Advancing Reservoir Performance

BAKER HUGHES

TECH FACTS

Engineering Handbook







Baker Hughes

Tech Facts Engineering Handbook

Technical Information

for Completions, Workovers, and Fishing

Comments, requests and corrections should be sent to
TechFacts@bakerhughes.com

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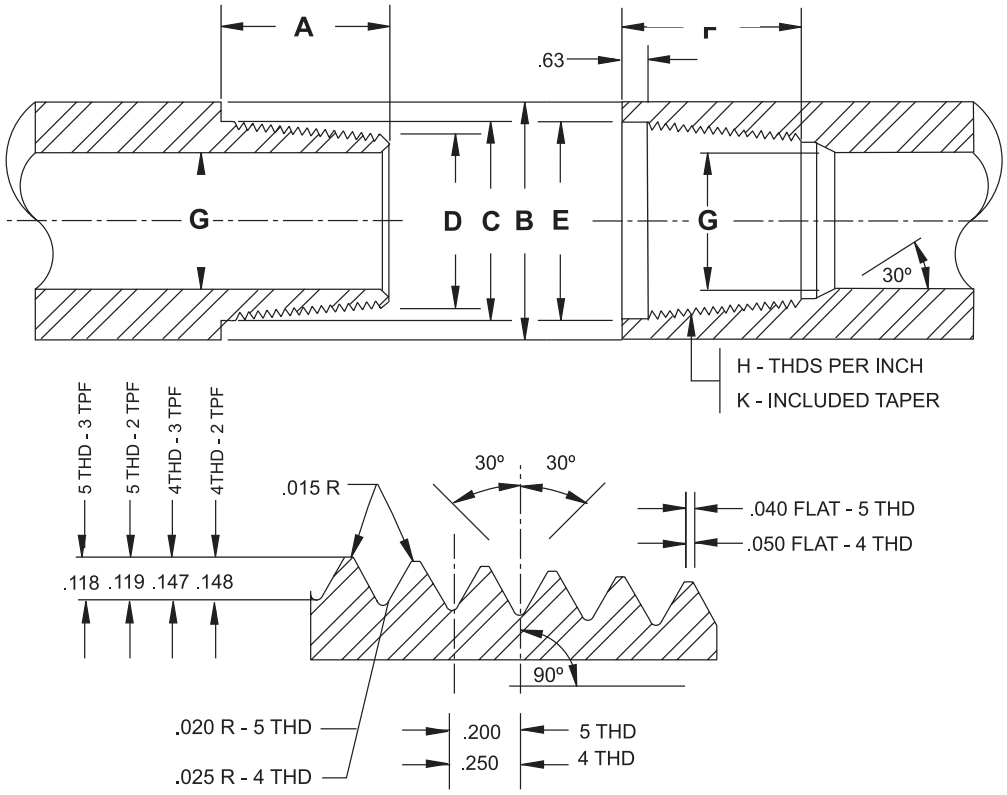
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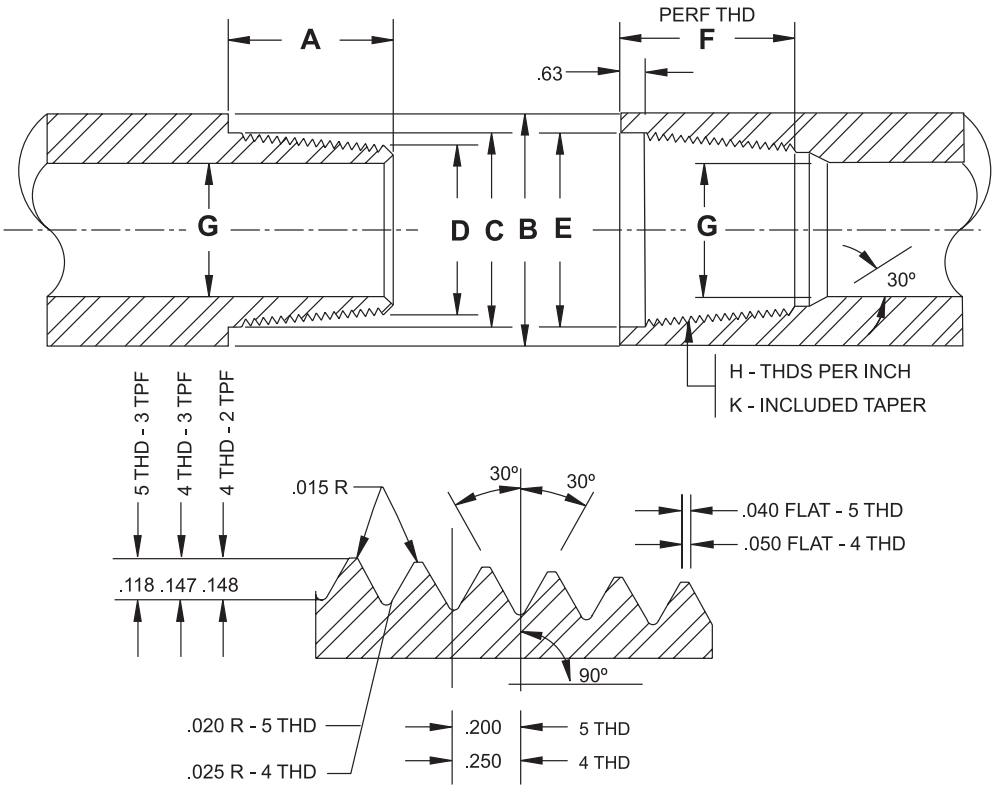


API Regular Thread Dimensions

Size	A	B	C	D	E	F	G	H	K
	in.	in.	in.	in.	in.	in.	in.	(TPI)	(TPF)
2-3/8	3	3-1/8	2.515	1.875	2-11/16	3-5/8	1	5	3
2-7/8	3-1/2	3-3/4	2.890	2.125	3-1/16	4-1/8	1-1/4	5	3
3-1/2	3-3/4	4-1/4	3.390	2.562	3-9/16	4-3/8	1-1/2	5	3
4-1/2	4-1/4	5-1/2 ■	4.515	3.562	4-11/16	4-7/8	2-1/4	5	3
5-1/2	4-3/4	6-3/4	5.410	4.333	5-37/64	5-3/8	2-3/4	4	3
6-5/8	5	7-3/4	5.882	5.159	6-1/16	5-5/8	3-1/2	4	2
7-5/8	5-1/4	8-7/8	6.890	5.688	7-3/32	5-7/8	4	4	3
8-5/8	5-3/8	10	7.840	6.608	8-3/64	6	4-3/4	4	3

Size	Notes
1-1/4	Non-API
4-1/2	■ 5-3/4" Optional OD
6-5/8	Threaded portion same as that of 5-1/2" Union Tool Full Hole
7-5/8	Obsolete API connection
8-5/8	Obsolete API connection

Data provided by API from table 25 columns 3, 4, 7, 8, 9, 11 and 12, fortieth edition, API 7; November, 2001

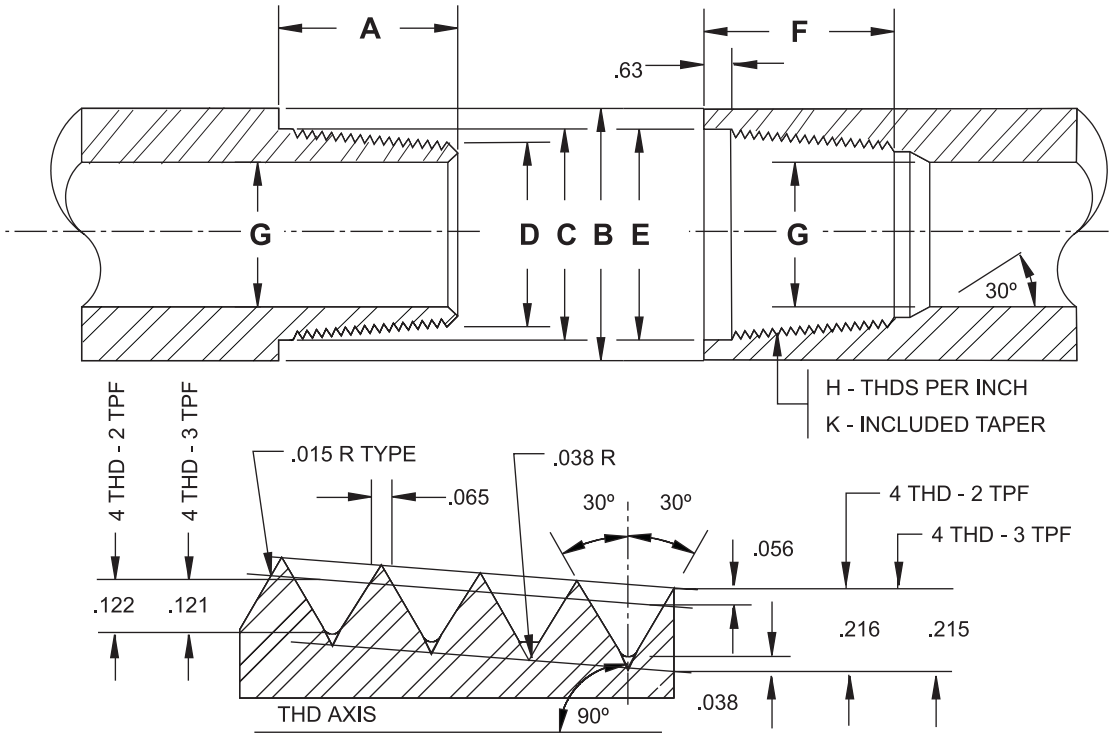


API Full Hole

Size	A	B	C	D	E	F	G	H	K
	in.	in.	in.	in.	in.	in.	in.	(TPI)	(TPI)
2-7/8	3-1/2	4-1/4	3-5/8	2.750	3-11/16	3-9/16	2-1/8	5	3
3-1/2	3-3/4	4-5/8	-	3.056	4-3/64	4-3/8	2-1/8■	5	3
4	4-1/2	5-1/4	4.156	3.530	4-11/32	5-1/8	2-13/16	4 ▲	2
4-1/2	4	5-3/4	-	3.792	4-7/8	4-5/8	3	5	3
5-1/2	5	7	-	4.992	5-29/32	5-5/8	4	4	2
6-5/8	5	8	-	5.920	6-27/32	5-5/8	5	4	2

Size	Notes
2-7/8	Not API standard
3-1/2	■ ID changed from 2-7/16", May, 1979 (API)
4	▲ Thread form same as that of API IF connection

Data provided by API table J-1 (Appendix J) columns 3, 4, 7, 8, 9, 11 and 12and table 25 columns 3, 4, 7, 8, 9, 11 and 12, fortieth edition, API 7; November, 2001

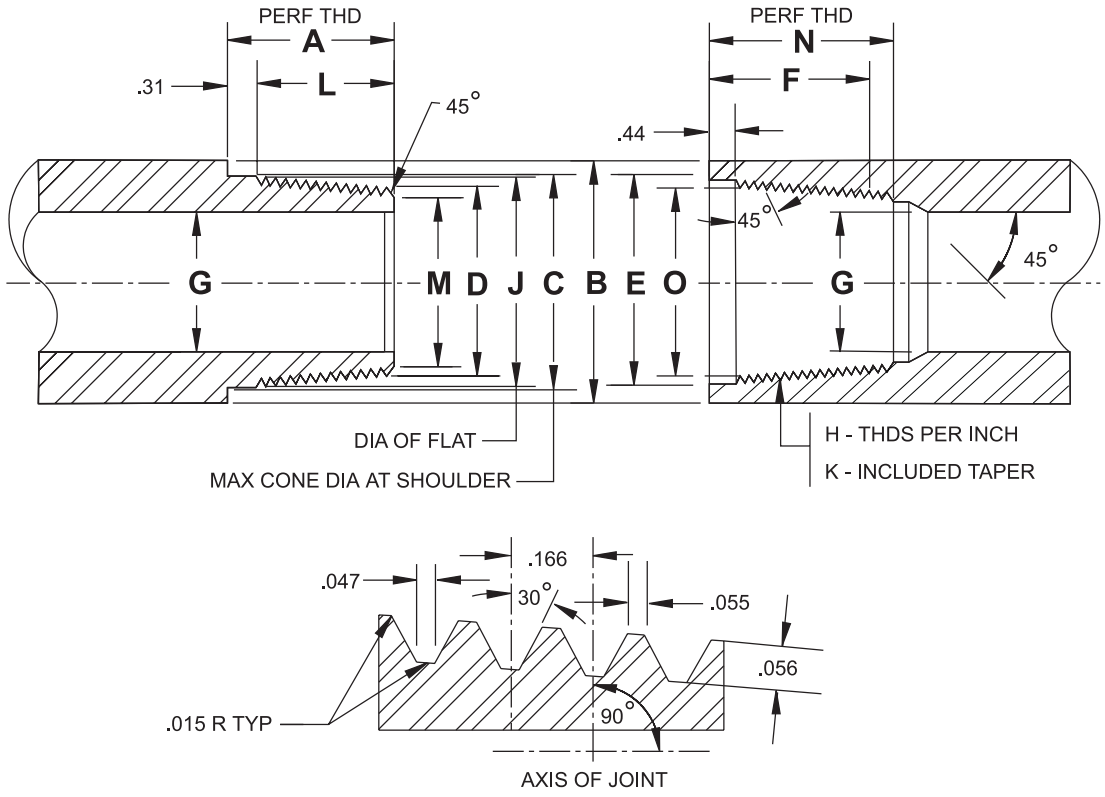


API Numbered Connections

OD's and ID's Listed Denote API Standard for Drillpipe Connections

Size	A	B	C	D	E	F	G	H	K
	in.	in.	in.	in.	in.	in.	in.	(TPI)	(TPF)
NC 23	3	3-1/8	2.437	2.063	2-5/8	3-5/8	1-1/4	4	2
NC 26	3	3-3/8	2.750	2.376	2-15/16	3-5/8	1-3/4	4	2
NC 31	3-1/2	4-1/8	3.266	2.808	3-29/64	4-1/8	2-1/8	4	2
NC 35	3-3/4	4-3/4	3.625	3.114	3-13/16	4-3/8	2-1/4	4	2
NC 38	4	4-3/4	3.891	3.349	4-5/64	4.000	2-11/16	4	2
NC 40	4-1/2	5-1/4	4.156	3.530	4-11/32	5-1/8	2-13/16	4	2
NC 44	4-1/2	5-3/4	4.499	3.875	4-11/16	5-1/8	3-1/8	4	2
NC 46	4-1/2	6	4.709	4.084	4-29/32	5-1/8	3-1/4	4	2
NC 50	4-1/2	6-5/8	5.135	4.500	5-5/16	5-1/8	3-3/4	4	2
NC 56	5	7	5.703	4.626	6-15/16	5-5/8	3-3/4	4	3
NC 61	5-1/2	8	6.266	5.063	6-1/2	6-1/8	4	4	3
NC 70	6	9-1/4	7.141	5.813	7-3/8	6-5/8	4-1/2	4	3
NC 77	6-1/2	10-3/4	7.828	6.376	8-1/16	7-1/8	4-3/4	4	3

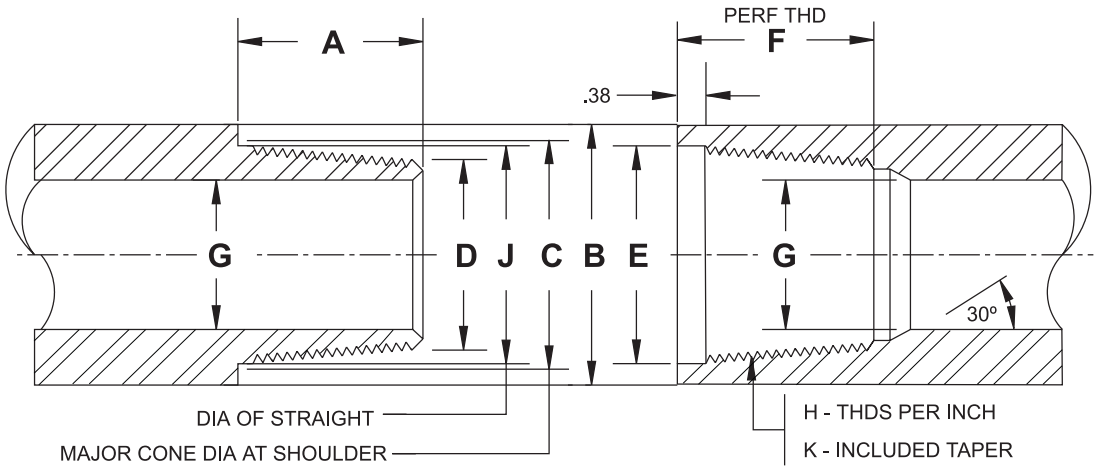
Data provided by API from table 25 columns 3, 4, 7, 8, 9, 11 and 12, fortieth edition, API 7; November, 2001

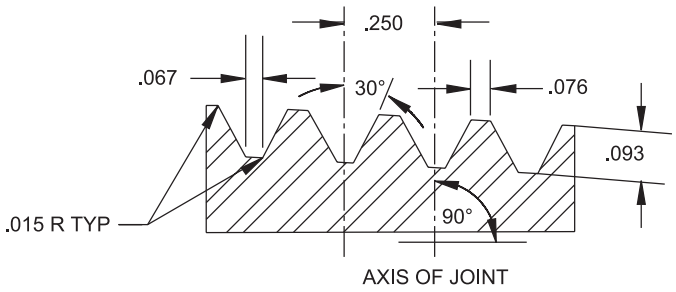


American MT, AMT, AMMT■

Size	A	B	C	D	E	F	G	H	J	K	L	M	N	O
	in.	in.	in.	in.	in.	in.	in.	(TPI)	in.	(TPF)	in.	in.	in.	in.
1	1-1/2	1-9/16	1.281	1.093	1.301	1-1/2	3/4	6	1.233	1-1/2	1-1/8	61/64	2	1.183
1-1/4	2	1-3/4	1.469	1.218	1.489	2	3/4	6	1.421	1-1/2	1-5/8	1-3/32	2-1/2	1.371
1-1/2	2	2	1.668	1.418	1.688	2	1	6	1.621	1-1/2	1-5/8	1-9/32	2-1/2	1.570

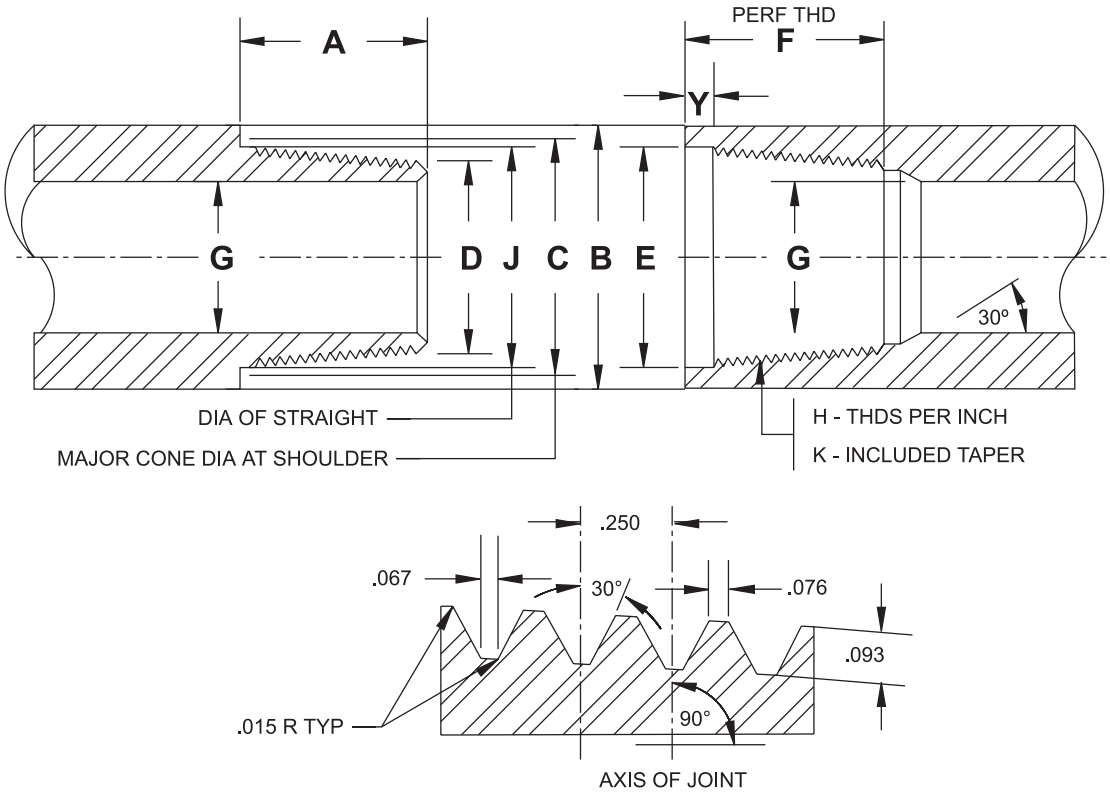
■ MT is Macaroni Tubing; AMT is American Macaroni Tubing; AMMT is American Mining Macaroni Tubing
These connection names are three (3) names given to the same basic threaded connection





PAC

Size	A	B	C	D	E	F	G	H	J	K
	in.	in.	in.	in.	in.	in.	in.	(TPI)	in.	(TPF)
2-3/8	2-3/8	2-7/8	2-23/64	2-1/16	2-27/64	2-1/2	1-3/8	4	2-5/16	1-1/2
2-7/8	2-3/8	3-1/8	2-17/32	2-15/64	2-19/32	2-1/2	1-1/2	4	2-31/64	1-1/2
3-1/2	3-1/4	3-3/4	3-3/64	2-41/64	3-7/64	3-3/8	2	4	3	1-1/2

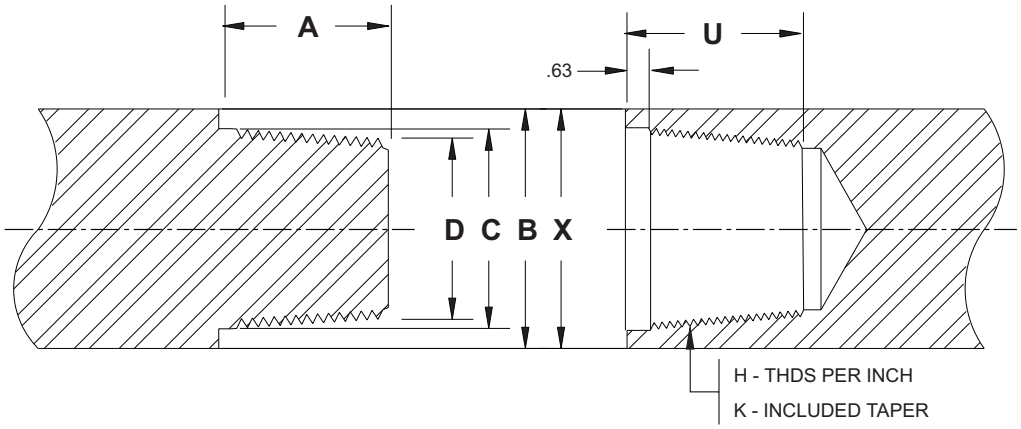


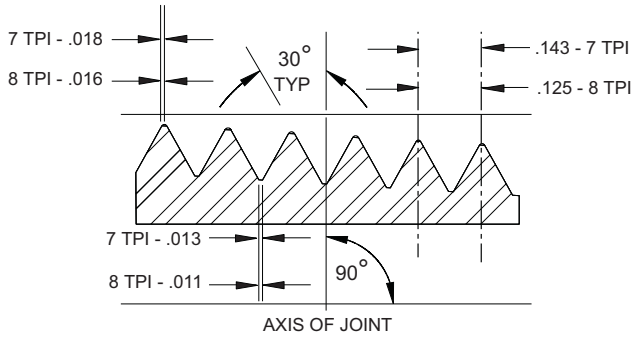
American Openhole

Size	A	B	C	D	E	F	G	H	J	K	Y
	in.	in.	in.	in.	in.	in.	in.	(TPI)	in.	(TPF)	in.
2-3/8	2-3/8	3-1/4	2-3/4	2-29/64	2-13/16	2-1/2	1-13/16	4	2-45/64	1-1/2	3/8
2-7/8	2-7/8	3-7/8	3-9/64	2-25/32	3-7/32	3	2.151	4	3-7/64	1-1/2	3/8
3-1/2	3-1/4	4-3/4	3-57/64	3-31/64	3-61/64	3-3/8	2-11/16	4	3-27/32	1-1/2	5/8
4	4	5-1/2	4-37/64	4-5/64	4-41/64	4-1/8	3-1/4	4	4-17/32	1-1/2	5/8

American Openhole Light Weight and Tubing

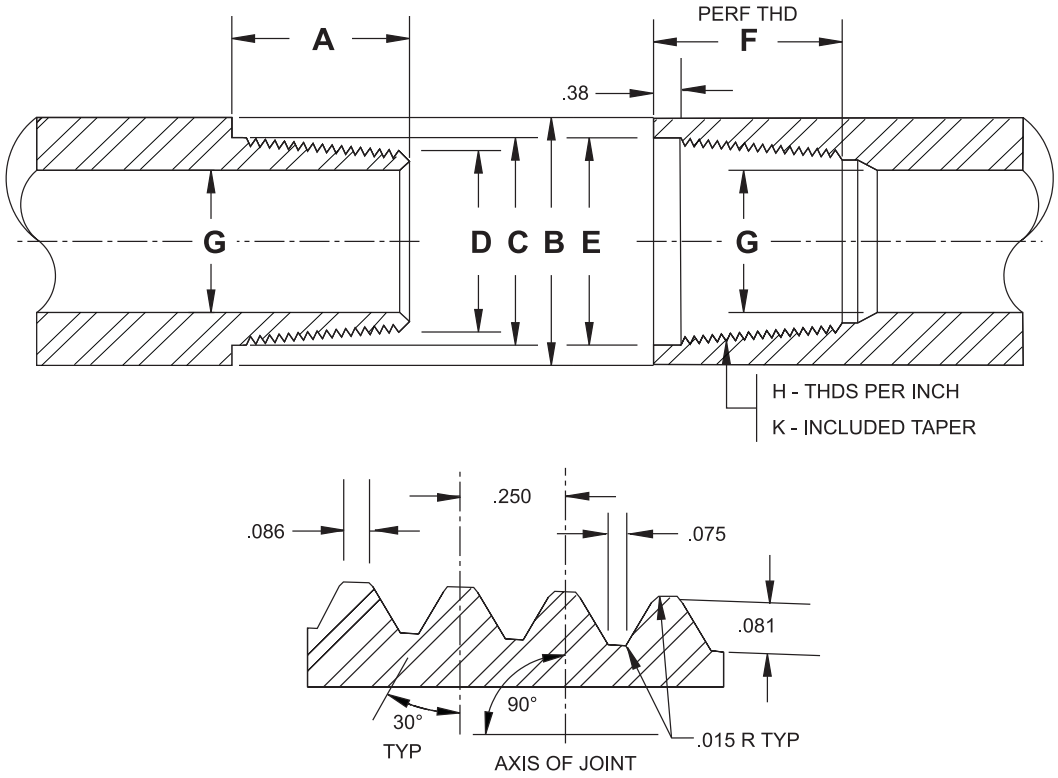
Size	A	B	C	D	E	F	G	H	J	K	Y
	in.	in.	in.	in.	in.	in.	in.	(TPI)	in.	(TPF)	in.
2-3/8	2-3/8	3-1/8	2-3/4	2-29/64	2-13/16	2-1/2	1.995	4	2-45/64	1-1/2	3/8
2-7/8	2-1/2	3-3/4	3-9/64	2-53/64	3-7/32	3	2.441	4	3-7/64	1-1/2	3/8
3-1/2	3-1/4	4-1/2	3-57/64	3-31/64	3-61/64	3-3/8	2.992	4	3-27/32	1-1/2	5/8
4	3-1/2	5-1/4	4-37/64	4-9/64	4-41/64	4-1/8	3.476	4	4-17/32	1-1/2	5/8
4-1/2	3-3/4	5-3/4	4-59/64	4-29/64	4-63/64	3-7/8	3.958	4	4-7/8	1-1/2	5/8





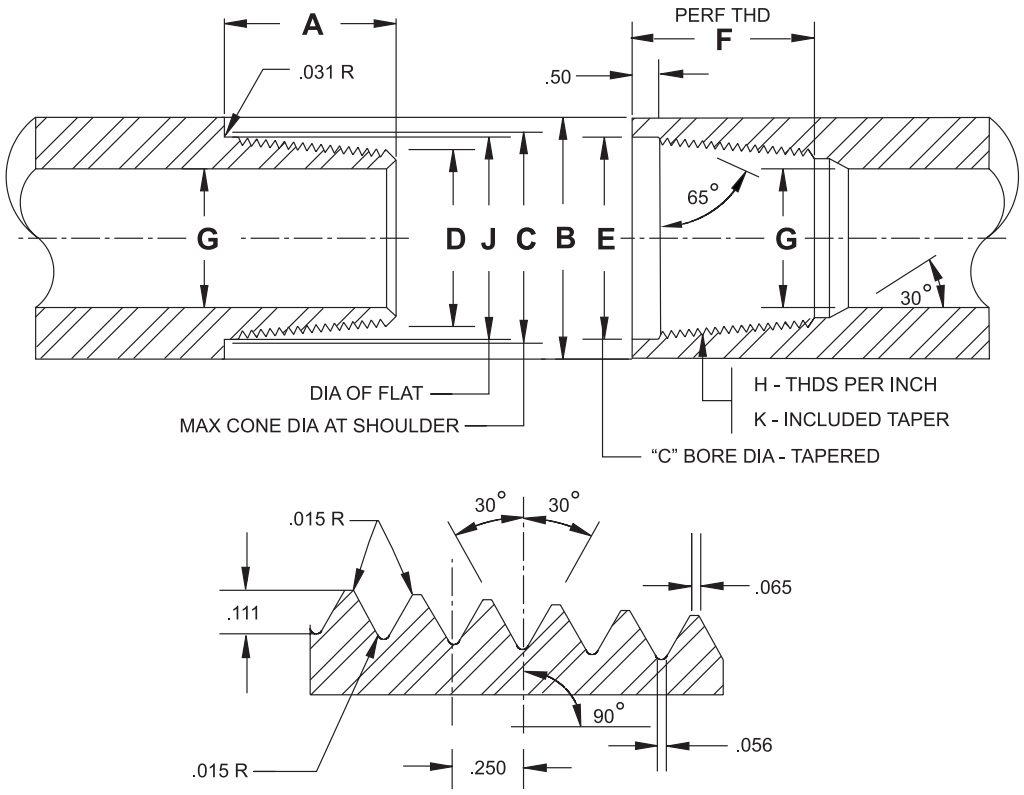
Cable Tool Joints

Size	A	B	C	D	H	K	U	X
	in.	in.	in.	in.	(TPI)	(TPF)	in.	in.
7/8 x 1-1/4-10	2-1/4	1-7/8	1-5/16	15/16	10	2	3	1-15/16
7/8 x 1-1/2-10	2-5/8	2-1/4	1-19/32	27/32	10	3-7/16	3-3/8	2-3/8
1 x 1-1/2-8	2	2	1-31/64	61/64	8	3	2-3/4	2-1/16
1-1/8 x 1-3/4-8	2-1/2	2-1/2	1-47/64	1-7/64	8	3	3-1/4	2-5/8
			1-49/64	1-7/32		2-5/8		
1-1/2 x 2-1/4-8	3	3-1/8	2-15/64	1-31/64	8	3	3-3/4	3-1/4
1-5/8 x 2-1/2-8	3-1/2	3-1/2	2-1/2	1-5/8	8	3	4-1/4	3-5/8
1-5/8 x 2-5/8-7	3-1/2	3-5/8	2-43/64	1-51/64	7	3	4-1/4	3-3/4
1-3/4 x 2-3/4-8	3-1/2	3-3/4	2-3/4	1-3/4	8	3-7/16	4-14	3-7/8
2 x 3-7	4	4-1/4	3-7/64	2-7/64	7	3	4-3/4	4-3/8
			3-1/16	2		3-3/16		
2-1/4 x 3-1/4-7	4	4-1/2	3-5/16	2-17/64	7	3-1/8	4-3/4	4-3/4
			3-9/32	2-9/32		3		
2-1/2 x 3-1/2-7	4-1/4	5	3-37/64	2-33/64	7	3	5	5-1/4
2-3/4 x 3-3/4-7	4-1/2	5-1/4	3-13/16	2-11/16	7	3	5-1/4	5-1/2
3 x 4-7	4-3/4	6	4	2-13/16	7	3	5-1/2	6-1/4
				2-47/64		3-3/16		
3-1/4 x 4-1/4-7	5	6-1/4	4-19/64	3-3/64	7	3	5-3/4	6-1/2
3-1/2 x 4-1/2-7	5-1/2	6-1/2	4-21/32	3-9/32	7	3	6-1/4	6-3/4
4 x 5-7	5-1/2	7	5-1/16	3-11/16	7	3	6-1/4	7-3/8
	5			3-13/16			5-3/4	
4 x 5-1/2-7	6-1/2	7-1/2	5-1/2	3-7/8	7	3	7-1/4	7-7/8
4-1/4 x 6-7	7	8-1/4	6	4-1/4	7	3	7-3/4	8-5/8



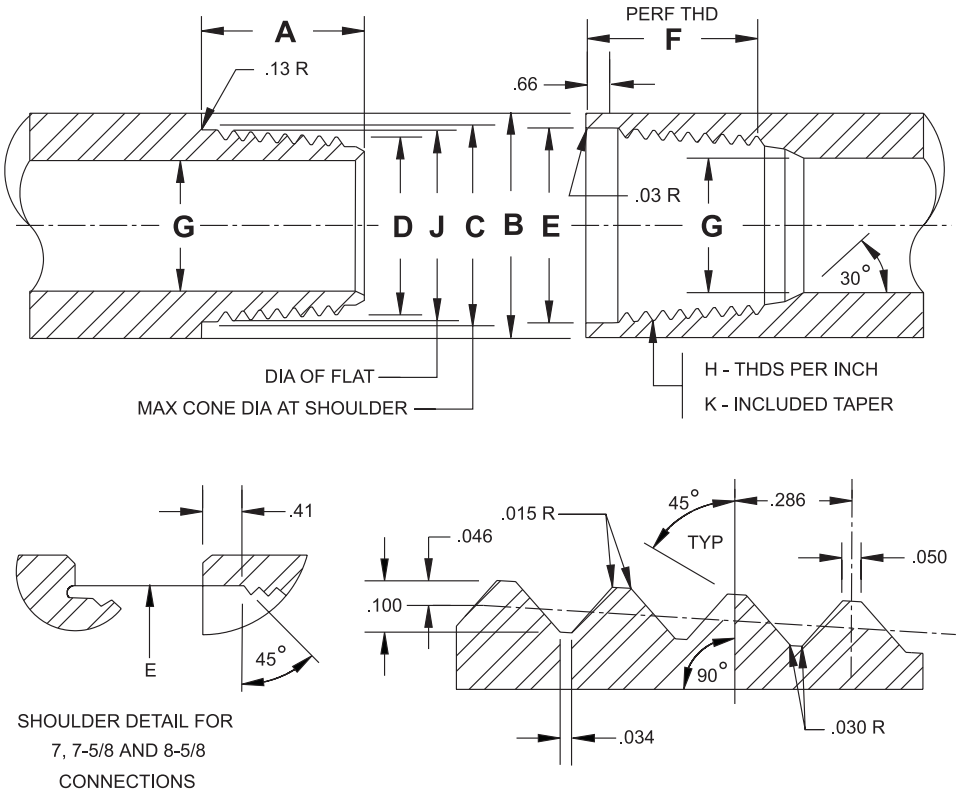
Gulf Tubing Tool Joints

Size	A	B	C	D	E	F	G	H	K
	in.	in.	in.	in.	in.	in.	in.	(TPI)	(TPF)
A-200 2-3/8	2-3/8	3.060	2.720	2.423	2.739	2-3/4	1.995	4	1-1/2
A-250 2-7/8	2-3/8	3.668	3.294	2.997	3.314	2-3/4	2.441	4	1-1/2
A-300 3	2-3/4	4.500	3.978	3.634	4.000	3	2.992	4	1-1/2



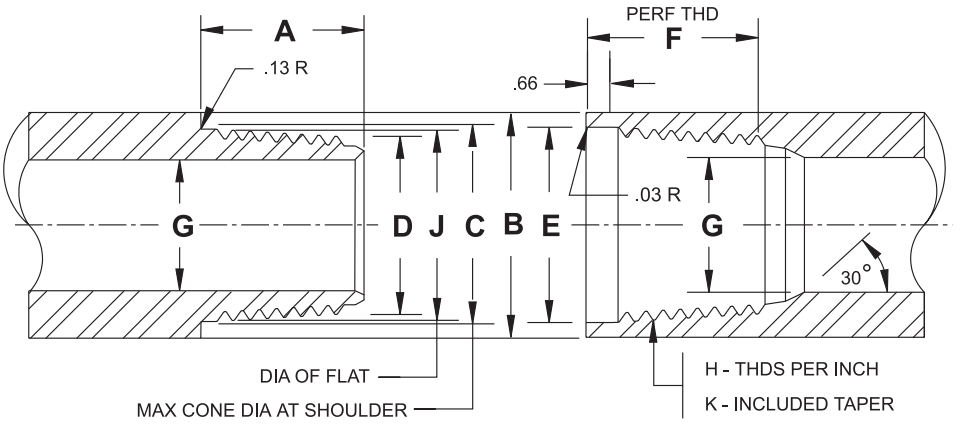
Hughes Double Streamline

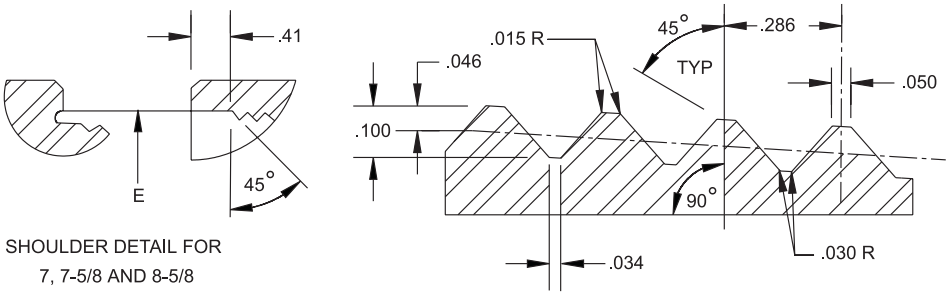
Size	A	B	C	D	E	F	G	H	J	K
	in.	in.	in.	in.	in.	in.	in.	(TPI)	in.	(TPF)
3-1/2	3-7/8	3-7/8	3-21/64	2-11/16	3-23/64	4-14	1-13/16	4	3-15/64	2
4	4	4-1/2	3-57/64	3-7/32	3-59/64	4-3/8	2-3/8	4	3-51/64	2
4-1/2	4-1/2	5	4-9/32	3-17/32	4-5/16	4-7/8	2-11/16	4	4-3/16	2



Hughes H - 90

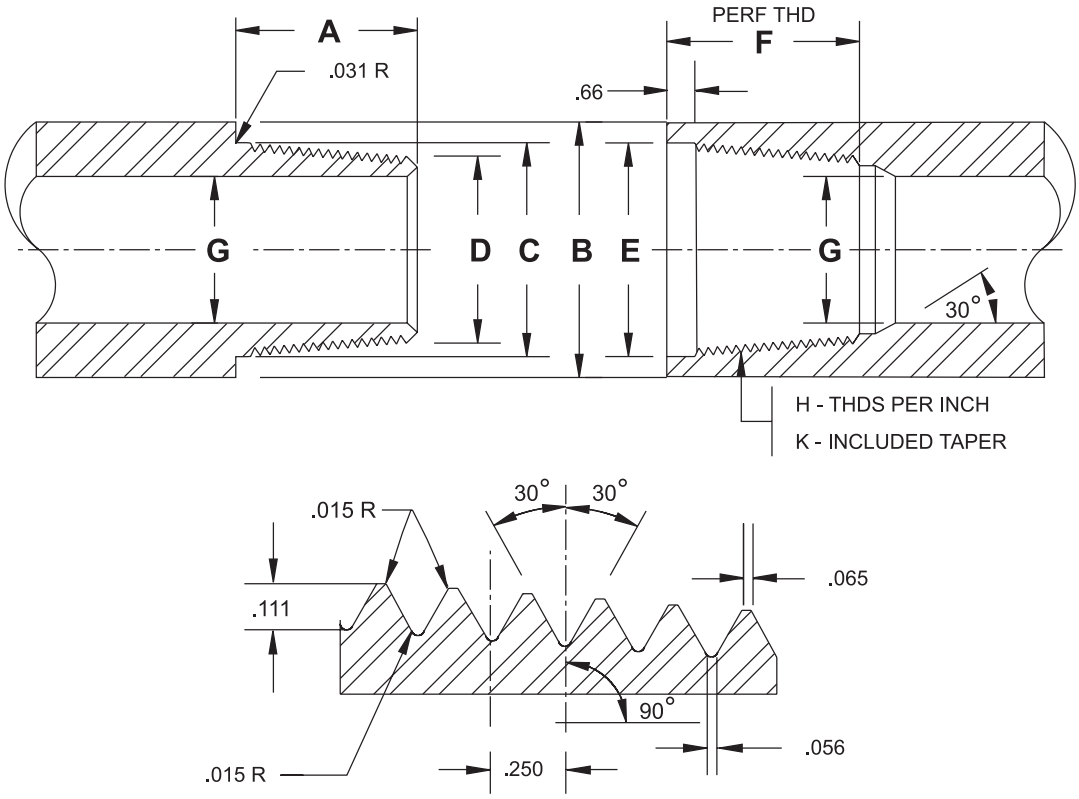
Size	A	B	C	D	E	F	G	H	J	K
	in.	in.	in.	in.	in.	in.	in.	(TPI)	in.	(TPF)
3-1/2	3-7/8	5	4-1/8	3-31/64	4-3/16	4-7/16	2-5/8 - 2-3/4	3-1/2	3-15/16	2
		5-1/8					2-1/2 - 2-3/4			
		5-1/4					2 - 2-5/8			
		5-3/8					2 - 2-1/4			
		5-1/2					2 - 2-1/8			
4	4-1/8	5-1/2	4-1/2	3-13/16	4-9/16	4-11/16	2-7/8 - 3	3-1/2	4-5/16	2
		5-5/8					2-1/2 - 2-7/8			
		5-3/4					2-1/4 - 2-7/8			
		5-7/8					2 - 2-3/4			
		6					2 - 2-1/2			
4-1/2	4-3/8	6	4-53/64	4-7/64	4-57/64	4-15/16	3 - 3-1/4	3-1/2	4-41/64	2
		6-1/8					2 -3/4 - 3			
		6-1/4					2-1/2 - 3			
		6-3/8					2 - 3			
		6-1/2					2 - 2-3/4			
5	4-5/8	6-1/2	5-7/64	4-21/64	5-11/64	5-3/16	2-7/8 - 3-1/4	3-1/2	4-59/64	2
		6-5/8					2-1/2 - 3			
		6-3/4					2-1/4 - 3			
		6-7/8					2-1/4 - 2-3/4			
		7					2-1/2			6-3/8
5-1/2	4-5/8	6-3/4	5-3/8	4-39/64	5-7/16	5-3/16	3-1/8 - 3-3/8	3-1/2	5-3/16	2
		6-7/8					3 - 3-1/4			
		7					2-3/4 - 3-1/4			
		7-1/8					2-1/4 - 3-1/4			
		7-1/4					2-1/4 - 3			
		7-3/8					2-1/4 - 2-3/4			
		7-1/2					2-1/4 - 2-1/2			





Hughes H-90 (Continued)

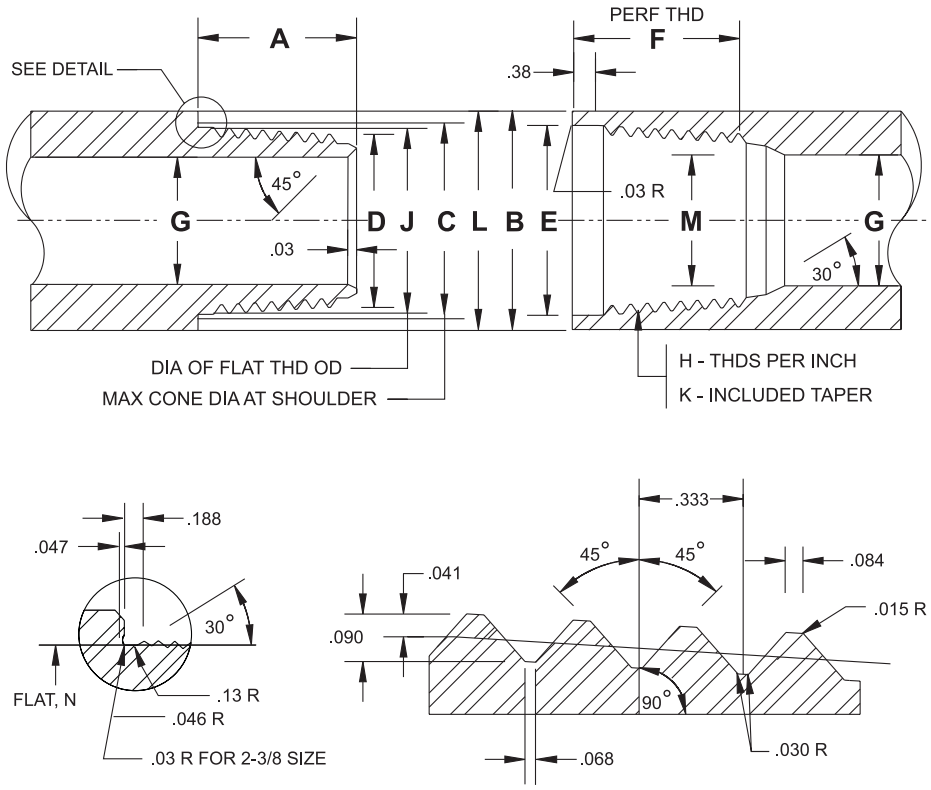
Size	A	B	C	D	E	F	G	H	J	K
	in.	in.	in.	in.	in.	in.	in.	(TPI)	in.	(TPF)
6-5/8	4-7/8	7-5/8	6	5-3/16	6-1/16	5-11/16	3-3/8 - 3-5/8	3-1/2	5-13/16	2
		7-3/4					3-1/4 - 3-1/2			
		7-7/8					3 - 3-1/2			
		8					2-1/2 - 3-1/2			
		8-1/8					2-1/2 - 3-1/4			
		8-1/4					2-1/2 - 3			
7	5-3/8	8-1/4	6-1/2	5-5/32	7-1/8	5-15/16	3-1/2 - 3-3/4	3-1/2	6-3/8	3
		8-3/8					2-3/4 - 3-3/4			
		8-1/2								
		8-5/8					2-3/4 - 3-1/2			
		8-3/4					2-3/4 - 3-1/4			
		9					2-3/4 - 3			
7-5/8	6	9-1/2	7-25/64	5-57/64	8	6-9/16	3-1/2 - 4	3-1/2	7-17/64	3
		9-5/8					3 - 4			
		9-3/4								
		9-7/8								
		10					3 - 3-3/4			
		10-1/4					3 - 3-1/4			
8-5/8	6-1/2	10-3/4	8-17/64	6-41/64	9-3/8	7-1/16	3-1/2 - 4	3-1/2	8-9/64	3
		11					3 - 4			
		11-1/4								
		11-1/2					3 - 3-1/4			



Hughes Slim Hole

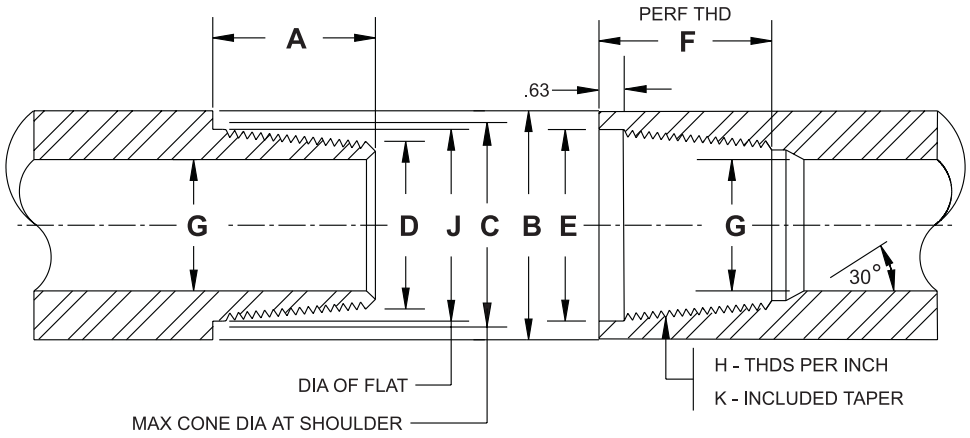
Size	A	B	C	D	E	F	G	H	K
	in.	in.	in.	in.	in.	in.	in.	(TPI)	(TPF)
2-3/8	2-7/8	2-7/8	2-7/16	1-31/32	2-1/2	3-1/4	1-13/16	4	2
2-7/8	2-7/8	3-3/8	2-7/8	2-25/64	2-15/16	3-1/4	1-3/4	4	2
3-1/2	3-3/8	4-1/8	3-25/64	2-53/64	3-29/64	3-3/4	2-1/8	4	2
4	3-3/8	4-5/8	3-13/16	3-1/4	3-7/8	3-3/4	2-7/16	4	2
4-1/2	3-7/8	5	4-1/64	3-3/8	4-5/64	4-1/4	2-11/16	4	2

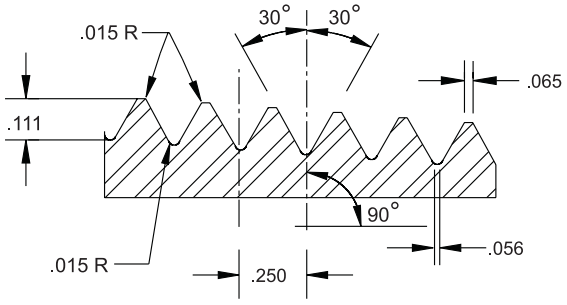
Size	Notes
2-3/8	Obsolete Connection



Hughes Slimline H - 90

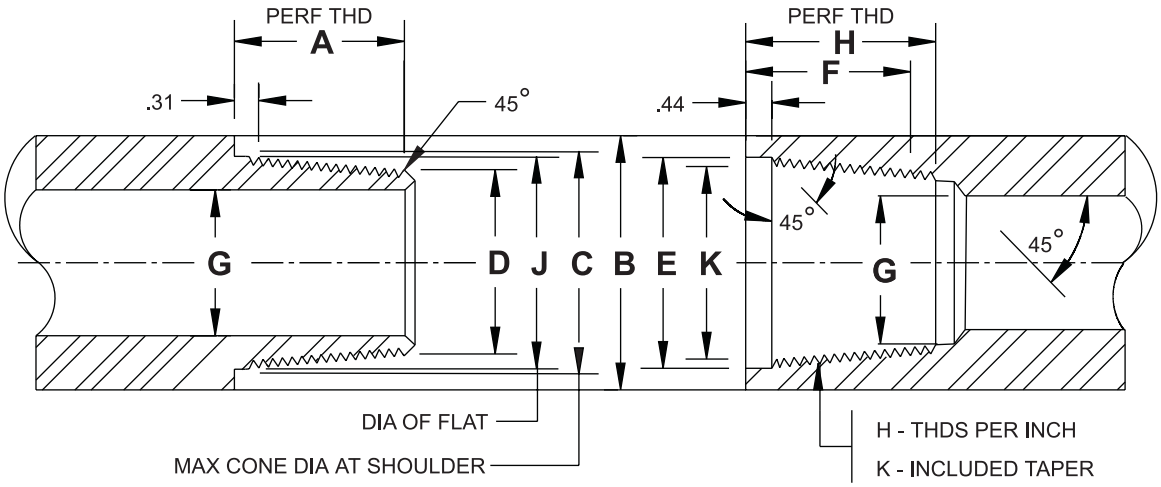
Size	A	B	C	D	E	F	G	H	J	K	L	M	N
	in.	in.	in.	in.	in.	in.	in.	(TPI)	in.	(TPF)	in.	in.	in.
2-3/8	2-3/4	3-1/8	2.725	2.439	2-49/64	3-1/16	1-1/2	3	2-43/64	1-1/4	3-1/16	2-1/4	2-5/8
		3-1/4									3-3/16		
2-7/8	2-7/8	3-3/4	3.196	2.897	3-15/64	3-3/8	2-1/8 - 2-1/4	3	3-5/32	1-1/4	3-5/8	2-45/64	3-3/32
		3-7/8									3-23/32		
		4					2				3-13/16		
		4-1/8					1-3/4 - 2				3-29/32		
		4-1/4					1-1/2 - 1-3/4				4		
3-1/2	3-1/8	4-5/8	3.835	3.509	3-7/8	3-3/8	2-3/8 - 2-3/4	3	3-25/32	1-1/4	4-7/16	3-11/32	3-47/64
		4-3/4					2-1/2 - 2-3/4				4-17/32		
		4-7/8					2-5/8				4-5/8		
							2-3/8 - 2-1/2						
		5					2 - 2-3/8				4-23/32		
		5-1/8					1-3/4 - 2-1/8				4-13/16		

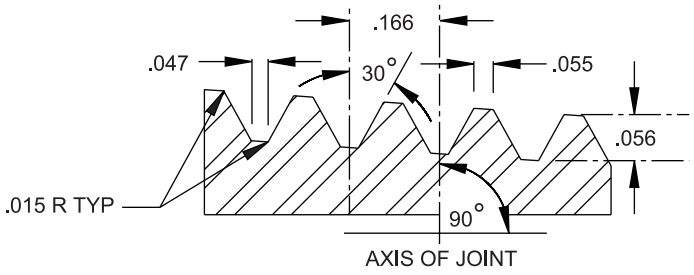




Hughes Xtra Hole

Size	A	B	C	D	E	F	G	H	J	K
	in.	in.	in.	in.	in.	in.	in.	(TPI)	in.	(TPF)
2-7/8	3-7/8	4-1/4	3-21/64	2-11/16	3-23/64	4-1/2	1-7/8	4	3-15/64	2
3-1/2	3-3/8	4-3/4	3-13/16	3-1/4	3-7/8	3-15/16	2-7/16	4	-	2
4-1/2	4-3/8	6-1/4	4-53/64	4-7/64	4-29/32	4-15/16	3-1/4	4	-	2
5	4-1/2	6-3/8	5-1/4	4-1/2	5-5/16	4-7/8	3-3/4	4	-	2





Hughes External Flush

Size	A	B	C	D	E	F	G	H	J	K
	in.	in.	in.	in.	in.	in.	in.	(TPI)	in.	(TPF)
2-3/8	2-3/8	2-1/2	2-7/64	1-23/32	2-1/16	3-1/4	1	6	2-1/64	2
2-7/8	2-5/8	3	2-1/2	2-1/16	2-17/32	3	1-1/16	6	-	2
3-1/2	3-1/4	3-5/8 3-11/16	3	2-29/64	3-1/32	4	1-1/2	4	-	2
4-1/2	3-3/8	4-11/16 4-17/32	3-13/16	3-1/4	3-7/8	4-1/4	2-3/16	4	-	2

Size	Note
2-3/8	Threaded part same as or interchanges with 2-3/8" HOMCO (External Flush) “Little Inch”
3-1/2	Threaded part same as or interchanges with 3-1/2" FH Reed External Flush
4-1/2	Threaded part same as or interchanges with 3-1/2" Hughes Extra Hole, 3-1/2" Reed Extra Hole, 4" Hughes Slim Hole, 4-1/2" FH Reed External Flush

■ Straight Counterbore

Rotary Shouldered Connection Interchange List

Common Name		Pin Base Diameter (Tapered)	Threads Per in.	Taper	Thread Form▲	Same As Or Interchanges With
Style	Size			in./ft		
Internal Flush (IF)	2-3/8"	2.876	4	2	V-0.065 (V-0.038 rad)	2-7/8" Slim Hole NC 26■
	2-7/8"	3.391				3-1/2" Slim Hole NC 31■
	3-1/2"	4.016				4-1/2" Slim Hole NC 38■
	4"	4.834				4-1/2" Extra Hole NC 46■
	4-1/2"	5.250				5" Extra Hole NC 50■ 5-1/2" Double Streamline
Full Hole (FH)	4"	4.280	4	2	V-0.065 (V-0.038 rad)	4-1/2" Double Streamline NC 40■
Extra Hole (XH) (EH)	2-7/8"	3.327	4	2	V-0.065 (V-0.038 rad)	3-1/2" Double Streamline
	3-1/2"	3.812				4" Slim Hole 4-1/2" External Hole
	4-1/2"	4.834				4" Internal Flush NC 46■
	5"	5.250				4-1/2" Internal Flush NC 50■ 5-1/2" Double Streamline
Slim Hole (SH)	2-7/8"	2.876	4	2	V-0.065 (V-0.038 rad)	2-3/8" Internal Flush NC 26■
	3-1/2"	3.391				2-7/8" Internal Flush NC 31■
	4"	3.812				3-1/2" Extra Hole 4-1/2" External Flush
	4-1/2"	4.016				3-1/2" Internal Flush NC 38■
Double Streamline (DSL)	3-1/2"	3.327	4	2	V-0.065 (V-0.038 rad)	2-7/8" Extra Hole
	4-1/2"	4.280				4" Full Hole NC 40■
	5-1/2"	5.250				4-1/2" Internal Flush 5" Extra Hole NC 50■
Numbered Conn (NC)	26	2.876	4	2	V-0.038 rad	2-3/8" Internal Flush 2-7/8" Slim Hole
	31	3.391				2-7/8" Internal Flush 3-1/2" Slim Hole
	38	4.016				3-1/2" Internal Flush 4-1/2" Slim Hole
	40	4.280				4" Full Hole 4-1/2" Double Streamline
	46	4.834				4" Internal Flush 4-1/2" Extra Hole
	50	5.250				4-1/2" Internal Flush 5" Extra Hole
External Flush (EF)	4-1/2"	3.812	4	2	V-0.065 (V-0.038 rad)	4" Slim Hole 3-1/2" Extra Hole

▲ Connections with two thread forms shown may be machined with either thread form without affecting gauging or interchangeability

■ Numbered connections (NC) may be machined only with the V-0.038 radius thread form

Data provided by API from table 12, sixteenth edition, API RP7G; August, 1998

Small Diameter Tool Joints Dimension and Strength Data

Size	Connection	Box OD	Pin ID	Yield Torque	Recommended Make-Up Torque	Tensile Yield Load at 0 Make-Up Torque
		in.	in.	ft-lb	ft-lb	lb
1	MT (API Reg)	1-9/16	3/4	690	410	61,870
			13/16	590	350	52,590
	MT DSI■		3/4	920	550	61,870
1-1/4	MT	1-3/4	1	780	470	63,090
			7/8	1,060	630	85,180
			13/16	1,100●	660	95,040
			3/4			104,320
	FJ (Reg)	2-3/16	5/8	2,230	1,330	162,020
	MT DSI■	1-3/4	7/8	1,290	770	85,180
1-1/2	MT (API Reg)	2	1	1,600	960	115,290
			1-5/32	1,160	700	83,590
			1-1/8	1,260	750	90,250
			1-1/16	1,430	860	103,040
	MT DSI■		1	2,150	1,290	115,290
1-9/16	Homco Slimline	1-9/16	15/16	900●	540	71,120
1-5/8	Baash Ross	1.660	3/4	1,050●	630	89,370
1-13/16	Homco Slimline	1-13/16	1	900●	540	111,000
	Homco FJ		3/4	1,600●	960	113,000
	Wilson FJ			1,220●	730	103,860
2-1/16	MT DSI■	2.330	1-1/4	2,490	1,490	121,940
2-3/8	PAC	2-7/8	1-3/8	4,930	2,960	244,720
	PAC DSI■		1-1/2	5,920	3,550	210,840
	Reg DSI■	3-1/8	1	7,280●	4,370	365,260
	Homco FJ	2-1/2		3,350●	2,010	203,100
	Wilson FJ		1-1/16	3,180	1,900	193,960
2-7/8	AM OH	3-7/8	2.151	8,900	5,340	345,360
	AM OH - LW	3-3/4	2.441	5,700	3,420	223,680
	PAC	3-1/8	1-1/2	6,010	3,610	279,720
	PAC DSI■			8,660	5,200	
3-1/2	PAC	3-3/4	2	9,110	5,470	361,540

Torque and tensile values based on material minimum yield strength of 120,000 psi

Check applicable pipe for comparative values

Recommended make-up torque = 60% of yield torque

Factor of safety = 1 for yield torque and tensile yield load calculations

■ Double Shoulder Internal

● Box weak in torsion, all other connections listed are pin weak in torsion

PRT Connections Dimension and Strength Data

Size	Connection	Box OD	Pin ID	Yield Torque	Recommended Make-Up Torque	Tensile Yield Load
		in.	in.	ft-lb	ft-lb	lb
1-13/16	PRT	1-13/16	3/4	2,160	1,080	74,520
2-1/4	PRT	2-1/4	3/4	4,440	2,220	132,090
3-1/8	PRT	3-1/8	1	10,470	5,230	284,760
4-1/4	PRT	4-1/4	2	21,290	10,640	447,630

Torque and tensile values based on material minimum yield strength of 110,000 psi

Check applicable pipe for comparative values

Recommended make-up torque = 50% of yield torque

Factor of safety = 1 for yield torque and tensile yield load calculations

Large Diameter Tool Joints Dimension and Strength Data

Size	Connection	Box OD	Pin ID	Yield Torque	Recommended Make-Up Torque	Tensile Yield Load at 0 Make-Up Torque
		in.	in.	ft-lb	ft-lb	lb
2-3/8	API Reg	3-1/8	1	5,810●	3,480	362,660
	API IF (NC26)	3-3/8	1-3/4	6,870●	4,120	303,790
2-7/8	API Reg	3-3/4	1-1/4	11,080	6,650	478,540
	API FH	4-1/4	2-1/8	13,310●	7,980	539,780
	API IF (NC31)	4-1/8		11,870	7,120	435,220
	Hughes SH	3-3/8	1-3/4	6,870●	4,120	313,280
	Hughes X-Hole	4-1/4	1-7/8	13,580	8,150	504,580
3-1/2	API Reg	4-1/4	1-1/2	15,140●	9,080	679,870
	API FH	4-5/8	2-1/8	16,270●	9,760	775,890
	API IF (NC38)	4-3/4	2-11/16	18,090	10,850	572,690
	Hughes DSL	3-7/8	1-13/16	10,290●	6,170	514,940
	Hughes SH	4-1/8	2-1/8	12,180	7,300	446,650
	Hughes X-Hole	4-3/4	2-7/16	17,470	10,480	570,160
	Hughes H-90	5	2-3/4	23,570	14,140	648,660
		5-1/4		23,710	14,220	
4	API FH (NC40)	5-1/4	2-13/16	23,470	14,080	695,940
	API IF (NC46)	6	3-1/4	33,620	20,170	883,580
	Hughes SH	4-5/8	2-9/16	15,550	9,330	511,250
	Hughes H-90	5-1/2	2-13/16	35,430	21,260	897,540
4-1/2	API Reg	5-1/2	2-1/4	29,900●	17,940	1,186,440
	API FH	5-3/4	3	34,380	20,630	950,330
	API IF (NC50)	6-5/8	3-3/4	38,060	22,830	919,880
	Hughes X-Hole	6-1/4	3-1/4	34,020	20,410	883,580
	Hughes H-90	6	3	45,260	27,150	1,068,490
			3-1/4	39,020	23,410	921,230
5	Hughes X-Hole	6-3/8	3-3/4	38,440	23,060	938,600
5-1/2	API Reg	6-3/4	2-3/4	61,330●	36,790	1,678,810
	API FH	7	4	55,930	33,550	1,244,530
	API IF	7-3/8	4-13/16	61,670	37,000	1,264,360
6-5/8	API Reg	7-3/4	3-1/2	83,380	50,020	1,770,500
	API FH	8	5	73,680	44,210	1,423,990
	API IF	8-1/2	5-29/32	83,460	50,070	1,476,870
7-5/8	API Reg	8-7/8	4	133,650	80,190	2,495,960
8-5/8	API Reg	10	4-3/4	189,880	113,930	3,132,570

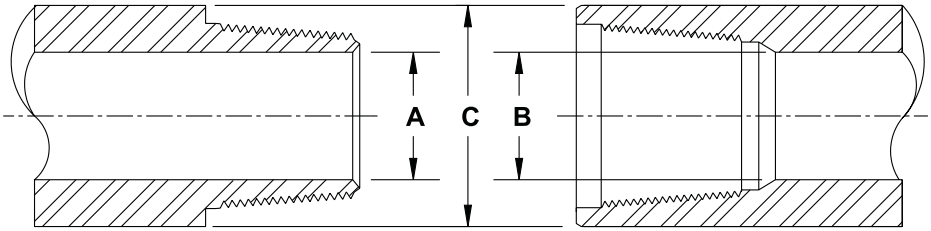
Torque and tensile values based on material minimum yield strength of 120,000 psi

Check applicable pipe for comparative values

Recommended make-up torque is equal to 60% of yield torque

Factor of safety = 1 for yield torque and tensile yield load calculations

● Box weak in torsion, all other connections listed are pin weak in torsion



Recommended Maximum and Minimum Tool Joint Dimensions

Joints		Nom OD	Nom ID	A	B	C	
Size	Type	in.	in.	Max	Max	Min	Max
2-3/8	API Reg	3-1/8	1	1-1/8	1-5/8	2-15/16	3-1/4
	API IF	3-3/8	1-3/4	1-3/4	2	3-3/16	3-5/8
2-7/8	API Reg	3-3/4	1-1/4	1-3/8	1-7/8	3-1/2	4
	FH	4-1/4	2-1/8	2-1/8	2-3/8	4-1/16	4-5/8
	API IF	4-1/8			2-1/2	3-7/8	4-3/8
	Hughes Extra Hole	4-1/4	1-7/8	1-7/8	2-1/8	4	4-5/8
3-1/2	API Reg	4-1/4	1-1/2	1-3/4	2-1/4	4	4-5/8
	API FH	4-5/8	2-1/8	2-7/16	2-3/4	4-1/2	5
	API IF	4-3/4	2-11/16	2-11/16	3		
	Hughes Extra Hole		2-7/16	2-7/16	2-3/4		
4	API FH	5-1/4	2-13/16	2-13/16	3-1/4	5	5-3/8
	API IF	6	3-1/4	3-5/16	3-1/2	5-1/2	6
4-1/2	API Reg	5-1/2	2-1/4	2-5/8	3-1/4	5-3/8	6
	API FH	5-3/4	3	3-5/32	3-1/2	5-1/2	
	API IF	6-5/8	3-3/4	3-3/4	4-1/8	5-7/8	6-3/4
	Hughes Extra Hole	6-1/4	3-1/4	3-1/4	3-3/8	5-5/8	6-1/4
5-1/2	API Reg	6-3/4	2-3/4	3-1/4	3-7/8	6-3/8	7
	API FH	7	4	4	4-1/2	6-1/2	7-1/4
	API IF	7-3/8	4-13/16	4-13/16	5-1/4	7-1/8	7-7/8
6-5/8	API Reg	7-3/4	3-1/2	4	4-3/4	7-1/8	7-7/8
	API FH	8	5	5	5-1/2	7-1/2	8-1/4
	API IF	8-1/2	5-29/32	5-29/32	6-1/4	8-3/8	9
7-5/8	API Reg	8-7/8	4	4-1/4	5-1/4	8-1/8	9
8-5/8	API Reg	10	4-3/4	5-1/4	6-1/4	9	10-1/8

Tool Joints - Interchangeability Charts

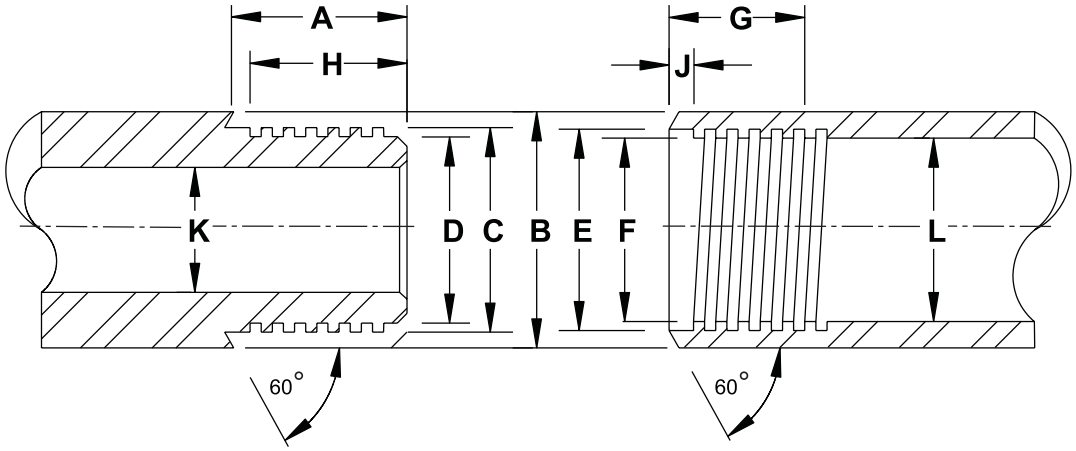
Size	Joint OD	Joint ID	Interchangeable With
API Regular			
2-3/8	3-1/8	1	-
2-7/8	3-3/4	1-1/4	-
3-1/2	4-1/4	1-1/2	-
4-1/2	5-1/2	2-1/4	-
5-1/2	6-3/4	2-3/4	5 Union Tool Regular
6-5/8	7-3/4	3-1/2	5 Union Tool FH
			6 Union Tool Regular
7-5/8	8-7/8	4	-
8-5/8	10	4-3/4	-
API Full Hole			
2-7/8	4-1/4	2-1/8	-
3-1/2	4-5/8	2-7/16	-
4	5-1/4	2-13/16	4-1/2 Reed Double Streamline
4-1/2	5-3/4	3	-
5-1/2	7	4	-
6-5/8	6	5	-
API Internal Flush, Hughes and Reed IF			
2-3/8	3-3/8	1-3/4	2-7/8 Slim Hole
2-7/8	4-1/8	2-1/8	3-1/2 Slim Hole
3-1/2	4-3/4	2-11/16	3-1/2 Reed Wide Open
			4-1/2 Slim Hole
4	5-3/4	3-1/4	4 Reed Wide Open
			4-1/2 Hughes Xtra Hole
			4-1/2 Reed Xtra Hole
			5 Reed Double Streamline
4-1/2	6-1/8	3-3/4	4-1/2 Reed Wide Open
			5 Hughes Xtra Hole
			5 Reed Xtra Hole
			5-1/2 Reed Double Streamline
5-1/2	7-3/8	4-13/16	-
Hughes Acme Regular			
2-3/8	3-1/8	1	-
2-7/8	3-3/4	1-1/4	-
3-1/2	4-1/4	1-7/8	-
4-1/2	5-1/2	2-1/2	-
5-1/2	6-3/4	3	-
6-5/8	7-3/4	3-1/2	-
Hughes Acme Streamline, Reed Acme Full Hole			
2-3/8	3-3/8	1-7/16	-
2-7/8	4	1-9/16	-
3-1/2	4-5/8	2-7/16	-
4-1/2	5-3/4	3	-
5-1/2	7	4	-
Hughes Xtra Hole			
2-718	4-1/4	1-7/8	2-7/8 Reed Xtra Hole
			3-1/2 Reed Double Streamline
			3-1/2 Hughes Double Streamline
3-1/2	4-3/4	2-7/16	3-1/2 Reed Xtra Hole
			4 Hughes Slim Hole
			4-1/2 Hughes External Flush
			4-1/2 FH Reed External Flush
4-1/2	6	3-1/4	4 API IF
			4-1/2 Reed Xtra Hole
			5 Reed Double Streamline
5	6-1/4	3-3/4	4-1/2 API IF
			5 Reed Xtra Hole
			5-1/2 Reed Double Streamline

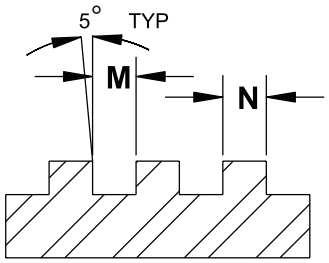
Tool Joints - Interchangeability Charts (Continued)

Size	Joint OD	Joint ID	Interchangeable With
Hughes External Flush			
2-3/8	2-1/2	1	2-3/8 Homco External Flush
2-7/8	3	1-1/16	-
3-1/2	3-5/8	1-1/2	3-1/2 FH Reed External Flush
4-1/2	4-11/16	2-3/16	3-1/2 Reed Xtra Hole
			3-1/2 Hughes Xtra Hole
			4 Hughes Slim Hole
			4-1/2 FH Reed External Flush
Hughes Slim Hole, Reed Slim Hole			
2-3/8	2-7/8	1-1/4	-
2-7/8	3-3/8	1-3/4	2-3/8 API IF
3-1/2	4	2-1/8	2-7/8 API IF
4	4-1/2	2-9/16	3-1/2 Hughes Xtra Hole
			3-1/2 Reed Xtra Hole
			4-1/2 Hughes External Flush
			4-1/2 FH Reed External Flush
4-1/2	5	2-11/16	13-1/2 API IF
Hughes Double Streamline			
3-1/2	3-7/8	1-13/16	2-7/8 Hughes Xtra Hole
			3-1/2 Reed Double Streamline
4	4-1/2	2-3/8	4 Reed Double Streamline
4-1/2	5	2-11/16	4-1/2 Reed Double Streamline
Reed External Flush			
2-3/8 Reg	2-3/8	7/8	-
2-3/8 FH	2-1/2	1	-
2-7/8 FH	3	1-1/4	-
3-1/2 FH	3-5/8	1-1/2	3-1/2 Hughes External Flush
4-1/2 FH	4-11/16	2-3/16	3-1/2 Hughes Xtra Hole
			3-1/2 Reed Xtra Hole
			4 Hughes Slim Hole
			4-1/2 Hughes External Flush
Reed Double Streamline			
2-7/8	3-1/4	1-1/4	-
3-1/2	3-7/8	1-13/16	2-7/8 Hughes Xtra Hole
			2-7/8 Reed Xtra Hole
			3-1/2 Hughes Double Streamline
4	4-1/2	2-3/8	4 Hughes Double Streamline
4-1/2	5	2-11/16	4-1/2 Hughes Double Streamline
5	5-9/16	3-3/8	4 API IF
			4-1/2 Hughes Xtra Hole
			4-1/2 Reed Xtra Hole
5-1/2	6-1/8	3-3/4	4-1/2 API IF
			5 Hughes Xtra Hole
			5 Reed Xtra Hole
Reed Full Hole			
2-3/8	3-3/8	1-7/16	-
2-7/8	4	1-7/8	-
Reed Xtra Hole (Semi-Internal Flush)			
2-7/8	4-1/4	1-7/8	3-1/2 Reed Double Streamline
3-1/2	4-3/4	2-7/16	3-1/2 Hughes Xtra Hole
			4 Hughes Slim Hole
			4-1/2 Hughes External Flush
			4-1/2 FH Reed External Flush
4-1/2	6	3-1/4	4 API IF
			4-1/2 Hughes Xtra Hole
			5 Reed Double Streamline
5	6-3/8	3-3/4	4-1/2 API IF
			5 Hughes Xtra Hole
			5-1/2 Reed Double Streamline

Tool Joints - Interchangeability Charts (Continued)

Size	Joint OD	Joint ID	Interchangeable With
Reed Openhole, Reed Full Opening			
2-3/8	3-1/8	2	2-3/8 American Openhole
2-7/8	3-3/4	2-7/16	2-7/8 American Openhole
3-1/2	3-5/8	3	3-1/2 American Openhole
4	5-1/4	3-15/32	4 American Openhole
4-1/2	5-3/4	3-31/32	-
Reed Wide Open (WO)			
2-3/8	3-3/8	2	-
2-7/8	4-1/8	2-7/16	-
3-1/2	4-3/4	3	3-1/2 API IF
			4-1/2 Slim Hole
4	5-3/4	3-7/16	4 API IF
			4-1/2 Reed Xtra Hole
			4-1/2 Hughes Xtra Hole
			5 Reed Double Streamline
4-1/2	6-1/8	3-7/8	4-1/2 API IF
			5 Reed Xtra Hole
			5 Hughes Xtra Hole
			5-1/2 Reed Double Streamline
PAC			
2-3/8	2-7/8	1-3/8	-
2-7/8	3-1/8	1-1/2	-
3-1/2	3-3/4	2	-
American Openhole			
2-3/8	3-1/4	1-13/16	2-3/8 Reed Openhole (FO)
2-7/8	3-7/8	2.151	2-7/8 Reed Openhole (FO)
3-1/2	4-3/4	2-11/16	3-1/2 Reed Openhole (FO)
4	5-1/2	3-1/4	4 Reed Openhole (FO)



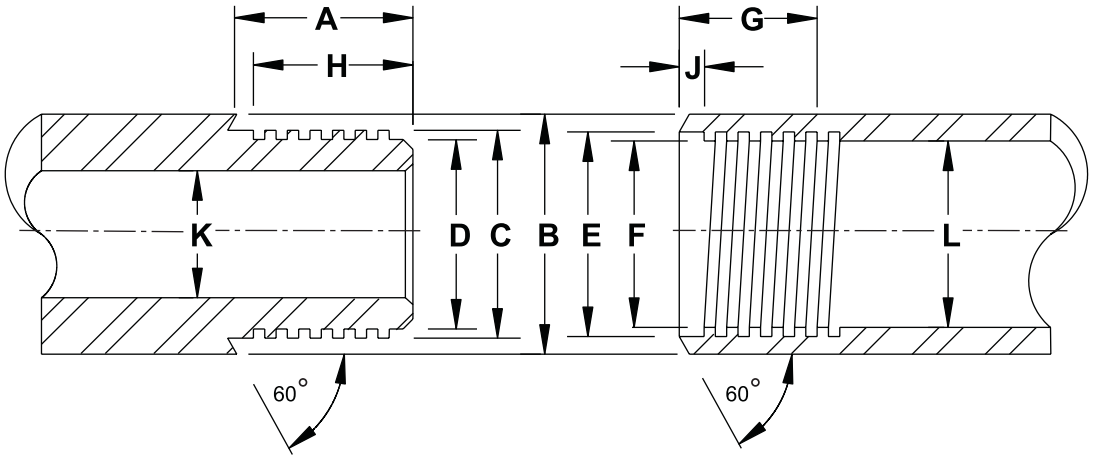


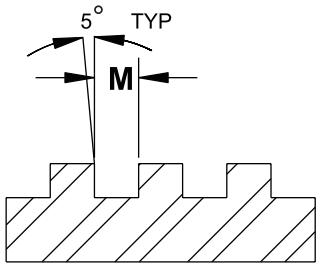
"X" Series Drill Rod

Symbol	A	B	C		D		E		F		G
			Max	Min	Max	Min	Max	Min	Max	Min	
E Rod (3 Thd)	1.50	1.312	.999	.997	.874	.870	1.003	1.001	.878	.876	1.625
A Rod (3 Thd)	1.75	1.625	1.264	1.262	1.139	1.134	1.268	1.266	1.143	1.141	1.875
B Rod (5 Thd)	1.87	1.906	1.405	1.403	1.280	1.275	1.409	1.407	1.284	1.282	2.000
N Rod (4 Thd)	2.37	2.375	1.874	1.872	1.686	1.681	1.878	1.876	1.690	1.688	2.500
N Rod (3 Thd)	2.37	2.375	1.874	1.872	1.686	1.681	1.878	1.876	1.690	1.688	2.500

"X" Series Drill Rod (Continued)

Symbol	H	J	K	L	M (Box)		M (Pin)		N (Box)		N (Pin)	
					Max	Min	Max	Min	Max	Min	Max	Min
E Rod (3 Thd)	1.437	.25	.437	.843	.1680	.1617	.1657	.1617	.1608	.1544	.1608	.1563
A Rod (3 Thd)	1.687	.25	.562	1.265	.1680	.1617	.1657	.1617	.1608	.1544	.1608	.1563
B Rod (5 Thd)	1.812	.25	.625	1.406	.1014	.0950	.0990	.0950	.0941	.0877	.0941	.0897
N Rod (4 Thd)	2.312	.31	1.000	2.000	.1236	.1173	.1212	.1173	.1163	.1099	.1164	.1120
N Rod (3 Thd)	2.312	.31	1.000	2.000	.1653	.1590	.1653	.1590	.1581	.1517	.1581	.1517





"W" Series Drill Rod

Symbol	A	B	C		D		E		F	
			Max	Min	Max	Min	Max	Min	Max	Min
EW Rod (3 Thd)	1.562	1.375	1.062	1.060	.937	.932	1.066	1.064	.941	.939
AW Rod (3 Thd)	1.875	1.750	1.374	1.372	1.249	1.244	1.378	1.376	1.253	1.251
BW Rod (3 Thd)	2.250	2.125	1.684	1.682	1.527	1.522	1.688	1.686	1.531	1.529
NW Rod (3 Thd)	2.750	2.625	2.218	2.216	2.030	2.025	2.222	2.220	2.034	2.032

"W" Series Drill Rod (Continued)

Symbol	G	H	J	K	L	M (Box)		M (Pin)	
						Max	Min	Max	Min
EW Rod (3 Thd)	1.562	1.437	.312	.437	1.062	.1680	.1617	.1657	.1617
AW Rod (3 Thd)	1.875	1.750	.375	.625	1.437	.1680	.1617	.1657	.1617
BW Rod (3 Thd)	2.250	2.125	.375	.750	1.812	.1665	.1604	.1641	.1604
NW ROD (3 Thd)	2.750	2.625	.375	1.375	2.312	.1651	.1590	.1627	.1590

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API Drillpipe Requirements Drift Test

Drillpipe Size	Drift Mandrel Length	Drift Mandrel Diameter
All EU (Except 3.5", 13.3#)	4"	ID Minus 3/16"

Tensile Requirements

Grade	Yield Strength		Tensile Strength
	Min	Max	Min
	psi	psi	psi
D*	55,000	-	95,000
E	75,000	105,000	100,000
X-95	95,000	125,000	105,000
G-105	105,000	135,000	115,000
S-135	135,000	165,000	145,000

* Grade “D” is no longer listed in API

Range Lengths

	Range 1	Range 2	Range 3
	ft	ft	ft
Total range length, includes	18-22	27-30	38-45
Range length for 95% or more of carload:			
Permissible length, minimum	20	-	-
Permissible variation, maximum	2	-	-
Range length for 90% or more of carload:			
Permissible length, minimum	-	27	38
Permissible variation, maximum	-	2	3

Tolerances

Drillpipe Size	Dimension	Tolerance
in.		in.
2.375 - 3.500	OD■	+ 3/32, - 1/32
4.000 - 5.000	OD■	+ 7/64, - 0.75% OD
5.500 - 6.625	OD■	+ 1/8, - 0.75% OD
All Sizes	Wall Thickness	- 12.5%
	ID	Governed by OD Tolerances
	Eccentricity OD	.093 Max (Total indicator reading)
	Eccentricity ID	1/16 Max (1/8" Total indicator reading)
	Ovality (On upset)	.093 Maximum

■ Measurements made immediately behind the upset for a distance of approximately 5" for sizes 5.5" OD and smaller, and a distance approximately equal to the OD for sizes larger than 5.5"

Data provided by API from table 9 API Spec 5D; October, 2001

Mechanical Properties of New Tool Joints and New Grade E Drillpipe

Drillpipe Data					Tool Joint Data							Drillpipe Data	
OD	Weight (lb/ft)		Upset		Connection				Strength		Rec Make-Up Torque	Strength	
	Nom Wt	Approx Wt*	Type	OD	Type	OD	ID	Drift ID	Tensile Yield■	Torsion Yield◆		Tensile Yield	Torsion Yield▲
in.	lb/ft			in.		in.	in.	in.	lb	ft-lb	ft-lb	lb	ft-lb
2-3/8	4.85	5.26	EU	2.656	NC26(IF)	3-3/8	1-3/4	1.625	313,681	6,875b	4,125b	97,817	4,763
		4.95			OH	3-1/8	2	1.807	206,416	4,521p	2,713p		
		5.05			SLH90	3-1/4		1.850	202,670	5,129p	3,074p		
		5.15			WO	3-3/8		1.807	205,369	4,311p	2,586p		
2-3/8	6.65	6.99	EU	2.656	NC26(IF)	3-3/8	1-3/4	1.625	313,681	6,875b	4,125b	138,214	6,250
		6.89			OH	3-1/4			294,620	6,484b	3,891b		
		6.71	IU	2.500	PAC	2-7/8	1-3/8	1.250	238,504	4,688p	2,813p		
		6.78	EU	2.656	SLH90	3-1/4	2	1.670	202,850	5,129p	3,074p		
2-7/8	6.85	7.50	EU	3.219	NC31(IF)	4-1/8	2-1/8	2.000	447,130	12,053p	7,122p	135,902	8,083
		6.93			OH	3-3/4	2-7/16	2.253	223,937	5,585p	3,351p		
		7.05			SLH90	3-7/8		2.296	260,783	7,628p	4,575p		
		7.31			WO	4-1/8		2.253	289,264	7,197p	4,318p		
2-7/8	10.40	10.87	EU	3.219	NC31(IF)	4-1/8	2-1/8	1.963	447,130	12,053p	7,122p	214,344	11,554
		10.59			OH	3-7/8	2-5/32		345,566	8,814p	5,270p		
		10.27	IU	2.875	PAC	3-1/8	1-1/2	1.375	272,938	5,730p	3,439p		
		10.59	EU	3.219	SLH90	3-7/8	2-5/32	2.006	382,765	11,288p	6,773p		
		11.19	IU	2.875	XH	4-1/4	1-7/8	1.750	505,054	13,282p	7,969p		
		10.35			NC26(SH)	3-3/8	1-3/4	1.625	313,681	6,875b	4,125b		
3-1/2	9.50	10.58	EU	3.938	NC38(IF)	4-3/4	2-11/16	2.563	587,308	18,107p	10,864p	194,264	14,146
		9.84			OH	4-1/2	3	2.804	392,071	11,870p	7,218p		
		9.99			SLH90	4-5/8		2.847	366,705	12,650p	7,584p		
		10.14			WO	4-3/4		2.804	419,797	12,878p	7,688p		
3-1/2	13.30	14.37	EU	3.938	H90	5-1/4	2-3/4	2.619	664,050	23,847p	14,300p	271,569	18,551
		13.93			NC38(IF)	4-3/4	2-11/16	2.457	587,308	18,107p	10,864p		
		13.75			OH			2.414	559,582	17,305p	10,387p		
		13.40	IU	3.500	NC31(SH)	4-1/8	2-1/8	2.000	447,130	11,869p	7,122p		
		13.91	EU	3.938	XH	4-3/4	2-7/16	2.313	570,939	17,493p	10,496p		
3-1/2	15.50	16.54	EU	3.938	NC38(IF)	5	2-9/16	2.414	649,158	20,326p	12,196p	322,775	21,086
4	11.85	13.00	IU	4.250	H90	5-1/2	2-13/16	2.688	913,708	35,374p	21,224p	230,755	19,474
		13.52	EU	4.563	NC46(IF)	6	3-1/4	3.125	901,164	33,625p	20,175p		
		12.10			OH	5-1/4	3-15/32	3.287	621,357	21,976p	13,186p		
		12.91			WO	5-3/4	3-7/16	3.313	782,987	28,809p	17,285p		
4	14.00	15.04	IU	4.250	NC40(FH)	5-1/4	2-13/16	2.688	711,611	23,487p	14,092p	285,359	23,288
		15.43			H90	5-1/2			913,708	35,374p	21,224p		
		15.85	EU	4.563	NC46(IF)	6	3-1/4	3.125	901,164	33,625p	20,175p		
		15.02			OH	5-1/2			759,875	27,289p	16,320p		
		14.35	IU	4.250	SH	4-5/8	2-9/16	2.438	512,035	15,170p	9,102p		
4	15.70	16.80	IU	4.250	NC40(FH)	5-1/4	2-11/16	2.563	776,406	25,673p	15,404p	324,118	25,810
		17.09			H90	5-1/2	2-13/16	2.688	913,708	35,374p	21,224p		
		17.54	EU	4.563	NC46(IF)	6	3-1/4	3.095	901,164	33,625p	20,175p		
4-1/2	13.75	15.23	IU	4.750	H90	6	3-1/4	3.125	938,403	38,925p	23,355p	270,034	25,907
		15.36	EU	5.063	NC50(IF)	6-3/8	3-3/4	3.625	939,096	37,676p	22,605p		
		14.04			OH	5-3/4	3-31/32	3.770	554,844	20,939p	12,563p		
		14.77			WO	6-1/8	3-7/8	3.750	849,266	33,651p	20,190p		

* Tool Joint plus drillpipe

■ The tensile strength of the tool joint pin is based on 120,000 PSI yield and the cross sectional area at the root of the thread 5/8 inch from the shoulder

▲ Torsional yield strength based on shear strength of 57.7 percent of the minimum yield strength

◆ p = pin limited yield; b = box limited yield; P or B indicates that tool joint could not meet 80 percent of tube torsion yield

Multiply ft-lb by 1.36 to convert to *Nm*

Data provided by API from Tables 8 and 10 from Figures 1-25, 16th edition, API 7G; August, 1998

Mechanical Properties of New Tool Joints and New Grade E Drillpipe (Continued)

Drillpipe Data					Tool Joint Data							Drillpipe Data	
OD	Weight (lb/ft)		Upset		Connection				Strength		Rec Make-Up Torque	Strength	
	Nom Wt	Approx Wt*	Type	OD	Type	OD	ID	Drift ID	Tensile Yield■	Torsion Yield◆		Tensile Yield	Torsion Yield▲
in.	lb/ft			in.		in.	in.	in.	lb	ft-lb	ft-lb	lb	ft-lb
4-1/2	16.60	18.14	IEU	4.750	FH	6	3	2.875	976,156	34,780p	20,868p	330,558	30,807
		17.92			H90		3-1/4	3.125	938,403	38,925p	23,355p		
		17.95	EU	5.063	NC50(IF)	6-5/8	3-3/4	3.625	939,096	37,676p	22,836p		
		17.07			OH	5-7/8			713,979	27,243p	16,346p		
		16.79	IEU	4.750	NC38(SH)	5	2-11/16	2.563	587,308	18,346p	11,008p		
		18.37			NC46(XH)	6-1/4	3-1/4	3.125	901,164	33,993p	20,396p		
4-1/2	20.00	21.64	IEU	4.781	FH	6	3	2.875	976,156	34,780p	20,868p	412,358	36,901
					H90				1,085,665	45,152p	27,091p		
		21.59	EU	5.063	NC50(IF)	6-5/8	3-5/8	3.452	1,025,980	41,235p	24,993p		
		22.09	IEU	4.781	NC46(XH)	6-1/4	3	2.875	1,048,426	39,659p	23,795p		
4-1/2	22.82	24.11	EU	5.063	NC50(IF)	6-5/8	3-5/8	3.452	1,025,980	41,235p	24,741p	471,239	40,912
		24.56	IEU	4.781	NC46(XH)	6-1/4	3	2.875	1,048,426	39,659p	23,795p		
5	19.50	22.28	IEU	5.188	5-1/2 FH	7	3-3/4	3.625	1,448,407	60,338b	36,203b	395,595	41,167
		20.85			NC50(XH)	6-5/8			939,095	37,676p	22,836p		
5	25.60	28.27	IEU	5.188	5-1/2 FH	7	3-1/2	3.375	1,619,231	60,338b	37,742b	530,144	52,257
		26.85			NC50(XH)	6-5/8			1,109,920	44,673p	27,076p		
5-1/2	21.90	23.78	IEU	5.188	FH	7	4	3.875	1,265,802	56,045p	33,560p	437,116	50,710
5-1/2	24.70	26.30	IEU	5.188	FH	7	4	3.875	1,265,802	56,045p	33,560p	497,222	56,574
6-5/8	25.20	27.28	IEU	5.188	FH	8	5	4.875	1,447,697	73,620p	44,196p	489,464	70,580
6-5/8	27.70	29.06	IEU	5.188	FH	8	5	4.875	1,447,697	73,620p	44,196p	534,198	76,295

* Tool Joint plus drillpipe

■ The tensile strength of the tool joint pin is based on 120,000 PSI yield and the cross sectional area at the root of the thread 5/8 inch from the shoulder

▲ Torsional yield strength based on shear strength of 57.7 percent of the minimum yield strength

◆ p = pin limited yield; b = box limited yield; P or B indicates that tool joint could not meet 80 percent of tube torsion yield

Multiply ft-lb by 1.36 to convert to *Nm*

Data provided by API from Tables 8 and 10 from Figures 1-25, 16th edition, API 7G; August, 1998

Mechanical Properties of New Tool Joints and New High Strength Drillpipe

Drillpipe Data						Tool Joint Data							Drillpipe Data	
OD	Weight (lb/ft)		Upset			Connection				Strength		Rec Make-Up Torque	Strength	
	Nom Wt	Approx Wt*	Type	Grade	OD	Type	OD	ID	Drift ID	Tensile Yield■	Torsion Yield◆		Tensile Yield	Torsion Yield▲
in.	lb/ft				in.		in.	in.	in.	lb	ft-lb	ft-lb	lb	ft-lb
2-3/8	6.65	7.11	EU	X-95	2.656	NC26(IF)	3-3/8	1-3/4	1.625	313,681	6,875b	4,125b	175,072	7,917
		6.99				SLH90	3-1/4	1-13/16	1.670	270,223	6,884p	4,130p		
		7.11		G-105		NC26(IF)	3-3/8	1-3/4	1.625	313,681	6,875b	4,125b	193,500	8,751
		6.99				SLH90	3-1/4	1-13/16	1.670	270,223	6,884p	4,130p		
2-7/8	10.40	11.09	EU	X-95	3.219	NC31(IF)	4-1/8	2	1.875	495,726	13,389p	7,918p	271,503	14,635
		10.95				SLH90	4			443,971	13,218p	7,931p		
		11.09		G-105		NC31(IF)	4-1/8			495,726	13,389p	7,918p	300,082	16,176
		10.95				SLH90	4			443,971	13,218p	7,931p		
		11.55		S-135		NC31(IF)	4-3/8	1-5/8	1.500	623,844	17,170p	10,167p	385,820	20,798
		11.26				SLH90	4-1/8			572,089	17,213p	10,328p		
3-1/2	13.30	14.60	EU	X-95	3.938	H90	5-1/4	2-3/4	2.619	664,050	23,833p	14,300p	343,988	23,498
		14.62				NC38(IF)	5	2-9/16	2.438	649,158	20,326p	12,196p		
		14.06				SLH90	4-3/4			596,066	20,879p	12,527p		
		14.71		G-105		NC38(IF)	5	2-7/16	2.313	708,063	22,213p	13,328p	380,197	25,972
		14.06				SLH90	4-3/4	2-9/16	2.438	596,066	20,879p	12,527p		
		14.92		S-135		NC38(IF)	5	2-1/8	2.000	842,440	26,515p	15,909p	488,825	33,392
		14.65				SLH90				789,348	28,078p	16,847p		
		15.13				NC40(4FH)	5-3/8	2-7/16	2.313	897,161	29,930p	17,958p		
3-1/2	15.50	16.82	EU	X-95	3.938	NC38(IF)	5	2-7/16	2.313	708,063	22,213p	13,328p	408,848	26,708
		17.03		G-105				2-1/8	2.000	842,440	26,515p	15,909p	451,885	29,520
		16.97				NC40(4FH)	5-1/4	2-9/16	2.438	838,257	27,760p	16,656p		
		17.57		S-135			5-1/2	2-1/4	2.125	979,996	32,943p	19,766p	580,995	37,954
4	14.00	15.34	IU	X-95	4.25	NC40(FH)	5-1/4	2-11/16	2.563	776,406	25,673p	15,404p	361,454	29,498
		15.63				H90	5-1/2	2-13/16	2.688	913,708	35,374p	21,224p		
		16.19	EU		4.563	NC46(IF)	6	3-1/4	3.125	901,164	33,625p	20,175p		
		15.91	IU	G-105	4.25	NC40(FH)	5-1/2	2-7/16	2.313	897,161	30,114p	18,608p	399,502	32,603
		15.63				H90		2-13/16	2.688	913,708	35,374p	21,224p		
		16.19	EU		4.563	NC46(IF)	6	3-1/4	3.125	901,164	33,625p	20,175p		
		15.63	IU	S-135	4.25	NC40(FH)	5-1/2	2	1.875	1,080,135	36,363p	21,818p	513,646	41,918
						H90		2-13/16	2.688	913,708	35,374p	21,224p		
		16.42	EU		4.563	NC46(IF)	6	3	2.875	1,048,426	39,229p	23,538p		
4	15.70	17.52	IU	X-95	4.25	NC40(FH)	5-1/2	2-7/16	2.313	897,161	30,114p	18,068p	410,550	32,692
		17.23				H90		2-13/16	2.688	913,708	35,374p	21,224p		
		17.80	EU		4.563	NC46(IF)	6	3-1/4	3.125	901,164	33,625p	20,125p		
		17.52	IU	G-105	4.25	NC40(FH)	5-1/2	2-7/16	2.313	897,161	30,114p	18,068p	453,765	36,134
		17.23				H90		2-13/16	2.688	913,708	35,374p	21,224p		
		17.80	EU		4.563	NC46(IF)	6	3-1/4	3.125	901,164	33,625p	20,175p		
		18.02		S-135				3	2.875	1,048,426	39,229p	23,537p	583,413	46,458
4-1/2	16.60	18.33	IEU	X-95	4.750	FH	6	3	2.875	976,156	34,780p	20,868p	418,707	39,022
		18.11				H90		3-1/4	3.125	938,403	38,925p	23,355p		
		18.36	EU		5.063	NC50(IF)	6-5/8	3-3/4	3.625	939,095	37,676p	22,836p		
		18.79	IEU		4.750	NC46(XH)	6-1/4	3	2.875	1,048,426	39,659p	23,795p		
		18.33		G-105		FH	6		2.625	976,156	34,780p	20,868p	462,781	43,130
						H90			3.125	1,085,665	45,152p	27,091p		
		18.36	EU		5.063	NC50(IF)	6-5/8	3-3/4	3.625	939,095	37,676p	22,836p		
		18.79	IEU		4.750	NC46(XH)	6-1/4	3	2.875	1,048,426	39,659p	23,795p		

* Tool Joint plus drillpipe

■ The tensile strength of the tool joint pin is based on 120,000 psi yield and the cross sectional area at the root of the thread 5/8 inch from from the shoulder

▲Torsional yield strength based on shear strength of 57.7 percent of the minimum yield strength

◆p = pin limited yield; b = box limited yield; P or B indicates that tool joint could not meet 80 percent of tube torsion yield

Multiply ft-lb by 1.36 to convert to *Nm*

Data provided by API from Tables 9 and 10 and from Figures 1-25, 16th edition, API 7G; August, 1998

Mechanical Properties of New Tool Joints and New High Strength Drillpipe (Continued)

Drillpipe Data						Tool Joint Data							Drillpipe Data	
OD	Weight (lb/ft)		Upset			Connection				Strength		Rec Make-Up Torque	Strength	
	Nom Wt	Approx Wt*	Type	Grade	OD	Type	OD	ID	Drift ID	Tensile Yield■	Torsion Yield◆		Tensile Yield	Torsion Yield▲
in.	lb/ft				in.		in.	in.	in.	lb	ft-lb	ft-lb	lb	ft-lb
4-1/2	16.60	19.19	IEU	S-135	4.750	FH	6-1/4	2-1/2	2.375	1,235,337	44,769p	26,861p	595,004	55,453
		18.33				H90	6	3	2.875	1,085,665	45,152p	27,091p		
		18.62	EU		5.063	NC50(IF)	6-5/8	3-1/2	3.375	1,109,920	44,673p	27,076p		
		19.00	IEU		4.750	NC46(XH)	6-1/4	2-3/4	2.625	1,183,908	44,871p	26,923p		
4-1/2	20	22.39	IEU	X-95	4.781	FH	6	2-1/2	2.375	1,235,337	44,265p	26,559p	522,320	46,741
		21.78				H90		3-1/4	3.125	938,403	38,925p	23,355p		
		22.08	EU		5.063	NC50(IF)	6-5/8	3-1/2	3.375	1,109,920	44,673p	27,076p		
		22.67	IEU		4.781	NC46(XH)	6-1/4	2-3/4	2.625	1,183,908	44,871p	26,923p		
		22.39		G-105		FH	6	2-1/2	2.375	1,235,337	44,265p	26,559p	577,301	51,661
		22.00				H90		3	2.875	1,085,665	45,152p	27,091p		
		22.08	EU		5.063	NC50(IF)	6-5/8	3-1/2	3.375	1,109,920	44,673p	27,076p		
		22.86	IEU		4.781	NC46(XH)	6-1/4	2-1/2	2.375	1,307,608	49,630p	29,778p		
		23.03	EU	S-135	5.063	NC50(IF)	6-5/8	3	2.875	1,416,225	57,800p	34,680p	742,244	66,421
			IEU		4.781	NC46(XH)	6-1/4	2-1/4	2.125	1,419,527	53,936p	32,362p		
4-1/2	22.82	25.13	IEU	X-95	4.781	FH	6-1/4	2-1/4	2.125	1,347,256	48,912p	29,347p	596,903	51,821
		24.24	EU		5.063	NC50(IF)	6-5/8	3-1/2	3.375	1,109,920	44,673p	26,804p		
		24.77	IEU		4.781	NC46(XH)	6-1/4	2-3/4	2.625	1,183,908	44,871p	26,923p		
		24.72	EU	G-105	5.063	NC50(IF)	6-5/8	3-1/4	3.125	1,268,963	51,447p	30,868p	659,735	57,276
		24.96	IEU		4.781	NC46(XH	6-1/4	2-1/2	2.375	1,307,608	49,630p	29,778p		
		25.41	EU	S-135	5.063	NC50(IF)	6-5/8	2-3/4	2.625	1,551,706	63,406p	38,044p	848,230	73,641
5	19.50	22.62	IEU	X-95	5.188	5-1/2 FH	7	3-3/4	3.625	1,448,407	60,338b	36,203b	501,087	52,144
		21.93				H90	6-1/2	3-1/4	3.125	1,176,265	51,870p	31,084p		
		21.45				NC50(XH)	6-5/8	3-1/2	3.375	1,109,920	44,673p	27,076p		
		22.62		G-105		5-1/2 FH	7	3-3/4	3.625	1,448,407	60,338b	36,203b	553,833	57,633
		22.15				H90	6-1/2	3	2.875	1,323,527	58,398p	35,039p		
		21.93				NC50(XH)	6-5/8	3-1/4	3.125	1,268,963	51,447p	31,025p		
		23.48		S-135		5-1/2 FH	7-1/4	3-1/2	3.375	1,619,231	72,627p	43,490p	712,070	74,100
		22.61				NC50(XH)	6-5/8	2-3/4	2.625	1,551,706	63,406p	38,044p		
5	25.60	28.59	IEU	X-95	5.188	5-1/2 FH	7	3-1/2	3.375	1,619,231	60,338b	37,742b	671,515	66,192
		27.87				NC50(XH)	6-5/8	3	2.875	1,416,225	56,984b	34,680b		
		29.16		G-105		5-1/2 FH	7-1/4	3-1/2	3.375	1,619,231	72,627p	43,490p	742,201	73,159
		28.32				NC50(XH)	6-5/8	2-3/4	2.625	1,551,706	63,406b	38,044b		
		29.43		S-135		5-1/2 FH	7-1/4	3-1/4	3.125	1,778,274	76,156b	47,230b	954,259	94,062
5-1/2	21.90	24.53	IEU	X-95	5.750	FH	7	3-3/4	3.625	1,448,407	60,338b	37,742b	553,681	64,233
		24.80				H90		3-1/2	3.125	1,268,877	59,091p	35,454p		
		25.38		G-105		FH	7-1/4		3.375	1,619,231	72,627p	43,490p	611,963	70,994
		26.50		S-135			7-1/2	3	2.875	1,925,536	87,341p	53,302p	786,809	91,278
5-1/2	24.70	27.85	IEU	X-95	5.750	FH	7-1/4	3-1/2	3.375	1,619,231	72,627p	43,490p	629,814	71,660
				G-105									696,111	79,204
		27.77		S-135			7-1/2	3	2.875	1,925,536	87,341p	52,302p	894,999	101,833
6-5/8	25.20	27.15	IEU	X-95	7.000	FH	8	5	4.875	1,448,416	73,661p	44,196p	619,988	89,402
		28.20		G-105			8-1/4	4-3/4	4.625	1,678,145	86,237p	51,742p	685,250	98,812
		29.63		S-135			8-1/2	4-1/4	4.125	2,102,260	109,226p	65,535p	881,035	127,044
6-5/8	27.70	30.11	IEU	X-95	7.000	FH	8-1/4	4-3/4	4.625	1,678,145	86,237p	51,742p	676,651	96,640
				G-105									747,250	106,813
		31.54		S-135			8-1/2	4-1/4	4.125	2,102,260	109,226p	65,535p	961,556	137,330

* Tool Joint plus drillpipe

■ The tensile strength of the tool joint pin is based on 120,000 psi yield and the cross sectional area at the root of the thread 5/8 inch from from the shoulder

▲Torsional yield strength based on shear strength of 57.7 percent of the minimum yield strength

◆p = pin limited yield; b = box limited yield; P or B indicates that tool joint could not meet 80 percent of tube torsion yield

Multiply ft-lb by 1.36 to convert to *Nm*

Data provided by API from Tables 9 and 10 and from Figures 1-25, 16th edition, API 7G; August, 1998

New Drillpipe Dimensional Data and Performance Properties

OD	Weight (lb/ft)		ID	Thickness	Section Area Body of Pipe	Grade	Torsional Yield▲	Yield Strength	Torsional Collapse Pressure	Tensile Burst Pressure
	T&C	Plain End								
in.			in.	in.	sq in.		ft-lb	lb	psi	psi
2-3/8	4.85*	4.43	1.995	.190	1.3042	E-75	4,763	97,817	11,040	10,500
						X-95	6,033	123,902	13,984	13,300
						G-105	6,668	136,944	15,456	14,700
						S-135	8,574	176,071	19,035	18,900
2-3/8	6.65	6.26	1.815	.280	1.8429	E-75	6,250	138,214	15,599	15,474
						X-95	7,917	175,072	19,759	19,600
						G-105	8,751	193,500	21,839	21,663
						S-135	11,251	248,786	28,079	27,853
2-7/8	6.85*	6.16	2.441	.217	1.8120	E-75	8,083	135,902	10,467	9,907
						X-95	10,238	172,143	12,940	12,548
						G-105	11,316	190,263	14,020	13,869
						S-135	14,549	244,624	17,034	17,832
2-7/8	10.40	9.72	2.151	.362	2.8579	E-75	11,554	214,344	16,509	16,526
						X-95	14,635	271,503	20,911	20,933
						G-105	16,176	300,082	23,112	23,137
						S-135	20,798	385,820	29,716	29,747
3-1/2	9.50	8.81	2.992	.254	2.5902	E-75	14,146	194,264	10,001	9,525
						X-95	17,918	246,068	12,077	12,065
						G-105	19,805	271,970	13,055	13,335
						S-135	25,463	349,676	15,748	17,145
3-1/2	13.30	12.31	2.764	.368	3.6209	E-75	18,551	271,569	14,113	13,800
						X-95	23,498	343,988	17,877	17,480
						G-105	25,972	380,197	19,758	19,320
						S-135	33,392	488,825	25,404	24,840
3-1/2	15.50	14.63	2.602	.449	4.3037	E-75	21,086	322,775	16,774	16,838
						X-95	26,708	408,848	21,247	21,328
						G-105	29,520	451,885	23,484	23,573
						S-135	37,954	580,995	30,194	30,308
4	11.85*	10.46	3.476	.262	3.0767	E-75	19,474	230,755	8,381	8,597
						X-95	24,668	292,290	9,978	10,889
						G-105	27,264	323,057	10,708	12,036
						S-135	35,054	415,360	12,618	15,474
4	14.00	12.93	3.340	.330	3.8048	E-75	23,288	285,359	11,354	10,828
						X-95	29,498	361,454	14,382	13,716
						G-105	32,603	399,502	15,896	15,159
						S-135	41,918	513,646	20,141	19,491
4	15.70*	14.69	3.240	.380	4.3216	E-75	25,810	324,118	12,896	12,469
						X-95	32,692	410,550	16,335	15,794
						G-105	36,134	453,765	18,055	17,456
						S-135	46,458	583,413	23,213	22,444
4-1/2	13.75	12.24	3.958	.271	3.6004	E-75	25,907	270,034	7,173	7,904
						X-95	32,816	342,043	8,412	10,012
						G-105	36,270	378,047	8,956	11,066
						S-135	46,633	486,061	10,283	14,228
4-1/2	16.60	14.98	3.826	.337	4.4074	E-75	30,807	330,558	10,392	9,829
						X-95	39,022	418,707	12,765	12,450
						G-105	43,130	462,781	13,825	13,761
						S-135	55,453	595,004	16,773	17,693

* These sizes/weights not included in API specification 5D, 1st edition; March 15, 1988

▲Based on the shear strength equal to 57.7 percent of minimum yield strength and nominal wall thickness

Multiply ft-lb by 1.36 to convert to *Nm*

Data provided by API from Tables 1, 2, and 3, pp 4-6, 16th edition, API RP7G; August, 1998

New Drillpipe Dimensional Data and Performance Properties (Continued)

OD	Weight (lb/ft)		ID	Thickness	Section Area Body of Pipe	Grade	Torsional Yield▲	Yield Strength	Torsional Collapse Pressure	Tensile Burst Pressure
	T&C	Plain End								
in.			in.	in.	sq in.		ft-lb	lb	psi	psi
4-1/2	20.00	18.69	3.640	.430	5.4981	E-75	36,901	412,358	12,964	12,542
						X-95	46,741	522,320	16,421	15,886
						G-105	51,661	577,301	18,149	17,558
						S-135	66,421	742,244	23,335	22,575
4-1/2	22.82	21.36	3.500	.500	6.2832	E-75	40,912	471,239	14,815	14,583
						X-95	51,821	596,903	18,765	18,472
						G-105	57,276	659,734	20,741	20,417
						S-135	73,641	848,230	26,667	26,250
5	16.25	14.87	4.408	.296	4.3743	E-75	35,044	328,073	6,938	7,770
						X-95	44,389	415,559	8,108	9,842
						G-105	49,062	459,302	8,616	10,878
						S-135	63,079	590,531	9,831	13,986
5	19.50	17.93	4.276	.362	5.2746	E-75	41,167	395,595	9,962	9,503
						X-95	52,144	501,087	12,026	12,037
						G-105	57,633	553,833	12,999	13,304
						S-135	74,100	712,070	15,672	17,105
5	25.60	24.03	4.000	.500	7.0686	E-75	52,257	530,144	13,500	13,125
						X-95	66,192	671,515	17,100	16,625
						G-105	73,159	742,201	18,900	18,375
						S-135	94,062	954,259	24,300	23,625
5-1/2	19.20*	16.87	4.892	.304	4.9624	E-75	44,074	372,181	6,039	7,255
						X-95	55,826	471,429	6,942	9,189
						G-105	61,703	521,053	7,313	10,156
						S-135	79,332	669,925	8,093	13,058
5-1/2	21.90	19.81	4.778	.361	5.8282	E-75	50,710	437,116	8,413	8,615
						X-95	64,233	553,681	10,019	10,912
						G-105	70,994	611,963	10,753	12,061
						S-135	91,278	786,809	12,679	15,507
5-1/2	24.70	22.54	4.670	.415	6.6296	E-75	56,574	497,222	10,464	9,903
						X-95	71,660	629,814	12,933	12,544
						G-105	79,204	696,111	14,013	13,865
						S-135	101,833	894,999	17,023	17,826
6-5/8	25.20	22.19	5.965	.330	6.5262	E-75	70,580	489,464	4,788	6,538
						X-95	89,402	619,988	5,321	8,281
						G-105	98,812	685,250	5,500	9,153
						S-135	127,044	881,035	6,036	11,768
6-5/8	27.70	24.22	5.901	.362	7.1227	E-75	76,295	534,199	5,894	7,172
						X-95	96,640	676,651	6,755	9,084
						G-105	106,813	747,877	7,103	10,040
						S-135	137,330	961,556	7,813	12,909

* These sizes/weights not included in API specification 5D, 1st edition; March 15, 1988

▲Based on the shear strength equal to 57.7 percent of minimum yield strength and nominal wall thickness

Multiply ft-lb by 1.36 to convert to *Nm*

Data provided by API from Tables 1, 2, and 3, pp 4-6, 16th edition, API RP7G; August, 1998

Wedge Thread™ Drillpipe Tool Joint Dimensions

Tool Joint	Drillpipe			Tool Joint									
	Size and Style	Nom Wt	Grades	OD of Pin and Box	ID of Pin	Bevel Diameter	Length of Tool Jt Pin (Lp)	Pin Tong Space (Lpb)	Box Tong Space	Combined Length of Pin and Box (L)	Diameter of Box at Elevator Upset Max (Dte)	Make-up Torques	
												Min	Max
		lb/ft		in.	in.	in.			(Lb)			ft-lb*	ft-lb*
WT23	2-3/8 EU	6.65	XG	3-1/8	1-1/2	2-15/16	12	7	10	17	2-9/16	2,200	8,300
	2-7/8 IU	10.40	XGS								2-29/32		
WT26	2-3/8 EU	6.65	XG	3-3/8	1-3/4	3-9/64	12	7	10	17	2-9/16	2,800	9,800
	2-7/8 IU	10.40	XGS								2-29/32		
WT31	2-7/8 IU	10.40	XGS	4-1/8	2	3-29/32	14	7	12	19	3-3/16	6,200	22,500
	3-1/2 IEU	15.50									3-11/16		
	4 IU	14.00									4-1/8		
		15.70											
WT38	3-1/2 EU	13.30	XGS	4-3/4 - 5	2-9/l6	4-9/16	15	8	14	22	3-7/8	9,000	31,500
		15.50			2-1/2								
	4-IU	14.00			2-9/16						4-3/16		
		15.70											
	4-1/2 IU	16.60		4-5/8							4-5/8		
		20.00											
WT39	4 IU	14.00	XGS	5 - 5-1/8	2-13/16	4-13/16	15	8	14	22	4-3/16	10,000	36,000
		15.70											
	4-1/2 IEU	16.60		5-1/8							4-11/16		
		20.00											
WT40	4 EU	14.00	XGS	5-1/2	3-1/8	5-1/8	15	8	14	22	4-1/2	12,000	42,000
		15.70											
	4-1/2 IEU	16.60									4-11/16		
		20.00											
	5 IEU	19.50		5-3/8							5-1/8		
		25.60											
WT46	4-1/2 EU	16.60	XGS	6 - 6-1/4	3-1/2	5-3/4	15	8	14	22	5	15,000	56,000
		20.00											
	5 IEU	19.50		6							5-1/8		
		25.60											
	5-1/2 IEU	21.90		5-7/8							5-11/16		
		24.70											
WT50	5 EU	19.50	XGS	6-3/4 - 7	4	6-11/32	16	8	15	23	5-11/16	23,000	86,000
		25.60			3-7/8								
	5 IEU	19.50		6-5/8	3-5/8						5-1/8		
		25.60											
	5-1/2 IEU	21.90		6-3/4 - 7	4						5-11/16		
		24.70											
WT54	5-1/2 IEU	21.90	XGS	7	4-3/8	6-5/8	16	8	15	23	5-11/16	25,000	90,000
		24.70											
WT56	5-1/2 EU	21.90	XGS	7-1/4	4-5/8	6-7/8	16	8	15	23	6	27,000	99,000
		24.70											
	5-1/2 IEU	21.90			4-3/8						5-11/16		
		24.70											
	6-5/8 IEU	25.20		7	4-5/8						6-5/8 IEU		
		27.70											
WT66	6-5/8 IEU	25.20	XGS	8	5-3/8	7-45/64	18	10	16	26	6-5/8 IEU	35,000	120,000
		27.70											

* Multiply ft-lb by 1.36 to convert to *Nm*

Wedge Thread™ Drillpipe Tool Joint Performance Data

Drillpipe Data				Tool Joint Data				Mechanical Properties				
								Tensile Yield		Torsional Yield		
Nom Size	Nom Wt	Adjusted Weight	Type Upset	Connection	OD	ID	Drift	Pipe	Tool Joint	Pipe	Tool Joint	Torsional Ratio
in.	lb/ft	lb/ft			in.	in.	in.	(1,000 lb)	(1,000 lb)	ft-lb*	ft-lb*	
2-3/8	6.65	7.20	EU-105	WT26	3-3/8	1-3/4	1.625	194	416	8,750	12,300	1.41
		7.10		WT23	3-1/8	1-1/2	1.375		387		10,400	1.19
2-7/8	10.40	11.30	EU-105	WT31	4-1/8	2	1.875	300	697	16,180	28,500	1.76
			EU-135					386		20,800		1.37
		10.50	IU-135	WT26	3-3/8	1-3/4	1.625		416		12,300	0.59
				WT23	3-1/8	1-1/2	1.375		387		10,400	0.50
3-1/2	13.30	14.50	EU-135	WT38	4-3/4	2-9/16	2.438	489	877	33,390	41,000	1.23
		14.90			5							
		13.90	IU-135	WT31	4-1/8	2	1.875		697		28,500	0.85
		13.30		WT26	3-9/16	1-3/4	1.625		416		12,300	0.37
3-1/2	15.50	16.70	EU-135	WT38	4-3/4	2-1/2	2.375	581	907	37,950	41,000	1.08
		17.10			5							
		16.20	IEU-135	WT31	4-1/8	2	1.875		697		28,500	0.75
4	14.00	15.80	EU-135	WT40	5-3/8	3-1/8	3.000	514	998	41,920	54,000	1.29
		16.00			5-1/2							
		15.30	IU-135	WT39	5	2-13/16	2.688		910		46,000	1.10
		15.50			5-1/8							
		15.20		WT38	4-3/4	2-9/16	2.438		877		41,000	0.98
		15.60			5							
		14.70		WT31	4-1/8	2	1.875		697		28,500	0.68
4	15.70	17.40	EU-135	WT40	5-3/8	3-1/8	3.000	583	998	46,460	54,000	1.16
		17.60			5-1/2							
		16.90	IU-135	WT39	5	2-13/16	2.688		910		46,000	0.99
		17.10			5-1/8							
		16.80		WT38	4-3/4	2-9/16	2.438		877		41,000	0.88
		17.10			5							
		16.20		WT31	4-1/8	2	1.875		697		28,500	0.61
4-1/2	16.60	18.60	EU-135	WT46	6	3-1/2	3.375	595	1,280	55,450	70,000	1.26
		19.10			6-1/4							
		17.80	IEU-135	WT40	5-1/2	3-1/8	3.000		998		54,000	0.97
		17.60		WT39	5-1/8	2-13/16	2.688		910		46,000	0.83
		17.10	IU-135	WT38	4-5/8	2-9/16	2.438		877		41,000	0.74
4-1/2	20.00	22.00	EU-135	WT46	6	3-1/2	3.375	742	1,280	66,420	70,000	1.05
		22.50			6-1/4							
		21.50	IEU-135	WT40	5-1/2	3-1/8	3.000		998		54,000	0.81
		21.30		WT39	5-1/8	2-13/16	2.688		910		46,000	0.69
		20.80	IU-135	WT38	4-5/8	2-9/16	2.438		877		41,000	0 62
5	19.50	22.70	EU-135	WT50	6-3/4	4	3.875	712	1,440	74,100	109,000	1.47
		23.30			7							
		22.20	IEU-135		6-5/8	3-7/8	3.750		1,533			
		21.40		WT46	6	3-1/2	3.375		1,280		70,000	0.94
		20.80		WT40	5-3/8	3-1/8	3.000		998		54,000	0.73
				WT39	5-1/8	2-13/16	2.688		910		46,000	0.62
5	25.60	28.50	EU-135	WT50	6-3/4	3-7/8	3.750	954	1,533	94,060	109,000	1.16
		29.10			7							
		28.20	IEU-135		6-5/8	3-5/8	3.500		1,710			
		27.00		WT46	6	3-1/2	3.375		1,280		70,000	0.74
		26.40		WT40	5-3/8	3-1/8	3.000		998		54,000	0.57
				WT39	5-1/8	2-13/16	2.688		910		46,000	0.49

* Multiply ft-lb by 1.36 to convert to *Nm*

Wedge Thread™ Drillpipe Tool Joint Performance Data (Continued)

Drillpipe Data				Tool Joint Data				Mechanical Properties				
								Tensile Yield		Torsional Yield		
Nom Size	Nom Wt	Adjusted Weight	Type Upset	Connection	OD	ID	Drift	Pipe	Tool Joint	Pipe	Tool Joint	Torsional Ratio
in.	lb/ft	lb/ft			in.	in.	in.	(1,000 lb)	(1,000 lb)	ft-lb*	ft-lb*	
5-1/2	21.90	24.20	EU-135	WT56	7	4-5/8	4.500	787	1,473	91,280	132,000	1.45
		24.70			7-1/4							
		24.30	IEU-135		7	4-3/8	4.250		1,685			
		24.90			7-1/4							
		24.30		WT54	7				1,406		120,000	1.31
		24.40		WT50	6-3/4	4	3.875		1,440		109,000	1.19
		25.00			7							
		23.40		WT46	5-7/8	3-1/2	3.375		1,280		70,000	0.77
5-1/2	24.70	26.60	EU-135	WT56	7	4-5/8	4.500	895	1,473	101,830	132,000	1.30
		27.20			7-1/4							
		26.70	IEU-135		7	4-3/8	4.250		1,685			
		27.30			7-1/4							
		26.70		WT54	7				1,406		120,000	1.18
		26.90		WT50	6-3/4	4	3.875		1,440		109,000	1.07
		27.40			7							
		25.80		WT46	5-7/8	3-1/2	3.375	895	1,280	101,830	70,000	0.69
6-5/8	25.20	28.30	IEU-135	WT66	8	5-3/8	5.250	881	1,654	127,050	168,000	1.32
		27.00		WT56	7	4-5/8	4.500		1,473		132,000	1.04
6-5/8	27.70	30.10	IEU-135	WT66	8	5-3/8	5.250	962	1,654	137,330	168,000	1.22
		28.80		WT56	7	4-5/8	4.500		1,473		132,000	0.96

* Multiply ft-lb by 1.36 to convert to *Nm*

Grant Prideco Drill Pipe Data

Size OD	Nominal Weight	Grade and Upset Type	Torsional Yield Strength	Tensile Yield Strength	Nominal ID	Internal Pressure	Collapse Pressure	Connection Type		Outside Diameter	Inside Diameter	Torsional Yield Strength	Tensile Yield Strength	Make-up Torque
in.	lb/ft		ft-lb	lb	in.	psi	psi			in.	in.	ft-lb	lb	ft-lb
2-3/8	6.65	E-75 EU	6,300	138,200	1.815	15,474	15,599	2-3/8	NC26	3-3/8	1-3/4	6,900	313,700	3,900
									HT26			8,700		5,200
									SLH90	3-1/4	1-13/16	6,900	270,200	3,700
2-3/8	6.65	X-95 EU	7,900	175,100	1.815	19,600	19,759	2-3/8	NC26	3-3/8	1-3/4	6,900	313,700	3,900
									HT26			8,700		5,200
									SLH90	3-1/4	1-13/16	6,900	270,200	3,700
2-3/8	6.65	G-105 EU	8,800	193,500	1.815	21,663	21,839	2-3/8	NC26	3-3/8	1-3/4	6,900	313,700	3,900
									HT26			8,700		5,200
									SLH90	3-1/4	1-13/16	6,900	270,200	3,700
2-3/8	6.65	S-135 EU	11,300	248,800	1.815	27,853	28,079	2-3/8	NC26	3-5/8	1-1/2	9,000	390,300	4,900
									HT26	3-3/8	1-5/8	9,500	353,400	5,700
									SLH90	3-1/4	1-11/16	7,700	311,500	4,200
									GPDS26	3-1/2		9,700	333,900	5,800
2-3/8	6.65	Z-140 EU	11,700	258,000	1.815	28,884	29,119	2-3/8	XT24	3-1/8	1-1/2	9,500	261,500	5,700
									XT26	3-3/8	1-5/8	12,600	330,600	7,600
									HT26			9,500	353,400	5,700
									GPDS26	3-1/2		10,500		6,300
2-3/8	6.65	V-150 EU	12,500	276,400	1.815	30,947	31,199	2-3/8	XT24	3-1/8	1-3/8	10,400	295,400	6,200
									XT26	3-3/8	1-1/2	13,200	367,400	7,900
									HT26			10,100	390,300	6,100
									GPDS26	3-1/2		11,200		6,700
2-7/8	6.85	E-75 IU	8,100	135,900	2.441	9,907	10,467	2-7/8	NC26	3-3/8	1-3/4	6,900	313,700	3,900
									HT26			8,700		5,200
		E-75 EU							NC31	4-1/8	2-5/32	11,500	434,500	6,200
	6.65	E-75 IU							XT26	3-3/8	1-3/4		290,900	6,900
	6.85	E-75 EU							HT31	4	2-5/32	14,900	434,500	8,900
									XT31		2-3/8	13,200	309,100	7,900
2-7/8	6.85	X-95 IU	10,200	172,100	2.441	12,548	12,940	2-7/8	NC26	3-1/2	1-1/2	8,800	390,300	4,900
									HT26	3-3/8	1-3/4	8,700	313,700	5,200
		X-95 EU							NC31	4-1/8	2-5/32	11,500	434,500	6,200
	6.65	X-95 IU							XT26	3-3/8	1-3/4		290,900	6,900
	6.85	X-95 EU							HT31	4	2-5/32	14,900	434,500	8,900
									XT31		2-3/8	13,200	309,100	7,900
2-7/8	6.85	G-105 IU	11,300	190,300	2.441	13,869	14,020	2-7/8	NC26	3-5/8	1-3/4	7,200	313,700	3,900
									HT26	3-3/8		8,700		5,200
		G-105 EU							NC31	4-1/8	2-5/32	11,500	434,500	6,200
	6.65	G-105 IU							XT26	3-3/8	1-3/4		290,900	6,900
	6.85	G-105 EU							HT31	4	2-5/32	14,900	434,500	8,900
									XT31		2-3/8	13,200	309,100	7,900
2-7/8	6.85	S-135 IU	14,500	244,600	2.441	17,832	17,034	2-7/8	NC26	3-5/8	1-1/2	9,000	390,300	4,900
									HT26	3-1/2		12,100		7,300
	6.85	S-135 EU							NC31	4-1/8	2-1/8	11,900	447,100	6,400
	6.65	S-135 IU							XT26	3-3/8	1-3/4	11,500	290,900	6,900
	6.85	S-135 EU							HT31	4	2-5/32	14,900	434,500	8,900
									XT31		2-3/8	13,200	309,100	7,900
2-7/8	6.85	Z-140 IU	15,100	253,700	2.441	18,492	17,500	2-7/8	HT26	3-1/2	1-1/2	12,100	390,300	7,300
	6.65								XT26	3-3/8	1-3/4	11,500	290,900	6,900
	6.85	Z-140 EU							HT31	4	2-5/32	14,900	434,500	8,900
									XT31		2-3/8	13,200	309,100	7,900
2-7/8	6.85	V-150 IU	16,200	271,800	2.441	19,813	18,398	2-7/8	HT26	3-1/2	1-1/2	12,100	390,300	7,300
	6.65								XT26	3-3/8	1-3/4	11,500	290,900	6,900
	6.85	V-150 EU							HT31	4	2-5/32	14,900	434,500	8,900
									XT31		2-3/8	13,200	309,100	7,900

This table provides data for the drill string. Data are given for the pipe body, tool joint, and drill pipe assembly in Class 1 (new) condition. The tool joint sizes displayed represent common OD and I D configurations, although additional size combinations are available. Grant Prideco offers all API tool joint connections as well as most non-API connections. Custom specifications and special sizes can be provided to meet specific requirements. The technical data are calculated per API RP7G, 16th edition, December 1, 1998 and API Spec 5D, 5th edition, April 30, 2002. While every effort has been made to insure the accuracy of the tables herein, this material is presented as a reference guide only. The technical information contained herein should not be construed as a recommendation. Grant Prideco can not assume responsibility for the results obtained through the use of this material. No expressed and implied warranty is intended. *Tong space is 2" longer than standard.

Data provided by Grant Prideco; October, 2005

Grant Prideco Drill Pipe Data (Continued)

Size OD	Nominal Weight	Grade and Upset Type	Torsional Yield Strength	Tensile Yield Strength	Nominal ID	Internal Pressure	Collapse Pressure	Connection Type		Outside Diameter	Inside Diameter	Torsional Yield Strength	Tensile Yield Strength	Make-up Torque
in.	lb/ft		ft-lb	lb	in.	psi	psi			in.	in.	ft-lb	lb	ft-lb
2-7/8	10.40	E-75 EU	11,600	214,300	2.15	16,526	16,509	2-7/8	NC31	4-1/8	2-1/8	11,900	447,100	6,400
									NC26	3-1/2	1-1/2	8,800	390,300	4,900
									SLH90	3-7/8	2	13,100	444,000	6,900
		E-75 IU							HT26	3-1/2	1-1/2	12,100	390,300	7,300
		E-75 EU							HT31	4-1/8	2-1/8	16,600	447,100	10,000
		E-75 IU							XT26	3-1/2	1-1/2	14,800	367,400	8,900
		E-75 EU							XT31	3-7/8	2-1/8	16,600	415,100	10,000
2-7/8	10.40	X-95 EU	14,600	271,500	2.151	20,933	20,911	2-7/8	NC31	4-1/8	2	13,200	495,700	7,100
		X-95 IU							NC26	3-1/2	1-1/2	8,800	390,300	4,900
		X-95 EU							SLH90	3-7/8	2	13,100	444,000	6,900
		X-95 IU							HT26	3-1/2	1-1/2	12,100	390,300	7,300
		X-95 EU							HT31	4-1/8	2-1/8	16,600	447,100	10,000
		X-95 IU							XT26	3-1/2	1-1/2	14,800	367,400	8,900
		X-95 EU							XT31	3-7/8	2-1/8	16,600	415,100	10,000
2-7/8	10.40	G-105 EU	16,200	300,100	2.151	23,137	23,112	2-7/8	NC31	4-1/8	2	13,200	495,700	7,100
		G-105 IU							NC26	3-1/2	1-1/2	8,800	390,300	4,900
		G-105 EU							SLH90	3-7/8	2	13,100	444,000	6,900
		G-105 IU							HT26	3-5/8	1-1/2		390,300	7,900
		G-105 EU							HT31	4-1/8	2-1/8	16,600	447,100	10,000
		G-105 IU							XT26	3-1/2	1-1/2	14,800	367,400	8,900
		G-105 EU							XT31	3-7/8	2-1/8	16,600	415,100	10,000
2-7/8	10.40	S-135 EU	20,800	385,800	2.151	29,747	29,716	2-7/8	NC31	4-1/8	2	13,200	495,700	7,100
		S-135 IU							NC26	3-5/8	1-1/2	9,000	390,300	4,900
		S-135 EU							SLH90	3-7/8	2	13,100	444,000	6,900
		S-135 IU							HT26	3-5/8	1-1/2		390,300	7,900
		S-135 EU							HT31	4-1/8	2	18,900	495,700	11,300
		S-135 IU							XT26	3-1/2	1-3/8	15,900	401,300	9,500
		S-135 EU							XT31	3-7/8	2-1/8	16,600	415,100	10,000
		S-135 EU							GPDS31	4-1/8	2	17,200	495,700	10,300
2-7/8	10.40	Z-140 IU	21,600	400,100	2.151	30,849	30,817	2-7/8	HT26	3-5/8	1-1/4	15,300	455,100	9,200
		Z-140 EU							HT31	4-1/8	2	18,900	495,700	11,300
		Z-140 IU							XT26	3-1/2	1-1/4	16,400	432,200	9,800
		Z-140 EU							XT31	4	2	20,400	463,700	12,200
									GPDS31	4-1/8		17,200	495,700	10,300
2-7/8	10.40	V-150 IU	23,100	428,700	2.151	33,052	33,018	2-7/8	HT26	3-5/8	1-1/4	15,300	455,100	9,200
		V-150 EU							HT31	4-1/8	2	18,900	495,700	11,300
		V-150 IU							XT26	3-1/2	1-1/4	16,400	432,200	9,800
		V-150 EU							XT31	4	2	20,400	463,700	12,200
									GPDS31	4-1/8		17,200	495,700	10,300
3-1/2	9.50	E-75 EU	14,100	194,300	2.992	9,525	10,001	3-1/2	NC38	4-3/4	2-11/16	18,100	587,300	9,700
		E-75 IU							NC31	4-1/8	2-1/8	11,900	447,100	6,400
									HT31			16,600		10,000
		E-75 EU							HT38	4-3/4	2-11/16	25,300	587,300	15,200
									SLH90			18,688	534,200	11,100
		E-75 IU							XT31	4	2-1/8	18,600	415,100	11,200
		E-75 EU							XT38	4-3/4	2-13/16	23,900	473,000	14,300
3-1/2	9.50	X-95 EU	17,900	246,100	2.992	12,065	12,077	3-1/2	NC38	4-3/4	2-11/16	18,100	587,300	9,700
		X-95 IU							NC31	4-1/8	2	13,200	495,700	7,100
									HT31		2-1/8	16,600	447,100	10,000
		X-95 EU							HT38	4-3/4	2-11/16	25,300	587,300	15,200
									SLH90			18,700	534,200	11,100
		X-95 IU							XT31	4	2-1/8	18,600	415,100	11,200
		X-95 EU							XT38	4-3/4	2-13/16	23,900	473,000	14,300

Refer to page 2-11 for additional information

Grant Prideco Drill Pipe Data (Continued)

Size OD	Nominal Weight	Grade and Upset Type	Torsional Yield Strength	Tensile Yield Strength	Nominal ID	Internal Pressure	Collapse Pressure	Connection Type		Outside Diameter	Inside Diameter	Torsional Yield Strength	Tensile Yield Strength	Make-up Torque
in.	lb/ft		ft-lb	lb	in.	psi	psi			in.	in.	ft-lb	lb	ft-lb
3-1/2	9.50	G-105 EU	19,800	272,000	2.992	13,335	13,055	3-1/2	NC38	4-3/4	2-11/16	18,100	587,300	9,700
		G-105 IU							NC31	4-1/8	2	13,200	495,700	7,100
									HT31			18,900		11,300
		G-105 EU							HT38	4-3/4	2-11/16	25,300	587,300	15,200
									SLH90			18,700	534,200	11,100
		G-105 IU							XT31	4	2-1/8	18,600	415,100	11,200
		G-105 EU							XT38	4-3/4	2-13/16	23,900	473,000	14,300
3-1/2	9.50	S-135 EU	25,500	349,700	2.992	17,145	15,748	3-1/2	NC38	4-7/8	2-9/16	20,200	649,200	10,700
		S-135 IU							NC31	4-1/8	2	13,200	495,700	7,100
									HT31			18,900		11,300
		S-135 EU							HT38	4-3/4	2-11/16	25,300	587,300	15,200
									SLH90		2-9/16	20,900	596,100	12,400
		S-135 IU							XT31	4	2	20,400	463,700	12,200
		S-135 EU							XT38	4-3/4	2-13/16	23,900	473,000	14,300
3-1/2	9.50	Z-140 IU	26,400	362,600	2.992	17,780	16,158	3-1/2	HT31	4-1/8	2	18,900	495,700	11,300
		Z-140 EU							HT38	4-3/4	2-11/16	25,300	587,300	15,200
		Z-140 IU							XT31	4	2	20,400	463,700	12,200
		Z-140 EU							XT38	4-3/4	2-13/16	23,900	473,000	14,300
3-1/2	9.50	V-150 IU	28,300	388,500	2.992	19,050	16,943	3-1/2	HT31	4-1/4	1-3/4	23,400	584,100	14,000
		V-150 EU							HT38	4-3/4	2-11/16	25,300	587,300	15,200
		V-150 IU							XT31	4	2	20,400	463,700	12,200
		V-150 EU							XT38	4-3/4	2-13/16	23,900	473,000	14,300
3-1/2	13.30	E-75 EU	18,600	271,600	2.764	13,800	14,113	3-1/2	NC38	4-3/4	2-11/16	18,100	587,300	9,700
		E-75 IU							NC31	4-1/8	2	13,200	495,700	7,100
									HT31		2-1/8	16,600	447,100	10,000
		E-75 EU							HT38	4-3/4	2-11/16	25,300	587,300	15,200
									SLH90			18,700	534,200	11,100
		E-75 IU							XT31	4	2-1/8	18,600	415,100	11,200
		E-75 EU							XT38	4-3/4	2-11/16	27,700	537,800	16,600
3-1/2	13.30	X-95 EU	23,500	344,000	2.764	17,480	17,877	3-1/2	NC38	5	2-9/16	20,300	649,200	10,700
		X-95 IU							NC31	4-1/8	2	13,200	495,700	7,100
									HT31			18,900		11,300
		X-95 EU			2.674				HT38	4-3/4	2-11/16	25,300	587,300	15,200
									SLH90			18,700	534,200	11,100
		X-95 IU							XT31	4	2-1/8	18,600	415,100	11,200
		X-95 EU							XT38	4-3/4	2-11/16	27,700	537,800	16,600
3-1/2	13.30	G-105 EU	26,000	380,200	2.764	19,320	19,758	3-1/2	NC38	5	2-7/16	22,200	708,100	11,700
		G-105 IU							NC31	4-1/8	2	13,200	495,700	7,100
									HT31			18,900		11,300
		G-105 EU							HT38	4-3/4	2-11/16	25,300	587,300	15,200
									SLH90		2-9/16	20,900	596,100	12,400
		G-105 IU							XT31	4-1/8	2	21,100	463,700	12,700
		G-105 EU							XT38	4-3/4	2-11/16	27,700	537,800	16,600
3-1/2	13.30	S-135 EU	33,400	488,800	2.764	24,840	25,404	3-1/2	NC38	5	2-1/8	26,500	842,400	14,000
		S-135 IU							NC31	4-1/8	2	13,200	495,700	7,100
									HT31			18,900		11,300
		S-135 EU							HT38	4-3/4	2-9/16	26,900	649,200	16,100
									SLH90			20,900	596,100	12,400
		S-135 IU							XT31	4-1/8	1-7/8	23,400	509,400	14,000
		S-135 EU							XT38	4-3/4	2-11/16	27,700	537,800	16,600
									GPDS38	4-7/8	2-9/16	25,700	649,200	15,400
3-1/2	13.30	Z-140 IU	34,600	506,900	2.764	25,760	26,345	3-1/2	HT31	4-1/8	1-7/8	19,900	541,400	11,900
		Z-140 EU							HT38	4-3/4	2-9/16	26,900	649,200	16,100
		Z-140 IU							XT31	4-1/8	1-3/4	25,000	552,100	15,000
		Z-140 EU							XT38	4-3/4	2-9/16	31,300	599,600	18,800
									GPDS38	5		25,800	649,200	15,500

Refer to page 2-11 for additional information

Grant Prideco Drill Pipe Data (Continued)

Size OD	Nominal Weight	Grade and Upset Type	Torsional Yield Strength	Tensile Yield Strength	Nominal ID	Internal Pressure	Collapse Pressure	Connection Type		Outside Diameter	Inside Diameter	Torsional Yield Strength	Tensile Yield Strength	Make-up Torque
in.	lb/ft		ft-lb	lb	in.	psi	psi			in.	in.	ft-lb	lb	ft-lb
3-1/2	13.30	V-150 IU	37,100	543,100	2.764	27,600	28,226	3-1/2	HT31	4-1/4	1-3/4	23,400	584,100	14,000
		V-150 EU							HT38	4-3/4	2-9/16	26,900	649,200	16,100
		V-150 IU							XT31	4-1/8	1-3/4	25,000	552,100	15,000
		V-150 EU							XT38	4-3/4	2-9/16	31,300	599,600	18,800
									GPDS38	5		25,800	649,200	15,500
3-1/2	15.50	E-75 EU	21,100	322,800	2.602	16,838	16,774	3-1/2	NC38	5	2-9/16	20,300	649,200	10,700
									HT38	4-3/4		26,900		16,100
									XT38			31,300	599,600	18,800
3-1/2	15.50	X-95 EU	26,700	408,800	2.602	21,328	21,247	3-1/2	NC38	5	2-7/16	22,200	708,100	11,700
									HT38	4-3/4	2-9/16	26,900	649,200	16,100
									XT38			31,300	599,600	18,800
3-1/2	15.50	G-105 EU	29,500	451,900	2.602	23,573	23,484	3-1/2	NC38	5	2-1/8	26,500	842,400	14,000
									HT38	4-3/4	2-9/16	26,900	649,200	16,100
									NC40	5-1/4		27,800	838,300	14,600
									XT38	4-3/4		31,300	599,600	18,800
3-1/2	15.50	S-135 EU	38,000	581,000	2.602	30,308	30,194	3-1/2	NC38	5	2-1/8	26,500	842,400	14,000
									HT38	4-3/4	2-7/16	28,400	708,100	17,000
									NC40	5-1/2	2-1/4	32,900	980,000	17,100
									XT38	4-3/4	2-7/16	34,200	658,500	20,500
									XT39	4-7/8		38,500	788,600	23,100
									GPDS38	5		29,200	708,100	17,500
3-1/2	15.50	Z-140 EU	39,400	602,500	2.602	31,430	31,312	3-1/2	HT38	4-3/4	2-7/16	28,400	708,100	17,000
									XT38			34,200	658,500	20,500
									XT39	4-7/8		38,500	788,600	23,100
									GPDS38	5		29,200	708,100	17,500
3-1/2	15.50	V-150 EU	42,200	645,500	2.602	33,675	33,549	3-1/2	HT38	5	2-1/4	37,700	790,900	22,600
									XT38	4-3/4		36,300	741,400	21,800
									XT39	4-7/8		40,700	871,400	24,400
									GPDS38	5		33,900	790,900	20,300
4	11.85	E-75 IU	19,500	230,800	3.476	8,597	8,381	4	NC40	5-1/4	2-13/16	23,500	711,600	12,400
									SH	4-3/4	2-9/16	15,300	512,000	8,100
									HT38		2-11/16	25,300	587,300	15,200
									XT38			27,700	537,800	16,600
									XT39	4-7/8	2-13/16	32,900	603,000	19,700
4	11.85	X-95 IU	24,700	292,300	3.476	10,889	9,978	4	NC40	5-1/4	2-13/16	23,500	711,600	12,400
									SH	4-3/4	2-9/16	15,300	512,000	8,100
									HT38		2-11/16	25,300	587,300	15,200
									XT38			27,700	537,800	16,600
									XT39	4-7/8		32,900	603,000	19,700
4	11.85	G-105 IU	27,300	323,100	3.476	12,036	10,708	4	NC40	5-1/4	2-13/16	23,500	711,600	12,400
									SH	4-3/4	2-9/16	15,300	512,000	8,100
									HT38			26,900	649,200	16,100
									XT38		2-11/16	27,700	537,800	16,600
									XT39	4-7/8	2-13/16	32,900	603,000	19,700
4	11.85	S-135 IU	35,100	415,400	3.476	15,474	12,618	4	NC40	5-1/2	2-9/16	28,100	838,300	14,600
									SH	4-3/4		15,300	512,000	8,100
									HT38		2-7/16	28,400	708,100	17,000
									XT38		2-11/16	27,700	537,800	16,600
									XT39	4-7/8	2-13/16	32,900	603,000	19,700
4	11.85	Z-140 IU	36,400	430,700	3.476	16,048	12,894	4	HT38	4-3/4	2-7/16	28,400	708,100	17,000
									XT38		2-11/16	27,700	537,800	16,600
									XT39	4-7/8	2-13/16	32,900	603,000	19,700
4	11.85	V-150 IU	38,900	461,500	3.476	17,194	13,404	4	HT38	5	2-7/16	33,000	708,100	19,800
									XT38	4-3/4	2-9/16	31,300	599,600	18,800
									XT39	4-7/8	2-13/16	32,900	603,000	19,700
4	14.00	E-75 IU	23,300	285,400	3.340	10,828	11,354	4	NC40	5-1/4	2-13/16	23,500	711,600	12,400
									HT38	4-3/4	2-11/16	25,300	587,300	15,200

Refer to page 2-11 for additional information

Grant Prideco Drill Pipe Data (Continued)

Size OD	Nominal Weight	Grade and Upset Type	Torsional Yield Strength	Tensile Yield Strength	Nominal ID	Internal Pressure	Collapse Pressure	Connection Type		Outside Diameter	Inside Diameter	Torsional Yield Strength	Tensile Yield Strength	Make-up Torque
in.	lb/ft		ft-lb	lb	in.	psi	psi			in.	in.	ft-lb	lb	ft-lb
4	14.00	E-75 IU	23,300	285,400	3.340	10,828	11,354	4	SH	4-3/4	2-7/16	17,100	570,900	9,100
									HT40	5-1/4	2-13/16	31,900	711,600	19,100
		E-75 EU							NC46	6	3-1/4	33,600	901,200	17,600
		E-75 IU							XT38	4-3/4	2-11/16	27,700	537,800	16,600
									XT39	4-7/8	2-13/16	32,900	603,000	19,700
4	14.00	X-95 IU	29,500	361,500	3.340	13,716	14,382	4	NC40	5-1/4	2-11/16	25,700	776,400	13,500
									HT38	4-3/4		25,300	587,300	15,200
									SH		2-7/16	17,100	570,900	9,100
									HT40	5-1/4	2-13/16	31,900	711,600	19,100
		X-95 EU							NC46	6	3-1/4	33,600	901,200	17,600
		X-95 IU							XT38	4-3/4	2-11/16	27,700	537,800	16,600
									XT39	4-7/8	2-13/16	32,900	603,000	19,700
4	14.00	G-105 IU	32,600	399,500	3.340	15,159	15,896	4	NC40	5-1/2	2-7/16	30,100	897,200	15,600
									HT38	5	2-9/16	29,600	649,200	17,800
									SH	4-3/4	2-7/16	17,100	570,900	9,100
									HT40	5-1/4	2-13/16	31,900	711,600	19,100
		G-105 EU							NC46	6	3-1/4	33,600	901,200	17,600
		G-105 IU							XT38	4-3/4	2-11/16	27,700	537,800	16,600
									XT39	4-7/8	2-13/16	32,900	603,000	19,700
4	14.00	S-135 IU	41,900	513,600	3.340	19,491	20,141	4	NC40	5-1/2	2	36,400	1,080,100	18,900
									HT38	5	2-7/16	33,000	708,100	19,800
									SH	4-3/4		17,100	570,900	9,100
									HT40	5-1/4	2-11/16	35,900	776,400	21,500
		S-135 EU							NC46	6	3	39,200	1,048,400	20,500
		S-135 IU							XT38	4-3/4	2-9/16	31,300	599,600	18,800
									XT39	4-7/8		37,000	729,700	22,200
									GPDS40	5-1/4	2-11/16	32,700	776,400	19,600
4	14.00	Z-140 IU	43,500	532,700	3.340	20,213	20,742	4	HT38	5	2-7/16	33,000	708,100	19,800
									HT40	5-1/4	2-11/16	35,900	776,400	21,500
									XT38	4-3/4	2-9/16	31,300	599,600	18,800
									XT39	4-7/8		37,000	729,700	22,200
									GPDS40	5-1/4		36,400	838,300	21,800
4	14.00	V-150 IU	46,600	570,700	3.340	21,656	21,912	4	HT38	5	2-7/16	33,000	708,100	19,800
									HT40	5-1/4	2-11/16	35,900	776,400	21,500
									XT38	4-3/4	2-7/16	34,200	658,500	20,500
									XT39	4-7/8	2-9/16	37,000	729,700	22,200
									GPDS40	5-1/4		36,400	838,300	21,800
4	15.70	E-75 IU	25,800	324,100	3.240	12,469	12,896	4	NC40	5-1/4	2-13/16	23,500	711,600	12,400
									HT40			31,900		19,100
									H90	5-1/2		35,400	913,700	20,400
		E-75 EU							NC46	6	3	39,200	1,048,400	20,500
		E-75 IU							XT39	4-7/8	2-9/16	37,000	729,700	22,200
									XT40	5-1/4	2-13/16	44,000	751,600	26,400
4	15.70	X-95 IU	32,700	410,500	3.240	15,794	16,335	4	NC40	5-1/4	2-9/16	27,800	838,300	14,600
									HT40		2-13/16	31,900	711,600	19,100
									H90	5-1/2		35,400	913,700	20,400
		X-95 EU							NC46	6	3	39,200	1,048,400	20,500
		X-95 IU							XT39	4-7/8	2-9/16	37,000	729,700	22,200
									XT40	5-1/4	2-13/16	44,000	751,600	26,400
4	15.70	G-105 IU	36,100	453,800	3.240	17,456	18,055	4	NC40	5-1/2	2-7/16	30,100	897,200	15,600
									HT40	5-1/4	2-13/16	31,900	711,600	19,100
									H90	5-1/2		35,400	913,700	20,400
		G-105 EU							NC46	6	3	39,200	1,048,400	20,500
		G-105 IU							XT39	4-7/8	2-9/16	37,000	729,700	22,200
									XT40	5-1/4	2-13/16	44,000	751,600	26,400

Refer to page 2-11 for additional information

Grant Prideco Drill Pipe Data (Continued)

Size OD	Nominal Weight	Grade and Upset Type	Torsional Yield Strength	Tensile Yield Strength	Nominal ID	Internal Pressure	Collapse Pressure	Connection Type		Outside Diameter	Inside Diameter	Torsional Yield Strength	Tensile Yield Strength	Make-up Torque
in.	lb/ft		ft-lb	lb	in.	psi	psi			in.	in.	ft-lb	lb	ft-lb
4	15.70	S-135 IU	46,500	583,400	3.240	22,444	23,213	4	NC40	5-1/2	2	36,400	1,080,100	18,900
									HT40	5-1/4	2-9/16	39,500	838,300	23,700
									H90	5-3/4	2-11/16	38,400	978,500	21,800
		S-135 EU							NC46	6	3	39,200	1,048,400	20,500
		S-135 IU							XT39	4-7/8	2-9/16	37,000	729,700	22,200
									XT40	5-1/4	2-13/16	44,000	751,600	26,400
									GPDS40		2-9/16	36,400	838,300	21,800
4	15.70	Z-140 IU	48,200	605,000	3.240	23,275	24,073	4	HT40	5-1/4	2-9/16	39,500	838,300	23,700
									XT39	4-7/8		37,000	729,700	22,200
									XT40	5-1/4	2-13/16	44,000	751,600	26,400
									GPDS40		2-9/16	36,400	838,300	21,800
4	15.70	V-150 IU	51,600	648,200	3.240	24,938	25,793	4	HT40	5-1/4	2-7/16	41,000	897,200	24,600
									XT39	4-7/8	2-9/16	37,000	729,700	22,200
									XT40	5-1/4	2-11/16	48,100	816,400	28,900
									GPDS40		2-7/16	38,100	897,200	22,900
4-1/2	16.60	E-75 IEU	30,800	330,600	3.826	9,829	10,392	4-1/2	NC46	6-1/4	3-1/4	34,000	901,200	17,600
		E-75 EU							OH	5-7/8	3-3/4	27,300	714,000	14,600
		E-75 IEU							FH	6	3	34,800	976,200	17,600
									H90		3-1/4	39,000	938,400	18,800
									HT46	6-1/4		47,600	901,200	28,600
		E-75 EU							NC50	6-5/8	3-3/4	38,100	939,100	19,800
									HT50	6-1/4		52,700		31,600
		E-75 IEU							XT40	5-1/4	3	37,400	648,900	22,400
									XT46	6	3-1/2	58,100	910,300	34,900
		E-75 EU							XT50	6-3/8	3-3/4	75,200	1,085,500	45,100
4-1/2	16.60	X-95 IEU	39,000	418,700	3.826	12,450	12,765	4-1/2	NC46	6-1/4	3-1/4	34,000	901,200	17,600
		X-95 EU							OH	5-7/8	3-1/2	33,900	884,800	18,200
		X-95 IEU							FH	6	3	34,800	976,200	17,600
									H90		3-1/4	39,000	938,400	18,800
									HT46	6-1/4		47,600	901,200	28,600
		X-95 EU							NC50	6-5/8	3-3/4	38,100	939,100	19,800
									HT50	6-1/4		52,700		31,600
		X-95 IEU							XT40	5-1/4	3	37,400	648,900	22,400
									XT46	6	3-1/2	58,100	910,300	34,900
		X-95 EU							XT50	6-3/8	3-3/4	75,200	1,085,500	45,100
4-1/2	16.60	G-105 IEU	43,100	462,800	3.826	13,761	13,825	4-1/2	NC46	6-1/4	3	39,700	1,048,400	20,500
		G-105 EU							OH	6	3-1/4	40,300	1,043,800	21,500
		G-105 IEU							FH	6-1/4	2-3/4	40,200	1,111,600	20,100
									H90	6	3-1/4	39,000	938,400	18,800
									HT46	6-1/4		47,600	901,200	28,600
		G-105 EU							NC50	6-5/8	3-3/4	38,100	939,100	19,800
									HT50	6-1/4		52,700		31,600
		G-105 IEU							XT40	5-1/4	3	37,400	648,900	22,400
									XT46	6	3-1/2	58,100	910,300	34,900
		G-105 EU							XT50	6-3/8	3-3/4	75,200	1,085,500	45,100
4-1/2	16.60	S-135 IEU	55,500	595,000	3.826	17,693	16,773	4-1/2	NC46	6-1/4	2-3/4	44,900	1,183,900	23,200
		S-135 EU							OH	6	3	43,400	1,191,100	24,600
		S-135 IEU							FH	6-1/4	2-3/4	40,200	1,111,600	20,100
									H90			51,500	1,221,100	24,600
									HT46		3-1/4	47,600	901,200	28,600
		S-135 EU							NC50	6-5/8	3-1/2	45,100	1,109,900	23,400
									HT50	6-3/8		65,700		39,400
		S-135 IEU							XT40	5-1/4	2-13/16	44,000	751,600	26,400
									XT46	6	3-1/2	58,100	910,300	34,900
		S-135 EU							XT50	6-3/8	3-3/4	75,200	1,085,500	45,100
		S-135 IEU							GPDS46	6-1/4	3-1/4	43,300	901,200	26,000

Refer to page 2-11 for additional information

Grant Prideco Drill Pipe Data (Continued)

Size OD	Nominal Weight	Grade and Upset Type	Torsional Yield Strength	Tensile Yield Strength	Nominal ID	Internal Pressure	Collapse Pressure	Connection Type		Outside Diameter	Inside Diameter	Torsional Yield Strength	Tensile Yield Strength	Make-up Torque
in.	lb/ft		ft-lb	lb	in.	psi	psi			in.	in.	ft-lb	lb	ft-lb
4-1/2	16.60	Z-140 IEU	57,500	617,000	3.826	18,348	17,228	4-1/2	HT46	6-1/4	3-1/4	47,600	901,200	28,600
		Z-140 EU							HT50	6-3/8	3-1/2	65,700	1,109,900	39,400
		Z-140 IEU							XT40	5-1/4	2-13/16	44,000	751,600	26,400
									XT46	6	3-1/2	58,100	910,300	34,900
		Z-140 EU							XT50	6-3/8	3-3/4	75,200	1,085,500	45,100
		Z-140 IEU							GPDS46	6-1/4	3-1/4	43,300	901,200	26,000
4-1/2	16.60	V-150 IEU	61,600	661,100	3.826	19,658	18,103	4-1/2	HT46	6-1/4	3-1/4	47,600	901,200	28,600
		V-150 EU							HT50	6-3/8	3-1/2	65,700	1,109,900	39,400
		V-150 IEU							XT40	5-1/4	2-13/16	44,000	751,600	26,400
									XT46	6-1/4	3-1/4	70,200	1,069,300	42,100
		V-150 EU							XT50	6-3/8	3-1/2	81,200	1,256,300	48,700
		V-150 IEU							GPDS46	6-1/4	3-1/4	43,300	901,200	26,000
4-1/2	20.00	E-75 IEU	36,900	412,400	3.640	12,542	12,964	4-1/2	NC46	6-1/4	3	39,700	1,048,400	20,500
		E-75 EU							OH	6	3-1/2	34,100	884,800	18,200
		E-75 IEU							H90		3-1/4	39,000	938,400	18,800
									HT46	6-1/4		47,600	901,200	28,600
		E-75 EU							NC50	6-5/8	3-5/8	41,700	1,026,000	21,600
									HT50	6-1/4		59,200		35,500
		E-75 IEU							XT46	6	3-1/2	58,100	910,300	34,900
		E-75 EU							XT50	6-3/8		81,200	1,256,300	48,700
4-1/2	20.00	X-95 IEU	46,700	522,300	3.640	15,886	16,421	4-1/2	NC46	6-1/4	3	39,700	1,048,400	20,500
		X-95 EU							OH		3-1/4	40,700	1,043,800	21,500
		X-95 IEU							H90	6		39,000	938,400	18,800
									HT46	6-1/4		47,600	901,200	28,600
		X-95 EU							NC50	6-5/8	3-1/2	45,100	1,109,900	23,400
									HT50	6-1/4		62,700		37,600
		X-95 IEU							XT46	6		58,100	910,300	34,900
		X-95 EU							XT50	6-3/8		81,200	1,256,300	48,700
4-1/2	20.00	G-105 IEU	51,700	577,300	3.640	17,558	18,149	4-1/2	NC46	6-1/4	2-3/4	44,900	1,183,900	23,200
		G-105 EU							OH		3	46,600	1,191,100	24,600
		G-105 IEU							H90			45,700	1,085,700	21,800
									HT46		3-1/4	47,600	901,200	28,600
		G-105 EU							NC50	6-5/8	3-1/2	45,100	1,109,900	23,400
									HT50	6-1/4		62,700		37,600
		G-105 IEU							XT46	6		58,100	910,300	34,900
		G-105 EU							XT50	6-3/8		81,200	1,256,300	48,700
4-1/2	20.00	S-135 IEU	66,400	742,200	3.640	22,575	23,335	4-1/2	NC46	6-1/4	2-3/4	44,900	1,183,900	23,200
		S-135 EU							OH	6-3/8		52,200	1,326,600	27,400
		S-135 IEU							H90			51,700	1,221,100	24,600
									HT46	6-1/4	3	57,700	1,048,400	34,600
		S-135 EU							NC50	6-5/8	3-1/4	51,700	1,269,000	26,800
									HT50	6-3/8	3-1/2	65,700	1,109,900	39,400
		S-135 IEU							XT46	6	3-1/4	64,800	1,069,300	38,900
		S-135 EU							XT50	6-3/8	3-1/2	81,200	1,256,300	48,700
		S-135 IEU							GPDS46	6-1/4	3	53,400	1,048,400	32,000
4-1/2	20.00	Z-140 IEU	68,900	769,700	3.640	23,411	24,199	4-1/2	HT46	6-1/4	3	57,700	1,048,400	34,600
		Z-140 EU							HT50	6-3/8	3-1/2	65,700	1,109,900	39,400
		Z-140 IEU							XT46	6	3-1/4	64,800	1,069,300	38,900
		Z-140 EU							XT50	6-3/8	3-1/2	81,200	1,256,300	48,700
		Z-140 IEU							GPDS46	6-1/4	3	53,400	1,048,400	32,000
4-1/2	20.00	V-150 IEU	73,800	824,700	3.640	25,083	25,927	4-1/2	HT46	6-1/4	3	57,700	1,048,400	34,600
		V-150 EU							HT50	6-3/8	3-1/2	65,700	1,109,900	39,400
		V-150 IEU							XT46	6-1/4	3-1/8	75,700	1,144,400	45,400
									XT50	6-3/8	3-1/2	81,200	1,256,300	48,700
		V-150 EU							GPDS46	6-1/4	3	53,400	1,048,400	32,000
		V-150 IEU												
5	19.50	E-75 IEU	41,200	395,600	4.276	9,503	9,962	4-1/2	NC50	6-5/8	3-3/4	38,100	939,100	19,800
									HT50			53,300		32,000

Refer to page 2-11 for additional information

Grant Prideco Drill Pipe Data (Continued)

Size OD	Nominal Weight	Grade and Upset Type	Torsional Yield Strength	Tensile Yield Strength	Nominal ID	Internal Pressure	Collapse Pressure	Connection Type		Outside Diameter	Inside Diameter	Torsional Yield Strength	Tensile Yield Strength	Make-up Torque
in.	lb/ft		ft-lb	lb	in.	psi	psi			in.	in.	ft-lb	lb	ft-lb
5	19.50	E-75 IEU	41,200	395,600	4.276	9,503	9,962	5-1/2	FH	7	3-3/4	62,900	1,448,400	33,400
									XT46	6	3-1/2	36,500	910,300	21,900
									XT50	6-1/2	4	38,700	902,900	23,200
5	19.50	X-95 IEU	52,100	501,100	4.276	12,037	12,026	5-1/2	NC50	6-5/8	3-1/2	45,100	1,109,900	23,400
									HT50		3-3/4	53,300	939,100	32,000
									FH	7		62,900	1,448,400	33,400
									XT46	6	3-1/2	58,100	910,300	34,900
									XT50	6-1/2	4	62,500	902,900	37,500
5	19.50	G-105 IEU	57,600	553,800	4.276	13,304	12,999	5-1/2	NC50	6-5/8	3-1/4	51,700	1,269,000	26,800
									HT50		3-1/2	66,200	1,109,900	39,700
									FH	7	3-3/4	62,900	1,448,400	33,400
									XT46	6	3-1/2	58,100	910,300	34,900
									XT50	6-1/2	4	62,500	902,900	37,500
									GPDS50	6-5/8	3-1/2	60,400	1,110,200	36,200
5	19.50	S-135 IEU	74,100	712,100	4.276	17,105	15,672	5-1/2	NC50	6-5/8	2-3/4	63,400	1,551,700	32,900
									HT50		3-1/2	66,200	1,109,900	39,700
									FH	7-1/4		72,500	1,619,200	37,400
									XT46	6		58,100	910,300	34,900
									XT50	6-1/2	3-3/4	77,000	1,085,500	46,200
									GPDS50	6-5/8	3-1/2	60,400	1,110,200	36,200
5	19.50	Z-140 IEU	76,800	738,400	4.276	17,738	16,079	5-1/2	HT50	6-5/8	3-1/2	66,200	1,109,900	39,700
									XT46	6		58,100	910,300	34,900
									XT50	6-1/2	3-3/4	77,000	1,085,500	46,200
									GPDS50	6-5/8	3-1/2	60,400	1,110,200	36,200
5	19.50	V-150 IEU	82,300	791,200	4.276	19,005	16,858	5-1/2	HT50	6-5/8	3-1/2	66,200	1,109,900	39,700
									XT46	6-1/4	3-1/4	70,200	1,069,300	42,100
									XT50	6-1/2	3-3/4	77,000	1,085,500	46,200
									GPDS50	6-5/8	3-1/2	60,400	1,110,200	36,200
5	25.60	E-75 IEU	52,300	530,100	4.000	13,125	13,500	5-1/2	NC50	6-5/8	3-1/2	45,100	1,109,900	23,400
									HT50		3-3/4	53,300	939,100	32,000
									FH	7	3-1/2	62,900	1,619,200	37,400
									XT50	6-5/8	3-3/4	77,300	1,085,500	46,400
5	25.60	X-95 IEU	66,200	671,500	4.000	16,625	17,100	5-1/2	NC50	6-5/8	3	57,800	1,416,200	30,000
									HT50		3-1/2	66,200	1,109,900	39,700
									FH	7		62,900	1,619,200	37,400
									XT50	6-5/8	3-3/4	77,300	1,085,500	46,400
5	25.60	G-105 IEU	73,200	742,200	4.000	18,375	18,900	5-1/2	NC50	6-5/8	2-3/4	63,400	1,551,700	32,900
									HT50		3-1/2	66,200	1,109,900	39,700
									FH	7-1/4		72,500	1,619,200	37,400
									XT50	6-5/8	3-3/4	77,300	1,085,500	46,400
									GPDS50		3-1/2	60,400	1,110,200	36,200
5	25.60	S-135 IEU	94,100	954,300	4.000	23,625	24,300	5-1/2	NC50	6-5/8	2-3/4	63,400	1,551,700	32,900
									HT50		3-1/2	66,200	1,109,900	39,700
									FH	7-1/4	3-1/4	78,700	1,778,300	41,200
									XT50	6-5/8	3-1/2	90,700	1,256,300	54,400
									GPDS50			60,400	1,110,200	36,200
5	25.60	Z-140 IEU	97,500	989,600	4.000	24,500	25,200	5-1/2	HT50	6-5/8	3-1/4	78,000	1,269,000	46,800
									XT50		3-1/2	90,700	1,256,300	54,400
									GPDS50		3-1/4	72,200	1,269,200	43,300
5	25.60	V-150 IEU	104,500	1,060,300	4.000	26,250	27,000	5-1/2	HT50	6-5/8	3-1/4	78,000	1,269,000	46,800
									XT50		3-3/8	97,000	1,337,300	58,200
									GPDS50		3-1/4	72,200	1,269,200	43,300
5-1/2	21.90	E-75 IEU	50,700	437,100	4.778	8,615	8,413	5-1/2	FH	7	4	57,900	1,265,800	31,200
									HT55			77,200		46,300
									XT54	6-3/4	4-1/4	70,400	960,700	42,200
									XT57	7		94,300	1,208,700	56,600

Refer to page 2-11 for additional information

Grant Prideco Drill Pipe Data (Continued)

Size OD	Nominal Weight	Grade and Upset Type	Torsional Yield Strength	Tensile Yield Strength	Nominal ID	Internal Pressure	Collapse Pressure	Connection Type		Outside Diameter	Inside Diameter	Torsional Yield Strength	Tensile Yield Strength	Make-up Torque
in.	lb/ft		ft-lb	lb	in.	psi	psi			in.	in.	ft-lb	lb	ft-lb
5-1/2	21.90	X-95 IEU	64,200	553,700	4.778	10,912	10,019	5-1/2	FH	7	3-3/4	65,100	1,448,400	35,700
									HT55		4	77,200	1,265,800	46,300
									XT54	6-3/4	4-1/4	70,400	960,700	42,200
									XT57	7		94,300	1,208,700	56,600
5-1/2	21.90	G-105 IEU	71,000	612,000	4.778	12,061	10,753	5-1/2	FH	7-1/4	3-1/2	75,000	1,619,200	40,000
									HT55	7	4	77,200	1,265,800	46,300
									XT54	6-3/4	4-1/4	70,400	960,700	42,200
									XT57	7		94,300	1,208,700	56,600
									GPDS55		4	74,200	1,292,500	44,500
5-1/2	21.90	S-135 IEU	91,300	786,800	4.778	15,507	12,679	5-1/2	FH	7-1/2	3	90,200	1,925,500	47,700
									HT55	7	4	77,200	1,265,800	46,300
									XT54	6-3/4	4-1/4	70,400	960,700	42,200
									XT57	7		94,300	1,208,700	56,600
									GPDS55		4	74,200	1,292,500	44,500
5-1/2	21.90	Z-140 IEU	94,700	816,000	4.778	16,081	12,957	5-1/2	FH	7-1/2	3	90,200	1,925,500	47,700
									HT55	7	4	77,200	1,265,800	46,300
									XT54	6-3/4	4-1/4	70,400	960,700	42,200
									XT57	7		94,300	1,208,700	56,600
									GPDS55		4	74,200	1,292,500	44,500
5-1/2	21.90	V-150 IEU	101,400	874,200	4.778	17,230	13,473	5-1/2	FH	7-1/2	3	90,200	1,925,500	47,700
									HT55	7	4	77,200	1,265,800	46,300
									XT54	6-3/4		86,600	1,155,100	52,000
									XT57	7	4-1/4	94,300	1,208,700	56,600
									GPDS55		4	74,200	1,292,500	44,500
5-1/2	24.70	E-75 IEU	56,600	497,200	4.670	9,903	10,464	5-1/2	FH	7	4	57,900	1,265,800	31,200
									HT55			77,200		46,300
									XT54	6-3/4	4-1/4	70,400	960,700	42,200
									XT57	7		94,300	1,208,700	56,600
5-1/2	24.70	X-95 IEU	71,700	629,800	4.670	12,544	12,933	5-1/2	FH	7-1/4	3-1/2	75,000	1,619,200	40,000
									HT55	7	4	77,200	1,265,800	46,300
									XT54	6-3/4	4-1/4	70,400	960,700	42,200
									XT57	7		94,300	1,208,700	56,600
5-1/2	24.70	G-105 IEU	79,200	696,100	4.670	13,865	14,013	5-1/2	FH	7-1/4	3-1/2	75,000	1,619,200	40,000
									HT55	7	4	77,200	1,265,800	46,300
									XT54	6-3/4	4-1/4	70,400	960,700	42,200
									XT57	7		94,300	1,208,700	56,600
									GPDS55		4	74,200	1,292,500	44,500
5-1/2	24.70	S-135 IEU	101,800	895,000	4.670	17,826	17,023	5-1/2	FH	7-1/2	3	90,200	1,925,500	47,700
									HT55	7	4	77,200	1,265,800	46,300
									XT54	6-3/4		86,600	1,155,100	52,000
									XT57	7	4-1/4	94,300	1,208,700	56,600
									GPDS55		4	74,200	1,292,500	44,500
5-1/2	24.70	Z-140 IEU	105,600	928,100	4.670	18,486	17,489	5-1/2	FH	7-1/2	3	90,200	1,925,500	47,700
									HT55	7	3-3/4	87,700	1,448,400	52,600
									XT54	6-3/4	4	86,600	1,155,100	52,000
									XT57	7	4-1/4	94,300	1,208,700	56,600
									GPDS55	7-1/8	3-3/4	89,300	1,475,100	53,600
5-1/2	24.70	V-150 IEU	113,100	994,400	4.670	19,807	18,386	5-1/2	FH	7-1/2	3	90,200	1,925,500	47,700
									HT55	7	3-3/4	87,700	1,448,400	52,600
									XT54	6-3/4	4	86,600	1,155,100	52,000
									XT57	7		106,200	1,403,100	63,700
									GPDS55	7-1/8	4-1/8	66,600	1,196,700	40,000
5-7/8	23.40	E-75 IEU	58,600	469,000	5.153	8,065	7,453	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600
5-7/8	23.40	X-95 IEU	74,200	594,100	5.153	10,216	8,775	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600
5-7/8	23.40	G-105 IEU	82,000	656,600	5.153	11,291	9,362	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600
5-7/8	23.40	S-135 IEU	105,500	844,200	5.153	14,517	10,825	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600
5-7/8	23.40	Z-140 IEU	109,400	875,500	5.153	15,054	11,023	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600
5-7/8	23.40	V-150 IEU	117,200	938,000	5.153	16,130	11,376	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600

Refer to page 2-11 for additional information

Grant Prideco Drill Pipe Data (Continued)

Size OD	Nominal Weight	Grade and Upset Type	Torsional Yield Strength	Tensile Yield Strength	Nominal ID	Internal Pressure	Collapse Pressure	Connection Type		Outside Diameter	Inside Diameter	Torsional Yield Strength	Tensile Yield Strength	Make-up Torque
in.	lb/ft		ft-lb	lb	in.	psi	psi			in.	in.	ft-lb	lb	ft-lb
5-7/8	26.30	E-75 IEU	65,500	533,900	5.045	9,271	9,558	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600
5-7/8	26.30	X-95 IEU	83,000	676,300	5.045	11,744	11,503	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600
5-7/8	26.30	G-105 IEU	91,700	747,400	5.045	12,980	12,414	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600
5-7/8	26.30	S-135 IEU	117,900	961,000	5.045	16,688	14,892	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600
5-7/8	26.30	Z-140 IEU	122,300	996,600	5.045	17,306	15,266	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600
5-7/8	26.30	V-150 IEU	131,000	1,067,800	5.045	18,543	15,976	5-7/8	XT57	7	4-1/4	94,300	1,208,700	56,600
6-5/8	25.20	E-75 IEU	70,600	489,500	5.965	6,538	4,788	6-5/8	FH	8	5	73,700	1,448,400	38,400
									HT65			99,700		59,800
									XT65			135,300	1,543,700	81,200
6-5/8	25.20	X-95 IEU	89,400	620,000	5.965	8,281	5,321	6-5/8	FH	8	5	73,700	1,448,400	38,400
									HT65			99,700		59,800
									XT65			135,300	1,543,700	81,200
6-5/8	25.20	G-105 IEU	98,800	685,200	5.965	9,153	5,500	6-5/8	FH	8-1/4	4-3/4	86,200	1,678,100	44,600
									HT65	8	5	99,700	1,448,400	59,800
									XT65			135,300	1,543,700	81,200
6-5/8	25.20	S-135 IEU	127,000	881,000	5.965	11,768	6,036	6-5/8	FH	8-1/2	4-1/4	109,200	2,102,300	56,100
									HT65	8	5	99,700	1,448,400	59,800
									XT65			135,300	1,543,700	81,200
									GPDS65		4-7/8	107,500	1,596,400	64,500
6-5/8	25.20	Z-140 IEU	131,700	913,700	5.965	12,204	6,121	6-5/8	FH	8-1/2	4-1/4	109,200	2,102,300	56,100
									HT65	8	5	99,700	1,448,400	59,800
									XT65			135,300	1,543,700	81,200
									GPDS65	8-1/4	4-7/8	108,200	1,596,400	64,900
6-5/8	27.70	V-150 IEU	141,200	978,900	5.965	13,075	6,260	6-5/8	FH	8-1/2	4-1/4	109,200	2,102,300	56,100
									HT65	8	5	99,700	1,448,400	59,800
									XT65			135,300	1,543,700	81,200
									GPDS65	8-1/4	4-7/8	108,200	1,596,400	64,900
6-5/8	27.70	E-75 IEU	76,300	534,200	5.901	7,172	5,894	6-5/8	FH	8	5	73,700	1,448,400	38,400
									HT65			99,700		59,800
									XT65			135,300	1,543,700	81,200
6-5/8	27.70	X-95 IEU	96,600	676,700	5.901	9,084	6,755	6-5/8	FH	8-1/4	4-3/4	86,200	1,678,100	44,600
									HT65	8	5	99,700	1,448,400	59,800
									XT65			135,300	1,543,700	81,200
6-5/8	27.70	G-105 IEU	106,800	747,900	5.901	10,040	7,103	6-5/8	FH	8-1/4	4-3/4	86,200	1,678,100	44,600
									HT65	8	5	99,700	1,448,400	59,800
									XT65			135,300	1,543,700	81,200
6-5/8	27.70	S-135 IEU	137,300	961,600	5.901	12,909	7,813	6-5/8	FH	8-1/2	4-1/4	109,200	2,102,300	56,100
									HT65	8	5	99,700	1,448,400	59,800
									XT65			135,300	1,543,700	81,200
									GPDS65		4-7/8	107,500	1,596,400	64,500
6-5/8	27.70	Z-140 IEU	142,400	997,200	5.901	13,387	7,881	6-5/8	FH	8-1/2	4-1/4	109,200	2,102,300	56,100
									HT65	8	5	99,700	1,448,400	59,800
									XT65			135,300	1,543,700	81,200
									GPDS65	8-1/4	4-7/8	108,200	1,596,400	64,900
6-5/8	27.70	V-150 IEU	152,600	1,068,400	5.901	14,343	7,970	6-5/8	FH	8-1/2	4-1/4	109,200	2,102,300	56,100
									HT65	8	5	99,700	1,448,400	59,800
									XT65			135,300	1,543,700	81,200
									GPDS65	8-1/4	4-7/8	108,200	1,596,400	64,900

Refer to page 2-11 for additional information

VAM EIS 95 KSI

Connection Type	Outside Diameter		Inside Diameter		Distance Between Shoulders		Recommended Make-Up Torque (±5% with max 2,000 ft-lb)	
	in.	*mm*	in.	*mm*	in.	*mm*	ft-lb	*Nm*
NC26 VAM EIS	3-3/8	*85.73*	1-3/4	*44.45*	3.626	*92.10*	4,400	*6,000*
	3-1/2	*88.90*	1-1/2	*38.10*			6,000	*8,100*
	3-5/8	*92.08*					6,100	*8,300*
NC38 VAM EIS	4-3/4	*120.65*	2-7/16	*61.91*	4.626	*117.50*	13,100	*17,800*
			2-9/16	*65.09*			12,400	*16,800*
			2-11/16	*68.26*			11,200	*15,200*
	5	*127.00*	2 13/16	*71.44*			9,500	*12,900*
			2-9/16	*65.09*			13,000	*17,600*
			2-7/16	*61.91*			14,500	*19,700*
			2-11/16	*68.26*			11,250	*15,300*
NC46 VAM EIS	6	*152.40*	3-1/4	*82.55*	5.126	*130.20*	21,500	*29,100*
			3	*76.20*			26,200	*35,500*
	6-1/4	*158.75*	3-1/4	*82.55*			21,600	*29,300*
			3	*76.20*			26,400	*35,800*
			2-3/4	*69.85*			30,800	*41,800*
NC50 VAM EIS	6-1/2	*165.10*	3-1/4	*82.55*	5.126	*130.20*	35,400	*48,000*
	6-3/8	*161.93*					34,900	*47,300*
			3-1/2	*88.90*			29,700	*40,300*
			3-3/4	*95.25*			23,700	*32,100*
	6-5/8	*168.28*	3-1/2	*88.90*			29,900	*40,500*
			3-1/4	*82.55*			35,400	*48,000*
			3	*76.20*			40,600	*55,000*
			2-3/4	*69.85*			45,200	*61,300*
5-1/2 FH VAM EIS	7	*177.80*	3-3/4	*95.25*	5.626	*142.90*	42,600	*5,800*
			3-1/2	*88.90*			45,500	*61,700*
	7-1/4	*184.15*	3-3/4	*95.25*			43,500	*59,000*
			3-1/2	*88.90*			50,000	*67,800*
	7-1/2	*190.50*	3	*76.20*			61,900	*83,900*
6-5/8 FH VAM EIS	8	*203.20*	5	*127.00*	5.626	*142.90*	47,300	*64,100*
			4-3/4	*120.65*			57,700	*78,200*
	8-1/4	*209.55*	5	*127.00*			47,600	*64,500*
			4-3/4	*120.65*			58,000	*78,600*
	8-1/2	*215.90*	5	*127.00*			47,900	*64,900*
			4-3/4	*120.65*			58,300	*79,000*

The above make-up torques with the friction factor of 1.0 should be applied to VAM TAURUS connections only in 120 ksi. The tolerance on make-up torque is ± 5% with max 2,000 ft-lb

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM EIS 120 KSI

Connection Type	Outside Diameter		Inside Diameter		Distance Between Shoulders		Recommended Make-Up Torque (±5% with max 2,000 ft-lb)	
	in.	*mm*	in.	*mm*	in.	*mm*	ft-lb	*Nm*
NC26 VAM EIS	3-3/8	*85.73*	1-3/4	*44.45*	3.626	*92.10*	5,500	*7,500*
	3-1/2	*88.90*	1-1/2	*38.10*			7,600	*10,300*
	3-5/8	*92.08*					7,700	*10,400*
NC38 VAM EIS	4-3/4	*120.65*	2-7/16	*61.91*	4.626	*117.50*	16,600	*22,500*
			2-9/16	*65.09*			15,700	*21,300*
			2-11/16	*68.26*			14,100	*19,100*
	5	*127.00*	2-13/16	*71.44*			12,000	*16,300*
			2-9/16	*65.09*			16,400	*22,200*
			2-7/16	*61.91*			18,400	*24,900*
			2-11/16	*68.26*			14,300	*19,400*
NC46 VAM EIS	6	*152.40*	3-1/4	*82.55*	5.126	*130.20*	27,100	*36,700*
			3	*76.20*			33,100	*44,900*
	6-1/4	*158.75*	3-1/4	*82.55*			27,300	*37,000*
			3	*76.20*			33,400	*45,300*
			2-3/4	*69.85*			38,900	*52,700*
NC50 VAM EIS	6-1/2	*165.10*	3-1/4	*82.55*	5.126	*130.20*	44,600	*60,500*
	6-3/8	*161.93*					44,100	*59,800*
			3-1/2	*88.90*			37,500	*50,800*
			3-3/4	*95.25*			29,900	*40,500*
	6-5/8	*168.28*	3-1/2	*88.90*			37,800	*51,200*
			3-1/4	*82.55*			44,800	*60,700*
			3	*76.20*			51,200	*69,400*
			2-3/4	*69.85*			57,100	*77,400*
5-1/2 FH VAM EIS	7	*177.80*	3-3/4	*95.25*	5.626	*142.90*	53,800	*72,900*
			3-1/2	*88.90*			57,400	*77,800*
	7-1/4	*184.15*	3-3/4	*95.25*			54,900	*74,400*
			3-1/2	*88.90*			63,200	*85,700*
	7-1/2	*190.50*	3	*76.20*			78,200	*106,000*
6-5/8 FH VAM EIS	8	*203.20*	5	*127.00*	5.626	*142.90*	59,700	*80,900*
			4-3/4	*120.65*			72,800	*98,700*
	8-1/4	*209.55*	5	*127.00*			60,100	*81,500*
			4-3/4	*120.65*			73,200	*99,200*
	8-1/2	*215.90*	5	*127.00*			60,500	*82,000*
			4-3/4	*120.65*			73,600	*99,800*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; by TSLI 942, Rev. 02 edition, pages 5 of 6; August, 2005

VAM EIS

Connection Type	Outside Diameter		Inside Diameter		Thickness		120 Ksi						105 Ksi						95 Ksi					
							Torsional Yield Strength		Tensile Yield Strength		Make-Up Torque		Torsional Yield Strength		Tensile Yield Strength		Make-Up Torque		Torsional Yield Strength		Tensile Yield Strength		Make-Up Torque	
	in.	mm	in.	mm	in.	mm	ft-lb	Nm	1,000 lb	kn	ft-lb	Nm	ft-lb	Nm	1,000 lb	kn	ft-lb	Nm	ft-lb	Nm	1,000 lb	kn	ft-lb	Nm
NC26 VAM EIS	3-3/8	85.73	1-3/4	44.45	0.81	20.64	9,240	12,520	314	1,396	5,540	7500	8,080	10,950	274	1218	4,850	6,600	7,310	9,910	248	1,103	4,400	6,000
	3-1/2	88.90	1-1/2	38.10	1.00	25.40	12,590	17,060	390	1,734	7,560	10,200	11,020	14,940	341	1,516	6,600	8,900	9,970	13,510	309	1,374	6,000	8,100
	3-5/8	92.08			1.06	26.99	12,790	17,340			7,670	10,400	11,190	15,170			6,700	9,100	10,120	13,720			6,050	8,200
NC38 VAM EIS	4-3/4	120.65	2-7/16	61.91	1.16	29.37	27,620	37,440	708	3,149	16,550	22,400	24,170	32,760	620	2,758	14,500	19,700	21,870	29,650	561	2,495	13,100	17,800
		120.65	2-11/16	68.26	1.03	26.19	23,500	31,860	587	2,611	14,100	19,100	20,560	27,870	514	2,286	12,350	16,700	18,600	25,210	465	2,068	11,150	15,100
	5	127.00	2-13/16	71.44	1.09	27.78	19,980	27,080	523	2,326	12,000	16,300	17,480	23,690	457	2,032	10,500	14,200	15,810	21,430	414	1,841	9,500	12,900
			2-11/16	68.26	1.16	29.37	23,740	32,180	587	2,611	14,250	19,300	20,770	28,150	514	2,286	12,450	16,900	18,790	25,470	465	2,068	11,250	15,300
			2-9/16	65.09	1.22	30.96	27,300	37,010	649	2,887	16,380	22,200	23,880	32,370	568	2,526	14,350	19,500	21,610	29,290	514	2,286	12,950	17,600
			2-7/16	61.91	1.28	32.54	30,660	41,560	708	3,149	18,400	24,900	26,830	36,370	620	2,758	16,100	21,800	24,270	32,900	561	2,495	14,550	19,700
NC46 VAM EIS	6	152.40	3	76.20	1.50	38.10	55,170	74,790	1,048	4,661	33,105	44,900	48,280	65,450	917	4,079	28,950	39,200	43,680	59,210	830	3,692	26,200	35,500
	6-1/4	158.75	3-1/4	82.55			45,500	61,680	901	4,008	27,300	37,000	39,810	53,970	789	3,509	23,900	32,400	36,020	48,830	713	3,171	21,600	29,300
			3	76.20	1.63	41.28	55,600	75,370	1,048	4,661	33,360	45,200	48,650	65,950	917	4,079	29,200	39,600	44,020	59,680	830	3,692	26,400	35,800
			2-3/4	69.85	1.75	44.45	64,770	87,810	1,184	5,266	38,860	52,700	56,670	76,830	1,036	4,608	34,000	46,100	51,280	69,520	937	4,168	30,750	41,700
NC50 VAM EIS	6-1/2	165.10	3-1/4	82.55	1.63	41.28	74,420	100,890	1,269	5,645	44,650	60,500	65,120	88,280	1,110	4,937	39,050	52,900	58,920	79,880	1,005	4,470	35,350	47,900
	6-3/8	161.93			1.56	39.69	73,460	99,590			44,080	59,800	64,280	87,140			38,550	52,300	58,150	78,830			34,900	47,300
			3-1/2	88.90	1.44	36.51	62,470	84,690	1,110	4,937	37,490	50,800	54,670	74,110	971	4,319	32,800	44,500	49,460	67,050	879	3,910	29,700	40,300
			3-3/4	95.25	1.31	33.34	49,760	67,460	939	4,177	29,860	40,500	43,540	59,020	822	3,656	26,150	35,500	39,400	53,410	743	3,305	23,650	32,100
	6-5/8	168.28	3-1/2	88.90	1.56	39.69	62,930	85,310	1,110	4,937	37,760	51,200	55,060	74,640	971	4,319	33,050	44,800	49,820	67,540	879	3,910	29,900	40,500
			3-1/4	82.55	1.69	42.86	74,680	101,240	1,269	5,645	44,810	60,800	65,350	88,590	1,110	4,937	39,200	53,100	59,120	80,150	1,005	4470	35,450	48,100
			3	76.20	1.81	46.04	85,420	115,800	1,416	6,298	51,250	69,500	74,750	101,340	1,239	5,511	44,850	60,800	67,630	91,680	1,121	4,986	40,600	55,000
			2-3/4	69.85	1.94	49.21	95,160	129,010	1,552	6,903	57,100	77,400	83,270	112,890	1,358	6,040	49,950	67,700	75,340	102,140	1,228	5,462	45,200	61,300
5-1/2 FH VAM EIS	7	177.80	3-3/4	95.25	1.63	41.28	89,680	121,580	1,448	6,441	53,810	73,000	78,470	106,380	1,267	5,636	47,100	63,900	71,000	96,250	1,147	5,102	42,600	57,800
			3-1/2	88.90	1.75	44.45	95,700	129,740	1,619	7,201	57,420	77,800	83,730	113,510	1,417	6,303	50,250	68,100	75,760	102,710	1,282	5,702	45,450	61,600
	7-1/4	184.15	3-3/4	95.25			91,510	124,060	1,448	6,441	54,910	74,400	80,070	108,550	1,267	5,636	48,050	65,100	72,450	98,220	1,147	5,102	43,450	58,900
			3-1/2	88.90	1.88	47.63	105,280	142,730	1,619	7,201	63,170	85,600	92,120	124,890	1,417	6,303	55,250	74,900	83,350	113,000	1,282	5,702	50,000	67,800
	7-1/2	190.50	3	76.20	2.25	57.15	130,310	176,660	1,926	8,567	78,185	106,000	114,020	154,580	1,685	7,495	68,400	92,700	103,160	139,850	1,524	6,779	61,900	83,900
6-5/8 FH VAM EIS	8	203.20	5	127.00	1.50	38.10	99,570	134,990	1,448	6,441	59,740	81,000	87,120	118,110	1,267	5,636	52,250	70,800	78,830	106,870	1,147	5,102	47,300	64,100
			4-3/4	120.65	1.63	41.28	121,370	164,540	1,678	7,464	72,800	98,700	106,200	143,980	1,468	6,530	63,700	86,400	96,080	130,260	1,329	5,911	57,650	78,200
	8-1/4	209.55			1.75	44.45	122,060	165,480			73,230	99,300	141,660	192,050	1,840	8,185	85,000	115,200	128,170	173,760	1,664	7402	76,900	104,300
	8-1/2	215.90	5	127.00			100,760	136,600	1,448	6,441	60,450	82,000	88,160	119,520	1,267	5,636	52,900	71,700	79,760	108,130	1,147	5,102	47,850	64,900

Data provided by Vallourec and Mannesman; September, 2005

VAM TAURUS 120 KSI

Connection Type	Outside Diameter		Inside Diameter		Distance Between Shoulder on the Pin		Distance Between Shoulder on the Box		Recommended Make-Up Torque (±5% with max 2,000 ft-lb)	
	in.	mm	in.	mm	in.	mm	in.	mm	ft-lb	Nm
VAM Taurus VT39	4-3/4	120.650	2-7/16	61.913	5.250	133.35	5.243	133.17	20,800	28,200
			2-1/2	63.500					20,300	27,500
VAM Taurus VT40	4-7/8	123.825	2-1/2	63.500	5.250	133.35	5.243	133.17	22,900	31,000
			2-9/16	65.088					22,300	30,200
VAM Taurus VT43	5-1/4	133.350	2-7/16	61.913	5.500	139.70	5.492	139.50	31,100	42,200
			2-1/2	63.500					30,600	41,500
			2-9/16	65.088			5.493	139.52	30,000	40,700
			2-5/8	66.675					29,300	39,700
			2-11/16	68.263					28,700	38,900
			2-3/4	69.850					28,000	38,000
			2-13/16	71.438			5.494	139.54	27,400	37,100
	5-3/8	136.525	2-1/2	63.500			5.493	139.52	33,000	44,700
VAM Taurus VT44	5-3/8	136.525	2-9/16	65.088	5.500	139.70	5.492	139.50	32,900	44,600
			2-5/8	66.675			5.493	139.52	32,300	43,800
			2-11/16	68.263					31,600	42,800
			2-3/4	69.850					30,900	41,900
			2-13/16	71.438					30,300	41,100
	5-1/2	139.700	2-1/2	63.500					36,100	48,900
			2-9/16	65.088					35,500	48,100
			2-5/8	66.675					34,800	47,200
			2-11/16	68.263					34,200	46,400
VAM Taurus VT53	6-3/8	161.925	3-1/2	88.900	5.750	146.05	5.743	145.87	49,100	66,600
	6-1/2	165.100	3-1/4	82.550			5.742	145.85	56,500	76,600
			3-1/2	88.900			5.743	145.87	52,600	71,300
	6-5/8	168.275	3-1/4	82.550					60,000	81,300
VAM Taurus VT57	6-5/8	168.275	3-3/4	95.250	6.000	152.40	5.991	152.18	54,200	73,500
			4	101.600			5.992	152.20	49,000	66,400
	6-3/4	171.450	3-3/4	95.250					57,900	78,500
			4	101.600			5.993	152.22	52,900	71,700
			4-1/8	104.775			5.994	152.24	50,200	68,100
VAM Taurus VT59	6-7/8	174.625	4-1/4	107.950	6.000	152.40	5.993	152.22	53,000	71,900
	7	177.800	4	101.600			5.992	152.20	62,700	85,000
			4-1/8	104.775			5.993	152.22	59,900	81,200
			4-1/4	107.950					57,100	77,400
	7-1/4	184.150	3-3/4	95.250					76,000	103,000
			4	101.600					70,900	96,100

The above make-up torques with the friction factor of 1.0 should be applied to VAM TAURUS connections only in 120 ksi. The tolerance on make-up torque is ± 5% with max 2,000 ft-lb

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; September 23, 2004

VAM TAURUS

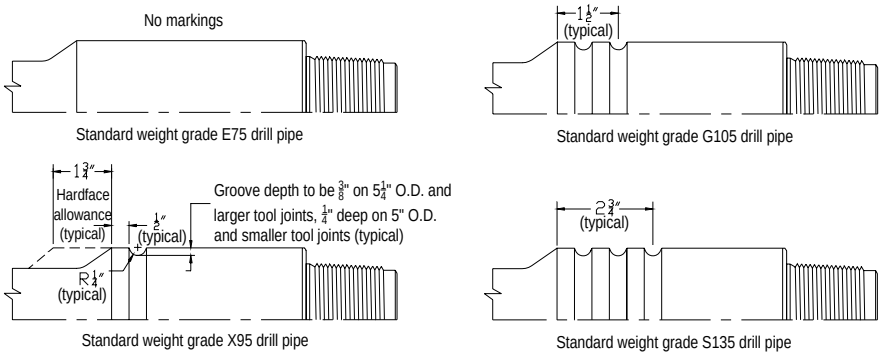
Connection Type	Outside Diameter		Inside Diameter		Thickness		120 ksi					
							Torsional Yield Strength		Tensile Yield Strength		Make-up Torque	
	in.	*mm*	in.	*mm*	in.	*mm*	ft-lb	*Nm*	1,000 lb	*kn*	ft-lb	*Nm*
VAM TAURUS VT39	4-3/4	*120.65*	2-7/16	*61.91*	1.16	*29.36875*	29,910	*40,550*	614	*2,731*	20,800	*28,200*
			2-1/2	*63.50*	1.13	*28.57500*	29,210	*39,600*	590	*2,624*	20,300	*27,500*
VAM TAURUS VT40	4-7/8	*123.83*	2-1/2	*63.50*	1.19	*30.16250*	32,670	*44,290*	647	*2,878*	22,900	*31,000*
			2-9/16	*65.09*	1.16	*29.36875*	31,940	*43,300*	622	*2,766*	22,300	*30,200*
VAM TAURUS VT43	5-1/4	*133.35*	2-7/16	*61.91*	1.41	*35.71875*	44,290	*60,040*	745	*3,314*	31,100	*42,200*
			2-1/2	*63.50*	1.38	*34.92500*	43,560	*59,050*	768	*3,416*	30,600	*41,500*
			2-9/16	*65.09*	1.34	*34.13125*	42,800	*58,020*	789	*3,509*	30,000	*40,700*
			2-5/8	*66.68*	1.31	*33.33750*	42,020	*56,960*	780	*3,469*	29,300	*39,700*
			2-11/16	*68.26*	1.28	*32.54375*	41,210	*55,870*	753	*3,349*	28,700	*38,900*
			2-3/4	*69.85*	1.25	*31.75000*	40,370	*54,730*	727	*3,233*	28,000	*38,000*
			2-13/16	*71.44*	1.22	*30.95625*	39,510	*53,560*	699	*3,109*	27,400	*37,100*
	5-3/8	*136.53*	2-1/2	*63.50*	1.44	*36.51250*	48,040	*65,130*	827	*3,678*	33,000	*44,700*
VAM TAURUS VT44	5-3/8	*136.53*	2-9/16	*65.09*	1.41	*35.71875*	47,060	*63,800*	799	*3,554*	32,900	*44,600*
			2-5/8	*66.68*	1.38	*34.92500*	46,270	*62,730*	821	*3,652*	32,300	*43,800*
			2-11/16	*68.26*	1.34	*34.13125*	45,450	*61,610*	817	*3,634*	31,600	*42,800*
			2-3/4	*69.85*	1.31	*33.33750*	44,600	*60,460*	790	*3,514*	30,900	*41,900*
			2-13/16	*71.44*	1.28	*32.54375*	43,730	*59,280*	762	*3,389*	30,300	*41,100*
	5-1/2	*139.70*	2-1/2	*63.50*	1.50	*38.10000*	52,510	*71,190*	890	*3,959*	36,100	*48,900*
			2-9/16	*65.09*	1.47	*37.30625*	51,740	*70,140*	865	*3,847*	35,500	*48,100*
			2-5/8	*66.68*	1.44	*36.51250*	50,950	*69,070*	839	*3,732*	34,800	*47,200*
			2-11/16	*68.26*	1.41	*35.71875*	50,130	*67,960*	813	*3,616*	34,200	*46,400*
VAM TAURUS VT53	6-3/8	*161.93*	3-1/2	*88.90*	1.44	*36.51250*	72,170	*97,840*	1062	*4,724*	49,100	*66,600*
	6-1/2	*165.10*	3-1/4	*82.55*	1.63	*41.27500*	83,730	*113,510*	1190	*5,293*	56,500	*76,600*
			3-1/2	*88.90*	1.50	*38.10000*	78,700	*106,690*	1057	*4,701*	52,600	*71,300*
	6 5/8	*168.28*	3-1/4	*82.55*	1.69	*42.86250*	90,440	*122,610*	1184	*5,266*	60,000	*81,300*
VAM TAURUS VT57	6-5/8	*168.28*	3-3/4	*95.25*	1.44	*36.51250*	77,470	*105,020*	922	*4,101*	54,200	*73,500*
			4	*101.60*	1.31	*33.33750*	71,130	*96,430*	1072	*4,768*	49,000	*66,400*
	6-3/4	*171.45*	3-3/4	*95.25*	1.50	*38.10000*	84,610	*114,700*	1142	*5,080*	57,900	*78,500*
			4	*101.60*	1.38	*34.92500*	78,270	*106,110*	1096	*4,875*	52,900	*71,700*
			4-1/8	*104.78*	1.31	*33.33750*	74,880	*101,510*	1017	*4,524*	50,200	*68,100*
VAM TAURUS VT59	6-7/8	*174.63*	4-1/4	*107.95*	1.31	*33.33750*	77,850	*105,540*	1019	*4,532*	53,000	*71,900*
	7	*177.80*	4	*101.60*	1.50	*38.10000*	92,560	*125,480*	1265	*5,627*	62,700	*85,000*
			4-1/8	*104.78*	1.44	*36.51250*	89,110	*120,810*	1185	*5,271*	59,900	*81,200*
			4-1/4	*107.95*	1.38	*34.92500*	85,510	*115,930*	1103	*4,906*	57,100	*77,400*
	7-1/4	*184.15*	3-3/4	*95.25*	1.75	*44.45000*	114,930	*155,810*	1404	*6,245*	76,000	*103,000*
			4	*101.60*	1.63	*41.27500*	108,490	*147,080*	1252	*5,569*	70,900	*96,100*

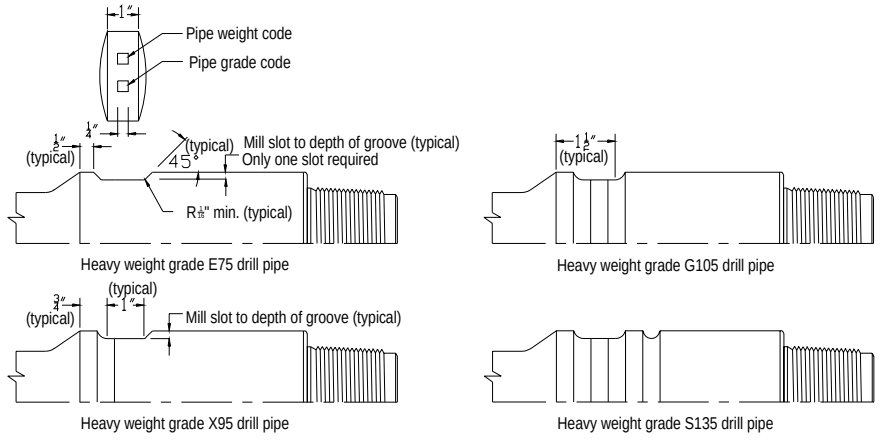
Data provided by Vallourec and Mannesmann; September, 2005

Drilco “Hevi-Wate” Drillpipe
Dimensional Data and Performance Properties

Nom Size	Tube					Mechanical Properties Tube Section		Tool Joint							
	Nom Tube Dim			Center Upset OD	Elevator Upset OD	Tensile Yield	Torsional Yield	Connection Size and Type	OD	ID	Tensile Yield	Torsional Yield	Make-up Torque	Approx Overall Length Pin/Box	Approx Overall Length
	ID	Wall Thick	Area												
in.	in.	in.	sq in.	in.	in.	lb	ft-lb		in.	in.	lb	ft-lb	ft-lb	in.	ft
3-1/2	2-1/4	.625	5.645	4	3-5/8	310,475	18,460	NC38: 3-1/2 IF	4-3/4	2-3/8	675,045	17,575	10,000	30/27	31
4	2-9/16	.719	7.410	4-1/2	4-1/8	407,550	27,635	NC40: 4 FH	5-1/4	2-11/16	711,475	23,525	13,300	30/27	31
4-1/2	2-3/4	.875	9.965	5	4-5/8	548,075	40,715	NC46: 4 IF	6-1/4	2-7/8	1,024,500	38,800	21,800	30/27	31
5	3	1.000	12.566	5-1/2	5-1/8	691,185	56,495	NC50: 4-1/2 IF	6-5/8	3-1/16	1,266,000	51,375	29,200	30/27	31
5-1/2	3-3/8	1.063	14.812	6	5-5/8	814,660	74,140	5-1/2 FH	7	3-1/2	1,349,365	53,080	32,800	30/27	31
6-5/8	4-1/2	1.063	18.567	7-1/8	6-3/4	1,021,185	118,845	6-5/8 FH	8	4-5/8	1,490,495	73,215	45,800	30/27	31

Data provided by Smith Services; February, 2006





Drillpipe Grade Code

Standard Grades	
Grade	Symbol
N-80	N
E	E
C-75	C
-	-

High Strength Grades	
Grade	Symbol
X-95	X
G-105	G
S-135	S
V-150	V

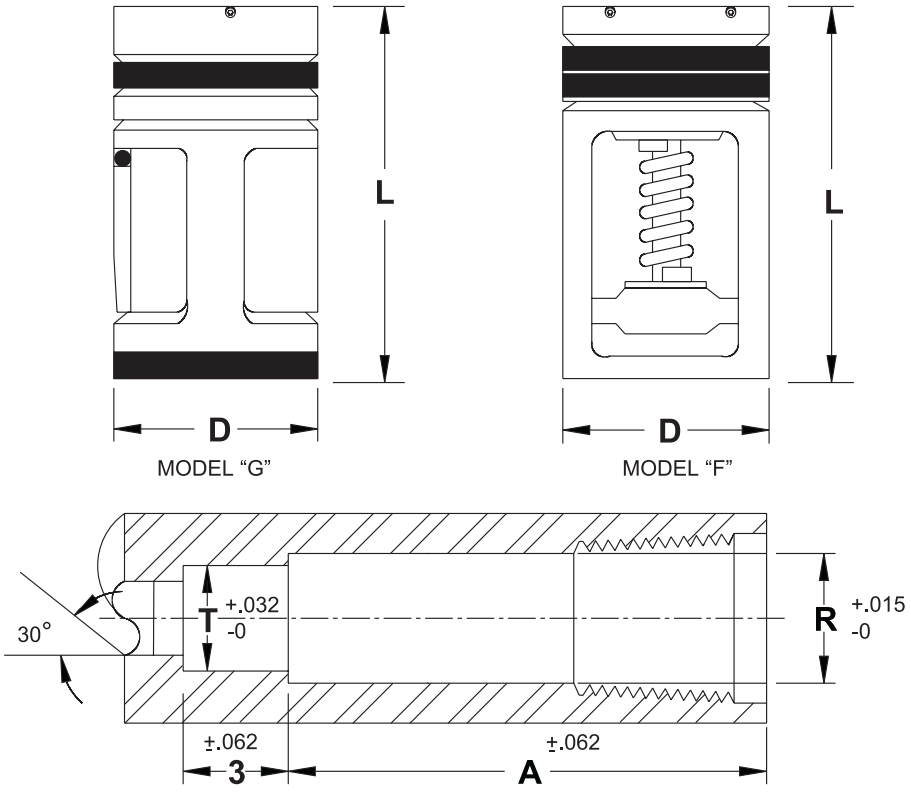
Specification Guide - Baker Drillpipe Floats and Valves

Sizes Tool Joint Types	1R	1F-2R	2F-3R▲	3F▲	3-1/2 IF	4R▲	4F▲	5R▲	5F-6R▲	6F
API Regular	2-3/8	2-7/8	3-1/2	-	-	4-1/2	-	5-1/2 - 5-9/16*	6-5/8*	8-5/8
Hughes Or Reed Acme Regular	2-3/8	2-7/8	3-1/2	-	-	4-1/2	-	5-1/2 - 5-9/16	6-5/8	-
API Full Hole	-	2-3/8	2-7/8	3-1/2	4	-	4-1/2◆	-	5-1/2 - 5-9/16	6-5/8◆
Reed Acme Full Hole	-	-	-	-	3-1/2	-	-	4-1/2	-	5-1/2 - 5-9/16
Hughes Acme Streamline	-	2-3/8	2-7/8	3-1/2	-	-	4-1/2◆	-	5-1/2 - 5-9/16	-
Hughes Xtra Hole	-	-	2-7/8	3-1/2	-	-	4-1/2	5	-	-
Reed Semi-internal Flush	-	-	-	3-1/2	-	-	4-1/2	-	-	-
API Internal Flush	-	2-3/8	2-7/8	-	3-1/2	-	4	4-1/2	-	-
Hughes Ext Flush Acme Type	-	3-1/2	4-1/2	-	-	5-1/2 - 5-9/16	-	-	6-5/8	-
Hughes Ext Flush Full Hole Type	-	-	-	4-1/2	-	-	-	-	-	-

* Interchangeable

▲Sizes available in both Model “F” and Model “G”; All other are available in Model “F” only

◆Float body in these sizes has smaller ID than standard tool joint



A=L (LGTH. OF VALVE) + LGTH OF TOOL JOINT PIN + .25

Dimensional Data

Size Valve	D Diameter of Valve	R (D + 1/32) Diameter of Recess For Valve	L Length of Valve	T* Diameter of Recess for Totco Spider
1R	1-21/32	1-11/16	5-7/8	1-5/16
1F-2R	1-29/32	1-15/16	6-1/4	1-1/2
2F-3R	2-13/32	2-7/16	6-1/2	1-29/32
3F	2-13/16	2-27/32	10	2-7/16
3-1/2IF	3-1/8	3-5/32	10	2-11/16

Size Valve	D Diameter of Valve	R (D + 1/32) Diameter of Recess For Valve	L Length of Valve	T* Diameter of Recess for Totco Spider
4R	3-15/32	3-1/2	8-5/16	2-15/16
4F	3-21/32	3-11/16	12	3-1/4
5R	3-7/8	3-29/32	9-3/4	3-3/8
5F-6R	4-25/32	4-13/16	11-3/4	4-9/32
6F	5-11/16	5-23/32	14-5/8	5-3/16

* If this diameter is the same or smaller than standard tool joint ID, disregard it

Section 3 - Drill Collars and Connections
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Kelly Weights (lb per ft) 7

Hexagon Kellys 7

Maximum Cone Dimensions
Reed-Hycalog Milled Tooth Three Cone Rock Bits 8

Maximum Cone Dimensions
Reed-Hycalog Insert Type Three Cone Rock Bits 9

Maximum Cone Dimensions
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Smith Bits Two-Cone Rock Bit 10

Maximum Cone Dimensions
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Drill Collars

Connections and Recommended Make-up Torque■

Connection			Minimum Make-up Torque in ft-lb ❖								
Size	Type	OD	Bore Of Drill Collar in.								
in.		in.	1	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2	2-13/16	3
API	NC 23	3	*2,508			-	-	-	-	-	-
		3-1/8	*3,330		2,647						
		3-1/4	4,000	3,387	2,647						
2-3/8	Regular	3	-	*2,241		1,749	-	-	-	-	-
		3-1/8		*3,028	2,574						
		3-1/4		3,285							
2-7/8	PAC●	3	-	*3,797		2,926	-	-	-	-	-
		3-1/8		*4,966	4,151						
		3-1/4		5,206							
2-3/8 API 2-7/8	API IF NC 26 Regular	3-1/2	-	*4,606		3,697	-	-	-	-	-
		3-3/4		5,501	4,668	3,697					
		3-1/2		*3,838							
		3-3/4		5,766	4,951	4,002					
		3-7/8									
2-7/8	Slim Hole	-	-	-			-	-	-	-	-
2-7/8	Extra Hole	3-3/4	-	*4,089			-	-	-	-	-
3-1/2	Dbl Streamline	3-7/8	-	*5,352			-	-	-	-	-
2-7/8	Model Open	4-1/8	-	*8,059		7,433	-	-	-	-	-
2-7/8 API 3-1/2	API IF NC 31 Regular	3-7/8	-	*4,640	*4,640	*4,640	*4,640	-	-	-	-
		4-1/8		*7,390	*7,390	*7,390	6,853				
				*6,466	*6,466	*6,466	*6,466	5,685			
		4-1/4		*7,886	*7,886	*7,886	7,115				
		4-1/2		10,471	9,514	8,394					
3-1/2	Slim Hole	4-1/4	-	*8,858	*8,858	8,161	6,853	5,391	-	-	-
		4-1/2		10,286	9,307						
API	NC 35	4-1/2	-	-	-	*9,038	*9,038	*9,038	7,411	-	-
		4-3/4				12,273	10,826	9,202			
		5									
3-1/2 4 3-1/2	Extra Hole Slim Hole Model Open	4-1/4	-	-	-	*5,161	*5,161	*5,161	*5,161	-	-
		4-1/2				*8,479	*8,479	*8,479	8,311		
		4-3/4				*12,074	11,803	10,144			
		5				13,283					
		5-1/4									
3-1/2 API 4-1/2	API IF NC 38 Slim Hole	4-3/4	-	-	-	*9,986				8,315	-
		5				*13,949		12,907	10,977		
		5-1/4				16,207	14,643				
		5-1/2									
3-1/2	H-90 ▲	4-3/4	-	-	-	*8,786					-
		5				*12,794				10,408	
		5-1/4				*17,094	16,929	15,137	13,151		
		5-1/2				18,522					

Note: In each connection size and type group, Torque values apply to all connection types in the group when used with the same drill collar outside collar diameter and bore; I.E., 2-3/8" API IF, API NC26 and 2-7/8" slim hole connections used with 3-1/2" x 1-1/4" drill collars all have the same minimum make-up torque of 4,600 ft-lb and the box is the weaker member.

* Torque figures preceded by an asterisk indicate the box as the weaker member for the corresponding outside diameter (OD) and bore. The pin is the weaker member for all other torque values.

■ Recommended Make-up Torque calculations assume the thorough application to all threads and shoulders of a thread compound which contains either 40 - 60 percent by weight finely powdered metallic Zinc or 60 percent by weight finely powdered metallic Lead and never more than 0.3 percent Sulfur. Calculations also assume use of the Modified Jack Screw Formula contained in API RP7G, Appendix A, Paragraph A.8, and a Unit Stress of 62,500 psi in the box or pin, whichever is weaker.

❖Normal torque range is tabulated value plus 10 percent. Higher values may be used under extreme conditions.

▲Make-up torque for H-90 based on 56,200 psi stress and other factors in 1, above

● Make-up torque for 2-7/8" PAC based on 87,500 psi stress and other factors in 1, above

Data provided by API, from Table 14, pages 35-38, 16th edition, API RP7G; August, 1998

Drill Collars (Continued)

Connections and Recommended Make-up Torque■

Connection			Minimum Make-up Torque in ft-lb ❖								
Size	Type	OD	Bore Of Drill Collar in.								
in.		in.	1	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2	2-13/16	3
4 API 4 4-1/2	Full Hole NC 40 Model Open Dbl Streamline	5	-	-	-	*10,910					-
		5-1/4				*15,290			14,969	12,125	
		5-1/2				*19,985	18,886	17,028			
		5-3/4				20,539					
		6									
4	H-90 ▲	5-1/4	-	-	-	*12,590					-
		5-1/2				*17,401				16,536	
		5-3/4				*22,531		21,714	19,543		
		6				25,408	23,671				
		6-1/4									
4-1/2	API Regular	5-1/2	-	-	-	*15,576					-
		5-3/4				*20,609			19,601	16,629	
		6				25,407	23,686	21,749			
		6-1/4									
API	NC 44	5-3/4	-	-	-	*20,895				18,161	-
		6				*26,453	25,510	23,493	21,257		
		6-1/4				27,300					
		6-1/2									
4-1/2	API Full Hole	5-1/2	-	-	-	-	*12,973				
		5-3/4					*18,119				17,900
		6					*23,605		22,028	19,921	
		6-1/4					27,294	25,272			
		6-1/2									
4-1/2 API 4 4-1/2 5 4-1/2	Extra Hole NC 46 API IF Semi IF Dbl Streamline Model Open	5-3/4	-	-	-	-	-	*17,738			
		6						*23,422		22,426	20,311
		6-1/4						28,021	25,676		
		6-1/2									
		6-3/4									
4-1/2	H-90 ▲	5-3/4	-	-	-	-	-	*18,019			
		6						*23,681		23,159	21,051
		6-1/4						28,732	26,397		
		6-1/2									
		6-3/4									
5	H-90 ▲	6-1/4	*25,360				23,988	-	-	-	-
		6-1/2	*31,895		29,400	27,167					
		6-3/4	35,292	32,825							
		7									
4-1/2 API 5 5 5-1/2 5	API IF NC 50 Extra Hole Model Open Dbl Streamline Semi IF	6-1/4	*23,004					-	-	-	-
		6-1/2	*29,679				26,675				
		6-3/4	*36,742	35,824	32,277	29,966					
		7	38,379								
		7-1/4									
		7-1/2									
5-1/2	H-90 ▲	6-3/4	*34,508			34,142	30,781	-	-	-	-
		7	*41,993	40,117	36,501						
		7-1/4	42,719								
		7-1/2									
	API Regular	6-3/4	*31,941				30,495	-	-	-	-
		7	*39,419		36,235	33,868					
		7-1/4	42,481	39,866							
		7-1/2									
	API Full Hole	7	*32,762					-	-	-	-
		7-1/4	*40,998								
		7-1/2	*49,661		47,756	45,190	41,533				
		7-3/4	54,515	51,687							

Refer to page 3-1 for additional information

Drill Collars (Continued)

Connections and Recommended Make-up Torque■

Connection			Minimum Make-up Torque in ft-lb ❖								
Size	Type	OD	Bore Of Drill Collar in.								
in.		in.	1	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2	2-13/16	3
API	NC 56	7-1/4	-	*40,498				-	-	-	-
		7-1/2		*49,060	48,221	45,680	42,058				
		7-3/4		52,115							
		8									
6-5/8	API Regular	7-1/2	-	*46,399				-	-	-	-
		7-3/4		*55,627	53,346	50,704	46,936				
		8		57,393							
		8-1/4									
	H-90 ▲	7-1/2		*46,509							
		7-3/4		*55,708		53,629	46,855				
		8		60,321	56,273						
		8-1/4									
API	NC 61	8	-	*55,131				-	-	-	-
		8-1/4		*65,438			61,624				
		8-1/2		72,670	68,398	65,607					
		8-3/4									
		9									
5-1/2	API IF	8	-	*56,641					-	-	-
		8-1/4		*67,133			63,381	59,027			
		8-1/2		74,626	70,277	67,436					
		8-3/4									
		9									
		9-1/4									
6-5/8	API Full Hole	8-1/2	-	*67,789					67,184	-	-
		8-3/4		*79,544			76,706	72,102			
		9		88,582	83,992	80,991					
		9-1/4									
		9-1/2									
API	NC 70	9	-	*75,781						-	-
		9-1/4		*88,802							
		9-1/2		*102,354			101,107	96,214	90,984		
		9-3/4		113,710	108,841	105,657					
		10									
		10-1/4									
	NC 77	10	-	-	*108,194						
		10-1/4			*124,051						
		10-1/2			*140,491			140,488	135,119		
		10-3/4			154,297	148,965	145,476				
		11									
7	H-90 ▲	8	-	*53,454						-	-
		8-1/4		*63,738				60,971	56,382		
		8-1/2		*74,478	72,066	69,265	65,267				
7-5/8	API Regular	8-1/2	-	*60,402						-	-
		8-3/4		*72,169							
		9		*84,442			84,221	79,536	74,529		
		9-1/4		96,301	91,633	88,580					
		9-1/2									
	H-90 ▲	9		*73,017							
		9-1/4		*86,006							
		9-1/2		*99,508					96,285		
8-5/8	API Regular	10	-	*109,345						-	-
		10-1/4		*125,263					125,034		
		10-1/2		*141,767		141,134	136,146	130,777			
	H-90 ▲	10-1/4		*113,482							
		10-1/2		*130,063							

Refer to page 3-1 for additional information

Drill Collars (Continued)

Connections and Recommended Make-up Torque■

Connection			Minimum Make-up Torque in ft-lb ❖								
Size	Type	OD	Bore Of Drill Collar in.								
in.		in.	1	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2	2-13/16	3
7	H-90 ▲ (with low torque face)	8-3/4	-	-	*68,061		67,257	62,845	58,131	-	-
		9			74,235	71,361					
7-5/8	API Regular (with low torque face)	9-1/4	-	-	-	*73,099				-	-
		9-1/2				*86,463		82,457	77,289		
		9-3/4				91,789	87,292				
		10									
	H-90 ▲ (with low torque face)	9-3/4			*91,667						
		10			*106,260			104,171	98,804		
		10-1/4			117,112	113,851	109,188				
		10-1/2									
8-5/8	API Regular (with low torque face)	10-3/4	-	-	-	*112,883				-	-
		11				*130,672					
		11-1/4				147,616	142,430	136,846	130,871		
	H-90 ▲ (with low torque face)	10-3/4				*92,960					
		11				*110,781					
		11-1/4				*129,203					

Refer to page 3-1 for additional information

Drill Collar Weight (Steel)
(lb per ft)

Collar OD	Drill Collar ID (in.)												
in.	1	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2	2-13/16	3	3-1/4	3-1/2	3-3/4	4
2-7/8	19	18	16	-	-	-	-	-	-	-	-	-	-
3	21	20	18	-	-	-	-	-	-	-	-	-	-
3-1/8	22	22	20	-	-	-	-	-	-	-	-	-	-
3-1/4	26	24	22	-	-	-	-	-	-	-	-	-	-
3-1/2	30	29	27	-	-	-	-	-	-	-	-	-	-
3-3/4	35	33	32	-	-	-	-	-	-	-	-	-	-
4	40	39	37	35	32	29	-	-	-	-	-	-	-
4-1/8	43	41	39	37	35	32	-	-	-	-	-	-	-
4-1/4	46	44	42	40	38	35	-	-	-	-	-	-	-
4-1/2	51	50	48	46	43	41	-	-	-	-	-	-	-
4-3/4	-	-	54	52	50	47	44	-	-	-	-	-	-
5	-	-	61	59	56	53	50	-	-	-	-	-	-
5-1/4	-	-	68	65	63	60	57	-	-	-	-	-	-
5-1/2	-	-	75	73	70	67	64	60	-	-	-	-	-
5-3/4	-	-	82	80	78	75	72	67	64	60	-	-	-
6	-	-	90	88	85	83	79	75	72	68	-	-	-
6-1/4	-	-	98	96	94	91	88	83	80	76	72	-	-
6-1/2	-	-	107	105	102	99	96	91	89	85	80	-	-
6-3/4	-	-	116	114	111	108	105	100	98	93	89	-	-
7	-	-	125	123	120	117	114	110	107	103	98	93	84
7-1/4	-	-	134	132	130	127	124	119	116	112	108	103	93
7-1/2	-	-	144	142	139	137	133	129	126	122	117	113	102
7-3/4	-	-	154	152	150	147	144	139	136	132	128	123	112
8	-	-	165	163	160	157	154	150	147	143	138	133	122
8-1/4	-	-	176	174	171	168	165	160	158	154	149	144	133
8-1/2	-	-	187	185	182	179	176	172	169	165	160	155	150
9	-	-	210	208	206	203	200	195	192	188	184	179	174
9-1/2	-	-	234	232	230	227	224	220	216	212	209	206	198
9-3/4	-	-	248	245	243	240	237	232	229	225	221	216	211
10	-	-	261	259	257	254	251	246	243	239	235	230	225
11	-	-	317	315	313	310	307	302	299	295	291	286	281
12	-	-	379	377	374	371	368	364	361	357	352	347	342

Note 1: To determine weights of standard drill collars not shown use the following formula:
(Area OD - Area ID) x 3.408 = wt/ft

Note 2: To determine approximate weights of spiral drill collars, find the pounds per foot for a collar of the same size in the above chart and multiply by 96 percent; for example, a collar with an OD of 6" and an ID of 2" OD = 85 pounds per foot above; 85 x .96 = 81.6 pounds per foot (an approximation)

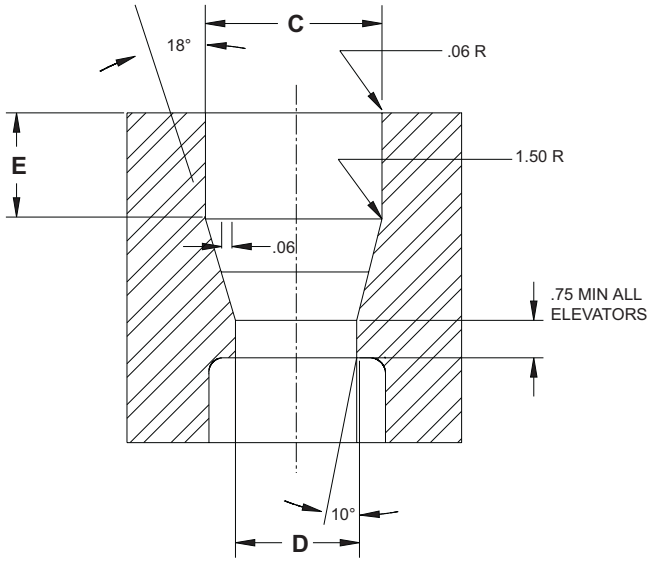
Note 3: To determine class weights, multiply by number of feet; for example, a 30" class collar with an OD of 6" and an ID of 2" weighs 85 pounds per foot; 85 x 30 = 2,550 pounds

Data provided by API, from Table 13, page 34, 16th edition, API RP7G; August, 1998

See API Specification 7, Table 13 for API standard drill collar dimensions

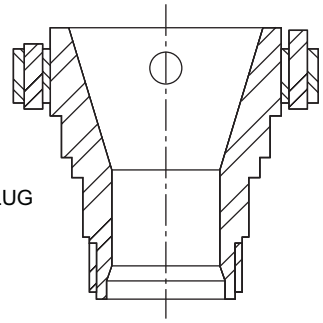
For special configurations of drill collars, consult manufacturer for reduction in weight

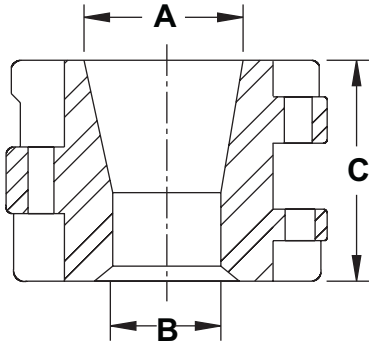
Baash-Ross 18° Elevator Bore Chart



Drill Pipe Size		Neck Diameter	C Top Bore	D Center Bore	E T-100	E T-150	E T-250 & T-350
2-3/8	IF	2-9/16	4-1/4	2-21/32	-	-	-
2-7/8	R & FH	3	4-3/8	3-3/32	-	1-5/8	-
	IF	3-3/16	4-3/4	3-9/32			
3-1/2	R & FH	3-11/16	5-1/4	3-25/32	-	1-5/8	-
	IF	3-7/8	5-1/2	3-31/32			
4	FH	4-3/16	6-1/2	4-9/32	1-1/2	1-5/8	3-3/8
	IF	4-1/2	6-3/4	4-25/32			
4-1/2	R & FH	4-11/16	6-3/4	4-25/32	1-1/2	1-5/8	3-3/8
	IF	5	7-1/8	5-1/4			
5	EIU	5-1/8	7-1/8	5-1/4	1-1/2	1-5/8	3-3/8
5-1/2	R & FH	5-11/16	7-7/8	5-13/16	-	1-5/8	3-3/8

TRI-STATE
25 TON
STRIPPING PLUG



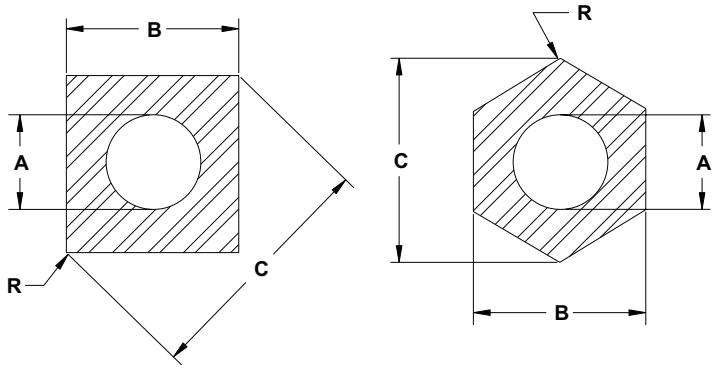


TRI-STATE
HINGED
STRIPPING BOWL

Baker Hughes Hinged Stripping Bowls

	50 Ton Capacity		100 Ton Capacity		150 Ton Capacity
A	6-7/8	7-1/2	7-9/16▲	9-7/8▲	13-1/16▲
B	5	6-3/8	5-1/2	7	10-1/8
C	6	6	10	10	12

▲Allows for Reda cable



Square Kellys Dimensions

Kelly Size (API)	Upper Box Connection		Lower Pin Connection	Max Bore A	Across Flats B	Across Corner C	Radius R
	Standard	Optional		in.	in.	in.	in.
2-1/2	6-5/8 Reg	4-1/2 Reg	(NC26)	1-1/4	2-1/2	3-9/32	5/16
3	6-5/8 Reg	4-1/2 Reg	(NC31)	1-3/4	3	3-15/16	3/8
3-1/2	6-5/8 Reg	4-1/2 Reg	(NC38)	2-1/4	3-1/2	4-17/32	1/2
4-1/4	6-5/8 Reg	4-1/2 Reg	(NC46)	2-13/16	4-1/4	5-9/16	1/2
			(NC50)				
5-1/4	6-5/8 Reg	-	5-1/2 FH	3-1/4	5-1/4	6-29/32	5/8
			NC56				

Data provided by API from table 2 columns 1, 6, 7, 9, 12, 13, 19 and 23, fortieth edition, API Spec 7; November, 2001

Hexagon Kellys Dimensions

Kelly Size (API)	Upper Box Connection		Lower Pin Connection	Max Bore A	Across Flats B	Across Corner C	Radius R
	Standard	Optional		in.	in.	in.	in.
3	6-5/8 Reg	4-1/2 Reg	(NC26)	1-1/4	3	3-3/8	1/4
3-1/2	6-5/8 Reg	4-1/2 Reg	(NC31)	1-3/4	3-1/2	3-31/32	1/4
4-1/4	6-5/8 Reg	4-1/2 Reg	(NC38)	2-1/4	4-1/4	4-13/16	5/16
5-1/4	6-5/8 Reg	-	(NC46)	3	5-1/4	5-31/32	3/8
			(NC50)	3-1/4			
6	6-5/8 Reg	-	5-1/2 FH	3-1/2	6	6-13/16	3/8
			NC56				

Data provided by API from table 2 columns 1, 6, 7, 9, 12, 13, 19 and 23, fortieth edition, API Spec 7; November, 2001

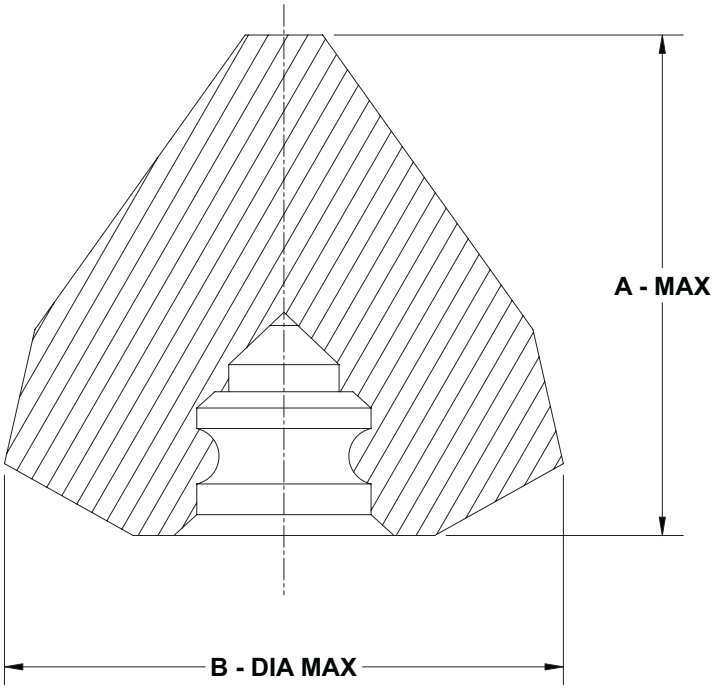
Kelly Weights (lb per ft)

(Drive Section) Square Kelly

Across Flat	Bore Of Square Kelly											
	1-1/16	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2	2-3/4	2-7/8	3	3-1/4	3-1/2
2-1/2	18.3	17.1	-	-	-	-	-	-	-	-	-	-
3	-	25.8	24.0	21.8	-	-	-	-	-	-	-	-
3-1/2	-	-	35.6	33.5	31.0	28.2	-	-	-	-	-	-
4-1/4	-	-	-	-	-	47.9	44.7	41.3	39.3	-	-	-
5-1/4	-	-	-	-	-	-	-	73.5	71.6	69.7	65.5	-
6	-	-	-	-	-	-	-	-	-	-	-	89.6

Hexagon Kellys

Across Flat	Bore Of Square Kelly											
	1-1/4	1-1/2	1-3/4	2	2-1/4	2-1/2	2-3/4	2-7/8	3	3-1/4	3-1/2	4
3	22.3	20.5	-	-	-	-	-	-	-	-	-	-
3-1/2	-	30.1	27.9	25.4	22.6	-	-	-	-	-	-	-
3-3/4	-	35.3	33.2	30.7	27.9	-	-	-	-	-	-	-
4-1/4	-	-	-	-	39.6	36.4	32.9	31.0	-	-	-	-
4-27/32	-	-	-	-	-	56.4	53.3	49.8	47.9	45.9	41.7	-
5-1/4	-	-	-	-	-	-	60.9	59.0	57.1	52.9	48.4	-
6	-	-	-	-	-	-	-	-	-	-	73.2	63.2



Maximum Cone Dimensions Reed-Hycalog
Milled Tooth Three Cone Rock Bits

Size Range	A	B
3-3/4	1-27/32	2-31/64
3-7/8	1-27/32	2-35/64
4-5/8 - 4-3/4	2-1/4	3-1/16
5-7/8 - 6	2-53/64	3-53/64
6-1/8 - 6-1/4	3-1/32	3-31/32
6-1/2 - 6-5/8	3-11/64	4-17/64
3-9/64	3-9/32	4-11/64
7-5/8 - 7-3/4	3-23/32	4-59/64
7-7/8	3-31/32	5-17/64
8-3/8 - 8-5/8	4-13/64	5-45/64
8-3/4	4-7/32	5-55/64
9-1/2 - 9-5/8	4-27/32	6-25/64
9-7/8	4-15/16	6-29/64
10-5/8	5-9/32	7-1/64
11	5-7/32	7-21/64
12	5-7/8	7-3/4
12-1/4	5-7/8	7-59/64
13-1/2	6-53/64	8-27/32
13-3/4	6-53/64	8-7/8
14-3/4 - 15	7-5/16	9-57/64
17-1/2	8-3/4	11-9/32
18-1/2	8-29/32	10-5/8

Data provided by Reed-Hycalog; August, 2005

Maximum Cone Dimensions
Reed-Hycalog Insert Type Three Cone Rock Bits

Size Range	A	B
6-1/4	2-9-16	3-25/32
6-1/2	2-21/32	3-31/32
6-3/4	2-23/32	4-1/8
7-5/8 - 7-3/4	3-1/8	4-11/16
7-7/8	3-17/32	5-29/32
8-3/8 - 8-5/8	3-9/16	5-1/2
8-3/4	3-19/32	5-5/32
9-1/2 - 9-5/8	4-3/16	5-7/8
9-7/8	4-3/8	5-7/8
10-5/8	4-1/2	6-3/8
11	4-1/4	6-1/2
12	5	7-3/8
12-1/4	5-3/8	7-1/2
17-1/2	8	10-1/2
22	9-11/16	13-9/16
24	10-5/8	14-23/32
26	11-13/32	15-25/32

Data provided by Reed-Hycalog; August, 2005

Maximum Cone Dimensions For Three-Cone Rock Bits

Size Range		Maximum Diameter		Maximum Length	
in.	*mm*	in.	*mm*	in.	*mm*
3-1/2 - 3-7/8	*89-98*	2-3/8	*60*	1-5/8	*41*
4-3/4	*121*	2-7/8	*73*	2-1/8	*54*
5-7/8 - 6-1/4	*149-159*	4-1/4	*108*	3-1/8	*79*
6-1/2 - 6-3/4	*165-172*	4-1/2	*114*	3-1/2	*89*
7-3/8 - 8	*187-203*	5-1/4	*133*	4	*102*
8-1/8 - 8-1/2	*206-216*	5-7/8	*149*	4-1/8	*105*
8-5/8 - 9	*219-229*	6-1/8	*156*	4-5/8	*117*
9-1/8 - 9-1/2	*232-241*	6-1/2	*165*	4-3/8	*111*
9-5/8 - 9-7/8	*245-251*	6-3/4	*171*	4-3/4	*121*
10 - 10-5/8	*254-270*	7-1/4	*184*	5-1/2	*140*
11 - 11-7/8	*279-302*	7-7/8	*200*	5-7/8	*149*
12 - 12-1/4	*305-311*	8	*203*	6-1/8	*156*
13-1/4 - 15	*337-381*	9-5/8	*244*	7-5/8	*194*
16	*406*	10-1/4	*260*	8-1/8	*206*
17-1/2	*445*	11-1/2	*292*	8-5/8	*219*
18-1/2	*470*	12	*305*	9	*229*
20	*508*	12-1/2	*318*	9-5/8	*244*
22	*559*	13-3/4	*349*	10-1/2	*267*
24	*610*	15-1/4	*387*	11-1/4	*286*
26	*660*	16	*406*	12-3/4	*324*
28	*711*	17	*432*	13	*330*

Data provided by Smith Bits; August, 2005

Maximum Cone Dimensions
Smith Bits Two-Cone Rock Bit

Size Range	A	B
6-1/2 - 6-3/4	2-49/64	4-41/64
7-5/8 - 8	3-11/32	5-5/8
8-5/8 - 9	3-27/32	5-3/4
9-5/8 - 9-7/8	4-19/64	6-41/64
12 - 12-1/4	5-11/64	8-23/32

Data provided by Smith Bits; August, 2005

Maximum Cone Dimensions
Hughes Christensen Rock Bits

Size Range	A	B
3-3/4	1-39/64	2-5/16
3-7/8	1-21/32	2-11/32
4-1/8	1-63/64	2-49/64
4-3/4	2-17/64	3-13/64
5-7/8	2-49/64	3-27/32
6	2-15/16	3-59/64
6-1/8	3-17/64	4-13/64
6-1/4	3-1/64	4-1/8
6-1/2	3-3/64	4-5/16
6-3/4	3-11/64	4-7/16
7-7/8	3-51/64	5-15/64
8-3/8	4-1/64	5-45/64
8-1/2	4-7/32	5-13/16
8-3/4	4-41/64	6-1/32
9-1/2	4-18/32	6-13/64
9-7/8	4-53/64	6-31/64
10-5/8	5-1/2	7-1/64
11	5-29/64	7-11/64
12-1/4	6-19/64	8-13/64
13-3/4	6-5/32	8-13/16
14-3/4	7-6/64	9-13/16
17-1/2	8-45/64	11-37/64
20	9-17/64	13-11/32
24	11	15-19/32
26	11-19/32	16-31/64

Data provided by Hughes Christensen; August, 2005

API Casing - Bit Sizes and Clearances

Casing Data				Drill Bit Specifications									
				8 Round and Buttress Casing					X-line Casing				
OD	Wt T and C	ID 8 Rd and Butt	Upset ID X-Line	Size	Conn API Reg	Wt	Clearance		Conn Size	API Reg	Wt	Clearance	
							Dec	Frac				Dec	Frac
in.	lb-ft	in.	in.	in.		lb			in.		lb		
4-1/2	9.50	4.090	-	3-7/8	2-3/8	10	.215	7/32	-	-	-	-	-
	10.50	4.052					.177	11/64					
	11.60	4.000					.125	1/8					
	13.50	3.920		3-3/4			.170	11/64					
5	11.50	4.560	-	4-1/4	2-3/8	11	.310	5/16	-	-	-	-	-
	13.00	4.494					.244	1/4					
	15.00	4.408	4.198				.158	5/32	4-1/8	2-3/8	11	.073	5/64
	18.00	4.276		4-1/8			.151						
5-1/2	14.00	5.012	-	4-3/4	2-7/8	16	.262	17/64	-	-	-	-	-
	15.50	4.950	4.736				.200	13/64	4-5/8	2-7/8	16	.111	7/64
	17.00	4.892	4.701				.142	9/64				.076	5/64
	20.00	4.778		4-5/8			.153	5/32					
	23.00	4.670	4.610	4-1/2	2-3/8	12	.170	11/64	4-1/2	2-3/8	12	.110	7/64
6-5/8	20.00	6.049	-	5-7/8	3-1/2	29	.174	17/64	-	-	-	-	-
	24.00	5.921	5.781	5-5/8		24	.296	19/64	5-5/8	3-1/2	24	.156	5/32
	28.00	5.791	5.731				.166	11/64				.106	7/64
	32.00	5.675	5.615	4-3/4	2-7/8	15	.925	59/64	4-3/4	2-7/8	15	.865	55/64
7	17.00	6.538	-	6-1/4	3-1/2	30	.288	9/32	-	-	-	-	-
	20.00	6.456					.206	13/64					
	23.00	6.366	6.171	6-1/8			.241	1/4	6-1/8	3-1/2	30	.046	3/64
	26.00	6.276					.151	5/32					
	29.00	6.184	6.123	6		29	.184	3/16	6		29	.123	1/8
	32.00	6.094	6.032				.219	7/32	5-7/8			.157	5/32
	35.00	6.004	5.940	5-7/8			.129	1/8				.065	1/16
	38.00	5.920	5.860			24	.295	3/64	5-5/8		24	.235	15/64
7-5/8	24.00	7.025	-	6-3/4	3-1/2	45	.275	9/32	-	-	-	-	-
	26.40	6.969	6.770				.219	7/32	6-5/8	3-1/2	38	.145	9/64
	29.70	6.875		6-5/8		38	.250	1/4					
	33.70	6.765	6.705				.140	9/64				.085	5/64
	39.00	6.625	6.565	6-1/4		30	.375	3/8	6-1/4		30	.315	5/16
8-5/8	24.00	8.097	-	7-7/8	4-1/2	73	.222	7/32	-	-	-	-	-
	28.00	8.017					.142	9/64					
	32.00	7.921	7.725	7-5/8		68	.271	17/64	7-5/8	4-1/2	68	.100	3/32
	36.00	7.825					.200	13/64					
	40.00	7.725	7.663	6-3/4	3-1/2	42	.975	31/32	6-3/4	3-1/2	42	.913	29/32
	44.00	7.625	7.565				.875	7/8				.815	13/16
	49.00	7.511	7.451				.761	49/64				.706	45/64
9-5/8	32.30	9.001	-	8-3/4	4-1/2	90	.251	1/4	-	-	-	-	-
	36.00	8.921					.171	11/64					
	40.00	8.835	8.665	8-5/8		89	.210	13/64	8-1/2	4-1/2	86	.165	11/64
	43.50	8.755		8-1/2		86	.255	1/4					
	47.00	8.681	8.621				.181	3/16				.121	1/8
	53.50	8.535	8.475	8-3/8			.160	5/32	8-3/8			.100	7/64
10-3/4	32.75	10.192	-	9-7/8	5-1/2 or 6-5/8	135	.317	5/16	-	-	-	-	-
	40.50	10.050					.175	11/64					
	45.50	9.950	9.719	9-5/8			.325	21/64	9-5/8	6-5/8	135	.094	3/32
	51.00	9.850	9.629		4-1/2		.225	7/32	9-1/2			.129	1/8
	55.50	9.760		9-1/2			.260	17/64					
11-3/4	42.00	11.084	-	10-5/8	6-5/8	145	.459	29/64	(No X-line In This Size)				
	47.00	11.000					.375	3/8					
	54.00	10.880					.255	1/4					
	60.00	10.772					.147	5/32					

Diametrical clearances listed above are based on the inside diameter of casing (or joint ID for X-line Casing)

Data provided by API from tables 6.1 and 6.3, pages 54 and 61, API Spec 5C7, 3rd edition; December 1, 1990

API Casing - Bit Sizes and Clearances (Continued)

Casing Data				Drill Bit Specifications								
				8 Round and Buttress Casing					X-line Casing			
OD	Wt T and C	ID 8 Rd and Butt	Upset ID X-Line	Size	Conn API Reg	Wt	Clearance		Conn Size	API Reg	Wt	Clearance	
							Dec	Frac				Dec	Frac
in.	lb-ft	in.	in.	in.		lb			in.		lb		
13-3/8	48.00	12.715	-	12-1/4	6-5/8	211	.465	15/32	-				
	54.50	12.615					.365	23/64					
	61.00	12.515					.265	17/64					
	68.00	12.415					.165	11/64					
	72.00	12.347		12		201	.347	11/32					
16	65.00	15.250	-	15	6-5/8 or 7-5/8	300	.250	1/4	-				
	75.00	15.125		14-3/4			.375	3/8					
	84.00	15.010					.260	17/64					
18-5/8	87.50	17.755	-	17-1/2	6-5/8 or 7-5/8	500	.255	1/4	-				
20	94.00	19.124	-	18-1/2	6-5/8 or 7-5/8	615	.624	5/8	-				
	106.50	19.000					.500	1/2					
	133.00	18.730					.230	15/64					

Diametrical clearances listed above are based on the inside diameter of casing (or joint ID for X-line Casing)

Data provided by API from tables 6.1 and 6.3, pages 54 and 61, API Spec 5C7, 3rd edition; December 1, 1990

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Tubing, Drill Pipe, and Casing Stretch Data

The stretch or elongation of oil well tubular material resulting from an applied pulling force is a commonly required determination. Robert Hooke (1635-1702), discovered the law (Hooke's Law) that strain or distortion is proportional to stress or force if the elastic limit of the material is not exceeded. (The elastic limit of a material is the maximum stress that can be developed within it without causing permanent deformation, or permanent stretch in oil field terms.)

The amount of stretch that will occur when a pull force is applied varies with the amount of pull, the length of material being stretched, the elasticity of the material, and its cross-sectional area, as given in the general stretch formula that follows, provided the elastic limit is not exceeded.

General Stretch Formula:

$$\Delta L = \frac{F \times L \times 12}{E \times a_s}$$

where ΔL = stretch, in inches

F = pull force, in pounds

L = length, in feet

E = modulus of elasticity, in pounds per square inch (for steel, E = 30,000,000 psi)

a_s = cross-sectional area (wall area or OD area minus ID area for tubular material), in square inches

NOTE: It is a common misconception that the rate of stretch for oil field tubular material also is affected by the grade of steel (J-55, N-80, etc.). This is not true.

Higher grades of steel have greater elastic limits and can therefore be stretched farther before reaching their elastic limits than can the lower grades, but the rate of stretch is the same for all grades. The only factors that affect the rate of stretch are those shown in the preceding general stretch formula.

Stretch Tables:

Stretch tables in this section (Pages 4-3 through 4-6) cover a wide range of sizes and weights of tubing, drill pipe, and casing.

Columnar tabulations in the tables show outside diameter weight per foot, inside diameter, pipe wall cross-sectional area, Stretch Constant (SC) and Free Point Constant (FPC).

Determining Stretch:

Amount of stretch is determined by using the correct Stretch Constant from the tables in the following formula:

$$\Delta L = F \times L \times SC$$

where ΔL = stretch, in inches

F = pull force, in thousands of pounds

L = length, in thousands of feet

SC = charted Stretch Constant, in inches of stretch per thousand pounds of pull per thousand feet of length

Example:

Determine the amount of stretch for 30,000 pounds of pull on 6,500 feet of 2.375 OD, 4.7 lb/ft, 1.995 ID tubing.

$$\Delta L = F \times L \times SC$$
$$= 30 \times 6.5 \times 0.30675$$
$$= 59.8 \text{ inches of stretch}$$

Determining Free Point:

The charted Free Point Constant makes it possible to determine very easily the length of pipe being stretched, commonly referred to as determining the free point in a string of stuck or anchored pipe, when the amount of pull force and amount of stretch are known. Read the correct Free Point Constant from the chart for the pipe involved, and use in the following formula:

$$L = \frac{\Delta L \times FPC}{F}$$

where: L = *minimum length of free pipe, or length being stretched, in feet.

ΔL = stretch, in inches

F = pull force, in thousands of pounds

FPC = charted Free Point Constant

***Because of friction forces, which cannot be determined readily, the actual length of free pipe may be longer than calculated. The formula necessarily assumes complete absence of friction.**

Example:
Determine the minimum length of free pipe being stretched when a string of 4-1/2 OD, 16.60 lb/ft drill pipe stretches 18.6 inches with an applied pull of 25,000 pounds.

$$L = (\Delta L \times FPC \times 1{,}000)/F$$

$$= \frac{18.6 \times 11{,}017.5}{25}$$

= 8,197 feet, or approximately 8,200 feet

Calculation of Stretch Constants and Free Point Constants:

For any pipe sizes not included in the tabulated stretch chart data, Stretch Constants and Free Point Constants can be calculated as follows:

$$SC = \frac{0.4}{a_s}$$

$$FPC = 2{,}500 \times a_s$$

where: a_s = pipe wall cross-sectional area, in square inches

Example:
Determine the Stretch Constant for 2.375 OD, 4.7 lb/ft tubing which has a pipe wall cross-sectional area (a_s) of 1.304 square inches.

$$SC = \frac{0.4}{a_s}$$

$$= \frac{0.4}{1.304}$$

= 0.30675

Example:
Determine the Free Point Constant for 4-1/2 OD, 16.60 lb/ft drill pipe which has a pipe wall cross-sectional area (a_s) of 4.407 square inches.

$$FPC = 2{,}500 \times a_s$$

$$= 2{,}500 \times 4.407$$

$$= 11{,}017.5$$

Stretch Graphs:

Stretch graphs are included in this section (Pages 4-7 through 4-12) for 1.660 through 7 OD external upset or non-upset API tubing in the most common weight and wall thickness for each size. For tubing having any other cross-sectional wall area, stretch must be determined from the general stretch formula or from the stretch charts also included in this section.

Each stretch graph involves only three variables: amount of pull force, depth (or length), and amount of stretch. When any two of the variables are known, the third can be read directly from the graph as follows:

1. If **depth** and **pull force** are known, the amount of stretch can be found.
2. If **depth** and **stretch** are known, the amount of pull can be found.
3. If **pull force** and **stretch** are known, the depth or length of tubing being stretched can be found.

Tubing Stretch Table

OD	Weight	ID	Wall Area	Stretch Constant	Free Point Constant
in.	lb/ft	in.	sq in.	in./1,000 lb/1,000 ft	
1.050	1.14	0.824	0.333	1.20120	832.5
	1.20				
1.315	1.30	1.125	0.364	1.09890	910.0
	1.43	1.097	0.413	0.96852	1,032.5
	1.63	1.065	0.467	0.85653	1,167.5
	1.70	1.049	0.494	0.80972	1,235.0
	1.72				
	1.80				
1.660	2.10	1.410	0.603	0.66335	1,507.5
	2.30	1.380	0.669	0.59791	1,672.5
	2.33				
1.900	2.40	1.650	0.697	0.57389	1,742.5
	2.60	1.610	0.799	0.50063	1,997.5
	2.72				
	2.75				
	2.76				
	2.90				
2.000	3.30	1.670	0.951	0.42061	2,377.5
	3.40				
2.063	2.66	1.813	0.761	0.52562	1,902.5
	3.25	1.751	0.935	0.42781	2,337.5
	3.30				
	3.40				
2.375	3.10	2.125	0.884	0.45249	2,210.0
	3.32	2.107	0.943	0.42418	2,357.5
	4.00	2.041	1.158	0.34542	2,895.0
	4.60	1.995	1.304	0.30675	3,260.0
	4.70				
	5.30	1.939	1.477	0.27082	3,692.5
	5.80	1.867	1.692	0.23641	4,230.0
	5.95				
	6.20	1.853	1.733	0.23081	4,332.5
	7.70	1.703	2.152	0.18587	5,380.0
2.875	4.36	2.579	1.268	0.31546	3,170.0
	4.64	2.563	1.333	0.30008	3,332.5
	6.40	2.441	1.812	0.22075	4,530.0
	6.50				
	7.90	2.323	2.254	0.17746	5,635.0
	8.60	2.259	2.484	0.16103	6,210.0
	8.70				
	8.90	2.243	2.540	0.15748	6,350.0
	9.50	2.195	2.708	0.14771	6,770.0
	10.40	2.151	2.858	0.13996	7,145.0
2.875	11.00	2.065	3.143	0.12727	7,857.5
	11.65	1.995	3.366	0.11884	8,415.0
3.500	5.63	3.188	1.639	0.24405	4,097.5
	5.75				
	7.70	3.068	2.228	0.17953	5,7570.0

Tubing Stretch Table (Continued)

OD	Weight	ID	Wall Area	Stretch Constant	Free Point Constant
in.	lb/ft	in.	sq in.	in./1,000 lb/1,000 ft	
3.500	9.20	2.992	2.590	0.15444	6,475.0
	9.30				
	10.20	2.922	2.915	0.13722	7,287.5
	10.30				
	12.80	2.764	3.621	0.11047	9,052.5
	12.95	2.750	3.682	0.10864	9,205.0
	13.70	2.673	4.010	0.09975	10,025.0
	14.70	2.601	4.308	0.09285	10,770.0
	15.10	2.602	4.304	0.09294	10,760.0
	15.80	2.524	4.618	0.08662	11,545.0
	17.05	2.440	4.945	0.08089	12,362.5
4.000	9.40	3.548	2.680	0.14925	6,700.0
	9.50				
	10.80	3.476	3.077	0.13000	7,692.5
	10.90				
	11.00				
	11.60	3.428	3.337	0.11987	8,342.5
	13.40	3.340	3.805	0.10512	9,512.5
4.500	12.60	3.958	3.600	0.11111	9,000.0
	12.75				
	15.10	3.826	4.407	0.09076	11,017.5
	15.50				
	16.90	3.754	4.836	0.08271	12,090.0
	19.20	3.640	5.498	0.07275	13,745.0

Drill Pipe Stretch Table

OD	Nominal Weight	ID	Wall Area	Stretch Constant	Free Point Constant
in.	lb/ft	in.	sq in.	in./1,000 lb/1,000 ft	
2-3/8	4.85	1.995	1.304	0.30675	3,260.0
	6.65	1.815	1.843	0.21704	4,607.5
2-7/8	6.85	2.441	1.812	0.22075	4,530.0
	10.40	2.151	2.858	0.13996	7,145.0
3-1/2	9.50	2.992	2.590	0.15444	6,475.0
	13.30	2.764	3.621	0.11047	9,052.5
	15.50	2.602	4.304	0.09294	10,760.0
4	11.85	3.476	3.077	0.13000	7,692.5
	14.00	3.340	3.805	0.10512	9,512.5
4-1/2	13.75	3.958	3.600	0.11111	9,000.0
	16.60	3.826	4.407	0.09076	11,017.5
	18.10	3.754	4.836	0.08271	12,090.0
	20.00	3.640	5.498	0.07275	13,745.0
5	16.25	4.408	4.374	0.09145	10,935.0
	19.50	4.276	5.275	0.07583	13,187.5
5-1/2	21.90	4.778	5.828	0.06863	14,570.0
	24.70	4.670	6.630	0.06033	16,575.0
6-5/8	25.20	5.965	6.526	0.06129	16,315.0

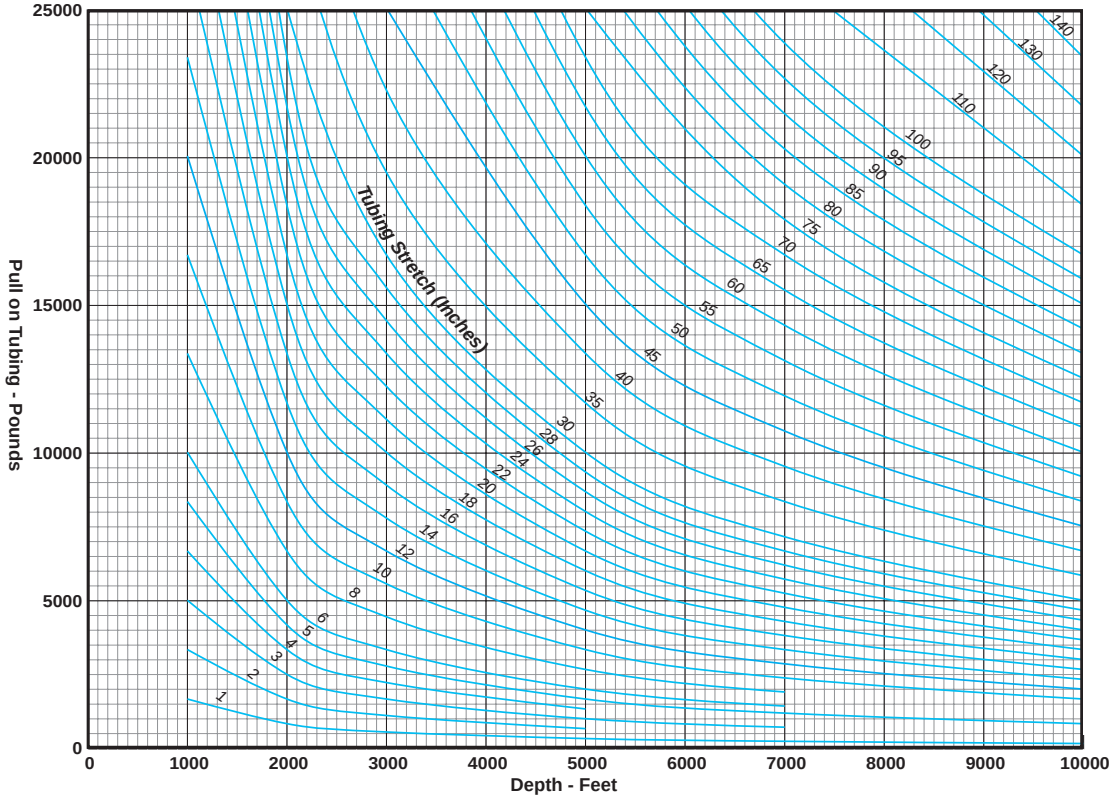
Casing Stretch Table

OD	Nominal Weight	ID	Wall Area	Stretch Constant	Free Point Constant
in.	lb/ft	in.	sq in.	in./1,000 lb/1,000 ft	
4-1/2	9.50	4.090	2.766	0.14461	6,915.0
	10.50	4.052	3.009	0.13293	7,522.5
	11.60	4.000	3.338	0.11983	8,345.0
	13.50	3.920	3.836	0.10428	9,590.0
	15.10	3.826	4.407	0.09076	11,017.5
	16.90	3.740	4.918	0.08133	12,295.0
5	11.50	4.560	3.304	0.12107	8,260.0
	13.00	4.494	3.773	0.10602	9,432.5
	15.00	4.408	4.374	0.09145	10,935.0
	18.00	4.276	5.275	0.07583	13,187.5
	20.80	4.156	6.069	0.06591	15,172.5
5-1/2	14.00	5.012	4.029	0.09928	10,072.5
	15.50	4.950	4.514	0.08861	11,285.0
	17.00	4.892	4.962	0.08061	12,405.0
	20.00	4.778	5.828	0.06863	14,570.0
	23.00	4.670	6.630	0.06033	16,575.0
6-5/8	20.00	6.049	5.734	0.06976	14,335.0
	24.00	5.921	6.937	0.05766	17,342.5
	28.00	5.791	8.133	0.04918	20,332.5
	32.00	5.675	9.177	0.04359	22,942.5
7	17.00	6.538	4.912	0.08143	12,280.0
	20.00	6.456	5.749	0.06958	14,372.5
	23.00	6.366	6.656	0.06010	16,640.0
	26.00	6.276	7.549	0.05299	18,872.5
	29.00	6.184	8.449	0.04734	21,122.5
	32.00	6.094	9.317	0.04293	23,292.5
	35.00	6.004	10.172	0.03932	25,430.0
	38.00	5.920	10.959	0.03650	27,397.5
7-5/8	24.00	7.025	6.904	0.05794	17,260.0
	26.40	6.969	7.519	0.05320	18,797.5
	29.70	6.875	8.541	0.04683	21,352.5
	33.70	6.765	9.720	0.04115	24,300.0
	39.00	6.625	11.192	0.03574	27,980.0
8-5/8	24.00	8.097	6.934	0.05769	17,335.0
	28.00	8.017	7.947	0.05033	19,867.5
	32.00	7.921	9.149	0.04372	22,872.5
	36.00	7.825	10.336	0.03870	25,840.0
	40.00	7.725	11.557	0.03461	28,892.5
	44.00	7.625	12.673	0.03156	31,682.5
	49.00	7.511	14.118	0.02833	35,295.0
9-5/8	32.30	9.001	9.128	0.04382	22,820.0
	36.00	8.921	10.254	0.03901	25,635.0
	40.00	8.835	11.454	0.03492	28,635.0
	43.50	8.755	12.559	0.03185	31,397.5
	47.00	8.681	13.572	0.02947	33,930.0
	53.50	8.535	15.546	0.02573	38,865.0
10-3/4	32.75	10.192	9.178	0.04358	22,945.0
	40.50	10.050	11.435	0.03498	28,587.5
	45.50	9.950	13.006	0.03076	32,515.0
	51.00	9.850	14.561	0.02747	36,402.5
	55.50	9.760	15.947	0.02508	39,867.5
	60.70	9.660	17.473	0.02289	43,682.5
	65.70	9.560	18.982	0.02107	47,455.0

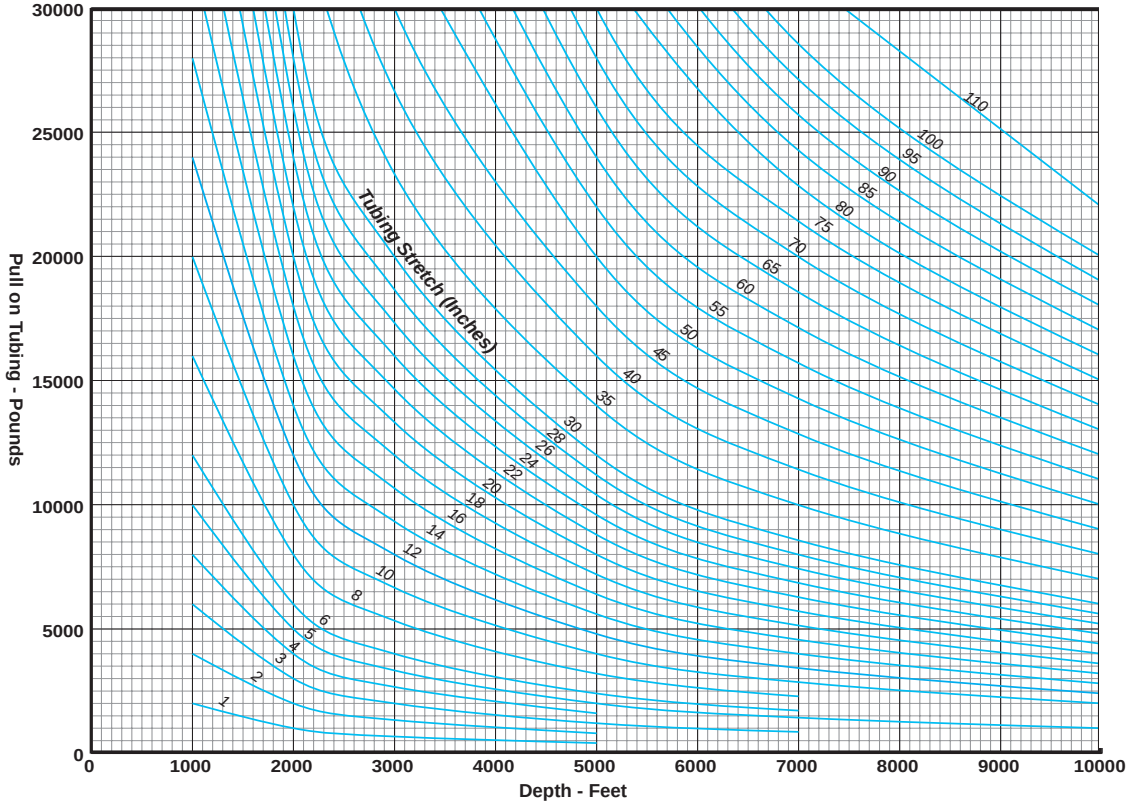
Casing Stretch Table (Continued)

OD	Nominal Weight	ID	Wall Area	Stretch Constant	Free Point Constant
in.	lb/ft	in.	sq in.	in./1,000 lb/1,000 ft	
11-3/4	42.00	11.084	11.944	0.03349	29,860.0
	47.00	11.000	13.401	0.02985	33,502.5
	54.00	10.880	15.463	0.02587	38,657.5
	60.00	10.772	17.300	0.02312	43,250.0
13-3/8	48.00	12.715	13.524	0.02958	33,810.0
	54.50	12.615	15.514	0.02578	38,785.0
	61.00	12.515	17.487	0.02287	43,717.5
	68.00	12.415	19.445	0.02057	48,612.5
	72.00	12.347	20.768	0.01926	51,920.0
16	65.00	15.250	18.408	0.02173	46,020.0
	75.00	15.124	21.414	0.01868	53,535.0
	84.00	15.010	24.112	0.01659	60,280.0
20	94.00	19.124	26.918	0.01486	67,295.0

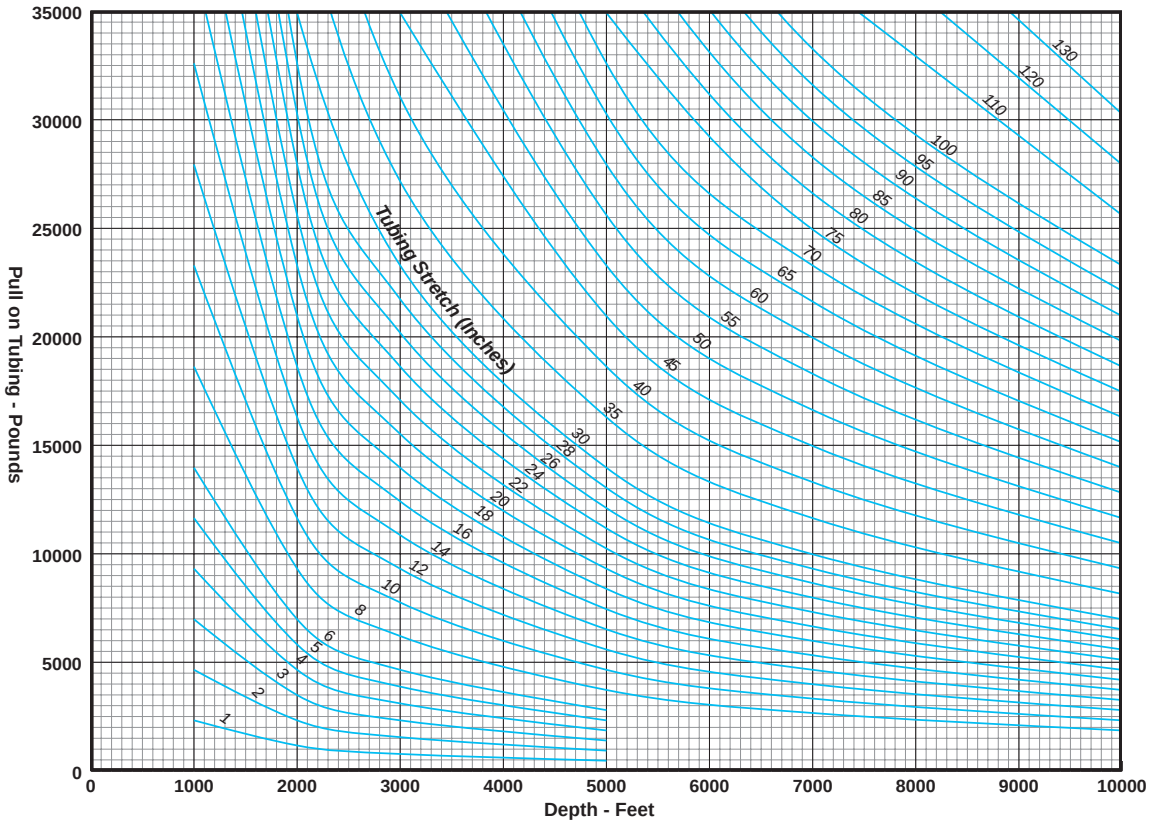
Tubing Stretch Chart for 1.660" OD 2.4 lb/ft EU or NU API Tubing



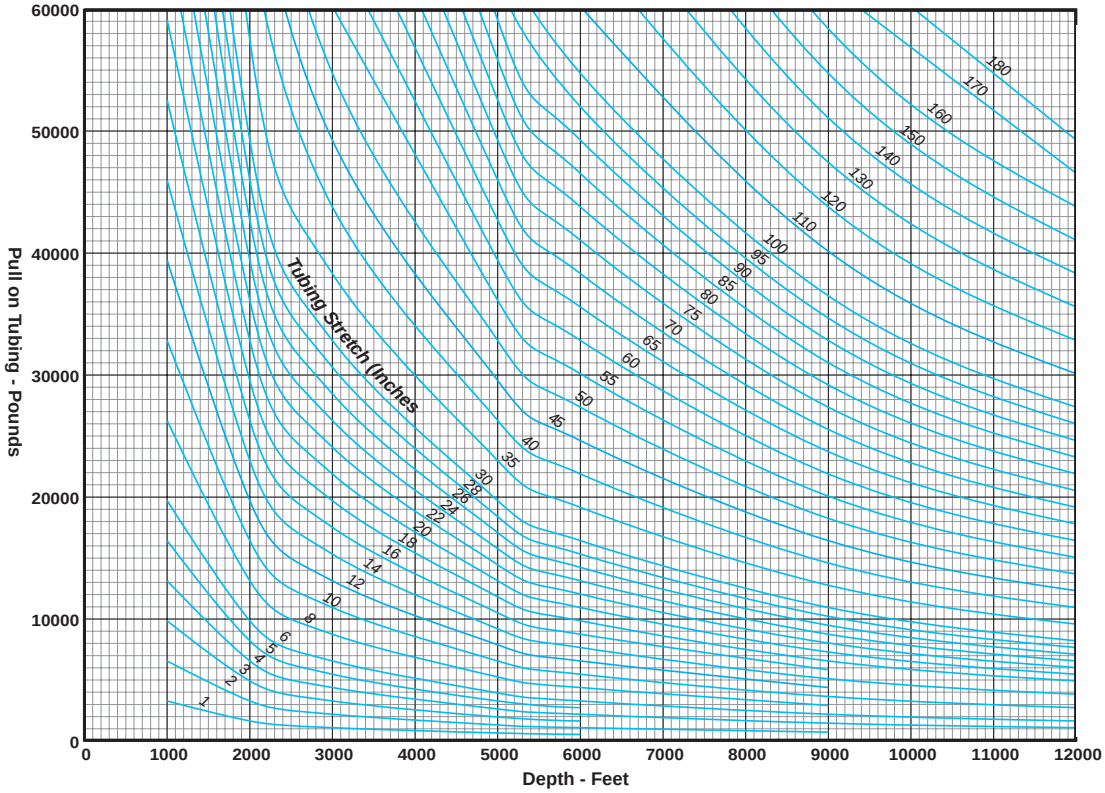
Tubing Stretch Chart for 1.900" OD 2.9 lb/ft EU or NU API Tubing



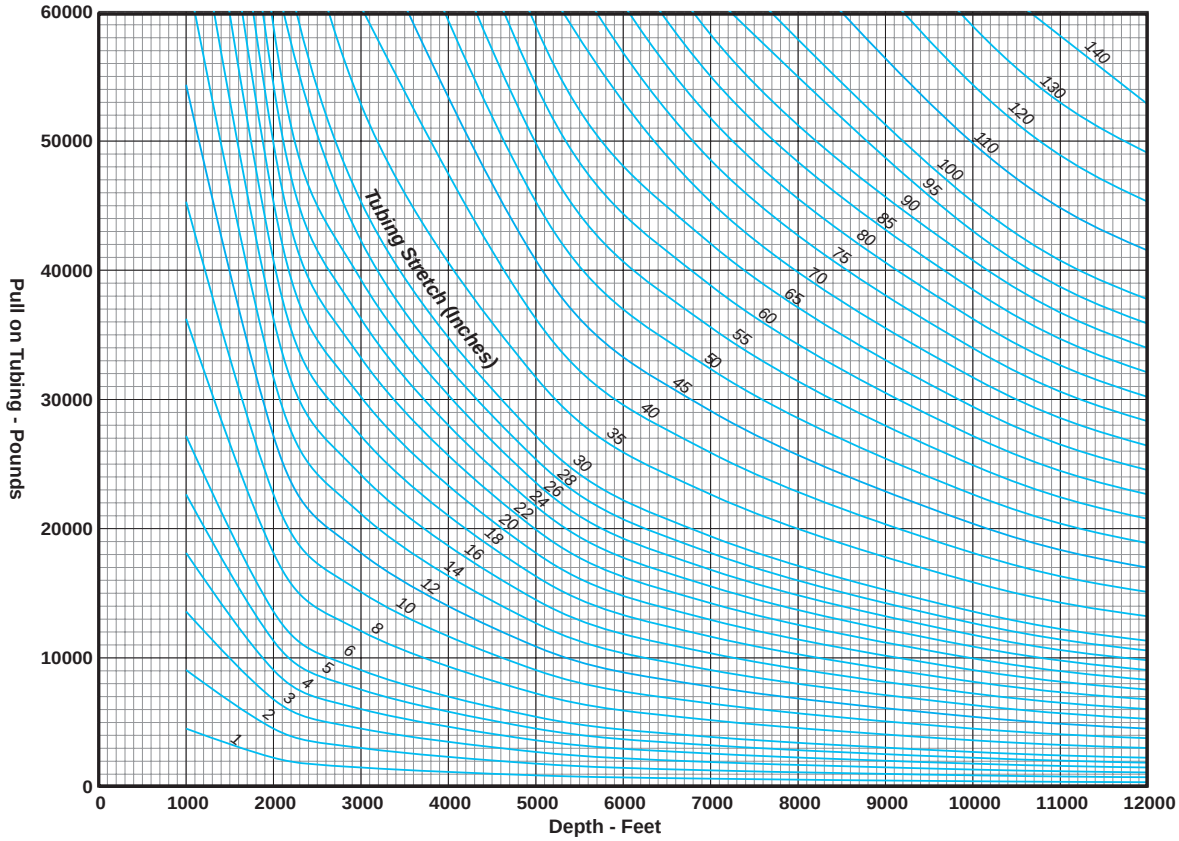
Tubing Stretch Chart for 2.062" OD 3.25 lb/ft EU or NU API Tubing



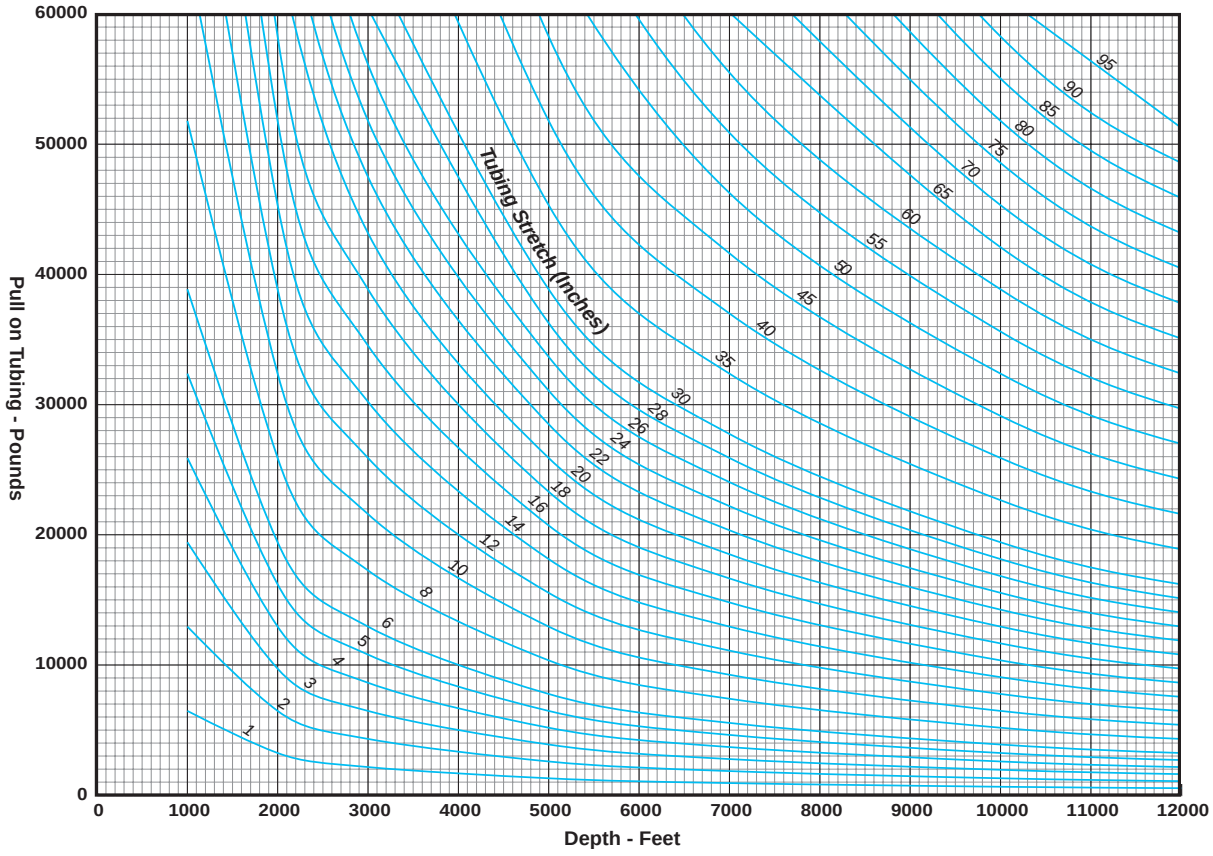
Tubing Stretch Chart for 2-3/8" OD 4.7 lb/ft EU or NU API Tubing



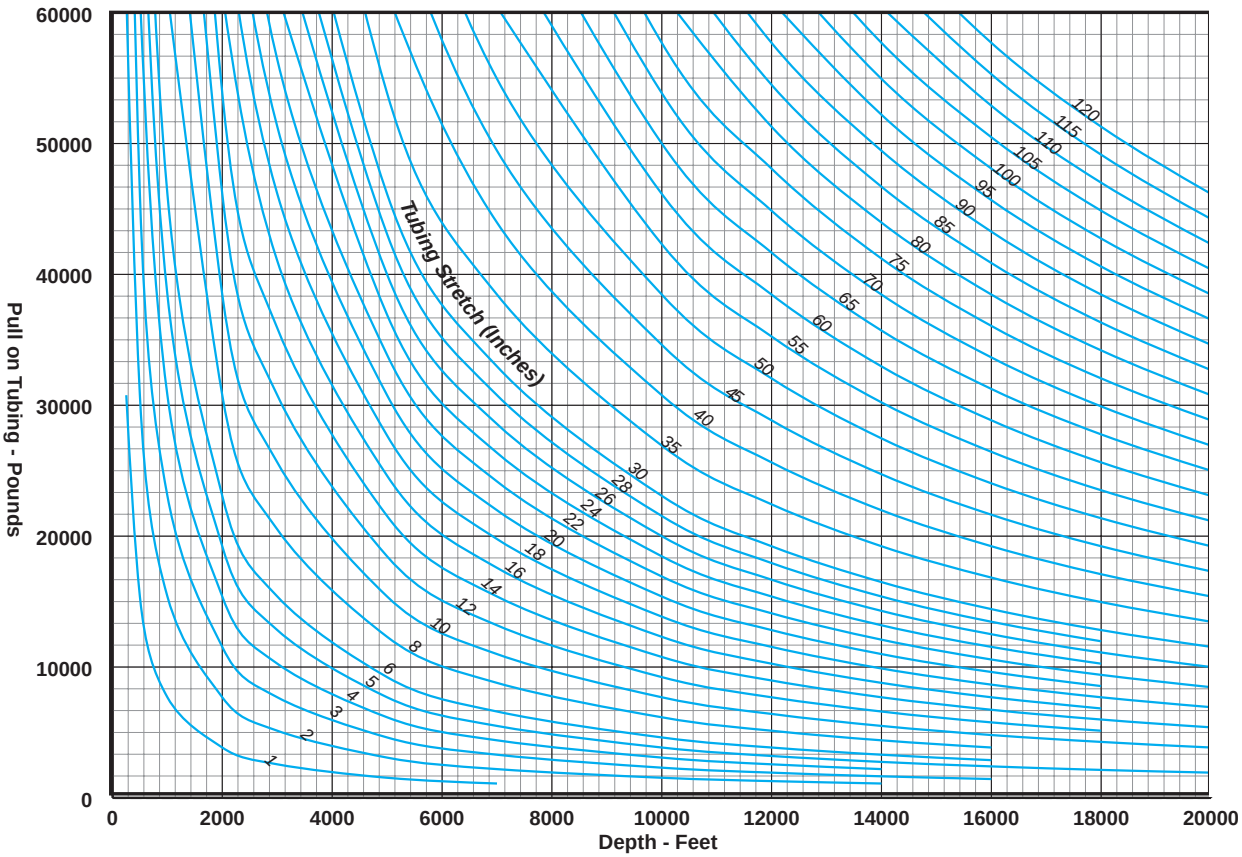
Tubing Stretch Chart for 2-7/8" OD 6.5 lb/ft EU or NU API Tubing



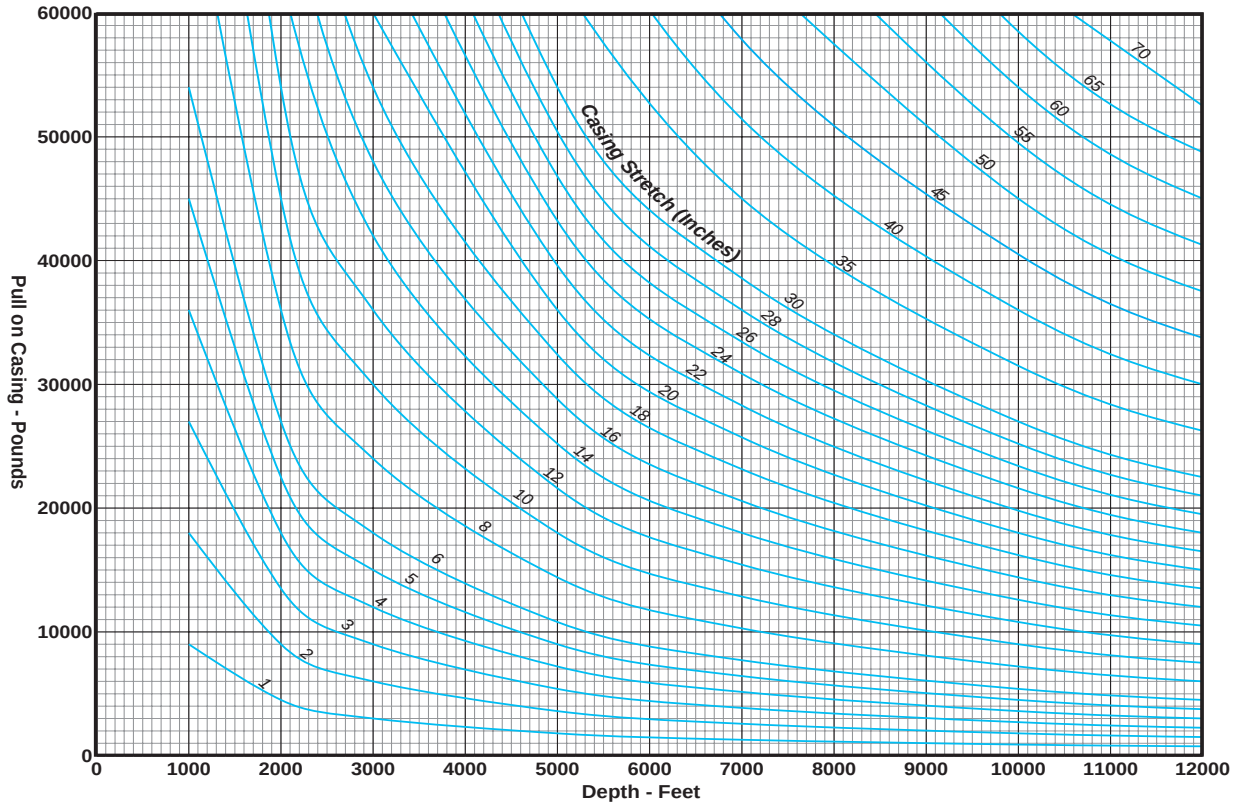
Tubing Stretch Chart for 3-1/2" OD 9.3 lb/ft EU or NU API Tubing



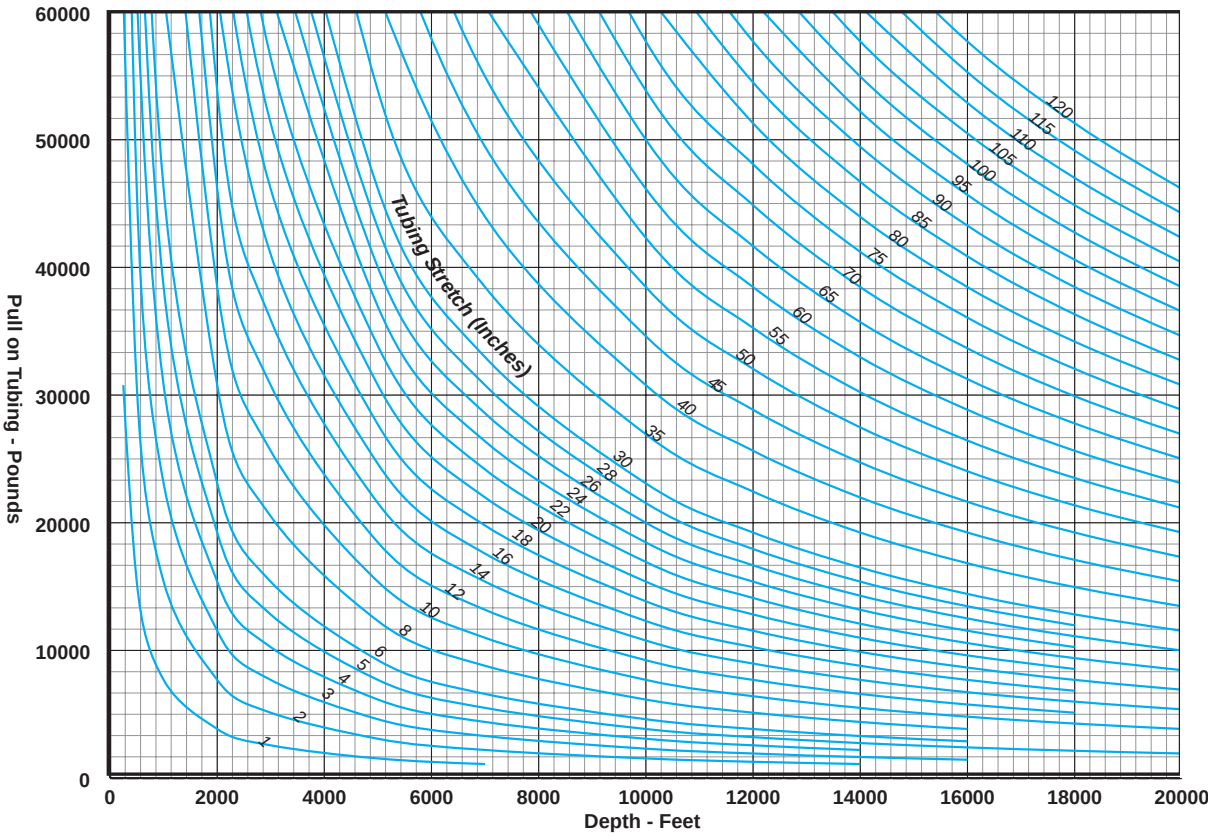
Tubing Stretch Chart for 4" OD 10.9 lb/ft EU or NU API Tubing



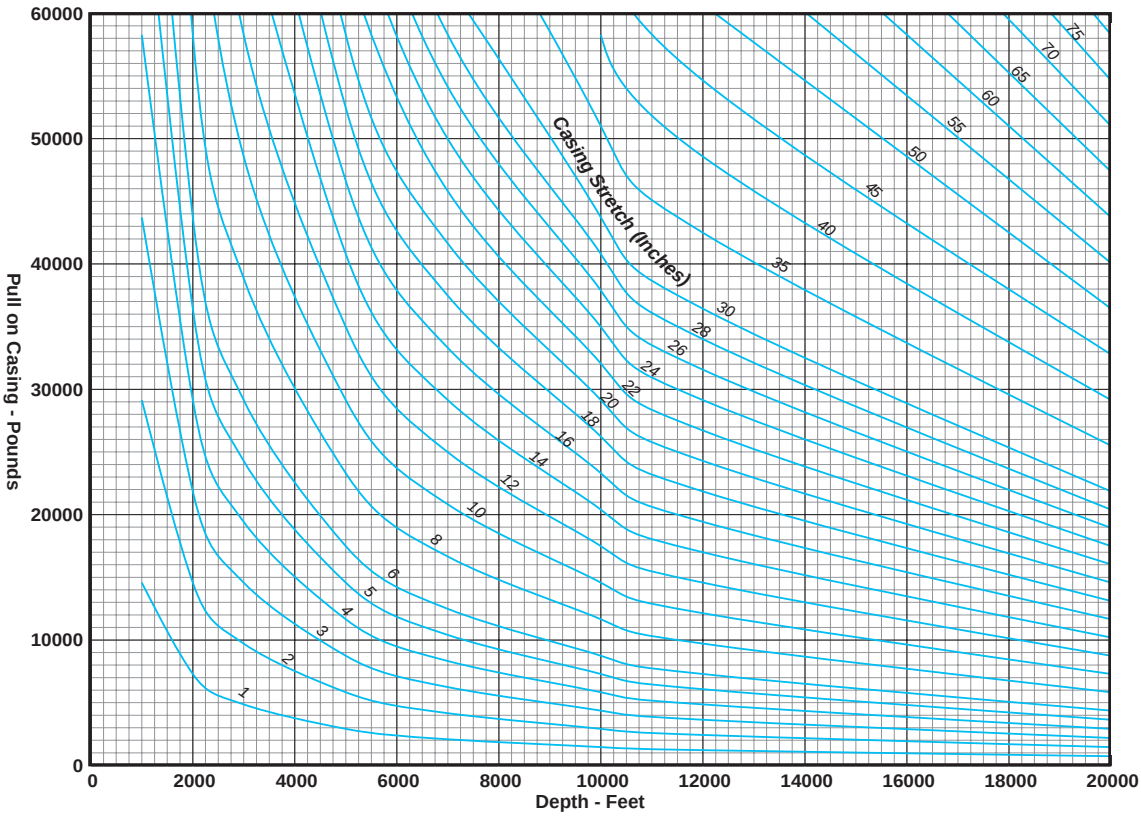
Casing Stretch Chart for 4-1/2" OD 12.75 lb/ft EU or NU API Casing



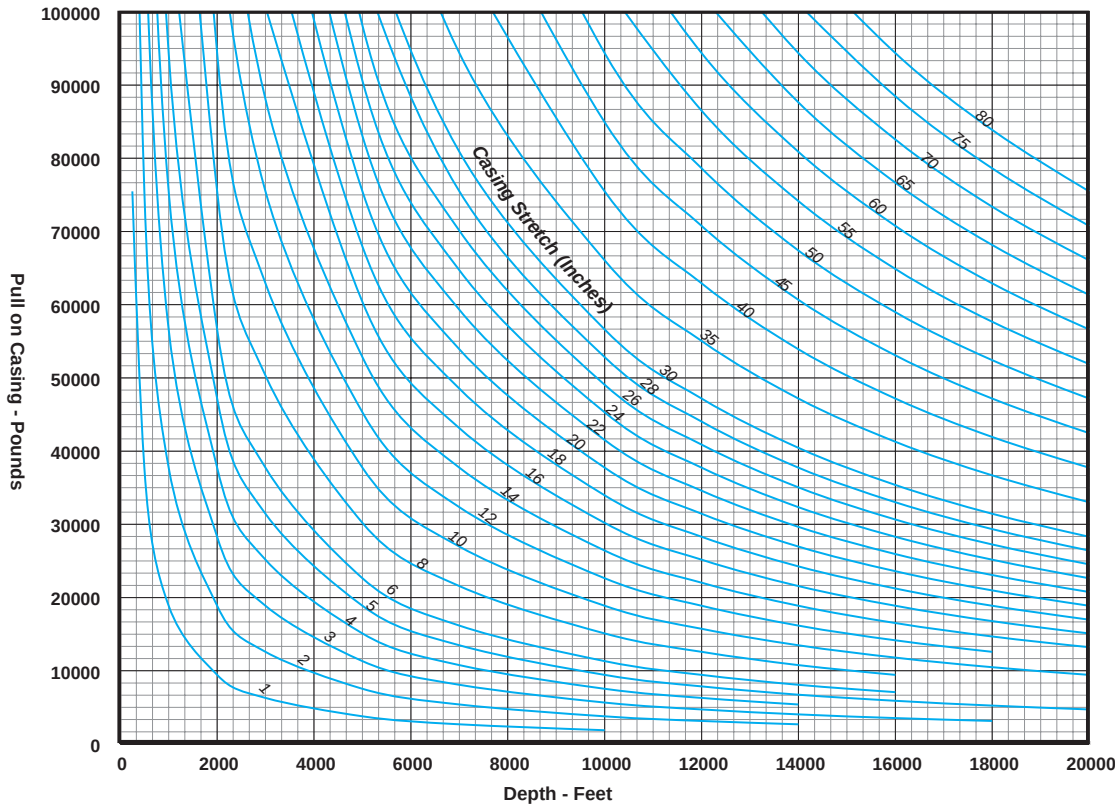
Casing Stretch Chart for 5" OD 15.0 lb/ft EU or NU API Casing



Casing Stretch Chart for 5-1/2" OD 20 lb/ft EU or NU API Casing



Casing Stretch Chart for 7" OD 26.0 lb/ft EU or NU API Casing

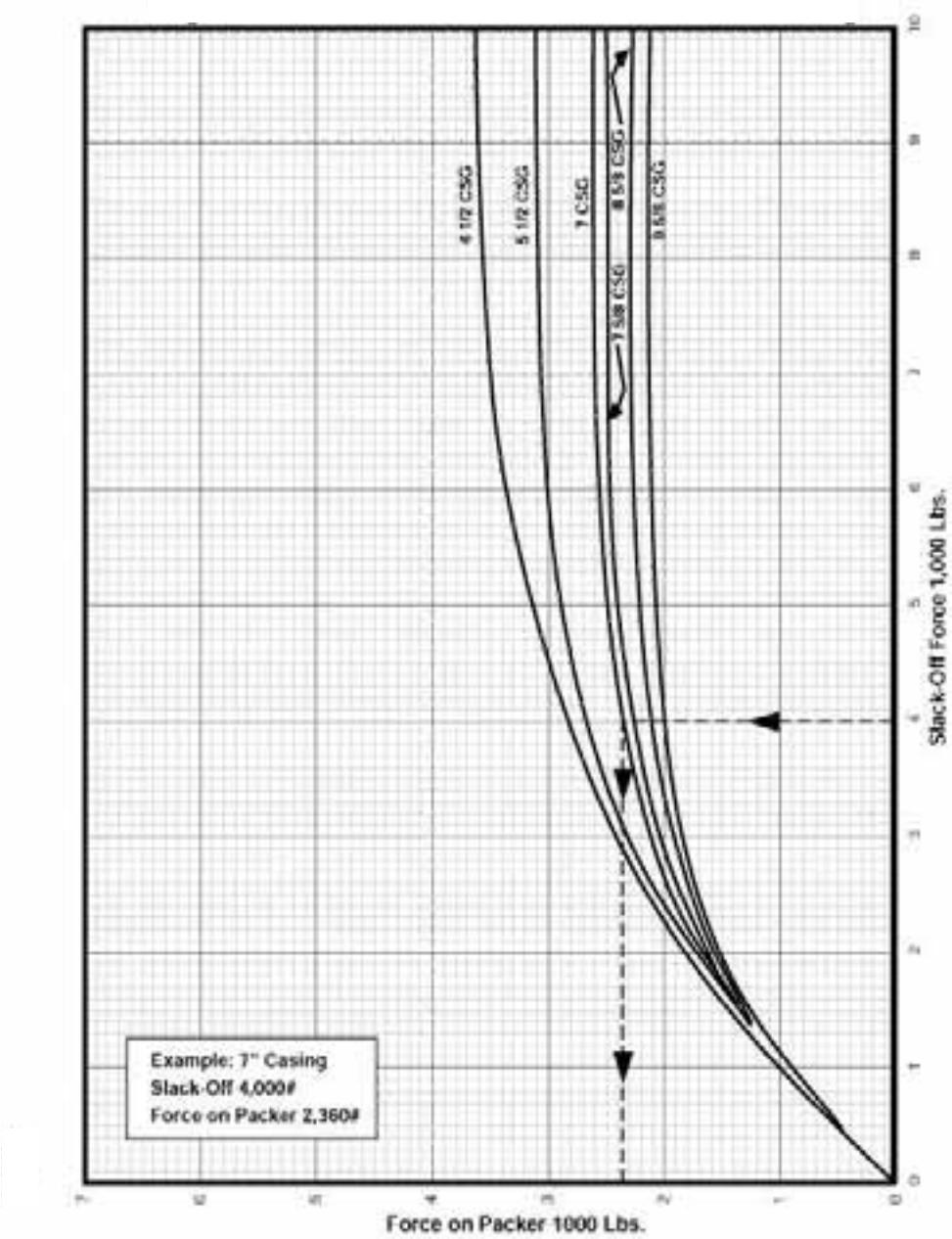


Set-Down and Slack Off Weights

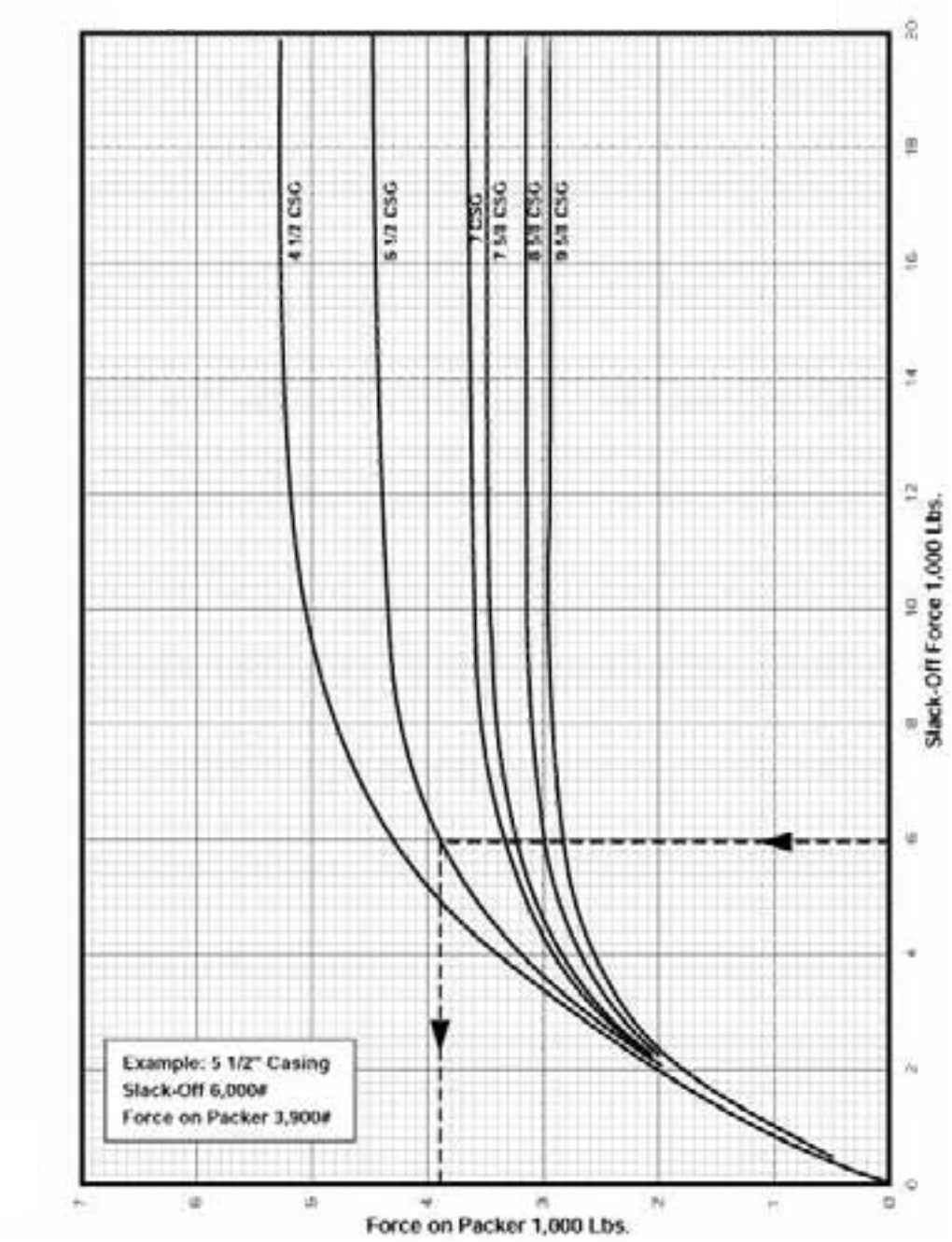
When a string of tubing is lowered to put weight on bottom, as in setting a packer, the tubing buckles in the form of a helix and a significant amount of the applied weight is supported by friction between the tubing and casing. The accompanying slack off graphs (Pages 4-13 through 4-18) indicate the magnitude of the effect of friction and provide a means of determining the approximate amount of weight applied on bottom as the tubing is lowered and the weight loss is measured at the surface. Graphs are provided for most common tubing/casing combinations. The graphs were developed from mathematical calculations using an assumed average value for the coefficient of friction. They are presented for information and may not be exactly accurate for any specific case because of the possibility that the coefficient of friction actually involved may vary from the assumed value; however, actual tests run in a variety of well fluids indicate that variations are relatively small.

In situations where the amount of effective tubing weight on bottom may be marginal or inadequate to completely pack off a set-down type packer, it is suggested that an attempt be made to pressure the casing. Pressure in the casing/tubing annulus tends to straighten the tubing and put more weight on the packer. Casing pressure will also increase the pack off force in the packing element of a partially packed off set-down type packer.

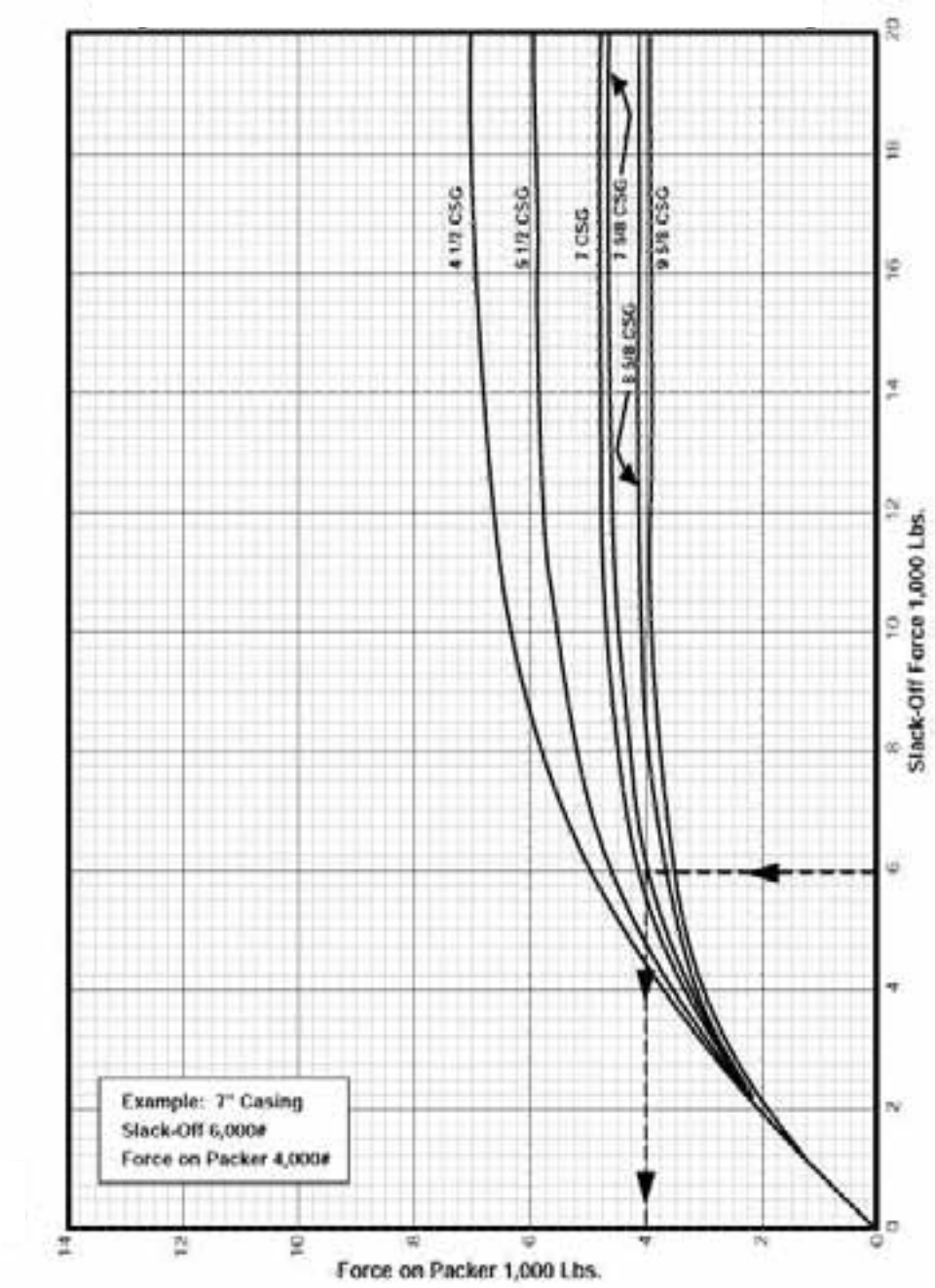
Weight on Packer Chart
For 1.660" OD 2.4 lb/ft EU or NU API Tubing



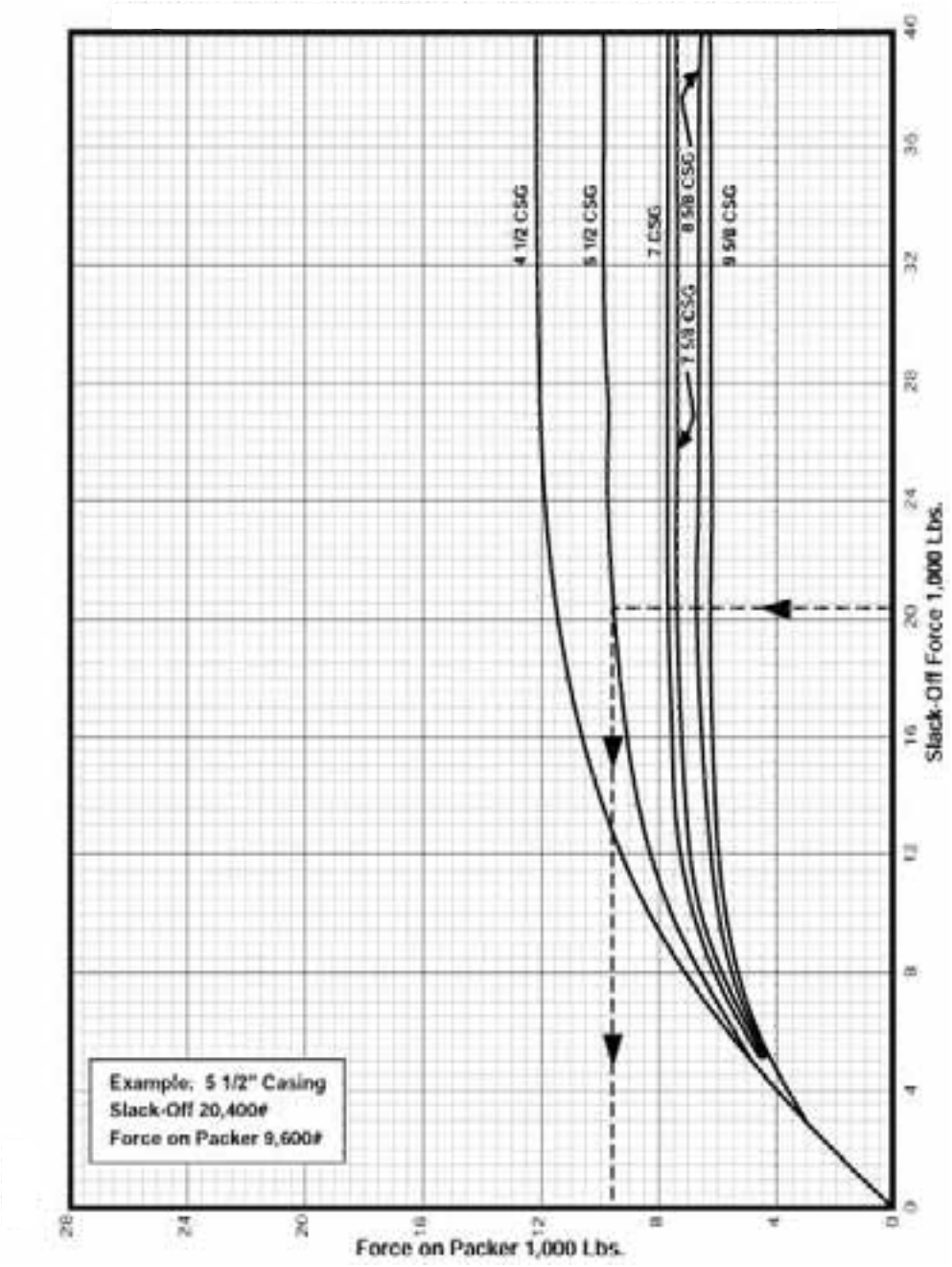
Weight on Packer Chart
For 1.900" OD 2.9 lb/ft EU or NU API Tubing



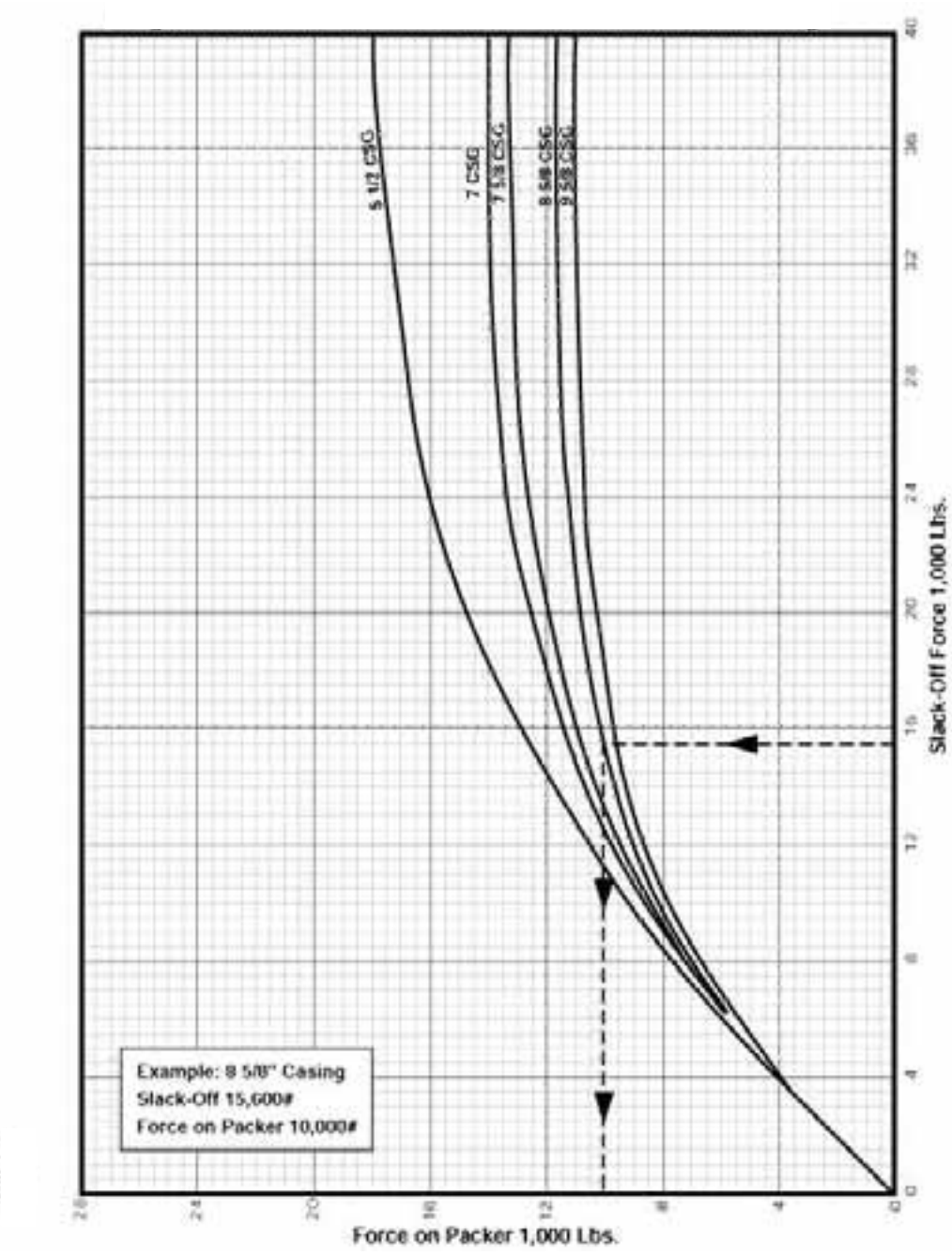
Weight on Packer Chart
For 2.062" OD 3.25 lb/ft EU or NU API Tubing



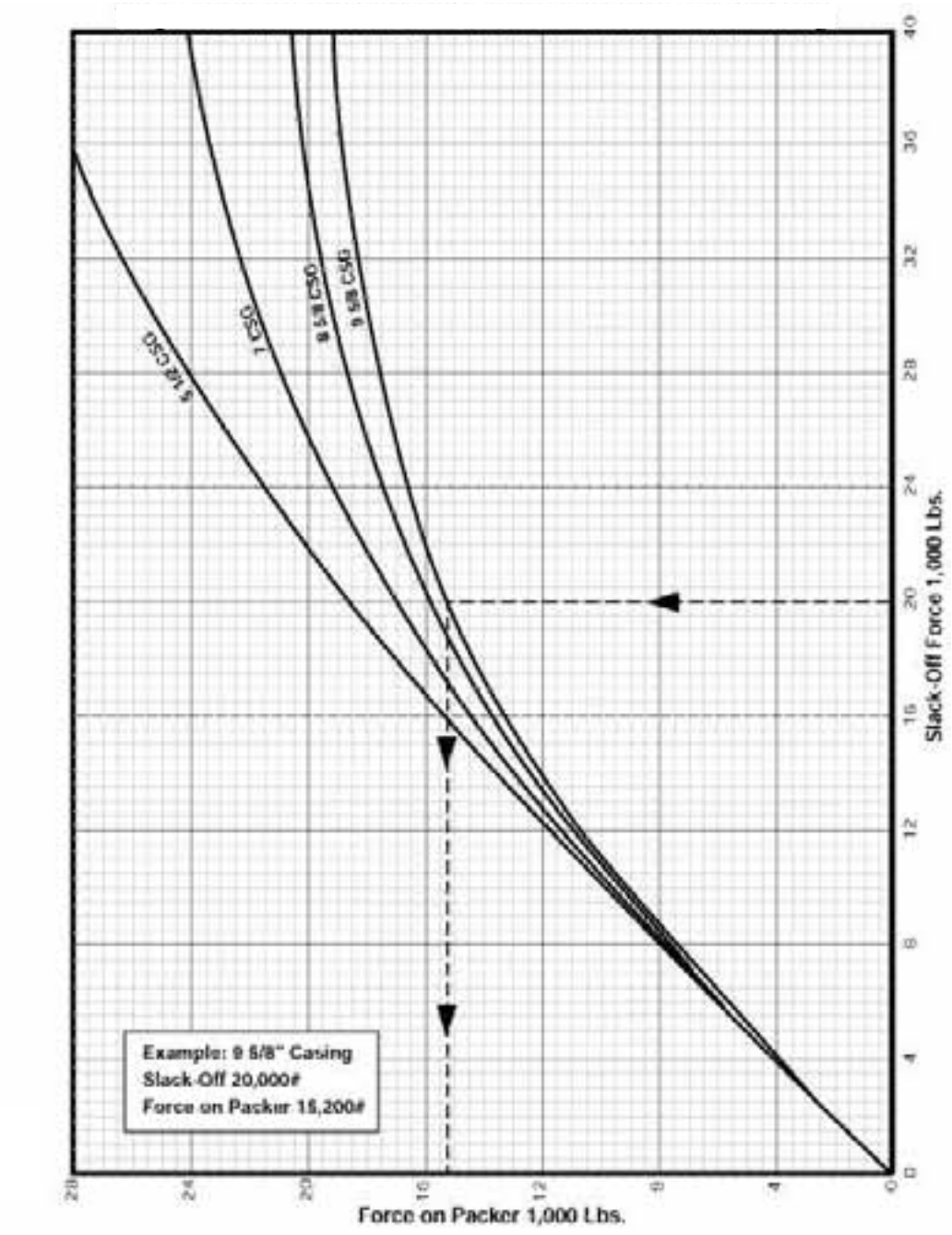
Weight on Packer Chart
For 2-3/8" OD 4.7 lb/ft EU or NU API Tubing



Weight on Packer Chart
For 2-7/8" OD 6.5 lb/ft EU or NU API Tubing



Weight on Packer Chart
For 3-1/2" OD 9.3 lb/ft EU or NU API Tubing



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Tubing API Requirements Drift Test

Tubing Size	Drift Mandrel Length	Drift Mandrel Diameter
≤ 2-7/8	42"	*d* - 3/32"
> 2-7/8	42"	*d* - 1/8"

Data provided by API from table E.31, API 5CT, eighth edition; July, 2005

Casing API Requirements Drift Test

Casing Size	Drift Mandrel Length	Drift Mandrel Diameter
< 9-5/8	6"	*d* - 1/8"
≥ 9-5/8" to ≤ 13-3/8"	12"	*d* - 5/32"
≥ 13-3/8	12"	*d* - 3/16"

Data provided by API from table E.31, API 5CT, eighth edition; July, 2005

Tubing and Casing Tensile Requirements

Grade	Yield Strength		Tensile Strength
	Minimum psi	Maximum psi	Minimum psi
H-40	40,000	80,000	60,000
J-55	55,000	80,000	75,000
K-55	55,000	80,000	95,000
N-80	80,000	110,000	110,000
M-65	65,000	85,000	85,000
L-80	80,000	95,000	95,000
C-90	90,000	105,000	100,000
C-95	95,000	110,000	105,000
T-95	95,000	110,000	105,000
P-110	110,000	140,000	125,000
Q-125	125,000	150,000	135,000

Data provided by API from table E.6 columns 2, 5, 6 and 7 API 5CT, eighth edition; July, 2005

Tubing Range Lengths

	Range 1 (ft)	Range 2 (ft)	Range 3 (ft)
Total Range Length, Inclusive	20-24●	28-32■	38-42♦
Range Length for 100% of Carload*			
Permissible Variation, Maximum	2	2	2

* Carload tolerances shall not apply to order items of less than 40,000 lb of pipe. For any carload of 40,000 lb or more of pipe that is shipped to the final destination without transfer or removal from the car, the tolerance shall apply to each car. For any order item consisting of more than 40,000 lb of pipe that is shipped from the manufacturer's facility by rail, but not to the final destination, the carload tolerance shall apply to the overall quantity of pipe shipped on the order item, but not to the individual carloads.

● By agreement between purchaser and manufacturer the maximum length may be increased to 28.0 ft

■ By agreement between purchaser and manufacturer the maximum length may be increased to 34.0 ft

♦ By agreement between purchaser and manufacturer, the maximum length may be increased to 45.0 ft

Data provided by API from table E. 30, API 5CT, eighth edition; July, 2005

Casing Range Lengths

	Range 1 (ft)	Range 2 (ft)	Range 3 (ft)
Total Range Length, Inclusive	16-25	25-34	34-48
Range Length for 95 Percent or More of Carload*			
Permissible Variation, Maximum	6	5	6
Permissible Length, Minimum	18	28	36

***** Carload tolerances shall not apply to order items of less than 40,000 lb of pipe. For any carload of 40,000 lb or more of pipe that is shipped to the final destination without transfer or removal from the car, the tolerance shall apply to each car. For any order item consisting of more than 40,000 lb of pipe that is shipped from the manufacturer's facility by rail, but not to the final destination, the carload tolerance shall apply to the overall quantity of pipe shipped on the order item, but not to the individual carloads.

Data provided by API from table E. 30, API 5CT, eighth edition; July, 2005

Tubing and Casing Tolerances

Pipe Size OD (in.)	Type	Dimension	Tolerance
<4-1/2	Non Upset Pipe	OD	±-0.031 in.
≥4-1/2	Non Upset Pipe	OD	+1% OD to -0.5% OD
≥3-1/2	Upset Pipe	OD	+3/32 in. to -1/32 in.
>3-1/2 to ≤5	Upset Pipe	OD	+7/64 in. to -0.75% OD
>5 to ≤8-5/8	Upset Pipe	OD	+1/8 in. to -0.75% OD
>8-5/8	Upset Pipe	OD	+5/32 in. to -0.75% OD
≥2-3/8 to ≤3-1/2	External Upset Tubing	OD	+3/32 in. to -1/32 in.
>3-1/2 to ≤4	External Upset Tubing	OD	+7/64 in. to -1/32 in.
>4	External Upset Tubing	OD	+7/64 in. to -0.75% OD
All Pipe Sizes	All Types	Wall Thickness	-12.5%
		ID	Governed by the OD and mass tolerances*

* For Mass Tolerances, reference section 8.11.3 Mass, API 5CT; July, 2005

Interchangeability of 10 Rd Integral Joint Tubing Thread

Description	Joint OD	ID	Equivalent Thread Form	Joints Interchangeable with 10 Rd Integral Joint
1.315 OD 10 Rd API Integral Jt	1.550	.970	1.315 NU 10 Rd	Atlas, Aztec, Jal-Con-Weld 55, J & L Aztec, W.C. Norris, Kilby Steel SW Pipe
1.660 OD 10 Rd API Integral Jt	1.880	1.301	1.660 NU 10 Rd	Atlas, Aztec, Jal-Con-Weld 55, J & L Aztec, Southwestern Pipe, W.C. Norris, Kilby Steel, Tex-Tube
1.900 OD 10 Rd API Integral Jt	2.110	1.531	1.900 NU 10 Rd	Atlas, Aztec, Jal-Con-Weld 55, J & L Aztec, Southwestern Pipe, W.C. Norris, Kilby Steel, Tex-Tube
2.000 OD 10 Rd Integral Jt	2.340	1.649	1.900 EU 10 Rd	Atlas
2.063 OD 10 Rd API Integral Jt	2.325	1.672	1.900 EU 10 Rd	Atlas, Aztec, Jal-Con-Weld 55, J & L Aztec, Southwestern Pipe, W.C. Norris, Kilby Steel, Tex-Tube, Youngstown YCO50
2.375 OD 10 Rd Integral Jt	2.625	1.926	2.375 NU 10 Rd	Atlas, Aztec, Jal-Con-Weld 55, J & L Aztec
2.875 OD 10 Rd Integral Jt	3.150	2.372	2.875 NU 10 Rd	Aztec, Jal-Con-Weld 55, J & L Aztec

Dimensional Data And Minimum Performance Properties Of Tubing

OD		Nom Wt			Wall Thickness		ID		Threaded and Coupled						Int Joint				Grade	Collapse	Internal Yield Pressure	Joint Yield Strength			
		Non-Upset	Upset	Int Jt					Drift Dia		Coupling OD				Drift Dia		Box OD					T&C Non-Upset	T&C Upset	Special Clearance	Integral Joint
											Non-Upset		Upset Reg		Upset Spec										
in.	mm	lb/ft	lb/ft	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		psi	psi	lb	lb	lb	lb
1.05	26.67	1.14	1.20	-	0.113	2.87	0.824	20.92	0.730	18.54	1.313	33.35	1.66	42.16	-	-	-	-	H-40	7,680	7,530	6,320	13,320	-	-
		-	1.54		0.154	3.91	0.742	18.84	0.648	16.45	-	-								10,010	10,270	-	17,320		
1.05	26.67	1.14	1.20	-	0.113	2.87	0.824	20.92	0.730	18.54	1.313	33.35	1.66	42.16	-	-	-	-	J-55	10,560	10,360	8,690	18,320	-	-
		-	1.54		0.154	3.91	0.742	18.84	0.648	16.45	-	-								13,770	14,120	-	23,820		
1.05	26.67	1.14	1.20	-	0.113	2.87	0.824	20.92	0.730	18.54	1.313	33.35	1.66	42.16	-	-	-	-	L-80	15,370	15,070	12,640	26,640	-	-
		-	1.54		0.154	3.91	0.742	18.84	0.648	16.45	-	-								20,020	20,530	-	34,640		
1.05	26.67	1.14	1.20	-	0.113	2.87	0.824	20.92	0.730	18.54	1.313	33.35	1.66	42.16	-	-	-	-	N-80	15,370	15,070	12,640	26,640	-	-
		-	1.54		0.154	3.91	0.742	18.84	0.648	16.45	-	-								20,020	20,530	-	34,640		
1.05	26.67	1.14	1.20	-	0.113	2.87	0.824	20.92	0.730	18.54	1.313	33.35	1.66	42.16	-	-	-	-	C-90	17,290	16,950	14,220	29,970	-	-
		-	1.54		0.154	3.91	0.742	18.84	0.648	16.45	-	-								22,530	23,100	-	38,970		
1.05	26.67	1.14	1.20	-	0.113	2.87	0.824	20.92	0.730	18.54	1.313	33.35	1.66	42.16	-	-	-	-	T-95	18,250	17,890	15,010	31,640	-	-
		-	1.54		0.154	3.91	0.742	18.84	0.648	16.45	-	-								23,780	24,380	-	41,140		
1.05	26.67	-	1.54	-	0.154	3.91	0.742	18.84	0.648	16.45	-	-	1.66	42.16	-	-	-	-	P-110	27,530	28,230	-	47,630	-	-
1.315	33.4	1.70	1.80	1.72	0.133	3.38	1.049	26.70	0.955	24.26	1.66	42.16	1.90	48.26	-	-	0.955	24.26	H-40	7,270	7,080	10,920	19,760	-	15,940
		-	2.24	-	0.179	4.54	0.957	24.30	0.863	21.92	-	-					-	-		9,410	9,530	-	25,560		-
1.315	33.4	1.70	1.80	1.72	0.133	3.38	1.049	26.64	0.955	24.26	1.66	42.16	1.90	48.26	-	-	0.955	24.26	J-55	10,000	9,730	15,020	27,170	-	21,910
		-	2.24	-	0.179	4.54	0.957	24.30	0.863	21.92	-	-					-	-		12,940	13,100	-	35,150		-
1.315	33.4	1.70	1.80	1.72	0.133	3.38	1.049	26.64	0.955	24.26	1.66	42.16	1.90	48.26	-	-	0.955	24.26	L-80	14,550	14,160	21,840	39,520	-	31,870
		-	2.24	-	0.179	4.54	0.957	24.30	0.863	21.92	-	-					-	-		18,810	19,060	-	51,120		-
1.315	33.4	1.70	1.80	1.72	0.133	3.38	1.049	26.64	0.955	24.26	1.66	42.16	1.90	48.26	-	-	0.955	24.26	N-80	14,550	14,160	21,840	39,520	-	31,870
		-	2.24	-	0.179	4.54	0.957	24.30	0.863	21.92	-	-					-	-		18,810	19,060	-	51,120		-
1.315	33.4	1.70	1.80	1.72	0.133	3.38	1.049	26.64	0.955	24.26	1.66	42.16	1.90	48.26	-	-	0.955	24.26	C-90	16,360	15,930	24,570	44,460	-	35,860
		-	2.24	-	0.179	4.54	0.957	24.30	0.863	21.92	-	-					-	-		21,170	21,440	-	57,510		-
1.315	33.4	1.70	1.80	1.72	0.133	3.38	1.049	26.64	0.955	24.26	1.66	42.16	1.90	48.26	-	-	0.955	24.26	T-95	17,270	16,810	25,940	46,930	-	37,850
		-	2.24	-	0.179	4.54	0.957	24.30	0.863	21.92	-	-					-	-		22,340	22,630	-	60,710		-
1.315	33.4	-	2.24	-	0.179	4.54	0.957	24.30	0.863	21.92	-	-	1.90	48.26	-	-	-	-	P-110	25,870	26,200	-	70,290	-	-
1.66	42.16	-	-	2.10	0.125	3.17	1.410	35.81	1.316	32.90	-	-	-	-	-	-	1.316	33.43	H-40	5,570	5,270	-	-	-	22,230
		2.30	2.40	2.33	0.140	3.55	1.380	35.05	1.286	32.66	2.054	52.17	2.20	55.88	-	-	1.286	32.66		6,180	5,900	15,480	26,760	-	
		-	3.07	-	0.191	4.85	1.278	32.46	1.184	30.07	-	-					-	-		8,150	8,050	-	35,240		-
1.66	42.16	-	-	2.10	0.125	3.17	1.410	35.81	1.316	32.90	-	-	-	-	-	-	1.316	33.43	J-55	7,660	7,250	-	-	-	30,560
		2.30	2.40	2.33	0.140	3.55	1.380	35.05	1.286	32.66	2.054	52.17	2.20	55.88	-	-	1.286	32.66		8,490	8,120	21,290	36,800	-	
		-	3.07	-	0.191	4.85	1.278	32.46	1.184	30.07	-	-					-	-		11,200	11,070	-	48,460		-
1.66	42.16	2.30	2.40	2.33	0.140	3.55	1.380	35.05	1.286	32.66	2.054	52.17	2.20	55.88	-	-	1.286	32.66	L-80	12,360	11,810	30,960	53,520	-	44,460
		-	3.07	-	0.191	4.85	1.278	32.46	1.184	30.07	-	-					-	-		16,290	16,110	-	70,480		-
1.66	42.16	2.30	2.40	2.33	0.140	3.55	1.380	35.05	1.286	32.66	2.054	52.17	2.20	55.88	-	-	1.286	32.66	N-80	12,360	11,810	30,960	53,520	-	44,460
		-	3.07	-	0.191	4.85	1.278	32.46	1.184	30.07	-	-					-	-		16,290	16,110	-	70,480		-
1.66	42.16	2.30	2.40	2.33	0.140	3.55	1.380	35.05	1.286	32.66	2.054	52.17	2.20	55.88	-	-	1.286	32.66	C-90	13,900	13,280	34,830	60,210	-	50,010
		-	3.07	-	0.191	4.85	1.278	32.46	1.184	30.07	-	-					-	-		18,330	18,120	-	79,290		-
1.66	42.16	2.30	2.40	2.33	0.140	3.55	1.380	35.05	1.286	32.66	2.054	52.17	2.20	55.88	-	-	1.286	32.66	T-95	14,670	14,020	36,770	63,560	-	52,790
		-	3.07	-	0.191	4.85	1.278	32.46	1.184	30.07	-	-					-	-		19,350	19,130	-	83,700		-
1.66	42.16	-	3.07	-	0.191	4.85	1.278	32.46	1.184	30.07	-	-	2.20	55.88	-	-	-	-	P-110	22,400	22,150	-	96,910	-	-

Dimensional Data And Minimum Performance Properties Of Tubing (Continued)

OD		Nom Wt			Wall Thickness		ID		Threaded and Coupled						Int Joint				Grade	Collapse	Internal Yield Pressure	Joint Yield Strength			
		Non-Upset	Upset	Int Jt					Drift Dia		Coupling OD				Drift Dia		Box OD					T&C Non-Upset	T&C Upset	Special Clearance	Integral Joint
											Non-Upset		Upset Reg		Upset Spec										
in.	mm	lb/ft	lb/ft	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		psi	psi	lb	lb	lb	lb
1.900	48.26	-	-	2.40	0.125	3.18	1.650	41.91	1.556	39.52	-	-	-	-	1.556	39.52	2.110	53.59	H-40	4,920	4,610	-	-	-	26,940
		2.75	2.90	2.76	0.145	3.68	1.610	40.89	1.516	38.51	2.200	55.88	2.50	63.50	1.516	38.51				5,640	5,340	19,040	31,960	-	
		-	3.73	-	0.200	5.08	1.500	38.10	1.406	35.71	-	-			-	-	-	-		7,530	7,370	-	42,720		-
1.900	48.26	-	-	2.40	0.125	3.18	1.650	41.91	1.556	39.52	-	-	-	-	1.556	39.52	2.110	53.59	J-55	6,640	6,330	-	-	-	37,040
		2.75	2.90	2.76	0.145	3.68	1.610	40.89	1.516	38.51	2.200	55.88	2.50	63.50	1.516	38.51				7,750	7,350	26,180	43,950	-	
		-	3.73	-	0.200	5.08	1.500	38.10	1.406	35.71	-	-			-	-	-	-		10,360	10,130	-	58,740		-
1.900	48.26	2.75	2.90	2.76	0.145	3.68	1.610	40.91	1.516	38.51	2.200	55.88	2.500	63.50	1.516	38.51	2.110	53.59	L-80	11,280	10,680	38,080	63,920	-	53,880
		-	3.73	-	0.200	5.08	1.500	38.10	1.406	35.71	-	-	-	-	-	-	-	-		15,070	14,740	-	85,440		-
		4.42	-		0.250	6.35	1.400	35.56	1.306	33.17										18,280	18,420		-		
		5.15			0.300	7.62	1.300	33.02	1.206	30.63										21,270	22,110				
1.900	48.26	2.75	2.90	2.76	0.145	3.68	1.610	40.91	1.516	38.51	2.200	55.88	2.500	63.50	1.516	38.51	2.110	53.59	N-80	11,280	10,680	38,080	63,920	-	53,880
		-	3.73	-	0.200	5.08	1.500	38.10	1.406	35.71	-	-			-	-	-	-		15,070	14,740	-	85,440		-
1.900	48.26	2.75	2.90	2.76	0.145	3.68	1.610	40.91	1.516	38.51	2.200	55.88	2.500	63.50	1.516	38.51	2.110	53.59	C-90	12,620	12,020	42,840	71,910	-	60,610
		-	3.73	-	0.200	5.08	1.500	38.10	1.406	35.71	-	-	-	-	-	-	-	-		16,950	16,580	-	96,120		-
		4.42	-		0.250	6.35	1.400	35.56	1.306	33.17										20,570	20,720		-		
		5.15			0.300	7.62	1.300	33.02	1.206	30.63										23,930	24,870				
1.900	48.26	2.75	2.90	2.76	0.145	3.68	1.610	40.91	1.516	38.51	2.200	55.88	2.500	63.50	1.516	38.51	2.110	53.59	T-95	13,190	12,690	45,220	75,910	-	63,980
		-	3.73	-	0.200	5.08	1.500	38.10	1.406	35.71	-	-	-	-	-	-	-	-		17,890	17,500	-	101,460		-
		4.42	-		0.250	6.35	1.400	35.56	1.306	33.17										21,710	21,880		-		
		5.15			0.300	7.62	1.300	33.02	1.206	30.63										25,260	26,250				
1.900	48.26	-	3.73	-	0.200	5.08	1.500	38.10	1.406	35.71	-	-	2.50	63.50	-	-	-	-	P-110	20,720	20,260	-	117,480	-	-
2.063	52.4	-	-	3.25	0.156	3.96	1.751	44.47	1.657	42.09	-	-	-	-	1.657	42.09	2.325	59.06	H-40	5,590	5,290	-	-	-	35,800
		4.50		-	0.225	5.72	1.613	40.97	1.519	38.58					-	-	-	-		7,770	7,630				-
2.063	52.4	-	-	3.25	0.156	3.96	1.751	44.47	1.657	42.09	-	-	-	-	1.657	42.09	2.325	59.06	J-55	7,690	7,280	-	-	-	49,300
		4.50		-	0.225	5.72	1.613	40.97	1.519	38.58					-	-	-	-		10,690	10,500				-
2.063	52.4	-	-	3.25	0.156	3.96	1.751	44.47	1.657	42.09	-	-	-	-	1.657	42.09	2.325	59.06	L-80	11,180	10,590	-	-	-	71,700
		4.50		-	0.225	5.72	1.613	40.97	1.519	38.58					-	-	-	-		15,550	15,270				-
2.063	52.4	-	-	3.25	0.156	3.96	1.751	44.47	1.657	42.09	-	-	-	-	1.657	42.09	2.325	59.06	N-80	11,180	10,590	-	-	-	71,700
		4.50		-	0.225	5.72	1.613	40.97	1.519	38.58					-	-	-	-		15,550	15,270				-
2.063	52.4	-	-	3.25	0.156	3.96	1.751	44.47	1.657	42.09	-	-	-	-	1.657	42.09	2.325	59.06	C-90	12,420	11,910	-	-	-	80,700
		4.50		-	0.225	5.72	1.613	40.97	1.519	38.58					-	-	-	-		17,490	17,180				-
2.063	52.4	-	-	3.25	0.156	3.96	1.751	44.47	1.657	42.09	-	-	-	-	1.657	42.09	2.325	59.06	T-95	12,980	12,570	-	-	-	85,100
		4.50		-	0.225	5.72	1.613	40.97	1.519	38.58					-	-	-	-		18,460	18,130				-
2.063	52.4	4.50	-	-	0.225	5.72	1.613	40.97	1.519	38.58	-	-	-	-	-	-	-	-	P110	21,380	20,990	-	-	-	-
2.375	60.33	4.00	-	-	0.167	4.24	2.041	51.84	1.947	49.45	2.875	73.03	-	-	-	-	-	-	H-40	5,230	4,920	30,100	-	-	-
		4.60	4.70		0.190	4.83	1.995	50.67	1.901	48.29			3.063	77.80	2.91	73.91				5,890	5,600	35,900	52,200	52,200	
2.375	60.33	4.00	-	-	0.167	4.24	2.041	51.84	1.947	49.45	2.875	73.03	-	-	-	-	-	-	J-55	7,190	6,770	41,400	-	-	-
		4.60	4.70		0.190	4.83	1.995	50.67	1.901	48.29			3.063	77.80	2.91	73.91				8,100	7,700	49,400	71,700	71,700	
2.375	60.33	4.00	-		0.167	4.24	2.041	51.84	1.947	49.45	2.875	73.03	-	-	-	-	-	-	L-80	9,980	9,840	60,200	-	-	-
		4.60	4.70		0.190	4.83	1.995	50.67	1.901	48.29			3.063	77.80	2.91	73.91				11,780	11,200	71,800	104,300	104,300	
		5.80	5.95	-	0.254	6.45	1.867	47.42	1.773	45.03										15,280	14,970	102,900	135,400	135,400	
		6.60	-		0.295	7.493	1.785	45.34	1.691	42.95	-	-	-	-	-	-				17,410	17,390	-	-	-	
		7.35	7.45		0.336	8.53	1.703	43.26	1.609	40.87			3.063	77.80	2.91	73.91				19,430	19,810		172,200	141,300	

Dimensional Data And Minimum Performance Properties Of Tubing (Continued)

OD		Nom Wt			Wall Thickness		ID		Threaded and Coupled						Int Joint				Grade	Collapse	Internal Yield Pressure	Joint Yield Strength			
		Non-Upset	Upset	Int Jt					Drift Dia		Coupling OD				Drift Dia		Box OD					T&C Non-Upset	T&C Upset	Special Clearance	Integral Joint
											Non-Upset		Upset Reg		Upset Spec										
in.	mm	lb/ft	lb/ft	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		psi	psi	lb	lb	lb	lb
2.375	60.33	4.00	-	-	0.167	4.24	2.041	51.84	1.947	49.45	2.875	73.03	-	-	-	-	-	-	-	-	N-80	9,980	9,840	60,200	-	-	-
		4.60	4.70		0.190	4.83	1.995	50.67	1.901	48.29			3.063	77.80	2.91	73.91						11,780	11,200	71,800	104,300	104,300	
		5.80	5.95		0.254	6.45	1.867	47.42	1.773	45.03												15,280	14,970	102,900	135,400	135,400	
2.375	60.33	4.00	-	-	0.167	4.24	2.041	51.84	1.947	49.45	2.875	73.03	-	-	-	-	-	-	-	-	C-90	10,940	11,070	67,700	-	-	-
		4.60	4.70		0.190	4.83	1.995	50.67	1.901	48.29			3.063	77.80	2.91	73.91						13,250	12,600	80,800	117,400	117,400	
		5.80	5.95		0.254	6.45	1.867	47.42	1.773	45.03												17,190	16,840	115,700	152,300	152,300	
		6.60	-		0.295	7.493	1.785	45.34	1.691	42.95	-	-	-	-	-	-						19,580	19,560	-	-	-	
		7.35	7.45		0.336	8.53	1.703	43.26	1.609	40.87			3.063	77.80	2.91	73.91						21,860	22,280		193,700	159,000	
2.375	60.33	4.00	-	-	0.167	4.24	2.041	51.84	1.947	49.45	-	-	-	-	-	-	-	-	-	-	T-95	11,410	11,690	-	-	-	-
		4.60	4.70		0.190	4.83	1.995	50.67	1.901	48.29	2.875	73.03	3.063	77.80	2.91	73.91						13,980	13,300	85,300	123,900	123,900	
		5.80	5.95		0.254	6.45	1.867	47.42	1.773	45.03												18,150	17,780	122,200	160,700	160,700	
		6.60	-		0.295	7.493	1.785	45.34	1.691	42.95	-	-	-	-	-	-						20,670	20,650	-	-	-	
		7.35	7.45		0.336	8.53	1.703	43.26	1.609	40.87			3.063	77.80	2.91	73.91						23,080	23,520		204,400	167,800	
2.375	60.33	4.60	4.70	-	0.190	4.83	1.995	50.67	1.901	48.29	2.875	73.03	3.063	77.80	2.91	73.91	-	-	-	-	P-110	16,130	15,400	98,800	143,400	143,400	-
		5.80	5.95		0.254	6.45	1.867	47.42	1.773	45.03												21,010	20,590	141,500	186,100	186,100	
2.875	73.03	6.40	6.50	-	0.217	5.51	2.441	62.00	2.347	59.61	3.500	88.90	3.668	93.17	3.46	87.88	-	-	-	-	H-40	5,580	5,280	52,700	72,500	72,500	-
2.875	73.03	6.40	6.50	-	0.217	5.51	2.441	62.00	2.347	59.61	3.500	88.90	3.668	93.17	3.46	87.88	-	-	-	-	J-55	7,680	7,260	72,500	99,700	99,700	-
2.875	73.03	6.40	6.50	-	0.217	5.51	2.441	62.00	2.347	59.61	3.500	88.90	3.668	93.17	3.46	87.88	-	-	-	-	L-80	11,170	10,570	105,400	145,000	145,000	-
		7.80	7.90		0.276	7.01	2.323	59.00	2.229	56.62												13,890	13,440	140,700	180,300	180,300	
		8.60	8.70		0.308	7.82	2.259	57.38	2.165	54.99												15,300	15,000	159,200	198,700	193,100	
		9.35	9.45		0.340	8.64	2.195	55.75	2.101	53.37	-	-										16,680	16,560	-	216,600		
		10.50	-		0.392	9.97	2.091	53.11	1.997	50.73			-	-	-	-						18,840	19,090		-	-	
		11.50			0.440	11.18	1.995	50.67	1.901	48.29												20,740	21,430				
2.875	73.03	6.40	6.50	-	0.217	5.51	2.441	62.00	2.347	59.61	3.500	88.90	3.668	93.17	3.46	87.88	-	-	-	-	N-80	11,170	10,570	105,400	145,000	145,000	-
		7.80	7.90		0.276	7.01	2.323	59.00	2.229	56.62												13,890	13,440	140,700	180,300	180,300	
		8.60	8.70		0.308	7.82	2.259	57.38	2.165	54.99												15,300	15,000	159,200	198,700	193,100	
2.875	73.03	6.40	6.50	-	0.217	5.51	2.441	62.00	2.347	59.61	3.500	88.90	3.668	93.17	3.46	87.88	-	-	-	-	C-90	12,380	11,890	118,600	163,100	163,100	-
		7.80	7.90		0.276	7.01	2.323	59.00	2.229	56.62												15,620	15,120	158,300	202,900	202,900	
		8.60	8.70		0.308	7.82	2.259	57.38	2.165	54.99												17,220	16,870	179,100	223,600	217,300	
		9.35	9.45		0.340	8.64	2.195	55.75	2.101	53.37	-	-										18,770	18,630	-	243,700		
		10.50	-		0.392	9.97	2.091	53.11	1.997	50.73			-	-	-	-						21,200	21,470		-	-	
		11.50			0.440	11.18	1.995	50.67	1.901	48.29												23,330	24,100				
2.875	73.03	6.40	6.50	-	0.217	5.51	2.441	62.00	2.347	59.61	3.500	88.90	3.668	93.17	3.46	87.88	-	-	-	-	T-95	12,940	12,550	125,200	172,100	172,100	-
		7.80	7.90		0.276	7.01	2.323	59.00	2.229	56.62												16,490	15,960	167,100	214,100	214,100	
		8.60	8.70		0.308	7.82	2.259	57.38	2.165	54.99												18,170	17,810	189,100	236,000	229,400	
		9.35	9.45		0.340	8.64	2.195	55.75	2.101	53.37	-	-										19,810	19,660	-	257,300		
		10.50	-		0.392	9.97	2.091	53.11	1.997	50.73			-	-	-	-						22,370	22,670		-	-	
		11.50			0.440	11.18	1.995	50.67	1.901	48.29												24,630	25,440				
2.875	73.03	6.40	6.50	-	0.217	5.51	2.441	62.00	2.347	59.61	3.500	88.90	3.668	93.17	3.46	87.88	-	-	-	-	P-110	14,550	14,530	145,000	199,300	199,300	-
		7.80	7.90		0.276	7.01	2.323	59.00	2.229	56.62												19,090	18,480	193,500	247,900	247,900	
		8.60	8.70		0.308	7.82	2.259	57.38	2.165	54.99												21,040	20,620	218,900	273,200	265,600	

Dimensional Data And Minimum Performance Properties Of Tubing (Continued)

OD		Nom Wt			Wall Thickness		ID		Threaded and Coupled						Int Joint				Grade	Collapse	Internal Yield Pressure	Joint Yield Strength			
		Non-Upset	Upset	Int Jt					Drift Dia		Coupling OD				Drift Dia		Box OD					T&C Non-Upset	T&C Upset	Special Clearance	Integral Joint
											Non-Upset		Upset Reg		Upset Spec										
in.	mm	lb/ft	lb/ft	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		psi	psi	lb	lb	lb	lb
3.500	88.90	7.70	-	-	0.216	5.49	3.068	77.92	2.943	74.75	4.25	107.95	-	-	-	-	-	-	H-40	4,630	4,320	65,000	-	-	-
		9.20	9.30		0.254	6.45	2.992	75.99	2.867	72.82			4.500	114.30	4.18	106.17				5,380	5,080	79,400	103,600	103,600	
		10.20	-		0.289	7.34	2.922	74.21	2.797	71.04			-	-	-	-				6,060	5,780	92,500	-	-	
3.500	88.90	7.70	-	-	0.216	5.49	3.068	77.92	2.943	74.75	4.25	107.95	-	-	-	-	-	-	J-55	5,970	5,940	89,400	-	-	-
		9.20	9.30		0.254	6.45	2.992	75.99	2.867	72.82			4.500	114.30	4.18	106.17				7,400	6,990	109,200	142,500	142,500	
		10.20	-		0.289	7.34	2.922	74.21	2.797	71.04			-	-	-	-				8,330	7,950	127,200	-	-	
3.500	88.90	7.70	-	-	0.216	5.49	3.068	77.92	2.943	74.75	4.25	107.95	-	-	-	-	-	-	L-80	7,870	8,640	130,000	-	-	-
		9.20	9.30		0.254	6.45	2.992	75.99	2.867	72.82			4.500	114.30	4.18	106.17				10,540	10,160	158,900	207,200	207,200	
		10.20	-		0.289	7.34	2.922	74.21	2.797	71.04			-	-	-	-				12,120	11,560	185,000	-	-	
		12.70	12.95		0.375	9.52	2.750	69.85	2.625	66.68			4.500	114.30	4.18	106.17				15,310	15,000	246,200	294,600	273,100	
		14.30			0.430	10.92	2.640	67.06	2.515	63.88	-	-	-	-	-	-				17,240	17,200				
		15.50	-		0.476	12.09	2.548	64.72	2.423	61.54										18,800	19,040	-	-	-	
		17.00			0.530	13.46	2.440	61.98	2.315	58.80										20,560	21,200				
3.500	88.90	7.70	-	-	0.216	5.49	3.068	77.92	2.943	74.75	4.25	107.95	-	-	-	-	-	-	N-80	7,870	8,640	130,000	-	-	-
		9.20	9.30		0.254	6.45	2.992	75.99	2.867	72.82			4.500	114.30	4.18	106.17				10,540	10,160	158,900	207,200	207,200	
		10.20	-		0.289	7.34	2.922	74.21	2.797	71.04			-	-	-	-				12,120	11,560	185,000	-	-	
		12.70	12.95		0.375	9.52	2.750	69.85	2.625	66.68			4.500	114.30	4.18	106.17				15,310	15,000	246,200	294,600	273,100	
3.500	88.90	7.70	-	-	0.216	5.49	3.068	77.92	2.943	74.75	4.25	107.95	-	-	-	-	-	-	C-90	8,540	9,720	146,300	-	-	-
		9.20	9.30		0.254	6.45	2.992	75.99	2.867	72.82			4.500	114.30	4.18	106.17				11,570	11,430	178,700	233,100	233,100	
		10.20	-		0.289	7.34	2.922	74.21	2.797	71.04			-	-	-	-				13,640	13,010	208,100	-	-	
		12.70	12.95		0.375	9.52	2.750	69.85	2.625	66.68			4.500	114.30	4.18	106.17				17,220	16,880	277,000	331,400	307,300	
		14.30			0.430	10.92	2.640	67.06	2.515	63.88	-	-	-	-	-	-				19,400	19,350				
		15.50	-		0.476	12.09	2.548	64.72	2.423	61.54										21,150	21,420	-	-	-	
		17.00			0.530	13.46	2.440	61.98	2.315	58.80										23,130	23,850				
3.500	88.90	7.70	-	-	0.216	5.49	3.068	77.92	2.943	74.75	4.25	107.95	-	-	-	-	-	-	T-95	8,850	10,260	154,400	-	-	-
		9.20	9.30		0.254	6.45	2.992	75.99	2.867	72.82			4.500	114.30	4.18	106.17				12,080	12,070	188,700	246,000	246,000	
		10.20	-		0.289	7.34	2.922	74.21	2.797	71.04			-	-	-	-				14,390	13,730	219,600	-	-	
		12.70	12.95		0.375	9.52	2.750	69.85	2.625	66.68			4.500	114.30	4.18	106.17				18,180	17,810	292,400	349,800	324,300	
		14.30			0.430	10.92	2.640	67.06	2.515	63.88	-	-	-	-	-	-				20,480	20,430				
		15.50	-		0.476	12.09	2.548	64.72	2.423	61.54										22,330	22,610	-	-	-	
		17.00			0.530	13.46	2.440	61.98	2.315	58.80										24,410	25,170				
3.500	88.90	9.20	9.30	-	0.254	6.45	2.992	75.99	2.867	72.82	4.25	107.95	4.500	114.30	4.18	106.17	-	-	P-110	13,530	13,970	218,500	284,900	284,900	-
		12.70	12.95		0.375	9.52	2.750	69.85	2.625	66.68										21,050	20,630	338,600	405,000	375,500	
4.000	101.60	9.50	-	-	0.226	5.74	3.548	90.11	3.423	86.94	4.75	120.65	-	-	-	-	-	-	H-40	4,050	3,960	72,000	-	-	-
		-	11.00		0.262	6.65	3.476	88.29	3.351	85.12	-	-	5.000	127.00						4,900	4,590	-	123,100		
4.000	101.60	9.50	-	-	0.226	5.74	3.548	90.11	3.423	86.94	4.75	120.65	-	-	-	-	-	-	J-55	5,110	5,440	99,000	-	-	-
		-	11.00		0.262	6.65	3.476	88.29	3.351	85.12	-	-	5.000	127.00						6,590	6,300	-	169,200		
4.000	101.60	9.50	-	-	0.226	5.74	3.548	90.11	3.423	86.94	4.75	120.65	-	-	-	-	-	-	L-80	6,590	7,910	144,000	-	-	-
		-	11.00		0.262	6.65	3.476	88.29	3.351	85.12	-	-	5.000	127.00						8,800	9,170	-	246,200	-	
		13.20			0.330	8.38	3.340	84.83	3.215	81.66										12,110	11,550				
		16.10	-		0.415	10.54	3.170	80.51	3.045	77.34	-	-	-	-	-	-				14,880	14,530		-		
		18.90			0.500	12.70	3.000	76.20	2.875	73.03										17,500	17,500				
		22.20			0.610	15.49	2.780	70.61	2.655	67.43										20,680	21,350				

Dimensional Data And Minimum Performance Properties Of Tubing (Continued)

OD		Nom Wt			Wall Thickness		ID		Threaded and Coupled						Int Joint				Grade	Collapse	Internal Yield Pressure	Joint Yield Strength			
		Non-Upset	Upset	Int Jt					Drift Dia		Coupling OD				Drift Dia		Box OD					T&C Non-Upset	T&C Upset	Special Clearance	Integral Joint
											Non-Upset		Upset Reg		Upset Spec										
in.	mm	lb/ft	lb/ft	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm	in.	mm		psi	psi	lb	lb	lb	lb
4.000	101.60	9.50	-	-	0.226	5.74	3.548	90.11	3.423	86.94	4.750	120.65	-	-	-	-	-	-	N-80	6,590	7,910	144,000	-	-	-
		-	11.00		0.262	6.65	3.476	88.29	3.351	85.12	-	-	5.000	127.00						8,800	9,170	-	246,200		
4.000	101.60	9.50	-	-	0.226	5.74	3.548	90.11	3.423	86.94	4.75	120.65	-	-	-	-	-	-	C-90	7,080	8,900	162,000	-	-	-
		-	11.00		0.262	6.65	3.476	88.29	3.351	85.12			5.000	127.00						9,590	10,320		276,900		
		13.20			0.330	8.38	3.340	84.83	3.215	81.66										13,620	12,990				
		16.10	-		0.415	10.54	3.170	80.51	3.045	77.34	-	-	-	-						16,740	16,340	-	-		
		18.90			0.500	12.70	3.000	76.20	2.875	73.03										19,690	19,690				
		22.20			0.610	15.49	2.780	70.61	2.655	67.43										23,260	24,020				
4.000	101.60	9.50	-	-	0.226	5.74	3.548	90.11	3.423	86.94	4.75	120.65	-	-	-	-	-	-	T-95	7,310	9,390	171,000	-	-	-
		-	11.00		0.262	6.65	3.476	88.29	3.351	85.12			5.000	127.00						9,980	10,890		292,300		
		13.20			0.330	8.38	3.340	84.83	3.215	81.66										14,380	13,720				
		16.10	-		0.415	10.54	3.170	80.51	3.045	77.34	-	-	-	-						17,670	17,250	-	-		
		18.90			0.500	12.70	3.000	76.20	2.875	73.03										20,780	20,780				
		22.20			0.610	15.49	2.780	70.61	2.655	67.43										24,560	25,350				
4.500	114.30	12.60	12.75	-	0.271	6.88	3.958	100.5	3.833	97.36	5.20	132.08	5.563	141.30	-	-	-	-	H-40	4,490	4,220	104,400	144,000	-	-
4.500	114.30	12.60	12.75	-	0.271	6.88	3.958	100.5	3.833	97.36	5.20	132.08	5.563	141.30	-	-	-	-	J-55	5,730	5,800	143,500	198,000	-	-
4.500	114.30	12.60	12.75	-	0.271	6.88	3.958	100.5	3.833	97.36	5.20	132.08	5.563	141.30	-	-	-	-	L-80	7,500	8,430	208,700	288,000	-	-
		15.20			0.337	8.55	3.826	97.18	3.701	94.00										11,080	10,480				
		17.00			0.380	9.65	3.740	94.99	3.615	91.82										12,370	11,820				
		18.90	-		0.430	10.92	3.640	92.45	3.515	89.28	-	-	-	-						13,830	13,380	-	-		
		21.50			0.500	12.70	3.500	88.90	3.375	85.72										15,800	15,560				
		23.70			0.560	14.22	3.380	85.85	3.255	82.67										17,430	17,420				
		26.00			0.630	16.00	3.240	82.29	3.115	79.12										19,260	19,600				
4.500	114.30	12.60	12.75	-	0.271	6.88	3.958	100.5	3.833	97.36	5.20	132.08	5.563	141.30	-	-	-	-	N-80	7,500	8,430	208,700	288,000	-	-
4.500	114.30	12.60	12.75	-	0.271	6.88	3.958	100.5	3.833	97.36	5.20	132.08	5.563	141.30	-	-	-	-	C-90	8,120	9,490	234,800	324,000	-	-
		15.20			0.337	8.55	3.826	97.18	3.701	94.00										12,220	11,800				
		17.00			0.380	9.65	3.740	94.99	3.615	91.82										13,920	13,300				
		18.90	-		0.430	10.92	3.640	92.45	3.515	89.28	-	-	-	-						15,560	15,050	-	-		
		21.50			0.500	12.70	3.500	88.90	3.375	85.72										17,780	17,500				
		23.70			0.560	14.22	3.380	85.85	3.255	82.67										19,610	19,600				
		26.00			0.630	16.00	3.240	82.29	3.115	79.12										21,670	22,050				
4.500	114.30	12.60	12.75	-	0.271	6.88	3.958	100.5	3.833	97.36	5.20	132.08	5.563	141.30	-	-	-	-	T-95	8,410	10,010	247,900	342,000	-	-
		15.20			0.337	8.55	3.826	97.18	3.701	94.00										12,760	12,450				
		17.00			0.380	9.65	3.740	94.99	3.615	91.82										14,690	14,040				
		18.90	-		0.430	10.92	3.640	92.45	3.515	89.28	-	-	-	-						16,420	15,890	-	-		
		21.50			0.500	12.70	3.500	88.90	3.375	85.72										18,770	18,470				
		23.70			0.565	14.22	3.380	85.85	3.255	82.67										20,700	20,690				
		26.00			0.630	16.00	3.240	82.29	3.115	79.12										22,880	23,280				

API Tubing – T&C External Upset Diameters

API Size OD	Weight T&C	Upset Dia
in.	lb/ft	in.
3/4 (1.050)	1.20	1.315
	1.54	
1 (1.315)	1.80	1.469
	2.24	
1-1/4 (1.660)	2.40	1.812
	3.07	
1-1/2 (1.900)	2.90	2.094
	3.73	
2-3/8	4.70	2.594
	5.95	
	7.45	
2-7/8	6.50	3.094
	7.90	
	8.70	
	9.45	
3-1/2	9.30	3.750
	12.95	
4	11.00	4.250
4-1/2	12.75	4.750

Threads cut with 3/4" taper per foot, 10 threads per inch from 3/4" thru 1-1/2" tubing,
8 threads per inch from 2-3/8" thru 4-1/2" tubing

Data provided by API from table E.27 columns 1, 2 and 5, API 5CT, eighth edition; July 1, 2005

Performance Data For Selected Heavy Weight And Non-API Tubulars*

OD		Wall Thickness		Plain End Wt	Nominal - Dependent on Type of Joint Wt	Grade	Collapse Pressure		Internal Yield Pressure		Tensile Strength	
in.	*mm*	in.	*mm*	lb/ft	lb/ft		psi	*kg/sq cm*	psi	*kg/sq cm*	lb	*kg*
1.050	*26.67*	.154	*3.91*	1.47	1.50	J-55	13,770	*968*	14,120	*993*	24,000	*10.900*
						C-75	18,770	*1.320*	19,250	*1.353*	33,000	*15.000*
						L/N-80	20,020	*1.408*	20,530	*1.443*	35,000	*15.900*
						P-105	26,280	*1.848*	26,950	*1.895*	46,000	*20.900*
1.315	*33.40*	.179	*4.55*	2.17	2.25	J-55	12,940	*910*	13,100	*921*	35,000	*15.900*
						C-75	17,640	*1.240*	17,870	*1.256*	48,000	*21.800*
						N-80	18,820	*1.323*	19,060	*1.340*	51,000	*23.100*
						P-105	24,700	*1.737*	25,010	*1.758*	67,000	*30.400*
1.660	*42.16*	.191	*4.85*	2.99	3.02	J-55	11,200	*787*	11,070	*778*	48,000	*21.800*
						C-75	15,270	*1.074*	15,100	*1.062*	66,000	*29.900*
						L/N-80	16,290	*1.145*	16,110	*1.133*	71,000	*32.200*
						P-105	21,380	*1.503*	21,140	*1.486*	93,000	*42.200*
1.660	*42.16*	.198	*5.03*	3.09	3.24	J-55	11,560	*813*	11,480	*807*	50,000	*22.700*
						C-75	15,760	*1.108*	15,660	*1.101*	68,000	*30.800*
						L/N-80	16,810	*1.182*	16,700	*1.174*	73,000	*33.100*
						P-105	22,060	*1.551*	21,920	*1.541*	95,000	*43.100*
1.900	*48.26*	.200	*5.08*	3.63	3.64	J-55	10,360	*728*	10,130	*712*	57,000	*25.900*
						C-75	14,130	*993*	13,820	*972*	80,000	*36.300*
						L/N-80	15,070	*1.060*	14,740	*1.036*	84,000	*38.100*
						P-105	19,780	*1.391*	19,340	*1.360*	110,000	*49.900*
1.900	*48.26*	.219	*5.56*	3.93	4.19	J-55	11,220	*789*	11,090	*780*	64,000	*29.000*
						C-75	15,300	*1.076*	15,130	*1.064*	87,000	*39.500*
						L/N-80	16,320	*1.147*	16,140	*1.135*	93,000	*42.200*
						P-105	21,420	*1.506*	21,180	*1.489*	121,000	*54.900*

* Based on pipe body and calculated for J-55 = 55,000 lb yield, C-75 75,000 lb yield, L-80 and N-80 80,000 lb yield, and P-105 = 105,000 lb yield

Performance Data For Selected Heavy Weight And Non-API Tubulars* (Continued)

OD		Wall Thickness		Plain End Wt	Nominal - Dependent on Type of Joint Wt	Grade	Collapse Pressure		Internal Yield Pressure		Tensile Strength	
in.	mm	in.	mm	lb/ft	lb/ft		psi	kg/sq cm	psi	kg/sq cm	lb	kg
2.000	50.80	.165	4.19	3.23	3.40	J-55	8,320	585	7,940	558	52,320	23.730
						C-75	11,350	798	10,830	761	71,330	32.360
						L/N-80	12,110	851	11,550	812	76,080	34.510
						P-105	15,890	1.117	15,160	1.066	99,800	45.296
2.062	52.40	.225	5.71	4.41	4.50	J-55	10,690	752	10,500	738	71,000	32.200
						C-75	14,580	1.025	14,320	1.007	97,000	44.000
						L/N-80	15,550	1.093	15,270	1.074	104,000	47.200
						P-105	20,410	1.435	20,050	1.410	136,000	61.700
2.375	60.33	.218	5.54	5.01	5.10-5.30	J-55	9,170	645	8,840	622	81,000	36.700
						C-75	12,510	880	12,050	847	111,000	50.300
						L/N-80	13,340	938	12,860	904	118,000	53.500
						P-105	17,510	1.231	16,870	1.186	155,000	70.300
2.375	60.33	.261	6.63	5.89	6.20	J-55	10,760	757	10,580	744	95,000	43.100
						C-75	14,670	1.031	14,420	1.014	130,000	59.000
						L/N-80	15,650	1.100	15,390	1.082	139,000	63.100
						P-105	20,540	1.444	20,200	1.420	182,000	82.600
2.375	60.33	.280	7.12	6.26	6.30-6.50	J-55	11,440	804	11,350	798	101,000	45.800
						C-75	15,600	1.097	15,740	1.088	138,000	62.600
						L/N-80	16,640	1.170	16,500	1.160	147,000	66.700
						P-105	21,840	1.536	21,660	1.523	193,000	87.500
2.375	60.33	.336	8.53	7.30	7.30-7.70	J-55	13,360	939	13,620	958	118,000	53.500
						C-75	18,220	1.281	18,570	1.306	161,000	73.000
						L/N-80	19,430	1.366	18,810	1.393	172,000	78.000
						P-105	25,510	1.794	26,010	1.829	226,000	102.500
2.875	73.03	.276	7.01	6.48	7.70-7.90	J-55	9,550	671	9,250	650	124,000	56.200
						C-75	13,020	915	12,600	886	169,000	76.700
						L/N-80	13,890	977	13,450	946	180,000	81.600
						P-105	18,230	1.282	17,650	1.241	236,000	107.000
2.875	73.03	.308	7.82	8.44	8.70	J-55	10,530	740	10,320	726	137,000	62.100
						C-75	14,350	1.009	14,060	989	186,000	84.400
						L/N-80	15,300	1.076	15,000	1.055	199,000	90.300
						P-105	20,090	1.413	19,690	1.384	261,000	118.400
2.875	73.03	.340	8.64	9.18	9.50	J-55	11,470	806	11,390	801	149,000	67.600
						C-75	15,640	1.100	15,520	1.091	203,000	92.100
						L/N-80	16,690	1.173	16,560	1.164	217,000	98.400
						P-105	21,900	1.540	21,730	1.528	285,000	129.300
2.875	73.03	.362	9.19	9.69	9.70-10.40	J-55	12,110	851	12,120	852	157,000	71.200
						C-75	16,510	1.161	16,530	1.162	214,000	97.100
						L/N-80	17,610	1.238	17,630	1.240	229,000	103.900
						P-105	23,110	1.625	23,140	1.627	300,000	136.100
2.875	73.03	.392	9.96	10.39	10.70	J-55	12,960	911	13,120	922	168,000	76.200
						C-75	17,610	1.242	17,890	1.258	229,000	103.900
						L/N-80	18,850	1.325	19,090	1.342	245,000	111.100
						P-105	24,740	1.739	25,050	1.761	321,000	145.600
2.875	73.03	.405	10.28	10.66	10.70-11.00	J-55	13,310	936	13,570	954	173,000	78.500
						C-75	18,150	1.276	18,490	1.300	236,000	107.000
						L/N-80	19,360	1.361	19,730	1.387	251,000	113.900
						P-105	25,410	1.787	25,890	1.820	329,000	149.200
2.875	73.03	.440	11.18	11.44	11.65	J-55	14,260	1.003	14,730	1.036	185,000	83.900
						C-75	19,440	1.367	20,090	1.412	252,000	114.300
						L/N-80	20,740	1.458	21,430	1.507	269,000	122.000
						P-105	27,220	1.914	28,120	1.977	353,000	160.100

* Based on pipe body and calculated for J-55 = 55,000 lb yield, C-75 75,000 lb yield, L-80 and N-80 80,000 lb yield, and P-105 = 105,000 lb yield

Performance Data For Selected Heavy Weight And Non-API Tubulars* (Continued)

OD		Wall Thickness		Plain End Wt	Nominal - Dependent on Type of Joint Wt	Grade	Collapse Pressure		Internal Yield Pressure		Tensile Strength	
in.	*mm*	in.	*mm*	lb/ft	lb/ft		psi	*kg/sq cm*	psi	*kg/sq cm*	lb	*kg*
3.500	*88.90*	.368	*9.35*	12.31	12.70-12.80	J-55	10,350	*728*	10,120	*712*	199,000	*90.300*
						C-75	14,110	*992*	13,800	*970*	272,000	*123.400*
						L/N-80	15,060	*1.059*	14,730	*1.036*	290,000	*131.500*
						P-105	19,760	*1.389*	19,320	*1.389*	380,000	*172.400*
3.500	*88.90*	.413	*10.49*	13.60	13.70	J-55	11,520	*810*	11,440	*804*	222,000	*100.700*
						C-75	15,710	*1.105*	15,600	*1.097*	302,000	*137.000*
						L/N-80	16,760	*1.178*	16,640	*1.170*	322,000	*146.100*
						P-105	21,990	*1.546*	21,8404	*1.536*	423,000	*191.900*
3.500	*88.90*	.449	*11.40*	14.62	14.70-15.50	J-55	12,300	*865*	12,370	*870*	237,000	*107.500*
						C-75	16,770	*1.179*	16,870	*1.186*	323,000	*146.500*
						L/N-80	17,890	*1.258*	17,990	*1.265*	345,000	*156.500*
						P-105	23,480	*1.651*	23,610	*1.660*	452,000	*205.000*
3.500	*88.90*	.476	*12.09*	15.37	15.80	J-55	12,930	*909*	13,090	*920*	249,000	*112.900*
						C-75	17,630	*1.240*	17,850	*1.255*	339,000	*153.800*
						L/N-80	18,800	*1.322*	19,040	*1.339*	362,000	*164.200*
						P-105	24,680	*1.735*	24,990	*1.757*	475,000	*215.500*
3.500	*88.90*	.488	*12.39*	15.68	15.80	J-55	13,200	*928*	13,420	*944*	254,000	*115.200*
						C-75	18,000	*1.266*	18,300	*1.287*	346,000	*156.900*
						L/N-80	19,200	*1.350*	19,520	*1.372*	369,000	*167.400*
						P-105	25,200	*1.772*	25,610	*1.801*	485,000	*220.000*
3.500	*88.90*	.510	*12.95*	16.28	16.70	J-55	13,690	*963*	14,020	*986*	264,000	*119.800*
						C-75	18,670	*1.313*	19,130	*1.345*	359,000	*162.800*
						L/N-80	19,920	*1.401*	20,400	*1.434*	383,000	*173.700*
						P-105	26,140	*1.838*	26,770	*1.882*	503,000	*228.200*
3.500	*88.90*	.530	*13.46*	16.81	17.05	J-55	14,130	*993*	14,580	*1.025*	272,000	*123.400*
						C-75	19,270	*1,355*	19,880	*1,398*	371,000	*168.300*
						L/N-80	20,560	*1.446*	21,200	*1,491*	396,000	*179.600*
						P-105	26,980	*1.897*	27,830	*1,957*	519,000	*235.400*
4.000	*101.60*	.286	*7.26*	11.34	11.60	J-55	7,300	*513*	6,880	*484*	183,000	*83.000*
						C-75	9,790	*688*	9,390	*660*	250,000	*113.400*
						L/N-80	10,270	*722*	10,010	*704*	267,000	*121.100*
						P-105	12,690	*892*	13,140	*924*	350,000	*158.800*
4.000	*101.60*	.330	*8.38*	12.93	13.00 - 13.40 - 14.00	J-55	8,330	*586*	7,940	*558*	209,000	*94.800*
						C-75	11,350	*798*	10,830	*761*	285,000	*129.300*
						L/N-80	12,110	*851*	11,550	*812*	304,900	*137.900*
						P-105	15,900	*1.118*	15,160	*1.066*	400,000	*181.400*
4.000	*101.60*	.380	*9.65*	14.66	14.80	J-55	9,460	*665*	9,140	*643*	238,000	*108.00*
						C-75	12,900	*907*	12,470	*877*	324,000	*147.000*
						L/N-80	13,760	*967*	13,300	*935*	346,000	*156.900*
						P-105	18,060	*1.270*	17,460	*1.228*	454,000	*205.900*
4.000	*101.60*	.430	*10.92*	16.36	16.50	J-55	10,550	*742*	10,350	*728*	265,000	*120.200*
						C-75	14,390	*1.012*	14,110	*992*	362,000	*164.200*
						L/N-80	15,350	*1.079*	15,050	*1.058*	386,000	*175.100*
						P-105	20,150	*1.417*	19,750	*1.389*	506,000	*229.500*
4.000	*101.60*	.500	*12.70*	18.69	19.00	J-55	12,030	*846*	12,030	*846*	302,000	*137.000*
						C-75	16,410	*1.154*	16,410	*1.154*	412,000	*186.900*
						L/N-80	17,500	*1.230*	17,500	*1.230*	440,000	*199.600*
						P-105	22,970	*1.615*	22,970	*1.615*	577,000	*261.700*
4.000	*101.60*	.610	*15.49*	22.08	22.50 - 22.80	J-55	14,220	*1.000*	14,680	*1.032*	357,000	*161.900*
						C-75	19,390	*1.363*	20,020	*1.408*	487,000	*220.900*
						L/N-80	20,680	*1.454*	21,350	*1.501*	520,000	*235.900*
						P-105	27,140	*1.908*	28,020	*1.970*	682,000	*309.400*
4.500	*114.30*	.205	*5.21*	9.40	9.50	J-55	3,310	*233*	4,380	*308*	151,000	*68.500*

* Based on pipe body and calculated for J-55 = 55,000 lb yield, C-75 75,000 lb yield, L-80 and N-80 80,000 lb yield, and P-105 = 105,000 lb yield

Performance Data For Selected Heavy Weight And Non-API Tubulars* (Continued)

OD		Wall Thickness		Plain End Wt	Nominal - Dependent on Type of Joint Wt	Grade	Collapse Pressure		Internal Yield Pressure		Tensile Strength	
in.	*mm*	in.	*mm*	lb/ft	lb/ft		psi	*kg/sq cm*	psi	*kg/sq cm*	lb	*kg*
4.500	*114.30*	.224	*5.69*	10.23	10.50	J-55	4,010	*282*	4,790	*337*	165,000	*74.800*
4.500	*114.30*	.250	*6.35*	11.35	11.60	J-55	4,960	*349*	5,350	*376*	184,000	*83.500*
						C-75	6,130	*431*	7,290	*513*	250,000	*113.400*
						L/N-80	6,350	*446*	7,780	*547*	267,000	*121.100*
						P-105	7,560	*532*	10,690	*752*	350,000	*158.800*
4.500	*114.30*	.290	*7.37*	13.04	13.50	J-55	6,420	*451*	6,200	*436*	211,000	*95.700*
						C-75	8,170	*574*	8,460	*595*	288,000	*130.600*
						L/N-80	8,540	*600*	9,020	*634*	307,000	*139.300*
						P-105	10,350	*728*	11,840	*832*	403,000	*182.800*
4.500	*114.30*	.337	*8.56*	14.98	15.10 - 15.50	J-55	7,620	*536*	7,210	*507*	242,000	*109.800*
						C-75	10,390	*730*	9,830	*691*	331,000	*150.100*
						L/N-80	11,090	*780*	10,480	*737*	353,000	*160.100*
						P-105	13,820	*972*	13,760	*967*	463,000	*210.000*
4.500	*114.30*	.373	*9.47*	16.44	16.90	C-75	11,400	*801*	10,880	*765*	363,000	*164.700*
						L/N-80	12,160	*855*	11,600	*816*	387,000	*175.500*
						P-105	15,960	*1.122*	15,230	*1.071*	508,000	*230.400*
4.500	*114.30*	.430	*10.92*	18.69	19.20	J-55	9,510	*669*	9,200	*647*	302,000	*137.000*
						C-75	12,960	*876*	12,540	*882*	412,000	*186.900*
						L/N-80	13,830	*972*	13,380	*941*	439,000	*199.100*
						P-105	18,150	*1.276*	17,560	*1.235*	577,000	*261.700*
4.500	*114.30*	.500	*12.70*	21.36	21.60	J-55	10,860	*764*	10,690	*752*	346,000	*156.900*
						C-75	14,810	*1.041*	14,580	*1.025*	471,000	*213.600*
						L/N-80	15,800	*1.111*	15,560	*1.094*	503,000	*228.200*
						P-105	20,740	*1.458*	20,420	*1.436*	660,000	*299.400*
4.500	*114.30*	.560	*14.22*	23.56	24.60	J-55	11,990	*843*	11,980	*842*	381,000	*172.800*
						C-75	16,340	*1.149*	16,330	*1.148*	520,000	*235.900*
						L/N-80	17,430	*1.225*	17,420	*1.225*	555,000	*251.700*
						P-105	22,880	*1.609*	22,870	*1.608*	728,000	*330.200*
4.500	*114.30*	.630	*16.00*	26.04	26.50	J-55	13,240	*931*	13,480	*948*	421,000	*191.000*
						C-75	18,060	*1.270*	18,380	*1.292*	575,000	*260.800*
						L/N-80	19,260	*1.354*	19,600	*1.378*	613,000	*278.100*
						P-105	25,280	*1.777*	25,730	*1.809*	804,000	*364.700*

* Based on pipe body and calculated for J-55 = 55,000 lb yield, C-75 75,000 lb yield, L-80 and N-80 80,000 lb yield, and P-105 = 105,000 lb yield

Recommended Tubing Joint Make-up Torque

Values shown are applicable to standard couplings with standard box OD and are based on use of an API modified-type thread lubricant, according to API Bulletin 5A2. Other thread lubricants might require correction factors for make-up torque. Contact manufacturers of premium threads for their recommendations.

Tubing Makeup Torque Guidelines - Round Thread Tubing

OD		Nominal Weight, Threads and Coupling			Torque	
in.	*mm*	lb/ft	Grade	Thread	ft-lb	*Nm*
1.050	*26.7*	1.14	H40	NU	140	*190*
			J55		180	*240*
			C75		230	*320*
			L80		240	*330*
			N80		250	*340*
			C90		260	*350*
1.050	*26.7*	1.20	H40	EUE	460	*630*
			J55		600	*810*
			C75		780	*1,060*
			L80		810	*1,090*
			N80		830	*1,130*
			C90		880	*1,190*
1.315	*33.4*	1.70	H40	NU	210	*280*
			J55		270	*370*
			C75		360	*480*
			L80		370	*500*
			N80		380	*510*
			C90		400	*540*
1.315	*33.4*	1.80	H40	EUE	440	*590*
			J55		570	*770*
			C75		740	*1,010*
			L80		760	*1,040*
			N80		790	*1,070*
			C90		830	*1,130*
1.315	*33.4*	1.72	H40	IJ	310	*410*
			J55		400	*540*
			C75		520	*700*
			L80		530	*720*
			N80		550	*740*
			C90		580	*780*
1.660	*42.2*	2.30	H40	NU	270	*360*
			J55		350	*470*
			C75		460	*620*
			L80		470	*640*
			N80		490	*660*
			C90		510	*700*
1.660	*42.2*	2.30	H40	EUE	530	*720*
1.660	*42.2*	2.40	J55	EUE	690	*940*
			C75		910	*1,230*
			L80		940	*1,270*
			N80		960	*1,300*
			C90		1,020	*1,380*
1.660	*42.2*	2.10	H40	IJ	380	*520*
		2.33			380	*520*
		2.10	J55		500	*680*
		2.33				

It is recommended that the makeup target be based on position, not torque per API 5C1

Under normal circumstances, variations in the listed torque values of +/-25% should be considered acceptable

Data provided by API from table 3, API 5C1, eighteenth edition; May, 1999

Tubing Makeup Torque Guidelines - Round Thread Tubing (Continued)

OD		Nominal Weight, Threads and Coupling			Torque	
in.	*mm*	lb/ft	Grade	Thread	ft-lb	*Nm*
1.660	*42.2*	2.33	C75	IJ	650	*890*
			L80		680	*920*
			N80		690	*940*
			C90		730	*1,000*
1.900	*48.3*	2.75	H40	NU	320	*430*
			J55		410	*560*
			C75		540	*730*
			L80		560	*760*
			N80		570	*780*
			C90		610	*830*
1.900	*48.3*	2.90	H40	EUE	670	*910*
			J55		880	*1,190*
			C75		1,150	*1,560*
			L80		1,190	*1,610*
			N80		1,220	*1,650*
			C90		1,300	*1,760*
1.900	*48.3*	2.40	H40	IJ	450	*600*
		2.76				
		2.40	J55		580	*790*
		2.76			580	*790*
			C75		760	*1,030*
			L80		790	*1,070*
			N80		810	*1,100*
			C90		860	*1,160*
		3.25	H40		570	*770*
			J55		740	*1,010*
			C75		970	*1,320*
			L80		1,010	*1,370*
			N80		1,030	*1,400*
			C90		1,100	*1,490*
2.375	*60.3*	4.00	H40	NU	470	*630*
		4.60			560	*760*
		4.00	J55		610	*830*
		4.60			730	*990*
		4.00	C75		800	*1,090*
		4.60			960	*1,300*
		5.80			1,380	*1,860*
		4.00	L80		830	*1,130*
		4.60			990	*1,350*
		5.80			1,420	*1,930*
		4.00	N80		850	*1,160*
		4.60			1,020	*1,380*
		5.80			1,460	*1,980*
		4.00	C90		910	*1,230*
		4.60			1,080	*1,470*
		5.80			1,550	*2,110*
		4.60	P105		1,280	*1,740*
		5.80			1,840	*2,490*
2.375	*60.3*	4.70	H40	EUE	990	*1,340*
			J55		1,290	*1,750*
			C75		1,700	*2,310*
		5.95			2,120	*2,870*
		4.70	L80		1,760	*2,390*
		5.95			2,190	*2,970*

Refer to page 5-12 for footnote reference

Tubing Makeup Torque Guidelines - Round Thread Tubing (Continued)

OD		Nominal Weight, Threads and Coupling			Torque	
in.	*mm*	lb/ft	Grade	Thread	ft-lb	*Nm*
2.375	*60.3*	4.70	N80	EUE	1,800	*2,450*
		5.95			2,240	*3,040*
		4.70	C90		1,920	*2,610*
		5.95			2,390	*3,250*
		4.70	P105		2,270	*3,080*
		5.95			2,830	*3,830*
2.875	*73.0*	6.40	H40	NU	900	*1,080*
			J55		1,050	*1,420*
			C75		1,380	*1,880*
		7.80			1,850	*2,500*
		8.60			2,090	*2,830*
		6.40	L80		1,430	*1,940*
		7.80			1,910	*2,590*
		8.60			2,160	*2,930*
		6.40	N80		1,470	*1,990*
		7.80			1,960	*2,650*
		8.60			2,210	*3,000*
		6.40	C90		1,570	*2,130*
		7.80			2,090	*2,840*
		8.60			2,370	*3,210*
		6.40	P105		1,850	*2,510*
		7.80			2,470	*3,350*
		8.60			2,790	*3,790*
2.875	*73.0*	6.50	H40	EUE	1,250	*1,700*
			J55		1,650	*2,230*
			C75		2,170	*2,940*
		7.90			2,610	*3,540*
		8.70			2,850	*3,860*
		6.50	L80		2,250	*3,050*
		7.90			2,710	*3,680*
		8.70	L80		2,950	*4,000*
		6.50	N80		2,300	*3,120*
		7.90			2,770	*3,760*
		8.70			3,020	*4,090*
		6.50	C90		2,460	*3,340*
		7.90			2,970	*4,020*
		8.70			3,230	*4,380*
		6.50	P105		2,910	*3,940*
		7.90			3,500	*4,750*
		8.70			3,810	*5,170*
3.500	*88.9*	7.70	H40	NU	920	*1,250*
		9.20			1,120	*1,520*
		10.20			1,310	*1,770*
		7.70	J55		1,210	*1,640*
		9.20			1,480	*2,010*
		10.20			1,720	*2,330*
		7.70	C75		1,600	*2,170*
		9.20			1,950	*2,650*
		10.20			2,270	*3,080*
		12.70			3,030	*4,100*
		7.70	L80		1,660	*2,250*
		9.20			2,030	*2,750*
		10.20			2,360	*3,200*
		12.70			3,140	*4,260*

Refer to page 5-12 for footnote reference

Tubing Makeup Torque Guidelines - Round Thread Tubing (Continued)

OD		Nominal Weight, Threads and Coupling			Torque	
in.	*mm*	lb/ft	Grade	Thread	ft-lb	*Nm*
3.500	*88.9*	7.70	N80	NU	1,700	*2,300*
		9.20			2,070	*2,810*
		10.20			2,410	*3,270*
		12.70			3,210	*4,350*
		7.70	C90		1,820	*2,460*
		9.20			2,220	*3,010*
		10.20			2,590	*3,510*
		12.70			3,440	*4,670*
		9.20	P105		2,620	*3,550*
		12.70			4,060	*5,510*
3.500	*88.9*	9.30	H40	EUE	1,730	*2,340*
			J55		2,280	*3,090*
			C75		3,010	*4,080*
		12.95			4,040	*5,480*
		9.30	L80		3,030	*4,240*
		12.95			4,200	*5,700*
		9.30	N80		3,200	*4,330*
		12.95			4,290	*5,820*
		9.30	C90		3,430	*4,650*
		12.95			4,610	*6,250*
		9.30	P105		4,050	*5,490*
		12.95			5,430	*7,370*
4.000	*101.6*	9.50	H40	NU	930	*1,260*
			J55		1,220	*1,660*
			C75		1,620	*2,200*
			L80		1,680	*2,280*
			N80		1,720	*2,330*
			C90		1,950	*2,500*
4.000	*101.6*	11.00	H40	EUE	1,940	*2,630*
			J55		2,560	*3,470*
			C75		3,390	*4,600*
			L80		3,530	*4,780*
			N80		3,600	*4,880*
			C90		3,870	*5,250*
4.500	*114.3*	12.60	H40	NU	1,320	*1,780*
			J55		1,740	*2,360*
			C75		2,300	*3,120*
			L80		2,400	*3,250*
			N80		2,440	*3,310*
			C90		2,630	*3,570*
4.500	*114.3*	12.75	H40	EUE	2,160	*2,930*
			J55		2,860	*3,870*
			C75		3,780	*5,130*
			L80		3,940	*5,340*
			N80		4,020	*5,450*
			C90		4,330	*5,870*

Refer to page 5-12 for footnote reference

Dimensional Data Line Pipe - Standard Weight, Threaded - Dimensional Data

Size Nomination	OD	ID	Weight Per Foot		Threads per in.	Taper per ft	Male Thread Length	Coupling	
			Plain	T & C				Length	Diameter
in.	in.	in.	lb	lb			in.	in.	in.
1/8	.405	.269	.24	.25	27	3/4	.392	1-1/16	.563
1/4	.540	.364	.42	.43	18	3/4	.595	1-5/8	.719
3/8	.675	.493	.57	.57	18	3/4	.601	1-5/8	.875
1/2	.840	.622	.85	.86	14	3/4	.782	2-1/8	1.063
3/4	1.050	.824	1.13	1.14	14	3/4	.794	2-1/8	1.313
1	1.315	1.049	1.68	1.70	11-1/2	3/4	.985	2-5/8	1.576
1-1/4	1.660	1.380	2.27	2.30	11-1/2	3/4	1.009	2-3/4	2.054
1-1/2	1.900	1.610	2.72	2.75	11-1/2	3/4	1.025	2-3/4	2.200
2	2.375	2.067	3.65	3.75	11-1/2	3/4	1.058	2-7/8	2.875
2-1/2	2.875	2.469	5.79	5.90	8	3/4	1.571	4-1/8	3.375
3	3.500	3.068	7.58	7.70	8	3/4	1.634	4-1/4	4.000
3-1/2	4.000	3.548	9.11	9.25	8	3/4	1.684	4-3/8	4.625
4	4.500	4.026	10.79	11.00	8	3/4	1.734	4-1/2	5.200
5	5.563	5.047	14.62	15.00	8	3/4	1.840	4-5/8	6.296
6	6.625	6.065	18.97	19.45	8	3/4	1.946	4-7/8	7.390
8	8.625	8.071	24.70	25.55	8	3/4	2.146	5-1/4	9.625
		7.981	28.55	29.35			2.146	5-1/4	9.625
10	10.750	10.192	31.20	32.75	8	3/4	2.359	5-3/4	11.750
		10.136	34.24	35.75					
		10.020	40.48	41.85					
12	12.750	12.090	43.77	45.45	8	3/4	2.359	6-1/8	14.000
		12.000	49.56	51.15					
14D	14.000	13.250	54.57	57.00	8	3/4	2.684	6-3/8	15.000
16D	16.000	15.250	62.58	65.30	8	3/4	2.884	6-3/4	17.000
18D	18.000	17.250	70.59	73.00	8	3/4	3.084	7-1/8	19.000
20D	20.000	19.250	78.60	81.00	8	3/4	3.284	7-5/8	21.000

Data provided by API from table 4 columns 2, 4, 6 and 6 and table 12 columns 2 and 3, API 5L, forty third edition; March 2004

Dimensional Data and Minimum Performance Properties of Casing

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)●			Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)*	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread	Threaded and Coupled Joint	
														Short	Long		Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm							Short	Long
4-1/2	114.3	9.50	.205	5.21	4.090	103.9	3.965	100.7	5.000	127.0	H-40	2,760	3,190	3,190	-	-	111	77	-
											J-55 K-55	3,310	4,380	4,380			152	101 112	
											M-65	3,600	5,180	5,180	-	-	180	118	-
4-1/2	114.3	10.50	.224	5.69	4.052	102.9	3.927	99.75	5.000	127.0	J-55 K-55	4,010	4,790	4,790	-	4,790	166	132 146	-
											M-65	4,430	5,660	5,660	-	5,660	196	154	-
4-1/2	114.3	11.60	.250	6.35	4.000	101.6	3.875	98.43	5.000	127.0	J-55 K-55	4,960	5,350	5,350	5,350	5,350	184	154 170	162 180
											M-65	5,560	6,320		6,320	6,320	217		188
											L-80 N-80	6,350	7,780	-	7,780	7,780	267	-	211 222
											C-90	6,820	8,750		8,750	8,750	305		222
											C-95	7,030	9,240		9,240	9,240	317		234
											T-95	7,030	9,240		9,240	9,240	317		234
											P-110	7,580	10,690		10,690	10,690	367		278
4-1/2	114.3	13.50	.290	7.37	3.920	99.60	3.795	96.39	5.000	127.0	M-65	7,310	7,330	-	7,330	7,330	249	-	228
											L-80 N-80	8,540	9,020		9,020	9,020	307		256 270
											C-90	9,300	10,150		10,150	10,150	300		270
											C-95	9,660	10,710		10,710	10,710	364		283
											T-95	9,660	10,710		10,710	10,710	364		283
											P-110	10,690	12,410		12,410	12,410	422		337
4-1/2	114.3	15.10	.337	8.56	3.826	97.20	3.701	94.01	5.000	127.0	P-110	14,340	14,420	-	14,420	13,460	485	-	405
											Q-125	15,830	16,380		16,380	15,300	551		438
5	127.0	11.5	.220	5.59	4.560	115.8	4.435	112.6	5.563	141.3	J-55 K-55	3,060	4,240	4,240	-	-	182	133 147	-
											M-65	3,290	5,010	5,010	-	-	215	155	-
5	127.0	13.0	.253	6.43	4.494	114.1	4.369	111.0	5.563	141.3	J-55 K-55	4,140	4,870	4,870	4,870	4,870	208	169 186	182 201
											M-65	4,590	5,760	5,760	5,760	5,760	245	196	212
5	127.0	15.0	.296	7.52	4.408	112.0	4.283	108.8	5.563	141.3	J-55 K-55	5,560	5,700	5,700	5,700	5,700	241	207 228	223 246
											M-65	6,280	6,730	-	6,730	6,730	284	-	259
											L-80 N-80	7,250	8,290		8,290	8,290	350		295 310
											C-90	7,830	9,320		9,320	9,320	394		310
											C-95	8,110	9,840		9,840	9,840	416		326
											T-95	8,110	9,840		9,840	9,840	416		326
											P-110	8,850	11,400		11,400	11,400	481		388
5	127.0	18.0	.362	9.19	4.276	108.6	4.151	105.4	5.563	141.3	M-65	8,730	8,240	-	8,240	8,240	343	-	331
											L-80 N-80	10,490	10,140		10,140	9,910	422		376 396
											C-90	11,520	11,400		11,400	11,150	475		396
											C-95	12,030	12,040		12,040	11,770	501		416
											T-95	12,030	12,040		12,040	11,770	501		416
											P-110	13,470	13,940		13,940	13,620	580		495
											Q-125	14,820	15,840		15,840	15,480	659		534
5	127.0	21.4	.437	11.10	4.126	104.8	4.001	101.6	5.563	141.3	M-65	10,370	9,940	-	9,940	9,910	407	-	409
											L-80 N-80	12,760	12,240		10,810	9,910	501		465 490
											C-90	14,360	13,770		12,170	11,150	564		490
											C-95	15,150	14,530		12,840	11,770	595		514
											T-95	15,150	14,530		12,840	11,770	595		514
											P-110	17,550	16,820		14,870	13,620	689		612
											Q-125	19,940	19,120		16,900	15,480	783		661
5	127.0	23.2	.478	12.14	4.044	102.7	3.919	99.54	5.563	141.3	L-80 N-80	13,830	13,380	-	10,810	9,910	543	-	513 540
											C-90	15,560	15,060		12,170	11,150	611		540
											C-95	16,430	15,890		12,840	11,770	645		567
											T-95	16,430	15,890		12,840	11,770	645		567
											P-110	19,020	18,400		14,870	13,620	747		675
											Q-125	21,620	20,910		16,900	15,480	849		729

* Some joint strengths listed are greater than the corresponding pipe body yield strength listed in the Body Yield Strength column

■ Collapse resistance values calculated by elastic formula

● Minimum internal yield pressure is the lowest of the internal yield pressure of the pipe or the internal yield pressure of the coupling.
The pressure leak resistance at the E1 or E7 plane is the lowest of the internal yield pressure at minimum yield. Leak resistance is as follows: For J-55 and K-55 casing the next higher grade is L-80, For N-80 casing the next higher grades is P-110, for P-110 casing the next higher grade is Q125, no higher grades have been established for other grades

Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)●				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)*	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
5	127.0	24.1	.500	12.7	4.000	101.6	3.875	98.4	5.563	141.3	L-80 N-80	14,400	14,000		10,810	9,910	565		538 566
											C-90	16,200	15,750		12,170	11,150	636		566
											C-95	17,100	16,630	-	12,840	11,770	672	-	595
											T-95	17,100	16,630		12,840	11,770	672		595
											P-110	19,800	19,250		14,870	13,620	778		708
											Q-125	22,500	21,880		16,900	15,480	884		765
5-1/2	139.7	14.0	.244	6.20	5.012	127.7	4.887	124.1	6.050	153.7	H-40	2,620	3,110	3,110			161	130	
											J-55 K-55	3,120	4,270	4,270	-	-	222	172 189	-
											M-65	3,360	5,050	5,050			262	200	
5-1/2	139.7	15.5	.275	6.98	4.950	125.7	4.825	122.6	6.050	153.7	J-55 K-55	4,040	4,810	4,810	4,810	4,810	248	202 222	217 239
											M-65	4,470	5,690	5;690	5,690	5,690	293	235	253
5-1/2	139.7	17.0	.304	7.72	4.892	124.3	4.767	121.1	6.050	153.7	J-55 K-55	4,910	5,320	5,320	5,320	5,320	273	229 252	247 272
											M-65	5,500	6,290		6,290	6,290	323		287
											L-80	6,290	7,740		7,740	7,740	397		338
											N-80	6,290	7,740		7,740	7,740	397		348
											C-90	6,740	8,710	-	8,710	8,710	447	-	355
											C-95	6,940	9,190		9,190	9,190	471		373
											T-95	6,940	9,190		9,190	9,190	471		373
											P-110	7,480	10,640		10,640	10,640	546		444
5-1/2	139.7	20.0	.361	9.17	4.778	121.4	4.653	118.2	6.050	153.7	M-65	7,540	7,470		7,470	7,470	379		353
											L-80	8,830	9,190		9,190	8,990	466		416
											N-80	8,830	9,190		9,190	8,990	466		428
											C-90	9,630	10,340	-	10,340	10,120	525	-	438
											C-95	10,020	10,910		10,910	10,680	554		460
											T-95	10,020	10,910		10,910	10,680	554		460
											P-110	11,100	12,640		12,640	12,360	641		547
5-1/2	139.7	23.0	.415	10.54	4.670	118.6	4.545	115.4	6.050	153.7	M-65	9,070	8,580		8,580	8,580	431		415
											L-80	11,160	10,560		9,880	8,990	530		488
											N-80	11,160	10,560		9,880	8,990	530		502
											C-90	12,380	11,880		11,110	10,120	597		514
											C-95	12,930	12,540	-	11,730	10,680	630	-	540
											T-95	12,930	12,540		11,730	10,680	630		540
											P-110	14,540	14,530		13,580	12,360	729		642
											Q-125	16,060	16,510		15,430	14,050	829		694
5-1/2	139.7	26.8	.500	12.70	4.500	114.3	4.375	111.1	-	-	C-90	14,880	14,320	-	-	-	707	-	-
											T-95	15,700	15,110				746		
5-1/2	139.7	29.7	.562	14.27	4.376	111.1	4.251	108.0	-	-	C-90	16,510	16,090	-	-	-	785	-	-
											T-95	17,430	16,990				828		
5-1/2	139.7	32.6	.625	15.87	4.250	108.0	4.125	104.8	-	-	C-90	18,130	17,900	-	-	-	861	-	-
											T-95	19,140	18,890				909		
5-1/2	139.7	35.3	.687	17.45	4.126	104.8	4.001	101.6	-	-	C-90	19,680	19,670	-	-	-	935	-	-
											T-95	20,770	20,770				987		
5-1/2	139.7	38.0	.750	19.05	4.000	101.6	3.875	98.4	-	-	C-90	21,200	21,480	-	-	-	1,007	-	-
											T-95	22,380	22,670				1,063		
5-1/2	139.7	40.5	.812	20.62	3.876	98.5	3.751	95.3	-	-	C-90	22,650	23,250	-	-	-	1,076	-	-
											T-95	23,910	24,540				1,136		
5-1/2	139.7	43.10	.875	22.22	3.750	95.2	3.625	92.1	-	-	C-90	24,080	25,060	-	-	-	1,144	-	-
											T-95	25,420	26,450	-	-	-	1,208	-	-
6-5/8	168.3	20.0	.288	7.32	6.049	153.7	5.924	150.5	7.390	187.7	H-40	2,520	3,040	3,040	-	-	229	184	-
											J-55 K-55	2,970	4,180	4,180	4,180	4,180	315	245 267	266 290
											M-65	3,190	4,940	4,940	4,940	4,940	373	285	309
6-5/8	168.3	24.0	.352	8.94	5.921	150.4	5.796	147.2	7.390	187.7	J-55 K-55	4,560	5,110	5,110	5,110	5,110	382	314 342	340 372
											M-65	5,080	6,040		6,040	6,040	451		396
											L-80	5,760	7,440		7,440	7,440	555		473
											N-80	5,760	7,440		7,440	7,440	555		481
											C-90	6,140	8,370	-	8,370	8,370	624	-	519
											C-95	6,310	8,830		8,830	8,830	659		545
											T-95	6,310	8,830		8,830	8,830	659		545
											P-110	6,730	10,230		10,230	10,230	763		641

Refer to page 5-17 for footnote reference

Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)●				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)*	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
6-5/8	168.3	28.0	.417	10.59	5.791	147.1	5.666	143.9	7.390	187.7	M-65	7,010	7,160	-	7,160	7,160	529	-	483
											L-80	8,170	8,810		8,810	8,810	651		576
											N-80	8,170	8,810		8,810	8,810	651		586
											C-90	8,880	9,910		9,910	9,910	732		633
											C-95	9,200	10,460		10,460	10,460	773		664
											T-95	9,220	10,460		10,460	10,460	773		664
											P-110	10,160	12,120		12,120	12,120	895		781
6-5/8	168.3	32.0	.475	12.06	5.675	144.2	5.550	141.0	7.390	187.7	L-80	10,320	10,040	-	10,040	9,820	734	-	666
											N-80	10,320	10,040		10,040	9,820	734		677
											C-90	11,330	11,290		11,290	11,050	826		732
											C-95	11,820	11,920		11,920	11,660	872		769
											T-95	11,820	11,920		11,920	11,660	872		769
											P-110	13,220	13,800		13,800	13,500	1,010		904
											Q-125	14,540	15,680		15,680	15,340	1,147		988
7	177.8	17.0	.231	5.87	6.538	166.1	6.413	162.9	7.656	194.5	H-40	1,420	2,310	2,310	-	-	196	122	-
7	177.8	20.0	.272	6.91	6.456	164.0	6.331	160.8	7.656	194.5	H-40	1,970	2,720	2,720	-	-	230	176	-
											J-55 K-55	2,270	3,740	3,740			316	234 254	
											M-65	2,480	4,420	4,420			374	272	
7	177.8	23.0	.317	8.05	6.366	161.7	6.241	158.5	7.656	194.5	J-55 K-55	3,270	4,360	4,360	4,360	4,360	366	284 309	313 341
											M-65	3,540	5,150	-	5,150	5,150	433	-	364
											L-80	3,830	6,340		6,340	6,340	532		435
											N-80	3,830	6,340		6,340	6,340	532		442
											C-90	4,030	7,130		7,130	7,130	599		479
											C-95	4,140	7,530		7,530	7,530	632		505
											T-95	4,140	7,530		7,530	7,530	632		505
7	177.8	26.0	.362	9.19	6.276	159.4	6.151	156.2	7.656	194.5	J-55 K-55	4,330	4,980	4,980	4,980	4,980	415	334 364	367 401
											M-65	4,810	5,880	-	5,880	5,880	491	-	428
											L-80	5,410	7,240		7,240	7,240	604		511
											N-80	5,410	7,240		7,240	7,240	604		519
											C-90	5,740	8,140		8,140	8,140	679		563
											C-95	5,890	8,600		8,600	8,600	717		593
											T-95	5,890	8,600		8,600	8,600	717		593
											P-110	6,230	9,960		9,960	9,960	830		693
7	177.8	29.0	.408	10.36	6.184	157.1	6.059	153.9	7.656	194.5	M-65	6,100	6,630	-	6,630	6,630	549	-	492
											L-80	7,030	8,160		8,160	8,160	676		587
											N-80	7,030	8,160		8,160	8,160	676		597
											C-90	7,580	9,180		9,180	9,180	760		648
											C-95	7,840	9,690		9,690	9,690	803		683
											T-95	7,840	9,690		9,690	9,690	803		683
											P-110	8,530	11,220		11,220	11,220	929		797
7	177.8	32.0	.453	11.51	6.094	154.8	5.969	151.6	7,656	194.5	M-65	7,360	7,360	-	7,360	7,360	606	-	554
											L-80	8,600	9,060		9,060	8,460	745		661
											N-80	8,600	9,060		9,060	8,460	745		672
											C-90	9,380	10,190		10,190	9,520	839		729
											C-95	9,740	10,760		10,760	10,050	885		768
											T-95	9,740	10,760		10,760	10,050	885		768
											P-110	10,780	12,460		12,460	11,640	1,025		897
7	177.8	35.0	.498	12.65	6.004	152.5	5.879	149.3	7.656	194.5	L-80	10,180	9,960	-	9,240	8,460	814	-	734
											N-80	10,180	9,960		9,240	8,460	814		746
											C-90	11,170	11,210		10,390	9,520	916		809
											C-95	11,650	11,830		10,970	10,050	966		853
											T-95	11,650	11,830		10,970	10,050	966		853
											P-110	13,030	13,700		12,700	11,640	1,119		996
											Q-125	14,310	15,560		14,430	13,220	1,272		1,105
7	177.8	38.0	.540	13.72	5.920	150.4	5.795	147.2	7.656	194.5	L-80	11,390	10,800	-	9,240	8,460	877	-	801
											N-80	11,390	10,800		9,240	8,460	877		814
											C-90	12,810	12,150		10,390	9,520	986		883
											C-95	13,430	12,830		10,970	10,050	1,041		931
											T-95	13,430	12,830		10,970	10,050	1,041		931
											P-110	15,130	14,850		12,700	11,640	1,206		1,087
											Q-125	16,740	16,880		14,430	13,220	1,370		1,206
7	177.8	42.7	.625	15.87	5.750	146.0	5.625	142.9	-	-	C-90	14,640	14,060	-	-	-	1,127	-	-
											T-95	15,450	14,840				1,189		

Refer to page 5-17 for footnote reference

Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)●				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)*	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
7	177.8	46.4	.687	17.45	5.626	142.9	5.501	139.7	-	-	C-90	15,930	15,460	-	-	-	1,226	-	-
											T-95	16,820	16,320				1,294		
7	177.8	50.1	.750	19.05	5.500	139.7	5.375	136.5	-	-	C-90	17,220	16,880	-	-	-	1,325	-	-
											T-95	18,180	17,810				1,399		
7	177.8	53.6	.812	20.62	5.376	136.5	5.251	133.4	-	-	C-90	18,460	18,270	-	-	-	1,421	-	-
											T-95	19,480	19,290				1,500		
7	177.8	57.1	.875	22.22	5.250	133.4	5.125	130.2	-	-	C-90	19,690	19,690	-	-	-	1,515	-	-
											T-95	20,780	20,780				1,600		
7-5/8	193.7	24.0	.300	7.62	7.025	178.4	6.900	175.3	8.500	215.9	H-40	2,030	2,750	2,750	-	-	276	212	-
7-5/8	193.7	26.4	.328	8.33	6.969	177.0	6.844	173.8	8.500	215.9	J-55 K-55	2,900	4,140	4,140	4,140	4,140	414	315 342	346 377
											M-65	3,100	4,890	4,890	4,890	4,890	489	368	403
											L-80	3,400	6,020		6,020	6,020	602		482
											N-80	3,400	6,020		6,020	6,020	602		490
											C-90	3,610	6,780	-	6,780	6,780	677	-	532
											C-95	3,710	7,150		7,150	7,150	714		560
											T-95	3,710	7,150		7,150	7,150	714		560
7-5/8	193.7	29.7	.375	9.52	6.875	174.7	6.750	171.5	8.500	215.9	M-65	4,310	5,590		5,590	5,590	555		474
											L-80	4,790	6,890		6,890	6,890	683		566
											N-80	4,790	6,890		6,890	6,890	683		575
											C-90	5,030	7,750	-	7,750	7,750	769	-	625
											C-95	5,130	8,180		8,180	8,180	811		659
											T-95	5,130	8,180		8,180	8,180	811		659
											P-110	5,350	9,470		9,470	9,470	940		769
7-5/8	193.7	33.7	.430	10.92	6.765	171.9	6.640	168.7	8.500	215.9	M-65	5,720	6,410		6,410	6,410	632		556
											L-80	6,560	7,900		7,900	7,900	778		664
											N-80	6,560	7,900		7,900	7,900	778		674
											C-90	7,050	8,880	-	8,880	8,880	875	-	733
											C-95	7,280	9,380		9,380	9,380	923		772
											T-95	7,280	9,380		9,380	9,380	923		772
											P-110	7,870	10,860		10,860	10,860	1,069		901
7-5/8	193.7	39.0	.500	12.70	6.625	168.3	6.500	165.1	8.500	215.9	L-80 N-80	8,820	9,180		9,180	9,180	895		786 798
											C-90	9,620	10,330		10,330	10,330	1,007		867
											C-95	10,000	10,900	-	10,900	10,900	1,063	-	914
											T-95	10,000	10,900		10,900	10,900	1,063		914
											P-110	11,080	12,620		12,620	12,620	1,231		1066
											Q-125	12,060	14,340		14,340	14,340	1,399		1194
7-5/8	193.7	42.8	.562	14.27	6.501	165.1	6.376	161.9	8.500	215.9	L-80 N-80	10,810	10,320		10,320	9,790	998		891 905
											C-90	11,890	11,610		11,610	11,010	1,122		983
											C-95	12,410	12,250	-	12,250	11,620	1,185	-	1,037
											T-95	12,410	12,250		12,250	11,620	1,185		1,037
											P-110	13,930	14,190		14,190	13,460	1,372		1,210
											Q-125	15,350	1,6120		16,120	15,290	1,559		1,355
7-5/8	193.7	45.3	.595	15.11	6.435	163.5	6.310	160.3	8.500	215.9	L-80 N-80	11,510	10,920		10,490	9,790	1,051		947 962
											C-90	12,950	12,290		11,810	11,010	1,183		1,045
											C-95	13,670	12,970	-	12,460	11,620	1,248	-	1,101
											T-95	13,670	12,970		12,460	11,620	1,248		1,101
											P-110	15,440	15,020		14,430	13,460	1,445		1,285
											Q-125	17,100	17,070		16,400	15,290	1,643		1,439
7-5/8	193.7	47.1	.625	15.87	6.375	161.9	6.250	158.7	8.500	215.9	L-80 N-80	12,040	11,480		10,490	9,790	1,100		997 1,013
											C-90	13,540	12,910		11,810	11,010	1,237		1,100
											C-95	14,300	13,630	-	12,460	11,620	1,306	-	1,159
											T-95	14,300	13,630		12,460	11,620	1,306		1,159
											P-110	16,550	15,780		14,430	13,460	1,512		1,353
											Q-125	18,700	17,930		16,400	15,290	1,718		1,515
7-5/8	193.7	51.2	.687	17.45	6.251	158.8	6.126	155.6	-	-	C-90	14,760	14,190	-	-	-	1,348	-	-
											T-95	15,580	14,980				1,423		
7-5/8	193.7	55.3	.750	19.05	6.125	155.6	6.000	152.4	-	-	C-90	15,960	15,490	-	-	-	1,458	-	-
											T-95	16,850	16,350				1,539		

Refer to page 5-17 for footnote reference

Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)●				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)*	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
7-3/4	196.8	46.1	.595	15.11	6.560	166.6	6.435	163.5	-	-	L-80	11,340	10,750	-	-	-	1,070	-	-
											N-80	11,340	10,750				1,070		
											C-90	12,750	12,090				1,204		
											C-95	13,320	12,760				1,271		
											T-95	13,320	12,760				1,271		
											P-110	15,000	14,780				1,471		
											Q-125	16,590	16,790				1,672		
8-5/8	219.1	24.0	.264	6.71	8.097	205.7	7.972	202.5	9.625	244.5	J-55 K-55	1,370	2,950	2,950	-	-	381	244 263	-
											M-65	1,420	3,480	3,480			451	285	
8-5/8	219.1	28.0	.304	7.72	8.017	203.7	7.892	200.5	9.625	244.5	H-40	1,610	2,470	2,470	-	-	318	233	-
											M-65	2,020	4,010	4,010			517	362	
8-5/8	219.1	32.0	.352	8.94	7.921	201.2	7.796	198.0	9.625	244.5	H-40	2,200	2,860	2,860	-	-	366	279	-
											J-55 K-55	2,530	3,930	3,930	3,930	3,930	503	372 402	417 452
											M-65	2,740	4,640	4,640	4,640	4,640	595	435	487
8-5/8	219.1	36.0	.400	10.16	7.825	198.8	7.700	195.6	9.625	244.5	J-55 K-55	3,450	4,460	4,460	4,460	4,460	568	434 468	486 526
											M-65	3,760	5,280	5,280	5,280	5,280	672	506	567
											L-80 N-80	4,100 4,100	6,490 6,490	-	6,490 6,490	6,490 6,490	827 827	-	678 688
											C-90	4,250	7,300		7,300	7,300	930		749
											C-95	4,350	7,710		7,710	7,710	982		789
											T-95	4,350	7,710		7,710	7,710	982		789
8-5/8	219.1	40.0	.450	11.43	7.725	196.2	7.600	193.0	9.625	244.5	M-65	4,900	5,930	-	5,930	5,930	751	-	649
											L-80 N-80	5,520	7,300		7,300	7,300	925		776 788
											C-90	5,870	8,220		8,220	8,220	1,040		858
											C-95	6,020	8,670		8,670	8,670	1,098		904
											T-95	6,020	8,670		8,670	8,670	1,098		904
											P-110	6,390	10,040		10,040	10,040	1,271		1,055
8-5/8	219.1	44.0	.500	12.70	7.625	193.7	7.500	190.5	9.625	244.5	L-80 N-80	6,950	8,120	-	8,120	8,120	1,021	-	874 887
											C-90	7,490	9,130		9,130	9,130	1,149		965
											C-95	7,740	9,640		9,640	9,640	1,212		1,017
											T-95	7,740	9,640		9,640	9,640	1,212		1,017
											P-110	8,420	11,160		11,160	11,160	1,404		1,186
8-5/8	219.1	49.0	.557	14.15	7.511	190.8	7.386	187.6	9.625	244.5	L-80 N-80	8,570	9,040	-	9,040	9,040	1,129	-	983 997
											C-90	9,340	10,170		10,170	10,170	1,271		1,085
											C-95	9,700	10,740		10,740	10,740	1,341		1,144
											T-95	9,700	10,740		10,740	10,740	1,341		1,144
											P-110	10,730	12,430		12,430	12,430	1,553		1,335
											Q-125	11,660	14,130		14,130	14,130	1,765		1,496
9-5/8	244.5	32.3	.312	7.92	9.001	228.7	8.845	224.7	10.625	269.9	H-40	1,370	2,270	2,270	-	-	365	254	-
9-5/8	244.5	36.0	.352	8.94	8.921	226.6	8.765	222.6	10,625	269.9	H-40	1,720	2,560	2,560	-	-	410	294	-
											J-55 K-55	2,020	3,520	3,520	3,520	3,520	564	394 423	453 489
											M-65	2,190	4,160	4,160	4,160	4,160	667	460	529
9-5/8	244.5	40.0	.395	10.03	8.835	224.4	8.679	220.4	10.625	269.9	J-55 K-55	2,570	3,950	3,950	3,950	3,950	630	452 486	520 561
											M-65	2,770	4,670	4,670	4,670	4,670	744	528	607
											L-80 N-80	3,090	5,750	-	5,750	5,750	916	-	727 737
											C-90	3,260	6,460		6,460	6,460	1,031		804
											C-95	3,330	6,820		6,820	6,820	1,088		847
											T-95	3,330	6,820		6,820	6,820	1,088		847
9-5/8	244.5	43.5	.435	11.05	8.755	222.4	8.599	218.4	10.625	269.9	M-65	3,530	5,140	-	5,140	5,140	816	-	679
											L-80 N-80	3,810	6,330		6,330	6,330	1,005		813 825
											C-90	4,010	7,120		7,120	7,120	1,130		899
											C-95	4,130	7,510		7,510	7,510	1,193		948
											T-95	4,130	7,510		7,510	7,510	1,193		948
											P-110	4,420	8,700		8,700	8,700	1,381		1,105

Refer to page 5-17 for footnote reference

Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)●				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)*	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
9-5/8	244.5	47.0	.472	11.99	8.681	220.5	8.525	216.5	10.625	269.9	M-65	4,280	5,580	-	5,580	5,580	882	-	745
											L-80 N-80	4,750	6,870		6,870	6,870	1,086		893 905
											C-90	4,990	7,720		7,720	7,720	1,222		987
											C-95	5,090	8,150		8,150	8,150	1,289		1,040
											T-95	5,090	8,150		8,150	8,150	1,289		1,040
											P-110	5,310	9,440		9,440	9,440	1,493		1,213
											Q-125	5,630	10,730		10,730	10,730	1,697		1,360
9-5/8	244.5	53.0	.545	13.84	8.535	216.8	8.379	212.8	10.625	269.9	T-95 C-95	7,340	9,410	-	9,410	9,410	1,477	-	1,220
9-5/8	244.5	53.5	.545	13.84	8.535	216.8	8.379	212.8	10.625	269.9	L-80 N-80	6,620	7,930	-	7,930	7,930	1,244	-	1,047 1,062
											C-90	7,110	8,920		8,920	8,920	1,399		1,157
											P-110	7,950	10,900		10,900	10,900	1,710		1,422
											Q-125	8,440	12,390		12,390	12,390	1,943		1,595
9-5/8	244.5	58.4	.595	15.11	8.435	214.2	8.279	210.3	10.625	269.9	L-80	7,890	8,650	-	8,650	8,650	1,350	-	1,151
											N-80	7,890	8,650		8,650	8,650	1,350		1,167
											C-90	8,570	9,740		9,740	9,740	1,519		1,272
											C-95	8,890	10,280		10,280	10,280	1,604		1,341
											T-95	8,890	10,280		10,280	10,280	1,604		1,341
											P-110	9,770	11,900		11,900	11,900	1,857		1,563
											Q-125	10,540	13,520		13,520	13,520	2,110		1,754
9-5/8	244.5	59.4	.609	15.47	8.407	213.5	8.251	209.6	-	-	C-90	8,970	9,970	-	-	-	1,552	-	-
											T-95	9,320	10,520				1,639		
9-5/8	244.5	64.9	.672	17.07	8.281	210.3	8.125	206.4	-	-	C-90	10,800	11,000	-	-	-	1,701	-	-
											T-95	11,260	11,610				1,796		
9-5/8	244.5	70.3	.734	18.64	8.157	207.2	8.001	203.2	-	-	C-90	12,600	12,010	-	-	-	1,845	-	-
											T-95	13,170	12,680				1,948		
9-5/8	244.5	75.6	.797	20.24	8.031	204.0	7.875	200.0	-	-	C-90	13,670	13,040	-	-	-	1,989	-	-
											T-95	14,430	13,770				2,100		
10-3/4	273.0	32.75	.279	7.09	10.192	258.8	10.036	254.9	11.750	298.5	H-40	840	1,820	1,820	-	-	367	205	-
10-3/4	273.0	40.5	.350	8.89	10.050	255.3	9.894	251.3	11.750	298.5	H-40	1,390	2,280	2,280	-	-	457	314	-
											J-55 K-55	1,580	3,130	3,130		3,130	629	420 450	
											M-65	1,670	3,700	3,700		3,700	743	491	
10-3/4	273.0	45.5	.400	10.16	9.950	252.7	9.794	248.5	11.750	298.8	J-55 K-55	2,090	3,580	3,580	-	3,580	715	493 528	-
											M-65	2,270	4,230	4,230		4,230	845	576	
10-3/4	273.0	51.0	.450	11.43	9.850	250.1	9.694	246.2	11.750	298.5	J-55 K-55	2,710	4,030	4,030	-	4,030	801	565 606	-
											M-65	2,870	4,760	4,760		4,760	946	661	
											L-80 N-80	3,220	5,860	5,860		5,860	1,165	794 804	
											C-90	3,400	6,590	6,590		6,590	1,311	879	
											C-95	3,480	6,960	6,960		6,960	1,383	927	
											T-95	3,480	6,960	6,960		6,960	1,383	927	
											P-110	3,660	8,060	8,060		8,060	1,602	1,079	
10-3/4	273.0	55.5	.495	12.57	9.760	247.9	9.604	243.9	11.750	298.5	M-65	2,870	4,760	4,760	-	4,760	946	661	-
											L-80 N-80	4,020	6,450	6,450		6,450	1,276	884 895	
											C-90	4,160	7,250	7,250		7,250	1,435	979	
											C-95	4,290	7,660	7,660		7,660	1,515	1,032	
											T-95	4,290	7,660	7,660		7,660	1,515	1,032	
											P-110	4,610	8,860	8,860		8,860	1,754	1,202	
10-3/4	273.0	60.7	.545	13.84	9.660	245.4	9.504	241.4	11.750	298.5	C-90	5,460	7,980	7,980	-	7,980	1,573	1,089	-
											T-95	5,580	8,430	8,430		8,430	1,660	1,148	
											P-110	5,880	9,760	9,760		9,760	1,922	1,337	
											Q-125	6,070	11,090	11,090		11,090	2,184	1,502	
10-3/4	273.0	65.7	.595	15.11	9.560	242.8	9.404	238.9	11.750	298.5	C-90	6,760	8,720	8,720	-	8,720	1,708	1,198	-
											T-95	6,970	9,200	9,200		9,200	1,803	1,263	
											P-110	7,500	10,650	10,650		10,650	2,088	1,471	
											Q-125	7,920	12,110	12,110		12,110	2,373	1,652	
10-3/4	273.0	73.2	.672	17.07	9.406	238.9	9.250	234.9	-	-	C-90	8,760	9,850	-	-	-	1,915	-	-
											T-95	9,090	10,390				2,021		
10-3/4	273.0	79.2	.734	18.64	9.282	235.8	9.126	231.8	-	-	C-90	10,370	10,750	-	-	-	2,079	-	-
											T-95	10,800	11,350				2,194		

Refer to page 5-17 for footnote reference

Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)●				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)★	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
10-3/4	273.0	85.3	.797	20.24	9.156	232.6	9.000	228.6	-	-	C-90	12,010	11,680	-	-	-	2,243	-	-
											T-95	12,540	12,330				2,367		
11-3/4	298.5	42.0	.333	8.46	11.084	281.5	10.928	277.6	12.750	323.9	H-40	1,040	1,980	1,980	-	-	478	307	-
11-3/4	298.5	47.0	.375	9.52	11.000	279.4	10.844	275.4	12.750	323.9	J-55 K-55	1,510	3,070	3.070	-	3,070	737	477 509	-
											M-65	1,590	3,630	3,630		3,630	871	557	
11-3/4	298.5	54.0	.435	11.05	10.880	276.3	10.724	272.4	12.750	323.9	J-55 K-55	2,070	3,560	3,560	-	3,560	850	568 606	-
											M-65	2,250	4,210	4,210		4,210	1,005	664	
11-3/4	298.5	60.0	.489	12.42	10.772	273.6	10.616	269.6	12.750	323.9	J-55 K-55	2,670	4,010	4,010	-	4,010	951	649 693	-
											M-65	2,840	4,730	4,730		4,730	1,124	759	
											L-80 N-80	3,180	5,830	5,830		5,830	1,384	913 924	
											C-90	3,360	6,550	6,550		6,550	1,557	1,011	
											C-95	3,440	6,920	6,920		6,920	1,643	1,066	
											T-95	3,440	6,920	6,920		6,920	1,643	1,066	
											P-110	3,610	8,010	8,010		8,010	1,903	1,242	
											Q-125	3,680	9,100	9,100		9,100	2,162	1,395	
11-3/4	298.5	65.0	.534	13.56	10.682	271.3	10.526	267.4	-	-	L-80	3,870	6,360	-	-	-	1,505	-	-
											N-80	3,870	6,360				1,505		
											C-90	4,060	7,160				1,693		
											C-95	4,170	7,560				1,788		
											T-95	4,170	7,560				1,788		
											P-110	4,480	8,750				2,070		
											Q-125	4,690	9,940				2,352		
11-3/4	298.5	71.0	.582	14.78	10.586	268.9	10.430	264.9	-	-	L-80	4,880	6,930	-	-	-	1,634	-	-
											C-90	5,130	7,800				1,838		
											C-95	5,240	8,230				1,940		
											N-80	4,880	6,930				1,634		
											T-95	5,240	8,230				1,940		
											P-110	5,470	9,530				2,246		
											Q-125	5,760	10,840				2,552		
13-3/8	339.7	48.0	.330	8.38	12.715	323.0	12.559	319.0	14.375	365.1	H-40	740	1,730	1,730	-	-	541	322	-
13-3/8	339.7	54.5	.380	9.65	12.615	320.4	12.459	316.5	14.375	365.1	J-55 K-55	1,130	2,730	2,730	-	2,730	853	514 547	-
											M-65	1,140■	3,230	3,230		3,230	1,008	602	
13-3/8	339.7	61.0	.430	10.92	12.515	317.9	12.359	313.9	14.375	365.1	J-55 K-55	1,540	3,090	3,090	-	3,090	962	595 633	-
											M-65	1,620	3,660	3,660		3,660	1,137	697	
13-3/8	339.7	68.0	.480	12.19	12.415	315.3	12.259	311.4	14.375	365.1	J-55 K-55	1,950	3,450	3,450	-	3,450	1,069	675 718	-
											M-65	2,100	4,080	4,080		4,080	1,264	790	
											L-80 N-80	2,260	5,020	5,020		5,020	1,556	952 963	
											C-90	2,320	5,650	5,650		5,650	1,750	1,057	
											C-95	2,330	5,970	5,970		5,970	1,847	1,114	
											T-95	2,330	5,970	5,970		5,970	1,847	1,114	
											P-110	2,330■	6,910	6,910		6,910	2,139	1,297	
13-3/8	339.7	72.0	.514	13.06	12.347	313.6	12.191	309.7	14.375	365.1	L-80 N-80	2,670	5,380	5,380	-	5,380	1,661	1,029 1,040	-
											C-90	2,780	6,050	6,050		6,050	1,869	1,142	
											C-95	2,820	6,390	6,390		6,390	1,973	1,204	
											T-95	2,820	6,390	6,390		6,390	1,973	1,204	
											P-110	2,880	7,400	7,400		7,400	2,284	1,401	
											Q-125	2,880■	8,410	8,410		8,410	2,596	1,576	
16	406.4	65.0	.375	9.52	15.250	387.4	15.062	382.6	17.000	431.8	H-40	630■	1,640	1,640	-	-	736	439	-
16	406.4	75.0	.438	11.13	15.124	384.1	14.936	379.4	17.000	431.8	J-55 K-55	1,020	2,630	2,630	-	2,630	1,178	710 752	-
											M-65	1,020■	3,110	3,110		3,110	1,392	832	
16	406.4	84.0	.495	12.57	15.010	381.3	14.822	376.5	17.000	431.8	J-55 K-55	1,410	2,980	2,980	-	2,980	1,326	817 865	-
											M-65	1,460	3,520	3,520		3,520	1,567	957	

Refer to page 5-17 for footnote reference

Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)●				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)*	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
16	406.4	109.0	.656	16.66	14.688	373.1	14.500	368.3	-	-	J-55	2,560	3,950	-	-	-	1,739	-	-
											K-55	2,560	3,950				1,739		
											L-80	3,080	5,740				2,530		
											N-80	3,080	5,740				2,530		
											C-95	3,320	6,820				3,004		
											P-110	3,470	7,890				3,478		
											Q-125	3,520	8,970				3,953		
18-5/8	473.1	87.5	.435	11.05	17.755	451.0	17.567	446.2	20.000	508.0	H-40	630■	1,630	1,630	-	-	994	559	-
											J-55 K-55	630■	2,250	2,250	-	2,250	1,367	754 794	
											M-65	630■	2,660	2,660		2,660	1,616	884	
20	508.0	94.0	.438	11.13	19.124	485.7	18.936	481.0	21,000	533.4	H-40	520■	1,530	1,530	1,530	-	1,077	581	673
											J-55 K-55	520■	2,110	2,110	2,110	2,110	1,480	783 823	907 955
											M-65	520■	2,490	2,490	2,490	2,490	1,750	918	1,063
20	508	106.5	.500	12.70	19.000	482.6	18.812	477.8	21.000	533.4	J-55 K-55	770■	2,410	2,410	2,410	2,410	1,685	913 959	1,056 1,113
											M-65	770■	2,840	2,840	2,840	2,840	1,991	1,070	1,238
20	508	133.0	.635	16.13	18.730	475.7	18.542	471.0	21.000	533.4	J-55 K-55	1,500	3,060	3,060	3,060	3,060	2,125	1,192 1,252	1,379 1,453

Refer to page 5-17 for footnote reference

Non-API Dimensional Data and Minimum Performance Properties of Casing

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
4-1/2	114.3	11.60	.250	6.35	4.000	101.6	3.875	98.43	5.000	127.0	Q-125	15,840	16,380	-	16,380	15,300	551	-	438
4-1/2	114.3	15.10	.337	8.56	3.826	97.20	3.701	94.01	5.000	127.0	K-55	7,620	7,210	-	-	-	242	-	-
											C-75	10,390	9,830				331		
											N-80	11,080	10,480				353		
											C-95	-	-				419		
											V-150	18,110	19,660				661		
4-1/2	114.3	16.6 16.8 17.1	.373	9.47	3.754	95.35	3.629	92.17	5.000	127.0	K-55	8,360	7,980	-	-	-	266	-	-
											C-75	11,400	10,880				363		
											N-80	12,160	11,600				387		
											C-95	14,440	13,780				459		
											P-110	16,720	15,960				532		
											V-150	22,110	21,760				725		
4-1/2	114.3	16.9	.380	9.65	3.740	95.00	3.615	91.83	-	-	C-95	14,690	14,040	-	-	-	467	-	-
											P-110	17,010	16,260				541		
											V-150	22,890	22,170				738		
4-1/2	114.3	18.8 20.0	.430	10.92	3.640	92.46	3.515	89.29	-	-	K-55	9,510	9,200	-	-	-	302	-	-
											C-75	12,960	12,540				412		
											N-80	13,830	13,380				440		
											C-95	16,420	15,890				522		
											P-110	19,010	18,390				605		
											V-150	25,930	25,080				825		
4-1/2	114.3	21.6	.500	12.7	3.500	88.9	3.375	85.72	-	-	K-55	10,860	10,690	-	-	-	345	-	-
											C-75	14,810	14,580				471		
											N-80	15,800	15,560				503		
											P-110	21,730	21,390				691		
											V-150	29,630	29,170				942		
4-1/2	114.3	24.6	.560	14.22	3.380	85.85	3.255	82.68	-	-	N-80	17,430	17,420	-	-	-	554	-	-
											P-110	23,970	23,960				762		
											V-150	32,690	32,670				1,040		
4-1/2	114.3	26.5	.630	16.0	3.240	82.3	3.115	79.12	-	-	N-80	19,260	19,600	-	-	-	613	-	-
											P-110	26,490	26,950				842		
											V-150	36,120	36,750				1,149		
5	127.0	13.0	.253	6.43	4.494	114.1	4.369	111.0	5.563	141.3	C-75	4,990	6,640	-	-	-	283	-	-
											N-80	5,140	7,090				302		
5	127.0	15.0	.296	7.52	4.408	112.0	4.283	108.8	5.563	141.3	C-75	6,970	7,700	-	7,700	7,700	328	-	295
											V-150	10,260	15,540		-	-	656		-
5	127.0	18.0	.362	9.19	4.276	108.6	4.151	105.4	5.563	141.3	K-55	7,390	6,970	-	-	-	290	-	-
											C-75	10,000	9,500		9,500	9,290	396		376
											V-150	16,860	19,000		-	-	791		534
5	127.0	20.3	.408	10.36	4.184	106.3	4.059	103.1	-	-	K-55	8,240	7,850	-	-	-	324	-	-
											C-75	11,240	10,710				441		
											N-80	11,990	11,420				471		
											P-110	16,490	15,710				647		
											V-150	21,470	21,420				883		
5	127.0	20.8	.422	10.72	4.156	105.6	4.031	102.4	-	-	K-55	8,500	8,120	-	-	-	334	-	-
											C-75	11,590	11,080				455		
											N-80	12,360	11,820				486		
											P-110	17,000	16,250				668		
											V-150	22,870	22,160				910		
5	127.0	21.4	.437	11.10	4.126	104.8	4.001	101.6	5.563	141.3	C-75	-	-	-	-	-	-	-	-
5	127.0	23.2	.478	12.14	4.044	102.7	3.919	99.54	5.563	141.3	K-55	9,510	9,200	-	-	-	373	-	-
											C-75	12,970	12,550				509		
											V-150	25,940	25,100				1,019		
5	127.0	24.1	.500	12.7	4.000	101.6	3.875	98.4	5.563	141.3	C-75	-	-	-	-	-	-	-	-
5	127.0	26.7	.562	14.27	3.876	98.4	3.751	95.3	-	-	L-80	15,960	15,740	-	-	-	627	-	
											C-95	18,960	18,690				744		
											P-110	21,950	21,640				862		
5	127.0	29.2	.625	15.87	3.750	95.2	3.625	92.1	-	-	L-80	17,500	17,500	-	-	-	687	-	-
											C-95	20,780	20,780				816		
											P-110	24,060	24,060				945		
5	127.0	31.6	.687	17.45	3.626	92.1	3.501	88.9	-	-	L-80	18,960	19,240	-	-	-	745	-	-
											C-95	22,520	22,840				884		
											P-110	26,070	26,450				1,024		
5	127.0	34.0	.750	19.05	3.500	88.9	3.375	85.7	-	-	L-80	20,400	21,000	-	-	-	801	-	-
											C-95	24,230	24,940				951		
											P-110	28,050	28,880				1,101		

Non-API Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
5-1/2	139.7	14.0	.244	6.20	5.012	127.7	4.887	124.1	6.050	153.7	C-75	3,560	5,820	-	-	-	302	-	-
5-1/2	139.7	15.5	.275	6.98	4.950	125.7	4.825	122.6	6.050	153.7	C-75	4,860	6,560	-	-	-	339	-	-
											N-80	4,990	7,000				362		
											P-110	5,620	9,620				497		
5-1/2	139.7	17.0	.304	7.72	4.892	124.3	4.767	121.1	6.050	153.7	C-75	6,070	7,250	-	7,250	7,250	372	-	327
											V-150	8,300	14,510		-	-	744		-
5-1/2	139.7	20.0	.361	9.17	4.778	121.4	4.653	118.2	6.050	153.7	K-55	6,610	6,310	-	-	-	321	-	-
											C-75	8,440	8,610		8,610	8,430	437		403
											V-150	13,480	17,220		-	-	874		-
5-1/2	139.7	23.0	.415	10.54	4.670	118.6	4.545	115.4	6.050	153.7	K-55	7,670	7,270	-	-	-	365	-	-
											C-75	10,400	9,900		9,260	8,430	497		473
											V-150	18,390	19,810		-	-	994		-
5-1/2	139.7	26.0	.476	12.01	4.548	115.5	4.423	112.3	-	-	K-55	8,700	8,330	-	-	-	413	-	-
											C-75	11,860	11,360				563	464(8)	
											N-80	12,650	12,120				601	488(8)	
											C-95	15,020	14,390				714	513(8)	
											P-110	17,390	16,660				826	610(8)	
											Q-125	19,760	18,930				939	-	
											V-150	23,720	22,720				1,127		
5-1/2	139.7	26.8	.500	12.70	4.500	114.3	4.375	111.1	-	-	L-80	13,220	12,730	-	-	-	628	-	-
											C-95	15,700	15,110				746		
											P-110	18,180	17,500				864		
5-1/2	139.7	28.4	.530	13.46	4.440	112.8	4.315	109.6	-	-	C-75	13,060	12,650	-	-	-	621	-	-
											N-80	13,930	13,490				662		
											P-110	19,160	18,550				910		
5-1/2	139.7	29.7	.562	14.27	4.376	111.1	4.251	108.0	-	-	L-80	14,680	14,310	-	-	-	697	-	-
											C-95	17,430	16,990				828		
											P-110	20,180	19,670				959		
5-1/2	139.7	32.3	.612	15.54	4.276	108.6	4.151	105.4	-	-	N-80	15,820	15,580	-	-	-	752	-	-
											C-95	18,790	18,500				893		
											P-110	21,760	21,420				1,034		
											Q-125	24,720	24,340				1,175		
											V-150	29,670	29,210				1,410		
5-1/2	139.7	32.6	.625	15.87	4.250	108.0	4.125	104.8	-	-	L-80	16,120	15,910	-	-	-	766	-	-
											C-95	19,140	18,890				909		
											P-110	22,160	21,880				1,053		
5-1/2	139.7	35.3	.687	17.45	4.126	104.8	4.001	101.6	-	-	L-80	17,490	17,490	-	-	-	831	-	-
											C-95	20,770	20,770				987		
											P-110	24,050	24,040				1,143		
5-1/2	139.7	36.4	.705	17.91	4.090	103.9	3.965	100.7	-	-	N-80	17,880	17,950	-	-	-	850	-	-
											C-95	21,230	21,310				1,009		
											P-110	24,590	24,680				1,168		
											Q-125	27,940	28,040				1,328		
											V-150	33,530	33,650				1,593		
5-1/2	139.7	38.0	.750	19.05	4.000	101.6	3.875	98.4	-	-	L-80	18,840	19,090	-	-	-	895	-	-
											C-95	22,380	22,670				1,063		
											P-110	25,910	26,250				1,231		
											Q-125	29,440	29,830				1,399		
5-1/2	139.7	40.5	.812	20.62	3.876	98.5	3.751	95.3	-	-	L-80	20,130	20,670	-	-	-	957	-	-
											C-95	23,910	24,540				1,136		
											P-110	27,690	28,420				1,315		
6	152.4	20.0	.324	8.23	5.352	135.9	5.227	132.8	6.625	168.3	N-80	5,690	-	-	7,560	-	461	-	366
6-5/8	168.3	20.0	.288	7.32	6.049	153.7	5.924	150.5	7.390	187.7	N-80	3,480	6,090	-	-	-	459	-	-
											C-95	3,830	7,230				545		
6-5/8	168.3	23.2	.330	8.38	5.965	151.5	5.845	148.5	-	-	L-80	4,940	6,970	-	-	-	522	-	-
											P-110	5,550	9,590				718		
6-5/8	168.3	24.0	.352	8.94	5.92	150.4	5.796	147.2	7.390	187.7	C-75	5,550	6,970	-	6,970	6,970	520	-	453
											V-150	7,350	13,960		-	-	1,041		-
6-5/8	168.3	28.0	.417	10.59	5.791	147.1	5.666	143.9	7.390	187.7	K-55	6,170	6,060	-	-	-	447	-	-
											C-75	7,830	8,260		8,260	8,260	610		552
											V-150	12,130	16,510		-	-	1,220		-
6-5/8	168.3	32.0	.475	12.06	5.675	144.2	5.550	141.0	7.390	187.7	K-55	7,320	6,900	-	-	-	504	-	-
											C-75	9,800	9,410		9,410	9,200	688		638
											V-150	16,510	18,820		-	-	1,377		
6-5/8	168.3	33.0	.500	12.7	5.625	142.9	5.500	139.7	-	-	L-80	11,160	10,570	-	-	-	770	-	-
											C-95	12,920	12,550				914		
											P-110	14,530	14,530				1,058		

Non-API Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
6-5/8	168.3	34.5 35.0	.525	13.34	5.575	141.6	5.450	138.4	-	-	N-80	11,670	11,090	-	-	-	805	-	-
											P-110	15,850	15,250				1,107		
											V-150	20,290	20,880				1,509		
6-5/8	168.3	36.7	.562	14.27	5.501	139.7	5.376	136.6	-	-	L-80	12,420	11,880	-	-	-	856	-	-
											C-95	14,750	14,100				1,017		
											P-110	17,080	16,300				1,177		
6-5/8	168.3	40.2	.625	15.87	5.375	136.5	5.250	133.3	-	-	L-80	13,670	13,210	-	-	-	942	-	-
											C-95	16,230	15,680				1,119		
											P-110	18,800	18,160				1,296		
6-5/8	168.3	43.7	.687	17.45	5.251	133.4	5.126	130.2	-	-	L-80	14,870	14,520	-	-	-	1,025	-	-
											C-95	17,660	17,240				1,217		
											P-110	20,450	19,960				1,410		
6-5/8	168.3	47.1	.750	19.05	5.125	130.2	5.000	127.0	-	-	L-80	16,060	15,850	-	-	-	1,107	-	-
											C-95	19,070	18,820				1,315		
											P-110	22,090	21,790				1,523		
6-5/8	168.3	50.4	.812	20.62	5.001	127.0	4.876	123.8	-	-	L-80	17,210	17,160	-	-	-	1,186	-	-
											C-95	20,430	20,380				1,409		
											P-110	23,660	23,590				1,631		
6-5/8	168.3	53.7	.875	22.22	4.875	123.8	4.750	120.6	-	-	L-80	18,340	18,490	-	-	-	1,264	-	-
											C-95	21,780	21,960				1,502		
											P-110	25,220	25,420				1,738		
7	177.8	20.0	.272	6.91	6.456	164.0	6.331	160.8	7.656	194.5	C-75	2,660	5,100	-	-	-	431	-	-
7	177.8	23.0	.317	8.05	6.366	161.7	6.241	158.5	7.656	194.5	C-75	3,770	5,940	-	5,940	5,940	499	-	416
7	177.8	26.0	.362	9.19	6.276	159.4	6.151	156.2	7.656	194.5	C-75	5,250	6,790	-	6,790	6,790	566	-	489
											V-150	6,890	13,580		-	-	1,132		-
7	177.8	29.0	.408	10.36	6.184	157.1	6.059	153.9	7.656	194.5	K-55	5,400	5,610	-	-	-	465	-	-
											C-75	6,760	7,650		7,650	7,650	634		562
											V-150	9,800	15,300		-	-	1,267		-
7	177.8	32.0	.453	11.51	6.094	154.8	5.969	151.6	7,656	194.5	K-55	6,460	6,230	-	-	-	512	-	-
											C-75	8,230	8,490		8,490	7,930	699		633
											V-150	13,020	16,980		-	-	1,397		-
7	177.8	35.0	.498	12.65	6.004	152.5	5.879	149.3	7.656	194.5	K-55	7,270	6,850	-	-	-	559	-	-
											C-75	9,710	9,340		8,680	7,930	763		703
											V-150	16,230	18,660		-	-	1,526		-
7	177.8	38.0	.540	13.72	5.920	150.4	5.795	147.2	7.656	194.5	K-55	7,830	7,420	-	-	-	603	-	-
											C-75	10,680	10,120		8,660	7,930	822		767
											V-150	19,240	20,240		-	-	1,644		-
7	177.8	41.0	.590	14.98	5.820	147.8	5.695	144.7	-	-	N-80	12,350	11,800	-	-	-	950	-	-
											C-95	14,670	14,010				1,129		
											P-110	16,990	16,220				1,306		
											V-150	23,160	22,120				1,782		
7	177.8	42.7	.625	15.87	5.750	146.0	5.626	142.9	-	-	L-80	13,010	12,500	-	-	-	1,001	-	-
											C-95	15,450	14,840				1,189		
											P-110	17,890	17,190				1,377		
7	177.8	44.0	.640	16.25	5.720	145.3	5.595	142.1	-	-	C-95	15,780	15,200	-	-	-	1,215	-	-
											P-110	18,280	17,600				1,407		
											V-150	24,920	24,000				1,918		
7	177.8	45.4 46	.670	17.02	5.660	143.8	5.535	140.6	-	-	C-95	16,450	15,910	-	-	-	1,266	-	-
											P-110	19,040	18,430				1,466		
											V-150	25,970	25,120				1,998		
7	177.8	46.4	.687	17.45	5.626	142.9	5.501	139.7	-	-	L-80	14,160	13,740	-	-	-	1,090	-	-
											C-95	16,820	16,320				1,294		
											P-110	19,470	18,890				1,499		
7	177.8	49.5	.730	18.54	5.540	140.7	5.415	137.5	-	-	P-110	20,550	20,080	-	-	-	1,582	-	-
											V-150	28,020	27,380				2,157		
7	177.8	50.1	.750	19.05	5.500	139.7	5.375	136.5	-	-	L-80	15,310	15,000	-	-	-	1,178	-	-
											C-95	18,180	17,810				1,399		
											P-110	21,050	20,620				1,620		
7	177.8	53.6	.812	20.62	5.376	136.5	5.251	133.4	-	-	L-80	16,410	16,240	-	-	-	1,263	-	-
											C-95	19,480	19,290				1,500		
											P-110	22,560	22,330				1,736		
7	177.8	57.1	.875	22.22	5.250	133.4	5.125	130.2	-	-	L-80	17,500	17,500	-	-	-	1,347	-	-
											C-95	20,780	20,780				1,600		
											P-110	24,060	24,060				1,852		
7	177.8	60.5	.937	23.80	5.126	130.2	5.001	127.0	-	-	L-80	18,550	18,740	-	-	-	1,428	-	-
											C-95	22,030	22,250				1,695		
											P-110	25,510	25,770				1,963		

Non-API Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
7-5/8	193.7	26.4	.328	8.33	6.969	177.0	6.844	173.8	8.500	215.9	C-75	3,280	5,650	-	5,650	5,650	564	-	461
											P-110	3,900	8,280		-	-	827		-
											V-150	4,080	11,290				1,128		
7-5/8	193.7	29.7	.375	9.52	6.875	174.7	6.750	171.5	8.500	215.9	C-75	4,670	6,450	-	6,450	6,450	641	-	542
											V-150	6,060	12,910		-	-	1,281		-
7-5/8	193.7	33.7	.430	10.92	6.765	171.9	6.640	168.7	8.500	215.9	K-55	5,090	5,430	-	-	-	535	-	-
											C-75	6,320	7,400		7,400	7,400	729		635
											V-150	8,860	14,800		-	-	1,458		-
7-5/8	193.7	39.0	.500	12.70	6.625	168.3	6.500	165.1	8.500	215.9	C-75	8,430	8,610	-	8,610	8,610	839	-	-
											V-150	13,450	17,220		-	-	1,679		
7-5/8	193.7	45.3	.595	15.11	6.435	163.5	6.310	160.3	8.500	215.9	K-55	7,910	7,510	-	-	-	723	-	-
											C-75	10,790	10,240				986		
											V-150	19,680	20,480				1,971		
7-5/8	193.7	47.1	.625	15.87	6.375	161.9	6.250	158.7	8.500	215.9	C-75	11,290	10,760	-	9,840	9,190	1,031	-	953
7-5/8	193.7	51.2	.687	17.45	6.251	158.8	6.126	155.6	-	-	L-80	13,120	12,610	-	-	-	1,198	-	-
											P-110	18,040	17,340				1,647		
7-5/8	193.7	52.8	.712	18.08	6.201	157.5	6.076	154.3	-	-	N-80	13,550	13,070	-	-	-	1,237	-	-
											P-110	18,640	17,980				1,701		
											V-150	25,420	24,510				2,319		
7-5/8	193.7	55.3	.750	19.05	6.125	155.6	6.000	152.4	-	-	L-80	14,190	13,770	-	-	-	1,296	-	-
											P-110	19,510	18,930				1,782		
7-5/8	193.7	59.2	.812	20.62	6.001	152.4	5.876	149.2	-	-	L-80	15,220	14,910	-	-	-	1,390	-	-
											P-110	20,930	20,500				1,912		
7-5/8	193.7	63.2	.875	22.22	5.875	149.2	5.750	146.0	-	-	L-80	16,250	16,070	-	-	-	1,484	-	-
											P-110	22,350	22,090				2,041		
7-5/8	193.7	66.9	.937	23.80	5.751	146.0	5.626	142.9	-	-	L-80	17,250	17,200	-	-	-	1,575	-	-
											P-110	23,710	23,660				2,166		
7-5/8	193.7	70.7	1.000	25.40	5.625	142.9	5.500	139.7	-	-	L-80	18,230	18,360	-	-	-	1,665	-	-
											P-110	25,070	25,250				2,289		
7-3/4	196.8	46.1	.595	15.11	6.560	166.6	6.500	165.1	8.500	215.9	K-55	7,800	7,390	-	-	-	-	-	-
											S-95	12,650	12,760		12,460	11,620	1,070		992
											S-105	13,960	12,760		12,460	11,620	1,271		1,065
											V-150	19,050	20,150		-	-	-		-
7-3/4	196.8	48.6	.640	16.26	6.470	164.3	6.345	161.2	-	-	L-80	12,120	11,560	-	-	-	1,144	-	-
											P-110	16,670	15,900				1,573		
8-5/8	219.1	28.0	.304	7.72	8.017	203.7	7.892	200.5	9.625	244.5	K-55	1,880	3,390	-	-	-	437	-	-
8-5/8	219.1	32.0	.352	8.94	7.921	201.2	7.796	198.0	9.625	244.5	C-75	2,950	5,360	-	-	-	686	-	-
											N-80	3,050	5,710				732		
											P-110	3,430	7,860				1,006		
8-5/8	219.1	36.0	.400	10.16	7.825	198.8	7.700	195.6	9.625	244.5	C-75	4,020	6,090	-	6,090	6,090	775	-	648
											P-110	4,700	8,930		-	-	1,137		-
8-5/8	219.1	40.0	.450	11.43	7.725	196.2	7.600	193.0	9.625	244.5	K-55	4,400	5,020	-	-	-	636	-	-
											C-75	5,350	6,850		6,850	6,850	867		742
											V-150	7,040	13,700		-	-	1,734		-
8-5/8	219.1	44.0	.500	12.70	7.625	193.7	7.500	190.5	9.625	244.5	K-55	5,350	5,580	-	-	-	702	-	-
											C-75	6,680	7,610		7,610	7,610	957		834
											V-150	9,645	15,210		-	-	1,915		-
8-5/8	219.1	49.0	.557	14.15	7.511	190.8	7.386	187.6	9.625	244.5	K-55	6,440	6,220	-	-	-	776	-	-
											C-75	8,200	8,480		8,480	8,480	1,059		939
											V-150	12,950	16,940		-	-	2,120		-
8-5/8	219.1	52.0	.595	15.11	7.435	188.8	7.310	185.7	-	-	C-75	9,210	9,050	-	-	-	1,126	-	-
											N-80	9,650	9,660				1,201		
											P-110	12,260	13,280				1,651		
											V-150	15,160	18,110				2,252		
8-5/8	219.1	54.0	.625	15.87	7.375	187.3	7.250	184.1	-	-	L-80	10,510	10,140	-	-	-	1,257	-	-
											P-110	13,470	13,950				1,728		
8-5/8	219.1	58.7	.687	17.45	7.251	184.2	7.126	181.0	-	-	L-80	11,730	11,150	-	-	-	1,371	-	-
											P-110	15,990	15,330				1,885		
8-5/8	219.1	63.5	.750	19.05	7.125	181.0	7.000	177.8	-	-	L-80	12,700	12,170	-	-	-	1,484	-	-
											P-110	17,470	16,740				2,041		
8-5/8	219.1	68.1	.812	20.62	7.001	177.8	6.876	174.6	-	-	L-80	13,650	13,180	-	-	-	1,594	-	-
											P-110	18,760	18,120				2,192		
8-5/8	219.1	72.7	.875	22.22	6.875	174.6	6.750	171.5	-	-	L-80	14,590	14,200	-	-	-	1,704	-	-
											P-110	20,050	19,530				2,343		
8-5/8	219.1	77.1	.937	23.80	6.751	171.5	6.626	168.3	-	-	L-80	15,490	15,210	-	-	-	1,810	-	-
											P-110	21,300	20,910				2,489		

Non-API Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
8-3/4	222.3	49.7	.557	14.15	7.636	194.0	7.500	190.5	9.625	244.5	S-95	10,260	10,580	-	10,580	10,580	1,362	-	1,017
											S-105	11,100	10,580		10,580	10,580	1,362		1,095
9-5/8	244.5	36.0	.352	8.94	8.921	226.6	8.765	222.6	10,625	269.9	C-75	2,320	4,800	-	-	-	789	-	-
											N-80	2,370	5,120				820		
											P-110	2,470	7,040				1,128		
9-5/8	244.5	40.0	.395	10.03	8.835	224.4	8.679	220.4	10.625	269.9	C-75	2,980	5,390	-	5,390	5,390	859	-	694
											P-110	3,480	7,900		-	-	1,260		-
9-5/8	244.5	43.5	.435	11.05	8.755	222.4	8.599	218.4	10.625	269.9	K-55	3,250	4,350	-	-	-	691	-	-
											C-75	3,750	5,930		5,930	5,930	942		776
											V-150	4,750	11,860		-	-	1,818		-
9-5/8	244.5	47.0	.472	11.99	8.681	220.5	8.525	216.5	10.625	269.9	K-55	3,880	4,720	-	-	-	746	-	-
											C-75	4,630	6,440		6,440	6,440	1,018		852
											V-150	6,020	12,870		-	-	2,036		-
9-5/8	244.5	53.5	.545	13.84	8.535	216.8	8.379	212.8	10.625	269.9	K-55	5,130	5,450	-	-	-	855	-	-
											C-75	6,380	7,430		7,430	7,430	1,166		999
											V-150	8,970	14,860		-	-	2,332		-
9-5/8	244.5	58.4	.595	15.11	8.435	214.2	8.279	210.3	10.625	269.9	C-75	7,570	-	-	-	-	-	-	-
											S-95	9,950	-		-	-	-		-
											V-150	11,570	16,230		-	-	2,530		-
9-5/8	244.5	59.4	.609	15.47	8.407	213.5	8.251	209.6	10.625	269.9	L-80	8,250	8,860	-	-	-	1,380	-	-
											P-110	10,260	12,180		12,180	12,140	1,897		1,603
9-5/8	244.5	61.1	.625	15.87	8.375	212.7	8.219	208.8	10.625	269.9	C-95 S-95	9,800 10,500	10,800	-	10,800	10,490	1,680 1,679	-	1,430
											P-110	10,840	12,500		-	-	1,944		-
											V-150	13,130	17,050				2,650		
9-5/8	244.5	64.9	.672	17.07	8.281	210.3	8.125	206.4	10.625	269.9	L-80	9,860	9,770	-	-	-	1,512	-	-
											P-110	12,550	13,440		13,240	12,140	2,079		1,778
9-5/8	244.5	70.3	.734	18.64	8.157	207.2	8.001	203.2	10.625	269.9	L-80	11,270	10,680	-	-	-	1,640	-	-
											P-110	14,800	14,680		13,240	12,140	2,255		1,948
9-5/8	244.5	71.8	.750	19.05	8.125	206.4	7.969	202.4	10.625	269.9	P-110	15,810	15,000	-	-	-	2,300	-	-
											V-150	19,640	20,450		18,060	16,560	3,137		2,672
9-5/8	244.5	75.6	.797	20.24	8.031	204.0	7.875	200.0	-	-	L-80	12,150	11,590	-	-	-	1,768	-	-
											P-110	16,710	15,940				2,431		
9-5/8	244.5	80.8	.859	21.82	7.907	200.8	7.751	196.9	-	-	L-80	13,010	12,490	-	-	-	1,892	-	-
											P-110	17,880	17,180				2,602		
9-5/8	244.5	86.0	.922	23.42	7.781	197.6	7.625	193.7	-	-	L-80	13,860	13,410	-	-	-	2,017	-	-
											P-110	19,060	18,440				2,773		
9-5/8	244.5	91.0	.984	24.99	7.657	194.5	7.501	190.5	-	-	L-80	14,690	14,310	-	-	-	2,137	-	-
											P-110	20,190	19,680				2,938		
9-3/4	247.7	59.2	.595	15.11	8.560	217.4	8.500	215.9	10.625	269.9	S-95	9,750	10,150	-	10,150	10,150	1,626	-	1,204
											S-105	10,470	10,150		10,150	10,150	1,626		1,279
9-7/8	250.8	62.8	.625	15.88	8.625	219.1	8.500	215.9	10.625	269.9	S-95	10,180	10,520	-	10,520	10,490	1,725	-	1,123
											P-110	10,260	12,180		-	-	1,998		-
											S-105	11,010	10,520		10,520	10,490	1,725		1,210
10-3/4	273.0	40.5	.350	8.89	10.050	255.3	9.894	251.3	11.750	298.5	C-75	1,720	4,270	-	-	-	858	-	-
10-3/4	273.0	45.5	.400	10.16	9.950	252.7	9.794	248.5	11.750	298.8	C-75	2,410	4,880	-	-	-	975	-	-
											N-80	2,480	5,210				1,041		
											P-110	2,610	7,160				1,430		
10-3/4	273.0	51.0	.450	11.43	9.850	250.1	9.694	246.2	11.750	298.5	C-75	3,100	5,490	5,490	-	5,490	1,092	756	-
10-3/4	273.0	55.5	.495	12.57	9.760	247.9	9.604	243.9	11.750	298.5	K-55	3,320	4,430	-	-	-	877	-	-
											C-75	3,950	6,040	6,040		6,040	1,196	843	
											V-150	5,040	12,090	-		-	2,392	-	
10-3/4	273.0	60.7	.545	13.84	9.660	245.4	9.504	241.4	11.750	298.5	K-55	4,160	4,880	-	-	-	961	-	-
											C-75	5,020	6,650				1,310		
											N-80	5,160	7,100				1,390		
											C-95	5,580	8,430	8,430		8,430	1,660	1,148	
											V-150	6,560	13,310	-		-	2,620	-	
10-3/4	273.0	65.7	.595	15.11	9.560	242.8	9.404	238.9	11.750	298.5	K-55	4,920	5,330	-	-	-	1,134	-	-
											C-75	6,080	7,260				1,424		
											N-80	6,300	7,750				1,519		
											C-95	6,970	9,200	9,200		9,200	1,803	1,263	
											V-150	8,330	14,530	-		-	2,847	-	
10-3/4	273.0	71.1	.650	16.51	9.450	240.0	9.294	236.1	11.750	298.5	C-95 S-95	8,470 9,600	10,050	9,710	-	9,480	1,856 1,959	1,403	-
											P-110	9,280	11,640	11,200		10,980	2,269	1,618	
											V-150	10,890	15,070	15,070		14,970	3,094	2,174	

Non-API Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
10-3/4	273.0	73.2	.672	17.07	9.406	238.9	9.250	234.9	11.750	298.5	L-80	8,060	8,750	-	-	-	1,702	-	-
											P-110	9,990	12,030	11,240		10,980	2,340	1,676	
10-3/4	273.0	79.2	.734	18.64	9.282	235.8	9.126	231.8	11,750	298.5	L-80	9,480	9,560	-	-	-	1,848	-	-
											P-110	12,010	13,140	11,240		10,980	2,540	1,837	
10-3/4	273.0	85.3	.797	20.24	9.156	232.6	9.000	228.6	-	-	L-80	10,920	10,380	-	-	-	1,994	-	-
											P-110	14,060	14,270				2,741		
10-3/4	273.0	91.2	.859	21.82	9.032	229.4	8.876	225.4	-	-	L-80	11,760	11,190	-	-	-	2,135	-	-
											P-110	16,080	15,380				2,936		
10-3/4	273.0	97.1	.922	23.42	8.906	226.2	8.750	222.2	-	-	L-80	12,550	12,010	-	-	-	2,277	-	-
											P-110	17,250	16,510				3,131		
10-3/4	273.0	102.9	.984	24.99	8.782	223.1	8.626	219.1	-	-	L-80	13,300	12,810	-	-	-	2,415	-	-
											P-110	18,290	17,620				3,321		
10-3/4	273.0	108.7	1.047	26.59	8.656	219.9	8.500	215.9	-	-	L-80	14,070	13,640	-	-	-	2,553	-	-
											P-110	19,340	18,750				3,511		
11-3/4	298.5	47.0	.375	9.52	11.000	279.4	10.844	275.4	12.750	323.9	C-75	1,620	4,190	-	-	-	1,005	-	-
											N-80	-	-				1,072		
11-3/4	298.5	54.0	.435	11.05	10.880	276.3	10.724	272.4	12.750	323.9	C-75	2,380	4,860	-	-	-	1,160	-	-
											N-80	-	-				1,237		
11-3/4	298.5	60.0	.489	12.42	10.772	273.6	10.616	269.6	12.750	323.9	C-75	3,070	5,460	5,460	-	5,460	1,298	869	-
											V-150	3,680	10,920	-		-	2,595	-	
11-3/4	298.5	65.0	.534	13.56	10.682	271.3	10.526	267.4	12.750	323.9	K-55	3,290	4,370	-	-	-	1,035	-	-
											C-75	3,810	5,960				1,411		
											S-95	5,740	7,560	7,560		7,560	1,788	1,189	
											V-150	4,850	11930	-		-	2,822	-	
11-3/4	298.5	66.7	.547	3.89	10.656	270.2	10.500	266.7	12.750	323.8	C-95	4,400	7,740	7,740	-	7,740	1,829	1,208	-
											P-110	4,740	8,960	8,960		8,960	2,118	1,408	
11-3/4	298.5	71.0	.582	14.78	10.586	268.9	10.430	264.9	12.750	323.8	S-95	7,280	8,230	8,230	-	8,230	1,940	1,306	-
											V-150	6,180	13,000	-		-	3,063	-	
11-3/4	298.5	73.6	.609	15.47	10.532	267.5	10.376	263.6	12.750	323.8	C-95	5,900	8,620	8,620	-	8,620	2,025	1,358	-
											P-110	6,260	9,980	9,980		9,980	2,345	1,582	
11-3/4	298.5	75.0	.618	15.70	10.514	267.1	10.358	263.1	-	-	L-80	5,630	7,360	-	-	-	1,729	-	-
											P-110	6,520	10,120				2,377		
											V-150	7,170	13,810				3,242		
11-3/4	298.5	79.0	.656	16.66	10.438	265.1	10.282	261.2	-	-	L-80	6,420	7,820	-	-	-	1,829	-	-
											P-110	7,650	10,750				2,515		
											V-150	8,570	14,660				3,430		
11-3/4	298.5	80.5	.672	17.07	10.406	264.3	10.250	260.4	12.750	323.8	C-95	7,500	9,510	8,950	-	8,740	2,222	1,509	-
											P-110	8,130	11,010	10,360		10,120	2,573	1,757	
11-3/4	298.5	87.2	.734	18.64	10.282	261.2	10.126	257.2	12.750	323.8	C-95	9,060	10,390	8,950	-	8,740	2,413	1,655	-
											P-110	9,980	12,030	10,360		10,120	2,794	1,928	
11-7/8	301.6	71.8	.582	14.78	10.711	272.1	10.625	269.9	12.750	323.8	S-95	7,190	8,150	8,150	-	8,150	1,962	1,153	-
											P-110	5,300	9,430	-		-	2,271	-	
13-3/8	339.7	54.5	.380	9.65	12.615	320.4	12.459	316.5	14,375	365.1	N-80	1,130	3,980	-	-	-	1,241	-	-
											P-110	1,130	5,470				1,629		
13-3/8	339.7	61.0	.430	10.92	12.515	317.9	12.359	313.9	14.375	365.1	C-75	1,660	4,220	-	-	-	1,312	-	-
											N-80	1,670	4,500				1,400		
13-3/8	339.7	68.0	.480	12.19	12.415	315.3	12.259	311.4	14.375	365.1	C-75	2,220	4,710	-	-	-	1,458	-	-
											C-95	2,330	5,970	5,970		5,970	1,847	1,114	
13-3/8	339.7	72.0	.514	13.06	12.347	313.6	12.191	309.7	14.375	365.1	K-55	2,230	3,700	-	-	-	1,142	1,297	-
											C-75	2,590	5,040	5,040		5,040	1,558	978	
											C-95	2,820	6,390	6,390		6,390	1,973	1,204	
13-3/8	339.7	77.0	.550	13.97	12.275	311.8	12.119	307.8	14.375	365.1	C-75	2,990	5,400	5,400	-	5,400	1,662	1,054	-
											N-80	3,100	5,760	5,760		5,760	1,773	1,122	
13-3/8	339.7	80.7	.580	14.73	12.215	310.3	12.059	306.3	14.375	365.1	S-80	4,800	4,170	4,170	-	4,170	1,282	1,118	-
											S-95	4,990	7,210	7,210		7,210	2,215	1,389	
13-3/8	339.7	85.0	.608	15.44	12.159	308.8	12.003	304.9	14.375	365.1	C-75	3,810	5,970	5,970	-	5,970	1,829	1,177	-
											N-80	3,870	6,360	6,460		6,360	1,951	1,252	
											P-110	4,490	8,750	-		-	2,682	-	
13-3/8	339.7	86.0	.625	15.87	12.125	308.0	11.969	304.0	14.375	365.1	S-95	6,240	7,770	7,770	-	7,750	2,378	1,507	-
13-3/8	339.7	92.0	.672	17.07	12.031	305.6	11.875	301.6	14.375	365.1	P-110	5,700	9,670	9,190	-	8,980	2,950	1,878	-
13-3/8	339.7	100.3	.734	18.64	11.907	302.4	11.751	298.5	14.375	365.1	C-95	6,810	9,120	7,940	-	7,750	2,769	1,771	-
											P-110	7,320	10,560	9,190		8,980	3,205	2,062	
13-1/2	342.9	81.4	.580	14.73	12.340	313.4	12.250	311.2	14.375	365.1	S-95	4,860	7,140	7,140	-	7,140	2,236	1,225	-
13-5/8	346.1	88.2	.625	15.88	12.375	314.3	12.250	311.2	14.375	365.1	C-75	3,910	6,020	-	-	-	1,914	-	-
											S-95	5,930	7,630	7,630		7,630	2,425	1,178	
											P-110	4,590	8,830	-		-	2,807	-	
16	406.4	128.0	.781	19.84	14.438	366.7	14.250	362.0	17.000	431.8	L-80	4,700	6,830	5,800	-	6,080	2,987	1,900	-
											P-110	5,260	9,400	7,970		8,350	4,108	2,590	

Non-API Dimensional Data and Minimum Performance Properties of Casing (Continued)

OD		Weight With Coupling	Wall Thickness		ID		Drift Diameter		Coupling or Joint OD		Grade	Collapse Resistance (psi)	Internal Yield Pressure (psi)				Body Yield Strength (1,000 lb)	Joint Yield Strength (1,000 lb)	
									Round or Buttress				Plain End or Extreme Line	Round Thread		Buttress Thread		Threaded and Coupled Joint	
														Short	Long			Round Thread	
in.	mm	lb/ft	in.	mm	in.	mm	in.	mm	in.	mm								Short	Long
16	406.4	146.0	.906	23.01	14.188	360.4	14.000	355.6	17.000	431.8	L-80	6,620	7,930	5,800	-	6,080	3.437	2,216	-
											P-110	7,930	10,900	7,970		8,350	4,726	3,021	
18-5/8	473.1	94.5	.468	11.89	17.689	449.3	17.501	444.5	-	-	K-55	780	2,420	-	-	-	1,468	-	-
											X-60	780	2,640				1,602		
18-5/8	473.1	97.7	.486	12.34	17.653	448.4	17.465	443.6	-	-	K-55	880	2,510	-	-	-	1,523	-	-
											X-60	880	2,740				1,662		
18-5/8	473.1	106.0	.531	13.49	17.563	446.1	17.375	441.3	20.000	508.0	K-55	1,140	2,740	2,740	-	2,740	1,660	998	-
18-5/8	473.1	117.5	.593	15.06	17.439	443.0	17.251	438.2	20.000	508.0	K-55	1,500	3,060	3,060	-	3,060	1,848	1,129	-
20	508	163.0	.781	19.84	18.438	468.3	18.250	463.6	21.000	533.4	L-80	2,770	5,470	4,710	-	4,920	3,772	2,114	2,423
											P-110	3,030	7,520	6,470		6,760	5,187	2,885	3,306
20	508	169.0	.812	20.62	18.376	466.7	18.188	462.0	-	-	K-55	2,500	3,910	3,200	-	3,400	2,692	1,631	-
											X-60	2,590	4,260	-		-	2,937	-	
20	508	175.0	.843	21.41	18.314	465.2	18.126	460.4	21.000	533.4	L-80	3,270	5.900	4,710	-	4,920	4,059	2,291	2,626
											P-110	3,740	8,110	6,470		6,760	5,581	3,127	3,583
20	508	187.0	.906	23.01	18.188	462.0	18.000	457.2	21.000	533.4	L-80	3,830	6,340	4,710	-	4,920	4,348	2,470	2,831
											P-110	4,450	8,720	6,470		6,760	5,978	3,371	3,863

Casing Make-up Torque Guidelines 8 Round Thread Casing

Designation		OD		Grade	Torque			
		D	Dm		ST&C		LT&C	
Size	Weight	in.	mm		ft-lb	Nm	ft-lb	Nm
4.500	9.50	4.500	114.30	H40	770	1,040	-	-
4.500	9.50	4.500	114.30	J55	1,010	1,380	-	-
	10.50				1,320	1,790		
	11.60				1,540	2,090	1,620	2,200
4.500	9.50	4.500	114.30	K55	1,120	1,520	-	-
	10.50				1,460	1,980		
	11.60				1,700	2,310	1,800	2,430
4.500	9.50	4.500	114.30	M65	1,180	1,600	-	-
	10.50				1,540	2,090		
	11.60				-	-	1,880	2,550
	13.50						2,280	3,090
4.500	11.60	4.500	114.30	L80	-	-	2,230	3,030
	13.50						2,710	3,670
4.500	11.60	4.500	114.30	N80	-	-	2,280	3,090
	13.50						2,760	3,740
4.500	11.60	4.500	114.30	C90	-	-	2,450	3,320
	13.50						2,970	4,030
4.500	11.60	4.500	114.30	C95	-	-	2,580	3,500
	13.50						3,130	4,240
4.500	11.60	4.500	114.30	T95	-	-	2,580	3,500
	13.50						3,130	4,240
4.500	11.60	4.500	114.30	P110	-	-	3,020	4,100
	13.50						3,660	4,960
	15.10						4,400	5,960
4.500	15.10	4.500	114.30	Q125	-	-	4,910	6,650
5.000	11.50	5.000	127.00	J55	1,330	1,810	-	-
	13.00				1,690	2,290	1,820	2,470
	15.00				2,070	2,800	2,230	3,020
5.000	11.50	5.000	127.00	K55	1,470	1,990	-	-
	13.00				1,860	2,520	2,010	2,730
	15.00				2,280	3,090	2,460	3,340
5.000	11.50	5.000	127.00	M65	1,550	2,100	-	-
	13.00				1,960	2,660	2,120	2,870
	15.00				-	-	2,590	3,520
	18.00						3,310	4,480
	21.40						4,090	5,550
5.000	15.00	5.000	127.00	L80	-	-	3,080	4,170
	18.00						3,930	5,320
	21.40						4,860	6,590
	23.20						5,350	7,260
	24.10						5,610	7,610
5.000	15.00	5.000	127.00	N80	-	-	3,140	4,250
	18.00						4,000	5,420
	21.40						4,950	6,710
	23.20						5,450	7,400
	24.10						5,720	7,760
5.000	15.00	5.000	127.00	C90	-	-	3,380	4,590
	18.00						4,310	5,850
	21.40						5,340	7,240
	23.20						5,880	7,980
	24.10						6,170	8,370
5.000	15.00	5.000	127.00	C95	-	-	3,560	4,830
	18.00						4,550	6,160
	21.40						5,620	7,630
	23.20						6,200	8,400
	24.10						6,500	8,810

Data provided by API from table 1, API 5C1, eighteenth edition; May, 1999

Notes: 1. It is recommended that the makeup target be based on position, not torque

2. Under normal circumstances, and for sizes 13-3/8 and smaller, variations in the listed torque values of ±25 percent should be considered acceptable

Casing Make-up Torque Guidelines 8 Round Thread Casing (Continued)

Designation		OD		Grade	Torque			
		D	Dm		ST&C		LT&C	
Size	Weight	in.	*mm*		ft-lb	*Nm*	ft-lb	*Nm*
5.000	15.00	5.000	*127.00*	T95	-	-	3,560	*4,830*
	18.00						4,450	*6,160*
	21.40						5,620	*7,630*
	23.20						6,200	*8,400*
	24.10						6,500	*8,810*
5.000	15.00	5.000	*127.00*	P110	-	-	4,170	*5,650*
	18.00						5,310	*7,210*
	21.40						6,580	*8,920*
	23.20						7,250	*9,830*
	24.10						7,600	*10,310*
5.000	18.00	5.000	*127.00*	Q125	-	-	5,930	*8,050*
	21.40						7,340	*9,960*
	23.20						8,090	*10,970*
	24.10						8,490	*11,510*
5.500	14.00	5.500	*139.70*	H40	1,300	*1,760*	-	-
5.500	14.00	5.500	*139.70*	J55	1,720	*2,330*	-	-
	15.50				2,020	*2,730*	2,170	*2,940*
	17.00				2,290	*3,110*	2,470	*3,340*
5.500	14.00	5.500	*139.70*	K55	1,890	*2,560*	-	-
	15.50				2,220	*3,000*	2,390	*3,240*
	17.00				2,520	*3,410*	2,720	*3,680*
5.500	14.00	5.500	*139.70*	M65	2,000	*2,710*	-	-
	15.50				2,350	*3,180*	2,530	*3,430*
	17.00				-	-	2,870	*3,890*
	20.00						3,530	*4,790*
	23.00						4,150	*5,620*
5.500	17.00	5.500	*139.70*	L80	-	-	3,410	*4,630*
	20.00						4,200	*5,700*
	23.00						4,930	*6,690*
5.500	17.00	5.500	*139.70*	N80	-	-	3,480	*4,710*
	20.00						4,280	*5,800*
	23.00						5,020	*6,810*
5.500	17.00	5.500	*139.70*	C90	-	-	3,750	*5,090*
	20.00						4,620	*6,270*
	23.00						5,430	*7,360*
5.500	17.00	5.500	*139.70*	C95	-	-	3,960	*5,360*
	20.00						4,870	*6,600*
	23.00						5,720	*7,750*
5.500	17.00	5.500	*139.70*	T95	-	-	3,960	*5,360*
	20.00						4,870	*6,600*
	23.00						5,720	*7,750*
5.500	17.00	5.500	*139.70*	P110	-	-	4,620	*6,270*
	20.00						5,690	*7,720*
	23.00						6,680	*9,060*
5.500	23.00	5.500	*139.70*	Q125	-	-	7,470	*10,120*
6.625	20.00	6.625	*168.28*	H40	1,840	*2,490*	-	-
6.625	20.00	6.625	*168.28*	J55	2,450	*3,320*	2,660	*3,600*
	24.00				3,140	*4,250*	3,400	*4,620*
6.625	20.00	6.625	*168.28*	K55	2,670	*3,620*	2,900	*3,940*
	24.00				3,420	*4,640*	3,720	*5,050*
6.625	20.00	6.625	*168.28*	M65	2,850	*3,870*	3,090	*4,190*
	24.00						3,960	*5,380*
	28.00						4,830	*6,550*
6.625	24.00	6.625	*168.28*	L80	-	-	4,730	*6,410*
	28.00						5,760	*7,810*
	32.00						6,660	*9,030*
6.625	24.00	6.625	*168.28*	N80	-	-	4,810	*6,520*
	28.00						5,860	*7,940*
	32.00						6,780	*9,190*
6.625	24.00	6.625	*168.28*	C90	-	-	5,210	*7,060*
	28.00						6,350	*8,610*
	32.00						7,340	*9,950*

Refer to page 5-32 for footnote reference

Casing Make-up Torque Guidelines 8 Round Thread Casing (Continued)

Designation		OD		Grade	Torque			
		D	Dm		ST&C		LT&C	
Size	Weight	in.	mm		ft-lb	Nm	ft-lb	Nm
6.625	24.00	6.625	168.28	C95	-	-	5,490	7,440
	28.00						6,690	9,070
	32.00						7,740	10,490
6.625	24.00	6.625	168.28	T95	-	-	5,490	7,440
	28.00						6,690	9,070
	32.00						7,740	10,490
6.625	24.00	6.625	168.28	P110	-	-	6,410	8,690
	28.00						7,810	10,590
	32.00						9,040	12,250
6.625	32.00	6.625	168.28	Q125	-	-	10,110	13,710
7.000	17.00	7.000	177.80	H40	1,220	1,650	-	-
	20.00				1,760	2,380		
7.000	20.00	7.000	177.80	J55	2,340	3,170	-	-
	23.00				2,840	3,850	3,130	4,240
	26.00				3,340	4,530	3,670	4,980
7.000	20.00	7.000	177.80	K55	2,540	3,450	-	-
	23.00				3,090	4,190	3,410	4,630
	26.00				3,640	4,930	4,010	5,440
7.000	20.00	7.000	177.80	M65	2,730	3,690	-	-
	23.00				-	-	3,640	4,940
	26.00						4,280	5,800
	29.00						4,920	6,680
	32.00						5,540	7,520
7.000	23.00	7.000	177.80	L80	-	-	4,350	5,890
	26.00						5,110	6,930
	29.00						5,870	7,960
	32.00						6,610	8,970
	35.00						7,340	9,950
	38.00						8,010	10,860
7.000	23.00	7.000	177.80	N80	-	-	4,420	5,990
	26.00						5,190	7,040
	29.00						5,970	8,100
	32.00						6,720	9,110
	35.00						7,460	10,120
	38.00						8,140	11,040
7.000	23.00	7.000	177.80	C90	-	-	4,790	6,500
	26.00						5,630	7,630
	29.00						6,480	8,780
	32.00						7,290	9,890
	35.00						8,090	10,970
	38.00						8,830	11,970
7.000	23.00	7.000	177.80	C95	-	-	5,050	6,850
	26.00						5,930	8,050
	29.00						6,830	9,250
	32.00						7,680	10,420
	35.00						8,530	11,560
	38.00						9,310	12,620
7.000	23.00	7.000	177.80	T95	-	-	5,050	6,850
	26.00						5,930	8,050
	29.00						6,830	9,250
	32.00						7,680	10,420
	35.00						8,530	11,560
	38.00						9,310	12,620
7.000	26.00	7.000	177.80	P110	-	-	6,930	9,390
	29.00						7,970	10,800
	32.00						8,970	12,160
	35.00						9,960	13,500
	38.00						10,870	14,730
7.000	35.00	7.000	177.80	Q125	-	-	11,150	15,110
	38.00						12,160	16,490
7.625	24.00	7.625	193.68	H40	2,120	2,870	-	-
7.625	26.40	7.625	193.68	J55	3,150	4,270	3,460	4,690

Refer to page 5-32 for footnote reference

Casing Make-up Torque Guidelines 8 Round Thread Casing (Continued)

Designation		OD		Grade	Torque			
		D	Dm		ST&C		LT&C	
Size	Weight	in.	*mm*		ft-lb	*Nm*	ft-lb	*Nm*
7.625	26.40	7.625	*193.68*	K55	3,420	*4,640*	3,770	*5,110*
7.625	26.40	7.625	*193.68*	M65	3,680	*4,980*	4,040	*5,470*
	29.70				-	-	4,740	*6,430*
	33.70						5,560	*7,540*
7.625	26.40	7.625	*193.68*	L80	-	-	4,820	*6,530*
	29.70						5,670	*7,680*
	33.70						6,640	*9,000*
	39.00						7,860	*10,650*
	42.80						8,910	*12,090*
	45.30						9,470	*12,840*
	47.10						9,970	*13,520*
7.625	26.40	7.625	*193.68*	N80	-	-	4,900	*6,640*
	29.70						5,750	*7,800*
	33.70						6,740	*9,140*
	39.00						7,980	*10,820*
	42.80						9,060	*12,280*
	45.30						9,620	*13,040*
	47.10						10,130	*13,730*
7.625	26.40	7.625	*193.68*	C90	-	-	5,320	*7,210*
	29.70						6,250	*8,470*
	33.70						7,330	*9,930*
	39.00						8,670	*11,750*
	42.80						9,840	*13,330*
	45.30						10,450	*14,160*
	47.10						11,000	*14,910*
7.625	26.40	7.625	*193.68*	C95	-	-	5,600	*7,600*
	29.70						6,590	*8,930*
	33.70						7,720	*10,470*
	39.00						9,140	*12,390*
	42.80						10,370	*14,050*
	45.30						11,010	*14,930*
	47.10						11,590	*15,720*
7.625	26.40	7.625	*193.68*	T95	-	-	5,600	*7,600*
	29.70						6,590	*8,930*
	33.70						7,720	*10,470*
	39.00						9,140	*12,390*
	42.80						10,370	*14,050*
	45.30						11,010	*14,930*
	47.10						11,590	*15,720*
7.625	29.70	7.625	*193.68*	P110	-	-	7,690	*10,420*
	33.70						9,010	*12,220*
	39.00						10,660	*14,460*
	42.80						12,100	*16,440*
	45.30						12,850	*17,420*
	47.10						13,530	*18,340*
7.625	39.00	7.625	*193.68*	Q125	-	-	11,940	*16,190*
	42.80						13,550	*18,370*
	45.30						14,390	*19,520*
	47.10						15,150	*20,540*
8.625	28.00	8.625	*219.08*	H40	2,330	*3,150*	-	-
	32.00				2,790	*3,780*		
8.625	24.00	8.625	*219.08*	J55	2,440	*3,310*	-	-
	32.00				3,720	*5,050*	4,170	*5,660*
	36.00				4,340	*5,880*	4,860	*6,590*
8.625	24.00	8.625	*219.08*	K55	2,630	*3,570*	-	-
	32.00				4,020	*5,460*	4,520	*6,130*
	36.00				4,680	*6,350*	5,260	*7,140*
8.625	24.00	8.625	*219.08*	M65	2,850	*3,860*	-	-
	28.00				3,620	*4,910*		
	32.00				4,350	*5,890*	4,870	*6,600*
	36.00				5,060	*6,860*	5,670	*7,690*
	40.00				-	-	6,490	*8,800*

Refer to page 5-32 for footnote reference

Casing Make-up Torque Guidelines 8 Round Thread Casing (Continued)

Designation		OD		Grade	Torque			
		D	Dm		ST&C		LT&C	
Size	Weight	in.	mm		ft-lb	Nm	ft-lb	Nm
8.625	36.00	8.625	219.08	L80	-	-	6,780	9,190
	40.00						7,760	10,530
	44.00						8,740	11,840
	49.00						9,830	13,320
8.625	36.00	8.625	219.08	N80	-	-	6,880	9,330
	40.00						7,880	10,680
	44.00						8,870	12,020
	49.00						9,970	13,520
8.625	36.00	8.625	219.08	C90	-	-	7,490	10,150
	40.00						8,580	11,630
	44.00						9,650	13,080
	49.00						10,850	14,710
8.625	36.00	8.625	219.08	C95	-	-	7,890	10,700
	40.00						9,040	12,260
	44.00						10,170	13,790
	49.00						11,440	15,510
8.625	36.00	8.625	219.08	T95	-	-	7,890	10,700
	40.00						9,040	12,260
	44.00						10,170	13,790
	49.00						11,440	15,510
8.625	40.00	8.625	219.08	P110	-	-	10,550	14,300
	44.00						11,860	16,090
	49.00						13,350	18,100
8.625	49.00	8.625	219.08	Q125	-	-	14,960	20,280
9.625	32.30	9.625	244.48	H40	2,540	3,440	-	-
	36.00				2,940	3,990		
9.625	36.00	9.625	244.48	J55	3,940	5,340	4,530	6,140
	40.00				4,520	6,120	5,200	7,050
9.625	36.00	9.625	244.48	K55	4,230	5,740	4,890	6,630
	40.00				4,860	6,590	5,610	7,610
9.625	36.00	9.625	244.48	M65	4,600	6,230	5,290	7,170
	40.00				5,280	7,150	6,070	8,230
	43.50				-	-	6,790	9,210
	47.00						7,450	10,100
9.625	40.00	9.625	244.48	L80	-	-	7,270	9,860
	43.50						8,130	11,030
	47.00						8,930	12,100
	53.50						10,470	14,190
	58.40						11,510	15,600
9.625	40.00	9.625	244.48	N80	-	-	7,370	10,000
	43.50						8,250	11,190
	47.00						9,050	12,270
	53.50						10,620	14,390
	58.40						11,670	15,820
9.625	40.00	9.625	244.48	C90	-	-	8,040	10,900
	43.50						8,990	12,190
	47.00						9,870	13,380
	53.50						11,570	15,690
	58.40						12,720	17,250
9.625	40.00	9.625	244.48	C95	-	-	8,470	11,490
	43.50						9,480	12,850
	47.00						10,400	14,100
	53.50						12,200	16,540
	58.40						13,410	18,180
9.625	40.00	9.625	244.48	T95	-	-	8,470	11,490
	43.50						9,480	12,850
	47.00						10,400	14,100
	53.50						12,200	16,540
	58.40						13,410	18,180

Refer to page 5-32 for footnote reference

Casing Make-up Torque Guidelines 8 Round Thread Casing (Continued)

Designation		OD		Grade	Torque			
		D	Dm		ST&C		LT&C	
Size	Weight	in.	mm		ft-lb	Nm	ft-lb	Nm
9.625	43.50	9.625	244.48	P110	-	-	11,050	14,980
	47.00						12,130	16,440
	53.50						14,220	19,280
	58.40						15,630	21,200
9.625	47.00	9.625	244.48	Q125	-	-	13,600	18,440
	53.50						15,950	21,630
	58.40						17,540	23,770
10.750	32.75	10.750	273.05	H40	2,050	2,790	-	-
	40.50				3,140	4,250		
10.750	40.50	10.750	273.05	J55	4,200	5,700	-	-
	45.50				4,930	6,680		
	51.00				5,650	7,660		
10.750	40.50	10.750	273.05	K55	4,500	6,100	-	-
	45.50				5,280	7,160		
	51.00				6,060	8,210		
10.750	40.50	10.750	273.05	M65	4,910	6,660	-	-
	45.50				5,760	7,810		
	51.00				6,610	8,960		
	55.50							
10.750	51.00	10.750	273.05	L80	7,940	10,760	-	-
	55.50				8,840	11,990		
10.750	51.00	10.750	273.05	N80	8,040	10,900	-	-
	55.50				8,950	12,140		
10.750	51.00	10.750	273.05	C90	8,790	11,920	-	-
	55.50				9,790	13,270		
	60.70				10,890	14,770		
	65.70				11,980	16,240		
10.750	51.00	10.750	273.05	C95	9,270	12,560	-	-
	55.50				10,320	13,990		
10.750	51.00	10.750	273.05	T95	9,270	12,560	-	-
	55.50				10,320	13,990		
	60.70				11,480	15,570		
	65.70				12,630	17,130		
10.750	51.00	10.750	273.05	P110	10,790	14,630	-	-
	55.50				12,020	16,300		
	60.70				13,370	18,130		
	65.70				14,710	19,950		
10.750	60.70	10.750	273.05	Q125	15,020	20,360	-	-
	65.70				16,520	22,400		
11.750	42.00	11.750	298.45	H40	3,070	4,170	-	-
11.750	47.00	11.750	298.45	J55	4,770	6,460	-	-
	54.00				5,680	7,700		
	60.00				6,490	8,800		
11.750	47.00	11.750	298.45	K55	5,090	6,900	-	-
	54.00				6,060	8,220		
	60.00				6,930	9,400		
11.750	47.00	11.750	298.45	M65	5,570	7,560	-	-
	54.00				6,640	9,000		
	60.00				7,590	10,290		
11.750	60.00	11.750	298.45	L80	9,130	12,370	-	-
11.750	60.00	11.750	298.45	N80	9,240	12,520	-	-
11.750	60.00	11.750	298.45	C90	10,110	13,710	-	-
11.750	60.00	11.750	298.45	T95	10,660	14,460	-	-
11.750	60.00	11.750	298.45	C95	10,660	14,460	-	-
11.750	60.00	11.750	298.45	P110	12,420	16,830	-	-
11.750	60.00	11.750	298.45	Q125	13,950	18,920	-	-
13.375	48.00	13.375	339.73	H40	3,220	4,370	-	-
13.375	54.50	13.375	339.73	J55	5,140	6,970	-	-
	61.00				5,950	8,070		
	68.00				6,750	9,160		

Refer to page 5-32 for footnote reference

Casing Make-up Torque Guidelines 8 Round Thread Casing (Continued)

Designation		OD		Grade	Torque			
		D	Dm		ST&C		LT&C	
Size	Weight	in.	mm		ft-lb	Nm	ft-lb	Nm
13.375	54.50	13.375	339.73	K55	5,470	7,410	-	-
	61.00				6,330	8,580		
	68.00				7,180	9,740		
13.375	54.50	13.375	339.73	M65	6,020	8,160	-	-
	61.00				6,970	9,440		
	68.00				7,910	10,720		
13.375	68.00	13.375	339.73	L80	9,520	12,910	-	-
	72.00				10,290	13,950		
13.375	68.00	13.375	339.73	N80	9,630	13,060	-	-
	72.00				10,400	14,110		
13.375	68.00	13.375	339.73	C90	10,570	14,330	-	-
	72.00				11,420	15,480		
13.375	68.00	13.375	339.73	C95	11,140	15,110	-	-
	72.00				12,040	16,320		
13.375	68.00	13.375	339.73	T95	11,140	15,110	-	-
	72.00				12,040	16,320		
13.375	68.00	13.375	339.73	P110	12,970	17,580	-	-
	72.00				14,010	18,990		
13.375	72.00	13.375	339.73	Q125	15,760	21,360	-	-
16.000	65.00	16.000	406.40	H40	4,390	5,950	-	-
16.000	75.00	16.000	406.40	J55	7,100	9,630	-	-
	84.00				8,170	11,080		
16.000	75.00	16.000	406.40	K55	7,520	10,190	-	-
	84.00				8,650	11,730		
16.000	75.00	16.000	406.40	M65	8,320	11,280	-	-
	84.00				9,570	12,980		
18.625	87.50	18.625	473.08	H40	5,590	7,580	-	-
18.625	87.50	18.625	473.08	J55	7,540	10,220	-	-
18.625	87.50	18.625	473.08	K55	7,940	10,770	-	-
18.625	87.50	18.625	473.08	M65	8,840	11,980	-	-
20.000	94.00	20.000	508.00	H40	5,810	7,870	6,730	9,120
20.000	94.00	20.000	508.00	J55	7,830	10,620	9,070	12,290
	106.50				9,130	12,370	10,560	14,320
	133.00				11,920	16,160	13,790	18,700
20.000	94.00	20.000	508.00	K55	8,230	11,160	9,550	12,950
	106.50				9,590	13,000	11,130	15,090
	133.00				12,520	16,980	14,530	19,700
20.000	94.00	20.000	508.00	M65	9,180	12,450	10,630	14,410
	106.50				10,700	14,510	12,380	16,790

Refer to page 5-32 for footnote reference

Composite Casing Dimensional Data - Non API and Discontinued API Casing

OD	Nominal Linear Mass T&C	Wall Thickness	ID	Drift Diameter
in.	lb/ft	in.	in.	in.
4.500	9.50	0.205	4.090	3.965
	10.50	0.224	4.052	3.927
	11.60	0.250	4.000	3.875
	13.50	0.290	3.920	3.795
	15.10	0.337	3.826	3.701
5.000	11.50	0.220	4.560	4.435
	13.00	0.253	4.494	4.369
	15.00	0.296	4.408	4.283
	18.00	0.362	4.276	4.151
	21.40	0.437	4.126	4.001
	23.20	0.478	4.044	3.919
	24.10	0.500	4.000	3.875
5.500	14.00	0.244	5.012	4.887
	15.50	0.275	4.950	4.825
	17.00	0.304	4.892	4.767
	20.00	0.361	4.778	4.653
	23.00	0.415	4.670	4.545
	26.80	0.500	4.500	4.375
	29.70	0.562	4.376	4.251
	32.60	0.625	4.250	4.125
	35.30	0.687	4.126	4.001
	38.00	0.750	4.000	3.875
	40.50	0.812	3.876	3.751
	43.10	0.875	3.750	3.625
6.625	20.00	0.288	6.049	5.924
	24.00	0.352	5.921	5.796
	28.00	0.417	5.791	5.666
	32.00	0.475	5.675	5.550
7.000	17.00	0.231	6.538	6.413
	20.00	0.272	6.456	6.331
	23.00	0.317	6.366	6.250*
	23.00	0.317	6.366	6.241
	26.00	0.362	6.276	6.151
	29.00	0.408	6.184	6.059
	32.00	0.453	6.094	6.000*
	32.00	.453	6.094	5.969
	35.00	0.498	6.004	5.879
	38.00	0.540	5.920	5.795
	42.70	0.625	5.750	5.625
	46.40	0.687	5.625	5.500
	50.10	0.750	5.500	5.375
	53.60	0.812	5.376	5.251
	57.10	0.875	5.250	5.125
7.625	24.00	0.300	7.025	6.900
	26.20	0.328	6.969	6.844
	29.70	0.375	6.875	6.750
	33.70	0.430	6.765	6.640
	39.00	0.500	6.625	6.500
	42.80	0.562	6.501	6.376
	45.30	0.595	6.435	6.310
	47.10	0.625	6.375	6.250
	51.20	0.687	6.251	6.126
	55.30	.750	6.125	6.000

OD	Nominal Linear Mass T&C	Wall Thickness	ID	Drift Diameter
in.	lb/ft	in.	in.	in.
7.750	46.10	0.595	6.560	6.500*
	46.10	0.595	6.560	6.435
8.625	24.00	0.264	8.097	7.972
	28.00	0.304	8.017	7.892
	32.00	0.352	7.921	7.875*
	32.00	0.352	7.921	7.796
	36.00	0.400	7.825	7.700
	40.00	0.450	7.725	7.625*
	40.00	0.450	7.725	7.600
	44.00	0.500	7.625	7.500
	49.00	0.557	7.511	7.286
9.625	32.30	0.312	9.001	8.845
	36.00	0.352	8.921	8.765
	40.00	0.395	8.835	8.750*
	40.00	0.395	8.835	8.679
	43.50	0.435	8.755	8.599
	47.00	0.472	8.681	8.525
	53.50	0.545	8.535	8.500*
	53.50	0.545	8.535	8.379
	58.40	0.595	8.435	8.375*
	58.40	0.595	8.435	8.279
	59.40	0.609	8.407	8.251
	64.90	0.672	8.281	8.125
	70.30	0.734	8.157	8.001
	75.60	0.797	8.031	7.875
10.750	32.75	0.279	10.192	10.036
	40.50	0.350	10.050	9.894
	45.50	0.400	9.950	9.875*
	45.50	0.400	9.950	9.794
	51.00	0.450	9.850	9.694
	55.50	0.495	9.760	9.625*
	55.50	0.495	9.760	9.604
	60.70	0.545	9.660	9.504
	65.70	0.595	9.560	9.404
	73.20	0.672	9.406	9.250
	79.20	0.734	9.282	9.126
	85.30	0.797	9.156	9.000
11.750	42.00	0.333	11.084	11.000*
				10.928
	47.00	0.375	11.000	10.844
	54.00	0.435	10.880	10.724
	60.00	0.489	10.772	10.625*
				10.616
	65.00	0.534	10.682	10.625*
				10.526
	71.00	0.582	10.586	10.430
13.375	48.00	0.330	12.715	12.559
	54.50	0.380	12.615	12.459
	61.00	0.430	12.515	12.359
	68.00	0.480	12.415	12.259
	72.00	0.514	12.347	12.250*
				12.191

* Drift diameter for most common bit size

Data provided by API, table E. 24 columns 3, 4, 5, 6 and 7, API 5CT, eighth edition; July, 2005

Composite Casing Dimensional Data - Non API and Discontinued API Casing (Continued)

OD	Nominal Linear Mass T&C	Wall Thickness	ID	Drift Diameter
in.	lb/ft	in.	in.	in.
16.000	65.00	0.375	15.250	15.062
	75.00	0.438	15.124	14.936
	84.00	0.495	15.010	14.822
	109.00	0.656	14.688	14.500

OD	Nominal Linear Mass T&C	Wall Thickness	ID	Drift Diameter
in.	lb/ft	in.	in.	in.
18.625	87.50	0.435	17.755	17.567
20.000	94.00	0.438	19.124	18.936
	106.50	0.500	19.000	18.812
	133.00	0.635	18.730	18.542

Refer to page 5-39 for footnote reference

Torque Values for Extreme-Line Casing

OD		Torque							
		J55, K55		C75, L80, N80, C90		C95, P110		Q125	
in.	*mm*	ft-lb	*Nm*	ft-lb	*Nm*	ft-lb	*Nm*	ft-lb	*Nm*
5	*127.0*	2,700	*3,660*	3,200	*4,340*	3,700	*5,020*	4,200	*5,690*
5-1/2	*139.7*	2,700	*3,660*	3,200	*4,340*	3,700	*5,020*	4,200	*5,690*
6-5/8	*168.3*	3,200	*4,340*	3,700	*5,020*	4,200	*5,690*	4,700	*6,370*
7	*177.8*	3,200	*4,340*	3,700	*5,020*	4,200	*5,690*	4,700	*6,370*
7-5/8	*193.7*	3,700	*5,020*	4,200	*5,690*	4,700	*6,370*	5,200	*7,050*
8-5/8	*219.1*	4,200	*5,690*	4,700	*6,370*	5,200	*7,050*	5,700	*7,730*
9-5/8	*244.5*	4,700	*6,780*	5,200	*7,050*	6,200	*8,410*	6,700	*9,080*

Data provided by API from table 2, API 5C1, eighteenth edition; May, 1999

Grant Prideco: Tubing Sizes - Advanced NJO

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4.500	114.3	13.50	0.290	7.4	4.662	3.833	97.4	100	138	200	225	238	275	313	1500	1700	1600	1900	1700	2000	1900	2200	2100	2500
		15.10	0.337	8.6	4.720	3.790	96.3	126	173	251	283	298	346	393	1700	1900	1800	2000	1900	2100	2100	2400	2300	2600
		16.60	0.375	9.5	4.675	3.685	93.6	142	195	283	319	336	389	442	2600		2800	3200		3400	3300	3800		4200
		18.80	0.430	10.9	4.673	3.555	90.3	161	221	322	362	382	442	502	2700	3000	2900	3300	3000	3500	3400	3900	3700	4300
		19.30	0.441	11.2	4.681			166	228	332	373	394	456	518										

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - Advanced NJO

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4.500	114.3	13.50	0.290	7.4	4.662	3.833	97.4	100	138	200	225	238	275	313	1500	1700	1600	1900	1700	2000	1900	2200	2100	2500
		15.10	0.337	8.6	4.720	3.790	96.3	126	173	251	283	298	346	393	1700	1900	1800	2000	1900	2100	2100	2400	2300	2600
		16.60	0.375	9.5	4.675	3.685	93.6	142	195	283	319	336	389	442	2600		2800	3200		3400	3300	3800		4200
		18.80	0.430	10.9	4.673	3.555	90.3	161	221	322	362	382	442	502	2700	3000	2900	3300	3000	3500	3400	3900	3700	4300
		19.30	0.441	11.2	4.681			166	228	332	373	394	456	518										
5.000	127.0	18.00	0.362	9.2	5.178	4.191	106.5	150	206	300	337	356	412	468	2600	3000	2900	3300	3000	3500	3400	4000	3800	4400
		20.30	0.408	10.4	5.194	4.099	104.1	174	240	348	392	414	479	544	2800	3200	3100	3500	3200	3700	3600	4100	4000	4600
		20.80	0.422	10.7	5.206	4.071	103.4	182	250	363	409	431	499	567	2900	3300	3200	3600	3300	4200	3700	4400	4100	4700
		21.40	0.437	11.1	5.218	4.041	102.6	189	260	379	426	450	521	592	3000	3400		3700	3400	3800		4300		
		23.20	0.478	12.1	5.206	3.954	100.4	207	284	413	465	490	568	645	4400	5100	4900	5600	5100	5800	5700	6600	6400	7400
		24.10	0.500	12.7	5.223	3.915	99.4	218	299	435	490	517	599	680	4500	5200	5000	5700	5200	5900	5800	6700	6500	7500
		26.70	0.562	14.3	5.252	3.806	96.7	241	331	482	542	572	662	753	5200	5900	5700	6500	5900	6800	6700	7700	7400	8500
5.500	139.7	20.00	0.361	9.2	5.672	4.693	119.2	162	223	325	365	386	447	507	3000	3500	3300	3800	3500	4000	3900	4500	4400	5000
		23.00	0.415	10.5	5.698	4.585	116.5	194	267	389	438	462	535	608	3300	3700	3600	4100	3700	4300	4200	4800	4600	5300
		26.00	0.476	12.1	5.726	4.543	115.4	228	313	455	512	541	626	711	3800	4300	4100	4700	4300	4900	4800	5500	5300	6100
		26.70	0.500	12.7	5.745	4.420	112.3	241	332	483	543	573	664	754	4100	4600	4400	5000	4600	5200	5100	5800	5600	6400
		28.40	0.530	13.5	5.748	4.355	110.6	257	354	514	579	611	707	804	5600	6400	6200	7100	6400	7400	7200	8300	8000	9300
		29.70	0.562	14.3	5.777	4.302	109.3	275	378	550	619	653	756	859	5800	6600	6300	7200	6600	7600	7400	8500	8200	9400
		32.00	0.612	15.5	5.794	4.196	106.6	299	410	597	672	709	821	933	7000	8000	7600	8800	8000	9200	9000	10400	10000	11600
		32.60	0.625	15.9	5.804	4.170	105.9	305	420	611	687	726	840	955	7100	8100	7700	8900	8100	9300	9100	10500	10100	11700
6.625	168.3	28.00	0.417	10.6	6.815	5.706	144.9	227	313	455	512	540	625	711	5600	6500	6200	7200	6500	7500	7400	8600	8200	9600
		32.00	0.475	12.1	6.849	5.590	142.0	270	372	541	608	642	743	845	6900	8000	7600	8800	8000	9200	9000	10400	10000	11700
		35.00	0.525	13.3	6.890	5.490	139.4	306	420	611	688	726	840	955	7300	8400	8000	9200	8400	9600	9400	10800	10400	12100
7.000	177.8	29.00	0.408	10.4	7.177	6.099	154.9	235	324	471	530	559	648	736	5200	6000	5700	6600	6000	6900	6800	7900	7600	8800
		32.00	0.453	11.5	7.197	6.051	153.7	270	372	540	608	642	743	844	5400	6200	5900	6800	6200	7100	7000	8100	7800	9000
		35.00	0.498	12.6	7.235	5.919	150.3	304	419	609	685	723	837	951	5800	6600	6400	7300	6600	7600	7400	8500	8200	9500
		38.00	0.540	13.7	7.243	5.920	150.4	331	455	661	744	785	909	1033	7000	8000	7600	8700	8000	9100	8900	10300	9900	11400
		41.00	0.590	15.0	7.279	5.735	145.7	363	499	726	817	863	999	1135	10100	11600	11100	12800	11600	13400	13100	15100	14600	16900
		42.70	0.625	15.9	7.307	5.665	143.9	389	534	777	874	923	1069	1214	10400	11900	11400	13100	11900	13700	13400	15500	14900	17200
		42.80	0.626	15.9	7.308	5.663	143.8	389	535	779	876	925	1071	1217	10500									
		44.00	0.640	16.3	7.319	5.635	143.1	399	549	799	899	949	1099	1248	10600	12100	11600	13200	12100	13800	13600	15600	15000	17400
		46.00	0.670	17.0	7.344	5.575	141.6	421	579	842	947	1000	1158	1315	10900	12400	11900	13500	12400	14100	13800	15900	15300	17600
		57.10	0.875	22.2	7.452	5.250	133.4	548	753	1095	1232	1301	1506	1711	15700	17800	16900	19200	17400	19900	19200	21900	20800	23900
7.625	193.7	33.70	0.430	10.9	7.805	6.68	169.7	275	378	550	619	653	756	859	7400	8500	8100	9400	8500	9800	9600	11200	10700	12500
		39.00	0.500	12.7	7.831	6.54	166.1	313	431	627	705	744	862	979	10500	12200	11600	13500	12200	14200	13800	16200	15500	18100
		42.80	0.562	14.3	7.879	6.416	163.0	365	501	729	820	866	1003	1139	11000	12700	12200	14100	12700	14700	14400	16700	16000	18600
		45.30	0.595	15.1	7.906	6.35	161.3	391	538	783	881	929	1076	1223	11300	13000	12500	14400	13000	15000	14700	17000	16300	18900
		47.10	0.625	15.9	7.931	6.29	159.8	416	571	831	935	987	1143	1298	11600	13300	12700	14600	13300	15300	15000	17300	16500	19100
		51.20	0.687	17.4	8.036	6.251	158.8	478	657	956	1076	1135	1315	1494	12300	13900	13400	15300	13900	15900	15600	17900	17000	19600
		52.80	0.712	18.1	8.017	6.201	157.5	505	695	1011	1137	1200	1390	1579	12100	13800	13200	15200	13800	15900	15500	17900	17000	19700
		55.30	0.750	19.1	8.019	6.125	155.6	515	709	1031	1160	1224	1417	1610	14100	16200	15500	17900	16100	18600	17800	20700	19500	22700
		59.00	0.800	20.3	8.009	6.025	153.0	552	759	1104	1242	1311	1518	1725	19700	21600	23900	26100	23900	26100	23900	26100	25600	28000
		59.20	0.812	20.6	8.018	6.001	152.4	561	771	1122	1262	1332	1543	1753										
7.750	196.9	46.10	0.595	15.1	8.050	6.550	166.4	416	572	832	936	988	1145	1301	11500	13200	12600	14600	13200	15300	14900	17300	16500	19100
		48.60	0.640	16.3	8.091	6.395	162.4	453	623	906	1019	1076	1246	1416	12300	14000	13400	15300	14000	16000	15700	18000	17100	19800
		54.20	0.712	18.1	8.108	6.326	160.7	495	681	991	1115	1177	1363	1548	14700	16900	16100	18500	16700	19200	18400	21300	20100	23300
8.625	219.1	36.00	0.400	10.2	8.844	7.745	196.7	280	384	559	629	664	769	874	6000	6900	6600	7600	6900	7900	7700	8900	8600	9900
		40.00	0.450	11.4	8.839	7.675	194.9	323	444	646	727	767	888	1010	7900	9000	8600	9900	9000	10400	10200	11800	11300	13200
		44.00	0.500	12.7	8.852	7.550	191.8	368	506	737	829	875	1013	1151	12200	14100	13500	15700	14100	16400	15900	18600	17500	20500
		49.00	0.557	14.1	8.901	7.436	188.9	423	581	845	951	1004	1162	1321	12900	14800	14200	16300	14800	17100	16500	19100	18100	21000
		68.10	0.812	20.6	9.041	6.926	175.9	642	882	1283	1444	1524	1764	2005	19500	22700	21200	24700	22000	25700	24400	28500	26700	31200
9.625	244.5	43.50	0.435	11.0	9.844	8.686	220.6	334	459	668	752	794	919	1044	8400	9700	9300	10600	9700	11100	10900	12500	12100	14000
		47.00	0.472	12.0		8.680	220.5	375	515	749	843	890	1030	1171	8500			10700		11200		12600		
		53.50	0.545	13.8	9.848	8.532	216.7	440	605	880	990	1045	1210	1375	11300	12900	12400	14200	12900	14900	14600	16800	16100	18600
		58.40	0.595	15.1	9.892	8.432	214.2	493	678	987	1110	1172	1357	1542	12100	13700	13200	15000	13700	15700	15400	17600	16800	19300
		70.30	0.734	18.6	10.011	8.157	207.2	640	880	1280	1439	1519	1759	1999	18200	20600	19500	22200	20200	23000	22100	25300	23900	27500
		71.60	0.750	19.1	10.079	8.125	206.4	656	902	1312	1476	1558	1804	2050	18500	20900	19800	22500	20500	23300	22400	25600	24200	27700
9.875	250.8	62.80	0.625	15.9	10.162	8.605	218.6	542	745	1083	1219	1287	1490	1693	15600	17000	16800	19200	17400	19900	19200	22100	20900	24100
		65.10	0.650	16.5	10.214	9.563	242.9	569	782	1137	1280	1351	1564	1777	15900	18100	17100	19600	17700	20300	19500	22400	21200	24400
10.750	273.1	51.00	0.450	11.4	10.995	9.765	248.0	389	535	778	875	924	1070	1216	10800	12300	11800	13600	12300	14200	13900	16000	15400	17900
		55.50	0.495	12.6	10.975	9.688	246.1	438	602	876	986	1040	1205	1369	12100	13800	13200	15200	13800	15900	15500	17900	17000	19700
		60.70	0.545	13.8	10.978	9.575	243.2	499	686	998	1123	1185	1372	1560	13000	14800	14200	16100	14800	16800	16400	18700	17800	20500

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - Advanced NJO (Continued)

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
10.750	273.1	65.70	0.595	15.1	11.037	9.560	242.8	559	769	1119	1259	1329	1538	1748	13200	14900	14300	16300	14900	17000	16500	18900	18000	20600
		73.20	0.672	17.1	11.047	9.406	238.9	634	872	1268	1427	1506	1744	1982	14100	15800	15200	17100	15800	17800	17200	19500	18600	21200
		85.30	0.797	20.2	11.116	9.156	232.6	768	1056	1536	1728	1824	2112	2400	20200	23000	21700	24800	22400	25600	24500	28100	26500	30500
		91.20	0.859	21.8	11.217	9.032	229.4	839	1153	1678	1887	1992	2307	2622	21300	24100	22800	25800	23500	26700	25600	29200	27500	31500
		97.10	0.922	23.4	11.318	8.906	226.2	906	1246	1812	2038	2152	2491	2831	22500	25300	24000	27000	24600	27800	26600	30200	28600	32500
		102.90	0.984	25.0	11.253	8.681	220.5	999	1373	1997	2247	2372	2746	3121	35800	41800	38400	44900	39600	46400	43100	50600	46200	54300
		109.00	1.047	26.6	11.302	8.656	219.9	1021	1404	2042	2297	2425	2808	3191	35800	41800	38400	44900	39600	46400	43100	50600	46200	54300
10.875	276.2	72.60	0.656	16.7	11.194	9.563	242.9	622	856	1244	1400	1478	1711	1944	16200	18400	17500	19900	18100	20600	19800	22700	21500	24700
11.750	298.5	54.00	0.435	11.0	11.987	10.795	274.2	401	552	803	903	953	1104	1254	11300	12900	12400	14200	12900	14800	14500	16700	16000	18500
		60.00	0.489	12.4	12.002	10.691	271.6	470	647	940	1058	1117	1293	1469	13700	15700	15000	17300	15700	18000	17300	20000	18900	21900
		65.00	0.534	13.6	12.002	10.682	271.3	531	730	1062	1194	1261	1460	1659	13800	15800	15100			18100	17400	20100	19000	22000
		71.00	0.582	14.8	12.032	10.506	266.9	595	818	1190	1339	1413	1636	1860	15500	17400	16600	18800	17200	19500	18800	21400	20300	23300
		75.00	0.618	15.7	12.022	10.429	264.9	625	860	1250	1407	1485	1719	1954	22700	26100	24500	28300	25300	29300	27800	32300	30200	35100
		79.00	0.656	16.7	12.055	10.353	263.0	675	928	1350	1519	1604	1857	2110	23400	26800	25100	28900	26000	29900	28500	32900	30800	35700
		83.00	0.691	17.6	12.086	10.283	261.2	721	991	1442	1622	1712	1983	2253	24000	27400	25800	29500	26600	30500	29000	33400	31300	36200
11.875	301.6	71.80	0.582	14.8	12.134	10.681	271.3	603	829	1206	1357	1432	1658	1884	18700	21500	20200	23300	20900	24100	23100	26700	25100	29100
12.063	306.4	78.10	0.640	16.3	12.351	10.698	271.7	668	918	1336	1502	1586	1836	2087	25200	29100	27200	31400	28100	32600	30800	35800	33300	38800
13.375	339.7	72.00	0.514	13.1	13.680	12.315	312.8	562	773	1125	1265	1336	1546	1757	15200	17400	16500	18900	17100	19600	18900	21800	20600	23800
		77.00	0.550	14.0		12.164	309.0	603	829	1206	1356	1432	1658	1884	20200	23100	21800	24900	22500	25800	24700	28400	26700	30900
		80.70	0.580	14.7	13.665	12.104	307.4	649	892	1298	1460	1541	1785	2028	20800	23700	22300	25500	23100	26400	25200	28900	27300	31400
		85.00	0.608	15.4		12.048	306.0	692	951	1384	1557	1643	1903	2162	21400	24200	22900	26000	23600	26900	25700	29400	27700	31900
		86.00	0.625	15.9		12.045	305.9	718	987	1436	1615	1705	1974	2243		24300		26100			25800	29500	27800	
		92.00	0.672	17.1	13.687	12.031	305.6	791	1088	1582	1780	1879	2176	2473	26400	30300	28300	32600	29200	33700	31900	37000	34400	40000
		98.00	0.719	18.3	13.728	11.826	300.4	862	1185	1724	1940	2047	2371	2694	28400	32200	30200	34500	31100	35600	33700	38700	36100	41600
13.625	346.1	88.20	0.625	15.9	13.915	12.355	313.8	729	1002	1458	1640	1731	2005	2278	23400	26800	25100	28800	26000	29900	28400	32800	30700	35500

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - NJO

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
5.500	139.7	17.00	0.304	7.7	5.702	4.802	122.0	132	182	264	297	314	363	413	1900	2100	2000	2300	2100	2400	2400	2700	2600	3000
7.000	177.8	26.00	0.362	9.2	7.231	6.191	157.3	206	283	411	463	488	566	643	5200	6000	5700	6600	6000	6900	6800	7900	7600	8800
7.625	193.7	29.70	0.375	9.5	7.835	6.79	172.5	234	322	468	526	555	643	731	5300	6000	5800	6700	6000	7000	6800	7900	7600	8800

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - BIG NJO

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)											
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
10.750	273.1	73.20	0.672	17.1	11.009	9.309	236.4	618	850	1236	1390	1467	1699	1931			21000	24000	23000	27000	24000	29000	28000	33000	32000	37000
		79.00	0.730	18.5	11.059	9.193	233.5	686	943	1372	1543	1629	1886	2144			23200	26800	25600	29700	26800	31100	30500	35500	34200	39900
		79.20	0.734	18.6	11.062	9.185	233.3	691	950	1381	1554	1640	1899	2158	-	-		26900	25700	29800	26900	31200		35600		
		97.10	0.922	23.4	11.055	8.809	223.7	879	1208	1757	1977	2087	2416	2746			20600	23700	22700	26100	23700	27300	26700	31000	29800	34600
		109.00	1.050	26.7	11.099	8.579	217.9	1024	1408	2048	2304	2432	2816	3200			32300	37000	35000	40000	35000	40000	35000	40000	35000	40000
14.000	355.6	89.28	0.625	15.9	14.228	12.629	320.8	722	993	1445	1625	1716	1987	2257	16700	18900	22100	25400					28700	33200		
		94.80	0.656	16.7	14.256	12.567	319.2	772	1061	1544	1737	1833	2123	2412	17500	19700	22900	26200	-	-	-	-	29500	34000	-	-
		99.30	0.688	17.5	14.313	12.503	317.6	823	1131	1646	1851	1954	2263	2571	18400	20600	23800	27100					30400	34900		
		111.00	0.779	19.8	14.338	12.321	313.0	971	1335	1942	2185	2306	2670	3034	30200	34600		47400								
		112.60	0.797	20.2	14.354	12.317	312.9	999	1374	1998	2248	2373	2747	3122	-	-	40000	47500	40000	50000	40000	50000				
		113.00	0.800	20.3	14.356	12.279	311.9	1004	1380	2007	2258	2384	2760	3137	30800	35200		48000					40000	50000	40000	50000
		117.00	0.825	21.0	14.396	12.317	312.9	1043	1434	2085	2346	2476	2867	3258	-	-	-	-	-	-	-	-				
		123.00	0.872	22.1	14.477	12.135	308.2	1115	1533	2230	2509	2649	3067	3485	33000	37400	40000	50000							-	-
14.063	357.2	103.50	0.720	18.3	14.353	12.567	319.2	880	1210	1760	1979	2089	2419	2749	-	-	26100	30000	28700	33100	30000	34700	34000	39400	38000	44000
16.000	406.4	109.00	0.656	16.7	16.254	14.572	370.1	878	1208	1757	1976	2086	2415	2745	26200	30000	35400	40900								
		118.00	0.715	18.2	16.326	14.454	367.1	987	1357	1973	2220	2343	2713	3083	28200	32000	37400	42900	-	-	-	-	40000	50000	-	-
		128.00	0.781	19.8	16.339	14.322	363.8	1110	1527	2221	2498	2637	3054	3470	36100	41400										
		131.71	0.812	20.6	16.391	14.260	362.2	1167	1604	2333	2625	2770	3208	3645	37300	42500	40000	50000								
		146.00	0.906	23.0	16.328	14.072	357.4	1351	1857	2702	3039	3208	3715	4221	39600	45800										
18.625	473.1	125.89	0.656	16.7	18.874	17.204	437.0	1008	1386	2016	2268	2394	2773	3151	27600	31300	36500	41900								
		136.00	0.693	17.6	18.939	17.130	435.1	1089	1497	2177	2449	2585	2993	3402	29100	32800	38100	43400	-	-	-	-	40000	50000	-	-
		137.32	0.718	18.2	18.917	17.080	433.8	1146	1575	2292	2578	2721	3151	3580	40000	48300	40000	50000								
		148.84	0.781	19.8	19.002	16.954	430.6	1281	1762	2563	2883	3043	3524	4004		50000										
20.000	508.0	133.00	0.635	16.1	20.221	18.623	473.0	1012	1392	2024	2278	2404	2784	3163	36600	42200										
		141.90	0.688	17.5	20.270	18.517	470.3	1137	1563	2273	2557	2699	3126	3552	39000	44500										
		147.00	0.709	18.0	20.263	18.476	469.3	1195	1643	2390	2689	2838	3286	3735	35300	40100										
		154.19	0.750	19.1	20.335	18.394	467.2	1291	1775	2581	2904	3065	3549	4033	37200	42100	40000	50000	-	-	-	-	40000	50000	-	-
		169.00	0.812	20.6	20.448	18.270	464.1	1434	1972	2869	3227	3406	3944	4482		45200										
		184.76	0.906	23.0	20.417	18.082	459.3	1662	2286	3325	3740	3948	4571	5195	40000	50000										
		169.00	0.812	20.6	21.000	18.376	466.8	1876	2580	3752	4221	4456	5159	5863												

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - DWC/C

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4.500	114.3	10.50	0.224	5.7	5.000	4.052	102.9	120	166	241	271	286	331	376	3800	4100	4400	4900	4800	5400	5200	5800	5600	6300
		11.60	0.250	6.4		4.000	101.6	134	184	267	300	317	367	417	4300	5200	5200	6400	5700	7100	6200	7900	6800	8600
		12.75	0.271	6.9		3.958	100.5	144	198	288	324	342	396	450	4800	5300	5800	6500	6400	7300	7000	8000	7600	8700
		13.50	0.290	7.4		3.920	99.6	153	211	307	345	364	422	479	5200	5700	6300	7100	7000	8000	7700	8800	8400	9700
		15.10	0.337	8.6		3.826	97.2	174	239	348	391	413	478	544	6100	6800	7600	8600	8500	9700	9400	10800	10300	11900

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - DWC/C

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4.500	114.3	10.50	0.224	5.7	5.000	4.052	102.9	120	166	241	271	286	331	376	3800	4100	4400	4900	4800	5400	5200	5800	5600	6300
		11.60	0.250	6.4		4.000	101.6	134	184	267	300	317	367	417	4300	5200	5200	6400	5700	7100	6200	7900	6800	8600
		12.75	0.271	6.9		3.958	100.5	144	198	288	324	342	396	450	4800	5300	5800	6500	6400	7300	7000	8000	7600	8700
		13.50	0.290	7.4		3.920	99.6	153	211	307	345	364	422	479	5200	5700	6300	7100	7000	8000	7700	8800	8400	9700
		15.10	0.337	8.6		3.826	97.2	174	239	348	391	413	478	544	6100	6800	7600	8600	8500	9700	9400	10800	10300	11900
5.000	127.0	15.00	0.296	7.5	5.563	4.408	112.0	175	241	350	394	416	481	547	6900	7600	8400	9400	9300	10500	10200	11600	11100	12600
		18.00	0.362	9.2		4.276	108.6	211	290	422	475	501	580	659	8600	9600	10700	12100	11900	13600	13100	15100	14400	16600
		20.30	0.408	10.4		4.184	106.3								9700	10800	12100	13800	13600	15600	15100	17400	16500	19100
		20.80	0.422	10.7		4.156	105.6								10000	11200	12600	14300	14100	16200	15600	18000	17200	19900
		21.40	0.437	11.1		4.126	104.8	218	300	436	490	517	599	681	10300	11600	13000	14800	14600	16800	16200	18800	17800	20700
		23.20	0.478	12.1		4.044	102.7								11200	12600	14200	16300	16000	18400	17800	20600	19600	22800
		24.10	0.500	12.7		4.000	101.6								11700	13100	14800	17000	16700	19300	18600	21600	20500	23900
5.500	139.7	15.50	0.275	7.0	6.050	4.95	125.7	181	248	361	406	429	497	564	7000	7700	8500	9600	9400	10700	10400	11800	11300	12900
		17.00	0.304	7.7		4.892	124.3	198	273	397	447	471	546	620	7900	8800	9800	11100	10900	12400	12000	13800	13100	15100
		20.00	0.361	9.2		4.778	121.4	233	321	466	525	554	641	729	9600	10800	12100	13800	13600	15600	15100	17400	16600	19300
		23.00	0.415	10.5		4.670	118.6								11100	12600	14200	16300	16000	18500	17800	20700	19700	23000
		26.00	0.476	12.1		4.548	115.5	235	323	470	529	558	646	734	12700	14400	16400	18900	18600	21600	20800	24200	23000	26900
		26.80	0.500	12.7		4.500	114.3								13300	15100	17200	19900	19500	22700	21900	25500	24200	28400
6.625	168.3	20.00	0.288	7.3	7.390	6.049	153.6	229	315	459	516	545	631	717	9700	10900	12100	13800	13600	15500	15000	17300	16500	19000
		24.00	0.352	8.9		5.921	150.4	277	382	555	624	659	763	867	12600	14300	16100	18500	18200	21000	20300	23600	22400	26100
		28.00	0.417	10.6		5.791	147.1	325	447	651	732	773	895	1017	15400	17500	19900	23000	22600	26300	25300	29600	28100	32900
		32.00	0.475	12.1		5.675	144.1	367	505	734	826	872	1010	1147	17700	20300	23100	26800	26400	30800	29600	34700	23900	38700
		35.00	0.525	13.3		5.575	141.6	384	529	769	865	913	1057	1201	19600	22500	25800	30000	29500	34500	33200	38900	36800	43400
7.000	177.8	23.00	0.317	8.1	7.656	6.366	161.7	266	366	532	599	632	732	832	11500	13000	14700	16800	16500	19100	18400	21400	20300	23600
		26.00	0.362	9.2		6.276	159.4	302	415	604	679	717	830	944	13700	15600	17700	20400	20100	23300	22500	26200	24800	29100
		29.00	0.408	10.4		6.184	157.1	338	465	676	760	803	929	1056	15900	18100	20700	24000	23500	27500	26400	31000	29300	34500
		32.00	0.453	11.5		6.094	154.8								17900	20500	23500	27300	26800	31400	30200	35500	33500	39500
		35.00	0.498	12.6		6.004	152.5	357	491	715	804	849	983	1117	19800	22800	26200	30500	30000	35200	33800	39800	37600	44400
		38.00	0.540	13.7		5.920	150.4								21500	24900	28600	33400	32800	38600	37100	43700	41300	48900
		41.00	0.590	15.0		5.820	147.8								23500	27200	31400	36800	36100	42500	40800	48200	40000	50000
7.625	193.7	26.40	0.328	8.3	8.500	6.969	177.0	301	414	602	677	714	827	940	14000	15900	17900	20500	20200	23400	22500	26200	24800	29000
		29.70	0.375	9.5		6.875	174.6	342	470	683	769	811	940	1068	16800	19100	21700	25100	24700	28700	27600	32300	30600	35800
		33.70	0.430	10.9		6.765	171.8	389	535	778	875	923	1069	1215	19900	22800	26000	30200	29700	34700	33400	39100	37000	43600
		39.00	0.500	12.7		6.625	168.3	448	616	895	1007	1063	1231	1399	23700	27300	31300	36400	35800	42000	40300	47500		
		42.80	0.562	14.3		6.501	165.1	499	686	998	1122	1185	1372	1559	26900	31000	35700	41700	40900	48100	40000	50000	40000	50000
		47.10	0.625	15.9		6.375	161.9	509	700	1018	1146	1209	1400	1591	29900	34600	39900	46800	40000	50000				
8.625	219.1	28.00	0.304	7.7	9.625	8.017	203.6	318	437	636	715	755	874	993	14900	16800	19000	21900	21500	24900	24000	28000	26500	31000
		32.00	0.352	8.9		7.921	201.2	366	503	732	823	869	1006	1144	18600	21200	24200	28000	27500	32100	30900	36100	34200	40200
		36.00	0.400	10.2		7.825	198.8	413	568	827	930	982	1137	1292	22100	25400	29100	33900	33300	39000	37500	44000	41700	49100
		40.00	0.450	11.4		7.725	196.2	462	636	925	1040	1098	1271	1445	25700	29700	34100	39800	39100	45900				
		44.00	0.500	12.7		7.625	193.7	511	702	1021	1149	1212	1404	1595	29200	33800	38900	45600	40000	50000	40000	50000	40000	50000
		49.00	0.557	14.1		7.511	190.8	565	776	1129	1271	1341	1553	1765	33000	38300	40000	50000	40000	50000				
9.625	244.5	36.00	0.352	8.9	10.625	8.921	226.6	410	564	820	923	974	1128	1282	21800	25100	28800	33600	33000	38800	37200	43900	41500	49000
		40.00	0.395	10.0		8.835	224.4	458	630	916	1031	1088	1260	1432	25700	29800	34300	40200	39500	46500				
		43.50	0.435	11.0		8.755	222.4	502	691	1005	1130	1193	1381	1570	29300	34000	39300	46200						
		47.00	0.472	12.0		8.681	220.5	543	746	1086	1222	1289	1493	1697	32500	37800			40000	50000	40000	50000	40000	50000
		53.50	0.545	13.8		8.535	216.8	622	855	1244	1399	1477	1710	1943	38600	4500	40000	50000						
		58.40	0.595	15.1		8.435	214.2	675	928	1350	1519	1604	1857	2110	40000	50000								
10.750	273.1	40.50	0.350	8.9	11.750	10.05	255.3	457	629	915	1029	1086	1258	1429	25600	29700	34300	40400	39600	46800				
		45.50	0.400	10.2		9.95	252.7	520	715	1040	1171	1236	1431	1626	31200	36500	42300	49900						
		51.00	0.450	11.4		9.85	250.2	582	801	1165	1311	1383	1602	1820	36700	43000								
		55.50	0.495	12.6		9.76	247.9	638	877	1276	1435	1515	1754	1993	41500	48800	40000	50000	40000	50000	40000	50000	40000	50000
		60.70	0.545	13.8		9.66	245.4	699	961	1398	1573	1660	1922	2184	40000	50000								
		65.70	0.595	15.1		9.56	242.8	759	1044	1519	1708	1803	2088	2373										
11.750	298.5	47.00	0.375	9.5	12.755	11.00	279.4	536	737	1072	1206	1273	1474	1675	32900	38500								
		54.00	0.435	11.0		10.88	276.4	619	850	1237	1392	1469	1701	1933	40800	48000	40000	50000	40000	50000	40000	50000	40000	50000
		60.00	0.489	12.4		10.772	273.6	692	951	1384	1557	1643	1903	2162	40000	50000								
		65.00	0.534	13.6		10.682	271.3	753	1035	1505	1693	1788	2070	2352										

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - DWC/C (Continued)

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
11.750	298.5	71.00	0.582	14.8	12.755	10.586	268.9	817	1123	1634	1838	1940	2246	2552	40000	50000	40000	50000	40000	50000	40000	50000	40000	50000
		74.60	0.618	15.7		10.514	267.1	865	1189	1729	1945	2053	2377	2702										
13.375	339.7	54.50	0.380	9.7	14.375	12.615	320.4	621	853	1241	1396	1474	1706	1939	41900	49500	40000	50000	40000	50000	40000	50000	40000	50000
		61.00	0.430	10.9		12.515	317.9	699	962	1399	1574	1661	1924	2186	40000	50000								
		68.00	0.480	12.2		12.415	315.3	778	1069	1556	1750	1847	2139	2431										
		72.00	0.514	13.1		12.347	313.6	831	1142	1661	1869	1973	2284	2596										
		77.00	0.550	14.0		12.275	311.8	886	1219	1773	1994	2105	2438	2770										
		80.70	0.580	14.7		12.215	310.3	933	1282	1865	2098	2215	2565	2914										
		91.00	0.660	16.8		12.055	306.2	994	1367	1989	2237	2361	2734	3107										

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - FL-4S

Note, this product has been discontinued.

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2.375	60.3	4.70	0.190	4.8	2.375	1.926	48.9	21	29	42	48	50	58	66	400	500	500	600	-	-	-	-	550	650	-	-
		5.95	0.254	6.5		1.823	46.3	35	48	70	79	83	96	110									600	700		
2.875	73.0	6.50	0.217	5.5	2.875	2.372	60.2	30	41	60	68	71	83	94	600	700	800	900	-	-	-	-	800	1000	-	-
		7.90	0.276	7.0		2.279	57.9	47	65	94	106	112	129	147												
3.500	88.9	7.70	0.216	5.5	3.500	2.968	75.4	37	51	74	83	88	102	116	1000	1200	1100	1300	-	-	-	-	1150	1350	-	-
		9.30	0.254	6.5		2.917	74.1	54	74	107	121	128	148	168			1400	1600					1600	1800		
		10.30	0.289	7.3		2.847	72.3	58	80	117	131	139	160	182												
		12.95	0.375	9.5		2.675	67.9	92	127	185	208	220	254	289	1200	1400	1500	1700					1700	1900		
		15.80	0.476	12.1		2.488	63.2	112	154	224	252	266	308	350	1500	1700	1900	2200	1900	2200	1900	2200	2000	2300	2000	2300
4.000	101.6	9.50	0.226	5.7	4.000	3.448	87.6	44	61	89	100	106	122	139	1100	1400	1300	1500	-	-	-	-	1400	1600	-	-
		11.00	0.262	6.7		3.401	86.4	65	89	129	145	153	178	202	1200	1500	1400	1600						1750		
		11.60	0.286	7.3		3.353	85.2	70	96	140	157	166	192	218	1300	1600	1600	1900					2200	2600		
4.500	114.3	9.50	0.205	5.2	4.500	3.99	101.3	45	62	91	102	108	125	142	1800	2300	1800	2300	-	-	-	-	1800	2400	-	-
		10.50	0.224	5.7		3.952	100.4	50	69	100	113	119	138	157												
		11.00	0.237	6.0		3.926	99.7	53	73	106	119	126	146	166			2200	2800					2300	3000		
		11.60	0.250	6.4		3.925	99.7	69	95	138	156	164	190	216	2100	2600		2900						3100		
		12.75	0.271	6.9		3.883	98.6	75	103	150	169	179	207	235				3000					2400	3300		
		13.50	0.290	7.4		3.845	97.7	80	111	161	181	191	221	252	-	-	2300	3100					2800	3400		

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - FL-4S

Note, this product has been discontinued.

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)					
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		110 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max
4.500	114.3	9.50	0.205	5.2	4.500	3.990	101.3	45	62	91	102	108	125	142	1800	2300	1800	2300	1800	2400
		10.50	0.224	5.7		3.952	100.4	50	69	100	113	119	138	157						
		11.00	0.237	6.0		3.926	99.7	53	73	106	119	126	146	166			2200	2800	2300	3000
		11.60	0.250	6.4		3.925	99.7	69	95	138	156	164	190	216	2100	2600		2900		3100
		12.75	0.271	6.9		3.883	98.6	75	103	150	169	179	207	235				3000	2400	3300
		13.50	0.290	7.4		3.845	97.7	80	111	161	181	191	221	252	-	-	2300	3100	2800	3400
5.000	127.0	13.00	0.253	6.4	5.000	4.419	112.2	78	108	157	176	186	215	245	1200	1800	1200	1800	1200	1800
		15.00	0.296	7.5		4.333	110.1	92	126	184	207	218	253	287	3000	3600	3000	3900	3600	4300
		18.00	0.362	9.2		4.201	106.7	132	182	265	298	314	364	414			3100	3700		
5.500	139.7	14.00	0.244	6.2	5.500	4.912	124.8	67	92	134	151	159	184	209	1900	2400	1900	2500	1900	2500
		15.50	0.275	7.0		4.875	123.8	94	130	188	212	224	259	294	2300	2700	2800	3400	3100	3600
		17.00	0.304	7.7		4.817	122.4	104	143	209	235	248	287	326	2400	2900	3000	3600	4000	4600
		20.00	0.361	9.2		4.703	119.5	147	202	294	330	349	404	459			3400	4100	4400	5200
		23.00	0.415	10.5		4.595	116.7	168	231	335	377	398	461	524	-	-	4400	5200	4600	5600
		26.00	0.476	12.1		4.473	113.6	190	262	381	428	452	523	595			4500	5400	5300	6400
		28.40	0.530	13.5		4.365	110.9	210	289	421	473	500	579	658			4700	5700	5800	6900
		32.30	0.612	15.5		4.201	106.7	239	329	479	539	569	658	748			5500	6400	6600	7600

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - HD-L

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2.375	60.3	5.30	0.218	5.5	2.375	1.868	47.4	28	39	57	64	67	78	89	300	400	300	400	400	500	400	500	400	500	500	600
		5.95	0.254	6.5		1.806	45.9	35	49	71	80	84	97	111			400	500						600	600	700
		6.20	0.261	6.6		1.792	45.5	37	50	73	82	87	100	114					500	600	500	600	600	700		
		7.70	0.336	8.5		1.647	41.8	46	63	91	103	108	125	142	500	600	700	800	700	800	700	800	800	900	900	1000
2.875	73.0	6.50	0.217	5.5	2.875	2.371	60.2	35	49	71	80	84	97	111	300	400	500	600	500	600	500	600	600	700	700	800
		7.90	0.276	7.0		2.258	57.4	48	66	96	107	113	131	149	500	600	700	800	700	800	700	800	800	900	900	1000
		8.70	0.308	7.8		2.194	55.7	54	74	108	121	128	148	169												
		9.50	0.340	8.6		2.140	54.4	59	81	117	132	139	161	183	600	700			800	900	800	900	900	1000	1000	1100
		10.70	0.392	10.0		2.036	51.7	69	95	138	155	164	190	216	700	800	900	1000	1000	1100	1000	1100	1100	1200	1200	1300
3.500	88.9	9.30	0.254	6.5	3.500	2.908	73.9	56	77	111	125	132	153	174	600	700	700	800	700	800	700	800	800	900	900	1000
		10.30	0.289	7.3		2.838	72.1	69	94	137	155	163	189	215					800	900	800	900	900	1000		
		12.95	0.375	9.5		2.666	67.7	79	108	158	177	187	217	246	1100	1200	1300	1500	1400	1600	1500	1600	1700	1900	1800	2100
		15.80	0.476	12.1		2.464	62.6	112	153	223	251	265	307	349									1600	1800		2000
4.000	101.6	11.00	0.262	6.7	4.000	3.393	86.2	68	93	136	153	161	186	212	800	900	1000	1100	1100	1300	1100	1300	1300	1500	1400	1600
		11.60	0.286	7.3		3.345	85.0	74	102	149	167	177	205	233	1000	1100	1200	1400	1400	1500	1400	1500	1600	1800	1700	2000
		13.40	0.330	8.4		3.257	82.7	82	113	164	184	194	225	256				1300	1300	1400	1300	1400	1500	1600	1600	1800
4.500	114.3	11.60	0.250	6.4	4.500	3.918	99.5	71	98	142	160	168	195	222	1300	1500	1700	1800	1700	1800	1700	1800	1900	2100	1900	2100
		12.75	0.271	6.9		3.876	98.5	76	105	152	171	181	209	238	1500	1600	1800	1900	1900	2000	1900	2000	2100	2300	2200	2500
		13.50	0.290	7.4		3.838	97.5	81	111	162	182	192	223	253	1700	1900	2100	2300	2200	2400	2300	2400	2500	2800	2700	3000
		15.10	0.337	8.6		3.744	95.1	93	127	185	208	220	255	289	2000	2200	2500	2800	2700	3000	2800	3000	3000	3400	3300	3700
		16.90	0.380	9.7		3.658	92.9	106	145	211	238	251	291	330												
		19.20	0.430	10.9		3.558	90.4	128	176	256	287	303	351	399												
		19.12	0.441	11.2		3.558	90.4	133	183	266	299	315	365	415												
		21.60	0.500	12.7		3.418	86.8	159	219	318	358	378	438	497												

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - HD-L

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4.500	114.3	11.60	0.250	6.4	4.500	3.918	99.5	71	98	142	160	168	195	222	1300	1500	1700	1800	1700	1800	1700	1800	1900	2100	1900	2100
		12.75	0.271	6.9		3.876	98.5	76	105	152	171	181	209	238	1500	1600	1800	1900	1900	2000	1900	2000	2100	2300	2200	2500
		13.50	0.290	7.4		3.838	97.5	81	111	162	182	192	223	253	1700	1900	2100	2300	2200	2400	2300	2400	2500	2800	2700	3000
		15.10	0.337	8.6		3.744	95.1	93	127	185	208	220	255	289	2000	2200	2500	2800	2700	3000	2800	3000	3000	3400	3300	3700
		16.90	0.380	9.7		3.658	92.9	106	145	211	238	251	291	330												
		19.20	0.430	10.9		3.558	90.4	128	176	256	287	303	351	399												
		19.12	0.441	11.2				133	183	266	299	315	365	415												
		21.60	0.500	12.7		3.418	86.8	159	219	318	358	378	438	497												
5.000	127.0	15.00	0.296	7.5	5.000	4.327	109.9	81	111	161	181	191	221	252	2400	2700	3000	3400	3200	3600	3400	3600	3700	4200	4100	4600
		18.00	0.362	9.2		4.195	106.6	109	150	219	246	260	301	342												
		20.30	0.408	10.4		4.103	104.2	133	182	265	299	315	365	415												
		20.80	0.422	10.7		4.075	103.5	140	193	280	315	333	385	438												
		21.40	0.437	11.1		4.045	102.7	148	203	296	333	351	406	462												
		22.40	0.462	11.7		3.995	101.5	159	219	319	359	379	439	498												
		23.20	0.478	12.1		3.963	100.7	168	231	335	377	398	461	524												
		24.10	0.500	12.7		3.919	99.5	179	246	358	402	425	492	559												
5.500	139.7	15.50	0.275	7.0	5.500	4.871	123.7	98	134	196	220	232	269	306	1600	1800	2100	2400	2300	2700	2400	2700	2700	3200	3100	3500
		17.00	0.304	7.7		4.813	122.3	93	128	186	209	221	256	291	2700	3000	3500	3900	3700	4200	3900	4200	4300	4900	4700	5400
		20.00	0.361	9.2		4.699	119.4	120	165	240	270	285	329	374												
		23.00	0.415	10.5		4.591	116.6	150	207	301	339	357	414	470												
		26.00	0.476	12.1		4.546	115.5	184	254	369	415	438	507	576												
		26.80	0.500	12.7		4.446	112.9	198	272	396	446	471	545	619												
		28.40	0.530	13.5		4.361	110.8	215	296	430	484	511	591	672												
		29.70	0.562	14.3		4.297	109.1	231	318	463	521	549	636	723												
		32.60	0.625	15.9		4.171	105.9	265	365	531	597	631	730	830												
		35.20	0.684	17.4		4.126	104.8	297	408	593	667	704	816	927	-	-										
		35.30	0.687					298	410	596	671	708	820	932												
6.625	168.3	24.00	0.352	8.9	6.625	5.845	148.5	146	201	292	329	347	402	457	4100	4500	5100	5800	5600	6300	5800	6300	6500	7400	7100	8100
		28.00	0.417	10.6		5.715	145.2	183	251	366	411	434	503	571												
		32.00	0.475	12.1		5.599	142.2	225	309	449	505	534	618	702												
		35.00	0.525	13.3		5.499	139.7	258	355	517	581	614	710	807												
7.000	177.8	23.00	0.317	8.1	7.000	6.299	160.0	126	173	252	284	299	347	394	4300	4800	5500	6300	6000	6800	6300	6800	7000	8000	7700	8900
		26.00	0.362	9.2		6.200	157.5	152	209	303	341	360	417	474												
		29.00	0.408	10.4		6.108	155.1	188	258	375	422	446	516	587												
		32.00	0.453	11.5		6.049	153.6	221	303	441	497	524	607	690												
		35.00	0.498	12.6		5.928	150.6	253	348	506	570	601	696	791												
		38.00	0.540	13.7		5.920	150.4	285	391	569	640	676	783	890												
		42.70	0.625	15.9		5.674	144.1	345	475	690	777	820	949	1079												
		46.00	0.670	17.0		5.584	141.8	377	519	755	849	897	1038	1180												

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - HD-L (Continued)

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)											
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
7.625	193.7	26.40	0.328	8.3	7.625	6.895	175.1	146	200	291	327	346	400	455	5200	5900	6700	7600	7300	8300	7600	8300	8500	9800	9400	10800
		29.70	0.375	9.5		6.801	172.7	175	241	351	395	416	482	548												
		33.70	0.430	10.9		6.691	170.0	222	306	445	501	528	612	695												
		39.00	0.500	12.7		6.551	166.4	278	382	555	625	659	763	867												
		42.80	0.562	14.3		6.427	163.2	329	452	657	740	781	904	1027												
		45.30	0.595	15.1		6.361	161.6	356	489	711	800	844	978	1111												
		47.10	0.625	15.9		6.301	160.0	378	519	756	850	897	1039	1181												
		52.80	0.712	18.1		6.127	155.6	447	614	893	1005	1060	1228	1395												
		55.30	0.750	19.1		6.125	155.6	469	645	938	1055	1114	1289	1465												
		59.00	0.800	20.3		5.951	151.2	460	632	920	1035	1092	1265	1437	9100	10400	12200	14100	13500	15600	14100	15600	15900	18520	17800	20700
		59.20	0.812	20.6				469	645	938	1055	1114	1289	1465	-	-										
7.750	196.9	46.10	0.595	15.1	7.750	6.551	166.4	362	497	723	814	859	994	1130	5300	5900	6800	7700	7400	8500	7700	8500	8700	9900	9600	11000
		48.60	0.640	16.3		6.396	162.5	396	545	793	892	942	1090	1239												
8.625	219.1	32.00	0.352	8.9	8.625	7.850	199.4	186	255	371	418	441	511	580	6700	7500	8700	9900	9500	10800	9900	10800	11000	12700	12200	14100
		36.00	0.400	10.2		7.754	197.0	221	303	441	496	524	607	689												
		40.00	0.450	11.4		7.679	195.0	269	371	539	606	640	741	842												
		44.00	0.500	12.7		7.554	191.9	316	434	631	710	749	868	986												
		49.00	0.557	14.1		7.440	189.0	368	505	735	827	873	1011	1149												
		63.50	0.750	19.1		7.066	179.5	543	747	1086	1222	1289	1493	1697	-	-										
8.750	222.3	45.00	0.500	12.7	8.750	7.695	195.5	320	440	640	720	760	880	1000	7100	7900	9100	10300	9900	11300	10300	11700	11500	13200	12700	14600
9.625	244.5	40.00	0.395	10.0	9.625	8.735	221.9	238	327	476	535	565	654	743	8100	9200	10600	12200	11700	13400	12200	13400	13700	15700	15200	17500
		43.50	0.435	11.0		8.681	220.5	282	388	564	635	670	776	882												
		47.00	0.472	12.0		8.581	218.0	320	440	640	720	760	881	1001												
						8.681	220.5																			
		53.50	0.545	13.8		8.535	216.8	397	545	793	893	942	1091	1240												
		58.40	0.595	15.1		8.335	211.7	450	619	900	1013	1069	1238	1406												
		64.90	0.672	17.1		8.181	207.8	529	727	1057	1189	1255	1453	1652												
		70.30	0.734	18.6		8.057	204.6	593	815	1185	1333	1407	1630	1852												
9.750	247.7	59.20	0.595	15.1	9.750	8.556	217.3	456	627	912	1026	1083	1254	1424	8500	9500	11000	12600	12100	13800	12600	13800	14100	16300	15700	18100
9.875	250.8	54.00	0.530	13.5	9.875	8.807	223.7	393	540	785	883	932	1080	1227	9000	10100	11700	13300	12700	14500	13300	14500	14800	17000	16400	18900
		62.80	0.625	15.9		8.557	217.3	494	680	988	1112	1174	1359	1544												
		65.10	0.650	16.5				505	695	1011	1137	1200	1390	1579												
10.750	273.1	45.50	0.400	10.2	10.750	9.934	252.3	284	390	567	638	674	780	886	10400	11700	13600	15600	14900	17100	15600	17100	17500	20200	19400	22500
		51.00	0.450	11.4		9.753	247.7	330	454	660	743	784	908	1031												
		55.50	0.495	12.6		9.684	246.0	383	526	766	861	909	1053	1196												
		60.70	0.545	13.8		9.563	242.9	444	610	888	999	1054	1220	1387												
		65.70	0.595	15.1		9.559	242.8	501	690	1003	1128	1191	1379	1567												
10.875	276.2	72.60	0.656	16.7	10.875	9.563	242.9	576	792	1152	1296	1368	1584	1800	-	-	13400	15200	14600	16700	15200	17500	17100	19700	19000	22000
11.750	298.5	54.00	0.435	11.0	11.750	10.785	273.9	337	463	673	757	799	925	1052	12600	14200	16500	18900	18100	20800	18900	20800	21300	24600	23700	27500
		60.00	0.489	12.4		10.686	271.4	410	564	820	922	974	1127	1281												
		65.00	0.534	13.6		10.682	271.3	465	639	929	1045	1103	1277	1452												
		71.00	0.582	14.8		10.491	266.5	531	730	1061	1194	1260	1459	1658												
		73.60	0.609	15.5		10.437	265.1	565	776	1129	1270	1341	1553	1765												
		75.00	0.618	15.7		10.419	264.6	577	793	1153	1297	1369	1586	1802												
11.875	301.6	71.80	0.582	14.8	11.875	10.687	271.4	535	736	1070	1204	1271	1472	1672	13000	14700	17100	19600	18700	21500	19600	21500	22000	25400	24500	28300
12.000	304.8	86.50	0.707	18.0	12.000	10.562	268.3	708	973	1415	1592	1681	1946	2211	-	-	17400	19900	19100	21900	19900	21900	22400	25900	24900	28800
13.375	339.7	68.00	0.480	12.2	13.375	12.324	313.0	446	613	891	1003	1058	1225	1392	16800	19000	22200	25500	24400	28000	25500	28000	28700	33200	32000	37000
		72.00	0.514	13.1		12.345	313.6	497	683	994	1118	1181	1367	1553												
		77.00	0.550	14.0		12.184	309.5	537	738	1073	1208	1275	1476	1677												
		80.70	0.580	14.7		12.124	307.9	584	803	1168	1314	1387	1606	1825												
		85.00	0.608	15.4	13.375	12.068	306.5	628	863	1256	1413	1491	1727	1962	16800	19000	22200	25500	24400	28000	25500	28000	28700	33200	32000	37000
		86.00	0.625	15.9		12.034	305.7	651	896	1303	1465	1547	1791	2035												
13.625	346.1	88.20	0.625	15.9	13.625	12.316	312.8	661	909	1322	1487	1570	1817	2065	17900	20200	23500	26900	25800	29600	26900	29600	30300	34900	33700	38900
14.000	355.6	105.00	0.734	18.6	14.000	12.445	316.1	806	1108	1611	1813	1913	2216	2518	17700	20400	24300	28300	24300	28300	28300	33000	32300	37800	36300	42500
16.000	406.4	84.00	0.495	12.6	16.000	14.908	378.7	513	705	1026	1154	1218	1410	1602	23200	26800	32000	37200	-	-	37200	43500	42500	49700	47800	56000
		95.00	0.566	14.4		14.836	376.8	621	854	1242	1398	1475	1708	1941	22500	26200	31300	36500			36500	42800	41800	49000	47000	55200
		97.00	0.575	14.6																						
		109.00	0.656	16.7		14.686	373.0	717	986	1434	1614	1703	1972	2241	22900	26500	31600	36900			36900	43100	42100	49300	47400	55600
17.875	454.0	93.50	0.500	12.7	17.875	16.808	426.9	574	789	1147	1290	1362	1577	1792	28700	33200	39600	46200	-	-	46200	54000	50000	60000	50000	60000
18.000	457.2	94.00	0.500	12.7	18.000	16.903	429.3	577	793	1154	1298	1370	1586	1803	29100	33700	40200	46900	-	-	46900	54800				
		105.00	0.562	14.3		16.807	426.9	694	954	1387	1561	1647	1908	2168	28800	33300	39900	46500	39900	46500	46500	54400	50000	60000	50000	60000
		128.00	0.688	17.5		16.527	419.8	959	1319	1918	2158	2278	2638	2997	29200	33800	40300	46900	-	-	46900	54800				
18.625	473.1	87.50	0.435	11.0	18.625	17.66	448.6	479	659	958	1078	1138	1318	1497	30600	35500	42500	49700	-	-	49700	58200	50000	60000	50000	60000
20.000	508.0	133.00	0.635	16.1	20.000	18.638	473.4	921	1267	1843	2073	2188	2534	2879	35800	41500	49500	57700	49500	57700						
		145.00	0.699	17.8		18.602	472.5	1011	1390	2022	2275	2401	2781	3160	34500	40100	48200	56400	48200	56400	50000	60000	50000	60000	50000	60000
		169.00	0.812	20.6		18.284	464.4	1342	1845	2684	3019	3187	3690	4193	35700	41300	49300	57500	-	-						

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - HD-L/L

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)											
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		95 ksi		110 ksi		125 ksi			
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max		
17.938	455.6	93.80	0.500	12.7	17.938	16.808	426.9	574	789	1147	1290	1362	1577	1792	28700	33200	39600	46200	46200	54000	50000	60000	50000	60000		

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - RTS-6

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)										Interchangeable With
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi		
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
2.375	60.3	5.95	0.254	6.5	2.906	1.805	45.8	68	93	135	152	161	186	212	2200	2750	-	-	-	-	2700	3370	2700	3370	ST-P
		6.20	0.261	6.6	2.938	1.795	45.6	69	95	139	156	165	191	217									-	-	-
		7.70	0.336	8.5	3.125	1.645	41.8	86	118	172	194	204	237	269											
2.875	73.0	7.90	0.276	7.0	3.438	2.265	57.5	90	124	180	203	214	248	282	3000	3750	3000	3750	3000	3750	3500	4370	3500	4370	ST-P
		8.70	0.308	7.8	3.500	2.200	55.9	99	137	199	224	236	273	310									3500	4370	
		9.50	0.340	8.6	3.625	2.130	54.1	108	149	217	244	257	298	338	4500	5620	-	-	-	-	5500	6870	-	-	-
		10.70	0.392	10.0	3.688	2.030	51.6	122	168	245	275	290	336	382											
3.500	88.9	12.95	0.375	9.5	4.313	2.687	68.2	147	202	295	331	350	405	460	5500	6870	5500	6870	5500	6870	7000	8750	7000	8750	ST-P
		14.30	0.430	10.9	4.410	2.550	64.8	166	228	332	373	394	456	518			-	-	-	-			-	-	-
		15.80	0.476	12.1	4.500	2.485	63.1	181	249	362	407	430	497	565					5500	6870					ST-P
4.000	101.6	13.40	0.330	8.4	4.625	3.275	83.2	152	209	304	342	361	419	476	5500	6870	-	-	-	-	7000	8750	-	-	-
4.500	114.3	15.50	0.337	8.6	5.125	3.765	95.6	176	242	353	397	419	485	551	6000	7500	-	-	-	-	7500	9370	7500	9370	ST-P
		17.00	0.380	9.7	5.210	3.650	92.7	197	271	393	443	467	541	615									-	-	-
		19.20	0.430	10.9	5.313	3.560	90.4	220	302	440	495	522	605	687	7500	9370					9500	11870	9500	11870	

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - RTS-8

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)										Interchangeable With
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		95 ksi		110 ksi		125 ksi		
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	
1.315	33.4	1.80	0.133	3.4	1.552	0.970	24.6	20	27	40	44	47	54	62	300	375	400	500	-	-	400	500	-	-	-
		2.25	0.179	4.5	1.600	0.900	22.9	26	35	51	57	61	70	80									400	500	
1.660	42.2	2.40	0.140	3.6	1.883	1.312	33.3	27	37	53	60	64	74	84	400	500	600	750	-	-	600	750	-	-	ST-C
		3.02	0.191	4.9	1.927	1.218	30.9	35	48	71	79	84	97	110									600	750	
		3.24	0.198	5.0	1.927	1.200	30.5	36	50	73	82	86	100	114									-	-	
1.900	48.3	2.90	0.145	3.7	2.113	1.530	38.9	32	44	64	72	76	88	100	600	750	800	1000	-	-	800	1000	-	-	-
		3.64	0.200	5.1	2.162	1.440	36.6	43	59	85	96	101	117	134									800	1000	ST-C
		4.19	0.219	5.6	2.179	1.390	35.3	46	64	93	104	110	127	145									-	-	-
2.063	52.4	3.25	0.156	4.0	2.330	1.700	43.2	37	51	75	84	89	103	117	700	875	900	1120	-	-	900	1120	-	-	-
		4.50	0.225	5.7	2.460	1.550	39.4	52	71	104	117	123	143	162											
2.375	60.3	4.70	0.190	4.8	2.700	1.945	49.4	52	72	104	117	124	143	163	1100	1375	1500	1870	-	-	1500	1870	-	-	ST-C
		5.30	0.218	5.5	2.750	1.890	48.0	59	81	118	133	140	162	185											-
2.875	73.0	6.50	0.217	5.5	3.210	2.371	60.2	72	100	145	163	172	199	227	1500	1870	2100	2620			2100	2620	2100	2620	ST-C
3.500	88.9	9.30	0.254	6.5	3.915	2.920	74.2	104	142	207	233	246	285	324	2500	3125	3000	3750	3000	3750	3000	3750	-	-	ST-C
		10.30	0.289	7.3	3.915	2.870	72.9	117	160	233	262	277	321	364											
4.000	101.6	11.00	0.262	6.7	4.417	3.395	86.2	123	169	246	277	292	338	385	3000	3750	3500	4370	-	-	3500	4370	-	-	-
4.500	114.3	12.75	0.271	6.9	4.920	3.870	98.3	144	198	288	324	342	396	450	3500	4370	4500	5620	-	-	4500	5620	-	-	ST-C
		13.50	0.290	7.4	4.955	3.840	97.5	153	211	307	345	364	422	479											

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - ST-L

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)													
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi			
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2.375	60.3	4.70	0.190	4.8	2.375	1.920	48.8	23	32	46	52	55	63	72	400	600	500	700	500	700	500	700	500	700	500	700	500	700
		5.95	0.254	6.5		1.789	45.4	36	50	72	81	86	99	113	600	800	800	1000	800	1000	800	1000	800	1000	800	1000	800	1000
2.875	73.0	6.50	0.217	5.5	2.875	2.377	60.4	36	49	71	80	85	98	112	600	800	800	1000	800	1000	800	1000	800	1000	800	1000	800	1000
		7.90	0.276	7.0		2.247	57.1	50	68	99	112	118	137	155	800	1000	1000	1400	1000	1400	1000	1400	1000	1400	1000	1400	1000	1400
		8.70	0.308	7.8		2.196	55.8	56	77	113	127	134	155	176	1000	1200	1100	1500	1100	1500	1100	1500	1100	1500	1100	1500	1100	1500
		11.65	0.440	11.2		1.942	49.3	85	117	171	192	203	235	267	1400	1800	1800	2300	1800	2300	1800	2300	1800	2300	1800	2300	1800	2300
3.500	88.9	7.70	0.216	5.5	3.500	2.968	75.4	46	63	92	103	109	126	143	800	900	1000	1100	1000	1100	1000	1100	1000	1100	1000	1100	1400	1600
		9.30	0.254	6.5		2.972	75.5	52	71	104	117	123	142	162	1050	1350	1400	1800	1400	1800	1400	1800	1400	1800	1400	1800	1400	1800
		10.30	0.289	7.3		2.845	72.3	66	90	131	148	156	181	205														
		12.95	0.375	9.5		2.652	67.4	95	131	190	214	226	262	298	1600	2000	2000	2600	2000	2600	2000	2600	2000	2600	2000	2600	2000	2600
		15.80	0.476	12.1		2.489	63.2	121	166	241	271	286	332	377	2000	2600	2500	3300	2500	3300	2500	3300	2500	3300	2500	3300	2500	3300
4.000	101.6	9.50	0.226	5.7	4.000	3.468	88.1	50	69	101	113	120	138	157	1000	1200	1200	1600	1200	1600	1200	1600	1200	1600	1200	1600	1200	1600
		11.00	0.262	6.7		3.387	86.0	68	93	136	153	161	187	212	1150	1450	1400	1800	1400	1800	1400	1800	1400	1800	1400	1800	1400	1800
		11.60	0.286	7.3		3.347	85.0	75	104	151	170	179	207	236	1200	1600	1600	2000	1600	2000	1600	2000	1600	2000	1600	2000	1600	2000
		13.40	0.330	8.4		3.274	83.2	89	122	178	200	211	245	278	1450	1900	1800	2400	1800	2400	1800	2400	1800	2400	1800	2400	1800	2400
		13.60	0.345	8.8		3.225	81.9	93	128	187	210	222	257	292	1500	2000	1900	2500	1900	2500	1900	2500	1900	2500	1900	2500	1900	2500
		14.80	0.380	9.7		3.155	80.1	106	146	212	239	252	292	332	1700	2200	2200	2800	2200	2800	2200	2800	2200	2800	2200	2800	2200	2800

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - ST-L (Continued)

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)											
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4.500	114.3	9.50	0.205	5.2	4.500	4.010	101.9	54	74	108	121	128	148	168	900	1100	1100	1500	1100	1500	1100	1500	1100	1500	1100	1500
		10.50	0.224	5.7		3.952	100.4	58	80	117	131	139	161	183	950	1250	1200	1600	1200	1600	1200	1600	1200	1600	1200	1600
		11.00	0.237	6.0		3.944	100.2	68	93	136	153	161	187	212	1150	1450	1400	1800	1400	1800	1400	1800	1400	1800	1400	1800
		11.60	0.250	6.4		3.930	99.8	70	97	141	159	167	194	220			1500	1900	1500	1900	1500	1900	1500	1900	1500	1900
		12.75	0.271	6.9		3.874	98.4	80	111	161	181	191	221	251	1300	1700	1700	2100	1700	2100	1700	2100	1700	2100	1700	2100
		13.50	0.290	7.4		3.854	97.9	87	120	174	196	207	240	273	1400	1800	1800	2400	1800	2400	1800	2400	1800	2400	1800	2400
		15.10	0.337	8.6		3.776	95.9	104	143	208	234	247	286	325	1700	2100	2200	2800	2200	2800	2200	2800	2200	2800	2200	2800
		16.60	0.375	9.5		3.662	93.0	126	173	252	284	300	347	394	2100	2700	2600	3400	2600	3400	2600	3400	2600	3400	2600	3400
		18.80	0.430	10.9		3.565	90.6	132	182	264	298	314	364	413	2200	2800	2700	3500	2700	3500	2700	3500	2700	3500	2700	3500

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - ST-L

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)											
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4.500	114.3	9.50	0.205	5.2	4.500	4.010	101.9	54	74	108	121	128	148	168	900	1100	1100	1500	1100	1500	1100	1500	1100	1500	1100	1500
		10.50	0.224	5.7		3.952	100.4	58	80	117	131	139	161	183	950	1250	1200	1600	1200	1600	1200	1600	1200	1600	1200	1600
		11.00	0.237	6.0		3.944	100.2	68	93	136	153	161	187	212	1150	1450	1400	1800	1400	1800	1400	1800	1400	1800	1400	1800
		11.60	0.250	6.4		3.930	99.8	70	97	141	159	167	194	220	1150	1450	1500	1900	1500	1900	1500	1900	1500	1900	1500	1900
		12.75	0.271	6.9		3.874	98.4	80	111	161	181	191	221	251	1300	1700	1700	2100	1700	2100	1700	2100	1700	2100	1700	2100
		13.50	0.290	7.4		3.854	97.9	87	120	174	196	207	240	273	1400	1800	1800	2400	1800	2400	1800	2400	1800	2400	1800	2400
		15.10	0.337	8.6		3.776	95.9	104	143	208	234	247	286	325	1700	2100	2200	2800	2200	2800	2200	2800	2200	2800	2200	2800
		16.60	0.375	9.5		3.662	93.0	126	173	252	284	300	347	394	2100	2700	2600	3400	2600	3400	2600	3400	2600	3400	2600	3400
		18.80	0.430	10.9		3.565	90.6	132	182	264	298	314	364	413	2200	2800	2700	3500	2700	3500	2700	3500	2700	3500	2700	3500
5.000	127.0	13.00	0.253	6.4	5.000	4.421	112.3	82	113	164	185	195	226	257	1400	1600	1800	2200	1800	2200	1800	2200	1800	2200	1800	2200
		15.00	0.296	7.5		4.335	110.1	100	137	200	224	237	274	312	1700	2100	2100	2700	2100	2700	2100	2700	2100	2700	2100	2700
		18.00	0.362	9.2		4.206	106.8	124	171	248	279	295	341	388	2100	2700	2700	3500	2700	3500	2700	3500	2700	3500	2700	3500
		20.30	0.408	10.4		4.104	104.2	156	214	311	350	370	428	486	2500	3300	3200	4200	3200	4200	3200	4200	3200	4200	3200	4200
		20.80	0.422	10.7		4.081	103.7	149	205	298	336	354	410	466												
		21.40	0.437	11.1		4.055	103.0	167	230	335	377	397	460	523			3500	4500	3500	4500	3500	4500	3500	4500	3500	4500
		23.20	0.478	12.1		3.975	101.0	184	252	367	413	436	505	573	3000	3800	3800	4900	3800	4900	3800	4900	3800	4900	3800	4900
		24.10	0.500	12.7		4.000	101.6	163	224	326	366	387	448	509	2700	3500	3400	4400	3400	4400	3400	4400	3400	4400	3400	4400
5.250	133.4	20.00	0.375	9.5	5.250	4.500	114.3	124	171	249	280	295	342	388	2000	2600	2600	3300	2600	3300	2600	3300	2600	3300	2600	3300
5.500	139.7	14.00	0.244	6.2	5.500	4.941	125.5	86	118	172	194	205	237	269	1400	1800	1800	2200	1800	2200	1800	2200	1800	2200	1800	2200
		15.50	0.275	7.0		4.890	124.2	89	122	178	200	211	245	278	1500	1900	2200	2800	2200	2800	2200	2800	2200	2800	2200	2800
		17.00	0.304	7.7		4.822	122.5	111	153	223	251	265	306	348	1750	2250	2400	3200	2400	3200	2400	3200	2400	3200	2400	3200
		20.00	0.361	9.2		4.778	121.4	138	189	275	309	327	378	430	1900	2500	2900	3700	2900	3700	2900	3700	2900	3700	2900	3700
		23.00	0.415	10.5		4.600	116.8	169	233	339	381	403	466	530	2200	3000	3700	4700	3700	4700	3700	4700	3700	4700	3700	4700
		26.00	0.476	12.1		4.492	114.1	201	277	403	453	479	554	630	3300	4300	4200	5400	4200	5400	4200	5400	4200	5400	4200	5400
		26.80	0.500	12.7		4.468	113.5	199	274	398	448	473	548	622												
		28.40	0.530	13.5		4.440	112.8	192	264	384	432	456	529	601	3500	4800	4000	5200	4000	5200	4000	5200	4000	5200	4000	5200
		29.70	0.562	14.3		4.376	111.2	204	280	408	459	484	560	637	3150	4050	4200	5400	4200	5400	4200	5400	4200	5400	4200	5400
		32.00	0.612	15.5		4.276	108.6	216	297	432	486	513	594	675	3500	4500	4500	5700	4500	5700	4500	5700	4500	5700	4500	5700
		32.60	0.625	15.9		4.250	108.0	226	311	452	509	537	622	706	3700	4800	4700	6000	4700	6000	4700	6000	4700	6000	4700	6000
6.625	168.3	20.00	0.288	7.3	6.625	5.987	152.1	131	180	261	294	310	359	408	2100	2700	2700	3500	2700	3500	2700	3500	2700	3500	2700	3500
		24.00	0.352	8.9		5.866	149.0	166	228	332	374	394	457	519	2700	3500	3400	4400	3400	4400	3400	4400	3400	4400	3400	4400
		28.00	0.417	10.6		5.711	145.1	217	299	435	489	517	598	680	3500	4800	4500	5900	4500	5900	4500	5900	4500	5900	4500	5900
		28.60	0.432	11.0		5.691	144.6	219	301	437	492	519	601	683	3600	4600		5800		5800		5800		5800		5800
		32.00	0.475	12.1		5.610	142.5	250	344	500	563	594	688	781	4100	5300	5200	6600	5200	6600	5200	6600	5200	6600	5200	6600
		36.70	0.562	14.3		5.501	139.7	253	348	506	570	601	696	791	-	-	5300	6800	5300	6800	5300	6800	5300	6800	5300	6800
7.000	177.8	17.00	0.231	5.9	7.000	6.466	164.2	103	142	206	232	245	283	322	1700	2100	2200	2800	2200	2800	2200	2800	2200	2800	2200	2800
		20.00	0.272	6.9		6.394	162.4	128	176	256	288	304	352	400	2100	2700	2600	3400	2600	3400	2600	3400	2600	3400	2600	3400
		23.00	0.317	8.1		6.304	160.1	155	213	310	348	368	426	484	2500	3300	3200	4200	3200	4200	3200	4200	3200	4200	3200	4200
		26.00	0.362	9.2		6.211	157.8	189	260	378	426	449	520	591	3300	4200	4200	5400	4200	5400	4200	5400	4200	5400	4200	5400
		29.00	0.408	10.4		6.144	156.1	216	297	432	486	513	594	675	3700	4700	4700	6100	4700	6100	4700	6100	4700	6100	4700	6100
						6.184	157.1																			
		32.00	0.453	11.5		6.014	152.8	250	343	500	562	593	687	781	4100	5300	5200	6800	5200	6800	5200	6800	5200	6800	5200	6800
						6.023	153.0																			
		35.00	0.498	12.6		5.945	151.0	276	380	553	622	657	760	864	4500	5900	5800	7400	5800	7400	5800	7400	5800	7400	5800	7400
		38.00	0.540	13.7		5.850	148.6	301	414	602	677	714	827	940	5000	6400	6300	8100	6300	8100	6300	8100	6300	8100	6300	8100
		41.00	0.590	15.0		5.750	146.1	322	443	644	725	765	886	1006	5400	7000	6900	8900	6900	8900	6900	8900	6900	8900	6900	8900
		44.00	0.640	16.3		5.720	145.3	332	457	665	748	790	914	1039												
		46.00	0.670	17.0		5.660	143.8	344	473	689	775	818	947	1076	5700	7300	7200	9200	7200	9200	7200	9200	7200	9200	7200	9200
		49.50	0.730	18.5		5.540	140.7	392	540	785	883	932	1079	1226	6500	8300	8200	10600	8200	10600	8200	10600	8200	10600	8200	10600
7.625	193.7	24.00	0.300	7.6	7.625	6.955	176.7	159	218	317	357	377	436	495	2600	3400	3300	4300	3300	4300	3300	4300	3300	4300	3300	4300
		26.40	0.328	8.3		6.889	175.0	175	241	350	394	415	481	547	2900	3700	3700	4800	3700	4800	3700	4800	3700	4800	3700	4800
		29.70	0.375	9.5		6.782	172.3	222	305	444	500	527	611	694	3700	4700	4600	6000	4600	6000	4600	6000	4600	6000	4600	6000
		33.70	0.430	10.9		6.686	169.8	260	357	519	584	616	714	811	4300	5500	5400	7000	5400	7000	5400	7000	5400	7000	5400	7000
		35.80	0.465	11.8		6.625	168.3	281	387	562	633	668	773	879	4600	5900	5800	7500	5800	7500	5800	7500	5800	7500	5800	7500
		39.00	0.500	12.7		6.618	168.1	285	392	571	642	678	785	892	4900	6300	6200	8000	6200	8000	6200	8000	6200	8000	6200	8000
		42.80	0.562	14.3		6.453	163.9	347	477	693	780	823	953	1084	5700	6700	7200	8400	7200	8400	7200	8400	7200	8400	7200	8400
		45.30	0.595	15.1		6.397	162.5	368	506	735	827	873	1011	1149	6000	7800	7600	9800	7600	9800	7600	9800	7600	9800	7600	9800
		47.10	0.625	15.9		6.347	161.2	386	531	772	869	917	1062	1207	6300	8100	8000	10300	8000	10300	8000	10300	8000	10300	8000	10300

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - ST-L (Continued)

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)											
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
7.625	193.7	51.20	0.687	17.4	7.625	6.251	158.8	362	498	724	815	860	996	1131	5900	7600	7500	9700	7500	9700	7500	9700	7500	9700	7500	9700
		52.80	0.712	18.1		6.201	157.5	369	507	737	830	876	1014	1152	6000	7800	7700	9900	7700	9900	7700	9900	7700	9900	7700	9900
		55.30	0.750	19.1		6.125	155.6	458	630	916	1030	1087	1259	1431	7500	9700	9500	12200	9500	12200	9500	12200	9500	12200	9500	12200
		59.20	0.812	20.6		6.001	152.4	420	577	839	944	996	1154	1311	6900	8900	8700	11200	8700	11200	8700	11200	8700	11200	8700	11200
7.750	196.9	46.10	0.595	15.1	7.750	6.555	166.5	372	512	744	837	884	1023	1163	6100	7900	7800	10000	7800	10000	7800	10000	7800	10000	7800	10000
						6.528	165.8																			
8.000	203.2	30.60	0.375	9.5	8.000	7.180	182.4	224	307	447	503	531	615	699	3700	4700	4600	6000	4600	6000	4600	6000	4600	6000	4600	6000
8.625	219.1	24.00	0.264	6.7	8.625	8.032	204.0	152	208	303	341	360	417	474	2400	3200	3100	4100	3100	4100	3100	4100	3100	4100	3100	4100
		28.00	0.304	7.7		7.962	202.2	181	249	363	408	431	499	567	3000	3800	3800	4800	3800	4800	3800	4800	3800	4800	3800	4800
		32.00	0.352	8.9		7.880	200.2	217	298	434	488	515	597	678	3600	4600	4500	5900	4500	5900	4500	5900	4500	5900	4500	5900
						7.921	201.2	185	255	370	417	440	509	579	3000	3600	3800	4500	3800	4500	3800	4500	3800	4500	3800	4500
		36.00	0.400	10.2		7.753	196.9	273	375	546	614	648	750	852	4500	5700	5700	7300	5700	7300	5700	7300	5700	7300	5700	7300
		40.00	0.450	11.4		7.655	194.4	311	428	622	700	739	856	972	5100	6500	6500	8300	6500	8300	6500	8300	6500	8300	6500	8300
		44.00	0.500	12.7		7.625	193.7	297	408	594	668	705	817	928	4900	6300	6200	8000	6200	8000	6200	8000	6200	8000	6200	8000
		49.00	0.557	14.1		7.511	190.8	334	459	667	750	792	917	1042	5500	6400	6900	8100	6900	8100	6900	8100	6900	8100	6900	8100
9.375	238.1	34.00	0.347	8.8	9.375	8.644	219.6	232	319	464	521	550	637	724	3800	4900	4800	6200	4800	6200	4800	6200	4800	6200	4800	6200
		39.00	0.400	10.2		8.555	217.3	273	376	547	615	650	752	855	-	-	5700	7300	5700	7300	5700	7300	5700	7300	5700	7300
9.625	244.5	36.00	0.352	8.9	9.625	8.875	225.4	246	338	492	553	584	676	768	4000	5200	5200	6800	5200	6800	5200	6800	5200	6800	5200	6800
		40.00	0.395	10.0		8.797	223.4	275	378	549	618	652	755	858	4500	5700	5700	7300	5700	7300	5700	7300	5700	7300	5700	7300
		43.50	0.435	11.0		8.680	220.5	334	460	669	752	794	920	1045	5600	7200	7100	9100	7100	9100	7100	9100	7100	9100	7100	9100
		47.00	0.472	12.0		8.646	219.6	358	493	717	806	851	986	1120	5300	8100	8000	10200	8000	10200	8000	10200	8000	10200	8000	10200
						8.675	220.3																			
		53.50	0.545	13.8		8.535	216.8	391	538	782	880	929	1076	1222	7100	9100	8900	11500	8900	11500	8900	11500	8900	11500	8900	11500
		58.40	0.595	15.1		8.435	214.2	439	603	878	987	1042	1207	1371	7200	9200	9100	11700	9100	11700	9100	11700	9100	11700	9100	11700
		71.60	0.750	19.1		8.125	206.4	501	689	1003	1128	1191	1379	1567	8200	10600	10400	13400	10400	13400	10400	13400	10400	13400	10400	13400
9.875	250.8	62.80	0.625	15.9	9.875	8.565	217.6	511	702	1022	1149	1213	1405	1596	8400	10800	10700	13800	10700	13800	10700	13800	10700	13800	10700	13800
		65.10	0.650	16.5		8.564	217.5	527	725	1055	1187	1253	1450	1648	8700	11100	11000	14100	11000	14100	11000	14100	11000	14100	11000	14100
10.125	257.2	47.00	0.450	11.4	10.125	9.225	234.3	328	451	657	739	780	903	1026	5400	6900	6800	8800	6800	8800	6800	8800	6800	8800	6800	8800
10.750	273.1	40.50	0.350	8.9	10.750	10.008	254.2	274	377	548	617	651	754	857	4500	5700	5700	7300	5700	7300	5700	7300	5700	7300	5700	7300
		45.50	0.400	10.2		9.936	252.4	312	429	624	702	741	858	975	5100	6500	6500	8300	6500	8300	6500	8300	6500	8300	6500	8300
		51.00	0.450	11.4		9.764	248.0	393	541	786	885	934	1081	1229	6600	8400	8200	10600	8200	10600	8200	10600	8200	10600	8200	10600
		55.50	0.495	12.6		9.760	247.9	382	526	765	860	908	1051	1195	6300	8100	8000	10200	8000	10200	8000	10200	8000	10200	8000	10200
		60.70	0.545	13.8		9.585	243.5	487	670	974	1096	1157	1339	1522	6900	8900	8700	11200	8700	11200	8700	11200	8700	11200	8700	11200
		65.70	0.595	15.1		9.560	242.8	455	626	910	1024	1081	1252	1422	7400	9600	9400	12100	9400	12100	9400	12100	9400	12100	9400	12100
		109.00	1.047	26.6		8.656	219.9	811	1115	1621	1824	1925	2229	2533	13300	17100	16800	21700	16800	21700	16800	21700	16800	21700	16800	21700
11.750	298.5	47.00	0.375	9.5	11.750	10.976	278.8	322	442	643	724	764	885	1005	5300	6800	6700	8600	6700	8600	6700	8600	6700	8600	6700	8600
		54.00	0.435	11.0		10.880	276.4	371	510	741	834	880	1019	1158	6100	7800	7700	9900	7700	9900	7700	9900	7700	9900	7700	9900
		60.00	0.489	12.4		10.772	273.6	415	570	830	933	985	1141	1296	6800	8800	8600	11000	8600	11000	8600	11000	8600	11000	8600	11000
		65.00	0.534	13.6		10.682	271.3	443	609	885	996	1051	1217	1383	7300	9300	9200	11800	9200	11800	9200	11800	9200	11800	9200	11800
		71.00	0.582	14.8		10.586	268.9	490	673	979	1102	1163	1346	1530	8100	10350	10100	13000	10100	13000	10100	13000	10100	13000	10100	13000
		74.60	0.618	15.7		10.514	267.1	518	712	1036	1166	1231	1425	1619	8500	10900	10700	13800	10700	13800	10700	13800	10700	13800	10700	13800
11.875	301.6	71.80	0.582	14.8	11.875	10.711	272.1	495	681	990	1114	1176	1361	1547	8100	10400	10100	13000	10100	13000	10100	13000	10100	13000	10100	13000
12.000	304.8	77.60	0.625	15.9	12.000	10.750	273.1	535	736	1071	1205	1272	1473	1673	8800	11300	11100	14300	11100	14300	11100	14300	11100	14300	11100	14300
13.375	339.7	54.50	0.380	9.7	13.375	12.603	320.1	372	511	744	837	883	1023	1162	6100	7800	7700	9900	7700	9900	7700	9900	7700	9900	7700	9900
		61.00	0.430	10.9		12.515	317.9	419	576	838	943	996	1153	1310	6900	8900	8700	11200	8700	11200	8700	11200	8700	11200	8700	11200
		68.00	0.480	12.2		12.415	315.3	466	641	932	1049	1107	1282	1457	7600	9800	9700	12500	9700	12500	9700	12500	9700	12500	9700	12500
		72.00	0.514	13.1		12.284	312.0	574	789	1147	1291	1362	1577	1792	9500	12300	10900	13800	10900	13800	10900	13800	10900	13800	10900	13800
						12.298	312.4																			
		77.00	0.550	14.0		12.275	311.8	531	730	1062	1195	1262	1461	1660	8800	11200	11000	14200	11000	14200	11000	14200	11000	14200	11000	14200
		85.00	0.608	15.4		12.159	308.8	585	804	1169	1315	1389	1608	1827	9600	12400	12200	15600	12200	15600	12200	15600	12200	15600	12200	15600
13.625	346.1	88.20	0.625	15.9	13.625	12.343	313.5	722	993	1444	1624	1715	1985	2256	11900	15300	15100	19500	15100	19500	15100	19500	15100	19500	15100	19500
14.000	355.6	94.00	0.650	16.5	14.000	12.700	322.6	654	900	1309	1472	1554	1799	2045	-	-	13600	17500	13600	17500	13600	17500	13600	17500	13600	17500

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - TC-4S

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2.375	60.3	4.70	0.190	4.8	2.750	1.995	50.7	52	72	104	117	124	143	163	1200	1400	1200	1400	1200	1400	1200	1400	1400	1700
		5.30	0.218	5.5		1.939	49.3	59	81	118	133	140	162	185	1500	1750	1500	1750	1500	1750	1500	1750		
		5.95	0.254	6.5	2.800	1.867	47.4	68	93	135	152	161	186	212	1800	2050	1800	2050	1800	2050	1800	2050	-	-
		6.20	0.261	6.6		1.853	47.1	69	95	139	156	165	191	217		2100		2100		2100		2100		
		7.70	0.336	8.5	2.900	1.703	43.3	86	118	172	194	204	237	269	1900	2200	1900	2200	1900	2200	1900	2200		
2.875	73.0	6.50	0.217	5.5	3.250	2.441	62.0	72	100	145	163	172	199	227	1400	1650	1400	1650	1400	1650	1400	1650	-	-
		7.90	0.276	7.0	3.375	2.323	59.0	90	124	180	203	214	248	282	2000	2600	2000	2600	2000	2600	2300	2600	2600	3000
		8.70	0.308	7.8		2.259	57.4	99	137	199	224	236	273	310	2400	2800	2400	2800	2400	2800	2400	2800		
		9.50	0.340	8.6	3.450	2.195	55.8	108	149	217	244	257	298	338										
		10.70	0.392	10.0	3.500	2.091	53.1	122	168	245	275	290	336	382	2800	3500	2800	3500	2800	3500	2800	3500	-	-
		11.00	0.405	10.3		2.065	52.5	126	173	251	283	299	346	393		3250		3250		3250		3250		
		11.65	0.440	11.2	3.550	1.995	50.7	135	185	269	303	320	370	421	3000	3500	3000	3500	3000	3500	3000	3500		
3.500	88.9	9.30	0.254	6.5	3.950	2.992	76.0	104	142	207	233	246	285	324	2100	2500	2100	2500	2100	2500	2100	2500	2700	3300

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - TC-4S (Continued)

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
3.500	88.9	10.30	0.289	7.3	3.950	2.922	74.2	117	160	233	262	277	321	364	2600	3100	2600	3100	2600	3100	2600	3100	2700	3300
		12.95	0.375	9.5	4.100	2.750	69.9	147	203	295	331	350	405	460	3400	4000	3400	4000	3400	4000	3400	4000	3700	4300
		15.80	0.476	12.1	4.200	2.548	64.7	181	249	362	407	430	497	565	4000	4700	4000	4700	4000	4700	4000	4700	-	-
		16.70	0.510	13.0	4.250	2.480	63.0	192	264	383	431	455	527	599										
		17.05	0.530	13.5	4.300	2.440	62.0	198	272	396	445	470	544	618										
4.000	101.6	9.50	0.226	5.7	4.400	3.548	90.1	107	147	214	241	255	295	335	-	-	-	-	-	-	-	-	2000	2600
		11.00	0.262	6.7	4.450	3.476	88.3	123	169	246	277	292	338	385	3000	3800	3000	3800	3000	3800	3000	3800	3000	3800
		11.60	0.286	7.3		3.428	87.1	133	184	267	300	317	367	417	-	-	-	-	-	-	3400	4200	3400	4200
		13.40	0.330	8.4	4.525	3.340	84.8	152	209	304	342	361	419	476	3600	4200	3600	4200	3600	4200	3600	4200	3600	4200
		13.50	0.345	8.8	4.550	3.310	84.1	158	218	317	356	376	436	495										
4.500	114.3	12.75	0.271	6.9	4.950	3.958	100.5	144	198	288	324	342	396	450	3600	4200	3600	4200	3600	4200	3600	4200	-	-
		13.50	0.290	7.4		3.920	99.6	153	211	307	345	364	422	479	4000	4700	4000	4700	4000	4700	4000	4700	4000	4700
		15.50	0.337	8.6	5.100	3.826	97.2	176	242	353	397	419	485	551	4200	4900	4200	4900	4200	4900	4200	4900	4200	4900
		16.90	0.373	9.5		3.754	95.4	193	266	387	435	459	532	604	4800	5600	4800	5600	4800	5600	4800	5600		
		19.20	0.430	10.9	5.200	3.640	92.5	220	302	440	495	522	605	687	5800	6800	5800	6800	5800	6800	5800	6800	-	-
		21.60	0.500	12.7	5.300	3.500	88.9	251	346	503	565	597	691	785	6000	7000	6000	7000	6000	7000	6000	7000		

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - TC-4S

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4.500	114.3	12.75	0.271	6.9	4.950	3.958	100.5	144	198	288	324	342	396	450			3600	4200	3600	4200	3600	4200	3600	4200	-	-
		13.50	0.290	7.4	4.950	3.920	99.6	153	211	307	345	364	422	479			4000	4700	4000	4700	4000	4700	4000	4700	4000	4700
		15.50	0.337	8.6	5.100	3.826	97.2	176	242	353	397	419	485	551	-	-	4200	4900	4200	4900	4200	4900	4200	4900	4200	4900
		16.90	0.373	9.5		3.754	95.4	193	266	387	435	459	532	604			4800	5600	4800	5600	4800	5600	4800	5600		
		19.20	0.430	10.9	5.200	3.640	92.5	220	302	440	495	522	605	687			5800	6800	5800	6800	5800	6800	5800	6800	-	-
		21.60	0.500	12.7	5.300	3.500	88.9	251	346	503	565	597	691	785			6000	7000	6000	7000	6000	7000	6000	7000		
5.000	127.0	13.00	0.253	6.4	5.375	4.494	114.1	138	190	276	310	327	379	431			3500	4400	3500	4400	3500	4400	3500	4400	3500	4400
		15.00	0.296	7.5	5.450	4.408	112.0	162	223	324	364	385	445	506												
		18.00	0.362	9.2	5.550	4.276	108.6	198	272	396	445	470	544	619			4600	6900	4600	6900	4600	6900	4600	6900	4600	6900
		20.80	0.422	10.7	5.650	4.156	105.6	230	316	459	517	546	632	718	-	-	6000	7900	6000	7900	6000	7900	6000	7900	6000	7900
		21.40	0.437	11.1	5.750	4.126	104.8	238	327	475	534	564	653	742			6500	7500	-	-	-	-	-	-	8500	9800
		23.20	0.478	12.1		4.044	102.7	259	356	517	582	614	711	808			7000	9800	7000	9800	7000	9800	7000	9800	7000	9800
		24.20	0.500	12.7		4.000	101.6	270	371	539	607	641	742	843												
5.500	139.7	15.50	0.275	7.0	6.000	4.950	125.7	166	229	332	374	395	457	519			3500	4400	3500	4400	3500	4400	3500	4400	3500	4400
		17.00	0.304	7.7		4.892	124.3	184	253	368	414	437	506	576			6000	7300	6000	7300	6000	7300	6000	7300	6000	7300
		20.00	0.361	9.2	6.150	4.778	121.4	219	301	438	492	520	602	684												
		23.00	0.415	10.5		4.670	118.6	251	345	502	564	596	690	784			7000	9200	7000	9200	7000	9200	7000	9200	7000	9200
		26.00	0.476	12.1	6.325	4.548	115.5	286	393	572	644	680	787	894	-	-	8500	10000	8500	10000	8500	10000	8500	10000	8500	10000
		28.40	0.530	13.5		4.440	112.8	317	435	633	713	752	871	990												
		29.70	0.562	14.3	6.400	4.376	111.2	334	460	669	752	794	920	1045												
		32.30	0.612	15.5	6.450	4.276	108.6	362	497	723	814	859	994	1130			11000	12700	11000	12700	11000	12700	11000	12700	11000	12700
		35.00	0.650	16.5	6.500	4.200	106.7	382	525	764	859	907	1050	1193			-	-			-	-	-	-	-	-

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - TC-II

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
2.375	60.3	4.60	0.190	4.8	2.675	1.983	50.4	52	72	104	117	124	143	163	1200	1400	1200	1400	1200	1400	1200	1400	1200	1400
		5.10	0.218	5.5	2.716	1.927	48.9	59	81	118	133	140	162	185	-	-	-	-	-	-	-	-	-	-
		5.80	0.254	6.5	2.766	1.855	47.1	68	93	135	152	161	186	212										
2.875	73.0	6.40	0.217	5.5	3.211	2.429	61.7	72	100	145	163	172	199	227	1400	1700	1400	1700	1400	1700	1400	1700	1400	1700
		7.80	0.276	7.0	3.297	2.311	58.7	90	124	180	203	214	248	282	2100	2500	2100	2500	2100	2500	2100	2500	2100	2500
		8.60	0.308	7.8	3.342	2.247	57.1	99	137	199	224	236	273	310	-	-	-	-	-	-	-	-	-	-
3.100	78.7	9.20	0.300	7.6	3.561	2.486	63.1	106	145	211	238	251	290	330	2600	3100	2600	3100	2600	3100	2600	3100	2600	3100
3.188	81.0	6.20	0.194	4.9	3.515	2.786	70.8	73	100	146	164	173	201	228	1200	1400	1200	1400	1200	1400	1200	1400	1200	1400
3.500	88.9	7.70	0.216	5.5	3.827	3.056	77.6	89	123	178	201	212	245	278	-	-	-	-	-	-	-	-	-	-
		9.20	0.254	6.5	3.887	2.980	75.7	104	142	207	233	246	285	324	2100	2500	2100	2500	2100	2500	2100	2500	2100	2500
		10.20	0.289	7.3	3.940	2.910	73.9	117	160	233	262	277	321	364	2650	3250	-	-	-	-	-	-	-	-
		12.70	0.375	9.5	4.062	2.738	69.5	147	203	295	331	350	405	460	3600	4200	3600	4200	3600	4200	3600	4200	3600	4200
4.000	101.6	9.50	0.226	5.7	4.355	3.534	89.8	107	147	214	241	255	295	335	-	-	-	-	-	-	-	-	-	-
		10.90	0.262	6.7	4.412	3.462	87.9	123	169	246	277	292	338	385										
		13.20	0.330	8.4	4.517	3.326	84.5	152	209	304	342	361	419	476										
4.500	114.3	10.50	0.224	5.7	4.853	4.037	102.5	120	165	241	271	286	331	376	-	-	-	-	-	-	-	-	1900	2200
		11.60	0.250	6.4	4.896	3.985	101.2	134	184	267	300	317	367	417	2200	2600	2200	2600	2200	2600	2200	2600	2200	2600
		12.60	0.271	6.9	4.930	3.943	100.2	144	198	288	324	342	396	450	3500	4200	3500	4200	3500	4200	3500	4200	3500	4200
		13.50	0.290	7.4	4.961	3.905	99.2	153	211	307	345	364	422	479	2800	3300	2800	3300	2800	3300	2800	3300	2800	3300
		15.10	0.337	8.6	5.034	3.811	96.8	176	242	353	397	419	485	551	3600	4500	3600	4500	3600	4500	3600	4500	3600	4500
		16.60	0.375	9.5	5.091	3.735	94.9	194	267	389	437	462	535	607	3900	4600	3900	4600	3900	4600	3900	4600	3900	4600

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - TC-II

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4.500	114.3	10.50	0.224	5.7	4.853	4.037	102.5	120	165	241	271	286	331	376	-	-	-	-	-	-	-	-	-	-	1900	2200
		11.60	0.250	6.4	4.896	3.985	101.2	134	184	267	300	317	367	417			2200	2600	2200	2600	2200	2600	2200	2600	2200	2600
		12.60	0.271	6.9	4.930	3.943	100.2	144	198	288	324	342	396	450			3500	4200	3500	4200	3500	4200	3500	4200	3500	4200
		13.50	0.290	7.4	4.961	3.905	99.2	153	211	307	345	364	422	479			2800	3300	2800	3300	2800	3300	2800	3300	2800	3300
		15.10	0.337	8.6	5.034	3.811	96.8	176	242	353	397	419	485	551			3600	4500	3600	4500	3600	4500	3600	4500	3600	4500
		16.60	0.375	9.5	5.091	3.735	94.9	194	267	389	437	462	535	607			3900	4600	3900	4600	3900	4600	3900	4600	3900	4600
5.000	127.0	15.00	0.296	7.5	5.428	4.392	111.6	175	241	350	394	416	481	547			3500	3900	3500	3900	3500	3900	3500	3900	3500	3900
		18.00	0.362	9.2	5.533	4.276	108.6	211	290	422	475	501	580	659			3900	4300	3900	4300	3900	4300	3900	4300	3900	4300
		20.30	0.408	10.4	5.603	4.184	106.3	235	324	471	530	559	647	736			5700	6300	5700	6300	5700	6300	5700	6300	5700	6300
		20.80	0.422	10.7	5.624	4.156	105.6	243	334	486	546	577	668	759	-	-	6300	7000	6300	7000	6300	7000	6300	7000	6300	7000
		21.40	0.437	11.1	5.646	4.126	104.8	251	345	501	564	595	689	783			6700	7900	6700	7900	6700	7900	6700	7900	6700	7900
		23.20	0.478	12.1	5.705	4.044	102.7	272	374	543	611	645	747	849			7700	9100	7700	9100	7700	9100	7700	9100	7700	9100
		24.10	0.500	12.7	5.736	4.000	101.6	283	389	566	636	672	778	884			8200	9600	8200	9600	8200	9600	8200	9600	8200	9600
5.500	139.7	15.50	0.275	7.0	5.905	4.890	124.2	181	248	361	406	429	497	564			3200	3600	3200	3600	3200	3600	3200	3600	3200	3600
		17.00	0.304	7.7	5.953	4.832	122.7	198	273	397	447	471	546	620			4100	4600	4100	4600	4100	4600	4100	4600	4100	4600
		20.00	0.361	9.2	6.045	4.778	121.4	233	321	466	525	554	641	729			5200	5900	5200	5900	5200	5900	5200	5900	5200	5900
		23.00	0.415	10.5	6.129	4.670	118.6	265	365	530	597	630	729	829	-	-	6900	8100	6900	8100	6900	8100	6900	8100	6900	8100
		26.00	0.476	12.1	6.220	4.548	115.5	301	413	601	676	714	826	939			8500	10000	8500	10000	8500	10000	8500	10000	8500	10000
		26.80	0.500	12.7	6.255	4.500	114.3	314	432	628	707	746	864	982			9200	10800	9200	10800	9200	10800	9200	10800	9200	10800
6.625	168.3	20.00	0.288	7.3	7.049	5.989	152.1	229	315	459	516	545	631	717			4500	5000	4500	5000	4500	5000	4500	5000	4500	5000
		23.20	0.330	8.4	7.120	5.905	150.0	261	359	522	587	620	718	816			7200	8500	7200	8500	7200	8500	7200	8500	7200	8500
		24.00	0.352	8.9	7.157	5.861	148.9	277	382	555	624	659	763	867			7700	9100	7700	9100	7700	9100	7700	9100	7700	9100
		28.00	0.417	10.6	7.263	5.791	147.1	325	447	651	732	773	895	1017	-	-	8500	10000	8500	10000	8500	10000	8500	10000	8500	10000
		29.00	0.432	11.0	7.286	5.761	146.3	336	462	672	756	798	925	1051			9000	10600	9000	10600	9000	10600	9000	10600	9000	10600
		32.00	0.475	12.1	7.354	5.675	144.1	367	505	734	826	872	1009	1147			10500	12400	10500	12400	10500	12400	10500	12400	10500	12400
		34.50	0.525	13.3	7.430	5.575	141.6	402	553	805	905	956	1107	1258			12300	14500	12300	14500	12300	14500	12300	14500	12300	14500
7.000	177.8	23.00	0.317	8.1	7.457	6.343	161.1	266	366	532	599	632	732	832			6400	7100	6400	7100	6400	7100	6400	7100	6400	7100
		26.00	0.362	9.2	7.533	6.253	158.8	302	415	604	679	717	830	944			9300	10900	9300	10900	9300	10900	9300	10900	9300	10900
		29.00	0.408	10.4	7.609	6.184	157.1	338	465	676	760	803	929	1056			11700	13800	11700	13800	11700	13800	11700	13800	11700	13800
		32.00	0.453	11.5	7.681	6.094	154.8	373	512	745	839	885	1025	1165	-	-	14000	16000	14000	16000	14000	16000	14000	16000	14000	16000
		35.00	0.498	12.6	7.752	6.004	152.5	407	559	814	916	966	1119	1272			12000	14100	12000	14100	12000	14100	12000	14100	12000	14100
		38.00	0.540	13.7	7.816	5.920	150.4	438	603	877	986	1041	1205	1370			13700	16100	13700	16100	13700	16100	13700	16100	13700	16100
		41.00	0.590	15.0	7.891	5.820	147.8	475	653	950	1069	1129	1307	1485			15700	18500	15700	18500	15700	18500	15700	18500	15700	18500
7.625	193.7	26.40	0.328	8.3	8.105	6.944	176.4	301	414	602	677	714	827	940			7300	8100	7300	8100	7300	8100	7300	8100	7300	8100
		29.70	0.375	9.5	8.186	6.850	174.0	342	470	683	769	811	940	1068			9100	10700	9100	10700	9100	10700	9100	10700	9100	10700
		33.70	0.430	10.9	8.277	6.765	171.8	389	535	778	875	923	1069	1215			9900	11600	9900	11600	9900	11600	9900	11600	9900	11600
		35.80	0.465	11.8	8.334	6.695	170.1	418	575	837	941	994	1151	1308			11300	13300	11300	13300	11300	13300	11300	13300	11300	13300
		39.00	0.500	12.7	8.390	6.625	168.3	448	616	895	1007	1063	1231	1399	-	-	12800	15100	12800	15100	12800	15100	12800	15100	12800	15100
		42.80	0.562	14.3	8.486	6.501	165.1	499	686	998	1122	1185	1372	1559			15500	18200	15500	18200	15500	18200	15500	18200	15500	18200
		45.30	0.595	15.1	8.536	6.435	163.4	526	723	1051	1183	1248	1445	1643			18400	21600	18400	21600	18400	21600	18400	21600	18400	21600
		47.10	0.625	15.9	8.581	6.375	161.9	550	756	1100	1237	1306	1512	1718												
7.750	196.9	46.10	0.595	15.1	8.660	6.560	166.6	535	736	1070	1204	1271	1471	1672			17300	20400	17300	20400	17300	20400	17300	20400	17300	20400
		48.00	0.625	15.9	8.705	6.500	165.1	560	769	1119	1259	1329	1539	1749	-	-	18800	22100	18800	22100	18800	22100	18800	22100	18800	22100
		49.00	0.640	16.3	8.728	6.470	164.3	572	786	1144	1287	1358	1573	1787			19500	22900	19500	22900	19500	22900	19500	22900	19500	22900
8.625	219.1	28.00	0.304	7.7	9.083	7.938	201.6	318	437	636	715	755	874	993			6800	7600	6800	7600	6800	7600	6800	7600	6800	7600
		32.00	0.352	8.9	9.167	7.842	199.2	366	503	732	823	869	1006	1144			9300	10900	9300	10900	9300	10900	9300	10900	9300	10900
		36.00	0.400	10.2	9.250	7.825	198.8	413	568	827	930	982	1137	1292	-	-	10000	11800	10000	11800	10000	11800	10000	11800	10000	11800
		40.00	0.450	11.4	9.333	7.725	196.2	462	636	925	1040	1098	1271	1445			12400	14600	12400	14600	12400	14600	12400	14600	12400	14600
		44.00	0.500	12.7	9.415	7.625	193.7	511	702	1021	1149	1212	1404	1595			14900	17500	14900	17500	14900	17500	14900	17500	14900	17500
9.625	244.5	36.00	0.352	8.9	10.160	8.888	225.8	410	564	820	923	974	1128	1282			10800	12700	10800	12700	10800	12700	10800	12700	10800	12700
		40.00	0.395	10.0	10.235	8.835	224.4	458	630	916	1031	1088	1260	1432			11600	13600	11600	13600	11600	13600	11600	13600	11600	13600
		43.50	0.435	11.0	10.303	8.755	222.4	502	691	1005	1130	1193	1381	1570	-	-	13900	16400	13900	16400	13900	16400	13900	16400	13900	16400
		47.00	0.472	12.0	10.366	8.681	220.5	543	746	1086	1221	1289	1493	1696			16100	18900	16100	18900	16100	18900	16100	18900	16100	18900
		53.50	0.545	13.8	10.487	8.535	216.8	622	855	1244	1399	1477	1710	1943			19400	22800	19400	22800	19400	22800	19400	22800	19400	22800
		58.40	0.595	15.1	10.567	8.435	214.2	675	928	1350	1519	1604	1857	2110			23800	28000	23800	28000	23800	28000	23800	28000	23800	28000
9.875	250.8	62.80	0.625	15.9	10.860	8.625	219.1	726	999	1453	1635	1725	1998	2270	-	-	26600	31300	26600	31300	26600	31300	26600	31300	26600	31300
10.750	273.1	40.50	0.350	8.9	11.283	9.964	253.1	457	629	915	1029	1086	1258	1429			12400	14600	12400	14600	12400	14600	12400	14600	12400	14600
		45.50	0.400	10.2	11.372	9.950	252.7	520	715	1040	1171	1236	1431	1626			13500	15900	13500	15900	13500	15900	13500	15900	13500	15900
		51.00	0.450	11.4	11.458	9.850	250.2	582	801	1165	1310	1383	1602	1820			16800	19800	16800	19800	16800	19800	16800	19800	16800	19800
		55.50	0.495	12.6	11.535	9.760	247.9	638	877	1276	1435	1515	1754	1993	-	-	19800	23300	19800	23300	19800	23300	19800	23300	19800	23300
		60.70	0.545	13.8	11.619	9.660	245.4	699	961	1398	1573	1660	1922	2184			23500	27600	23500	27600	23500	27600	23500	27600	23500	27600
		65.70	0.595	15.1	11.702	9.560	242.8	759	1044	1519	1708	1803	2088	2373			27200	32000	27200	32000	27200	32000	27200	32000	27200	32000
11.750	298.5	47.00	0.375	9.5	12.326	10.960	278.4	536	737	1072	1206	1273	1474	1675			15800	18600	15800	18600	15800	18600	15800	18600	15800	18600
		54.00	0.435	11.0	12.433	10.880	276.4	619	850	1237	1392	1469	1701	1933			17400	20500	17400	20500	17400	20500	17400	20500	17400	20500
		60.00	0.489	12.4	12.526	10.772	273.6	692	951	1384	1557	1643	1903	2162	-	-	21500	25300	21500	25300	21500	25300	21500	25300	21500	25300
		65.00	0.534	13.6	12.603	10.682	271.3	753	1035	1505	1693	1788	2070	2352			25100	29500	25100	29500	25100	29500	25100	29500	25100	29500
		71.00	0.582	14.8	12.684	10.586	268.9	817	1123	1634	1838	1940	2246	2553			29100	34200	29100	34200	29100	34200	29100	34200	29100	34200
		74.60	0.618	15.7	12.744	10.514	267.1	865	1189	1729	1945	2053	2377	2702			32300	38000	32300	38000	32300	38000	32300	38000	32300	38000
11.875	301.6	71.80	0.582	14.8	12.819	10.711	272.1	826	1136	1652	1858	1962	2271	2581	-	-	28300	33300	28300	33300	28300	33300	28300	33300	28300	33300
13.375	339.7	54.50	0.380	9.7	13.947	12.519	318.0	621	853	1241	1396	1474	1706	1939	-	-	18000	21200	18000	21200	18000	21200	18000	21200	18000	21200
		61.00	0.430	10.9	14.037	12.515	317.9	699	962	1399	1574	1661	1924	2186	19500	22900	19500	22900	19500	22900	19500	22900	19500	22900	19500	22900
		68.00	0.480	12.2	14.126	12.415	315.3	778	1069	1556	1750	1847	2139	2431	21700	25500	24000	28200	24000	28200	24000	28200	24000	28200	24000	28200
		72.00	0.514	13.1	14.185	12.347	313.6	831	1142	1661	1869	1973	2284	2596			25500	30000	25500	30000	25500	30000	25500	30000	25500	30000
		77.00	0.550	14.0	14.248	12.275	311.8	886	1219	1773	1994	2105	2438	2770	-	-	30700	36100	30700	36100	30700	36100	30700	36100	30700	36100
		91.00	0.660	16.8	14.435	12.055	306.2	1055	1450	2109	2373	2505	2900	3296			42100	49500	42100	49500	42100	49500	42100	49500	42100	49500
13.625	346.1	88.20	0.625	15.9	14.641	12.329	313.2	1021	1404	2042	2297	2425	2808	3191	-	-	42500	47500	42500	47500	42500	47500	42500	47500	42500	47500

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - TC-II-HW

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
3.500	88.9	15.80	0.476	12.1	4.171	2.534	64.4	181	249	362	407	430	497	565	5300	6200	5300	6200	5300	6200	5300	6200	5300	6200
4.500	114.3	19.20	0.430	10.9	5.150	3.625	92.1	220	302	440	495	522	605	687	5100	6000	5100	6000	5100	6000	5100	6000	5100	6000
		21.60	0.500	12.7	5.232	3.485	88.5	251	346	503	565	597	691	785	6500	7600	6500	7600	6500	7600	6500	7600	6500	7600

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - TC-II-HW

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
4.500	114.3	19.20	0.430	10.9	5.150	3.625	92.1	220	302	440	495	522	605	687	5100	6000	5100	6000	5100	6000	5100	6000	5100	6000
		21.60	0.500	12.7	5.232	3.485	88.5	251	346	503	565	597	691	785	6500	7600	6500	7600	6500	7600	6500	7600	6500	7600
5.000	127.0	26.70	0.562	14.3	5.806	3.876	98.5	313	431	627	705	744	862	979	10400	12200	10400	12200	10400	12200	10400	12200	10400	12200
5.500	139.7	29.70	0.562	14.3	6.319	4.376	111.2	349	479	697	785	828	959	1090	11300	13300	11300	13300	11300	13300	11300	13300	11300	13300
		32.60	0.625	15.9	6.390	4.25	108.0	383	526	766	861	909	1053	1196	13300	15600	13300	15600	13300	15600	13300	15600	13300	15600
		35.30	0.687	17.4	6.324	4.126	104.8	416	571	831	935	987	1143	1298	13300	14800	13300	14800	13300	14800	13300	14800	13300	14800
7.000	177.8	46.00	0.670	17.0	7.979	5.66	143.8	533	733	1066	1199	1266	1466	1665	19300	22700	19300	22700	19300	22700	19300	22700	19300	22700
7.625	193.7	55.30	0.750	19.1	8.733	6.125	155.6	648	891	1296	1458	1539	1782	2025	26600	31300	26600	31300	26600	31300	26600	31300	26600	31300
8.625	219.1	57.40	0.656	16.7	9.491	7.313	185.8	657	903	1314	1478	1560	1807	2053	20600	24200	20600	24200	20600	24200	20600	24200	20600	24200
9.625	244.5	71.80	0.750	19.1	10.772	8.125	206.4	836	1150	1673	1882	1987	2300	2614	33800	39800	33800	39800	33800	39800	33800	39800	33800	39800
9.875	250.8	65.10	0.650	16.5	10.895	8.575	217.8	754	1036	1507	1695	1790	2072	2355	27700	32600	27700	32600	27700	32600	27700	32600	27700	32600
14.000	355.6	112.60	0.797	20.2	15.259	12.406	315.1	1322	1818	2645	2975	3141	3636	4132	56200	66100	56200	66100	56200	66100	56200	66100	56200	66100

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - TC-II/CRA

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)		Make up Torque (ft-lb)			
								110 ksi	125 ksi	110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm			Min	Max	Min	Max
2.375	60.3	4.60	0.190	4.8	2.665	1.983	50.4	143	163	800	1000	800	1000
		5.10	0.218	5.5	2.707	1.927	48.9	162	185	1000	1200	1000	1200
		5.80	0.254	6.5	2.757	1.854	47.1	186	212	1300	1600	1300	1600
2.875	73.0	6.40	0.217	5.5	3.198	2.425	61.6	199	227	1400	1700	1400	1700
		7.70	0.276	7.0	3.285	2.307	58.6	248	282	2000	2400	2000	2400
		8.60	0.308	7.8	3.330	2.243	57.0	273	310	2300	2800	2300	2800
3.500	88.9	7.70	0.216	5.5	3.834	3.049	77.4	245	279	1700	2100	1700	2100
		9.20	0.254	6.5	3.894	2.973	75.5	285	324	2300	2900	2300	2900
		10.20	0.289	7.3	3.947	2.903	73.7	321	364	2900	3600	2900	3600
		12.70	0.375	9.5	4.069	2.731	69.4	405	460	4100	5100	4100	5100
4.000	101.6	9.50	0.226	5.7	4.352	3.526	89.6	295	335	2400	3000	2400	3000
		10.90	0.262	6.7	4.409	3.454	87.7	338	385	3100	3900	3100	3900
		13.00	0.330	8.4	4.514	3.318	84.3	419	476	4500	5600	4500	5600
		14.80	0.380	9.7	4.586	3.218	81.7	475	540	5400	6800	5400	6800
4.500	114.3	10.50	0.224	5.7	4.862	4.030	102.4	331	376	3000	3800	3000	3800
		11.60	0.250	6.4	4.905	3.978	101.0	367	417	3700	4600	3700	4600
		12.60	0.271	6.9	4.939	3.936	100.0	396	450	4200	5300	4200	5300
		13.50	0.290	7.4	4.970	3.898	99.0	422	479	4700	5900	4700	5900
		15.10	0.337	8.6	5.043	3.804	96.6	485	551	5800	7400	5800	7400

Data provided by Grant Prideco; October, 2005

Grant Prideco: Tubing Sizes - TC-II/CRA-HW

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)			
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max
4.500	114.3	17.00	0.380	9.7	5.067	3.74	95.0	197	271	393	443	467	541	615	6000	7600	6000	7600
		18.90	0.430	10.9	5.140	3.64	92.5	220	302	440	495	522	605	687	7100	9100	7100	9100
		21.60	0.500	12.7	5.237	3.50	88.9	251	346	503	565	597	691	785	8600	11000	8600	11000

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - ATS-E

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)											
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
7.000	177.8	26.00	0.362	9.2	7.656	6.276	159.4	302	415	604	679	717	830	944	5700	8200	7000	10000	7500	10700	7800	11100	8500	12100	9200	13200
		29.00	0.408	10.4		6.184	157.1	338	465	676	760	803	929	1056	7800	11100	9700	13900	10500	15000	10900	15500	12000	17200	13200	18800
		32.00	0.453	11.5		6.094	154.8	373	512	745	839	885	1025	1165	9600	13700	12200	17400	13200	18900	13700	19600	15300	21800	16900	24100
		35.00	0.498	12.6		6.004	152.5	407	559	814	916	966	1119	1272	11300	16200	14600	20800	15900	22700	16500	23600	18500	26400	20400	29200
7.625	193.7	29.70	0.375	9.5	8.500	6.875	174.6	342	470	683	769	811	940	1068	7400	10500	9000	12900	9700	13900	10100	14400	11000	15700	12000	17200
		33.70	0.430	10.9		6.765	171.8	389	535	778	875	923	1069	1215	10200	14500	12900	18400	13900	19900	14500	20700	16100	23000	17600	25200
		35.80	0.465	11.8		6.695	170.1	418	575	837	941	994	1151	1307	11900	17000	15300	21800	16500	23600	17200	24600	19200	27400	21100	30200
		39.00	0.500	12.7		6.625	168.3	448	616	895	1007	1063	1231	1399	13600	19400	17500	25000	19000	27200	19800	28300	22200	31700	24500	35000
8.625	219.1	32.00	0.352	8.9	9.625	7.921	201.2	366	503	732	823	869	1006	1144	7300	10400	8800	12500	9300	13300	9600	13700	10500	15000	11300	16200
		36.00	0.400	10.2		7.825	198.8	413	568	827	930	982	1137	1292	10500	15000	13200	18800	14200	20300	14800	21100	16300	23300	17900	25600
		40.00	0.450	11.4		7.725	196.2	462	636	925	1040	1098	1271	1445	13700	19600	17600	25100	19100	27300	19900	28400	22200	31700	24500	35000
		44.00	0.500	12.7		7.625	193.7	511	702	1021	1149	1212	1404	1595	16900	24100	21800	31200	23900	34100	24900	35500	27900	39800	28000	40000
9.625	244.5	40.00	0.395	10.0	10.625	8.835	224.4	458	630	916	1031	1088	1260	1432	11800	16900	14900	21300	16100	23000	16700	23900	18500	26400	20400	29100
		43.50	0.435	11.0		8.755	222.4	502	691	1005	1130	1193	1381	1570	15100	21600	19300	27600	21100	30100	21900	31300	24400	34900	27000	38600
		47.00	0.472	12.0		8.681	220.5	543	746	1086	1222	1289	1493	1697	18100	25800	23400	33400	25600	36500	26600	38000	28000		28000	
		53.50	0.545	13.8		8.535	216.8	622	855	1244	1399	1477	1710	1943	23600	33700	28000	40000	28000	40000	35000	40000	35000	40000	35000	40000
		58.40	0.595	15.1		8.435	214.2	675	928	1350	1519	1604	1857	2110	27200	38800	35000		35000							
9.875	250.8	62.80	0.625	15.8	10.625	8.625	219.1	726	999	1453	1635	1725	1998	2270	24100	34400	28000	40000	28000	40000	28000	40000	35000	40000	35000	40000
10.750	273.1	40.50	0.350	8.9	11.750	10.050	255.3	457	629	915	1029	1086	1258	1429	9000	12900	10900	15600	11600	16600	12000	17100	13100	18700	14200	20300
		45.50	0.400	10.2		9.950	252.7	520	715	1040	1171	1236	1431	1626	14200	20300	18100	25800	19600	28000	20400	29100	22600	32300	24900	35600
		51.00	0.450	11.4		9.850	250.2	582	801	1165	1311	1383	1602	1820	19300	27500	25000	35700	27300	39000	28000		28000			
		55.50	0.495	12.6		9.760	247.9	638	877	1276	1435	1515	1754	1993	23700	33800	28000		28000			40000		40000	35000	40000
		60.70	0.545	13.8		9.660	245.4	699	961	1398	1573	1660	1922	2184	28000	40000	35000	40000	35000	40000	35000		35000			
		65.70	0.595	15.1		9.560	242.8	759	1044	1519	1708	1803	2088	2373												
11.750	298.5	47.00	0.375	9.5	12.750	11.000	279.4	536	737	1072	1206	1273	1474	1675	12900	18400	16100	23000	17400	24800	18100	25800	20000	28500	21800	31200
		54.00	0.435	11.0		10.880	276.4	619	850	1237	1392	1469	1701	1933	20200	28900	26300	37500	28000		28000		28000			
		60.00	0.489	12.4		10.772	273.6	692	951	1384	1557	1643	1903	2162	26500	37900				40000		40000		40000	35000	40000
		65.00	0.534	13.6		10.682	271.3	753	1035	1505	1693	1788	2070	2352	28000	40000	35000	40000	35000		35000		35000			
		71.00	0.582	14.8		10.586	268.9	817	1123	1634	1838	1940	2246	2552	35000											
13.375	339.7	61.00	0.430	10.9	14.375	12.515	317.9	699	962	1399	1574	1661	1924	2186	23900	34200	28000		28000							
		68.00	0.480	12.2		12.415	315.3	778	1069	1556	1750	1847	2139	2431	28000	40000	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000
		72.00	0.514	13.1		12.347	313.6	831	1142	1661	1869	1973	2284	2596	35000											
16.000	406.4	75.00	0.438	11.1	17.000	15.124	384.1	857	1178	1713	1927	2034	2355	2677	27800	39700	28000									
		84.00	0.495	12.6		15.010	381.3	964	1326	1929	2170	2291	2652	3014												
		84.80	0.500	12.7		15.000	381.0	974	1339	1948	2191	2313	2678	3043	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000
		97.00	0.575	14.6		14.850	377.2	1115	1533	2229	2508	2647	3065	3483												
		109.00	0.656	16.7		14.688	373.1	1265	1739	2530	2846	3004	3478	3953												
18.625	473.1	87.50	0.435	11.0	20.000	17.755	451.0	994	1367	1989	2237	2362	2734	3107	28000											
		94.50	0.468	11.9		17.689	449.3	1068	1468	2136	2403	2536	2937	3337												
		97.70	0.486	12.3		17.653	448.4	1108	1523	2216	2493	2631	3046	3462												
		106.00	0.531	13.5		17.563	446.1	1207	1660	2415	2717	2867	3320	3773												
		109.00	0.561	14.2		17.503	444.6	1273	1751	2547	2865	3024	3502	3980												
		112.00	0.579	14.7		17.467	443.7	1313	1805	2626	2954	3118	3611	4103	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000
		115.00	0.594	15.1		17.437	442.9	1346	1851	2692	3028	3195	3701	4206												
		117.50	0.593	15.1		17.439	443.0	1344	1848	2687	3023	3191	3695	4199												
		129.00	0.656	16.7		17.313	439.8	1481	2037	2963	3333	3518	4074	4629												
		138.60	0.718	18.2		17.189	436.6	1616	2222	3231	3635	3837	4443	5049												
		139.00	0.720	18.3		17.185	436.5	1620	2228	3240	3645	3848	4455	5063												
20.000	508.0	94.00	0.438	11.1	21.000	19.124	485.7	1077	1480	2153	2423	2557	2961	3365	28000											
		106.50	0.500	12.7		19.000	482.6	1225	1685	2450	2757	2910	3369	3829												
		119.00	0.562	14.3		18.876	479.5	1373	1888	2746	3089	3260	3775	4290												
		131.00	0.625	15.9		18.750	476.3	1522	2092	3043	3424	3614	4185	4755												
		133.00	0.635	16.1		18.730	475.7	1545	2125	3091	3477	3670	4249	4829												
		143.00	0.688	17.5		18.624	473.0	1670	2296	3339	3757	3965	4592	5218	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000
		149.00	0.718	18.2		18.564	471.5																			
		156.00	0.750	19.1		18.500	469.9	1697	2334	3395	3819	4031	4668	5304												
		163.00	0.781	19.8		18.438	468.3																			
		169.00	0.812	20.6		18.376	466.8																			

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - ATS-E/H1

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)											
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
7.750	196.9	46.10	0.595	15.1	8.500	6.560	166.6	482	662	964	1084	1144	1325	1505	16700	23800	21100	30200	22900	32700	23800	34000	26400	37700	28000	40000
		48.00	0.625	15.9		6.500	165.1	506	696	1013	1139	1203	1393	1582	18100	25800	23000	32900	25000	35700	26000	37100	28000	40000		
9.875	250.8	62.80	0.625	15.9	10.625	8.625	219.1	579	797	1159	1304	1376	1593	1811	22100	31500	28000	40000	28000	40000	28000	40000	35000	40000	35000	40000
11.875	301.6	71.80	0.582	14.8	12.750	10.711	272.1	737	1013	1473	1658	1750	2026	2302	28000	40000	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000
13.625	346.1	88.20	0.625	15.9	14.375	12.375	314.3	816	1122	1632	1836	1938	2243	2549	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - ATS-E/SC

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)											
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	55 ksi		80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
16.000	406.4	84.80	0.500	12.7	16.500	15	381.0	878	1207	1755	1974	2084	2413	2742	28000											
		97.00	0.575	14.6		14.85	377.2	936	1287	1872	2106	2223	2574	2925	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000	35000	40000
					16.570			978	1344	1955	2200	2322	2688	3055												

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - HFR1

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
9.625	244.5	53.50	0.545	13.8	10.488	8.535	216.8	610	838	1220	1372	1448	1677	1906	22400	25800	22400	25800	22400	25800	22400	25800	22400	25800
10.750	273.1	65.70	0.595	15.1	11.702	9.56	242.8	746	1025	1492	1678	1771	2051	2331	24600	27600	24600	27600	24600	27600	24600	27600	24600	27600

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - HFR1-EE

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
13.375	339.7	75.00	0.534	13.6	14.640	12.307	312.6	819	1126	1637	1842	1944	2251	2558	26800	31500	26800	31500	26800	31500	26800	31500	26800	31500
		80.70	0.580	14.7		12.215	310.3	886	1218	1772	1993	2104	2436	2769	33700	39600	33700	39600	33700	39600	33700	39600	33700	39600

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - HFR1-EE-HW

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
11.750	298.5	87.20	0.734	18.6	13.015	10.282	261.2	965	1327	1931	2172	2293	2655	3017	40600	47800	40600	47800	40600	47800	40600	47800	40600	47800

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - HFR2

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
7.000	177.8	32.00	0.453	11.5	7.672	6.094	154.8	373	512	745	839	885	1025	1165	14000	16000	14000	16000	14000	16000	14000	16000	14000	16000

Data provided by Grant Prideco; October, 2005

Grant Prideco: Casing Sizes - HFR2-SR

OD		Weight With Coupling	Wall Thickness		Coupling or Joint OD	Bored Pin ID		Joint Yield Strength (ksi)							Make up Torque (ft-lb)									
								40 ksi	55 ksi	80 ksi	90 ksi	95 ksi	110 ksi	125 ksi	80 ksi		90 ksi		95 ksi		110 ksi		125 ksi	
in.	mm	lb/ft	in.	mm		in.	mm								Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
5.500	139.7	17.00	0.304	7.7	5.943	4.874	123.8	198	273	397	447	471	546	620	4100	4600	4100	4600	4100	4600	4100	4600	4100	4600
		20.00	0.361	9.2	6.036	4.778	121.4	233	321	466	525	554	641	729	5200	5900	5200	5900	5200	5900	5200	5900	5200	5900
		23.00	0.415	10.5	6.120	4.670	118.6	265	365	530	597	630	729	829	6900	8100	6900	8100	6900	8100	6900	8100	6900	8100
6.625	168.3	28.00	0.417	10.6	7.254	5.791	147.1	325	447	651	732	773	895	1017	8500	10000	8500	10000	8500	10000	8500	10000	8500	10000
7.000	177.8	29.00	0.408	10.4	7.600	6.184	157.1	338	465	676	760	803	929	1056	11700	13800	11700	13800	11700	13800	11700	13800	11700	13800
		32.00	0.453	11.5	7.672	6.094	154.8	373	512	745	839	885	1025	1165	14000	16000	14000	16000	14000	16000	14000	16000	14000	16000
5.000	127.0	26.70	0.562	14.3	5.252	3.806	96.7	726	999	1453	1635	1725	1998	2270	26600	31300	26600	31300	26600	31300	26600	31300	26600	31300

Data provided by Grant Prideco; October, 2005

NOTE: *All values provided by HYDRIL® are for informational purposes only. All values should be verified before use. HYDRIL does not guarantee the accuracy or completeness of any information provided. In addition, HYDRIL shall not be held responsible for any errors, omissions, or damages arising out of the use of this information. Contact your local HYDRIL Representative for verification of any value before use.*

HYDRIL® 511™ Torque Values

Pipe		Connection							
Size (OD) & Wt		Efficiency	Make-up Torque		Yield Torque (Maximum Torque)				
Nominal		Internal Yield	Minimum	Target	J-55/ K-55	N-80/ L-80	T-95/ HC-95	P-110	Q-125
in.	lb/ft	%	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
2-1/16	3.25	100.00	450	500	1000	1,500	1,800	2,100	-
	4.50		600	700	-	1,400	1,700	1,900	
2-3/8	4.60	99.60	550	600	1,300	1,900	2,300	2,700	-
	5.10	98.70	600	700					
2-7/8	6.40	99.40	700	800	2,000	2,800	3,400	3,900	-
3-1/2	7.70	98.20	1,000	1,200	3,800	5,600	6,600	-	-
	9.20	100.00	1,200	1,400				7,600	
	10.20	93.80	1,400	1,600					
4	9.50	100.00	1,300	1,500	5,200	7,500	8,900	-	-
	11.00	97.20	1,500	1,700				10,300	
	11.60	93.60	1,700	2,000					
4-1/2	10.50	100.00	1,500	1,700	6,700	-	-	-	-
	11.00		1,600	1,800		9,700	11,500	13,300	
	11.60	99.70							
	12.60	100.00	1,700	2,000	7,100	10,300	12,200	14,100	
	13.50		1,800	2,100					
	15.10		2,400	2,800	-	11,600	13,800	16,000	
5	15.00	100.00	2,000	2,300	8,800	12,800	15,200	17,700	-
	18.00		3,500	4,000	-	18,300	21,700	25,000	
5-1/2	15.50	100.00	2,000	2,300	10,800	15,700	-	-	-
	17.00		2,200	2,500			18,600	21,600	
	20.00		3,400	3,900	-	20,100	23,900	28,000	
5-3/4	18.00	100.00	2,300	2,600	11,800	17,200	20,400	23,600	-
	21.80		4,500	5,200	19,800	29,000	34,000	40,000	
	24.20		5,000	5,800	19,400	28,000	34,000	39,000	
6	20.00	100.00	3,100	3,600	14,800	21,600	26,000	30,000	-
	23.00		3,900	4,500	17,100	24,800	30,000	34,000	
6-5/8	24.00	100.00	4,400	5,100	23,000	34,000	40,000	46,000	-
	28.00		5,700	6,600	-	38,000	46,000	53,000	
7	23.00	100.00	3,300	3,800	20,600	30,000	36,000	41,000	-
	26.00		5,200	6,000	30,000	43,000	51,000	59,000	
	29.00		5,800	6,700					
7-5/8	26.40	100.00	3,700	4,300	24,600	36,000	42,000	-	-
	29.70		5,900	6,800	36,000	52,000	62,000	72,000	
	33.70		7,600	8,700	-	59,000	70,000	81,000	
8	31.00	100.00	6,300	7,200	40,000	58,000	69,000	80,000	-
8-1/8	32.50	100.00	6,400	7,400	41,000	59,000	70,000	81,000	-
	35.50		7,000	8,100					
	39.50	99.40	8,900	10,200	46,000	67,000	80,000	92,000	
8-5/8	32.00	91.50	4,800	5,500	36,000	53,000	-	-	-
	36.00	100.00	7,000	8,100	46,000	67,000	80000	93,000	
	40.00	97.40	8,800	10,100	-	77,000	91,000	105,000	
9	40.00	100.00	7,900	9,100	51,000	73,000	87,000	101,000	-
9-5/8	40.00	95.60	7,600	8,700	58,000	84,000	100,000	116,000	-
	43.50	100.00	8,400	9,700					
	47.00		10,400	12,000	-	95,000	113,000	131,000	-
10-3/4	45.50	93.80	11,000	12,700	74,000	108,000	128,000	148,000	-
	51.00	100.00	14,000	16,100	83,000	120,000	143,000	165,000	
	55.50	96.70	16,000	18,400	-	120,000	143,000	165,000	
	60.70	100.00	21,000	24,200		144,000	170,000	197,000	224,000
	65.70	95.60	23,000	26,500					
11-3/4	60.00	100.00	20,000	23,000	-	172,000	204,000	237,000	269,000
	65.00	91.60	21,000	24,200					
11-7/8	58.80	93.00	18,000	20,700	-	149,000	176,000	204,000	232,000
	71.80	97.10	25,000	28,800		177,000	210,000	243,000	276,000
16	95.00	97.80	36,000	41,000	230,000	330,000	390,000	450,000	511,000
	96.00	96.30	37,000	43,000					
	102.90	100.00	45,000	52,000	280,000	400,000	480,000	550,000	625,000
	109.00		47,000	54,000					
18	117.00	100.00	52,000	60,000	352,000	512,000	607,000	703,000	799,000
	128.00		58,000	67,000					
18-5/8	123.40	100.00	55,000	63,000	380,000	550,000	650,000	750,000	852,000
	136.00		61,000	70,000					
	139.00	96.70	63,000	72,000					

The minimum and target makeup torque values apply to all grades of steel. An appropriate safety factor should be applied to these yield torque values. Data provided by HYDRIL Company LP; Type 511 Efficiency and Torque Values; October, 2005

HYDRIL® 513™ Torque Values

Pipe		Connection							
Size (OD) Nominal	Wt	Make-up Torque		Yield Torque (Maximum Torque)					
		Minimum	Target	K-55	N-80/ L-80	C-90	T-95/ HC-95	C-110/ P-110	Q-125
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
4-1/2	11.60	2,800	3,400	8,600	11,500	12,700	13,300	15,000	17,000
	12.60	3,000	3,600				13,200		
	13.50	3,900	4,700	12,000	16,000	18,000	19,000	21,000	24,000
	15.10	5,100	6,200	14,000	18,000	20,000	21,000	24,000	26,000
	16.60	6,000	7,200	16,000	21,000	23,000	24,000	27,000	30,000
	17.00	6,100	7,400						
	18.80	6,800	8,200						
	21.50	6,700	8,100	13,500	17,000	19,000	20,000	22,000	24,000
5	15.00	4,700	5,700	15,000	20,000	22,000	23,000	26,000	29,000
	18.00	6,500	7,800	17,000	23,000	25,000	26,000	29,000	33,000
	21.40	8,200	9,900	20,000	26,000	29,000	30,000	34,000	38,000
	23.20	7,700	9,300	17,000	22,000	24,000	25,000	28,000	31,000
	24.10	8,000	9,600	17,000	22,000	24,000	25,000	28,000	31,000
	26.70	11,000	13,200	22,000	28,000	30,000	31,000	35,000	39,000
5-1/2	17.00	5,100	6,200	18,000	24,000	26,000	28,000	31,000	35,000
	20.00	7,000	8,400	20,000	27,000	30,000	31,000	35,000	39,000
	23.00	8,400	10,100	23,000	31,000	34,000	36,000	41,000	45,000
	26.00	8,200	9,900	20,000	26,000	28,000	29,000	33,000	37,000
7	26.00	7,900	9,500	31,000	42,000	47,000	49,000	56,000	63,000
	29.00			26,000	35,000	39,000	41,000	46,000	52,000
	32.00	10,700	12,900	34,000	46,000	51,000	53,000	61,000	68,000
	35.00	11,700	14,100				54,000		
	38.00	14,900	18,000	43,000	59,000	65,000	68,000	77,000	86,000
7-5/8	29.70	9,000	10,800	38,000	53,000	59,000	62,000	70,000	79,000
	33.70	8,700	10,500	31,000	42,000	46,000	48,000	55,000	62,000
	39.00	12,500	15,000	40,000	54,000	60,000	63,000	72,000	80,000
	42.80	17,000	21,000	51,000	69,000	76,000	80,000	91,000	102,000
	45.30	18,000	22,000	52,000	70,000	77,000	81,000		
7-3/4	46.10	18,000	21,000	53,000	72,000	79,000	83,000	94,000	106,000
8-5/8	40.00	10,100	12,200	55,000	78,000	86,000	91,000	104,000	118,000
9-3/8	39.00	10,100	11,600	52,000	76,000	85,000	90,000	104,000	118,000
9-5/8	47.00	14,000	17,000	61,000	84,000	94,000	98,000	112,000	126,000
	53.50	18,000	22,000	78,000	108,000	120,000	126,000	144,000	163,000
	58.40	21,000	26,000						161,000
9-7/8	62.80	22,000	27,000	82,000	114,000	126,000	132,000	151,000	170,000
	65.10								
10-3/4	55.50	18,000	22,000	75,000	105,000	117,000	123,000	141,000	159,000
	60.70	23,000	28,000	98,000	136,000	151,000	158,000	181,000	204,000
	65.70	25,000	30,000						
11-3/4	60.00	20,000	24,000	89,000	125,000	139,000	146,000	168,000	189,000
	65.00	22,000	26,000						
11-7/8	71.80	30,000	36,000	124,000	174,000	195,000	205,000	235,000	266,000
12-3/4	88.00	37,000	44,400	133,000	186,000	207,000	218,000	249,000	281,000
13-3/8	68.00	24,000	29,000	115,000	162,000	181,000	190,000	218,000	246,000
	72.00	26,000	31,000						
13-5/8	88.20	42,000	50,000	205,000	288,000	321,000	338,000	388,000	438,000
14	99.60	44,000	53,000	160,000	223,000	249,000	261,000	299,000	337,000
	104.20	46,000	55,000	161,000	224,000		262,000	300,000	338,000
	112.60	48,000	58,000	195,000	271,000	302,000	317,000	363,000	409,000
	113.00								
16	95.00	44,000	53,000	225,000	319,000	357,000	376,000	433,000	490,000
	96.00	45,000	54,000						
	102.90	47,000	56,000	207,000	293,000	327,000	344,000	395,000	447,000
	109.00	48,000	58,000		292,000	326,000	343,000		446,000

The minimum and target makeup torque values apply to all grades of steel. An appropriate safety factor should be applied to these yield torque values. Data provided by HYDRIL Company LP; Type 513 Efficiency and Torque Values; October, 2005

HYDRIL® 503™ Tubing Torque Values

Size & Wt		Make-Up		Yield		
		Minimum	Field Target	J-55	M-65	L-80/N-80
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
2-3/8	4.70	1,500	1,700	3,100	3,700	4,500
2-7/8	6.50	1,900	2,200	4,600	5,400	6,600
3-1/2	9.30	2,800	3,200	6,800	8,000	9,900
4	11.00	3,300	3,800	8,900	10,500	12,900
4-1/2	11.60	3,500	4,000	11,300	13,300	16,400
	12.75	3,800	4,400			

Data provided by HYDRIL Company LP; Type 503 Efficiency And Torque Values; October, 2005

HYDRIL® 523™ Torque Values

Pipe		Connection						
Size (OD) Nominal	Wt	Make-up Torque		Yield Torque (Maximum Torque)				
		Minimum	Target	N-80/ L-80	C-90	T-95/ HC-95	C-110/ P-110	Q-125
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
7	29.00	8,800	10,600	40,000	45,000	47,000	53,000	60,000
	32.00	11,900	14,300	51,000	57,000	59,000	68,000	76,000
	35.00	13,200	16,000	52,000		60,000		
	38.00	17,000	21,000	66,000	72,000	76,000	86,000	96,000
7-5/8	29.70	9,900	11,900	58,000	65,000	68,000	78,000	88,000
	33.70			48,000	53,000	55,000	63,000	71,000
	39.00	14,000	17,000	61,000	67,000	70,000	80,000	89,000
	42.80	19,000	23,000	76,000	84,000	88,000	100,000	112,000
	45.30	20,000	24,000	77,000	85,000	89,000	101,000	113,000
7-3/4	46.10	20,000	24,000	79,000	88,000	92,000	104,000	117,000
8-5/8	40.00	13,400	16,000	76,000	85,000	89,000	102,000	114,000
9-5/8	47.00	15,000	19,000	93,000	104,000	109,000	125,000	140,000
	53.50	21,000	25,000	120,000	133,000	140,000	160,000	180,000
	58.40	24,000	29,000	119,000	132,000	139,000	158,000	178,000
9-7/8	62.80	25,000	30,000	125,000	139,000	146,000	167,000	187,000
	65.10							
10-3/4	55.50	24,000	29,000	117,000	130,000	137,000	157,000	176,000
	60.70	30,000	36,000	149,000	166,000	174,000	199,000	224,000
	65.70	33,000	40,000	150,000				
11-3/4	60.00	26,000	31,000	138,000	154,000	162,000	186,000	209,000
	65.00	28,000	34,000	139,000				210,000
11-7/8	71.80	38,000	46,000	192,000	215,000	226,000	259,000	293,000
12-3/4	88.00	47,000	56,000	205,000	228,000	240,000	275,000	310,000
13-3/8	68.00	30,000	36,000	179,000	200,000	210,000	241,000	272,000
	72.00	33,000	40,000			211,000	242,000	273,000
	88.20	53,000	64,000	317,000	354,000	372,000	427,000	481,000
14	99.60	55,000	66,000	245,000	273,000	287,000	328,000	370,000
	104.20	57,000	68,000	246,000	274,000	288,000	329,000	371,000
	112.60	58,000	70,000	303,000	338,000	355,000	406,000	457,000
	113.00	58,000	70,000	303,000	338,000	355,000	406,000	457,000
16	95.00	54,000	65,000	350,000	392,000	412,000	475,000	537,000
	96.00	55,000	66,000					
	102.90	58,000	70,000	321,000	359,000	377,000	434,000	490,000
	109.00				358,000		433,000	489,000

The minimum and target makeup torque values apply to all grades of steel. An appropriate safety factor should be applied to these yield torque values. Data provided by HYDRIL Company LP; Type 521 Efficiency and Torque Values; October, 2005

HYDRIL® MAC™ II Torque Values

Pipe		Connection				
Size (OD) (Nominal)	Wt	Minimum Make-Up Torque				
		L-80/N-80	C-90	T-95/HC-95	C-110/P110	Q-125
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
5-1/2	28.40	5,200	5,700	5,900	6,600	7,300
	29.70	6,100	6,600	6,900	7,700	8,500
	32.60	7,100	7,800	8,100	9,100	10,000
	35.30	7,600	8,300	8,600	9,600	10,700
	36.40	7,700	8,400	8,700	9,700	10,800
	38.00	8,000	8,700	9,100	10,100	11,200
	40.50	8,300	9,100	9,400	10,500	11,600
6-5/8	36.70	7,900	8,400	8,700	9,500	10,300
	40.20	9,500	10,300	10,700	11,900	13,100
	43.70	11,500	12,400	12,900	14,200	16,000
	47.10	12,700	13,900	14,400	16,000	18,000
	50.40	13,400	14,600	15,000	17,000	19,000
	53.70	14,000	15,000	16,000	18,000	20,000
	65.80	16,000	18,000	19,000	21,000	23,000
7	41.00	8,900	9,700	10,000	11,200	12,300
	42.70	10,100	10,900	11,400	12,600	13,900
	44.00	9,700	10,600	11,000	12,300	13,600
	45.40	10,800	11,800	12,300	13,800	15,000
	46.40	11,300	12,400	12,900	14,400	16,000
	49.50	12,500	13,600	14,200	16,000	18,000
	50.10	12,700	13,900	14,400		
	53.60	14,300	16,000	16,000	18,000	20,000
	57.10	14,900		17,000	19,000	21,000
	60.50	16,000	17,000	18,000	20,000	22,000
	63.90		18,000	19,000	21,000	23,000
7-5/8	45.30	10,300	11,100	11,500	12,800	14,100
	47.10	11,400	12,300	12,800	14,200	16,000
	51.20	13,000	14,100	14,700	16,000	18,000
	52.80	13,500	14,600	15,000	17,000	19,000
	55.30	14,900	16,000	17,000	19,000	21,000
	59.20	17,000	18,000	19,000	21,000	24,000
	63.20	19,000	20,000	21,000	24,000	26,000
	66.90		21,000	22,000	25,000	27,000
	70.70	20,000	22,000	23,000	26,000	28,000
7-3/4	46.10	10,100	11,000	11,400	12,700	14,000
	48.60	12,100	13,100	13,600	15,000	17,000
8	70.80	21,000	23,000	24,000	26,000	29,000
8-1/16	74.20	23,000	25,000	26,000	29,000	32,000
8-5/8	54.00	13,000	14,100	14,600	16,000	18,000
	58.70	16,000	17,000	18,000	20,000	22,000
	63.50	18,000	20,000	21,000	23,000	25,000
	68.10	20,000	22,000	23,000	26,000	29,000
	72.70	23,000	25,000	26,000	29,000	32,000
	77.10	25,000	28,000	29,000	32,000	36,000
	81.50	28,000	30,000	31,000	35,000	39,000
	83.20	29,000	32,000	33,000	37,000	41,000
9-5/8	58.40	10,900	11,900	12,300	13,700	15,000
	59.40	13,500	14,700	15,000	17,000	19,000
	61.10	14,300	15,000	16,000	18,000	20,000
	64.90	17,000	18,000	19,000	21,000	23,000
	70.30	19,000	21,000	22,000	24,000	27,000
	71.60	20,000	22,000	23,000	25,000	28,000
	75.60	22,000	24,000	25,000	28,000	31,000
	80.80	25,000	27,000	28,000	32,000	35,000
	86.00	28,000	31,000	32,000	36,000	40,000
	91.00	31,000	34,000	35,000	39,000	44,000
9-7/8	62.80	14,500	16,000	16,000	18,000	20,000

Many factors influence torque application. To ensure minimum torque is attained, HYDRIL recommends a field target make-up torque (optimum torque) 10% over minimum. Maximum recommended make-up torque is 20% over minimum make-up torque. Data provided by HYDRIL Company LP; MAC II Efficiency and Torque Values; October, 2005

HYDRIL® MAC™ II Torque Values (Continued)

Pipe		Connection				
Size (OD) (Nominal)	Wt	Minimum Make-Up Torque				
		L-80/N-80	C-90	T-95/HC-95	C-110/P110	Q-125
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
10-3/4	73.20	19,000	20,000	21,000	24,000	26,000
	75.90	21,000	22,000	23,000	26,000	28,000
	79.20	23,000	25,000	26,000	29,000	32,000
	80.80	24,000	26,000	27,000	30,000	33,000
	85.30	26,000	28,000	29,000	32,000	36,000
	91.20	30,000	33,000	34,000	38,000	42,000
	97.10	34,000	37,000	38,000	42,000	47,000
	102.90	37,000	40,000	42,000	47,000	52,000
	104.30	36,000	39,000	41,000	46,000	51,000
	108.70	39,000	43,000	44,000	50,000	55,000
11-3/4	87.50	25,000	27,000	28,000	31,000	35,000
	94.00	30,000	33,000	34,000	38,000	41,000
	100.50	34,000	37,000	38,000	43,000	47,000
	107.10	38,000	42,000	43,000	48,000	53,000
	111.50	43,000	46,000	48,000	53,000	59,000
	113.50	42,000		47,000		
	119.90	46,000	51,000	53,000	59,000	66,000
12-3/4	94.20	28,000	30,000	31,000	35,000	38,000
	101.70	34,000	37,000	38,000	42,000	46,000
	109.10	40,000	43,000	45,000	50,000	54,000
	116.50	43,000	47,000	48,000	54,000	59,000
	123.70	49,000	53,000	55,000	61,000	67,000
	130.90	51,000	55,000	57,000	63,000	69,000
	137.90	57,000	62,000	65,000	73,000	81,000
13-3/8	92.50	25,000	27,000	28,000	31,000	34,000
	100.30	31,000	34,000	35,000	38,000	42,000
	108.10	34,000	37,000	39,000	43,000	47,000
	115.70	41,000	44,000	46,000	51,000	56,000
	123.40	46,000	49,000	51,000	57,000	63,000
	130.80	51,000	55,000	57,000	64,000	70,000
	138.30	57,000	62,000	64,000	72,000	79,000
	145.60	60,000	65,000	68,000	75,000	83,000
14	99.60	29,000	31,000	32,000	35,000	39,000
	104.20	32,000	35,000	36,000	40,000	43,000
	112.60	39,000	42,000	43,000	48,000	52,000
16	109.00	28,000	30,000	30,000	33,000	36,000
	118.00	33,000	35,000	37,000	40,000	43,000
	128.60	39,000	42,000	43,000	47,000	51,000
	137.90	44,000	47,000	48,000	53,000	57,000
	147.30	46,000	49,000	51,000	55,000	60,000

Refer to page 5-58 for footnote reference

HYDRIL® SuPreme™ LX Torque Values

Pipe		Connection											
Size (OD) & Wt Nominal		Make-Up Torque											
		K-55		L-80/N-80		C-90		T-95/HC-95		P-110/C-110		Q-125	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
4-1/2	12.60	2,100	2,400	2,500	3,100	2,600	3,200	2,700	3,300	2,900	3,700	3,100	4,100
	13.50	2,300	2,700	2,700	3,200	2,800	3,400	2,900	3,600	3,100	3,900	3,300	4,200
	15.10	2,800	3,200	3,200	4,000	3,400	4,200	3,500	4,300	3,800	4,800	4,100	5,200
	17.00	2,700	3,000	3,000	3,600	3,200	3,800	3,300	4,000	3,500	4,200	3,700	4,600
	18.80	3,400	3,600	3,800	4,200	3,900	4,400	4,000	4,600	4,200	5,000	4,400	5,300
	21.60	3,700	4,000	4,100	4,700	4,300	5,000	4,400	5,100	4,700	5,600	4,900	6,000
5	15.00	2,800	3,200	3,200	4,000	3,400	4,200	3,500	4,400	3,800	4,900	4,100	5,300
	18.00	3,600	4,000	4,100	4,700	4,300	5,000	4,400	5,100	4,600	5,600	4,900	6,000
	20.30	3,500		4,000		4,200	5,000	4,300	5,200		5,700	4,900	6,100
	20.80	3,700	4,100	4,200	5,000	4,400	5,200	4,500	5,400	4,800	5,900	5,100	6,300
	21.40	4,000	4,300	4,500	5,100	4,700	5,400	4,800	5,600	5,100	6,100	5,400	6,600
	23.20	4,100	4,500	4,600	5,400	4,900	5,800	5,000	5,900	5,300	6,400	5,600	6,900
	24.10	4,400	4,900	5,000	5,700	5,200	6,000	5,300	6,200	5,600	6,800	6,000	7,300
5-1/2	17.00	3,200	3,800	3,800	4,700	4,000	5,100	4,200	5,300	4,500	5,900	4,900	6,400
	20.00	4,100	4,500	4,600	5,500	4,900	5,900	5,000	6,000	5,300	6,600	5,700	7,100
	23.00		4,600	4,700	5,600		6,000	5,100	6,200	5,400	6,800	5,800	7,400
	26.00	4,500	5,100	5,200	6,300	5,500	6,800	5,700	6,900	6,100	7,600	6,500	8,300
	26.80	5,500	6,000	6,200	7,100	6,500	7,600	6,600	7,800	7,000	8,500	7,400	9,100
6-5/8	22.60	4,800	6,000	5,900	7,700	6,300	8,500	6,600	8,700	7,200	9,800	7,800	11,000
	24.00	5,300	6,500	6,400	8,200	6,800	8,900	7,000	9,200	7,700	10,000	8,300	
	24.60	5,500	6,600	6,600	8,400	7,000	9,000	7,200	9,400	7,900		8,500	
	28.00	5,400	6,300	6,300	7,700	6,700	8,400	6,900	8,600	7,400	9,500	8,000	10,000
	32.00	6,600	7,400	7,500	8,800	7,900	9,500	8,100	9,700	8,600	11,000	9,200	12,000
7	23.00	5,000	6,100	6,100	7,800	6,500	8,500	6,700	8,800	7,300	9,800	7,900	11,000
	26.00	5,900	6,900	7,000	8,600	7,400	9,300	7,600	9,600	8,200	11,000	8,800	12,000
	29.00	5,300	6,300	6,300	7,900	6,700	8,600	6,900	8,800	7,500	9,800	8,100	11,000
	32.00	6,700	7,600	7,700	9,200	8,100	9,800	8,300	10,000	8,900	11,000	9,500	12,000
	35.00		7,700	7,800	9,500	8,300	10,000	8,500	11,000	9,200	12,000	9,800	13,000
	38.00	7,000	8,000	8,100	9,800	8,500		8,800		9,400		10,000	
	41.00	8,100	9,200	9,300	11,000	9,800	12,000	10,000	12,000	11,000	13,000	12,000	15,000
	42.70	9,000	10,000	10,000	12,000	11,000	13,000	11,000	13,000	12,000	14,000		
7-5/8	26.40	6,100	7,600	7,500	9,700	8,000	11,000	8,300	11,000	9,100	12,000	9,900	14,000
	29.70	7,200	8,600	8,500	11,000	9,000	12,000	9,300	12,000	10,000	13,000	11,000	15,000
	33.70	6,800	8,000	8,000	10,000	8,500	11,000	8,700	11,000	9,500	12,000	10,000	14,000
	39.00	8,500	9,500	9,700	12,000	10,000	12,000	11,000	13,000	11,000	14,000	12,000	15,000
	42.80	8,200		9,500			13,000	10,000					16,000
	45.30	9,000	10,000	10,000	12,000	11,000		11,000	14,000	12,000	15,000	13,000	16,000
	47.10	9,400	11,000	11,000	13,000	12,000	14,000	12,000	15,000	13,000	16,000	14,000	18,000
7-3/4	46.10	9,100	11,000	11,000	13,000	11,000	14,000	12,000	15,000	13,000	16,000	14,000	18,000
	48.60	11,000	12,000	13,000	15,000	13,000	16,000	13,000	16,000	14,000	18,000	15,000	19,000
	54.20	12,000	13,000	14,000	16,000	14,000	17,000	15,000	18,000	16,000	19,000	17,000	20,000
8-5/8	36.00	7,800	9,500	9,500	12,000	10,000	13,000	10,000	14,000	11,000	15,000	12,000	17,000
	40.00	9,100	11,000	11,000	13,000	11,000	14,000	12,000	15,000	13,000	16,000	14,000	18,000
	44.00	9,600			14,000	12,000	15,000		16,000	13,000	18,000	15,000	19,000
	49.00	11,000	13,000	13,000	16,000	14,000	17,000	14,000	17,000	15,000	19,000	16,000	21,000
	52.00								18,000	16,000	20,000	17,000	22,000
	54.00	12,000	14,000	14,000	17,000	15,000	18,000	15,000	19,000	16,000	21,000	18,000	23,000
9-5/8	43.50	10,000	12,000	12,000	15,000	13,000	17,000	13,000	17,000	14,000	19,000	16,000	21,000
	47.00	11,000	13,000	13,000	17,000	14,000	18,000	15,000	19,000	16,000	20,000	17,000	22,000
	53.50	12,000	14,000	14,000	18,000	15,000	19,000	15,000	20,000	17,000	22,000	18,000	24,000
	58.40	13,000	16,000	16,000	19,000	17,000	21,000	17,000	21,000	18,000	24,000	20,000	26,000
9-3/4	59.20	14,000	17,000	17,000	21,000	18,000	23,000	18,000	24,000	20,000	26,000	21,000	29,000
9-7/8	62.80	15,000	17,000	17,000	21,000	18,000	23,000	19,000	24,000	20,000	27,000	22,000	29,000
	65.10		18,000	18,000	22,000	19,000				21,000			
10	66.95	15,000	18,000	18,000	22,000	19,000	23,000	19,000	24,000	21,000	27,000	22,000	29,000
	68.42												
10-3/4	51.00	12,000	15,000	15,000	19,000	16,000	20,000	16,000	21,000	18,000	24,000	19,000	26,000
	55.50	14,000	16,000	16,000	20,000	17,000	22,000	18,000	23,000	19,000	25,000	21,000	28,000
	60.70	15,000	18,000	18,000	23,000	19,000	25,000	20,000	26,000	22,000	29,000	23,000	31,000
	65.70	16,000	19,000	19,000	24,000	20,000	26,000	21,000	27,000	23,000		24,000	32,000

Many factors affect torque application. A field target torque (optimum torque) mid-way between minimum and maximum is recommended
Data provided by HYDRIL Company LP; SuPreme LX Efficiency And Torque Values; October, 2005

HYDRIL® SuPreme™ LX Torque Values (Continued)

Pipe		Connection											
Size (OD) & Wt Nominal		Make-Up Torque											
		K-55		L-80/N-80		C-90		T-95/HC-95		P-110/C-110		Q-125	
		Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
11-3/4	60.00	15,000	19,000	19,000	24,000	20,000	26,000	21,000	27,000	23,000	30,000	25,000	34,000
	65.00	16,000			25,000	21,000	27,000		28,000		31,000		
	71.00	20,000	23,000	23,000	28,000	24,000	30,000	25,000	31,000	27,000	34,000	29,000	37,000
11-7/8	71.80	18,000	22,000	22,000	29,000	24,000	31,000	25,000	32,000	27,000	36,000	29,000	40,000
12	74.80	19,000	23,000	23,000	29,000	24,000	32,000	25,000	33,000	28,000	37,000	30,000	40,000
12-1/16	78.10	19,000	23,000	23,000	29,000	25,000	32,000	25,000	33,000	28,000	37,000	30,000	41,000
13-3/8	68.00	18,000	23,000	22,000	29,000	24,000	32,000	25,000	33,000	27,000	37,000	30,000	41,000
	72.00	19,000		23,000	30,000				34,000	28,000	38,000		42,000
	77.00	21,000	25,000	25,000	32,000	27,000	35,000	28,000	36,000	30,000	40,000	33,000	44,000
	80.70	22,000	27,000	27,000	36,000	29,000	39,000	30,000	41,000	33,000	46,000	36,000	51,000
	85.00	23,000	29,000	28,000	37,000	30,000	40,000	31,000	42,000	34,000	47,000	38,000	52,000
	86.00	24,000	30,000	29,000	38,000	31,000	41,000	32,000	43,000	35,000	48,000	39,000	53,000
13-1/2	81.40	19,000	24,000	23,000	30,000	25,000	33,000	26,000	34,000	28,000	38,000	31,000	42,000
13-5/8	88.20	25,000	30,000	30,000	39,000	32,000	43,000	33,000	44,000	37,000	50,000	40,000	55,000

Refer to page 5-60 for footnote reference

HYDRIL® 563™ Casing Torque Values

Pipe		Connection				
Size (OD) Nominal	Wt	Minimum Make-Up Torque	Yield Torque (Maximum Torque)			
			N-80/L-80	T-95/HC-95	C-110/P-110	Q-125
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
5	13.00	4,500	18,400	21,900	25,000	29,000
	15.00	5,500				
	18.00	6,500				
	21.40	13,900	31,000	37,000	43,000	48,000
	23.20	14,500				
	24.10	15,000				
5-1/2	14.00	4,500	22,400	27,000	31,000	35,000
	15.50	5,200				
	17.00	5,800				
	20.00	6,600				
	23.00	7,700				
	26.00	11,000	27,000	32,000	37,000	42,000
	26.80	12,000				
	28.40	12,500				
	29.70	16,100	35,000	41,000	48,000	54,000
	32.60	17,600				
6-5/8	20.00	5,900	37,000	43,000	50,000	57,000
	24.00	7,500				
	28.00	8,600				
	32.00	9,900				
7	20.00	5,600	39,000	47,000	54,000	61,000
	23.00	6,700				
	26.00	7,800				
	29.00	8,400				
	32.00	9,500				
	35.00	14,800	55,000	65,000	75,000	86,000
	38.00	16,200				
	41.00	17,300				
	42.70	18,700				
7-5/8	26.40	7,800	47,000	55,000	64,000	73,000
	29.70	8,600				
	33.70	10,100				
	39.00	16,100	62,000	74,000	86,000	97,000
	42.80	17,800				
	45.30	19,000				
	55.30	28,000	81,000	96,000	112,000	127,000

The minimum makeup torque values apply to all grades of steel. Many factors influence torque application. To ensure that minimum torque is attained, a field target torque (optimum torque) 15% over minimum is recommended. An appropriate safety factor should be applied to these yield torque values. Data provided by HYDRIL Company LP; 563 Casing Efficiency and Torque Values; October, 2005

HYDRIL® 563™ Casing Torque Values (Continued)

Pipe		Connection				
Size (OD) Nominal	Wt	Minimum Make-Up Torque	Yield Torque (Maximum Torque)			
			N-80/L-80	T-95/HC-95	C-110/P-110	Q-125
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
7-3/4	46.10	25,000	79,000	93,000	108,000	123,000
	48.60					
8-5/8	32.00	9,400	60,000	71,000	82,000	93,000
	36.00	10,500				
	40.00	12,000				
	44.00	18,200	80,000	95,000	110,000	125,000
	49.00	19,800				
	52.00	21,200				
	54.00	22,600				
	68.10	36,000	105,000	125,000	145,000	163,000
9-5/8	36.00	10,000	75,000	89,000	103,000	117,000
	40.00	10,800				
	43.50	11,900				
	47.00	13,200				
	53.50	15,500				
9-7/8	62.80	24,000	108,000	129,000	149,000	169,000
	65.10					
10-3/4	40.50	12,200	103,000	122,000	142,000	161,000
	45.50	13,500				
	51.00	15,500				
	55.50	22,800	145,000	172,000	199,000	226,000
	60.70	25,000				
	65.70	27,000				
	73.20	31,000				
	79.20	45,000	198,000	235,000	273,000	310,000
11-3/4	47.00	13,000	123,000	147,000	170,000	193,000
	54.00	15,400				
	60.00	22,500	161,000	191,000	221,000	250,000
	65.00	24,000				
	71.00	27,000				
11-7/8	71.80	27,000	164,000	195,000	226,000	260,000
13-3/8	54.50	17,400	188,000	223,000	260,000	290,000
	61.00	20,000				
	68.00	21,000				
	72.00	23,000				
	77.00	34,000	250,000	300,000	340,000	390,000
	80.70	36,000				
	85.00	36,000				
	86.00	37,000				
13-1/2	81.40	31,000	242,000	290,000	330,000	380,000
13-5/8	88.20	37,000	260,000	310,000	360,000	410,000
16	95.00	45,000	360,000	430,000	490,000	560,000
	96.00					
	109.00	49,000				
	118.00	52,000				

Refer to page 5-61 for footnote reference

HYDRIL® 533™ Tubing Torque Values

Size & Wt		Torque					
		Make-Up		Yield			
		Minimum	Field Target	J-55/K-55	L-80/N-80	T-95	P-110
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
2-3/8	4.70	1,500	1,700	3,100	4,500	5,300	6,200
	5.30	1,800	2,100	-			
	5.95	2,100	2,400				
	6.60	2,200	2,500				
	7.45	2,600	3,000				
2-7/8	6.50	1,900	2,200	4,600	6,600	7,900	9,100
	7.90	2,400	2,800	-			
	8.70	2,500	2,900				
	9.50	3,900	4,500		8,500	10,100	11,700
	10.70	4,600	5,300				
	11.65	5,100	5,900				
3-1/2	9.30	2,800	3,200	6,800	9,900	11,700	13,600
	10.30	3,200	3,700	-			
	12.95	4,000	4,600				
	14.30	7,000	8,100		14,700	17,500	20,000
	15.80	7,800	9,000				
	16.70	8,300	9,500				
	17.05	8,700	10,000				
4	11.00	3,300	3,800	8,900	12,900	15,400	17,800
	11.60	3,700	4,300				
	13.40	4,000	4,600	-			
	14.80	6,200	7,100		16,800	19,900	23,000
	16.10	6,800	7,800				
	19.00	10,400	12,000		23,000	27,000	31,000
	21.10	11,800	13,600				
	22.50	12,800	14,700				
4-1/2	12.75	3,800	4,400	11,300	16,400	19,500	23,000
	13.50	4,100	4,700	-			
	15.50	5,800	6,700		21,000	25,000	29,000
	17.00	6,600	7,600				
	19.20	7,500	8,600				
	21.60	11,600	13,300		29,000	34,000	40,000
	24.00	13,100	15,100				
	26.50	14,800	17,000				
5	15.00	6,300	7,200	14,400	21,000	25,000	29,000
	18.00	7,700	8,900	-			
	21.40	15,600	17,900		36,000	42,000	49,000
	23.20	16,300	18,700				
	24.10	16,800	19,300				
5-1/2	15.50	6,000	6,900	17,400	-	-	-
	17.00	6,700	7,700		25,000	30,000	35,000
	20.00	8,000	9,200	-			
	23.00	9,200	10,600				
	26.00	11,800	13,600		29,000	34,000	39,000
	26.80	12,400	14,300				
	28.40	13,200	15,200				
6-5/8	24.00	8,800	10,100	30,000	43,000	51,000	59,000
	28.00	10,500	12,100	-			
	32.00	12,000	13,800				
7	23.00	8,200	9,400	33,000	48,000	58,000	67,000
	26.00	9,400	10,800	33,000			
	29.00	10,600	12,200	-			
	32.00	11,800	13,600				
	35.00	16,200	18,600		59,000	70,000	81,000
	38.00	17,700	20,000				
7-5/8	26.40	9,500	10,900	40,000	58,000	68,000	79,000
	29.70	10,900	12,500	-			
	33.70	12,500	14,400				
	39.00	18,300	21,000		71,000	84,000	97,000

The minimum and field target torque values apply to all grades and alloys of steel. Recommended torque values for CB and non-CB products are the same. An appropriate safety factor should be applied to these yield torque values. Data provided by HYDRIL Company LP; Type 533 Tubing Efficiency and Torque Values; October, 2005

HYDRIL® 553™ Tubing Torque Values

Size & Wt		Torque					
		Make-Up		Yield			
		Minimum	Field Target	J-55/K-55	L-80/N-80	T-95	C-110/P110
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
2-3/8	4.70	1,300	1,500	2,800	3,600	4,300	4,900
	5.30	1,500	1,700	-			
	5.95	1,700	2,000				
	6.60	1,900	2,200				
	7.45	2,200	2,500				
2-7/8	6.50	1,600	1,800	3,900	5,300	6,100	6,900
	7.90	2,000	2,300	-			
	8.70	2,100	2,400				
	9.50	3,500	4,000		8,800	10,000	11,300
	10.70	4,000	4,600				
	11.65	4,500	5,200				
3-1/2	9.30	2,400	2,800	5,900	8,000	9,200	10,400
	10.30	2,700	3,100	-			
	12.95	3,300	3,800				
	14.30	6,000	6,900		14,500	16,400	18,400
	15.80	6,600	7,600				
	16.70	7,000	8,100				
	17.05	7,400	8,500				
4	11.00	2,800	3,200	7,500	10,200	11,800	13,400
	11.60	3,100	3,600				
	13.40	3,400	3,900	-	16,600	19,100	21,600
	14.80	5,500	6,300				
	16.10	6,000	6,900				
	19.00	9,100	10,500		23,300	27,000	30,000
	21.10	10,300	11,800				
	22.50	11,300	13,000				
4-1/2	12.75	3,200	3,700	7,700	12,600	14,600	16,600
	13.50	3,500	4,000	-			
	15.50	5,100	5,900		19,900	23,000	26,000
	17.00	5,800	6,700				
	19.20	6,600	7,600				
	21.60	10,200	11,700		29,000	33,000	37,000
	24.00	11,500	13,200				
	26.50	13,000	15,000				
5	15.00	5,500	6,300	12,700	18,400	21,900	25,000
	18.00	6,500	7,500	-			
	21.40	13,900	16,000		31,000	37,000	43,000
	23.20	14,500	16,700				
	24.10	15,000	17,300				
5-1/2	15.50	5,200	6,000	15,400	22,400	27,000	31,000
	17.00	5,800	6,700				
	20.00	6,600	7,600	-			
	23.00	7,700	8,900				
	26.00	11,000	12,700		27,000	32,000	37,000
	26.80	12,000	13,800				
	28.40	12,500	14,400				
6-5/8	24.00	7,500	8,600	25,000	37,000	43,000	50,000
	28.00	8,600	9,900	-			
	32.00	9,900	11,400				
7	23.00	6,700	7,700	27,000	39,000	47,000	54,000
	26.00	7,800	9,000				
	29.00	8,400	9,700	-			
	32.00	9,500	10,900				
	35.00	14,800	17,000		55,000	65,000	75,000
	38.00	16,200	18,600				
7-5/8	26.40	7,800	9,000	-	47,000	55,000	64,000
	29.70	8,600	9,900				
	33.70	10,100	11,600				
	39.00	16,100	18,500		62,000	74,000	86,000

The minimum and field target torque values apply to all grades and alloys of steel. Recommended torque values for CB and non-CB products are the same. Data provided by HYDRIL Company LP; Type 553 Tubing Torque Values; October, 2005

HYDRIL® 563™ Tubing Torque Values

Size & Wt		Make-Up Torque			Yield Torque			
		Minimum	Field Target	Buck-On	J-55/K-55	L-80/N-80	T-95	C-110/P-110
in.	lb/ft	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb	ft-lb
2-3/8	4.60	1,300	1,500	2,400	2,800	3,600	4,300	4,900
	5.10	1,500	1,700	2,700	-			
	5.80	1,700	2,000	3,100				
	6.60	1,900	2,200	3,500				
	7.35	2,200	2,500	3,600				
2-7/8	6.40	1,600	1,800	2,900	3,900	5,300	6,100	6,900
	7.80	2,000	2,300	3,600	-			
	8.60	2,100	2,400	3,800				
	9.35	3,500	4,000	6,400		8,800	10,000	11,300
	10.50	4,000	4,600	7,300				
	11.50	4,500	5,200	8,200				
3-1/2	9.20	2,400	2,800	4,400	5,900	8,000	9,200	10,400
	10.20	2,700	3,100	4,900	-			
	12.70	3,300	3,800	6,000				
	14.30	6,000	6,900	10,900		14,500	16,400	18,400
	15.50	6,600	7,600	12,000				
	16.70	7,000	8,100	12,700				
	17.00	7,400	8,500	13,500				
4	11.00	2,800	3,200	5,100	7,500	10,200	11,800	13,400
	11.60	3,100	3,600	5,600				
	13.20	3,400	3,900	6,200	-	16,600	19,100	21,600
	14.80	5,500	6,300	10,000				
	16.10	6,000	6,900	10,900				
	18.90	9,100	10,500	16,600		23,300	27,000	30,000
	21.10	10,300	11,800	18,700				
	22.20	11,300	13,000	21,000				
4-1/2	11.60	3,000	3,500	5,500	9,200	12,600	14,600	16,600
	12.60	3,200	3,700	5,800	7,700			
	13.50	3,500	4,000	6,400	-			
	15.20	5,100	5,900	9,300		19,900	23,000	26,000
	17.00	5,800	6,700	10,600				
	18.90	6,600	7,600	12,000				
	21.50	10,200	11,700	18,600		29,000	33,000	37,000
	23.70	11,500	13,200	21,000				
	26.10	13,000	15,000	24,000				
5	15.00	5,500	6,300	10,000	12,700	18,400	21,900	25,000
	18.00	6,500	7,500	11,800	-			
	21.40	13,900	16,000	25,000		31,000	37,000	43,000
	23.20	14,500	16,700	26,000				
	24.10	15,000	17,300	27,000				
5-1/2	15.50	5,200	6,000	9,500	15,400	22,400	27,000	31,000
	17.00	5,800	6,700	10,600				
	20.00	6,600	7,600	12,000	-			
	23.00	7,700	8,900	14,000				
	26.00	11,000	12,700	20,000		27,000	32,000	37,000
	26.80	12,000	13,800	22,000				
	28.40	12,500	14,400	23,000				
	29.70	16,100	18,500	29,000		35,000	41,000	48,000
	32.60	17,600	20,000	32,000				
6-5/8	24.00	7,500	8,600	13,700	25,000	37,000	43,000	50,000
	28.00	8,600	9,900	15,700	-			
	32.00	9,900	11,400	18,000				
7	23.00	6,700	7,700	12,200	27,000	39,000	47,000	54,000
	26.00	7,800	9,000	14,200				
	29.00	8,400	9,700	15,300	-			
	32.00	9,500	10,900	17,300				
	35.00	14,800	17,000	27,000		55,000	65,000	75,000
	38.00	16,200	18,600	29,000				
	41.00	17,300	19,900	31,000				
	42.70	18,700	22,000	34,000				

The minimum, field target, and buck-on torque values apply to all grades of steel. The appropriate safety factor should be applied to these yield torque values. Data provided by HYDRIL Company LP; Type 563 Tubing Torque Values; October, 2005

Hunting: Seal Lock HT Database

Pipe (OD)	Wt	Grade	PIPE					Standard Connection		Special Clearance Connection		Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb		
2-1/16	3.25	L-80	.156	1.751	1.657	10,590	11,180	2.450	88,800	-	-	1,200	1,500	1,800
		13 CR-80												
		N-80							93,500					
		P-110				14,560	14,600		116,900			1,400	1,700	2,000
2-3/8	4.60	J-55	.190	1.995	1.901	7,700	8,100	2.875	97,800	-	-	1,400	1,800	2,000
		13 CR-80				11,200	11,780		123,900			1,600	2,000	2,400
		L-80												
		N-80							130,400					
		13 CR-105				14,700	15,460		156,500			1,800	2,200	2,600
		P-110				15,400	16,100		163,000					
		13 CR-110					16,130							
2-3/8	5.10	P-110	.218	1.939	1.845	17,670	18,340	2.875	184,600	-	-	1,900	2,300	2,700
2-7/8	6.40	J-55	.217	2.441	2.347	7,260	7,680	3.500	135,900	-	-	2,300	2,800	3,300
		L-80				10,570	11,170		172,100			2,500	3,000	3,500
		13 CR-80												
		N-80							181,200	3.187	151,000			
		13 CR-85				11,230						2,600	3,100	3,600
		P-110				14,530	14,550		226,500	3.187	188,800	2,700	3,200	3,700
		13 CR-110												
2-7/8	7.70	13 CR-80	.276	2.323	2.229	13,440	13,890	3.500	214,100	3.187	143,500	2,800	3,300	3,800
2-7/8	7.80	L-80	.276	2.323	2.229	13,440	13,890	3.500	214,100	-	-	2,800	3,300	3,800
		Super CR-80												
		P-110				18,480	19,090	3.500	281,800			3,000	3,500	4,000
2-7/8	8.60	P-110	.308	2.259	2.165	20,620	21,040	3.500	323,800	-	-	3,100	3,600	4,100
2-7/8	10.50	C-95	.392	2.091	1.997	22,670	22,370	3.500	298,800	-	-	3,300	3,800	4,300
		P-110				26,250	25,910		355,800			3,400	3,900	4,400
3-1/2	9.20	J-55	.254	2.992	2.867	6,990	7,400	4.250	194,300	-	-	3,200	3,700	4,200
		13 CR-80				10,160	10,540		246,100			3,400	3,900	4,400
		L-80								3.844	204,800			
		N-80							259,000	-	-			
		13 CR-85				10,800	11,060			3.844	215,600			
		C-90				11,430	11,570			-	-	3,500	4,000	4,500
		13 CR-95				12,070	12,080		272,000	3.844	226,400			
		P-105				13,340	13,060		310,800	-	-	3,600	4,100	4,600
		13 CR-110				13,970	13,530		323,800					
		P-110								3.844	269,500			
3-1/2	10.20	L-80	.289	2.992	2.797	11,560	12,120	4.250	276,900	-	-	3,600	4,100	4,600
										3.844	204,800			
		N-80							291,500		215,600			
		13 CR-85	.289	2.992	2.797	12,280	12,880	4.250	291,500	3.844	215,600	3,700	4,200	4,700
		13 CR-95				13,730	14,390		306,100		226,400			
		P-110				15,890	16,670		364,400		269,500	3,800	4,300	4,800
3-1/2	12.70	L-80	.375	2.750	2.625	15,000	15,310	4.250	349,800	-	-	4,100	4,600	5,100
		13 CR-80							349,800	3.844	204,800			
4	9.50	J-55	.226	3.548	3.423	5,440	5,110	4.500	201,000	-	-	2,700	3,200	3,700
		13 CR-80				7,910	6,590		254,600			2,900	3,400	3,900
		L-80												
		N-80							268,000					
		13 CR-95				9,390	7,310		281,400	4.300	226,900	3,000	3,500	4,000
		P-110				10,880	7,910		335,000	-	-	3,100	3,600	4,100
		Super 13 CR-110							348,400					

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HT Database (Continued)

Pipe (OD)	Wt	Grade	PIPE					Standard Connection		Special Clearance Connection		Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb		
4	10.80	13 CR-80	.262	3.476	3.351	9,170	8,800	4.500	292,300	4.300	205,200	3,100	3,600	4,100
		P-110				12,610	11,060		384,600	-	-	3,300	3,800	4,300
4	11.00	N-80	.262	3.476	3.351	9,170	8,800	4.500	307,700	-	-	3,100	3,600	4,100
		L-80							292,300	4.300	205,200			
		P-110				12,610	11,060		384,600		270,000	3,300	3,800	4,300
4	11.60	J-55	.286	3.428	3.303	6,880	7,300	4.500	250,300	-	-	3,100	3,600	4,100
		L-80				10,010	10,280		317,000	4.300	205,200	3,300	3,800	4,300
		13 CR-80								-	-			
		13 CR-105				13,140	12,690		400,400	4.300	259,300	3,500	4,000	4,500
		P-110				13,760	13,150		417,100		270,100			
		Super 13 CR-110							433,800	-	-			
4	13.20	13 CR-80	.330	3.340	3.215	11,550	12,110	4.500	319,400	4.300	205,200	3,500	4,000	4,500
		K-55				7,940	8,330		319,400	-	-	3,300	3,800	4,300
		L-80				11,550	12,110			4.300	205,200	3,500	4,000	4,500
		N-80							336,200		216,000			
		13 CR-95				13,720	14,380		353,000		226,800	3,600	4,100	4,600
		P-110				15,880	16,650		420,300		270,000	3,700	4,200	4,700
		Super 13 CR-110							437,100	-	-			
4-1/2	10.50	L-80	.224	4.052	3.927	6,970	4,940	5.000	285,900	-	-	3,100	3,600	4,100
		P-110				9,580	5,550		376,100	4.875	376,100	3,300	3,800	4,300
4-1/2	11.60	13 CR-80	.250	4.000	3.875	7,780	6,360	5.000	317,100	-	-	3,300	3,800	4,300
		13 CR-95				9,240	7,030		350,500			3,400	3,900	4,400
		K-55				5,350	4,940		317,100			3,100	3,600	4,100
		L-80				7,780	6,360					3,300	3,800	4,300
		N-80							333,800	4.875	306,800			
		P-110				10,690	7,580		417,300	-	-	3,500	4,000	4,500
4-1/2	12.60	K-55	.271	3.958	3.833	5,800	5,730	5.000	342,000	-	-	3,300	3,800	4,300
		13 CR-80				8,430	7,500					3,500	4,000	4,500
		13 CR-95				10,010	8,410		378,000			3,600	4,100	4,600
		L-80				8,430	7,500		342,000	4.944	342,000	3,500	4,000	4,500
		N-80							360,000	-	-			
		P-110				11,590	9,210		450,000			3,700	4,200	4,700
4-1/2	13.50	K-55	.290	3.920	3.795	6,200	6,420	5.000	361,000	-	-	3,400	3,900	4,400
		13 CR-80				9,020	8,540					3,600	4,100	4,600
		L-80								4.875	291,400			
		N-80							380,000		306,800			
		13 CR-85				9,590	8,920			-	-	3,700	4,200	4,700
		C-95				10,710	9,660		399,000	4.875	322,100			
		13 CR-95								-	-			
									380,000					
		P-110				12,410	10,690		475,000	4.875	383,500	3,800	4,300	4,800
		13 CR-110												
4-1/2	15.10	L-80	.337	3.826	3.701	10,480	11,080	5.000	361,000	-	-	3,900	4,400	4,900
		13 CR-80												
		P-110				14,420	14,340		475,000	4.875	383,500	4,100	4,600	5,100
		13 CR-110												
4-1/2	15.20	Super 13 CR-110	.337	3.826	3.701	14,420	14,340	5.000	494,000	-	-	4,100	4,600	5,100
5	13.00	L-80	.253	4.494	4.369	7,080	5,140	5.563	358,400	5.375	358,400	4,700	5,500	6,300

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HT Database (Continued)

Pipe (OD)	Wt	Grade	PIPE					Standard Connection		Special Clearance Connection		Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb		
5	15.00	K-55	.296	4.408	4.283	5,700	5,560	5.563	415,500	-	-	5,000	5,500	6,000
		N-80				8,290	7,250		437,400	5.375	420,400	5,300	6,100	6,900
		L-80							415,500		399,400			
		13 CR-80								-	-			
										5.375	399,400			
		13 CR-85				8,810	7,550		437,400		420,400	5,400	6,200	7,000
		P-110				11,400	8,850		546,800		525,500	5,500	6,300	7,100
5	18.00	K-55	.362	4.276	4.151	6,970	7,390	5.563	501,100	-	-	5,900	6,700	7,500
		13 CR-80				10,140	10,500		501,100			6,000	6,800	7,600
		L-80								5.375	399,400			
		N-80							527,500		420,400			
		S-95				12,040	12,020		580,200		462,400	6,100	6,900	7,700
		P-110				13,940	13,470		659,400		525,500	6,200	7,000	7,800
		Super 13 CR-110							685,800		546,500			
5	23.20	L-80	.478	4.044	3.919	13,380	13,830	5.563	523,500	-	-	6,900	7,700	8,500
5-1/2	15.50	K-55	.275	4.950	4.825	4,810	4,040	6.050	428,800	-	-	4,800	5,300	5,800
		13 CR-80				7,000	4,990			5.875	428,800	5,100	5,900	6,700
		L-80							428,800					
		N-80							451,400	-	-			
		P-110				9,630	5,630		524,300			5,300	6,100	6,900
5-1/2	17.00	K-55	.304	4.892	4.767	5,320	4,910	6.050	471,400	-	-	5,300	6,100	6,900
		13 CR-80				7,740	6,290					5,400	6,200	7,000
		L-80								5.800	377,300			
										5.908	471,400			
		N-80							496,200	5.800	397,200			
										5.908	496,200			
		PS-80							471,400	-	-			
		13 CR-85				8,220	6,520		496,200	5.875	465,800	5,500	6,300	7,100
		C-95				9,190	6,940		521,000	5.908	521,000	5,500	6,300	7,100
		T-95								5.875	489,100			
		13 CR-95								5.908	521,000			
										5.875	489,100			
		P-110				10,640	7,480		620,300	-	-	5,600	6,400	7,200
									620,300	5.800	496,500	5,600	6,400	7,200
		25 CR-125				12,090	7,890		645,100	5.875	605,500			
5-1/2	20.00	L-80	.361	4.778	4.653	9,190	8,830	6.050	553,700	-	-	6,000	6,800	7,600
		N-80							582,800					
		13 CR-80							553,700	5.875	442,500			
		13 CR-95				10,910	10,010		611,900		489,100	6,100	6,900	7,700
		T-95												
		P-110				12,640	11,100		728,500		582,200	6,200	7,000	7,800
		13 CR-110												
5-1/2	23.00	L-80	.415	4.670	4.545	10,560	11,160	6.050	562,000	-	-	6,500	7,300	8,100
		13 CR-80												
		13 CR-85				11,220	11,820		591,500	5.875	465,800	6,600	7,400	8,200
		T-95				12,540	12,930		621,100	-	-			
		13 CR-105				13,860	14,020		709,800	5.875	559,000	6,700	7,500	8,300
		P-110				14,530	14,540		739,400		582,300			
5-1/2	26.00	L-80	.476	4.548	4.423	12,120	12,650	6.050	562,000	-	-	7,000	7,800	8,600
5-1/2	28.40	L-80	.530	4.440	4.315	13,490	13,930	6.050	561,900	-	-	7,400	8,200	9,000

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HT Database (Continued)

Pipe (OD)	Wt	Grade	PIPE					Standard Connection		Special Clearance Connection		Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb		
6-5/8	20.00	K-55	.288	6.049	5.924	4,180	2,970	7.390	544,700	7.000	531,500	5,600	6,400	7,200
		13 CR-80				6,090	3,480			-	-	5,700	6,500	7,300
		L-80												
		P-110				8,370	4,030		716,700			5,900	6,700	7,500
6-5/8	24.00	13 CR-80	.352	5.921	5.796	7,440	5,760	7.390	659,000	-	-	6,600	7,400	8,200
		L-80												
		N-80							693,700					
		P-110				10,230	6,730		867,100			6,800	7,600	8,400
6-5/8	28.00	13 CR-80	.417	5.791	5.666	8,810	8,170	7.390	772,600	7.039	572,300	7,400	8,200	9,000
		L-80								-	-			
6-5/8	32.00	13 CR-80	.475	5.675	5.550	10,040	10,320	7.390	871,800	-	-	8,000	8,800	9,600
		L-80								7.000	531,500			
		N-80							917,700	-	-			
		P-110				13,800	13,220		1,147,100	7.000	699,400	8,200	9,000	9,800
7	23.00	K-55	.317	6.366	6.241	4,360	3,270	7.656	632,300	-	-	6,700	7,500	8,300
		13 CR-80				6,340	3,830					6,800	7,600	8,400
		L-80												
		N-80							665,600					
		P-110				8,720	4,440		832,000			7,000	7,800	8,600
		PS-80				6,340	3,830		632,300			6,800	7,600	8,400
		S-95				7,350	5,650		732,200			6,900	7,700	8,500
7	26.00	K-55	.362	6.276	6.151	4,980	4,330	7.656	717,200	7.500	717,200	7,300	8,100	9,000
		13 CR-80				7,240	5,410			-	-	7,400	8,200	9,000
		L-80								7.500	717,200			
		N-80							754,900	-	-	17,000	18,500	20,000
		P-110				9,960	6,230		943,600	7.500	943,600	7,600	8,400	9,200
7	29.00	13 CR-80	.408	6.184	6.059	8,160	7,030	7.656	802,700	-	-	8,000	8,800	9,600
		L-80								7.375	580,500			
		N-80						7	844,900	-	-	20,000	21,500	23,000
		T-95				9,690	7,840		887,100			8,100	8,900	9,700
												16,000	20,000	24,000
		P-110				11,220	8,530		1,056,100	7.441	859,600	8,200	9,000	9,800
		Q-125				12,750	9,110		1,140,600	-	-			
7	32.00	L-80	.453	6.094	5.969	9,060	8,610	7.656	832,500	-	-	8,600	9,400	10,200
		P-110				12,460	10,780		1,095,400			8,800	9,600	10,400
7	35.00	P-110	.498	6.004	5.879	13,700	13,030	7.656	1,095,400	-	-	9,200	10,000	10,800
		Q-125				15,560	14,310		1,183,000					
7	38.00	P-110	.540	5.920	5.795	14,850	15,130	7.656	1,095,400	-	-	9,600	10,400	11,200
		Q-125				16,880	16,750		1,183,000					

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HT - ST

Pipe (OD)	Wt	Grade	Pipe					Standard Connection		Special Clearance Connection		Field End Torque	
			Nominal Wall Thickness	Inside Diameter	Drift Diameter* (Special Drift)	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb	
2-1/16	3.25	L-80	.156	1.751	1.657	10,590	11,180	2.450	88,800	-	-	1,200	1,800
		N-80							93,500				
		P-110				14,560	14,600		116,900			1,400	2,400
2-3/8	4.60	J-55	.190	1.995	1.901	7,700	8,100	2.875	97,800	-	-	1,400	2,200
		13 CR-80				11,200	11,780		123,900			1,600	2,400
		L-80											
		N-80							130,400				
		P-110				15,400	16,100		163,000			1,800	3,100
		13 CR-110											
2-3/8	5.10	P-110	.218	1.939	1.845	17,670	18,340	2.875	184,600	-	-	1,900	3,500
2-7/8	6.40	J-55	.217	2.441	2.347	7,260	7,680	3.500	135,900	-	-	2,300	3,300
		L-80				10,570	11,170		172,100			2,500	4,000
		N-80							181,200	3.187	151,000		
		13 CR-80							172,100	-	-		
		13 CR-85				11,230	11,820		181,200	3.250	181,200		4,200
										3.187	151,000	2,600	
		13 CR-95				12,550	12,940		190,300	3.187	158,500	2,600	4,600
										3.250	182,600		
											190,300		
		P-110				14,530	14,550		226,500	3.187	188,700	2,700	5,200
		13 CR-110				14,530	14,550						
		Super 13 CR-110							235,600	-	-		
2-7/8	7.70	13 CR-80	.276	2.323	2.229	13,440	13,890	3.500	214,100	3.187	143,500	2,800	5,000
2-7/8	7.80	L-80	.276	2.323	2.229	13,440	13,890	3.500	214,100	-	-	2,800	5,000
		Super CR-80											
		13 CR-95				15,960	16,480		236,700			2,900	5,800
		13 CR-110				18,480	19,090		281,800			3,000	6,600
		P-110											
2-7/8	8.60	P-110	.308	2.259	2.165	20,620	21,040	3.500	323,800	-	-	3,100	7,500
2-7/8	10.50	C-95	.392	2.091	1.997	22,670	22,370	3.500	298,800	-	-	3,300	8,400
		P-110				26,250	25,910		355,800			3,400	9,600
3-1/2	9.20	J-55	.254	2.992	2.867	6,990	7,400	4.250	194,300	-	-	3,200	4,200
		13 CR-80				10,160	10,540		246,100	4.000	246,100	3,400	5,500
										3.844	204,800		
		L-80								-	-		
										3.844	204,800		
		N-80							259,000	-	-		
										3.844	215,600		
		13 CR-85				10,800	11,050			-	-	2,600	5,800
		C-90				11,430	11,570		259,000			3,500	6,100
		13 CR-95				12,070	12,080		271,900	3.844	226,400		6,300
		P-105				13,340	13,060		310,800	-	-	3,600	6,900
		13 CR-110				13,970	13,530		323,800	4.000	323,750		7,100
										3.844	269,500		
		P-110											
		Super 13 CR-110							336,700	4.115	336,700		

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HT - ST (Continued)

Pipe (OD)	Wt	Grade	Pipe					Standard Connection		Special Clearance Connection		Field End Torque	
			Nominal Wall Thickness	Inside Diameter	Drift Diameter* (Special Drift)	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb	
3-1/2	10.20	L-80	.289	2.922	2.797	11,560	12,120	4.250	276,900	-	-	3,600	6,200
		N-80							276,900	3.844	204,800		
		13 CR-95				13,730	14,390		291,500		215,600		
		P-110				15,890	16,670		306,100		226,400	3,700	7,100
3-1/2	12.70	L-80	.375	2.750	2.625	15,000	15,310	4.250	364,400		269,500	3,800	8,100
		13 CR-80							349,800	-	-	4,100	8,200
		13 CR-95				17,810	18,180		386,600	3.844	204,800		
4	9.50	13 CR-80	.226	3.548	3.423	7,910	6,590	4.500	254,600		226,400	4,200	9,500
		J-55				5,440	5,110		201,000	4.300	205,200	2,900	5,900
		L-80				7,910	6,590		254,600	-	-	2,700	4,400
		N-80							268,000			2,900	5,900
		P-110				10,880	7,910		335,000			3,100	7,800
		Super 13 CR-110							348,400				
4	10.80	13 CR-80	.262	3.476	3.351	9,170	8,800	4.500	292,300	-	-	3,100	6,900
		P-110				12,610	11,060		384,600			3,300	9,000
4	11.00	L-80	.262	3.476	3.351	9,170	8,800	4.500	292,300	4.300	205,200	3,100	6,900
		13 CR-80								4.300			
		N-80							307,700		216,000		
		13 CR-85				9,740	9,200					3,200	7,200
		P-110				12,610	11,050		384,600		270,100	3,300	9,000
4	11.60	J-55	.286	3.428	3.303	6,880	7,300	4.500	250,300	-	-	3,100	5,700
		L-80				10,010	10,280		317,000	4.300	205,200	3,300	7,700
		13 CR-80								4.400	269,900		
		P-110				13,760	13,150		417,100	4.300	205,200	3,500	10,100
		Super 13 CR-110							433,800	-	-		
4	13.20	13 CR-80	.330	3.340	3.215	11,550	12,110	4.500	319,400	4.300	205,200	3,500	9,000
		K-55				7,940	8,330			-	-	3,300	6,600
		L-80				11,550	12,110		319,400	4.300	205,200	3,500	9,000
		N-80							336,200		216,000		
		13 CR-95				13,720	14,380		353,000		226,800	3,600	10,500
		P-110				15,880	16,650		420,300		270,000	3,700	12,000
		Super 13 CR-110							437,100	-	-		
4-1/2	10.50	L-80	.224	4.052	3.927	6,970	4,940	5.000	285,900	-	-	3,100	7,000
4-1/2	11.60	13 CR-80	.250	4.000	3.875	7,780	6,360	5.000	317,100	-	-	3,300	7,900
		13 CR-95				9,240	7,030		350,500			3,400	9,100
		K-55				5,350	4,940		317,100			3,100	5,800
		L-80				7,780	6,360					3,300	7,900
		N-80							333,800	4.875	306,800		
		P-110				10,690	7,580		417,300	-	-	3,500	10,400
4-1/2	12.60	K-55	.271	3.958	3.833	5,800	5,730	5.000	342,000	-	-	3,300	6,500
		13 CR-80				8,430	7,500			4.875	291,500	3,500	8,800
		13 CR-95				10,010	8,410		378,000	-	-	3,600	10,200
		L-80				8,430	7,500		342,000	4.944	342,000	3,500	8,800
		N-80							360,000	4.875	291,400		
		P-110				11,590	9,210		450,000	-	-	3,700	11,600
		13 CR-110								4.875	383,500		

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HT - ST (Continued)

Pipe (OD)	Wt	Grade	Pipe					Standard Connection		Special Clearance Connection		Field End Torque	
			Nominal Wall Thickness	Inside Diameter	Drift Diameter* (Special Drift)	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb	
4-1/2	13.50	K-55	.290	3.920	3.795	6,200	6,420	5.000	361,000	-	-	3,400	7,000
		13 CR-80				9,020	8,540					3,600	9,600
		L-80								4.875	291,400		
		N-80							380,000		306,800		
		13 CR-85				9,590	8,920			-	-	3,700	10,200
		13 CR-95				10,710	9,660		399,000				11,200
		P-110				12,410	10,690		475,000	4.875	383,500	3,800	12,700
4-1/2	15.10	L-80	.337	3.826	3.701	10,480	11,080	5.000	361,000	-	-	3,900	11,500
		13 CR-80								4.875	291,500		
		13 CR-85				11,140	11,670		380,000		306,800	4,000	12,100
		P-110				14,420	14,340		475,000	-	-	4,100	15,300
		Super 13 CR-110							494,000				
5	15.00	K-55	.296	4.408	4.283	5,700	5,560	5.563	415,500	-	-	5,000	6,000
		N-80				8,290	7,250		437,400	5.375	420,400	5,300	7,000
		L-80							415,500		399,400		
		13 CR-80								-	-		
		13 CR-85				8,810	7,550		437,400	5.375	399,400	5,400	7,400
		13 CR-95				9,840	8,110		459,300		420,400		8,100
		Super 13 CR-95				9,840	8,110		459,300		441,400	5,400	8,100
		P-110				11,400	8,850		546,800		525,500	5,500	9,200
		22 CR-110									525,500		
5	18.00	K-55	.362	4.276	4.151	6,970	7,390	5.563	501,100	-	-	5,900	7,500
		13 CR-80				10,140	10,500			5.375	399,400	6,000	10,100
		L-80								-	-		
		N-80							527,500	5.375	420,400		
		S-95				12,040	12,020		580,200		462,400	6,100	11,800
		HP2 13 CR-110				13,940	13,470		633,000		504,500	6,200	13,400
		P-110							659,400	5.501	659,400		
										5.375	525,500		
		13 CR-110								5.400	551,800		
										5.375	525,500		
5	23.20	L-80	.478	4.044	3.919	13,380	13,830	5.563	523,500	-	-	6,900	14,600
		13 CR-110				18,400	19,020		688,800	5.375	525,500	7,100	19,500
5-1/2	15.50	K-55	.275	4.950	4.825	4,810	4,040	6.050	428,800	-	-	4,800	5,000
		13 CR-80				7,000	4,990			5.875	428,800	5,100	7,000
		L-80											
		N-80							451,400	-	-		
		P-110				9,630	5,630		524,300			5,300	9,100
5-1/2	17.00	K-55	.304	4.892	4.767	5,320	4,910	6.050	471,400	-	-	5,300	6,900
		13 CR-80				7,740	6,290					5,400	8,600
		L-80								5.875	442,500		
										5.800	377,300		
										5.908	471,400		
		N-80							496,200	5.800	397,200		
										5.875	465,800		

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HT - ST (Continued)

Pipe (OD)	Wt	Grade	Pipe					Standard Connection		Special Clearance Connection		Field End Torque	
			Nominal Wall Thickness	Inside Diameter	Drift Diameter* (Special Drift)	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb	
5-1/2	17.00	N-80	.304	4.892	4.767	7,740	6,290	6.050	496,200	5.908	496,200	5,400	8,600
		PS-80							471,400	-			
		13 CR-85				8,220	6,520		496,200			5,500	9,100
		C-95				9,190	6,940		521,000	5.908	521,000		10,100
		13 CR-95								5.875	489,100		
		P-110				10,640	7,480		620,300		582,200	5,600	11,400
										5.800	496,500		
5-1/2	20.00	L-80	.361	4.778	4.653	9,190	8,830	6.050	553,700	-	-	6,000	11,200
		13 CR-80								5.875	442,500		
		N-80							582,800	-			
		13 CR-85				9,760	9,230					6,100	11,840
		13 CR-95				10,910	10,010		611,900				13,100
		13 CR-110				12,640	11,100		728,500	5.875	582,200	6,200	15,000
		P-110											
5-1/2	23.00	L-80	.415	4.670	4.545	10,560	11,160	6.050	562,000	-	-	6,500	14,200
		13 CR-80											
		13 CR-85				11,220	11,820		591,500			6,600	15,000
		T-95				12,540	12,930		621,100				16,600
		P-110				14,530	14,540		739,400	5.875	582,300	6,700	19,000
5-1/2	26.00	L-80	.476	4.548	4.423	12,120	12,650	6.050	562,000	-	-	7,000	17,400
5-1/2	28.40	L-80	.530	4.440	4.315	13,490	13,930		561,900	-	-	7,400	21,400
6-5/8	20.00	K-55	.288	6.049	5.924	4,180	2,970	7.390	544,700	7.000	531,500	5,600	7,900
		13 CR-80				6,090	3,480			-	-	5,700	11,000
		L-80											
		P-110				8,370	4,030		716,700			5,900	14,800
6-5/8	24.00	13 CR-80	.352	5.921	5.796	7,440	5,760	7.390	659,000	7.000	531,500	6,600	16,500
		L-80								-	-		
		N-80							693,700				
		P-110				10,230	6,730		867,100			6,800	22,200
6-5/8	28.00	13 CR-80	.417	5.791	5.666	8,810	8,170	7.390	772,600	7.039	572,300	7,400	20,800
		L-80								-	-		
6-5/8	32.00	13 CR-80	.475	5.675	5.550	10,040	10,320	7.390	871,800	-	-	8,000	25,500
		L-80								7.000	531,500		
		N-80							917,700	-	-		
		P-110				13,800	13,220		1,147,100	7.000	699,400	8,200	34,500
7	23.00	K-55	.317	6.366	6.241	4,360	3,270	7.656	632,300	-	-	6,700	10,800
		13 CR-80				6,340	3,830					6,800	14,900
		L-80											
		N-80							665,600				
		P-110				8,720	4,440		832,000			7,000	19,800
		PS-80				6,340	3,830		632,300			6,800	14,900
		S-95				7,350	5,650		732,200			6,900	17,400
7	26.00	K-55	.362	6.276	6.151	4,980	4,330	7.656	717,200	7.500	717,200	7,300	13,800
		13 CR-80				7,240	5,410			-	-	7,400	19,100
		L-80								7.500	717,200		
		N-80							754,900	-	-		
		P-110				9,960	6,230		943,600	7.500	943,600	7,600	25,600

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HT - ST (Continued)

Pipe (OD)	Wt	Grade	Pipe					Standard Connection		Special Clearance Connection		Field End Torque	
			Nominal Wall Thickness	Inside Diameter	Drift Diameter* (Special Drift)	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb	
7	29.00	13 CR-80	.408	6.184	6.059	8,160	7,030	7.656	802,700	-	-	8,000	22,300
		L-80								7.375	580,500		
		N-80							844,900	-	-		
		T-95				9,690	7,840		887,100			8,100	26,200
		P-110				11,220	8,530		1,056,100	7.441	859,600	8,200	29,900
7	32.00	L-80	.453	6.094	5.969	9,060	8,610	7.656	832,500	-	-	8,600	25,400
		P-110				12,460	10,780		1,095,400			8,800	34,100
7	35.00	P-110	.498	6.004	5.879	13,700	13,030	7.656	1,095,400	-	-	9,200	39,600
		Q-125				15,560	14,310		1,183,000				44,600
7	38.00	P-110	.540	5.920	5.795	14,850	15,130	7.656	1,095,400	-	-	9,600	44,600
		Q-125				16,880	16,750		1,183,000				50,300

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock APEX

Size	Wt	Grade	Pipe					Standard Connection				Special Clearance Connection			Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Bored ID	Longitudinal Joint Strength	Maximum Recommended Footage	Special Clearance OD	Bored ID	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft	in.	in.	in.	ft-lb		
2-3/8	4.70	J-55	.190	1.995	1.901	7,700	8,100	2.875	1.985	97,800	10,170	-	-	-	700	900	1,100
		L-80				11,200	11,780			123,900	14,790				900	1,100	1,300
		P-110				15,400	16,130			163,000	20,340				1,000	1,300	1,500
2-7/8	6.40	J-55	.217	2.441	2.347	7,260	7,680	3.500	2.431	135,900	10,390	-	-	-	1,400	1,600	1,800
		L-80				10,570	11,170			172,100	15,100	3.230	2.431	172,100	1,500	1,800	2,200
		13 CR-80															
		P-110				14,530	14,550			226,500	20,760	-	-	-		1,900	
2-7/8	7.70	13 CR-85	.276	2.323	2.229	14,280	14,750	3.500	2.313	225,400	16,590	-	-	-	1,900	2,300	2,700
		22 CR-85															
		13 CR-95				15,960	16,480			236,700	18,540				2,000	2,400	2,800
		22 CR-95															
		P-110				18,480	19,090			281,800	21,460						
2-7/8	8.60	P-110	.308	2.259	2.165	20,620	21,040	3.500	2.249	310,500	21,180	-	-	-	2,200	2,700	3,100
3-1/2	9.20	J-55	.254	2.992	2.867	6,990	7,400	4.250	2.982	194,300	10,330	-	-	-	2,400	2,800	3,300
		L-80				10,160	10,540			246,100	15,010	3.896	2.982	246,100	2,500	2,900	
		13 CR-80										3.950	2.982	246,100			
		C-90				11,430	11,570			259,000	16,890	-	-	-			
		C-95				12,070	12,080			272,000	17,830						
		T-95															
3-1/2	10.20	13 CR-80	.289	2.992	2.797	11,560	12,120	4.250	2.912	276,900	15,240	-	-	-	2,900	3,400	3,800
		C-90				13,010	13,640			291,500	17,740						
3-1/2	12.70	L-80	.375	2.750	2.625	15,000	15,310	4.250	2.740	349,800	15,460	-	-	-	3,800	4,300	4,800
		P-110				20,630	21,050			460,300	21,260				3,900	4,500	5,000
4-1/2	11.60	N-80	.250	4.000	3.875	7,780	6,350	5.250	3.921	333,800	17,980	5.000	3.921	333,800	3,300	3,800	4,300
4-1/2	12.60	N-80	.271	3.958	3.833	8,430	7,500	5.250	3.958	360,000	17,860	4.878	3.958	360,000	3,400	3,900	4,500
		L-80								342,000	18,100			342,000			
		13 CR-80										5.000					
		13 CR-85				8,960	7,810			360,000	19,050	-	-	-			
		*Super 13 CR-95				10,010	8,410			378,000	20,000					4,000	
		13 CR-95										4.861	3.958	364,700			

* Special API drifts

** Maximum strength coupling OD will always generate a tensile efficiency equal to pipe body

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock APEX (Continued)

Size	Wt	Grade	Pipe					Standard Connection				Special Clearance Connection			Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Bored ID	Longitudinal Joint Strength	Maximum Recommended Footage	Special Clearance OD	Bored ID	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft	in.	in.	in.	ft-lb		
4-1/2	12.60	C-95	.271	3.958	3.833	10,010	8,410	5.250	3.958	378,000	20,000	4.878	3.958	378,000	3,400	4,000	4,500
		ST-95										-	-	-			
		*Super 13 CR-110				11,590	9,200			468,000	24,760				3,500	4,000	4,600
		Super 13 CR-120				12,650	9,670								3,700	4,300	4,800
		P-110				11,590	9,200			450,000	23,810	4.878	3.958	450,000	3,500	4,000	4,600
4-1/2	13.50	L-80	.290	3.920	3.795	9,020	8,540	5.250	3.920	364,400	18,000	-	-	-	3,800	4,400	5,000
		13 CR-85 *				9,590	8,920			402,800	19,890						
		13 CR-95				10,710	9,660					5.000	3.920	402,800			
		*28 CR-100				11,280	10,020			422,000	20,840	-	-	-			
		P-110				12,410	10,680			479,500	23,680	5.000	3.920	479,500	3,900	4,500	5,100
		*Hyper 13 CR-110								498,700	24,630			498,700			
4-1/2	15.10	USS FSS-95	.337	3.826	3.701	11,140	12,330	5.250	3.906	418,700	18,490	4.982	3.906	418,500	4,200	4,900	5,500
		L-80				10,480	11,080										
		N-80								440,700	18,240			440,500			
		C-95				12,450	12,760			462,700	20,430			462,500			5,600
		P-110				14,420	14,340			550,900	24,320			550,600	4,300	5,000	5,700
		*Super 13 CR-110								572,900	25,290	-	-	-			
4-1/2	16.60	P-110	.373	3.754	3.629	15,960	16,720	5.250	3.846	604,500	24,280	-	-	-	5,000	5,700	6,400
4-1/2	17.00	L-80	.380	3.740	3.615	11,820	12,370	5.250	3.836	467,200	18,320	-	-	-	4,900	5,600	6,400
		P-110				16,260	17,010			614,800	24,110				5,100	5,800	6,500
4-1/2	18.80	L-80	.430	3.640	3.515	13,380	13,830	5.250	3.756	522,300	18,520	-	-	-	5,600	6,400	7,200
		13 CR-80															
		13 CR-95				15,890	16,420			577,300	20,470				5,700	6,500	7,300
		13 CR-110				18,390	19,010			687,300	24,370				5,900	6,700	7,500
4-1/2	19.10	L-80	.437	3.626	3.501	13,600	14,030	5.250	3.756	529,900	18,500	5.130	3.756	529,800	5,700	6,500	7,300
		T-95				16,140	16,660			585,700	20,440			585,600	5,800	6,600	7,400
4-1/2	21.40	P-110	.500	3.500	3.375	21,390	21,730	5.250	3.633	783,300	24,400	-	-	-	6,900	7,800	8,700
4-1/2	31.00	T-95	.735	3.030	2.905	27,150	25,970	5.500	3.633	684,800	14,730	-	-	-	8,400	9,600	10,900

* Special API drifts

** Maximum strength coupling OD will always generate a tensile efficiency equal to pipe body

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock APEX (Continued)

Size	Wt	Grade	Pipe					Standard Connection				Special Clearance Connection			Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Bored ID	Longitudinal Joint Strength	Maximum Recommended Footage	Special Clearance OD	Bored ID	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft	in.	in.	in.	ft-lb		
5	18.00	N-80	.362	4.276	4.151	10,140	10,500	5.750	4.357	527,500	18,320	-	-	-	5,400	6,100	6,800
		L-80								501,100	18,560						
		13 CR-80										5.527	4.357	500,900			
		13 CR-95				12,040	12,020			553,900	20,510	-	-	-	5,500	6,200	6,900
		P-110				13,940	13,470			659,400	24,420				5,600	6,300	7,000
5	20.80	13 CR-95	.422	4.156	4.031	14,030	14,680	5.750	4.357	637,200	20,420	-	-	-	10,700	11,200	11,700
5	23.20	13 CR-80	.478	4.044	3.919	13,380	13,830	5.750	4.177	645,100	18,540	5.375	4.177	377,600	7,400	8,200	9,100
		* Enhanced N-80				15,890	16,430			713,100	19,210	-	-	-	7,500	8,400	9,300
		T-95									20,490						
		P-110				18,400	19,020			848,900	24,390				7,700	8,600	9,500
		Q-125				20,910	21,620			916,800	26,340				8,400	9,300	10,100
5	24.10	T-95	.500	4.000	3.875	16,630	17,100	5.750	4.145	727,500	20,120	-	-	-	7,900	8,800	9,600
		P-110				19,250	19,800			866,100	23,960				8,100	9,000	9,900
		Q-125				21,880	22,500			935,400	25,880				8,800	9,700	10,600
5	29.20	Q-125	.625	3.750	3.625	27,340	27,340	6.000	4.145	986,900	22,530	-	-	-	10,100	11,300	12,400
5	38.00	T-95	.825	3.350	3.225	27,430	26,180	6.000	4.145	767,600	13,470	-	-	-	10,100	11,400	12,700
5-1/2	15.50	L-80	.275	4.950	4.825	7,000	4,990	6.050	4.936	428,800	18,440	-	-	-	4,300	4,900	5,400
		13 CR-80															
5-1/2	17.00	L-80	.304	4.892	4.767	7,740	6,290	6.050	4.878	471,400	18,490	-	-	-	5,100	5,700	6,200
		13 CR-80															
		25 CR-80								496,200	19,460						
		C-90				8,710	6,730								5,200	5,800	6,300
		T-95				9,190	6,940			521,000	20,430						6,400
		13 CR-95										5.939	4.878	521,000			
		*28 CR-100				9,670	7,140			545,800	21,400	-	-	-			
		P-110				10,640	7,480			620,300	24,330				5,400	5,900	6,500
		22 CR-110															
		Q-125				12,090	7,890			669,900	26,270				5,800	6,400	7,000

* Special API drifts

** Maximum strength coupling OD will always generate a tensile efficiency equal to pipe body

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock APEX (Continued)

Size	Wt	Grade	Pipe					Standard Connection				Special Clearance Connection			Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Bored ID	Longitudinal Joint Strength	Maximum Recommended Footage	Special Clearance OD	Bored ID	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft	in.	in.	in.	ft-lb		
5-1/2	20.00	L-80	.361	4.778	4.653	9,190	8,830	6.050	4.764	553,700	18,460	-	-	-	6,500	7,200	7,800
		13 CR-80								539,300	17,980						
		13 CR-85				9,760	9,230			567,700	18,920						
		C-90				10,340	9,630			582,800	19,430				6,600	7,300	7,900
		T-95				10,910	10,020			611,900	20,400				6,700		8,000
		13 CR-95								596,100	19,870						
5-1/2	23.00	L-80	.415	4.670	4.545	10,560	11,160	6.250	4.809	629,900	18,260	-	-	-	6,100	6,800	7,600
		C-90				11,880	12,380			663,000	19,220					6,900	7,700
		13 CR-95				12,540	12,930			696,200	20,180						
		P-110				14,530	14,540			828,800	24,020				6,300	7,000	7,800
		Q-125				16,510	16,070			895,100	25,940				6,700	7,400	8,200
5-1/2	26.00	T-95	.476	4.548	4.423	14,390	15,020	6.250	4.727	788,900	20,230	-	-	-	7,400	8,300	9,200
		*T-95E				*15150	*15820										
		P-110				16,660	17,390			939,100	24,080				7,600	8,500	9,300
		HCP-110*				18,930	19,760								8,100	9,000	9,900
		*Super 13 Cr-110				16,660	17,390			976,700	25,040				7,600	8,500	9,300
		*25 Cr-125				**19470	19,760			1,014,300	26,010				8,100	9,000	9,900
5-1/2	29.70	T-95	.562	4.376	4.251	16,990	17,430	6.250	4.594	881,500	19,790	-	-	-	9,200	10,200	11,200
		T-95E*				*18,390	*18,340										
		*C-110				19,670	20,180			1,007,400	22,610	6.300	4.594	1,046,200	9,400	10,400	11,400
		Q-125				22,350	22,940			1,133,300	25,440			1,176,900	10,200	11,200	12,200
6-5/8	24.00	13 CR-80	.352	5.921	5.796	7,440	5,760	7.500	5.791	659,000	18,310	-	-	-	5,100	5,700	6,400
6-5/8	28.00	HC-95	.417	5.791	5.666	10,460	10,990	7.500	5.791	854,000	20,330	-	-	-	6,500	7,300	8,100
6-5/8	36.70	X-56	.562	5.501	5.376	8,310	8,690	7.500	5.632	760,100	13,810	-	-	-	8,900	9,900	10,900
6-5/8	65.80	Q-125	1.125	4.375	4.250	37,150	35,240	7.500	5.160	1,597,500	16,190	-	-	-	19,700	21,200	22,600
7	23.00	L-80	.317	6.366	6.241	6,340	3,830	7.656	6.350	632,300	18,330	-	-	-	7,200	7,800	8,400
		13 CR-80															
		C-90				7,130	4,030			665,600	19,290				7,400	8,000	8,600

* Special API drifts

** Maximum strength coupling OD will always generate a tensile efficiency equal to pipe body

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock APEX (Continued)

Size	Wt	Grade	Pipe					Standard Connection				Special Clearance Connection			Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Bored ID	Longitudinal Joint Strength	Maximum Recommended Footage	Special Clearance OD	Bored ID	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft	in.	in.	in.	ft-lb		
7	26.00	L-80	.362	6.276	6.151	7,240	5,410	7.656	6.344	717,200	18,390	-	-	-	7,700	8,400	9,100
		N-80								754,900	18,150						
		13 CR-80								717,200	18,390						
		C-90				8,150	5,740			*754,900	*19,360				7,900	8,600	9,300
		13 CR-95				8,600	5,890			792,600	20,320						
		T-95															
7	29.00	L-80	.408	6.184	*6.125	8,160	7,030	7.656	6.268	*802,300	*18,440	-	-	-	9,100	9,900	10,600
		13 CR-80								801,100	18,420						
		*13 CR-85				8,670	7,300			*885,500	*20,360						
		C-90				9,180	7,580			*844,500	*19,410				9,400	10,100	10,900
		*Super 13 CR-95				9,690	7,840			*885,500	*20,360						
		T-95								*886,700	*20,380						
		P-110				11,220	8,530			1,054,100	24,230				9,700	10,500	11,200
7	32.00	L-80	.453	6.094	*6.000	9,060	8,610	8.000	6.122	885,100	18,440	7.695	6.122	885,100	8,800	9,600	10,500
		13 CR-80										7.577					
		USS FSS-95				9,630	10,400					7.561		867,200			
		C-90				10,190	9,370			931,700	19,410	7.695		931,700	9,000	9,900	10,700
		T-95				10,760	9,740			978,300	20,380	-	-	-			
		P-110				12,460	10,780			1,164,600	24,260	7.577	6.122	1,164,600	9,300	10,200	11,000
7	35.00	L-80	.498	6.004	5.879	9,960	10,190	8.000	6.105	966,300	18,410	7.850	6.105	966,300	8,800	9,700	10,700
		P-110				13,700	13,030			1,271,500	24,220	7.648	6.105	1,270,600	9,200	10,200	11,100
		LSS-125				15,560	14,320			1,373,200	26,160	-	-	-	10,100	11,100	12,000
		Q-125															
7	38.00	L-80	.540	5.920	5.795	10,800	11,390	8.000	6.047	1,041,100	18,260	-	-	-	9,900	10,900	11,900
		P-110				14,850	15,130			1,369,900	24,030	7.714	6.047	1,369,900	10,500	11,500	12,500
		Q-125				16,880	16,740			1,479,500	25,960	-	-	-	11,500	12,500	13,600
7	41.00	C-90	.590	5.820	5.695	13,280	13,890	8.000	5.980	1,188,100	19,320	-	-	-	11,400	12,500	13,600
		T-95				14,010	14,660			1,247,500	20,280						
		P-110 SR-16				16,230	16,980			1,485,100	24,150				11,800	12,900	14,000

* Special API drifts

** Maximum strength coupling OD will always generate a tensile efficiency equal to pipe body

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock APEX (Continued)

Size	Wt	Grade	Pipe					Standard Connection				Special Clearance Connection			Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Bored ID	Longitudinal Joint Strength	Maximum Recommended Footage	Special Clearance OD	Bored ID	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft	in.	in.	in.	ft-lb		
7	46.10	P-110	.687	5.626	5.501	18,890	19,470	8.000	5.858	1,703,100	24,630	-	-	-	14,200	15,400	16,700
		Q-125 Type I				21,470	22,130			1,839,400	26,600				15,800	17,100	18,300
7	49.50	C-90	.730	5.540	5.415	16,430	16,810	8.000	5.806	1,404,500	18,920	-	-	-	14,700	15,900	17,200
		C-95				17,340	17,750			1,474,700	19,860	7.992	5.806	1,509,800			
		T-95E*				18,250	18,680								15,100	16,300	17,600
		C-110				20,080	20,550			1,685,400	22,700			1,725,500	15,200	16,500	17,700
		Q-125				22,810	23,350			1,896,100	25,540	-	-	-	17,000	18,200	19,500
7	60.50	T-95	.937	5.126	5.001	22,250	22,030	8.000	5.778	1,474,700	16,250	-	-	-	16,400	17,800	19,300
7-5/8	33.70	13 CR-80	.430	6.765	6.640	7,900	6,560	8.500	6.872	923,400	18,270	-	-	-	12,000	12,800	13,700
		C-90				8,880	7,050			972,000	19,230				12,300	13,100	14,000
		C-95				9,380	7,280			1,020,600	20,190				12,400	13,200	14,100
		P-110				10,860	7,870			1,215,000	24,040	8.375	6.872	1,215,000	12,700	13,600	14,500
7-5/8	39.00	P-110	.500	6.625	6.500	12,620	11,080	8.750	6.651	1,399,000	23,910	8.375	6.651	1,399,000	13,200	14,200	15,200
7-5/8	45.30	T-95	.595	6.435	6.310	12,970	13,670	8.750	6.608	1,379,800	20,310	8.075	6.608	896,200	13,600	14,800	15,900
7-5/8	47.10	L-80	.625	6.375	6.250	11,480	12,040	8.750	6.542	1,305,800	18,480	-	-	-	14,600	15,800	17,000
		13 CR-110				15,780	16,550			1,718,100	24,320				15,500	16,700	17,900
7-5/8	55.30	C-90	.750	6.125	6.000	15,490	15,960	8.750	6.354	1,619,900	19,530	-	-	-	18,500	19,900	21,200
		T-95				16,350	16,850			1,700,900	20,510	8.375	6.354	1,302,400			
		C-110				18,930	19,510			1,943,900	23,430	-	-	-	19,200	20,600	21,900
		Q-125				21,520	22,170			2,186,900	26,360	8.125	6.354	1,238,000	21,500	22,900	24,200
7-5/8	59.10	C-90	.800	6.025	5.900	16,520	16,910	8.750	6.300	1,696,000	19,130	-	-	-	18,800	20,300	21,700
		C-95				17,440	17,850	8.750		1,780,800	20,090	8.250	6.300	1,131,400	18,800	20,300	21,700
		T-95				*17,940						8.650		1,687,900			
						17,440						8.500		1,476,100			
		C-110				20,200	20,660			2,035,200	22,960			1,687,000	19,500	21,000	22,400
7-5/8	59.20	ML-80	.812	6.001	5.876	14,910	15,220	8.750	6.300	1,611,200	18,140	-	-	-	18,400	19,800	21,300
		P-110				20,500	20,930			2,120,000	23,870	8.250	6.300	1,346,900	19,600	21,000	22,500
7-5/8	66.90	C-100	.937	5.751	5.626	21,500	21,550	8.750	6.276	1,865,600	18,590	-	-	-	19,700	21,200	22,700
7-3/4	46.10	C-90	.595	6.560	6.435	12,090	12,750	8.600	6.686	1,337,400	19,340	-	-	-	14,100	15,100	16,100
		Q-125				16,790	16,600			1,805,500	26,110				16,300	17,400	18,400
7-7/8	66.00	T-95	.875	6.125	6.000	18,470	18,770	9.000	6.626	1,836,200	18,550	-	-	-	19,300	20,800	22,300

* Special API drifts

** Maximum strength coupling OD will always generate a tensile efficiency equal to pipe body

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock APEX (Continued)

Size	Wt	Grade	Pipe					Standard Connection				Special Clearance Connection			Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Bored ID	Longitudinal Joint Strength	Maximum Recommended Footage	Special Clearance OD	Bored ID	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft	in.	in.	in.	ft-lb		
8	71.00	T-95	.937	6.126	6.001	19,470	19,640	8.515	6.252	1,743,900	16,370	-	-	-	15,000	16,200	17,400
8	84.00	T-95	1.125	5.750	5.625	23,380	22,960	8.515	5.876	1,743,900	13,840	9.125	5.876	2,551,300	20,200	21,600	23,000
8-1/16	54.00	L-80	.684	6.695	6.570	11,880	12,420	9.000	6.826	1,445,300	17,840	-	-	-	17,000	18,200	19,400
8-5/8	49.00	C-90	.557	7.511	7.386	10,170	9,340	9.625	7.626	1,411,800	19,210	9.384	7.626	1,411,500	14,800	15,900	16,900
		T-95				10,740	9,700			1,482,400	20,170	-	-	-			
		C-110				12,430	10,740		7.626	1,694,200	23,050				15,400	16,400	17,500
8-5/8	72.70	L-80	.875	6.875	6.750	14,200	14,590	9.625	7.387	1,632,100	14,970	9.385	7.387	1,342,400	18,400	19,800	21,200
9-5/8	40.00	L-80	.395	8.835	*8.750	5,750	3,090	10.625	8.805	1,088,100	18,140	-	-	-	16,400	17,300	18,100
		N-80								1,145,400	17,900						
		C-90				6,460	3,250				19,090				16,900	17,800	18,600
		C-95				6,820	3,320			1,202,700	20,050						
		T-95															
9-5/8	43.50	L-80	.435	8.755	8.599	6,330	3,810	10.625	8.680	1,193,100	18,290	-	-	-	16,900	17,900	18,800
		N-80								1,255,900	18,040						
9-5/8	47.00	L-80	.472	8.681	8.525	6,870	4,760	10.625	8.678	1,289,300	18,290	-	-	-	15,000	15,900	16,800
		13 CR-80															
		C-90				7,720	5,000			1,357,200	19,250	-	-	-	15,400	16,400	17,300
		C-95				8,150	5,090			1,425,100	20,210						
		T-95															
		13 CR-95				8,150	5,090					-	-	-			
		P-110				9,440	5,300			1,696,500	24,060				16,100	17,000	17,900
		Q-125				10,730	5,630			1,832,200	25,990				18,300	19,200	20,200
9-5/8	53.50	L-80	.545	8.535	*8.500	7,930	6,620	10.625	8.653	1,477,000	18,400	-	-	-	15,900	16,900	17,900
		HCL-80					8,850										
		C-90				8,920	7,120			1,554,700	19,370				16,300	17,400	18,400
		C-95				9,410	7,340			1,632,400	20,340						
		T-95															
		P-110				10,900	7,950			1,943,400	24,220				17,000	18,100	19,100
												10.312	8.653	1,817,400			
		Q-125				12,390	8,440			2,098,800	26,150	-	-	-	19,300	20,300	21,400
9-5/8	64.90	C-110	.672	8.281	8.125	13,440	12,570	10.625	8.568	2,268,100	23,300	-	-	-	18,300	19,600	20,800

* Special API drifts

** Maximum strength coupling OD will always generate a tensile efficiency equal to pipe body

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock APEX (Continued)

Size	Wt	Grade	Pipe					Standard Connection				Special Clearance Connection			Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Bored ID	Longitudinal Joint Strength	Maximum Recommended Footage	Special Clearance OD	Bored ID	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft	in.	in.	in.	ft-lb		
9-5/8	68.00	Q-125 Type I	.700	8.225	8.069	15,910	16,860	10.625	8.548	2,578,100	25,280	-	-	-	20,800	22,100	23,300
9-5/8	70.30	13 CR-110	.734	8.157	8.001	14,680	14,820	10.625	8.528	2,387,100	22,640	-	-	-	18,800	20,100	21,300
9-5/8	71.60	T-95	.750	8.125	7.969	12,950	13,650	10.625	8.478	2,005,200	18,670	-	-	-	18,200	19,500	20,800
		LS-140				19,090	18,640			2,864,600	26,670				22,700	24,000	25,300
9-3/4	59.20	Q-125	.595	8.560	*8.500	13,350	10,220	10.625	8.726	2,310,300	26,020	-	-	-	19,700	20,800	21,800
9-7/8	62.80	USS FSS-95	.625	8.625	*8.500	9,410	10,070	10.750	8.739	1,659,000	17,610	-	-	-	16,500	17,600	18,700
		T-95				*10.820	9,320			1,833,600	19,460	10.585	8.739	1,605,600	17,000	18,100	19,200
		C-110				12,180	10,290			2,095,600	22,250	-	-	-	17,700	18,800	19,900
		Q-125				13,840	11,140			2,357,500	25,030				20,000	21,100	22,200
		HC Q-125				*14,560	**13,300										
							13,300										
		Q-125	.678	8.519	8.363	15,020	13,310				23,180				20,300	21,500	22,700
		C-110				13,220	12,160			2,095,600	20,610				18,000	19,200	20,400
10-3/8	87.88	L-80	.864	8.647	*8.500	*11,990	12,210	11.500	8.647	2,452,500	18,600	-	-	-	20,100	21,000	22,000
10-3/4	64.00	HC Q-125*	.578	9.594	*9.500	12,700	8,130	11.750	9.674	2,493,600	25,980	-	-	-	20,600	21,700	22,800
10-3/4	55.50	K-55	.495	9.760	*9.625	4,430	3,390	11.750	9.760	1,515,000	13,650	11.500	9.760	1,515,000	15,700	16,700	17,600
		L-80				6,450	4,020				18,200	-	-	-	16,200	17,200	18,100
		N-80								1,594,700	17,960	11.500	9.760	1,594,700			
		C-90				7,250	4,160				19,160	-	-	-	16,700	17,700	18,600
10-3/4	60.70	L-80	.545	9.660	9.504	7,100	5,160	11.750	9.660	1,659,900	18,230	-	-	-	16,800	17,800	18,900
		C-90				7,980	5,460		9.759	1,747,300	19,190				17,300	18,300	19,400
10-3/4	65.70	C-90	.595	9.560	9.404	8,720	6,760	11.750	9.674	1,898,200	19,260	-	-	-	17,800	18,900	20,000
		Q-125				12,110	7,920			2,562,600	26,000				20,800	21,900	23,000
10-3/4	71.10	P-110	.650	9.450	9.294	11,640	9,300	11.750	9.624	2,578,100	24,170	-	-	-	19,000	20,200	21,400
10-3/4	73.20	Q-125	.672	9.406	9.250	13,670	10,810	11.750	9.624	2,872,300	26,160	-	-	-	21,500	22,700	23,900
10-3/4	79.20	T-95	.734	9.282	9.126	11,350	10,800	11.750	9.521	2,235,000	18,810	11.798	9.521	2,395,700	19,000	20,200	21,500
		Q-125				14,940	13,150			2,873,600	24,190	-	-	-	22,000	23,200	24,500
		HC Q-125					14,470										
10-3/4	84.30	C-110	.787	9.176	9.020	14,090	13,750	11.800	9.176	2,852,400	22,560	11.650	9.176	2,852,400	20,600	21,700	22,900

* Special API drifts

** Maximum strength coupling OD will always generate a tensile efficiency equal to pipe body

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock APEX (Continued)

Size	Wt	Grade	Pipe					Standard Connection				Special Clearance Connection			Field End Torque		
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Bored ID	Longitudinal Joint Strength	Maximum Recommended Footage	Special Clearance OD	Bored ID	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft	in.	in.	in.	ft-lb		
10-3/4	85.30	L-80	.797	9.156	9.000	10,380	10,920	11.800	9.156	2,285,500	17,860	11.250	9.156	2,177,400	20,300	21,500	22,600
		T-95				12,330	12,540			2,526,100	19,740	11.284		2,469,700	20,800	22,000	23,100
		HC Q-125				16,220	17,080			3,247,800	25,380	-	-	-	23,600	24,800	25,900
10-3/4	97.10	K-55	.922	8.906	8.750	8,260	8,630	11.800	9.002	2,622,500	13,500	11.500	9.002	2,601,200	22,800	24,200	25,600
		N-80				12,010	12,550			2,760,500	17,770	-	-	-	23,300	24,700	26,100
		Q-125				18,760	19,600			3,726,700	25,590	11.500	9.002	3,696,400	26,800	28,200	29,600
10-3/4	103.00	T-95	.984	8.782	8.626	15,220	15,800	11.800	8.927	3,079,300	19,930	-	-	-	24,900	26,400	27,800
10-3/4	170.00	T-95	1.750	7.250	7.094	27,060	25,900	12.000	8.802	3,773,700	14,800	-	-	-	34,200	36,600	39,000
11-7/8	71.80	Q-125	.582	10.711	*10.625	10,720	5,630	12.750	10.825	2,787,500	25,880	-	-	-	20,300	21,400	22,400
13-3/8	68.00	P-110	.480	12.415	12.259	6,910	2,330	14.375	12.415	2,430,600	23,830	-	-	-	17,900	18,800	19,800
13-3/8	72.00	T-95	.514	12.347	*12.250	6,390	2,830	14.375	12.422	2,180,600	20,190	-	-	-	17,600	18,600	19,600
		Q-125				8,410	2,880			2,803,700	25,960				20,600	21,600	22,600
13-5/8	88.20	L-80	.625	12.375	*12.250	6,420	3,980	14.375	12.497	2,011,300	15,200	-	-	-	17,500	18,600	19,600
		P-110				8,830	4,570			2,646,500	20,000				18,700	19,800	20,800
		Q-125				10,030	4,800			2,858,200	21,600				21,000	22,100	23,100
												14.250	12.497	2,585,700			

* Special API drifts

** Maximum strength coupling OD will always generate a tensile efficiency equal to pipe body

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Hunting: Seal-Lock BOSS Database

Pipe (OD)	Wt	Grade	Special Description	Pipe					Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb		
7-5/8	26.40	K-55	-	.328	6.969	6.844	4,140	2,890	8.500	714,300	-	-	7,200	7,700	8,200
		L-80					6,020	3,400			8.130	714,300	7,600	9,600	11,600
		13 Cr-80													
		P-110					8,280	3,920		939,900		939,900	8,000	10,000	12,000
		HCP-110						4,850			-	-			
7-5/8	29.70	L-80	-	.375	6.875	6.750	6,890	4,790	8.500	811,400	8.028	717,100	8,400	10,400	12,400
											8.125	811,400			
		N-80								854,100	-	-			
		P-110					9,470	5,350		1,067,600			8,800	10,800	12,800
7-5/8	33.70	L-80	-	.430	6.765	6.640	7,900	6,560	8.500	923,400	8.028	717,100	9,200	11,200	13,200
		N-80								972,000	-	-			
		P-110					10,860	7,870		1,215,000			9,600	11,600	13,600
7-5/8	39.00	L-80	-	.500	6.625	6.500	9,180	8,820	8.500	1,063,200	-	-	10,100	12,100	14,100
		P-110					12,620	11,080		1,399,000	8.125	1,097,100	10,500	12,500	14,500
		Q-125					14,340	12,060		1,510,900	-	-	10,600	12,600	14,600
7-5/8	42.80	T-95	-	.562	6.501	6.376	12,250	12,410	8.500	1,309,400	-	-	11,000	13,000	15,000
8-5/8	28.00	K-55	-	.304	8.017	7.892	3,390	1,880	9.625	755,000	-	-	6,900	8,900	10,900
		LS-65					4,010	2,150		675,500			7,000	9,000	11,000
		L-80					4,930	2,160		755,000			7,100	9,100	11,100
		PS-80													
8-5/8	32.00	K-55	-	.352	7.921	*7.875	3,930	2,530	9.625	869,200	-	-	7,800	9,800	11,800
			w/ L-80 Couplings												
		L-80	-				5,710	3,050			9.200	869,200	8,000	10,000	12,000
8-5/8	36.00	L-80	-	.400	7.825	7.700	6,490	4,100	9.625	981,900	-	-	8,700	10,700	12,700
8-5/8	44.00	C-100	-	.500	7.625	7.500	10,140	7,990	9.625	1,403,900	-	-	10,300	12,300	14,300
		P-110					11,160	8,420		1,595,400	9.125	1,207,300	10,500	12,500	14,500
9-5/8	36.00	K-55	-	.352	8.921	8.765	3,520	2,020	10.625	974,100	-	-	8,700	10,700	12,700
		L-80					5,120	2,370					8,900	10,900	12,900
		PS-80													
		S-80													
9-5/8	40.00	K-55	-	.395	8.835	*8.750	3,950	2,570	10.625	1,088,100	-	-	9,500	11,500	13,500
		L-80					5,750	3,090					9,700	11,700	13,700
		N-80								1,145,400					
		S-80								1,088,100					
		C-90					6,460	3,260		1,145,400			9,900	11,900	13,900
		C-95					6,820	3,330		1,202,700	10.250	1,202,700			
		S-95						4,230		1,259,900	-	-			
		P-110					7,900	3,470		1,431,800			10,100	12,100	14,100
9-5/8	43.50	K-55	-	.435	8.755	8.599	4,350	3,520	10.625	1,193,000	-	-	10,200	12,200	14,200
		LS-65	w/ L-80 Couplings				5,140			1,067,500			10,400	12,400	14,400
		L-80	-				6,330	3,810		1,193,100					
		N-80								1,255,900					
		C-95					7,510	4,130		1,318,700			10,600	12,600	14,600
		S-95						5,600		1,381,500					
		P-110					8,700	4,420		1,570,000			10,800	12,800	14,800
9-5/8	47.00	K-55	-	.472	8.681	*8.625	4,720	3,890	10.625	1,289,300	-	-	10,800	12,800	14,800
		L-80					6,870	4,760					11,000	13,000	15,000
		N-80								1,357,200					
		S-95	w/ L-80 Couplings												
		S-95	-				8,150	7,100		1,492,900			11,200	13,200	15,200
		TRC-95								1,425,100					
		P-110					9,440	5,300		1,696,500			11,400	13,400	15,400
		Q-125					10,730	5,630		1,832,200			11,500	13,500	15,500
		V-150					12,870	6,000	10.625	2,171,500			11,500	13,500	15,500
9-5/8	53.50	K-55	-	.545	8.535	*8.500	5,450	5,130	10.625	1,477,000	-	-	11,900	13,900	15,900
		L-80					7,930	6,620		1,476,900			12,100	14,100	16,100
		N-80								1,554,600					
		C-95					9,410	7,340		1,632,300			12,300	14,300	16,300
		S-95						8,850		1,710,100					
		T-95						7,340		1,632,300	10.250	1,372,200			
											10.125	1,162,500			
		P-110					10,900	7,950		1,943,300		1,383,900	12,500	14,500	16,500
		SM-110									-				
		Q-125					12,390	8,440		2,099,000			12,600	14,600	16,600
		HCQ-125						8,850							
		HCQ-125*											40,000	45,000	50,000
9-5/8	58.40	P-110	-	.595	8.435	*8.375	11,900	9,770	10.625	2,109,900	-	-	13,100	15,100	17,100
9-7/8	62.80	L-80	w/ 9-5/8" Coupling	.625	8.625	*8.500	8,860	8,260	10.625	1,494,300	-	-	12,400	14,400	16,400

* Special API drifts

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Hunting: Seal-Lock BOSS Database (Continued)

Pipe (OD)	Wt	Grade	Special Description	Pipe					Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb		
9-7/8	62.80	USS FSS-95*	-	.625	8.625	*8.500	9,410	10,070	10.625	1,690,700	-	-	12,500	14,500	16,500
		T-95 E					11,390	9,650		1,868,700			12,600	14,600	16,600
		T-95	w/ 9-5/8" Coupling				10,520	9,320		1,651,500					
		P-110					12,180	10,280		1,966,100			12,800	14,800	16,800
			w/ Oversize Coupling						10.750	2,270,300			13,300	15,300	17,300
		Q-125	-				13,840	11,140	10.625	2,402,600			12,900	14,900	16,900
			w/ 9-5/8" Coupling							2,123,300					
		HCQ-125	-					12,030		2,402,600					
9-7/8	68.80	Q-125	-	.700	8.475	8.319	15,510	14,210	10.625	2,402,600	-	-	14,100	16,100	18,100
10-3/4	45.50	K-55	-	.400	9.950	*9.875	3,580	2,090	11.750	1,235,600	-	-	10,400	12,400	14,400
		L-80					5,210	2,480			11.286	1,235,600	10,600	12,600	14,600
		L-80								1,300,600	-	-			
		N-80													
		HCN-80	w/ N-80 Coupling					3,130							
		P-110	-				7,160	2,610		1,625,700			11,000	13,000	15,000
10-3/4	51.00	K-55	-	.450	9.850	9.694	4,030	2,700	11.750	1,383,300	-	-	11,300	13,300	15,300
		L-80					5,860	3,220			11.275	1,218,200	11,500	13,500	15,500
											11.250	1,176,300			
		HCN-80	w/ N-80 Coupling					4,460		1,456,100	-	-			
10-3/4	55.50	L-80	-	.495	9.760	*9.625	6,450	4,020	11.750	1,515,000	-	-	12,300	14,300	16,300
		S-95	w/ L-80 Coupling				7,660	5,950		1,754,200			12,500	14,500	16,500
		TRC-95	-					4,300		1,674,400					
10-3/4	60.70	L-80	-	.545	9.660	9.504	7,100	5,160	11.750	1,660,000	-	-	13,100	15,100	17,100
		P-110					9,760	5,880		2,184,100	11.375	1,825,000	13,500	15,500	17,500
											11.535	2,184,100			
		Q-125					11,090	6,070		2,358,900	-	-	13,600	15,600	17,600
10-3/4	65.70	NSS-80	-	.595	9.560	9.404	7,750	6,310	11.750	1,803,300	-	-	13,800	15,800	17,800
		P-110					10,650	7,500		2,372,800	11.618	2,372,800	14,200	16,200	18,200
		Q-125					12,110	7,920		2,562,600	-	-	14,300	16,300	18,300
10-3/4	73.20	Q-125	-	.672	9.406	9.250	13,670	10,810	11.750	2,619,600	-	-	15,200	17,200	19,200
10-3/4	80.80	K-55	-	.750	9.250	9.094	6,720	7,140	11.750	1,843,400	-	-	15,400	17,400	19,400
		C-100					12,210	11,690		2,134,400			15,800	17,800	19,800
11-3/4	47.00	K-55	-	.375	11.000	10.844	3,070	1,510	12.750	1,273,100	-	-	10,600	12,600	14,600
		L-80					4,470	1,630					10,800	12,800	14,800
11-3/4	54.00	K-55	-	.435	10.880	10.724	3,560	2,070	12.750	1,469,000	-	-	11,900	13,900	15,900
		N-80					5,180	2,450		1,546,300			12,100	14,100	16,100
		P-110					7,130	2,570		1,932,900			12,500	14,500	16,500
11-3/4	60.00	L-80	-	.489	10.772	*10.625	5,830	3,180	12.750	1,643,500	-	-	13,100	15,100	17,100
11-3/4	65.00	K-55	-	.534	10.682	*10.625	4,370	3,290	12.750	1,788,000	12.500	1,749,000	13,600	15,600	17,600
		L-80					6,360	3,870					13,800	15,800	17,800
		N-80								1,881,600	-	-			
		P-110					8,750	4,480		2,352,000			14,200	16,200	18,200
		Q-125					9,940	4,690		2,540,200			14,300	16,300	18,300
		HCQ-125						5,740							
11-7/8	71.80	TRC-95	-	.582	10.711	*10.625	8,150	5,080	12.750	2,168,000	-	-	14,600	16,600	18,600
		P-110					9,430	5,290		2,581,000			14,800	16,800	18,800
		LS-125					10,720	5,630		2,787,500			14,900	16,900	18,900
		Q-125	w/ 11-3/4" Coupling							2,703,500					
		HCQ-125						7,190							
		HCQ-125 E					11,580								
		HCQ-125 E+					11,910								
		LS-140	w/ 11 3/4" Q-125 Coupling				12,010			2,925,200					
13-3/8	54.50	K-55	-	.380	12.615	12.459	2,730	1,130	14.375	1,473,700	14.000	1,473,700	13,100	15,800	18,500
13-3/8	61.00	K-55	-	.430	12.515	12.359	3,090	1,540	14.375	1,661,300	14.000	1,661,300	14,300	17,000	19,700
		L-80					4,500	1,670			-	-	14,600	17,300	20,000
		N-80								1,748,700	14.000	1,748,700			
13-3/8	68.00	K-55	-	.480	12.415	12.259	3,450	1,950	14.375	1,847,300	14.084	1,846,800	15,500	18,200	20,900
		L-80					5,020	2,260			14.000	1,671,000	15,800	18,500	21,200
		HCL-80						2,910			-	-			
		N-80						2,260		1,944,500	14.084	1,944,000			
			w/ L-80 Coupling								14.000	1,671,000			
		C-90	-				5,650	2,320			-	-	16,100	18,800	21,500
		C-95					5,970	2,340		2,041,700					
		P-110					6,910	2,330		2,430,600			16,300	19,000	21,700
		HCP-110						2,910			13.875	1,856,900			
		TAC-110						3,030		2,527,900	-	-			

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock BOSS Database (Continued)

Pipe (OD)	Wt	Grade	Special Description	Pipe					Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb		
13-3/8	72.00	K-55	-	.514	12.347	*12.250	3,700	2,220	14.375	1,973,000	-	-	16,200	18,900	21,600
			w/ HCL-80 Coupling								14.000	1,671,000			
		L-80	-				5,380	2,670		2,076,800	-	-	16,500	19,200	21,900
		N-80									13.960	1,671,100			
											14.144	2,076,800			
		HCN-80						3,470		1,973,000	-	-			
		HCL-80													
		C-90					6,050	2,780		2,076,800			16,800	19,500	22,200
		C-95					6,390	2,830		2,180,600	14.022	1,897,600			
		ST-95									-	-			
		S-95						3,470		2,284,500					
		T-95						2,830		2,180,600					
		TRC-95						*3,600		2,284,500					
		P-110	w/ C-90 Coupling				7,400	2,880		2,402,500			17,000	19,700	22,400
			-							2,596,000					
		P-110	w/ Half Tolerances							2,596,000	14.144	2,596,000			
			w/ Special Pin Tolerances								14.022	2,259,000			
		HCP-110	-					3,470			14.125	2,543,400			
		Q-125					8,410	2,880		2,804,000	14.022	2,440,000	17,200	19,900	22,600
			w/ Half Tolerances								14.144	2,804,000			
		HCQ-125	-					3,470		2,803,700	-	-			
13-3/8	86.00	TRC-95	-	.625	12.125	11.969	7,770	*6,240	14.375	2,642,800	-	-	18,900	21,600	24,300
13-5/8	88.20	L-80	-	.625	12.375	*12.250	6,420	3,980	14.375	2,238,100	-	-	22,200	24,900	27,600
		HCL-80						5,340							
		L-80	w/ 13-3/8" Coupling					3,980		2,058,700			19,300	22,000	24,700
		N-80	-				6,420	3,980		2,355,900			22,200	24,900	27,600
			w/ 13-3/8" Coupling							2,167,100			19,300	22,000	24,700
		S-95	-				7,630	5,930		2,591,500			22,500	25,200	27,900
			w/ 13-3/8" Coupling							2,383,800			19,600	22,300	25,000
		SS-95					6,420	5,930		2,058,700			19,300	22,000	24,700
		CYS-95								2,275,500			19,600	22,300	25,000
		ST-95	-				7,630	4,260		2,473,700			22,500	25,200	27,900
		T-95									14.275	2,473,700			
			w/ 13-3/8" Coupling							2,275,500	14.000	1,846,800	19,600	22,300	25,000
		P-110	-				8,830	4,570		2,944,900	14.275	2,944,900	22,700	25,400	28,100
											13.985	2,157,400			
			w/ 13-3/8" Coupling							2,708,900	-	-	19,800	22,500	25,200
											13.985	2,157,400			
		CP-110						4,940			-	-			
		HCP-110	-					5,930		2,944,900			22,700	25,400	28,100
			w/ 13-3/8" Coupling							2,708,900	13.985	2,157,400	19,800	22,500	25,200
		LS-110						4,570			-	-			
		LS-125					10,030	4,800		2,925,600			20,000	22,700	25,400
		Q-125	-							3,180,500	14.275	3,180,500	22,900	25,600	28,300
											14.250	3,122,500			
			w/ 13-3/8" Coupling							2,925,600	13.985	2,330,000	20,000	22,700	25,400
			-								-	-			
											14.250	2,925,600			
		HCQ-125						5,930		3,180,500	14.275	3,180,500	22,900	25,600	28,300
		HCQ-125*													42,500
		HCQ-125	w/ 13-3/8" Coupling							2,925,600	-	-	20,000	22,700	25,400
		HCQ-125 E					11,150	6,120							
		TCA-140					11,240	4,940		3,250,700					
14	82.50	L-80	-	.562	12.876	12.720	5,620	2,940	15.000	2,254,000	-	-	19,600	22,300	25,000
		N-80								2,372,600	14.829	2,371,900			
		P-110					7,730	3,270		2,965,800		2,964,800	20,100	22,800	25,500
14	94.50	P-110	-	.650	12.700	12.544	8,940	4,700	15.000	3,215,800	-	-	21,900	24,600	27,300
		Q-125					10,160	4,950		3,473,000			22,100	24,800	27,500
14	101.50	C-110	-	.700	12.600	12.444	9,630	5,630	15.000	3,087,100	14.750	2,626,200	22,800	25,500	28,200
		P-110								3,215,800	-	-			
		Type I Q-110									14.800	2,880,500			
			w/ C-95 Coupling							2,701,200	15.100	3,158,600			
		Type I Q-110	w/ S-95 Coupling				9,630	5,630		2,829,900	-	-			
		Q-125	-				10,940	5,890		3,473,000			23,000	25,700	28,400

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock BOSS Database (Continued)

Pipe (OD)	Wt	Grade	Special Description	Pipe					Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb		
14	108.00	Q-125	-	.750	12.500	12.344	11,720	7,200	15.000	3,473,000	-	-	23,900	26,600	29,300
14	114.00	P-110	-	.800	12.400	*12.250	11,000	8,130	15.000	3,215,800	-	-	24,400	27,100	29,800
14	117.00	T-95	-	.827	12.346	*12.250	9,820	8,070	15.000	2,701,200	-	-	24,600	27,300	30,000
15	77.50	L-80	-	.500	14.000	13.813	4,670	1,860	16.000	2,163,800	-	-	19,900	22,600	25,300
		P-110					6,420	1,860		2,847,100			20,400	23,100	25,800
		Q-125					7,290			3,074,900			20,600	23,300	26,000
14	93.00	P-110	-	.600	13.800	13.613	7,700	3,240	16.000	3,392,900	-	-	22,900	25,600	28,300
		Q-125					8,750	3,260		3,664,300			23,100	25,800	28,500
16	65.00	H-40	-	.375	15.250	15.063	1,640	630	17.000	1,104,400	-	-	15,700	18,400	21,100
		K-55					2,260			1,748,800					
14	75.00	K-55	-	.438	15.124	14.937	2,630	1,010	17.000	2,034,300	16.625	2,034,300	17,800	20,500	23,200
											16.750				
											16.500	1,732,500			
		X-60					2,870	1,110		1,606,100	16.625	1,606,100			
		L-80					3,830	1,020		2,034,300	-	-	18,100	20,800	23,500
		N-80								2,141,400					
		P-110					5,270			2,677,000			18,600	21,300	24,000
14	84.00	H-40	-	.495	15.010	14.823	2,170	1,250	17.000	1,446,700	-	-	19,500	22,200	24,900
		X-52					2,820	1,420		1,591,400					
		K-55	-				2,980	1,400		2,291,000	16.500	1,733,000			
										2,290,600	16.725	2,289,800			
											16.750	2,290,600			
			w/ HCN-80 Coupling								16.600	2,083,000			
		X-56	-				3,030	1,430		1,712,000	16.500	1,295,000			
		L-80					4,330	1,480		2,290,600	-	-	19,800	22,500	25,200
											16.750	2,290,600			
		HCN-80						*1,910		2,411,200	16.550	1,953,400			
											-	-			
											16.500	1,824,000			
											16.735	2,411,000			
		N-80						1,480			16.850				
		HCN-80						*1,910			16.750				
		N-80					4,330	1,480		2,411,200	16.500	1,824,000			
		HC-95					5,140	1,910		2,652,300	-	-	20,100	22,800	25,500
		LS-110					5,960	1,480		3,014,000			20,300	23,000	25,700
16	84.00	P-110	-	.495	15.010	14.823	5,960	1,480	17.000	3,014,000	-	-	20,300	23,000	25,700
											16.750	3,014,000			
16	85.00	Grade B (35 ksi)	-	.500	15.000	14.813	1,910	1,210	17.000	1,460,800	-	-	19,200	21,900	24,600
		X-56					3,060	1,450		1,729,000			19,600	22,300	25,000
16	94.50	K-55	-	.562	14.876	14.689	3,380	1,860	17.000	2,589,400	-	-	21,300	24,000	26,700
		L-80					4,920	2,140			16.585	1,942,200	21,600	24,300	27,000
		N-80								2,725,700	-	-			
		P-110					6,760	2,190		3,407,100			22,100	24,800	27,500
16	95.00	L-80	-	.566	14.868	*14.750	4,950	2,180	17.000	2,607,200	16.750	2,352,200	21,700	24,400	27,100
		N-80								2,744,400	-	-			
		HCN-80						2,580							
16	97.00	L-80	-	.575	14.850	*14.750	5,030	2,270	17.000	2,647,100	-	-	21,900	24,600	27,300
		N-80								2,786,400	16.750	2,476,000			
		HCN-80						*2,990			16.500	1,823,700			
											16.625	2,148,600			
											16.750	2,476,000			
		S-95					5,970	2,350		3,065,000	16.500	2,006,100	22,200	24,900	27,600
		P-110					6,920	2,340		3,483,000		2,279,600	22,400	25,100	27,800
											16.600	2,604,300			
		HCP-110	w/ Special Tolerance Coupling					2,990			16.750	3,095,000			
			w/ Special Tolerance Coupling*												41,700
		97.00	-				6,920	2,990		3,483,000	16.625	2,685,700	22,400	25,100	27,800
											16.500	2,279,600			
		Q-125		.575	14.850	*14.750	7,860	2,340	17.000	3,761,600		2,462,000	22,600	25,300	28,000
		Q-125	w/ Special Tolerance P-110 Coupling							3,639,900	-	-			
		HCQ-125	-					2,990		3,761,600					
16	104.00	X-56	-	.625	14.750	14.563	3,830	2,330	17.000	2,067,400	16.955	2,142,900	22,700	25,400	28,100

* Special API drifts

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Hunting: Seal-Lock BOSS Database (Continued)

Pipe (OD)	Wt	Grade	Special Description	Pipe					Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	psi	psi	in.	lb	in.	in.	ft-lb		
16	109.00	K-55	-	.656	14.688	14.501	3,950	2,560	17.000	2,766,200	-	-	23,400	26,100	28,800
		X-56					4,020	2,630		2,067,400					
		L-80					5,740	3,080		2,766,200			23,700	26,400	29,100
		N-80								2,911,800					
		C-90	w/ L-80 Matched Strength Coupling				6,460	3,250		2,766,200	17.071	3,161,500	24,000	26,700	29,400
		Q-125	w/ Special Tolerance Coupling*				8,970	3,520		3,931,100	16.750	3,342,600	24,400	27,100	44,700
		P-110	-				7,890	3,470		3,639,800	-	-	24,200	26,900	29,600
											16.600	2,604,300			
16	118.00	N-80	-	.715	14.570	14.383	6,260	3,690	17.000	2,911,800	-	-	24,800	27,500	30,200
18-5/8	87.50	J-55	-	.435	17.755	17.568	2,250	630	19.625	1,864,400	-	-	20,800	23,500	26,200
		K-55								2,361,500	19.125	2,055,700			
		MW-55 LT								*1,864,400	-	-			
		X-56					2,290			1,764,900	19.125	1,536,400	21,100	23,800	26,500
		X-65					2,660			1,914,100	-	-			
		L-80					3,270			2,362,000	19.125	2,056,000			
18-5/8	97.70	K-55	-	.486	17.653	*17.500	2,510	880	19.625	2,631,000	-	-	22,600	25,300	28,000
		X-56					2,560			1,966,300	19.125	1,536,400	22,900	25,600	28,300
		P-110					5,020			3,461,900	-	-	23,400	26,100	28,800
18-5/8	99.00	K-55	-	.500	17.625	17.438	2,580	960	19.625	2,704,700	-	-	23,100	25,800	28,500
		X-56								2,021,400					
18-5/8	101.50	N-80	-	.510	17.605	17.418	3,830	1,020	19.625	2,902,000	-	-	23,700	26,400	29,100
		X-80								2,612,200	19.125	1,947,500			
18-5/8	105.00	K-55	-	.531	17.563	17.376	2,740	1,140	19.625	2,867,500	-	-	24,100	26,800	29,500
		X-56					2,790	1,150		2,143,000					
		N-80					3,990			3,018,400			24,400	27,100	29,800
18-5/8	112.00	K-55	-	.579	17.467	17.280	2,990	1,420	19.625	3,118,400	-	-	25,500	28,200	30,900
		N-80					4,350	1,500		3,282,500			25,800	28,500	31,200
		C-95	w/ K-55 Coupling				5,170			3,252,000			26,100	28,800	31,500
18-5/8	120.00	X-52	-	.600	17.425	17.238	2,930	1,470	19.625	2,242,400	-	-	26,100	28,800	31,500
18-5/8	136.00	L-80	w/ K-55 Coupling	.693	17.239	17.052	5,210	2,470	19.625	3,252,000	-	-	28,700	31,400	34,100
18-5/8	138.00	X-56	-	.720	17.185	16.998	3,790	2,280	19.625	2,430,500	-	-	29,000	31,700	34,400
18-5/8	139.00	N-80	-	.720	17.185	16.998	5,410	2,710	19.625	3,423,200	-	-	29,300	32,000	34,700
20	94.00	H-40	w/ K-55 Coupling	.438	19.124	18.937	1,530	520	21.000	1,615,100	-	-	23,000	25,700	28,400
		J-55	w/ K-55 Coupling				2,110			2,018,900					
		K-55	-							2,557,200					
		X-56	w/ K-55 Coupling				2,150			1,911,200			23,300	26,000	28,700
20	106.50	K-55	-	.500	19.000	18.813	2,410	770	21.000	2,909,900	-	-	25,600	28,300	31,000
		X-56					2,450			2,174,800			25,900	28,600	31,300
		N-80					3,500			3,063,100					
20	129.00	X-56	-	.615	18.770	18.583	3,010	1,390	21.000	2,653,100	-	-	29,600	32,300	35,000
20	131.00	X-52	-	.625	18.750	18.563	2,840	1,410	21.000	2,466,000	-	-	29,900	32,600	35,300
		X-56	w/ K-55 Coupling				3,060	1,450		2,701,000					
		N-80	-				4,380	1,530		3,737,000			30,200	32,900	35,600
20	133.00	X-52	-	.635	18.730	18.543	2,890	1,470	21.000	2,466,000	-	-	30,200	32,900	35,600
		J-55					3,060	1,500		2,802,500					
		K-55								3,549,900					
		X-56								2,653,000			30,500	33,200	35,900
		X-56	w/ K-55 Coupling				3,110			2,742,900	-	-			
			w/ N-80 Coupling												
		N-80	-				4,450	1,600		3,737,000					
		NT-80													
20	156.00	X-52	-	.750	18.500	18.313	3,410	2,060	21.000	2,466,200	-	-	33,300	36,000	38,700
		X-56					3,680	2,150		2,653,000					
		X-60	w/ K-55 Coupling				3,940	2,220		3,401,800					
20	169.00	X-52	-	.812	18.376	18.189	3,690	2,450	21.000	2,466,200	-	-	34,800	37,500	40,200
		K-55					3,910	2,500		3,550,000					
		X-56								*2,653,000			35,100	37,800	40,500
		X-56	w/ K-55 Coupling				3,980	2,510		3,475,000					
			w/ N-80 Coupling												
		X-70	w/ K-55 Coupling				4,970	2,820		3,550,000					
		L-80	-				5,680	3,020		3,736,700					
		N-80													
			w/ K-55 Coupling							3,550,000					
		X-80	w/ N-80 Coupling							3,736,700					
24	158.00	X-42	-	.625	22.750	22.563	1,910	890	25.375	2,754,000	-	-	32,900	35,600	38,300
24-1/2	140.00	K-55	-	.531	23.438	23.251	2,090	500	25.500	3,798,600	-	-	26,700	29,400	32,100

* Special API drifts

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Hunting: Seal Lock FLUSH

Size	Nom Weight	Grade	Pipe					Standard Connection							
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Nominal Outside Diameter	Minimum Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	Nominal Tensile Efficiency	L. Joint Strength	Setting Depth	
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	%	1,000 lb	SF	ft
2-7/8	6.40	J-55	.217	2.441	2.347	7,260	7,680	2.875	2.375	.869	.985	48%	65.2	1.70	4,560
		K-55											82.6	2.00	3,880
		13 CR-80				10,570	11,160							1.70	6,640
		L-80													
		N-80											86.9		7,050
		13-CR-85				11,230	11,820								
		C-90				11,890	12,380								7,470
		T-95				12,550	12,940						91.2		7,880
		P-110				14,530	14,540						108.6		9,130
		13-CR-110													
		Q-125				16,510	16,070						117.3		10,370
3-1/2	9.20	J-55	.254	2.992	2.867	6,990	7,400	3.500	2.912	1.501	1.503	58%	112.6	1.70	5,510
		K-55											142.6	2.00	4,690
		L-80				10,160	10,530							1.70	*8,020
		13 CR-80													8,020
		N-80											150.1		*8,020
		13-CR-85				10,800	11,060								8,520
		C-90				11,430	11,570								*9,020
		Super 13 Cr*				12,070	12,080						157.6		**9,530
		T-95													9,530
		13 CR-105				13,340	13,050						180.1		10,530
		13-CR-110				13,970	13,530						187.6		11,030
		P-110													
		Q-125				15,880	14,890						202.6		12,530
3-1/2	10.20	13-CR-85	.289	2.922	2.797	12,280	12,880	3.500	2.912	1.826	1.503	52%	150.3	1.70	7,580
		13-CR-95				13,730	14,390						157.8		8,470
									2.837	1.692	1.803	58%	177.7		9,540
		105 KSI				15,170	15,910						203.0		10,540
3-1/2	12.70	L-80	.375	2.750	2.625	15,000	15,310	3.500	2.670	2.428	2.429	66%	230.7	1.70	9,120
4	9.50	J-55	.226	3.548	3.423	5,440	5,110	4.000	3.463	1.276	1.486	48%	95.7	1.70	4,530
		K-55											121.2	2.00	3,850
		L-80				7,910	6,590							1.70	6,590
		N-80											127.6		
		C-90				8,900	7,080								7,420
		T-95				9,390	7,310						134.0		7,830
		P-110				10,880	7,910						159.5		9,060
		Q-125				12,360	8,380						172.3		10,300
4	11.00	J-55	.262	3.476	3.351	6,300	6,590	4.000	3.391	1.786	1.814	58%	134.0	1.70	5,520
		K-55											169.7	2.00	4,690
		L-80				9,170	8,790							1.70	8,030
		N-80											178.6		
		C-90				10,320	9,590								9,040
		T-95				10,890	9,970						187.5		9,540
		P-110				12,610	11,050						223.3		11,050
		Q-125				14,330	12,020						241.1		12,550
4	11.60	J-55	.286	3.428	3.303	6,880	7,300	4.000	3.343	2.070	2.074	62%	155.3	1.70	5,910
		K-55											196.7	2.00	5,020
		L-80				10,010	10,270							1.70	8,590
		N-80											207.0		8,590
		C-90				11,260	11,270								9,660
		T-95				11,890	11,750						217.4		10,200
		P-110				13,760	13,150						258.8		11,810
		Q-125				15,640	14,450						279.5		13,420
4-1/2	10.50	J-55	.224	4.052	3.927	4,790	4,010	4.500	3.967	1.512	1.651	50%	113.4	1.70	6,520
		K-55											143.6	2.00	7,020
		L-80				6,970	4,940							1.70	8,260
		N-80											151.2		8,690
		C-90				7,840	5,200								
		T-95				8,280	5,310						158.8		9,130
		P-110				9,580	5,550						189.0		10,870
		Q-125				10,890	5,830						204.1		11,740
4-1/2	11.60	J-55	.250	4.000	3.875	5,350	4,960	4.500	3.915	1.935	1.938	58%	145.1	1.70	7,520
		K-55											183.8	2.00	8,100
		L-80				7,780	6,350							1.70	9,530
		N-80											193.5		10,030
		C-90				8,750	6,820								

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Hunting: Seal Lock FLUSH (Continued)

Size	Nom Weight	Grade	Pipe					Standard Connection							
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Nominal Outside Diameter	Minimum Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	Nominal Tensile Efficiency	L. Joint Strength	Setting Depth	
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	%	1,000 lb	SF	ft
4-1/2	11.60	13-CR-95	.250	4.000	3.875	9,240	7,030	4.500	3.915	1.935	1.938	58%	203.2	1.70	10,530
		C-95													
		T-95													
		P-110				10,690	7,580						241.9		12,540
		Q-125				12,150	8,000						261.2	1.70	13,540
4-1/2	12.60	J-55	.271	3.958	3.833	5,800	5,720	4.500	3.878	2.130	2.201	59%	159.8	1.70	7,680
		K-55											202.4	2.00	8,270
		L-80				8,430	7,500								9,720
		N-80											213.0	1.70	10,240
		13-CR-85				8,960	7,810								
		C-90				9,490	8,120								
		T-95				10,010	8,410						223.7		10,750
		P-110				11,590	9,200						266.3		12,800
		Q-125				13,170	9,890						287.6		13,820
4-1/2	13.50	J-55	.290	3.920	3.795	6,200	6,420	4.500	3.855	2.393	2.404	62%	179.5	1.70	8,100
		K-55											227.3	2.00	8,720
		L-80				9,020	8,540						227.3		10,260
		N-80											239.3		10,800
		C-90				10,150	9,300								
		USS FSS-95				9,590	8,920						227.3	1.70	10,260
		T-95				10,710	9,660						251.3		11,340
		P-110				12,410	10,680						299.1		13,490
		Q-125				14,100	11,600						323.1		14,570
4-1/2	15.10	L-80	.337	3.826	3.701	10,480	11,080	4.500	3.746	2.729	2.734	62%	259.3	1.70	10,180
		HCL-80*					12,330								
		USS FSS-95				11,140	12,330								
		13-CR-110				14,420	14,340						341.1		13,390
		P-110													
		Q-125				16,380	15,830						368.4		14,460
4-1/2	24.60	J-55	.560	3.380	3.255	11,980	11,980	4.500	3.315	4.744	4.742	68%	355.7	1.70	8,880
		K-55				11,980	11,980						450.5	2.00	9,560
		L-80				17,420	17,430								11,250
		N-80											474.2		11,840
		C-90				19,600	19,600							1.70	
		T-95				20,690	20,690						497.9		12,430
		P-110				23,960	23,960						592.8		14,800
		Q-125				27,220	27,230						640.2		15,980
5	15.00	J-55	.296	4.408	4.283	5,700	5,560	5.000	4.323	2.714	2.733	62%	203.6	1.70	8,050
		K-55											257.8	2.00	8,670
		13-CR-80				8,290	7,250								*10,200
		L-80													10,200
		N-80											271.4		10,740
		C-90				9,320	7,840							1.70	
		T-95				9,840	8,110						285.0		11,270
		P-110				11,400	8,850						339.3		13,420
		Q-125				12,950	9,480						366.4		14,490
5	18.00	J-55	.362	4.276	4.151	6,970	7,390	5.000	4.191	3.465	3.454	65%	259.1	1.70	8,500
		K-55											328.1	2.00	9,150
		13-CR-80				10,140	10,500								10,760
		L-80													
		N-80											345.4		11,330
		C-90				11,400	11,530								
		S-95				12,040	12,030						379.9	1.70	12,460
		T-95											362.7		11,900
		P-110				13,940	13,470						431.8		14,160
		Q-125				15,840	14,830						466.3		15,300
		22-CR-140				17,740	16,080						518.1		*17,000
5	21.40	J-55	.437	4.126	4.001	8,410	8,770	5.000	4.041	4.053	4.061	65%	304.0	1.70	8,400
		K-55											385.0	2.00	9,040
		L-80				12,240	12,760								10,640
		N-80											405.3		11,200
		C-90				13,770	14,360							1.70	
		T-95				14,530	15,160						425.6		11,750
		P-110				16,820	17,550						506.6		13,990
		Q-125				19,120	19,940						547.2		15,110

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Hunting: Seal Lock FLUSH (Continued)

Size	Nom Weight	Grade	Pipe					Standard Connection							
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Nominal Outside Diameter	Minimum Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	Nominal Tensile Efficiency	L. Joint Strength	Setting Depth	
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	%	1,000 lb	SF	ft
5	23.20	J-55	.478	4.044	3.919	9,200	9,510	5.000	3.969	4.653	4.512	66%	338.4	1.70	8,620
		K-55											428.6	2.00	9,280
		13-CR-80				13,380	13,830							1.70	*10,920
		L-80													10,920
		N-80											451.2		11,500
		C-90				15,060	15,560								
		T-95				15,890	16,430						473.8		12,070
		P-110				18,400	19,020						564.0		14,370
		Q-125				20,910	21,620						609.1		15,520
5	24.10	J-55	.500	4.000	3.875	9,630	9,900	5.000	3.920	4.894	4.869	69%	365.2	1.70	8,940
		K-55											462.6	2.00	9,620
		L-80				14,000	14,400							1.70	11,320
		N-80											486.9		11,920
		C-90				15,750	16,200						486.9		11,920
		T-95				16,630	17,100						511.2		12,510
		P-110				19,250	19,800						608.6		14,900
		Q-125				21,880	22,500						657.3		16,090
5-1/2	15.50	J-55	.275	4.950	4.825	4,810	4,040	5.500	4.865	2.710	2.709	60%	203.2	1.70	7,790
		K-55											257.4	2.00	8,390
		13-CR-80				7,000	4,990							1.70	*9,860
		L-80													9,860
		N-80											270.9		10,380
		C-90				7,880	5,260								
		T-95				8,310	5,380						284.4		10,900
		P-110				9,630	5,630						338.6		12,980
		Q-125				10,940	5,890						365.7		14,020
5-1/2	17.00	J-55	.304	4.892	4.767	5,320	4,910	5.500	4.807	3.249	3.250	65%	243.7	1.70	8,500
		K-55											308.7	2.00	9,150
		13-CR-80				7,740	6,290							1.70	*10,760
		25-CR-80											324.9		*11,240
		L-80											308.7		10,760
		N-80											324.9		11,330
		C-90				8,710	6,740								
		S-95				9,190	8,580						357.4		12,460
		T-95					6,940						341.1		11,900
		P-110				10,640	7,480						406.1		14,160
		HC P-110					8,580								
		Q-125				12,090	7,890						438.6	1.70	15,290
5-1/2	20.00	J-55	.361	.4.778	4.653	6,320	6,610	5.500	4.693	3.775	3.784	65%	283.1	1.70	8,410
		K-55											358.6	2.00	9,050
		13-CR-80				9,190	8,830							1.70	10,650
		L-80													
		N-80											377.5		11,210
		C-90				10,340	9,630								
		T-95				10,910	10,010						396.4		11,770
		P-110				12,640	11,100						471.9		14,010
		Q-125				14,360	12,080						509.6		15,130
5-1/2	23.00	J-55	.415	4.670	4.545	7,260	7,680	5.500	4.585	4.338	4.350	65%	325.4	1.70	8,490
		K-55											412.1	2.00	9,140
		L-80				10,560	11,160							1.70	10,760
		N-80											433.8		11,320
		C-90				11,880	12,380								
		S-95				12,540	12,940						477.2		12,450
		T-95											455.5		11,890
		P-110				14,530	14,540						542.3		14,150
		Q-125				16,510	16,070						585.6		15,280
5-1/2	26.00	J-55	.476	4.548	4.423	8,330	8,700	5.500	4.535	5.155	4.962	66%	372.2	1.70	8,570
		K-55											471.4	2.00	9,230
		L-80				12,120	12,650							1.70	10,860
		N-80											496.2		11,430
		C-90				13,630	14,240								
		T-95				14,390	15,030						521.0		12,000
		P-110				16,660	17,400						620.3	1.70	14,290
		Q-125				18,930	19,770						669.9		15,430

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Hunting: Seal Lock FLUSH (Continued)

Size	Nom Weight	Grade	Pipe					Standard Connection							
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Nominal Outside Diameter	Minimum Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	Nominal Tensile Efficiency	L. Joint Strength	Setting Depth	
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	%	1,000 lb	SF	ft
5-1/2	32.00	105 KSI	.612	4.276	4.151	20,450	20,760	5.500	None	6.293	6.298	67%	755.2	1.70	12,170
		120 KSI				23,370	23,730						818.1		13,900
		28 CR-110 KSI				21,420	21,750						786.6		12,750
		28 CR-125 KSI				24,340	24,720						849.6		14,480
6-5/8	28.00	J-55	.417	5.791	5.666	6,060	6,170	6.625	5.711	5.330	5.141	63%	385.6	1.70	8,200
		K-55											488.4	2.00	8,830
		L-80				8,810	8,170								10,390
		N-80											514.1	1.70	10,940
		C-90				9,910	8,880								
		T-95				10,460	9,220						539.8		11,480
		P-110				12,120	10,160						642.6		13,670
		Q-125				13,770	10,990						694.0		14,770
6-5/8	36.70	J-55	.562	5.501	5.376	8,160	8,540	6.625	5.436	7.346	7.280	68%	546.0	1.70	8,830
		K-55											691.6	2.00	9,500
		L-80				11,880	12,420						695.1	1.70	11,240
		N-80											731.7		11,830
		C-90				13,360	13,970								
		T-95				14,100	14,750						768.3		12,420
		P-110				16,330	17,080						914.6		14,780
		Q-125				18,560	19,410						987.8		15,970
7	17.00	J-55	.231	6.538	6.413	3,180	1,630	7.000	6.453	2.457	2.785	50%	184.3	1.70	6,490
		K-55				3,180	1,630						233.4	2.00	6,990
		13-CR-80				4,620	1,800								*8,220
		L-80													8,220
		N-80											245.7	1.70	8,650
		C-90				5,200									
		T-95				5,490							258.0		9,090
		P-110				6,350							307.1		10,820
		Q-125				7,220							331.7		11,680
7	20.00	J-55	.272	6.456	6.331	3,740	2,270	7.000	6.376	3.166	3.165	55%	237.4	1.70	7,140
		K-55											300.7	2.00	7,690
		13-CR-80				5,440	2,740								*9,050
		L-80													9,050
		N-80											316.5	1.70	9,530
		C-90				6,120	2,860								
		T-95				6,460	2,900						332.3		10,000
		P-110				7,480	2,980						395.6		11,910
		Q-125				8,500							427.3		12,860
7	23.00	J-55	.317	6.366	6.241	4,360	3,270	7.000	6.311	4.072	3.165	48%	237.4	1.70	6,170
		K-55											300.7	2.00	6,640
		L-80				6,340	3,830								7,820
		N-80											316.5	1.70	8,230
		C-90				7,130	4,030								
		T-95				7,530	4,140						332.3		8,640
		P-110				8,720	4,440						395.6		10,290
		Q-125				9,910	4,650						427.3	1.70	11,110
7	26.00	J-55	.362	6.276	6.151	4,980	4,320	7.000	6.196	4.680	4.676	62%	350.7	1.70	8,040
		K-55											444.2	2.00	8,650
		C-75				6,790	5,220								10,180
		L-80				7,240	5,410								
		N-80											467.6	1.70	10,720
		C-90				8,150	5,740								
		T-95				8,600	5,880						491.0		11,250
		P-110				9,960	6,230						584.5		13,400
		Q-125				11,310	6,450						631.3		14,470
7	29.00	J-55	.408	6.184	6.059	5,610	5,410	7.000	6.104	5.485	5.495	65%	411.4	1.70	8,420
		K-55											521.1	2.00	9,070
		L-80				8,160	7,020								10,670
		N-80											548.5	1.70	11,230
		13-CR-85				8,670	7,310								
		C-90				9,180	7,580								
		T-95				9,690	7,830						575.9		11,790
		P-110				11,220	8,530						685.6		14,040
		HC P-110					9,200								
		Q-125				12,750	9,100						740.5		15,160

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Hunting: Seal Lock FLUSH (Continued)

Size	Nom Weight	Grade	Pipe					Standard Connection							
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Nominal Outside Diameter	Minimum Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	Nominal Tensile Efficiency	L. Joint Strength	Setting Depth	
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	%	1,000 lb	SF	ft
7	32.00	J-55	.453	6.094	*6.000	6,230	6,470	7.000	6.045	6.332	6.315	68%	473.6	1.70	8,800
		K-55											599.9	2.00	9,470
		L-80				9,060	8,610							1.70	11,140
		N-80											631.5		11,730
		USS FSS-95				9,630	10,400						599.9		11,140
		13-CR-85					9,000						631.5		11,730
		C-90				10,190	9,380								
		C-95				10,760	9,750						663.1		12,310
		T-95													
		P-110				12,460	10,780						789.4		14,660
		LSS-125				14,160	11,720						852.5		15,830
		Q-125													
7	35.00	J-55	.498	6.004	5.879	6,850	7,270	7.000	5.920	6.913	6.915	68%	518.5	1.70	8,820
		K-55											656.7	2.00	9,500
		L-80				9,960	10,180							1.70	11,170
		N-80											691.3		11,760
		C-90				11,210	11,170								
		T-95				11,830	11,650						725.9		12,350
		P-110				13,700	13,020						864.1		14,700
		LSS-125				15,560	14,310						933.3		15,870
		Q-125													
7	38.00	J-55	.540	5.920	5.795	7,430	7,830	7.000	5.840	7.668	7.510	69%	563.3	1.70	8,890
		K-55											713.5	2.00	9,570
		L-80				10,800	11,390							1.70	11,260
		N-80											751.0		11,860
		C-90				12,150	12,820								
		T-95				12,830	13,440						788.6		12,450
		P-110				14,850	15,140						938.8		14,820
		Q-125				16,880	16,750						1,013.9		16,010
		TCA-125													
		Q-125 Enhanced*				18,750**	17,780						1,051.4		16,600
		TCA-140				18,900	18,280						1,126.5		17,790
7	41.00	J-55	.590	5.820	5.695	8,110	8,490	7.000	5.755	8.317	8.294	70%	622.1	1.70	9,060
		K-55											787.9	2.00	9,750
		L-80				11,800	12,350							1.70	11,480
		N-80											829.4		12,080
		C-90				13,280	13,900								
		T-95				14,010	14,670						870.9		12,680
		P-110				16,230	16,990						1,036.8		15,100
		Q-125				18,440	19,300						1,119.7		16,310
7	42.70	J-55	.625	5.750	5.625	8,590	8,940	7.000	None	8.765	8.769	70%	657.4	1.70	9,090
		K-55											832.7	2.00	9,780
		L-80				12,500	13,010							1.70	11,510
		N-80											876.5		12,120
		C-90				14,060	14,640								
		T-95				14,840	15,450						920.3		12,720
		P-110				17,190	17,890						1,095.6		15,150
		Q-125				19,530	20,330						1,183.3		16,360
7	49.50	J-55	.730	5.540	5.415	10,040	10,270	7.000	5.460	9.920	9.917	69%	743.8	1.70	8,950
		K-55											942.1	2.00	9,640
		L-80				14,600	14,940							1.70	11,340
		N-80											991.7		11,930
		C-90				16,430	16,810						991.7	1.70	11,930
		T-95				17,340	17,750						1,041.3		12,530
		P-110				20,080	20,550						1,239.6		14,920
		Q-125				22,810	23,350						1,338.8		16,110
7-5/8	26.40	K-55	.328	6.969	6.844	4,140	2,890	7.625	6.889	4.585	4.586	61%	435.6	2.00	8,510
		L-80				6,020	3,400							1.70	10,010
		P-110				8,280	3,920						573.1		13,190

* Special API drifts
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Hunting: Seal Lock FLUSH (Continued)

Size	Nom Weight	Grade	Pipe					Standard Connection							
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Nominal Outside Diameter	Minimum Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	Nominal Tensile Efficiency	L. Joint Strength	Setting Depth	
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	%	1,000 lb	SF	ft
7-5/8	29.70	J-55	.375	6.875	6.750	4,730	3,910	7.625	6.795	5.550	5.456	64%	409.2	1.70	8,290
		K-55												2.00	8,930
		13-CR-80				6,890	4,790						518.3		10,500*
		L-80													10,500
		N-80											545.6		11,050
		C-90				7,750	5,040							1.70	
		S-95				8,180	7,150						600.2		12,160
		T-95					5,140						572.9		11,610
		P-110				9,470	5,350						682.0		13,820
		Q-125				10,760	5,670						736.6		14,920
7-5/8	33.70	J-55	.430	6.765	6.640	5,430	5,100	7.625	6.685	6.312	6.317	65%	473.4	1.70	8,430
		K-55											599.6	2.00	9,070
		13-CR-80				7,900	6,560								10,680*
		L-80													
		N-80											631.2		11,240
		C-90				8,880	7,050							1.70	
		C-95				9,380	7,280						662.8		11,800
		T-95				9,380	7,280						662.8		11,800
		P-110				10,860	7,870						789.0		14,050
		Q-125				12,340	8,350						852.1		15,170
7-5/8	39.00	J-55	.500	6.625	6.500	6,310	6,610	7.625	6.545	7.842	7.607	68%	570.5	1.70	8,820
		K-55											722.7	2.00	9,500
		L-80				9,180	8,820								11,170
		N-80											760.7		11,760
		C-90				10,330	9,620								
		S-95				10,900	10,600						836.8		12,940
		T-95					10,000						798.7	1.70	12,350
		P-110				12,620	11,080						950.9		14,700
		Q-125				14,340	12,060						1,026.9		15,880
		Q-125*													
		Q-125 HC					14,100								
7-5/8	42.80	J-55	.562	6.501	6.376	7,090	7,510	7.625	6.436	8.477	8.476	68%	635.7	1.70	8,820
		K-55											805.2	2.00	9,500
		L-80				10,320	10,810								11,170
		N-80											847.6		11,760
		C-90				11,610	11,890							1.70	
		T-95				12,250	12,410						890.0		12,350
		P-110				14,190	13,920						1,059.5		14,700
		Q-125				16,120	15,350						1,144.3		15,880
7-5/8	45.30	J-55	.595	6.435	6.310	7,510	7,910	7.625	6.355	8.931	8.950	68%	669.8	1.70	8,820
		K-55											848.4	2.00	9,500
		L-80				10,920	11,510								11,170
		N-80				10,920	11,510						893.1		11,760
		C-90				12,290	12,950							1.70	
		T-95				12,970	13,660						937.8		12,350
		P-110				15,020	15,430						1,116.4		14,700
		Q-125				17,070	17,090						1,205.7		15,880
7-3/4	46.10	J-55	.595	6.560	*6.500	7,390	7,790	7.750	6.545	9.094	9.105	68%	682.1	1.70	8,820
		K-55											863.9	2.00	9,500
		HCL-80*				10,750	12,650								11,180
		L-80					11,340								
		N-80											909.4		11,770
		TCA-85				11,420	12,050							1.70	
		C-90				12,090	12,740								
		T-95				12,760	13,320						954.9		12,350
		P-110				14,780	14,990						1,136.8		14,710
		Q-125				16,790	16,580						1,227.7		15,880
		LS-140				18,810	18,090						1,364.1		17,650
8-1/8	0.00	J-55	.438	7.249	7.124	5,190	4,690	8.125	7.169	6.881	6.877	65%	515.8	1.70	8,440
		K-55											653.3	2.00	9,080
		L-80				7,550	5,950								10,690
		N-80											687.7		11,250
		C-90				8,490	6,360							1.70	
		T-95				8,960	6,540						722.1		11,810
		P-110				10,380	7,000						859.6		14,060
		Q-125				11,790	7,340						928.4		15,190

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Hunting: Seal Lock FLUSH (Continued)

Size	Nom Weight	Grade	Pipe					Standard Connection							
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Nominal Outside Diameter	Minimum Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	Nominal Tensile Efficiency	L. Joint Strength	Setting Depth	
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	%	1,000 lb	SF	ft
8-5/8	40.00	J-55	.450	7.725	*7.625	5,020	4,400	8.625	7.670	7.498	7.442	64%	558.2	1.70	8,360
		K-55				5,020	4,400						707.0	2.00	9,000
		L-80				7,300	5,520								10,590
		N-80											744.2		11,140
		C-90				8,220	5,870								
		S-95				8,670	7,900						818.6	1.70	12,260
		T-95					6,020						781.4		11,700
		P-110				10,040	6,390						930.3		13,930
		Q-125				11,410	6,630						1,004.7		15,040
8-5/8	44.00	T-95	.500	7.625	7.500	9,640	7,740	8.625	7.545	8.677	8.675	68%	910.9	1.70	12,350
9-3/8	39.00	HCQ-125	.400	8.575	*8.500	*9,870	4,850	9.375	8.545	6.760	6.762	60%	912.6	1.70	14,000
		HCQ-125*				*9,870	4,850								
9-5/8	36.00	J-55	.352	8.921	8.765	3,520	2,020	9.625	8.820	6.303	5.646	55%	423.5	1.70	7,150
		K-55											536.4	2.00	7,690
		L-80				5,120	2,370								9,050
		N-80											564.6		9,530
		C-90				5,760	2,440							1.70	
		T-95				6,080	2,470						592.8		10,000
		P-110				7,040	2,480						705.8		11,910
		Q-125				8,000							762.2		12,860
9-5/8	40.00	J-55	.395	8.835	*8.750	3,950	2,570	9.625	8.795	7.209	7.220	63%	540.7	1.70	8,170
		K-55											684.9	2.00	8,790
		L-80				5,750	3,090								10,350
		N-80											720.9		10,890
		C-90				6,460	3,250							1.70	
		T-95				6,820	3,320						756.9		11,440
		P-110				7,900	3,470						901.1		13,610
		Q-125				8,980	3,530						973.2		14,700
9-5/8	43.50	J-55	.435	8.755	8.599	4,350	3,250	9.625	8.644	7.992	7.792	62%	584.4	1.70	8,050
		K-55											740.2	2.00	8,670
		L-80				6,330	3,810								10,200
		N-80											779.2		10,740
		C-90				7,120	4,010							1.70	
		T-95				7,510	4,120						818.2		11,270
		P-110				8,700	4,420						974.0		13,420
		Q-125				9,890	4,620						1,051.9		14,490
9-5/8	47.00	J-55	.472	8.681	8.525	4,720	3,890	9.625	8.595	8.815	8.817	65%	661.1	1.70	8,430
		K-55											837.4	2.00	9,070
		13-CR-80				6,870	4,760								10,680*
		L-80													10,680
		N-80											881.5		11,240
		C-90				7,720	5,000								
		C-95				8,150	5,090						925.6	1.70	11,800
		S-95					7,100						969.7		12,360
		T-95					5,090						925.6		11,800
		P-110				9,440	5,300						1,101.9		14,050
		Q-125				10,730	5,640						1,190.0		15,170
9-5/8	53.50	J-55	.545	8.535	*8.500	5,450	5,130	9.625	8.535	10.745	10.058	65%	754.4	1.70	8,400
		K-55											955.5	2.00	9,040
		L-80				7,930	6,620								10,630
		N-80				7,930	6,620						1,005.8		11,190
		C-90				8,920	7,120								
		S-95					8,850						1,106.4		12,310
		T-95				9,410	7,340						1,056.1	1.70	11,750
		T-95 Enhanced*					7,560								
		P-110				10,900	7,950						1,257.3		13,990
		P-110 HC					10,050*								
		HCQ-125				12,390	8,850						1,357.8		15,110
		Q-125					8,440								
		TCA-125													

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Hunting: Seal Lock FLUSH (Continued)

Size	Nom Weight	Grade	Pipe					Standard Connection							
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Nominal Outside Diameter	Minimum Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	Nominal Tensile Efficiency	L. Joint Strength	Setting Depth	
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	%	1,000 lb	SF	ft
9-5/8	58.40	J-55	.595	8.435	8.279	5,950	5,990	9.625	8.355	11.946	11.315	67%	848.6	1.70	8,700
		K-55											1,074.9	2.00	9,370
		L-80				8,650	7,890							1.70	11,020
		N-80											1,131.5		11,600
		C-90				9,740	8,560								
		T-95				10,280	8,880						1,188.1		12,180
		P-110				11,900	9,760						1,414.4		14,500
		Q-125				13,520	10,530						1,527.5		15,660
9-5/8	70.30	P-110	.734	8.157	8.001	14,680	14,830	9.625	8.061	14.233	14.631	69%	1,779.1	1.70	15,020
		Q-125				16,680	16,390						1,921.5		16,220
9-7/8	62.80	USS FSS-95	.625	8.625	8.500	9,410	8,620	9.875	8.545	12.740	12.078	67%	1,147.4	1.70	10,930
		T-95				10,520	9,320						1,268.2		12,080
		Q-125				13,840	11,140						1,630.5		15,530
		HCQ-125				13,840	12,030								
10-3/4	45.50	L-80	.400	9.950	*9.875	5,210	2,470	10.750	9.920	8.422	8.424	65%	800.1	1.70	10,640
		N-80				5,210	2,470						842.2		11,200
		C-90				5,860	2,560								
		T-95				6,190	2,590						884.3		11,760
		P-110				7,160	2,610						1,052.8		14,010
		Q-125				8,140							1,137.0		15,130
10-3/4	51.00	K-55	.450	9.850	9.694	4,030	2,700	10.750	9.755	9.320	9.322	64%	885.4	2.00	8,940
		L-80				5,860	3,220							1.70	10,520
		N-80											932.0		11,080
		C-90				6,590	3,400								
		T-95				6,960	3,480						978.6		11,630
		P-110				8,060	3,660						1,165.0		13,840
		Q-125				9,160	3,740						1,258.2		14,950
10-3/4	60.70	K-55	.545	9.660	9.504	4,880	4,160	10.750	9.565	11.577	11.577	66%	1,099.8	2.00	9,260
		N-80				7,100	5,160						1,157.7	1.70	11,460
		L-80											1,099.8		10,890
		C-90				7,980	5,460						1,157.7		11,460
		T-95				8,430	5,590						1,215.6		12,040
		P-110				9,760	5,880						1,447.1		14,330
		Q-125				11,090	6,070						1,562.9		15,480
10-3/4	65.70	J-55	.595	9.560	*9.500	5,330	4,920	10.750	9.555	14.118	12.881	68%	966.1	1.70	8,810
		K-55											1,223.7	2.00	9,480
		L-80				7,750	6,300							1.70	11,150
		N-80											1,288.1		11,740
		C-90				8,720	6,760								
		T-95				9,200	6,960						1,352.5		12,330
		P-110				10,650	7,500						1,610.1		14,680
		Q-125				12,110	7,920						1,738.9		15,850
11-3/4	47.00	J-55	.375	11.000	10.844	3,070	1,510	11.750	10.905	7.899	7.898	59%	592.4	1.70	7,650
		K-55											750.3	2.00	8,230
		L-80				4,470	1,630							1.70	9,690
		N-80											789.8		10,200
		C-90				5,030									
		T-95				5,310							829.3		10,710
		P-110				6,140							987.3		12,750
		Q-125				6,980							1,066.2		13,770
11-3/4	54.00	J-55	.435	10.880	10.724	3,560	2,070	11.750	10.795	9.871	9.279	60%	695.9	1.70	7,790
		K-55											881.5	2.00	8,380
		L-80				5,180	2,440							1.70	9,860
		N-80											927.9		10,380
		C-90				5,830	2,530								
		T-95				6,150	2,550						974.3		10,900
		P-110				7,130	2,570						1,159.9		12,980
		Q-125				8,100							1,252.7		14,020
11-3/4	60.00	J-55	.489	10.772	*10.625	4,010	2,660	11.750	10.670	11.241	11.246	65%	843.1	1.70	8,430
		K-55											1,067.9	2.00	9,080
		L-80				5,830	3,180							1.70	10,680
		N-80											1,124.1		11,240
		C-90				6,550	3,360								
		T-95				6,920	3,440						1,180.3		11,810
		P-110				8,010	3,610						1,405.1		14,050
		Q-125				9,100	3,680						1,517.5		15,180

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Hunting: Seal Lock FLUSH (Continued)

Size	Nom Weight	Grade	Pipe					Standard Connection							
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Nominal Outside Diameter	Minimum Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	Nominal Tensile Efficiency	L. Joint Strength	Setting Depth	
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	%	1,000 lb	SF	ft
11-3/4	65.00	J-55	.534	10.682	*10.625	4,370	3,300	11.750	10.660	13.224	11.700	62%	877.5	1.70	8,070
		K-55											1,111.5	2.00	8,690
		L-80				6,360	3,870							1.70	10,220
		N-80											1,170.0		10,760
		C-90				7,160	4,060								
		S-95				7,560	5,740						1,287.0		11,840
		T-95					4,180						1,228.5		11,300
		P-110				8,750	4,480						1,462.5		13,450
		Q-125				9,940	4,690						1,579.5		14,530
		HCQ-125					5,740								
		HCQ-125*													
11-7/8	71.80	J-55	.582	10.711	*10.625	4,720	3,880	11.875	10.670	14.035	14.037	68%	1,052.6	1.70	8,820
		K-55											1,333.3	2.00	9,500
		L-80				6,860	4,750							1.70	11,170
		N-80											1,403.5		11,760
		C-90				7,720	4,990								
		T-95				8,150	5,090						1,473.7		12,350
		P-110				9,430	5,290						1,754.4		14,700
		Q-125				10,720	5,630						1,894.7		15,880
		HCQ-125*					7,190								
		Q-125 HC													
13-3/8	68.00	J-55	.480	12.415	12.259	3,450	1,950	13.375	12.314	12.639	12.644	65%	947.9	1.70	8,440
		K-55											1,200.7	2.00	9,080
		L-80				5,020	2,260							1.70	10,680
		N-80				5,020	2,260						1,263.9		11,250
		C-90				5,650	2,320								
		C-95				5,970	2,330						1,327.1		11,810
		T-95													
		P-110				6,910	2,340						1,579.9		14,060
		Q-125				7,850							1,706.3		15,180
13-3/8	72.00	J-55	.514	12.347	*12.250	3,700	2,230	13.375	12.295	14.536	13.504	65%	1,012.8	1.70	8,440
		K-55											1,282.9	2.00	9,090
		HCN-80				5,380	3,470						1,350.4	1.70	11,250
		L-80					2,670						1,282.9		10,690
		N-80											1,350.4		11,250
		C-90				6,050	2,780								
		S-95				6,390	3,470						1,485.4		12,380
		C-95					2,820						1,417.9		11,810
		T-95													
		P-110				7,400	2,880						1,688.0		14,060
		Q-125				8,410							1,823.0		15,190
		HCQ-125					3,900								
		USS-140				9,420	2,880						2,025.6		16,880
13-5/8	88.20	J-55	.625	12.375	*12.250	4,420	3,360	13.625	12.295	17.360	17.363	68%	1,302.0	1.70	8,830
		K-55											1,649.2	2.00	9,500
		L-80				6,420	3,980							1.70	11,180
		N-80											1,736.0		11,770
		C-90				7,220	4,130								
		T-95				7,630	4,260						1,822.8		12,360
		P-110				8,830	4,570						2,170.0		14,710
		Q-125				10,030	4,800						2,343.6		15,890
		TCA-140				11,240	4,940						2,604.0		17,650
		V-150				12,040	4,970						2,777.6		18,830
16	84.00	HCN-80	.495	15.010	14.822	4,330	1,910	16.000	14.890	14.478	14.482	60%	1,447.8	1.70	10,380
16	109.00	N-80	.656	14.688	14.500	5,740	3,080	16.000	14.615	18.814	18.671	59%	1,867.1	1.70	10,220
		P-110				7,890	3,470						2,333.9		12,770
17-7/8	92.78	HCN-80	.500	16.875	16.750	3,920	1,270	17.875	16.790	16.247	16.347	59%	1,624.7	1.70	10,300
		P-110				5,380	1,090						2,030.9		12,880

* Special API drifts
** Maximum strength coupling OD will always generate a tensile efficiency equal to pipe body
Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock SF Database

Size	Nom Wt	Grade	Pipe					Connection											Torque		
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Box Outside Diameter	Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	L. Joint Strength	Nominal Makeup Loss	Setting Depth		Int Press Rating	Ext Press Rating	Comp Rating	Recommended Make-Up Torque		
																			Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	1,000 lb	in.	SF	ft	psi	psi	lb	ft-lb		
4-1/2	11.60	L-80	.250	4.000	3.875	7,780	6,360	4.700	3.925	2.226	2.115	200.9	2.797	1.70	10,400	13,000	11,150	212,000	1,500	2,000	2,500
4-1/2	12.60	L-80	.271	3.958	3.833	8,430	7,500	4.700	3.883	2.592	2.596	246.2	2.979	1.70	11,830	15,030	14,730	197,000	1,350	1,850	2,350
		T-95				10,010	8,410					272.2			13,080			234,000	1,500	2,000	2,500
		P-110				11,590	9,210					324.0			15,570			271,000	1,650	2,150	2,650
		Q-125				13,170	9,890					349.9			16,820			307,000	1,800	2,300	2,800
4-1/2	13.50	L-80	.290	3.920	3.795	9,020	8,540	4.736	3.883	2.827	2.830	268.6	2.979	1.70	12,120	15,450	13,640	197,000	1,450	1,950	2,450
		USS FSS-95*				9,590	10,380											209,000	1,500	2,000	2,500
		T-95				10,710	9,660					296.8			13,390			234,000	1,600	2,100	2,600
		P-110				12,410	10,690					353.4			15,940			271,000	1,750	2,250	2,750
		Q-125				14,100	11,600					381.6			17,210			307,000	1,900	2,400	2,900
4-1/2	15.10	L-80	.337	3.826	3.701	10,480	11,080	4.715	3.751	3.215	3.222	305.4	3.616	1.70	11,990	21,760	17,730	226,000	2,150	2,650	3,150
		USS FSS-95*				11,140	12,330											240,000	2,200	2,700	3,200
		C-95				12,450	12,760					337.6			13,260			268,000	2,350	2,850	3,350
		T-95																			
		P-110				14,420	14,340					401.9			15,780			311,000	2,600	3,100	3,600
		13 CR-110														21,760	17,730				
		Q-125				16,380	15,830					434.0			17,040			353,000	2,800	3,300	3,800
4-1/2	16.60	L-80	.375	3.750	3.625	11,670	12,220	4.746	3.751	3.667	3.669	348.4	3.616	1.70	12,400	22,600	16,020	226,000	2,250	2,750	3,250
		T-95				13,850	14,510					385.0			13,710			268,000	2,450	2,950	3,450
		P-110				16,040	16,810					458.4			16,320			311,000	2,700	3,200	3,700
		Q-125				18,230	19,100					495.0			17,630			353,000	2,900	3,400	3,900
4-1/2	17.00	L-80	.380	3.740	3.615	11,820	12,370	4.746	3.751	3.726	3.743	354.0	3.616	1.70	12,450	22,740	15,830	226,000	2,300	2,800	3,300
		P-110				16,260	17,010					465.8			16,390			311,000	2,700	3,200	3,700
4-1/2	18.80	L-80	.430	3.640	3.515	13,380	13,830	4.714	3.565	4.123	4.129	391.7	4.620	1.70	12,330	26,280	22,360	245,000	3,150	3,650	4,150
		T-95				15,890	16,420					432.9			13,630			291,000	3,400	3,900	4,400
		P-110				18,390	19,010					515.4			16,220			337,000	3,700	4,200	4,700
		Q-125				20,900	21,610					556.6			17,520	26,280	22,360	383,000	3,950	4,450	4,950
4-1/2	21.40	L-80	.500	3.500	3.375	15,560	15,800	4.767	3.565	4.908	4.909	466.3	4.620	1.70	12,840	27,620	19,930	245,000	3,450	3,950	4,450
		T-95				18,470	18,770					515.3			14,190			291,000	3,700	4,200	4,700
		P-110				21,390	21,730					613.5			16,900			337,000	4,000	4,500	5,000
		Q-125				24,310	24,690					662.6			18,250	27,620	19,930	383,000	4,250	4,750	5,250
5	15.00	L-80	.296	4.408	4.283	8,290	7,250	5.212	4.333	3.107	3.106	295.1	3.145	1.70	11,670	13,440	18,200	242,000	1,900	2,400	2,900
		T-95				9,840	8,110					326.1			12,900			288,000	2,150	2,650	3,150
		P-110				11,400	8,850					388.3			15,360			333,000	2,400	2,900	3,400
		Q-125				12,950	9,480					419.3			16,590			379,000	2,650	3,150	3,650
5	18.00	L-80	.362	4.276	4.151	10,140	10,500	5.214	4.201	3.848	3.858	365.6	3.835	1.70	11,990	16,250	21,260	269,000	2,700	3,200	3,700
		N-80										384.8			12,620						
		T-95				12,040	12,020					404.0			13,260			319,000	3,000	3,500	4,000
		P-110				13,940	13,470					481.0			15,780			369,000	3,300	3,800	4,300
		KO-HP2 13 CR-110										461.8			15,150						

* Special API drifts

Data provided by Hunting Tubular Systems; SDSSLSF-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock SF Database (Continued)

Size	Nom Wt	Grade	Pipe					Connection											Torque		
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Box Outside Diameter	Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	L. Joint Strength	Nominal Makeup Loss	Setting Depth		Int Press Rating	Ext Press Rating	Comp Rating	Recommended Make-Up Torque		
																			Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	1,000 lb	in.	SF	ft	psi	psi	lb	ft-lb		
5	18.00	Q-125	.362	4.276	4.151	15,840	14,820	5.214	4.201	3.848	3.858	519.5	3.835	1.70	17,040	16,250	21,260	420,000	3,600	4,100	4,600
5	20.30	L-80	.408	4.184	4.059	11,420	11,990	5.251	4.201	4.460	4.459	423.6	3.835	1.70	12,450	18,380	19,040	269,000	2,900	3,400	3,900
		T-95				13,570	14,240					468.2			13,760			319,000	3,200	3,700	4,200
		P-110				15,710	16,490					557.4			16,390			369,000	3,500	4,000	4,500
		Q-125				17,850	18,550					602.0			17,700			420,000	3,800	4,300	4,800
5	21.40	L-80	.437	4.126	4.001	12,240	12,760	5.275	4.201	4.838	4.721	448.5	3.835	1.70	12,390	20,140	21,020	269,000	3,000	3,500	4,000
		T-95				14,530	15,150					495.7			13,690			319,000	3,300	3,800	4,300
		P-110				16,820	17,550					590.1			16,300			369,000	3,600	4,100	4,600
		Q-125				19,120	19,940					637.3			17,600			420,000	3,900	4,400	4,900
5	23.20	L-80	.478	4.044	3.919	13,380	13,830	5.209	3.969	5.093	5.094	483.8	5.065	1.70	12,330	26,230	33,580	288,000	4,450	4,950	5,450
		C-90				15,060	15,560					509.3			12,970			324,000	4,700	5,200	5,700
		T-95				15,890	16,430					534.8			13,630			342,000	4,800	5,300	5,800
		P-110				18,400	19,020					636.6			16,230			397,000	5,150	5,650	6,150
		Q-125				20,910	21,620					687.6			17,520			451,000	5,500	6,000	6,500
5	24.10	L-80	.500	4.000	3.875	14,000	14,400	5.226	3.969	5.371	5.369	510.1	5.065	1.70	12,490	26,650	32,400	288,000	4,650	5,150	5,650
		C-90				15,750	16,200					536.9			13,130			324,000	4,900	5,400	5,900
		T-95				16,630	17,100					563.7			13,800			342,000	5,000	5,500	6,000
		P-110				19,250	19,800					671.1			16,430			397,000	5,350	5,850	6,350
		Q-125				21,880	22,500					724.8			17,740			451,000	5,700	6,200	6,700
5-1/2	17.00	L-80	.304	4.892	4.767	7,740	6,290	5.718	4.817	3.575	3.573	339.4	3.259	1.70	11,840	13,150	14,720	264,000	2,350	2,850	3,350
		13 CR-80				7,740	6,290								11,840						
		T-95				9,190	6,940					375.2			13,080			313,000	2,600	3,100	3,600
		P-110				10,640	7,480					446.6			15,570			363,000	2,900	3,400	3,900
		Q-125				12,090	7,890					482.4			16,820			412,000	3,200	3,700	4,200
5-1/2	20.00	L-80	.361	4.778	4.653	9,190	8,830	5.766	4.817	4.441	4.439	421.7	3.259	1.70	12,520	14,150	12,390	264,000	2,450	2,950	3,450
		T-95				10,910	10,020					466.1			13,840			313,000	2,700	3,200	3,700
		P-110				12,640	11,110					554.9			16,480			363,000	3,000	3,500	4,000
		Q-125				14,360	12,090					599.3			17,790			412,000	3,300	3,800	4,300
5-1/2	23.00	L-80	.415	4.670	4.545	10,560	11,160	5.723	4.595	4.975	4.980	472.6	4.454	1.70	12,330	17,290	18,910	303,000	3,750	4,250	4,750
		T-95				12,540	12,930					522.4			13,630			360,000	4,150	4,650	5,150
		P-110				14,530	14,540					621.9			16,230			416,000	4,550	5,050	5,550
		Q-125				16,510	16,060					671.6			17,530			473,000	4,900	5,400	5,900
5-1/2	23.80	L-80	.437	4.626	4.501	11,120	11,700	5.741	4.595	5.296	5.300	503.1	4.454	1.70	12,520	17,630	18,100	303,000	3,850	4,350	4,850
		T-95				13,210	13,900					556.1			13,840			360,000	4,250	4,750	5,250
		P-110				15,300	15,940					662.0			16,480			416,000	4,650	5,150	5,650
		Q-125				17,380	17,680					715.0			17,800	17,630	18,100	473,000	5,000	5,500	6,000
5-1/2	26.00	L-80	.476	4.548	4.423	12,120	12,650	5.713	4.473	5.634	5.638	535.2	5.030	1.70	12,330	21,650	26,500	321,000	4,900	5,400	5,900
		T-95				14,390	15,020					591.6			13,620			381,000	5,300	5,800	6,300
		T-95 E				15,150	15,030					591.6			13,620			400,000	5,450	5,950	6,450
		P-110				16,660	17,390					704.3			16,220			441,000	5,750	6,250	6,750
		HCP-110*				18,930	19,760											501,000	5,750	6,250	8,500
		Q-125										760.6			17,520				6,200	6,700	7,200

* Special API drifts

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Hunting: Seal-Lock SF Database (Continued)

Size	Nom Wt	Grade	Pipe					Connection											Torque		
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Box Outside Diameter	Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	L. Joint Strength	Nominal Makeup Loss	Setting Depth		Int Press Rating	Ext Press Rating	Comp Rating	Recommended Make-Up Torque		
																			Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	1,000 lb	in.	SF	ft	psi	psi	lb	ft-lb		
5-1/2	26.80	L-80	.500	4.500	4.375	12,730	13,220	5.732	4.473	5.975	5.975	567.6	5.030	1.70	12,510	22,060	25,480	321,000	5,000	5,500	6,000
		T-95				15,110	15,700					627.4			13,820			381,000	5,400	5,900	6,400
		P-110				17,500	18,180					746.9			16,450			441,000	5,850	6,350	6,850
		Q-125				19,890	20,660					806.6			17,770			501,000	6,300	6,800	7,300
6-5/8	24.00	L-80	.352	5.921	5.796	7,440	5,760	6.842	5.846	5.069	5.065	481.2	3.730	1.70	12,000	14,970	15,180	348,000	3,150	4,150	5,150
		T-95				8,830	6,310					531.8			13,270			413,000	3,500	4,500	5,500
		P-110				10,230	6,730					633.1			15,790			479,000	3,900	4,900	5,900
		Q-125				11,620	7,020					683.8			17,060			544,000	4,300	5,300	6,300
6-5/8	28.00	L-80	.417	5.791	5.666	8,810	8,170	6.898	5.846	6.265	6.265	595.2	3.730	1.70	12,660	16,120	13,000	348,000	3,450	4,450	5,450
		T-95				10,460	9,220					657.8			13,990			413,000	3,800	4,800	5,800
		P-110				12,120	10,160					783.1			16,660			479,000	4,200	5,200	6,200
		Q-125				13,770	11,000					845.8			17,990			544,000	4,600	5,600	6,600
6-5/8	32.00	L-80	.475	5.675	5.550	10,040	10,320	6.841	5.600	6.886	6.887	654.2	4.995	1.70	12,330	18,790	22,680	394,000	5,400	6,400	7,400
		T-95				11,920	11,820					723.0			13,630			468,000	5,900	6,900	7,900
		P-110				13,800	13,230					860.8			16,230			542,000	6,350	7,350	8,350
		Q-125				15,680	14,540					929.6			17,530			616,000	6,850	7,850	8,850
6-5/8	33.00	L-80	.500	5.625	5.500	10,570	11,160	6.862	5.600	7.329	7.324	695.8	4.995	1.70	12,510	19,200	21,760	394,000	5,700	6,700	7,700
		T-95				12,550	12,940					769.0			13,830			468,000	6,200	7,200	8,200
		P-110				14,530	14,550					915.5			16,460			542,000	6,650	7,650	8,650
		Q-125				16,510	16,070					988.7			17,780			616,000	7,150	8,150	9,150
7	23.00	J-55	.317	6.366	*6.250	4,360	3,270	7.205	6.325	4.659	4.421	331.6	3.250	1.70	8,620	10,830	11,940	256,000	2,200	3,200	4,200
		L-80				6,340	3,830					420.0			10,920			373,000	2,900	3,900	4,900
		T-95				7,530	4,150					464.2			12,070			442,000	3,350	4,350	5,350
		P-110				8,720	4,440					552.6			14,360			512,000	3,800	4,800	5,800
		Q-125				9,910	4,650					596.8			15,510			582,000	4,200	5,200	6,200
7	26.00	K-55	.362	6.276	6.151	4,980	4,320	7.245	6.325	5.553	5.308	504.3	3.250	2.00	9,830	11,500	10,300	256,000	2,300	3,300	4,300
		L-80				7,240	5,410							1.70	11,560			373,000	3,000	4,000	5,000
		T-95				8,600	5,890					557.3			12,780			442,000	3,450	4,450	5,450
		P-110				9,960	6,230					663.5			15,210			512,000	3,900	4,900	5,900
		Q-125				11,310	6,450					716.6			16,430			582,000	4,300	5,300	6,300
7	29.00	K-55	.408	6.184	*6.125	5,610	5,410	7.219	6.200	6.250	6.260	593.8	4.288	1.70	12,160	14,690	12,720	275,000	3,350	4,350	5,350
		L-80				8,160	7,030											400,000	4,200	5,200	6,200
		T-95				9,690	7,840					656.3			13,440			475,000	4,700	5,700	6,700
		P-110				11,220	8,530					781.3			16,000			550,000	5,200	6,200	7,200
		Q-125				12,750	9,110					843.8			17,280			625,000	5,700	6,700	7,700

* Special API drifts

Data provided by Hunting Tubular Systems; SDSSLSF-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock SF Database (Continued)

Size	Nom Wt	Grade	Pipe					Connection											Torque		
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Box Outside Diameter	Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	L. Joint Strength	Nominal Makeup Loss	Setting Depth		Int Press Rating	Ext Press Rating	Comp Rating	Recommended Make-Up Torque		
																			Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	1,000 lb	in.	SF	ft	psi	psi	lb	ft-lb		
7	32.00	L-80	.453	6.094	*6.000	9,060	8,610	7.257	6.200	7.118	7.117	676.1	4.288	1.70	12,560	15,370	11,610	400,000	4,500	5,500	6,500
		HCL-80					10,400														
		USS FSS-95*				9,630												425,000	4,700	5,700	6,700
		T-95				10,760	9,740					747.3			13,880			475,000	5,000	6,000	7,000
		P-110				12,460	10,780					889.6			16,520			550,000	5,500	6,500	7,500
		Q-125				14,160	11,710					960.8			17,850			625,000	6,000	7,000	8,000
		HCQ-125 E				15,290	13,600											675,000	6,300	7,300	8,300
7	35.00	L-80	.498	6.004	5.879	9,960	10,190	7.215	5.954	7.632	7.632	725.0	5.205	1.70	12,330	17,210	20,220	427,000	6,100	7,100	8,100
		HCL-80					11,600														
		USS FSS-95*				10,580												453,000	6,300	7,300	8,300
		T-95				11,830	11,650					801.4			13,630			507,000	6,700	7,700	8,700
		P-110				13,700	13,030					954.0			16,230			587,000	7,250	8,250	9,250
		Q-125				15,560	14,320					1030.3			17,530			667,000	7,800	8,800	9,800
7	38.00	L-80	.540	5.920	5.795	10,800	11,390	7.250	5.954	8.419	8.420	799.8	5.205	1.70	12,630	17,830	18,970	427,000	6,500	7,500	8,500
		T-95				12,830	13,430					884.0			13,960			507,000	7,100	8,100	9,100
		P-110				14,850	15,130					1052.4			16,610			587,000	7,650	8,650	9,650
		LS-125				16,880	16,740					1136.6			17,940			667,000	8,200	9,200	10,200
		Q-125																			
7-5/8	29.70	L-80	.375	6.875	6.750	6,890	4,790	7.835	6.825	6.154	6.156	584.6	3.861	1.70	11,840	12,040	11,390	439,000	4,100	5,100	6,100
		T-95				8,180	5,130					646.2			13,090			521,000	4,700	5,700	6,700
		P-110				9,470	5,350					769.3			15,580			603,000	5,300	6,300	7,300
		HCP-110					7,150														
		Q-125				10,760	5,670					830.8			16,830			685,000	5,900	6,900	7,900
7-5/8	33.70	L-80	.430	6.765	6.640	7,900	6,560	7.883	6.825	7.332	7.333	696.5	3.861	1.70	12,400	12,790	9,990	439,000	4,300	5,300	6,300
		T-95				9,380	7,270					769.9			13,710			521,000	4,900	5,900	6,900
		P-110				10,860	7,870					916.5			16,320			603,000	5,500	6,500	7,500
		Q-125				12,340	8,340					989.8			17,620			685,000	6,100	7,100	8,100
7-5/8	39.00	L-80	.500	6.625	6.500	9,180	8,820	7.844	6.575	8.397	8.396	797.6	5.213	1.70	12,330	16,080	14,600	470,000	5,050	6,050	7,050
		T-95				10,900	10,000					881.6			13,630			558,000	5,700	6,700	7,700
		P-110				12,620	11,080					1049.5			16,220			646,000	6,400	7,400	8,400
		Q-125				14,340	12,060					1133.5			17,520			734,000	7,100	8,100	9,100
		HCQ-125					12,510														
		HCQ-125 E				15,490	13,920											792,000	7,550	8,550	9,550
7-5/8	42.80	L-80	.562	6.501	6.376	10,320	10,820	7.896	6.575	9.676	9.673	918.9	5.213	1.70	12,750	16,960	13,340	470,000	5,350	6,350	7,350
		T-95				12,250	12,410					1015.7			14,090			558,000	6,000	7,000	8,000
		P-110				14,190	13,930					1209.1			16,780			646,000	6,700	7,700	8,700
		Q-125				16,120	15,350					1305.9			18,120			734,000	7,400	8,400	9,400
7-5/8	45.30	L-80	.595	6.435	6.310	10,920	11,510	7.833	6.385	9.860	9.860	936.7	6.104	1.70	12,330	18,120	20,380	510,000	6,800	7,800	8,800
		T-95				12,970	13,670					1035.3			13,630			606,000	7,550	8,550	9,550
		P-110				15,020	15,440					1232.5			16,230			702,000	8,350	9,350	10,350
		Q-125				17,070	17,110					1331.1			17,530			797,000	9,150	10,150	11,150

* Special API drifts

Data provided by Hunting Tubular Systems; SDSSLSF-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock SF Database (Continued)

Size	Nom Wt	Grade	Pipe					Connection											Torque		
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Box Outside Diameter	Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	L. Joint Strength	Nominal Makeup Loss	Setting Depth		Int Press Rating	Ext Press Rating	Comp Rating	Recommended Make-Up Torque		
																			Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	1,000 lb	in.	SF	ft	psi	psi	lb	ft-lb		
7-5/8	47.10	L-80	.625	6.375	6.250	11,480	12,040	7.858	6.385	10.464	10.459	993.6	6.104	1.70	12,510	18,530	19,630	510,000	7,000	8,000	9,000
		T-95				13,630	14,300					1098.2			13,820			606,000	7,750	8,750	9,750
		P-110				15,780	16,550					1307.4			16,460			702,000	8,550	9,550	10,550
		Q-125				17,930	18,810					1412.0			17,770			797,000	9,350	10,350	11,350
7-5/8	52.80	SM 125TT	.712	6.201	6.076	20,430	23,830	7.822	6.151	11.596	11.608	1565.5	7.212	1.70	17,520	22,600	21,010	871,000	10,950	11,950	12,950
		Q-125					21,160														
7-5/8	55.30	T-95	.750	6.125	6.000	16,350	16,850	7.898	6.151	12.332	12.329	1294.5	7.212	1.70	13,830	23,120	22,140	662,000	9,500	10,500	11,500
7-5/8	59.10	L-80	.800	6.025	5.900	14,690	15,030	7.811	5.975	12.863	12.875	1222.0	8.059	1.70	12,330	24,760	26,050	593,000	9,700	10,700	11,700
		C-90				16,520	16,900					1286.3			12,980			667,000	10,700	11,700	12,700
		T-95				17,440	17,840					1350.6			13,630			704,000			
		P-110				20,200	20,660					1607.9			16,220			815,000	11,650	12,650	13,650
		Q-125				22,950	23,480					1736.5			17,520			926,000	12,650	13,650	14,650
7-5/8	59.20	Q-125	.812	6.001	5.876	23,300	23,790	7.820	5.975	13.090	13.094	1767.2	8.059	1.70	17,560	24,920	25,060	926,000	12,750	13,750	14,750
7-3/4	46.10	L-80	.595	6.560	*6.500	10,750	11,340	7.959	6.575	10.027	10.041	952.6	6.095	1.70	12,320	17,210	17,940	520,000	6,850	7,850	8,850
		T-95				12,760	13,320					1052.8			13,620			618,000	7,650	8,650	9,650
		C-110				14,780	15,000					1203.2			15,570			715,000	8,450	9,450	10,450
		P-110										1253.4			16,210						
		Q-125				16,790	16,600					1353.6			17,510			813,000	9,300	10,300	11,300
		HCQ-125					18,950														
		HCQ-125 E				18,140	17,760									18,770		877,000	9,800	10,800	11,800
7-3/4	56.07	SM 125TT	.750	6.250	6.125	21,170	24,890	7.941	6.200	12.433	12.377	1670.9	7.579	1.70	17,530	24,700	24,750	910,000	12,600	13,600	14,600
8-1/16	54.00	L-80	.684	6.695	6.570	11,880	12,420	8.201	6.645	11.157	11.105	1055.0	6.365	1.70	11,510	19,080	21,630	655,000	9,450	10,450	20,000
		Q-125				18,560	19,410					1499.2			16,360			1,024,000	12,950	13,950	14,950
8-5/8	32.00	L-80	.352	7.921	*7.875	5,710	3,050	8.840	7.950	6.590	6.593	626.1	3.651	1.70	11,840	9,240	6,810	470,000	4,250	5,250	6,250
		T-95				6,780	3,290					692.0			13,090			558,000	4,950	5,950	6,950
		P-110				7,860	3,420					823.8			15,580			646,000	5,650	6,650	7,650
		Q-125				8,930	3,470					889.7			16,830			734,000	6,350	7,350	8,350
8-5/8	36.00	L-80	.400	7.825	7.700	6,490	4,100	8.883	7.950	7.777	7.782	738.8	3.651	1.70	12,370	9,840	6,000	470,000	4,450	5,450	6,450
		T-95				7,710	4,360					816.6			13,670			558,000	5,150	6,150	7,150
		P-110				8,930	4,690					972.1			16,270			646,000	5,850	6,850	7,850
		Q-125				10,140	4,930					1049.9			17,570			734,000	6,550	7,550	8,550
8-5/8	40.00	L-80	.450	7.725	*7.625	7,300	5,530	8.850	7.700	8.667	8.673	823.4	4.733	1.70	12,330	12,750	10,830	512,000	6,450	7,450	8,450
		T-95				8,670	6,020					910.0			13,620			608,000	7,250	8,250	9,250
		P-110				10,040	6,400					1083.4			16,220			704,000	8,050	9,050	10,050
		Q-125				11,410	6,640					1170.0			17,520			800,000	8,900	9,900	10,900
8-5/8	44.00	L-80	.500	7.625	7.500	8,120	6,950	8.894	7.700	9.873	9.878	937.9	4.733	1.70	12,720	13,400	9,940	512,000	6,750	7,750	8,750
		T-95				9,640	7,740					1036.7			14,050			608,000	7,550	8,550	9,550
		P-110				11,160	8,420					1234.1			16,730			704,000	8,350	9,350	10,350
		Q-125				12,680	8,980					1332.9			18,070			800,000	9,200	10,200	11,200
8-5/8	49.00	HCQ-125	.557	7.511	7.386	14,130	13,550	8.849	7.461	10.701	10.692	1443.4	5.868	1.70	17,690	14,830	14,700	867,000	11,900	12,900	13,900

* Special API drifts

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Hunting: Seal-Lock SF Database (Continued)

Size	Nom Wt	Grade	Pipe					Connection											Torque		
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Box Outside Diameter	Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	L. Joint Strength	Nominal Makeup Loss	Setting Depth		Int Press Rating	Ext Press Rating	Comp Rating	Recommended Make-Up Torque		
																			Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	1,000 lb	in.	SF	ft	psi	psi	lb	ft-lb		
8-5/8	49.10	L-80	.562	7.501	7.376	9,120	8,720	8.849	7.451	10.819	10.829	1027.8	5.868	1.70	12,490	14,950	15,890	555,000	9,100	10,100	11,100
		T-95				10,830	9,880					1136.0			13,810			659,000	10,050	11,050	12,050
		P-110				12,540	10,940					1352.4			16,440			763,000	10,950	11,950	12,950
		Q-125				14,250	11,890					1460.6			17,750			867,000	11,900	12,900	13,900
8-5/8	52.00	L-80	.595	7.435	7.310	9,660	9,660	8.877	7.451	11.593	11.589	1101.0	5.868	1.70	12,690	15,360	15,230	555,000	9,500	10,500	11,500
		T-95				11,470	11,010					1216.8			14,030			659,000	10,450	11,450	12,450
		P-110				13,280	12,280					1448.6			16,700			763,000	11,350	12,350	13,350
		Q-125				15,090	13,440					1564.5			18,030			867,000	12,300	13,300	14,300
8-5/8	54.00	L-80	.625	7.375	7.250	10,140	10,510	8.902	7.451	12.291	12.284	1167.0	5.868	1.70	12,860	15,720	14,720	555,000	9,800	10,800	11,800
		T-95				12,050	12,040					1289.8			14,210			659,000	10,750	11,750	12,750
		P-110				13,950	13,490					1535.5			16,910			763,000	11,650	12,650	13,650
		Q-125				15,850	14,850					1658.3			18,270			867,000	12,600	13,600	14,600
9-5/8	36.00	L-80	.352	8.921	8.765	5,120	2,370	9.841	8.840	7.381	7.383	701.2	3.642	1.70	11,830	8,580	6,900	524,000	4,950	6,450	7,950
		T-95				6,080	2,470					775.0			13,080			623,000	5,800	7,300	8,800
		P-110				7,040						922.6			15,570			721,000	6,650	8,150	9,650
		Q-125				8,000						996.4			16,810			819,000	7,500	9,000	10,500
9-5/8	40.00	L-80	.395	8.835	*8.750	5,750	3,090	9.880	8.840	8.580	8.583	815.1	3.642	1.70	12,310	9,080	6,140	524,000	5,150	6,650	8,150
		T-95				6,820	3,330					900.9			13,610			623,000	6,000	7,500	9,000
		P-110				7,900	3,470					1072.5			16,200			721,000	6,850	8,350	9,850
		Q-125				8,980	3,530					1158.3			17,500			819,000	7,700	9,200	10,700
9-5/8	43.50	L-80	.435	8.755	8.599	6,330	3,810	9.847	8.674	9.300	9.296	883.1	4.515	1.70	12,170	10,250	8,030	579,000	6,700	8,200	9,700
		T-95				7,510	4,130					976.1			13,450			688,000	7,750	9,250	10,750
		P-110				8,700	4,420					1162.0			16,010			796,000	8,800	10,300	11,800
		Q-125				9,890	4,620					1255.0			17,290			905,000	9,800	11,300	12,800
9-5/8	47.00	L-80	.472	8.681	8.525	6,870	4,760	9.880	8.674	10.314	10.312	979.6	4.515	1.70	12,490	10,660	7,480	579,000	6,900	8,400	9,900
		USS FSS-95				7,290	7,100											615,000	7,250	8,750	10,250
		T-95				8,150	5,090					1082.8			13,800			688,000	7,950	9,450	10,950
		P-110				9,440	5,300					1289.0	4.515		16,430	10,660	7,480	796,000	9,000	10,500	12,000
		HCP-110					7,100														
		Q-125				10,730	5,630					1392.1			17,750			905,000	10,000	11,500	13,000
9-5/8	53.50	L-80	.545	8.535	*8.500	7,930	6,620	9.847	8.575	11.654	11.672	1107.1	5.597	1.70	12,320	11,370	8,310	632,000	8,500	10,000	11,500
		L-80*																	16,500	18,000	19,500
		T-95				9,410	7,340					1223.7			13,620			750,000	9,700	11,200	12,700
		P-110				10,900	7,950					1456.8			16,210			869,000	10,900	12,400	13,900
		HCP-110					8,850														
		Q-125				12,390	8,440					1573.3			17,510	13,260		987,000	12,100	13,600	15,100
		HCQ-125					8,850														
		HCQ-125*																			22,700
		LS-140				13,870						1748.1			19,460			1,104,000	13,300	14,800	16,300
		TCA-140																			

* Special API drifts

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Hunting: Seal-Lock SF Database (Continued)

Size	Nom Wt	Grade	Pipe					Connection											Torque		
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Box Outside Diameter	Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	L. Joint Strength	Nominal Makeup Loss	Setting Depth		Int Press Rating	Ext Press Rating	Comp Rating	Recommended Make-Up Torque		
																			Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	1,000 lb	in.	SF	ft	psi	psi	lb	ft-lb		
9-5/8	58.40	L-80	.595	8.435	*8.375	8,650	7,900	9.839	8.450	12.664	12.672	1203.1	6.069	1.70	12,330	13,780	12,290	659,000	10,750	12,250	13,750
		T-95				10,280	8,880					1329.7			13,630			782,000	12,050	13,550	15,050
		P-110				11,900	9,770					1583.0			16,230			906,000	13,350	14,850	16,350
		Q-125				13,520	10,540					1709.6			17,530			1,030,000	14,650	16,150	17,650
9-5/8	59.40	L-80	.609	8.407	8.251	8,860	8,250	9.851	8.450	13.034	13.041	1238.2	6.069	1.70	12,420	13,950	12,070	659,000	10,950	12,450	13,950
		T-95				10,520	9,320					1368.6			13,730			782,000	12,250	13,750	15,250
		P-110				12,180	10,280					1629.3			16,340			906,000	13,550	15,050	16,550
		Q-125				13,840	11,130					1759.6			17,650			1,030,000	14,850	16,350	17,850
9-5/8	70.30	P-110	.734	8.157	*8.000	14,680	14,820	9.825	8.076	15.379	15.384	1922.4	7.378	1.70	16,220	19,650	16,200	1,010,000	18,000	19,500	21,000
9-3/4	59.20	L-80	.595	8.560	*8.500	8,540	7,700	9.964	8.575	12.842	12.842	1220.0	6.069	1.70	12,330	13,430	11,940	668,000	10,950	12,450	13,950
		T-95				10,150	8,650					1348.4			13,630			793,000	12,300	13,800	15,300
		P-110				11,750	9,490					1605.3			16,230			918,000	13,600	15,100	16,600
		Q-125				13,350	10,220					1733.7			17,530			1,044,000	14,900	16,400	17,900
9-7/8	62.80	L-80	.625	8.625	*8.500	8,860	8,260	10.135	8.575	13.625	13.627	1294.4	6.348	1.70	12,330	14,360	11,890	694,000	11,550	13,050	14,550
		HCL-80					9,750														
		USS FSS-95*				9,410	10,070											737,000	12,000	13,500	15,000
		T-95				10,520	9,320					1430.6						824,000	12,950	14,450	15,950
		C-110				12,180	10,290	10.135		13.625	13.627	1635.0	6.348		15,580	14,360	11,890	954,000	14,350	15,850	17,350
		P-110										1703.1			16,230						
		Q-125				13,840	11,140					1839.4			17,520			1,084,000	15,750	17,250	18,750
		HCQ-125					12,030														
		USS-140				15,510	11,870					2043.7			19,450	15,900		1,214,000	17,200	18,700	20,200
9-7/8	66.60	C-110	.678	8.519	8.363	13,220	12,160	10.240	8.575	14.456	14.463	1734.7	6.348	1.70	15,320	15,970	13,460	969,000	15,100	16,600	18,100
		Q-125				15,020	13,310					1951.6			17,240			1,101,000	16,550	18,050	19,550
10-1/8	79.22	HCQ-125	.795	8.535	*8.500	17,180	17,650	10.249	8.575	16.380	16.314	2202.4	7.264	1.70	16,350	18,200	17,270	1,558,000	26,400	27,900	29,400
						18,180*															
10-3/8	87.88	L-80	.864	8.647	*8.500	11,990*	12,210	10.455	8.575	17.631	17.558	1668.0	7.570	1.70	11,180	18,340	18,780	1,042,000	21,700	23,200	35,000
		P-110				16,030	16,790					2194.2			14,710			1,433,000	26,850	28,350	29,850
10-3/4	45.50	L-80	.400	9.950	*9.875	5,210	2,480	10.960	9.950	9.362	9.373	889.4	4.053	1.70	11,830	8,110	5,930	650,000	7,800	9,300	10,800
		HCN-80					3,130					936.2			12,450						
10-3/4	51.00	K-55	.450	9.850	9.694	4,030	2,700	10.969	9.769	10.769	10.786	1023.1	4.637	1.70	12,160	9,830	8,380	455,000	7,000	8,500	10,000
		L-80				5,860	3,220											661,000	9,250	10,750	12,250
		T-95				6,960	3,490					1130.7			13,440			785,000	10,550	12,050	13,550
		P-110				8,060	3,660					1346.1			16,000			909,000	11,900	13,400	14,900
		Q-125				9,160	3,740					1453.8			17,280			1,033,000	13,250	14,750	16,250
10-3/4	55.50	L-80	.495	9.760	*9.625	6,450	4,020	11.009	9.769	12.155	12.159	1154.7	4.637	1.70	12,530	10,310	7,720	661,000	9,550	11,050	12,550
		T-95				7,660	4,300					1276.3			13,850			785,000	10,850	12,350	13,850
		P-110				8,860	4,610					1519.4			16,490			909,000	12,200	13,700	15,200
		Q-125				10,070	4,850					1640.9			17,810			1,033,000	13,550	15,050	16,550

* Special API drifts

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Hunting: Seal-Lock SF Database (Continued)

Size	Nom Wt	Grade	Pipe					Connection											Torque		
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Box Outside Diameter	Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	L. Joint Strength	Nominal Makeup Loss	Setting Depth		Int Press Rating	Ext Press Rating	Comp Rating	Recommended Make-Up Torque		
																			Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	1,000 lb	in.	SF	ft	psi	psi	lb	ft-lb		
10-3/4	60.70	K-55	.545	9.660	9.504	4,880	4,160	10.972	9.579	13.102	13.105	1244.7	5.589	1.70	12,330	12,010	8,830	489,000	8,650	10,150	11,650
		L-80				7,100	5,160											711,000	11,150	12,650	14,150
		T-95				8,430	5,580					1375.7			13,620			844,000	12,700	14,200	15,700
		P-110				9,760	5,880					1637.8			16,220			977,000	14,200	15,700	17,200
		Q-125				11,090	6,070					1768.8			17,520			1,111,000	15,700	17,200	18,700
10-3/4	64.00	HCQ-125*	.578	9.594	9.500	12,700	8,130	11.004	9.579	14.178	14.183	1914.0	5.589	1.70	17,930	12,410	8,260	1,200,000	15,900	17,400	30,000
10-3/4	65.70	L-80	.595	9.560	*9.500	7,750	6,310	11.016	9.579	14.612	14.617	1388.1	5.589	1.70	12,650	12,560	8,250	711,000	11,550	13,050	14,550
		T-95				9,200	6,960					1534.3			13,990			844,000	13,100	14,600	16,100
		P-110				10,650	7,510					1826.5			16,650			977,000	14,600	16,100	17,600
		Q-125				12,110	7,920					1972.6			17,980			1,111,000	16,100	17,600	19,100
		HCQ-125					8,820														
10-3/4	85.30	L-80	.797	9.156	9.000	10,380	10,920	10.949	9.075	18.683	18.702	1774.9	7.936	1.70	12,320	15,680	15,090	870,000	18,950	20,450	21,950
		T-95				12,330	12,540					1961.7			13,620			1,033,000	21,000	22,500	24,000
		P-110				14,270	14,080					2335.4			16,220			1,196,000	23,100	24,600	26,100
		Q-125				16,220	15,530					2522.2			17,510			1,360,000	25,150	26,650	28,150
11-3/4	54.00	L-80	.435	10.880	10.724	5,180	2,450	11.975	10.799	11.440	11.442	1086.8	4.498	1.70	12,160	8,710	5,210	714,000	9,250	11,250	13,250
		T-95				6,150	2,560					1201.2			13,440			848,000	10,800	12,800	14,800
		P-110				7,130	2,570					1430.0			16,000			982,000	12,350	14,350	16,350
		Q-125				8,100						1544.4			17,280			1,116,000	13,900	15,900	17,900
11-3/4	60.00	L-80	.489	10.772	*10.625	5,830	3,180	12.024	10.799	13.277	13.281	1261.3	4.498	1.70	12,620	9,230	4,710	714,000	9,550	11,550	13,550
		T-95				6,920	3,440					1394.1			13,940			848,000	11,100	13,100	15,100
		P-110				8,010	3,610					1659.6			16,600			982,000	12,650	14,650	16,650
		Q-125				9,100	3,680					1792.4			17,930			1,116,000	14,200	16,200	18,200
11-3/4	65.00	L-80	.534	10.682	*10.625	6,360	3,870	11.974	10.700	14.106	14.112	1340.1	5.484	1.70	12,320	10,250	6,180	774,000	11,750	13,750	15,750
		HCN-80					5,740					1410.6			12,970						
		T-95				7,560	4,180					1481.1			13,620			919,000	13,550	15,550	17,550
		P-110				8,750	4,480					1763.3			16,210			1,064,000	15,350	17,350	19,350
		Q-125				9,940	4,690					1904.3			17,510			1,209,000	17,150	19,150	21,150
		HCQ-125					5,740														
		LS-140				11,130						2116.0			19,440	11,510		1,352,000	18,900	20,900	22,900
11-3/4	71.00	L-80	.582	10.586	10.430	6,930	4,880	12.017	10.700	15.710	15.706	1492.1	5.484	1.70	12,640	10,730	5,770	774,000	12,150	14,150	16,150
		T-95				8,230	5,240					1649.1			13,970			919,000	13,950	15,950	17,950
		P-110				9,530	5,470					1963.3			16,640			1,064,000	15,750	17,750	19,750
		Q-125				10,840	5,760					2120.3			17,970			1,209,000	17,550	19,550	21,550
11-3/4	74.60	L-80	.618	10.514	10.358	7,360	5,630	11.967	10.433	16.218	16.220	1540.7	6.261	1.70	12,340	12,470	9,280	833,000	15,050	17,050	19,050
		T-95				8,740	6,150					1702.9			13,630			989,000	17,100	19,100	21,100
		P-110				10,120	6,540					2027.3			16,230			1,145,000	19,100	21,100	23,100
		Q-125				11,510	6,810					2189.4			17,530			1,301,000	21,150	23,150	25,150
11-3/4	75.40	L-80	.625	10.500	10.344	7,450	5,780	11.973	10.433	16.449	16.445	1562.3	6.261	1.70	12,380	12,540	9,200	833,000	15,150	17,150	19,150
		T-95				8,840	6,320					1726.7			13,680			989,000	17,200	19,200	21,200
		P-110				10,240	6,750					2055.6			16,280	12,540	9,200	1,145,000	19,200	21,200	23,200
		Q-125				11,640	7,050					2220.1			17,590			1,301,000	21,250	23,250	25,250

* Special API drifts

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Hunting: Seal-Lock SF Database (Continued)

Size	Nom Wt	Grade	Pipe					Connection											Torque		
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Box Outside Diameter	Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	L. Joint Strength	Nominal Makeup Loss	Setting Depth		Int Press Rating	Ext Press Rating	Comp Rating	Recommended Make-Up Torque		
																			Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	1,000 lb	in.	SF	ft	psi	psi	lb	ft-lb		
11-3/4	119.79	L-80	1.047	9.656	9.500	12,470	12,990	11.753	9.575	23.331	24.649	2216.4	8.713	1.70	10,890	21,200	22,780	1,416,000	35,800	37,800	39,800
		HCQ-125*				21,050	20,000					3149.7			15,480			2,390,000	48,350	50,350	65,000
11-7/8	71.80	L-80	.582	10.711	*10.625	6,860	4,750	12.096	10.700	15.487	15.494	1471.3	5.929	1.70	12,330	10,760	6,820	817,000	13,400	15,400	17,400
		T-95				8,150	5,080					1626.1			13,630			970,000	15,350	17,350	19,350
		C-110				9,430	5,290					1858.4			15,570			1,123,000	17,300	19,300	21,300
		P-110										1935.9			16,220						
		HCP-110					7,190														
		Q-125				10,720	5,630					2090.7			17,520			1,277,000	19,300	21,300	23,300
		HCQ-125					7,190														
		HCQ-125*																			35,000
11-7/8	71.80	HCQ-125 E	.582	10.711	*10.625	11,580	7,160	12.096	10.700	15.487	15.494	2090.7	5.929	1.70	17,520	12,090	7,670	1,376,000	20,550	22,550	24,550
		LS-140				12,010	7,190					2323.0			19,470			1,427,000	21,200	23,200	25,200
		TCA-140					5,880										6,820				
13-3/8	61.00	L-80	.430	12.515	12.359	4,500	1,670	13.608	12.434	13.110	13.116	1245.5	4.524	1.70	12,320	7,450	4,390	774,000	11,150	13,150	15,150
		T-95				5,340						1376.6			13,620			919,000	13,000	15,000	17,000
		P-110				6,190						1638.8			16,210			1,064,000	14,850	16,850	18,850
		Q-125				7,030						1769.9			17,510			1,209,000	16,650	18,650	20,650
13-3/8	68.00	K-55	.480	12.415	12.259	3,450	1,950	13.654	12.434	15.068	15.078	1431.5	4.524	1.70	12,740	7,890	4,000	532,000	8,350	10,350	12,350
		L-80				5,020	2,260											774,000	11,450	13,450	15,450
		HCL-80					2,910														
		T-95				5,970	2,340					1582.1			14,080			919,000	13,300	15,300	17,300
		P-110				6,910	2,330					1883.5			16,760			1,064,000	15,150	17,150	19,150
		Q-125				7,850						2034.2			18,100			1,209,000	16,950	18,950	20,950
13-3/8	72.00	L-80	.514	12.347	*12.250	5,380	2,670	13.602	12.325	15.585	15.589	1480.6	5.292	1.70	12,340	8,870	5,340	868,000	14,650	16,650	18,650
		N-80										1558.5			12,990						
		T-95				6,390	2,830					1636.4			13,630			1,030,000	16,900	18,900	20,900
		P-110				7,400	2,880					1948.1			16,230			1,193,000	19,200	21,200	23,200
		Q-125				8,410						2104.0			17,530			1,356,000	21,450	23,450	25,450
		HCQ-125					3,470														
		USS-140				9,420	2,880					2337.8			19,480			1,519,000	23,700	25,700	27,700
13-3/8	77.00	L-80	.550	12.275	12.119	5,760	3,100	13.635	12.325	16.977	16.973	1612.4	5.292	1.70	12,590	9,200	5,060	868,000	15,050	17,050	19,050
		T-95				6,840	3,350					1782.2			13,920			1,030,000	17,300	19,300	21,300
		P-110				7,920	3,490					2121.6			16,570			1,193,000	19,600	21,600	23,600
		Q-125				9,000	3,550					2291.4			17,890			1,356,000	21,850	23,850	25,850
13-3/8	80.70	L-80	.580	12.215	12.059	6,070	3,460	13.597	12.134	17.493	17.500	1661.8	5.903	1.70	12,330	10,370	6,540	923,000	17,250	19,250	21,250
		T-95				7,210	3,780					1836.8			13,630			1,096,000	19,750	21,750	23,750
		P-110				8,350	4,000					2186.6			16,230			1,269,000	22,250	24,250	26,250
		Q-125				9,490	4,140					2361.6			17,530			1,442,000	24,750	26,750	28,750

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Hunting: Seal-Lock SF Database (Continued)

Size	Nom Wt	Grade	Pipe					Connection											Torque		
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Box Outside Diameter	Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	L. Joint Strength	Nominal Makeup Loss	Setting Depth		Int Press Rating	Ext Press Rating	Comp Rating	Recommended Make-Up Torque		
																			Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	1,000 lb	in.	SF	ft	psi	psi	lb	ft-lb		
13-3/8	85.00	L-80	.608	12.159	12.003	6,360	3,880	13.622	12.134	18.565	18.564	1763.6	5.903	1.70	12,510	10,640	6,300	923,000	17,550	19,550	21,550
		T-95				7,560	4,180					1949.2			13,830			1,096,000	20,050	22,050	24,050
		P-110				8,750	4,480					2320.5			16,470			1,269,000	22,550	24,550	26,550
		Q-125				9,940	4,690					2506.1			17,780			1,442,000	25,050	27,050	29,050
13-3/8	86.00	L-80	.625	12.125	11.969	6,540	4,190	13.637	12.134	19.214	19.204	1824.4	5.903	1.70	12,610	10,800	6,170	923,000	17,750	19,750	21,750
		T-95				7,770	4,430					2016.4			13,940			1,096,000	20,250	22,250	24,250
		P-110				9,000	4,770					2400.5			16,590			1,269,000	22,750	24,750	26,750
		Q-125				10,220	5,030					2592.5			17,920			1,442,000	25,250	27,250	29,250
13-5/8	88.20	L-80	.625	12.375	*12.250	6,420	3,980	13.844	12.325	19.134	19.145	1817.7	6.304	1.70	12,320	10,400	6,540	981,000	19,300	21,300	23,300
		T-95				7,630	4,260					2009.1			13,620			1,165,000	22,100	24,100	26,100
		C-110				8,830	4,570					2296.0			15,550			1,349,000	24,850	26,850	28,850
		P-110										2391.8			16,210						
		HCP-110					5,930														
		Q-125				10,030	4,800					2583.1			17,510			1,533,000	27,650	29,650	31,650
		HCQ-125					5,930														
		HCQ-125*																			40,000
		HCQ-140				11,240	5,970					2870.1			19,450	11,500		1,717,000	30,400	32,400	34,400
		HCQ-140*																			43,000
		TCA-140					4,940														34,400
		LS-140				12,010	5,930														
14	82.50	L-80	.562	12.876	12.720	5,620	2,940	14.211	12.825	17.436	17.318	1645.2	5.475	1.70	12,000	8,840	4,730	1,002,000	18,050	20,050	22,050
14	104.20	L-80	.734	12.532	12.376	7,340	5,590	14.215	12.451	22.947	22.961	2180.0	7.256	1.70	12,330	11,980	9,230	1,103,000	26,100	28,100	30,100
		T-95				8,720	6,100					2409.4			13,630			1,310,000	29,500	31,500	33,500
		P-110				10,090	6,480					2868.4			16,230			1,517,000	32,850	34,850	36,850
		Q-125				11,470	6,740					3097.8			17,520			1,724,000	36,200	38,200	40,200
14	112.60	L-80	.797	12.406	12.250	7,970	6,700	14.250	12.451	25.415	25.413	2414.2	7.256	1.70	12,640	12,530	8,690	1,103,000	27,300	29,300	31,300
		T-95				9,460	7,430					2668.4			13,970			1,310,000	30,700	32,700	34,700
		C-110				10,960	8,060					3049.6			15,960			1,517,000	34,050	36,050	38,050
		P-110										3176.6			16,630						
		Q-125				12,450	8,560					3430.8			17,960			1,724,000	37,400	39,400	41,400
		HCQ-125					11,320														
14	112.78	HCQ-125 E	.800	12.400	12.250	13,500	10,540	14.250	12.451	25.639	25.505	3443.2	7.256	1.70	17,960	13,780	10,770	1,862,000	36,300	38,300	40,300
		X-140				14,000	9,030				25.413	3812.0			19,880	12,530	9,110	1,931,000	37,400	39,400	41,400
		X-140														14,410					
14	116.19	Q-125	.825	12.350	12.250	12,890	9,370	14.400	12.451	26.611	26.635	3592.5	7.256	1.70	18,190	12,800	9,360	1,724,000	38,300	40,300	42,300
14-1/16	118.00	Q-125	.825	12.413	12.250	12,830	9,260	14.250	12.451	25.385	26.626	3427.0	7.256	1.70	17,280	12,990	9,830	1,924,000	42,100	44,100	46,100
14-1/16	122.00	C-110	.850	12.363	12.250	11,630	9,290	14.350	12.451	26.358	27.323	3163.0	7.256	1.70	15,510	12,930	10,070	1,693,000	38,500	40,500	42,500
		Q-125				13,220	9,990	14.250				3558.3			17,450	13,140		1,924,000	42,500	44,500	46,500
		Q-125 E				14,280		14.350								14,220					
		X-140				14,810	10,560					3953.7			19,390	14,460		2,155,000			
16	84.00	HCN-80	.495	15.010	14.822	4,330	1,910	16.259	15.011	17.902	17.902	1790.2	4.227	1.70	12,850	6,280	3,430	1,049,000	19,450	21,450	23,450
		P-110				5,960	1,480					2237.8			16,060			1,442,000	26,000	28,000	30,000

* Special API drifts

Data provided by Hunting Tubular Systems; SDSSLSF-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal-Lock SF Database (Continued)

Size	Nom Wt	Grade	Pipe					Connection											Torque		
			Nominal Wall Thickness	Nominal Inside Diameter	Drift Diameter	Internal Yield	Collapse	Box Outside Diameter	Pin Bore Diameter	Nominal Pin CSA	Nominal Box CSA	L. Joint Strength	Nominal Makeup Loss	Setting Depth		Int Press Rating	Ext Press Rating	Comp Rating	Recommended Make-Up Torque		
																			Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	sq in.	sq in.	1,000 lb	in.	SF	ft	psi	psi	lb	ft-lb		
16	97.00	HCP-110	.575	14.850	*14.750	6,920	2,990	16.350	14.820	19.422	19.564	2427.8	6.359	1.70	15,080	8,900	3,810	1,430,000	26,150	28,150	30,150
		HCP-110*																			45,200
		P-110			14.662		2,350	16.234	14.763	20.765	20.776	2595.6	5.554		16,120	7,420	4,470	1,546,000	30,600	32,600	34,600

* Special API drifts

Data provided by Hunting Tubular Systems; SDSSLSF-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HC

Pipe OD	Wt	Grade	Special Description	Pipe							Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Plain End Area	Longitudinal Plain End Yield	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	$in.^2$	lb	psi	psi	in.	lb	in.	lb	ft-lb		
4-1/2	11.60	N-80	-	.250	4.000	3.875	3.338	267,000	7,780	6,360	5.000	333,800	4.897	333,800	4,100	4,500	4,900
		L-80										317,100	-	-	3,800	4,200	4,600
		S-95						317,100	9,240	8,650		367,200			3,900	4,300	4,700
		P-110						367,200	10,690	7,580		417,300	4.897	417,300	4,100	4,500	4,900
4-1/2	12.60	13 CR-80	-	.271	3.958	3.833	3.600	288,000	8,430	7,500	5.000	342,000	-	-	3,800	4,300	4,700
		N-80										360,000					
		L-80										342,000	4.931	342,000			
		Super 13 Cr-110						396,000	11,590	9,210		468,000	-	-	4,200	4,700	5,100
		P-110										450,000					
		28 CR-125						450,000	13,170	9,890		468,000			4,900	5,300	5,800
4-1/2	13.50	L-80	-	.290	3.920	3.795	3.836	306,900	9,020	8,540	5.000	348,400	-	-	3,900	4,400	4,900
		S-95						364,400	10,710	10,380		403,400			4,100	4,500	5,000
		P-110						422,000	12,410	10,690		458,400			4,300	4,700	5,200
4-1/2	15.10	L-80	-	.337	3.826	3.701	4.407	352,600	10,480	11,080	5.000	348,400	-	-	4,100	4,600	5,200
		C-95						418,700	12,450	12,760		385,000			4,200	4,800	5,300
		P-110						484,800	14,420	14,340		458,400			4,400	5,000	5,500
		Q-125						550,900	16,380	15,840		495,000			5,100	5,700	6,200
		V-150						661,100	19,660	18,110		586,700			5,300	5,900	6,400
4-1/2	17.00	P-110	-	.380	3.740	3.615	4.918	541,000	16,260	17,010	5.000	458,400	-	-	4,500	5,100	5,700
4-1/2	18.90	L-80	-	.430	3.640	3.515	5.498	439,800	13,380	13,830	5.000	348,400	-	-	4,300	4,900	5,600
5	15.00	K-55	-	.296	4.408	4.283	4.374	240,600	5,700	5,560	5.563	407,300	-	-	3,900	4,500	5,000
		N-80						349,900	8,290	7,250		428,700			4,100	4,600	5,100
		L-80										407,300	5.372	348,700			
		P-110						481,100	11,400	8,850		535,900	-	-	4,400	5,000	5,500
		Q-125						546,800	12,950	9,480		578,700			5,100	5,700	6,200
		V-150						656,100	15,540	10,260		685,900					

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HC (Continued)

Pipe OD	Wt	Grade	Special Description	Pipe							Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Plain End Area	Longitudinal Plain End Yield	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	$in.^2$	lb	psi	psi	in.	lb	in.	lb	ft-lb		
5	18.00	N-80	-	.362	4.276	4.151	5.275	422,000	10,140	10,500	5.563	428,700	5.372	367,000	4,300	4,900	5,600
		L-80										407,300		348,700			
		S-95						501,100	12,040	11,880	5.563	471,600	-	-	4,500	5,100	5,700
		P-110						580,300	13,940	13,470		535,900	5.372	458,800	4,700	5,300	5,900
		Q-125						659,400	15,840	14,820		578,700	-	-	5,400	6,000	6,600
			w/P-110 Couplings									535,900	5.372	458,800	4,700	5,300	5,900
		V-150	-					791,300	19,010	16,860		685,900	-	-	5,400	6,000	6,600
5	21.40	P-110	-	.437	4.126	4.001	6.264	689,000	16,820	17,550	5.563	535,900	-	-	4,900	5,600	6,300
5	23.20	L-80	-	.478	4.044	3.919	6.791	543,300	13,380	13,830	5.563	407,300	-	-	4,600	5,400	6,100
		T-95						645,100	15,890	16,430		450,100			4,800	5,500	6,300
		P-110						747,000	18,400	19,020		535,900			5,000	5,700	6,500
5-1/2	15.50	K-55	-	.275	4.950	4.825	4.514	248,300	4,810	4,040	6.050	428,800	-	-	4,000	4,500	5,000
		13 CR-80						361,100	7,000	4,990					4,100	4,600	5,100
		N-80										451,400					
		L-80										428,800					
5-1/2	17.00	K-55	-	.304	4.892	4.767	4.962	272,900	5,320	4,910	6.050	471,400	-	-	4,100	4,700	5,200
		13 CR-80						397,000	7,740	6,290			5.875	405,300	4,300	4,800	5,400
		L-80											-	-			
		N-80										496,200					
		P-110						545,800	10,640	7,480		620,300			4,600	5,200	5,700
		Super 13 Cr-110										645,100					
5-1/2	20.00	N-80	-	.361	4.778	4.653	5.828	466,200	9,190	8,830	6.050	551,300	5.875	426,600	4,500	5,100	5,800
		L-80										523,700		405,300			
		C-90						524,500	10,340	9,630		551,300	-	-	4,600	5,300	5,900
		C-95						553,700	10,910	10,020		578,900					
		S-95								10,630		606,400					
		P-110						641,100	12,640	11,110		689,100			4,900	5,500	6,100
		Q-125						728,500	14,360	12,090		744,300			5,500	6,200	6,800
5-1/2	23.00	N-80	-	.415	4.670	4.545	6.630	530,400	10,560	11,160	6.050	551,300	5.875	426,600	4,700	5,400	6,100
		L-80										523,700		405,300			
		C-90						596,700	11,880	12,380		551,300	-	-	4,800	5,600	6,300
		C-95						629,900	12,540	12,930		578,900					
		S-95								12,450		606,400					
		T-95								12,930		578,900					
		P-110						729,300	14,530	14,540		689,100	5.875	533,300	5,000	5,800	6,500
		Q-125						828,800	16,510	16,060		744,300	-	-	5,700	6,500	7,200
5-1/2	26.00	C-90	-	.476	4.548	4.423	7.513	676,200	13,630	14,230	6.050	551,300	-	-	5,000	5,800	6,600
		C-95						713,700	14,390	15,020		578,900					
		P-110						826,400	16,660	17,390		689,100			5,200	6,000	6,800
		Q-125						939,100	18,930	19,760		744,300			5,900	6,700	7,500

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HC (Continued)

Pipe OD	Wt	Grade	Special Description	Pipe							Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Plain End Area	Longitudinal Plain End Yield	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	in.^{2}	lb	psi	psi	in.	lb	in.	lb	ft-lb		
6-5/8	24.00	N-80	-	.352	5.921	5.796	6.937	555,000	7,440	5,760	7.390	693,700	-	-	4,700	5,600	6,500
		L-80										659,000	7.145	659,000			
		T-95						659,000	8,830	6,310		728,400	7.000	576,000	4,800	5,700	6,700
6-5/8	28.00	L-80	-	.417	5.791	5.666	8.133	650,600	8,810	8,170	7.390	771,700	7.251	771,700	5,000	6,100	7,100
		N-80										812,300		812,300			
6-5/8	32.00	N-80	-	.475	5.675	5.550	9.177	734,200	10,040	10,320	7.390	812,300	7.251	812,300	5,200	6,400	7,600
		P-110						1,009,500	13,800	13,230		1,015,400	-	-	5,600	6,800	8,000
7	23.00	K-55	-	.317	6.366	*6.250	6.656	366,100	4,360	3,270	7.656	632,200	7.375	569,500	4,600	5,400	6,300
		N-80						532,500	6,340	3,830		665,500			4,700	5,600	6,400
		L-80										632,200					
		C-90						599,000	7,130	4,030		665,500	-	-	4,900	5,700	6,600
		C-95						632,300	7,530	4,150		698,800					
		S-95								5,650		732,100					
		P-110						732,200	8,720	4,440		831,900	7.375	749,400	5,100	5,900	6,800
		Q-125						832,000	9,910	4,650		898,400		809,300	5,800	6,600	7,500
7	26.00	K-55	-	.362	6.276	6.151	7.549	415,200	4,980	4,330	7.656	717,200	-	-	4,900	5,800	6,800
		N-80						603,900	7,240	5,410		754,900	7.375	599,500	5,000	6,000	6,900
		L-80										717,200		569,500			
		L-80						603,900	7,240	5,410			7.509	701,500			
		L-80											-	-			
		S-95						717,200	8,600	7,800		830,400			5,200	6,100	7,100
		P-110						830,400	9,960	6,230		943,600	7.375	749,400	5,400	6,300	7,300
7	29.00	C-75	-	.408	6.184	*6.125	8.449	633,700	7,650	6,730	7.656	*802,700	-	-	5,000	5,900	6,900
		N-80						675,900	8,160	7,030		844,900	7.441	676,300	5,300	6,300	7,400
		L-80										802,700		642,500			
			High Torque Application									802,700	-	-	12,000	14,000	16,000
			Sour Service*									*675,900	7.599	*675,900	5,300	6,300	7,400
		C-90	-					760,400	9,180	7,580		844,900	-	-	5,400	6,500	7,500
		S-95						802,700	9,690	9,200		929,400					
		T-95								7,830		887,100					
		P-110						929,400	11,220	8,530		1,056,100	7.441	845,400	5,700	6,700	7,700
		HCP-110								9,200			-	-			
		Q-125						1,056,100	12,750	9,110		1,140,600			6,300	7,400	8,400

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HC (Continued)

Pipe OD	Wt	Grade	Special Description	Pipe							Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Plain End Area	Longitudinal Plain End Yield	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	in.^{2}	lb	psi	psi	in.	lb	in.	lb	ft-lb		
7	32.00	N-80	-	.453	6.094	*6.000	9.317	745,400	9,060	8,610	7.656	931,300	7.441	676,300	5,500	6,600	7,800
		L-80	-									884,700		642,500			
		L-80	Sour Service*									*745,000		*541,000			
		25 CR-80	-									884,700	-	-	5,700	6,800	7,900
		USS FSS-95	-					791,900	9,630	10,400							
		C-90	-					838,500	10,190	9,370		931,300	7.620	888,100			
		C-95	-					885,100	10,760	9,740		977,900	-	-			
		S-95	-							10,400		1,024,400					
		T-95	-							9,740		977,900	7.620	932,500			
		P-110	-					1,024,900	12,460	10,780		1,164,100	7.441	823,400	5,900	7,000	8,100
													7.620	1,110,100			
		Q-125	-					1,164,600	14,160	11,710		1,257,300	-	-	6,600	7,700	8,800
		LS-140	-					1,304,400	15,860	12,530		1,397,000					
7	35.00	L-80	-	.498	6.004	5.879	10.172	813,800	9,960	10,190	7.656	884,700	-	-	5,700	6,900	8,100
		N-80	-									931,300					
		USS FSS-95	-					864,600	10,580	11,600		884,700			5,900	7,100	8,300
		S-95	-					966,300	11,830	11,600		1,024,400					
		T-95	-							11,650		977,900	7.620	932,500			
		T-95E	-					1,017,200	12,450			1,068,100	-	-	6,000	7,200	8,400
		T-95E	w/ C-110 Coupling														
		T-95E+	-						12810*			977,900					
		T-95E+	w/ C-110 Coupling					1,017,200	12810*	11,650		1,068,100					
		P-110	-					1,118,900	13,700	13,030		1,164,100	7.441	845,400	6,100	7,300	8,500
		Q-125	-					1,271,500	15,560	14,320		1,257,300		889,200	6,800	8,000	9,200
		Q-125 EHC	-					1,373,200	16,810	15,910			-	-	7,000	8,200	9,400
		LS-140	-					1,424,100	17,430	15,490		1,397,000					
		TCA-140	-														
7	38.00	L-80	-	.540	5.920	5.795	10.959	876,700	10,800	11,390	7.656	884,700	-	-	5,900	7,200	8,400
		N-80	-									931,300					
		C-90	-					986,300	12,150	12,810					6,000	7,300	8,600
		C-95	-					1,041,100	12,830	13,430		977,900					
		T-95	-														
		P-110	-					1,205,500	14,850	15,130		1,164,100			6,200	7,500	8,800
		Q-125	-					1,369,900	16,880	16,740		1,257,300			6,900	8,200	9,500
7	41.00	L-80	-	.590	5.820	5.695	11.881	950,500	11,800	12,350	7.656	884,700	-	-	6,100	7,400	8,700
		C-90	-					1,069,300	13,280	13,890		931,300			6,200	7,600	8,900
		Q-125	-					1,485,100	18,440	19,300		1,257,300			7,100	8,500	9,800

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HC (Continued)

Pipe OD	Wt	Grade	Special Description	Pipe							Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Plain End Area	Longitudinal Plain End Yield	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	in.^{2}	lb	psi	psi	in.	lb	in.	lb	ft-lb		
7-5/8	26.40	K-55	-	.328	6.969	6.844	7.519	413,500	4,140	2,890	8.500	714,300	8.344	714,300	5,000	6,000	7,000
		N-80						601,500	6,020	3,400		751,900		751,900	5,200	6,100	7,100
		L-80										714,300		714,300			
		S-95						714,300	7,150	4,850		827,100	-	-	5,300	6,300	7,300
		P-110						827,100	8,280	3,920		939,900	8.344	939,900	5,500	6,500	7,500
		HCP-110								4,850			-	-			
		Q-125						939,900	9,410	4,050		1,015,100	8.344	1,015,100	6,200	7,200	8,200
7-5/8	29.70	N-80	-	.375	6.875	6.750	8.541	683,300	6,890	4,790	8.500	854,100	8.344	854,100	5,500	6,600	7,800
		L-80										811,400		811,400			
		C-90						768,700	7,750	5,030		854,100	-	-	5,700	6,800	7,900
		S-95						811,400	8,180	7,150		939,500					
		P-110						939,500	9,470	5,350		1,067,600			5,900	7,000	8,100
		Q-125						1,067,600	10,760	5,670		1,153,000			6,600	7,700	8,800
		TCA Q-125 HC								7,230		1,153,000					
7-5/8	33.70	N-80	-	.430	6.765	6.640	9.720	777,600	7,900	6,560	8.500	972,000	-	-	5,900	7,200	8,400
		L-80										923,400	8.344	923,400			
		C-90						874,800	8,880	7,050		972,000	-	-	6,100	7,300	8,600
		S-95						923,400	9,380	8,800		1,069,200					
		P-110						1,069,200	10,860	7,870		1,215,000			6,300	7,500	8,800
		Q-125						1,215,000	12,340	8,340		1,312,200			7,000	8,200	9,500
7-5/8	39.00	L-80	-	.500	6.625	6.500	11.192	895,400	9,180	8,820	8.500	1,063,200	-	-	6,300	7,800	9,200
		N-80										1,119,200					
		C-90						1,007,300	10,330	9,610					6,500	7,900	9,300
		S-95						1,063,200	10,900	10,600		1,231,100	8.344	1,211,200			
		T-95								10,000		1,175,200	-	-			
		P-110						1,231,100	12,620	11,080		1,399,000	8.344	1,376,400	6,700	8,100	9,500
		Q-125						1,399,000	14,340	12,060		1,510,900		1,486,500	7,400	8,800	10,200
		Q-125 EHC						1,510,900	15,490	13,920			-	-	7,600	9,000	10,400
7-5/8	42.80	T-95	-	.562	6.501	6.376	12.470	1,184,700	12,250	12,410	8.500	1,177,300	-	-	6,800	8,400	9,900
		P-110						1,371,700	14,190	13,930		1,401,500			7,000	8,600	10,100
		Q-125						1,558,800	16,120	15,350		1,513,600	8.200	1,222,700	7,700	9,300	10,800
7-5/8	45.30	L-80	-	.595	6.435	6.310	13.141	1,051,300	10,920	11,510	8.500	1,065,100	8.344	1,046,000	6,800	8,400	10,000
		P-110						1,445,500	15,020	15,440		1,401,500		1,376,400	7,200	8,800	10,400
		Q-125						1,642,600	17,070	17,110		1,513,600		1,486,500	7,900	9,500	11,100
7-5/8	47.10	T-95	-	.625	6.375	*6.250	13.745	1,305,800	13,630	14,300	8.500	1,177,300	8.344	1,156,200	7,100	8,700	10,400
		P-110						1,512,000	15,780	16,550		1,401,500	-	-	7,300	9,000	10,600
		13 Cr-110													7,600	9,300	10,900
		Q-125						1,718,100	17,930	18,810		1,513,600			8,000	9,600	11,300
		V-150						2,061,800	21,520	21,650		1,793,900			9,600	11,500	13,600
7-5/8	52.80	P-110	-	.712	6.201	6.076	15.463	1,700,900	17,980	18,620	8.500	1,401,500	8.344	1,376,400	7,700	9,400	11,200

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HC (Continued)

Pipe OD	Wt	Grade	Special Description	Pipe							Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Plain End Area	Longitudinal Plain End Yield	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	in.^{2}	lb	psi	psi	in.	lb	in.	lb	ft-lb		
7-3/4	46.10	C-90	-	.595	6.560	*6.500	13.374	1,203,700	12,090	12,750	8.600	1,337,400	-	-	6,900	8,600	10,200
		C-95						1,270,500	12,760	13,320		1,404,300					
		T-95															
		T-95	w/ 7-5/8" Coupling								8.500	1,296,200			6,800	8,400	10,100
		P-110	-					1,471,100	14,780	15,000	8.600	1,671,800			7,200	8,800	10,400
			w/ 7-5/8" Coupling								8.500	1,543,100					
		Q-125	-					1,671,800	16,790	16,600	8.600	1,805,500	8.079	1,025,900	7,800	9,500	11,100
			w/ 7-5/8" Coupling								8.500	1,666,600	-	-			
		HCQ-125	w/ 7-5/8" Q-125 Coupling							18,180							
		Q-125 EHC	-					1,805,500	18,140	17,760	8.600	1,805,500			8,100	9,700	11,300
8-5/8	32.00	K-55	-	.352	7.921	7.796	9.149	503,200	3,930	2,530	9.625	869,200	-	-	5,600	6,800	7,900
8-5/8	36.00	L-80	-	.400	7.825	7.700	10.336	826,900	6,490	4,100	9.625	981,900	9.159	981,900	6,200	7,500	8,800
8-5/8	40.00	L-80	-	.450	7.725	7.600	11.557	924,600	7,300	5,530	9.625	1,097,900	9.242	1,097,900	6,600	8,100	9,600
8-5/8	44.00	P-110	-	.500	7.625	7.500	12.763	1,403,900	11,160	8,420	9.625	1,595,400	-	-	7,300	8,900	10,600
		Q-125						1,595,400	12,680	8,980	9.625	1,723,000	9.125	1,334,300	8,000	9,600	11,300
8-5/8	49.00	HCQ-125	-	.557	7.511	7.386	14.118	1,764,800	14,130	13,550	9.625	1,905,900	-	-	8,400	10,200	11,900
9-5/8	36.00	K-55	-	.352	8.921	8.765	10.254	564,000	3,520	2,020	10.625	974,100	-	-	6,600	8,000	9,500
		L-80						820,300	5,120	2,370			10.175	974,100	6,800	8,200	9,600
9-5/8	40.00	K-55	-	.395	8.835	*8.750	11.454	630,000	3,950	2,570	10.625	1,088,100	10.175	1,088,100	7,100	8,700	10,300
		L-80						916,300	5,750	3,090			-	-	7,300	8,900	10,500
		P-110						1,259,900	7,900	3,470		1,431,800	10.175	1,431,800	7,700	9,300	10,900
9-5/8	43.50	K-55	-	.435	8.755	*8.625	12.559	690,700	4,350	3,250	10.625	1,193,100	-	-	7,600	9,300	11,000
		L-80						1,004,700	6,330	3,810					7,700	9,500	11,200
		N-80										1,255,900					
		C-95						1,193,100	7,510	4,130		1,318,700			7,900	9,600	11,400
		S-95								5,600		1,381,500	10.220	1,381,500			
		HCP-110						1,381,500	8,700			1,569,900	-	-	8,100	9,900	11,600
9-5/8	47.00	C-75	-	.472	8.681	*8.625	13.572	1,017,900	6,440	4,610	10.625	1,289,300	-	-	8,100	9,900	11,800
		L-80						1,085,800	6,870	4,760			10.405	1,289,300			
		N-80										1,357,200	-	-			
		C-95						1,289,300	8,150	5,090		1,425,100	10.282	1,424,700	8,300	10,100	12,000
													10.405	1,425,100			
		S-95								7,100		1,492,900	-	-			
		T-95								5,090		1,425,100	10.405	1,425,100			
		P-110						1,492,900	9,440	5,300		1,696,500	10.500	1,696,500	8,500	10,300	12,200
		Q-125						1,696,500	10,730	5,630		1,832,200	10.405	1,832,200	9,200	11,100	13,000
		V-150						2,035,800	12,870	6,000		2,171,500		2,171,500			

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HC (Continued)

Pipe OD	Wt	Grade	Special Description	Pipe							Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Plain End Area	Longitudinal Plain End Yield	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	in.^{2}	lb	psi	psi	in.	lb	in.	lb	ft-lb		
9-5/8	53.50	K-55	-	.545	8.535	*8.500	15.547	855,100	5,450	5,130	10.625	1,476,900	-	-	8,600	10,600	12,700
		L-80	-					1,243,800	7,930	6,620			10.390	1,455,400	8,700	10,800	12,900
													10.188	1,145,800			
													10.405	1,476,900			
		HCL-80	-							8,850				-			
		N-80	-							6,620		1,554,600	10.405	1,554,600			
		USS FSS-95	-					1,321,500	8,420	6,870		1,476,900	-	-	8,900	11,000	13,000
			w/L-80 Couplings												8,700	10,800	12,900
		C-90	-					1,399,200	8,920	7,110		1,554,600	10.405	1,554,600	8,900	11,000	13,000
		C-95	-					1,477,000	9,410	7,340		1,632,300	-	-			
		S-95	-							8,850		1,710,100	10.175	1,303,900			
		T-95	-							7,340		1,632,300		1,244,700			
		P-110	-					1,710,200	10,900	7,950		1,943,300	-	-	9,100	11,200	13,300
													10.390	1,915,000			
													10.125	1,382,000			
													10.405	1,943,300			
		HCP-110	-							8,850			10.390	1,915,000			
		Q-125	-					1,943,400	12,390	8,440		2,098,700	10.405	2,098,700	9,900	12,000	14,000
		HCQ-125	w/P-110 Couplings							8,850			-	-	9,100	11,200	13,300
													10.250	1,794,800	9,900	12,000	14,000
		Q-125 EHC	-					2,098,800	13,380	10,330			-	-	10,100	12,200	14,300
		V-150	-					2,332,100	14,860	8,970		2,487,400			9,900	12,000	14,000
9-5/8	58.40	C-95	-	.595	8.435	8.279	16.879	1,603,500	10,280	8,880	10.625	1,772,300	-	-	9,300	11,500	13,700
		T-95	-														
		P-110	-					1,856,700	11,900	9,770		2,109,900	10.405	1,945,800	9,500	11,700	13,900
		Q-125	-					2,109,900	13,520	10,540		2,278,700	-	-	10,300	12,500	14,700
9-5/8	70.30	13 Cr-110	-	.734	8.157	8.001	20.502	2,255,200	14,680	14,820	10.625	2,138,500	-	-	10,400	12,900	15,500
		P-110	-														
		Q-125	-					2,562,800	16,680	16,390		2,309,600	10.390	2,068,200	11,200	13,700	16,200
9-3/4	59.20	P-110	-	.595	8.560	*8.500	17.113	1,882,400	11,750	9,490	10.625	2,139,100	-	-	9,300	11,400	13,600
			w/ 9-5/8" Coupling									1,977,100			9,500	11,700	13,900
		Q-125	-					2,139,100	13,350	10,210		2,310,300			10,000	12,200	14,300

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Seal Lock HC (Continued)

Pipe OD	Wt	Grade	Special Description	Pipe							Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Plain End Area	Longitudinal Plain End Yield	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	in.^{2}	lb	psi	psi	in.	lb	in.	lb	ft-lb		
9-7/8	62.80	USS FSS-95	-	.625	8.625	*8.500	18.162	1,543,800	9,410	10,070	10.625	1,725,400	-	-	10,500	12,800	15,000
		T-95	-					1,725,400	10,520	9,320		1,907,000			9,200	11,500	13,800
			w/ 9-5/8" Coupling									1,568,700					
		P-110	-					1,997,800	12,180	10,290		2,270,300			9,500	11,800	14,100
		C-110										2,179,400					
		P-110	w/ 9-5/8" Coupling									1,867,500	10.563	1,867,500	8,900	10,900	12,900
		C-110										1,792,800		1,792,800			
		Q-125	-					2,270,300	13,840	11,140		2,451,900		2,451,900	10,200	12,500	14,800
		HCQ-125								12,030							
		EHC Q-125	w/ Spl. Seal Tolerance					2,451,900	15,810	12,411			-	-			
		Q-125	w/ 9-5/8" Coupling					2,270,300	13,840	11,140		2,016,900	10.563	2,016,900			
		HCQ-125								12,030							
9-7/8	67.00	Q-125	w/ Half Tolerance Coupling	.670	8.535	*8.500	19.375	2,421,900	14,840	12,980	10.625	2,615,600	-	-	10,600	13,100	15,500
10-3/4	40.50	K-55	-	.350	10.050	9.894	11.435	628,900	3,130	1,580	11.750	1,086,300	-	-	7,800	9,300	10,700
		L-80						914,800	4,560	1,730			11.288	1,086,300	8,000	9,500	10,900
10-3/4	45.50	K-55	-	.400	9.950	*9.875	13.006	715,300	3,580	2,090	11.750	1,235,600	11.288	1,235,600	8,500	10,100	11,700
		L-80						1,040,500	5,210	2,480					8,700	10,300	11,900
10-3/4	51.00	L-80	-	.450	9.850	9.694	14.561	1,164,900	5,860	3,220	11.750	1,383,300	11.376	1,383,300	9,300	11,100	12,900
													11.250	1,174,900			
		C-95						1,383,300	6,960	3,490		1,528,900		1,298,500	9,500	11,300	13,100
		T-95															
10-3/4	55.50	L-80	-	.495	9.760	*9.625	15.947	1,275,800	6,450	4,020	11.750	1,515,000	11.453	1,515,000	9,800	11,700	13,600
		N-80										1,594,700		1,594,700			
		C-95						1,515,000	7,660	4,300		1,674,400		1,674,400	10,000	11,900	13,800
		P-110						1,754,200	8,860	4,610		1,993,400	-	-	10,300	12,200	14,100
10-3/4	60.70	L-80	-	.545	9.660	9.504	17.473	1,397,800	7,100	5,160	11.750	1,659,900	-	-	10,200	12,300	14,400
		C-95						1,659,900	8,430	5,580		1,834,700			10,400	12,500	14,600
		P-110						1,922,000	9,760	5,880		2,184,100			10,700	12,800	14,900
10-3/4	65.70	L-80	-	.595	9.560	*9.500	18.982	1,518,600	7,750	6,310	11.750	1,803,300	-	-	10,700	12,900	15,100
		N-80										1,898,200					
		C-95						1,803,300	9,200	6,960		1,993,100			10,900	13,100	15,300
		S-95								8,640		2,088,000	11.621	2,088,000			
		T-95								6,960		1,993,100		1,993,100			
		P-110						2,088,000	10,650	7,510		2,372,800	11.500	2,103,500	11,200	13,400	15,600
		C-110										2,277,800		2,019,400			
		Q-125						2,372,800	12,110	7,920		2,562,600	11.300	1,788,900	12,100	14,300	16,500
		HCQ-125								8,640			-	-			

* Special API drifts

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Hunting: Seal Lock HC (Continued)

Pipe OD	Wt	Grade	Special Description	Pipe							Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Plain End Area	Longitudinal Plain End Yield	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	in.^{2}	lb	psi	psi	in.	lb	in.	lb	ft-lb		
10-3/4	71.10	N-80	-	.650	9.450	9.294	20.625	1,650,000	8,470	7,560	11.750	1,931,200	-	-	11,100	13,400	15,800
		P-110						2,268,800	11,640	9,300		2,414,000			11,600	13,900	16,300
11-3/4	47.00	K-55	-	.375	11.000	10.844	13.401	737,100	3,070	1,510	12.750	1,273,100	-	-	10,100	11,600	13,200
11-3/4	60.00	L-80	-	.489	10.772	*10.625	17.300	1,384,000	5,830	3,180	12.750	1,643,500	-	-	12,300	14,400	16,500
		P-110						1,903,000	8,010	3,610		2,162,500			12,500	14,500	16,400
11-3/4	65.00	L-80	-	.534	10.682	*10.625	18.816	1,505,300	6,360	3,870	12.750	1,787,500	-	-	12,300	14,300	16,400
		C-90						1,693,400	7,160	4,060		1,881,600			12,600	14,600	16,700
		T-95						1,787,500	7,560	4,180		1,975,700					
		P-110						2,069,800	8,750	4,480		2,352,000	12.542	2,352,000	13,000	15,100	17,100
		Q-125						2,352,000	9,940	4,690		2,540,200		2,540,200	14,400	16,400	18,500
11-3/4	71.00	P-110	-	.582	10.586	*10.500	20.420	2,246,200	9,530	5,470	12.750	2,552,500	12.624	2,552,500	13,400	15,600	17,800
		Q-125						2,552,500	10,840	5,760		2,756,700		2,756,700	14,800	17,000	19,200
11-3/4	79.00	Q-125	-	.656	10.438	10.282	22.864	2,858,000	12,210	8,120	12.750	3,086,500	-	-	15,400	17,800	20,200
11-7/8	71.80	T-95	w/ 11-3/4" Coupling	.582	10.711	*10.625	20.648	1,961,600	8,150	5,080	12.750	2,002,100	-	-	13,100	15,500	17,800
		P-110	-					2,271,300	9,430	5,290		2,581,000	12.635	2,581,000	13,600	15,900	18,200
			w/ 11-3/4" Coupling									2,383,500	12.555	2,383,500			
		Q-125	-					2,581,000	10,720	5,630		2,787,500	12.635	2,787,500	14,900	17,300	19,600
			w/ 11-3/4" Coupling							5,630		2,574,200	12.555	2,574,200			
		HCQ-125								7,190							
		HCQ-125 E						2,787,500	11,580	7,190			-	-	14,700	16,800	18,800
		HCQ-125 E+							11,910								
		LS-140	-					2,890,700	12,010	7,190		3,097,200	12.635	3,097,200	16,000	18,300	20,600
		LS-140	w/ 11-3/4" Coupling									2,860,200	12.555	2,860,200			
13-3/8	54.50	K-55	-	.380	12.615	12.459	15.514	853,300	2,730	1,130	14.375	1,473,800	-	-	12,300	13,800	15,400
13-3/8	61.00	L-80	-	.430	12.515	12.359	17.487	1,399,000	4,500	1,670	14.375	1,661,300	14.125	1,661,300	13,300	15,000	16,800
		P-110						1,923,600	6,190			2,185,900		2,185,900	14,300	16,000	17,800
13-3/8	68.00	K-55	-	.480	12.415	12.259	19.445	1,069,500	3,450	1,950	14.375	1,847,300	14.125	1,847,300	13,500	15,400	17,300
		N-80						1,555,600	5,020	2,260		1,944,500		1,944,500	13,900	15,800	17,700
		C-90						1,750,100	5,650	2,320					14,300	16,200	18,100
		P-110						2,139,000	6,910	2,330		2,430,600		2,430,600	14,900	16,800	18,700
13-3/8	72.00	L-80	-	.514	12.347	*12.250	20.768	1,661,400	5,380	2,670	14.375	1,973,000	-	-	14,300	16,300	18,300
		C-90						1,869,100	6,050	2,780		2,076,800	14.125	2,042,600	14,700	16,700	18,700
		C-95						1,973,000	6,390	2,830		2,180,600	-	-			
		S-95								3,470		2,284,500	14.000	1,943,500			
		T-95								2,830		2,180,600	-	-			
		P-110						2,284,500	7,400	2,880		2,596,000	14.125	2,553,300	15,200	17,200	19,300
		Q-125						2,596,000	8,410			2,803,700		2,757,500	17,100	19,100	21,100
13-3/8	86.00	LS-125	-	.625	12.125	*12.000	25.035	3,129,400	10,220	5,030	14.375	3,379,700	-	-	18,100	20,400	22,800

* Special API drifts

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Hunting: Seal Lock HC (Continued)

Pipe OD	Wt	Grade	Special Description	Pipe							Standard Connection		Special Clearance Connection		Field End Torque		
				Nominal Wall Thickness	Inside Diameter	Drift Diameter	Plain End Area	Longitudinal Plain End Yield	Internal Yield Pressure	Collapse Pressure	Coupling Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Longitudinal Joint Strength	Min	Opt	Max
in.	lb/ft			in.	in.	in.	$in.^2$	lb	psi	psi	in.	lb	in.	lb	ft-lb		
13-3/8	98.00	N-80	-	.719	11.937	11.781	28.588	2,287,000	7,530	5,920	14.375	2,635,400	-	-	16,000	18,500	21,000
		P-110	w/ Special Tolerance Coupling*					3,144,700	10,350	6,950		3,294,300			17,000	19,500	22,000
13-5/8	88.20	N-80	-	.625	12.375	*12.250	25.526	2,042,100	6,420	3,980	14.375	2,552,500	-	-	16,500	19,500	22,500
		C-95						2,425,000	7,630	4,260		2,680,100			16,900	19,900	22,900
		S-95								5,930		2,807,800					
			w/ 13-3/8" Coupling									2,317,300	14.250	2,317,300			
		T-95	-							4,260		2,680,100	-	-			
		P-110						2,807,900	8,830	4,570		3,190,600	14.250	2,901,100	17,500	20,500	23,500
			w/ 13-3/8" Coupling									2,633,300		2,633,300			
		Q-125	w/ Special Tolerance Coupling*					3,190,800	10,030	4,800		3,445,900	14.250	3,133,200	19,400	22,400	25,400
		HCQ-125	-							5,930			14.175	2,941,800			
		Q-125	w/ 13-3/8" Coupling*							4,800		2,843,900	14.250	2,843,900			
		Q-125	w/ SPL Tolerances & 13-3/8" Coupling*										14.000	2,374,500			
		EHC Q-125						3,446,000	11,150	6,120			-	-			
		LS-140						3,573,600	11,240	4,940		3,828,800			20,800	23,800	26,800
		USS-140E	w/ SPL Tolerances*							6,320					20,800	24,100	27,500

* Special API drifts

Data provided by Hunting Tubular Systems; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TKC Plus Buttress Connection

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard OD	Special Clearance OD	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
4-1/2	10.50	J-55	0.224	4.052	3.927	4,790	4,010	5.000	4.875	4,790	203,000	700	1,600	2,500
		K-55									249,000			
		L-80				6,970	4,940			6,970	262,000	900	2,300	3,600
		N-80									274,000			
		C-90				7,840	5,200			7,840	279,000	1,000	2,500	4,000
		C-95				8,280	5,310			8,280	293,000	1,100	2,700	4,200
		P-110				9,580	5,550			9,580	347,000	1,300	3,100	4,900
		Q-125				10,890	5,830			10,890	378,000	1,500	3,600	5,600
4-1/2	11.60	J-55	0.250	4.000	3.875	5,350	4,960	5.000	4.875	5,350	225,000	900	2,100	3,200
		K-55								5,350	277,000			
		L-80				7,780	6,350			7,780	291,000	1,300	3,000	4,600
		N-80									304,000			
		C-90				8,750	6,820			8,750	309,000	1,500	3,400	5,200
		C-95				9,240	7,030			9,240	325,000	1,600	3,500	5,400
		P-110				10,690	7,580			10,690	385,000	1,800	4,100	6,300
		Q-125				12,150	8,000			12,150	420,000	2,100	4,700	7,200
4-1/2	12.60	J-55	0.271	3.958	3.833	5,800	5,730	5.000	4.875	5,800	243,000	1,200	2,500	3,700
		K-55									298,000			
		L-80				8,430	7,500			8,430	314,000	1,700	3,600	5,400
		N-80									328,000			
		C-90				9,490	8,120			9,490	334,000	1,900	4,000	6,100
		C-95				10,010	8,410			10,010	351,000	2,000	4,200	6,400
		P-110				11,590	9,210			11,590	416,000	2,300	4,900	7,400
		Q-125				13,170	9,890			13,170	453,000	2,700	5,600	8,400
4-1/2	13.50	J-55	0.290	3.920	3.795	6,200	6,420	5.000	4.875	6,200	258,000	1,400	2,800	4,200
		K-55									318,000			
		L-80				9,020	8,540			9,020	334,000	2,100	4,100	6,100
		N-80									349,000			
		C-90				10,150	9,300			10,150	355,000	2,300	4,600	6,900
		C-95				10,710	9,660			10,710	374,000	2,500	4,900	7,300
		P-110				12,410	10,690			12,410	443,000	2,800	5,600	8,400
		Q-125				14,100	11,600			14,100	482,000	3,200	6,400	9,600
4-1/2	15.10	J-55	0.337	3.826	3.701	7,210	7,620	5.000	4.875	7,210	297,000	2,100	3,800	5,400
		K-55									365,000			
		L-80				10,480	11,080			10,480	379,000	3,100	5,500	7,900
		N-80									399,000			
		C-90				11,800	12,220			11,800		3,500	6,200	8,900
		C-95				12,450	12,760			12450,	419,000	3,700	6,500	9,300
		P-110				14,420	14,340			14,420	499,000	4,200	7,500	10,800
		Q-125				16,380	15,830			16,380	539,000	4,800	8,600	12,300
5	13.00	J-55	0.253	4.494	4.369	4,870	4,140	5.563	5.375	4,870	252,000	1,300	3,200	5,000
		K-55									309,000			
		L-80				7,080	5,140			7,080	327,000	1,900	4,600	7,200
		N-80									341,000			
		C-90				7,970	5,430			7,970	348,000	2,200	5,200	8,200
		C-95				84,10	5,560			8,410	366,000	2,300	5,500	8,600
		P-110				97,40	5,840			9,740	434,000	2,700	6,400	10,000
		Q-125				11,070	6,050			11,070	473,000	3,000	7,200	11,300
5	15.00	J-55	0.296	4.408	4.283	5,700	5,560	5.563	5.375	5,700	293,000	1,600	3,500	5,300
		K-55									359,000			
		L-80				8,290	7,250			8,290	379,000	2,400	5,100	7,700
		N-80									396,000			
		C-90				9,320	7,830			9,320	404,000	2,700	5,700	8,600

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Hunting: TKC Plus Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard OD	Special Clearance OD	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
5	15.00	C-95	0.296	4.408	4.283	9,840	8,110	5.563	5.375	9,840	424,000	2,800	6,000	9,100
		P-110				11,400	8,850			11,400	503,000	3,300	7,000	10,600
		Q-125				12,950	9,480			12,950	548,000	3,700	7,900	12,000
5	18.00	J-55	0.362	4.276	4.151	6,970	7,390	5.563	5.375	6,970	353,000	2,800	5,100	7,400
		K-55									432,000			
		L-80				10,140	10,490			10,140	457,000	4,100	7,400	10,700
		N-80									477,000			
		C-90				11,400	11,520			11,400	487,000	4,600	8,400	12,100
		C-95				12,040	12,030			12,040	512,000	4,800	8,800	12,700
		P-110				13,940	13,470			13,940	606,000	5,600	10,200	14,800
		Q-125				15,840	14,820			15,840	661,000	6,400	11,600	16,800
5	21.40	J-55	0.437	4.126	4.001	8,410	8,770	5.563	5.375	8,410	374,000	4,400	7,000	9,600
		K-55									474,000			
		L-80				12,240	12,760			12,240		6,400	10,200	14,000
		N-80									499,000			
		C-90				13,770	14,360			13,770	499,000	7,300	11,600	15,800
		C-95				14,530	15,150			14,530	524,000	7,700	12,200	16,700
		P-110				16,820	17,550			16,820	624,000	8,900	14,100	19,300
		Q-125				19,120	19,940			19,120	674,000	10,000	16,000	21,900
5	23.20	J-55	0.478	4.044	3.919	9,200	9,510	5.563	5.375	9,200	374,000	5,400	8,100	10,800
		K-55									474,000			
		L-80				13,380	13,830			13,380		7,900	11,900	15,800
		N-80									499,000			
		C-90				15,060	15,560			15,060		8,900	13,300	17,700
		C-95				15,890	16,430			15,890	524,000	9,400	14,100	18,700
		P-110				18,400	19,020			18,400	624,000	10,900	16,300	21,700
		Q-125				20,910	21,620			20,910	674,000	12,300	18,500	24,600
5	24.10	J-55	0.500	4.000	3.875	9,630	9,900	5.563	5.375	9,630	374,000	6,000	8,800	11,500
		K-55									474,000			
		L-80				14,000	14,400			14,000		8,800	12,800	16,700
		N-80									499,000			
		C-90				15,750	16,200			15,750		9,900	14,400	18,800
		C-95				16,630	17,100			16,630	524,000	10,400	15,100	19,800
		P-110				19,250	19,800			19,250	624,000	12,000	17,500	22,900
		Q-125				21,880	22,500			21,880	674,000	13,700	19,900	26,000
5-1/2	15.50	J-55	0.275	4.950	4.825	4,810	4,040	6.050	5.875	4,810	300,000	1,400	3,500	5,500
		K-55									366,000			
		L-80				7,000	4,990			7,000	389,000	2,100	5,100	8,000
		N-80									406,000			
		C-90				7,880	5,260			7,880	415,000	2,400	5,700	9,000
		C-95				8,310	5,380			8,310	436,000	2,500	6,000	9,500
		P-110				9,630	5,630			9,630	517,000	2,900	7,000	11,000
		Q-125				10,940	5,890			10,940	564,000	3,300	7,900	12,500
5-1/2	17.00	J-55	0.304	4.892	4.767	5,320	4,910	6.050	5.875	5,320	329,000	1,900	4,300	6,700
		K-55									402,000			
		L-80				7,740	6,290			7,740	428,000	2,800	6,300	9,700
		N-80									446,000			
		C-90				8,710	6,740			8,710	456,000	3,200	7,100	10,900
		C-95				9,190	6,940			9,190	480,000	3,300	7,400	11,500
		P-110				10,640	7,480			10,640	568,000	3,900	8,600	13,300
		Q-125				12,090	7,890			12,090	620,000	4,400	9,800	15,100

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Hunting: TKC Plus Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard OD	Special Clearance OD	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
5-1/2	20.00	J-55	0.361	4.778	4.653	6,320	6,620	6.050	5.875	6,320	387,000	3,100	6,000	8,900
		K-55									472,000			
		L-80				9,190	8,830			9,190	503,000	4,400	8,700	12,900
		N-80									524,000			
		C-90				10,340	9,630			10,340	536,000	5,000	9,800	14,500
		C-95				10,910	10,020			10,910	563,000	5,300	10,300	15,300
		P-110				12,640	11,100			12,640	667,000	6,100	11,900	17,700
		Q-125				14,360	12,080			14,360	727,000	7,000	13,600	20,200
5-1/2	23.00	J-55	0.415	4.670	4.545	7,260	7,670	6.050	5.875	7,260	404,000	4,300	7,600	10,900
		K-55									511,000			
		L-80				10,560	11,160			10,560	511,000	6,300	11,100	15,800
		N-80									538,000			
		C-90				11,880	12,380			11,880	538,000	7,000	12,400	17,800
		C-95				12,540	12,930			12,540	565,000	7,400	13,100	18,800
		P-110				14,530	14,540			14,530	673,000	8,600	15,200	21,800
		Q-125				16,510	16,060			16,510	727,000	9,800	17,300	24,800
6-5/8	20.00	J-55	0.288	6.049	5.924	4,180	2,970	7.390	7	4,180	374,000	1,900	5,200	8,500
		K-55									453,000			
		L-80				6,090	3,470			6,090	489,000	2,800	7,600	12,300
		N-80									509,000			
		C-90				6,850	3,700			6,850	523,000	3,200	8,500	13,800
		C-95				7,230	3,790			7,230	550,000	3,300	9,000	14,600
		P-110				8,370	4,030			8,370	650,000	3,900	10,400	16,900
		Q-125				9,510	4,170			9,510	711,000	4,400	11,800	19,200
6-5/8	24.00	J-55	0.352	5.921	5.796	5,110	4,560	7.390	7	5,110	453,000	3,400	7,800	12200
		K-55									548,000			
		L-80				7,440	5,760			7,440	592,000	4,900	11,300	17,700
		N-80									615,000			
		C-90				8,370	6,140			8,370	633,000	5,600	12,800	19,900
		C-95				8,830	6,310			8,830	665,000	5,900	13,500	21,000
		P-110				10,230	6,730			10,230	786,000	6,800	15,600	24,300
		Q-125				11,620	7,020			11,620	860,000	7,700	17,700	27,600
6-5/8	28.00	J-55	0.417	5.791	5.666	6,060	6,170	7.390	7	6,060	531,000	5,200	10,500	15,800
		K-55									643,000			
		L-80				8,810	8,170			8,810	693,000	7,600	15,300	23,000
		N-80									721,000			
		C-90				9,910	8,880			9,910	742,000	8,500	17,200	25,800
		C-95				10,460	9,220			10,460	780,000	9,000	18,200	27,300
		P-110				12,120	10,160			12,120	922,000	10,400	21,000	31,600
		Q-125				13,770	10,990			13,770	1,008,000	11,900	23,900	35,900
6-5/8	32.00	J-55	0.475	5.675	5.550	6,900	7,320	7.390	7	6,900	599,000	7,100	13,000	18,900
		K-55									725,000			
		L-80				10,040	10,320			10,040	783,000	10,400	19,000	27,500
		N-80									814,000			
		C-90				11,290	11,330			11,290	837,000	11,700	21,400	31,000
		C-95				11,920	11,820			11,920	880,000	12,300	22,500	32,700
		P-110				13,800	13,220			13,800	1,040,000	14,300	26,100	37,900
		Q-125				15,680	14,540			15,680	1,138,000	16,200	29,600	43,000
7	23.00	J-55	0.317	6.366	6.241	4,360	3,270	7.656	7.375	4,360	432,000	2,600	6,800	10,900
		K-55				4,360	3,270			4,360	522,000	2,600	6,800	10,900
		L-80				6,340	3,830			6,340	565,000	3,800	9,900	15,900
		N-80									588,000			

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Hunting: TKC Plus Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard OD	Special Clearance OD	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
7	23.00	C-90	0.317	6.366	6.241	7,130	4,030	7.656	7.375	7,130	605,000	4,300	11,100	17,900
		C-95				7,530	4,140			7,530	636,000	4,500	11,700	18,900
		P-110				8,720	4,440			8,720	752,000	5,200	13,600	21,900
		Q-125				9,910	4,650			9,910	823,000	5,900	15,400	24,900
7	26.00	J-55	0.362	6.276	6.151	4,980	4,330	7.656	7.375	4,980	490,000	3,700	8,800	13,800
		K-55									592,000			
		L-80				7,240	5,410			7,240	641,000	5,500	12,800	20,100
		N-80									667,000			
		C-90				8,150	5,740			8,150	687,000	6,100	14,400	22,600
		C-95				8,600	5,890			8,600	722,000	6,500	15,200	23,900
		P-110				9,960	6,230			9,960	853,000	7,500	17,600	27,700
		Q-125				11,310	6,450			11,310	934,000	8,500	20,000	31,400
7	29.00	J-55	0.408	6.184	6.059	5,610	5,410	7.656	7.375	5,610	548,000	5,100	10,900	16,700
		K-55									662,000			
		L-80				8,160	7,030			8,160	718,000	7,400	15,900	24,300
		N-80				8,160	7,030				746,000			
		C-90				9,180	7,580			9,180	768,000	8,400	17,900	27,400
		C-95				9,690	7,840			9,690	808,000	8,800	18,900	28,900
		P-110				11,220	8,530			11,220	955,000	10,300	21,900	33,500
		Q-125				12,750	9,110			12,750	1,045,000	11,600	24,800	38,000
7	32.00	J-55	0.453	6.094	5.969	6,230	6,460	7.656	7.375	6,230	605,000	6,600	13,100	19,500
		K-55									730,000			
		L-80				9,060	8,600			9,060	782,000	9,600	19,000	28,400
		N-80									823,000			
		C-90				10,190	9,380			10,190	823,000	10,800	21,400	31,900
		C-95				10,760	9,740			10,760	864,000	11,500	22,600	33,700
		P-110				12,460	10,780			12,460	1,029,000	13,300	26,200	39,000
		Q-125				14,160	11,710			14,160	1,111,000	15,100	29,700	44,300
7	35.00	J-55	0.498	6.004	5.879	6,850	7,270	7.656	7.375	6,850	617,000	8,300	15,300	22,200
		K-55									782,000			
		L-80				9,960	10,180			9,960		12,100	22,200	32,300
		N-80									823,000			
		C-90				11,210	11,170			11,210		13,600	25,000	36,400
		C-95				11,830	11,650			11,830	864,000	14,300	26,400	38,400
		P-110				13,700	13,030			13,700	1,029,000	16,600	30,500	44,400
		Q-125				15,560	14,10			15,560	1,111,000	18,900	34,700	50,500
7	38.00	J-55	0.540	5.920	5.795	7,430	7,830	7.656	7.375	7,430	617,000	10,000	17,400	24,700
		K-55									782,000			
		L-80				10,800	11,390			10,800		14,500	25,200	35,900
		N-80									823,000			
		C-90				12,150	12,810			12,150		16,400	28,400	40,400
		C-95				12,830	13,430			12,830	864,000	17,300	30,000	42,700
		P-110				14,850	15,130			14,850	1,029,000	20,000	34,700	49,400
		Q-125				16,880	16,740			16,880	1,111,000	22,700	39,400	56,100
7-5/8	26.40	J-55	0.328	6.969	6.844	4,140	2,900	8.500	8.125	4,140	483,000	3,000	8200	13400
		K-55									581,000			
		L-80				6,020	3,400			6,020	635,000	4,400	12000	19500
		N-80									659,000			
		C-90				6,780	3,610			6,780	681,000	4,900	13,400	21,900
		C-95				7,150	3,710			7,150	716,000	5,200	14,200	23,200
		P-110				8,280	3,920			8,280	845,000	6,100	16,500	26,800
		Q-125				9,410	4,050			9,410	926,000	6,900	18,700	30,500

Data provided by Hunting Tubular Systems; TKC-PBTC-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TKC Plus Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard OD	Special Clearance OD	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
7-5/8	29.70	J-55	0.375	6.875	6.750	4,730	3,910	8.500	8.125	4,730	549,000	4,400	10,700	17,000
		K-55									660,000			
		L-80				6,890	4,790			6,890	721,000	6,400	15,600	24,700
		N-80									749,000			
		C-90				7,750	5,030			7,750	773,000	7,200	17,500	27,800
		C-95				8,180	5,130			8,180	813,000	7,600	18,500	29,400
		P-110				9,470	5,350			9,470	960,000	8800	21,400	34,000
		Q-125				10,760	5,670			10,760	1,052,000	10,000	24,300	38,600
7-5/8	33.70	J-55	0.430	6.765	6.640	5,430	5,100	8.500	8.125	5,430	625,000	6,200	13,700	21,100
		K-55									751,000			
		L-80				7,900	6,560			7,900	820,000	9,100	19,900	30,700
		N-80									852,000			
		C-90				8,880	7,050			8,880	880,000	10,200	22,400	34,600
		C-95				9,380	7,280			9,380	925,000	10,800	23,700	36,500
		P-110				10,860	7,870			10,860	1,093,000	12,500	27,400	42,200
		Q-125				12,340	8,340			12,340	1,197,000	14,200	31,100	48,000
7-5/8	39.00	J-55	0.500	6.625	6.500	6,310	6,610	8.500	8.125	6,310	720,000	9,000	17,600	26,200
		K-55									864,000			
		L-80				9,180	8,820			9,180	945,000	13,100	25,600	38,100
		N-80									981,000			
		C-90				10,330	9,620			10,330	1,013,000	14,800	28,900	42,900
		C-95				10,900	10,000			10,900	1,065,000	15,600	30,500	45,300
		P-110				12,620	11,080			12,620	1,258,000	18,000	35,200	52,400
		Q-125				14,340	12,060			14,340	1,379,000	20,500	40,100	59,600
7-5/8	42.80	J-55	0.562	6.501	6.376	7,090	7,510	8.500	8.125	7,090	802,000	11,800	21,200	30,600
		K-55									963,000			
		L-80				10,320	10,810			10,320	1,053,000	17,200	30,900	44,500
		N-80									1,093,000			
		C-90				11,610	11,890			11,610	1,129,000	19,400	34,800	50,100
		C-95				12,250	12,410			12,250	1,187,000	20,500	36,700	52,900
		P-110				14,190	13,930			14,190	1,402,000	23,700	42,500	61,200
		Q-125				16,120	15,350			16,120	1,536,000	26,900	48,300	69,600
7-5/8	45.30	J-55	0.595	6.435	6.310	7,510	7,910	8.500	8.125	7,510	845,000	13,500	23,200	32,900
		K-55									1,015,000			
		L-80				10,920	11,510			10,920	1,109,000	19,600	33,700	47,800
		N-80									1,152,000			
		C-90				12,290	12,950			12,290	1,181,000	22,000	37,900	53,800
		C-95				12,970	13,670			12,970	1,241,000	23,300	40,100	56,800
		P-110				15,020	15,440			15,020	1,477,000	27,000	46,400	65,800
		Q-125				17,070	17,100			17,070	1,595,000	30,600	52,700	74,700
7-5/8	47.10	J-55	0.625	6.375	6.250	7,890	8,280	8.500	8.125	7,890	884,000	15,000	25,000	34,900
		K-55									1,062,000			
		L-80				11,480	12,040			11,480	1,122,000	21,900	36,400	50,800
		N-80									1,181,000			
		C-90				12,910	13,540			12,910		24,600	40,900	57,200
		C-95				13,630	14,300			13,630	1,241,000	26,000	43,200	60,300
		P-110				15,780	16,550			15,780	1,477,000	30,100	50,000	69,900
		Q-125				17,930	18,700			17,930	1,595,000	34,200	56,800	79,400
8-5/8	32.00	J-55	0.352	7.921	7.796	3,930	2,530	9.625	9.125	3,930	579,000	4,100	11,700	19,200
		K-55									690,000			
		L-80				5,710	3,050			5,710	764,000	6,000	17,000	28,000
		N-80									792,000			
		C-90				6,430	3,210			6,430	822,000	6,700	19,100	31,400

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Hunting: TKC Plus Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard OD	Special Clearance OD	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
8-5/8	32.00	C-95	0.352	7.921	7.796	6,780	3,280	9.625	9.125	6,780	864,000	7,100	20,200	33,200
		P-110				7,860	3,420			7,860	1,020,000	8,200	23,300	38,400
		Q-125				8,930	3,470			8,930	1,120,000	9,400	26,600	43,700
8-5/8	36.00	J-55	0.400	7.825	7.700	4,460	3,450	9.625	9.125	4,460	654,000	5,800	14,900	23,900
		K-55									780,000			
		L-80				6,490	4,100			6,490	864,000	8,500	21,700	34,800
		N-80									895,000			
		C-90				7,300	4,250			7,300	928,000	9,500	24,400	39,200
		C-95				7,710	4,350			7,710	976,000	10,100	25,700	41,300
		P-110				8,930	4,690			8,930	1,152,000	11,700	29,800	47,900
		Q-125				10,140	4,930			10,140	1,265,000	13,200	33,800	54,400
8-5/8	40.00	J-55	0.450	7.725	7.600	5,020	4,400	9.625	9.125	5,020	732,000	7,900	18,300	28,700
		K-55									872,000			
		L-80				7,300	5,520			7,300	966,000	11,400	26,600	41,800
		N-80									1,001,000			
		C-90				8,220	5,870			8,220	1,038,000	12,900	30,000	47,000
		C-95				8,670	6,020			8,670	1,092,000	13,600	31,600	49,600
		P-110				10,040	6,390			10,040	1,288,000	15,700	36,600	57,500
		Q-125				11,410	6,630			11,410	1,415,000	17,900	41,600	65,300
8-5/8	44.00	J-55	0.500	7.625	7.500	5,580	5,360	9.625	9.125	5,580	808,000	10,200	21,900	33,500
		K-55									963,000			
		L-80				8,120	6,950			8,120	1,066,000	14,800	31,800	48,700
		N-80									1,105,000			
		C-90				9,130	7,490			9,130	1,146,000	16,700	35,800	54,800
		C-95				9,640	7,740			9,640	1,206,000	17,600	37,700	57,800
		P-110				11,160	8,420			11,160	1,423,000	20,400	43,700	66,900
		Q-125				12,680	8,980			12,680	1,562,000	23,100	49,600	76,000
8-5/8	49.00	J-55	0.557	7.511	7.386	6,220	6,440	9.625	9.125	6,220	894,000	13,100	25,900	38,700
		K-55				6,220	6,440			6,220	1,065,000	13,100	25,900	38,700
		L-80				9,040	8,570			9,040	1,180,000	19,100	37,700	56,300
		N-80									1,222,000			
		C-90				10,170	9,340			10,170	1,268,000	21,500	42,500	63,400
		C-95				10,740	9,700			10,740	1,334,000	22,700	44,800	66,900
		P-110				12,430	10,730			12,430	1,574,000	26,300	51,900	77,500
		Q-125				14,130	11,660			14,130	1,728,000	29,800	58,900	88,000
9-5/8	36.00	J-55	0.352	8.921	8.765	3,520	2,020	10.625	10.125	3,520	639,000	4,600	14,400	24,100
		K-55									755,000			
		L-80				5,120	2,370			5,120	848,000	6,700	20,900	35,000
		N-80									877,000			
		C-90				5,760	2,440			5,760	914,000	7,600	23,500	39,400
		C-95				6,080	2,460			6,080	962,000	8,000	24,800	41,500
		P-110				7,040	2,470			7,040	1,133,000	9,200	28,700	48,100
		Q-125				8,000				8,000	1,247,000	10,500	32,600	54,700
9-5/8	40.00	J-55	0.395	8.835	8.679	3,950	2,570	10.625	10.125	3,950	714,000	6,300	17,900	29,400
		K-55									843,000			
		L-80				5,750	3,090			5,750	947,000	9,200	26,000	42,700
		N-80									979,000			
		C-90				6,460	3,260			6,460	1,021,000	10,300	29,200	48,000
		C-95				6,820	3,330			6,820	1,074,000	10,900	30,800	50,700
		P-110				7,900	3,470			7,900	1,266,000	12,600	35,700	58,700
		Q-125				8,980	3,530			8,980	1,393,000	14,400	40,600	66,700

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Hunting: TKC Plus Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard OD	Special Clearance OD	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
9-5/8	43.50	J-55	0.435	8.755	8.599	4,350	3250	10.625	10.125	4,350	783,000	8,100	21,200	34,200
		K-55									925,000			
		L-80				6,330	3,810			6,330	1,038,000	11,800	30,800	49,800
		N-80									1,074,000			
		C-90				7,120	4,010			7,120	1,119,000	13,300	34,700	56,000
		C-95				7,510	4,130			7,510	1,178,000	14,000	36,600	59,100
		P-110				8,700	4,420			8,700	1,388,000	16,200	42,300	68,400
		Q-125				9,890	4,620			9,890	1,527,000	18,500	48,200	77,800
9-5/8	47.00	J-55	0.472	8.681	8.525	4,720	3,890	10.625	10.125	4,720	846,000	10,000	24,400	38,700
		K-55									999,000			
		L-80				6,870	4,750			6,870	1,122,000	14,500	35,400	56,200
		N-80									1,161,000			
		C-90				7,720	4,990			7,720	1,210,000	16,300	39,800	63,300
		C-95				8,150	5,090			8,150	1,273,000	17,200	42,000	66,800
		P-110				9,440	5,300			9,440	1,500,000	19,900	48,600	77,300
		Q-125				10,730	5,630			10,730	1650000	22,600	55,300	87,900
9-5/8	53.50	J-55	0.545	8.535	8.379	5,450	5,130	10.625	10.125	5,450	969,000	14,100	30,700	47,300
		K-55									1,145,000			
		L-80				7,930	6,620			7,930	1,285,000	20,500	44,700	68,800
		N-80									1,329,000			
		C-90				8,920	7,110			8,920	1,386,000	23,000	50,200	77,400
		C-95				9,410	7,340			9,410	1,458,000	24,300	53,000	81,700
		P-110				10,900	7,950			10,900	1,718,000	28,100	61,400	94,600
		Q-125				12,390	8,440			12,390	1,890,000	31,900	69,700	107,400
9-5/8	58.40	J-55	0.595	8.435	8.279	5,950	5,990	10.625	10.125	5,950	1,052,000	15,900	32,400	48,900
		K-55									1,243,000			
		L-80				8,650	7,890			8,650	1,396,000	23,100	47,200	71,200
		N-80									1,443,000			
		C-90				9,740	8,570			9,740	1,505,000	26,000	53,100	80,100
		C-95				10,280	8,890			10,280	1,583,000	27,400	56,000	84500
		P-110				11,900	9,770			11,900	1,865,000	31,800	64,900	97,900
		Q-125				13,520	10,540			13,520	2,052,000	36,100	73,700	111,200
10-3/4	40.50	J-55	0.350	10.050	9.894	3,130	1,580	11.750	11.25	3,130	700,000	5,100	17,500	29,800
		K-55									819,000			
		L-80				4,560	1,730			4,560	934,000	7,400	25,400	43,400
		N-80									964,000			
		C-90				5,130				5,130	1,010,000	8,300	28,600	48,800
		C-95				5,410				5,410	1,063,000	8,800	30,200	51,500
		P-110				6,270				6,270	1,251,000	10,200	34,900	59,600
		Q-125				7,120				7,120	1,380,000	11,600	39,700	67,800
10-3/4	45.50	J-55	0.400	9.950	9.794	3,580	2,090	11.750	11.25	3,580	796,000	7,300	22,500	37,600
		K-55									931,000			
		L-80				5,210	2,470			5,210	1,063,000	10,700	32,700	54,700
		N-80									1,097,000			
		C-90				5,860	2,560			5,860	1,149,000	12,000	36,800	61,500
		C-95				6,190	2,590			6,190	1,209,000	12,700	38,800	64,900
		P-110				7,160	2,610			7,160	1,423,000	14,700	45,000	75,200
		Q-125				8,140				8,140	1,570,000	16,700	51,100	85,400

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Hunting: TKC Plus Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard OD	Special Clearance OD	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
10-3/4	51.00	J-55	0.450	9.850	9.694	4,030	2,710	11.750	11.25	4,030	891,000	9,900	27,600	45,200
		K-55									1,043,000			
		L-80				5,860	3,220			5,860	1,190,000	14,500	40,200	65,800
		N-80									1,228,000			
		C-90				6,590	3,400			6,590	1,287,000	16,300	45,200	74,000
		C-95				6,960	3,480			6,960	1,354,000	17,200	47,700	78,100
		P-110				8,060	3,660			8,060	1,594,000	19,900	55,200	90,400
		Q-125				9,160	3,740			9,160	1,758,000	22,600	62,700	102,800
10-3/4	55.50	J-55	0.495	9.760	9.604	4,430	3,390	11.750	11.25	4,430	976,000	12,600	32,300	52,000
		K-55									1,142,000			
		L-80				6,450	4,020			6,450	1,303,000	18,300	47,000	75,600
		N-80									1,345,000			
		C-90				7,250	4,160			7,250	1,409,000	20,600	52,900	85,100
		C-95				7,660	4,290			7,660	1,483,000	21,700	55,800	89,800
		P-110				8,860	4,610			8,860	1,745,000	25,100	64,600	104,000
		Q-125				10,070	4,850			10,070	1,925,000	28,600	73,400	118,200
10-3/4	60.70	J-55	0.545	9.660	9.504	4,880	4,160	11.750	11.25	4,880	1,070,000	21,500	46,200	70,800
		K-55									1,251,000			
		L-80				7,100	5,160			7,100	1,428,000	31,300	67,200	103,000
		N-80									1,473,000			
		C-90				7,980	5,460			7,980	1,544,000	35,300	75,600	115,900
		C-95				8,430	5,580			8,430	1,625,000	37,200	79,800	122,300
		P-110				9,760	5,880			9,760	1,912,000	43,100	92,400	141,600
		Q-125				11,090	6,070			11,090	2,109,000	49,000	105,000	160,900
10-3/4	65.70	J-55	0.595	9.560	9.404	5,330	4,920	11.750	11.25	5,330	1,162,000	25,600	51,800	77,900
		K-55									1,359,000			
		L-80				7,750	6,300			7,750	1,551,000	3,300	75,400	113,400
		N-80									1,600,000			
		C-90				8,720	6,760			8,720	1,677,000	41,900	84,700	127,500
		C-95				9,200	6,970			9,200	1,765,000	44,200	89,400	134,600
		P-110				10,650	7,500			10,650	2,077,000	51,200	103,600	155,900
		Q-125				12,110	7,920			12,110	2,291,000	58,200	117,700	177,100
11-3/4	47.00	J-55	0.375	11.000	10.844	3,070	1,510	12.750	N/A	3,070	807,000	6,800	23,600	40,400
		K-55									935,000			
		L-80				4,470	1,630			4,470	1,084,000	9,900	34,400	58,800
		N-80									1,116,000			
		C-90				5,030				5,030	1,175,000	11,100	38,600	66,100
		C-95				5,310				5,310	1,237,000	11,700	40,800	69,800
		P-110				6,140				6,140	1,454,000	13,500	47,200	80,800
		Q-125				6,980				6,980	1,607,000	15,400	53,700	91,900
11-3/4	54.00	J-55	0.435	10.880	10.724	3,560	2,070	12.750	N/A	3,560	931,000	10,000	30,800	51,500
		K-55									1,079,000			
		L-80				5,180	2,440			5,180	1,250,000	14,500	44,700	74,900
		N-80									1,287,000			
		C-90				5,830	2,530			5,830	1,356,000	16,400	50,400	84,300
		C-95				6,150	2,550			6,150	1,427,000	17,300	53,200	89,000
		P-110				7,130	2,570			7,130	1,677,000	20,000	61,500	103,000
		Q-125				8,100				8,100	1,854,000	22,800	70,000	117,100

Data provided by Hunting Tubular Systems; TKC-PBTC-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TKC Plus Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard OD	Special Clearance OD	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
11-3/4	60.00	J-55	0.489	10.772	10.616	4,010	2,670	12.750	N/A	4,010	1,042,000	13,400	37,400	61,400
		K-55									1,208,000			
		L-80				5,830	3,180			5,830	1,399,000	19,500	54,400	89,200
		N-80									1,440,000			
		C-90				6,550	3,360			6,550	1,517,000	21,900	61,200	100,400
		C-95				6,920	3,440			6,920	1,596,000	23,200	64,600	106,000
		P-110				8,010	3,610			8,010	1,877,000	26,800	74,800	122,700
		Q-125				9,100	3,680			9,100	2,074,000	30,400	84,900	139,400
13-3/8	54.50	J-55	0.380	12.615	12.459	2,730	1,130	14.375	N/A	2,730	909,000	8,400	32,300	56,200
		K-55									1,038,000			
		L-80				3,980	1,140			3,980	1,233,000	12,200	47,000	81,800
		N-80									1,265,000			
		C-90				4,470				4,470	1,343,000	13,700	52,900	92,000
		C-95				4,720				4,720	1,414,000	14,500	55,800	97,100
		P-110				5,470				5,470	1,659,000	16,800	64,700	112,500
		Q-125				6,210				6,210	1,840,000	19,000	73,400	127,800
13-3/8	61.00	J-55	0.430	12.515	12.359	3,090	1,540	14.375	N/A	3,090	1,025,000	11,500	39,900	68,300
		K-55									1,170,000			
		L-80				4,500	1,670			4,500	1,389,000	16,800	58,100	99,400
		N-80									1,426,000			
		C-90				5,060				5,060	1,514,000	18,900	65,400	111,800
		C-95				5,340				5,340	1,594,000	19,900	69,000	118,000
		P-110				6,190				6,190	1,870,000	23,100	79,900	136,600
		Q-125				7,030				7,030	2,074,000	26,200	90,800	155,300
13-3/8	68.00	J-55	0.480	12.415	12.259	3,450	1,950	14.375	N/A	3,450	1,140,000	15,100	47,700	80,300
		K-55									1,300,000			
		L-80				5,020	2,260			5,020	1,545,000	22,000	69,400	116,800
		N-80									1,585,000			
		C-90				5,650	2,320			5,650	1,683,000	24,700	78,100	131,400
		C-95				5,970				5,970	1,772,000	26,100	82,400	138,700
		P-110				6,910				6,910	2,079,000	30,200	95,400	160,500
		Q-125				7,850				7,850	2,306,000	34,400	108,400	182,400
13-3/8	72.00	J-55	0.514	12.347	12.191	3,700	2,230	14.375	N/A	3,700	1,217,000	17,800	53,100	88,300
		K-55									1,389,000			
		L-80				5,380	2,670			5,380	1,650,000	25,900	77,200	128,500
		N-80									1,693,000			
		C-90				6,050	2,780			6,050	1,797,000	29,100	86,800	144,500
		C-95				6,390	2,820			6,390	1,893,000	30,800	91,700	152,600
		P-110				7,400	2,880			7,400	2,221,000	35,600	106,100	176,600
		HCP-110					3,470							
		Q-125				8,410	2,880			8,410	2,463,000	40,500	120,600	200,700
13-5/8	88.20	HCP-110 w/ 13-3/8" Coupling	0.625	12.375	12.250	8,830	5,930	14.375	N/A	8,830	2,567,400	35,600	106,100	176,600
16	75.00	J-55	0.438	15.124	14.936	2,630	1,020	17.000	N/A	2,630	1,200,000	12,600	50,300	87,900
		K-55									1,331,000			
		L-80				3,830				3,830	1,653,000	18,400	73,200	127,900
		N-80									1,686,000			
		C-90				4,310				4,310	1,815,000	20,700	82,300	143,900
		C-95				4,550				4,550	1,912,000	21,800	86,900	151,900
		P-110				5,270				5,270	2,236,000	25,300	100,600	175,900
		Q-125				5,990				5,990	2,495,000	28,700	114,300	199,900

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Hunting: TKC Plus Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard OD	Special Clearance OD	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
16	84.00	J-55	0.495	15.010	14.822	2,980	1,410	17.000	N/A	2,980	1,351,000	17,500	62,600	107,600
		K-55									1,499,000			
		L-80				4,330	1,480			4,330	1,861,000	25,400	91,000	156,600
		N-80									1,898,000			
		C-90				4,870				4,870	2,043,000	28,600	102,400	176,100
		C-95				5,140				5,140	2,153,000	30,200	108,100	185,900
		P-110				5,960				5,960	2,518,000	35,000	125,200	215,300
		Q-125				6,770				6,770	2,809,000	39,700	142,200	244,600
18-5/8	87.50	J-55	0.435	17.755	17.567	2,250	630	20.000	N/A	2,250	1,329,000	14,500	66,500	118,400
		K-55									1,427,000			
		L-80				3,270				3,270	1,863,000	21,100	96,700	172,200
		N-80									1,888,000			
		C-90				3,680				3,680	2,062,000	23,800	108,800	193,700
		C-95				3,880				3,880	2,173,000	25,000	114,700	204,400
		P-110				4,500				4,500	2,534,000	29,000	132,900	236,700
		Q-125				5,110				5,110	2,844,000	33,000	151,000	269,000
20	94.00	J-55	0.438	19.124	18.936	2,110	520	21.000	N/A	2,110	1,402,000	15,900	77,200	138,400
		K-55									1,479,000			
		L-80				3,070				3,070	1,985,000	23,200	112,300	201,300
		N-80									2,004,000			
		C-90				3,450				3,450	2,207,000	26,000	126,300	226,500
		C-95				3,640				3,640	2,327,000	27,500	133,300	239,100
		P-110				4,220				4,220	2,708,000	31,900	154,400	276,800
		Q-125				4,790				4,790	3,050,000	36,200	175,400	314,600
20	106.50	J-55	0.500	19.000	18.812	2,410	770	21.000	N/A	2,410	1,595,000	22,600	97,500	172,300
		K-55									1,683,000			
		L-80				3,500				3,500	2,259,000	32,900	141,800	250,700
		N-80				3,500					2,281,000			
		C-90				3,940				3,940	2,511,000	37,000	159,500	282,000
		C-95				4,160				4,160	2,649,000	39,100	168,400	297,600
		P-110				4,810				4,810	3,082,000	45,200	194,900	344,600
		Q-125				5,470				5,470	3,471,000	51,400	221,500	391,600
20	133.00	J-55	0.635	18.730	18.542	3,060	1,500	21.000	N/A	3,060	2,012,000	40,900	143,000	245,000
		K-55									2,123,000			
		L-80				4,450	1,600			4,450	2,849,000	59,500	208,000	356,400
		N-80									2,877,000			
		C-90				5,000				5,000	3,167,000	66,800	233,900	401,000
		C-95				5,280				5,280	3,340,000	70,600	246,900	423,200
		P-110				6,110				6,110	3,887,000	81,700	285,900	490,100
		Q-125				6,950				6,950	4,378,000	92,900	324,900	556,900

Data provided by Hunting Tubular Systems; TKC-PBTC-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TKC EUE 8 Round Connection Database

Size	Wt	Grade	Pipe					Connection				Torque			
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Max Recommended Set Depth	Make-Up Torque			Yield
												Min	Opt	Max	Torque
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft	ft-lb			
1-9/10	2.75	J-55	0.145	1.610	1.516	7,350	7,750	2.500	2.125	44,000	10,000	280	375	470	700
		L/N-80				10,680	11,280			64,000	14,550	410	545	680	1,020
		C-90				12,020	12,620			72,000	16,360	460	615	770	1,150
2-3/8	4.70	J-55	0.190	1.995	1.901	7,700	8,100	3.063	2.910	72,000	9,570	570	735	900	1,350
		L/N-80				11,200	11,780			104,000	13,830	820	1,065	1,310	1,960
		C-90				12,600	13,250			117,000	15,560	920	1,195	1,470	2,200
		C-95				13,300	13,980			124,000	16,490	980	1,265	1,550	2,330
		P-110				15,400	16,130			143,000	19,020	1,130	1,460	1,790	2,690
2-3/8	5.95	J-55	0.254	1.867	1.773	10,290	10,510	3.063	2.910	93,000	9,770	1,030	1,125	1,220	1,830
		L/N-80				14,970	15,280			135,000	14,180	1,490	1,630	1,770	2,660
		C-90				16,840	17,190			152,000	15,970	1,680	1,840	2,000	3,000
		C-95				17,780	18,150			161,000	16,910	1,770	1,940	2,110	3,160
		P-110				20,590	21,010			186,000	19,540	2,060	2,250	2,440	3,660
2-7/8	6.50	J-55	0.217	2.441	2.347	7,260	7,680	3.668	3.460	100,000	9,620	880	1,175	1,470	2,210
		L/N-80				10,570	11,170			145,000	13,940	1,270	1,705	2,140	3,210
		C-90				11,890	12,390			163,000	15,670	1,430	1,920	2,410	3,610
		C-95				12,550	12,940			172,000	16,540	1,510	2,030	2,550	3,820
		P-110				14,530	14,550			199,000	19,130	1,750	2,350	2,950	4,420
2-7/8	7.90	J-55	0.276	2.323	2.229	9,240	9,550	3.668	3.460	124,000	9,810	1,440	1,675	1,910	2,860
		L/N-80				13,440	13,890			180,000	14,240	2,100	2,440	2,780	4,170
		C-90				15,120	15,620			203,000	16,060	2,360	2,745	3,130	4,690
		C-95				15,960	16,490			214,000	16,930	2,490	2,895	3,300	4,950
		P-110				18,480	19,090			248,000	19,620	2,890	3,355	3,820	5,730
2-7/8	8.70	J-55	0.276	2.323	2.229	10,310	10,520	3.668	3.460	137,000	9,840	1,800	1,965	2,130	3,200
		L/N-80				15,000	15,300			199,000	14,300	2,620	2,860	3,100	4,650
		C-90				16,870	17,220			224,000	16,090	2,950	3,225	3,500	5,240
		C-95				17,810	18,170			236,000	16,950	3,110	3,400	3,690	5,530
		P-110				20,620	21,040			273,000	19,610	3,600	3,935	4,270	6,400
3-1/2	9.30	J-55	0.254	2.992	2.867	6,990	7,400	4.500	4.180	142,000	9,540	1,560	2,145	2,730	4,090
		L/N-80				10,160	10,540			207,000	13,910	2,270	3,120	3,970	5,950
		C-90				11,430	11,570			233,000	15,660	2,550	3,505	4,460	6,690
		C-95				12,070	12,080			246,000	16,530	2,690	3,705	4,720	7,070
		P-110				13,970	13,530			285,000	19,150	3,120	4,290	5,460	8,180

Data provided by Hunting Tubular Systems; TKC-PEUE-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TKC EUE 8 Round Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque			
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Max Recommended Set Depth	Make-Up Torque			Yield
												Min	Opt	Max	Torque
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft	ft-lb			
3-1/2	10.30	J-55	0.289	2.922	2.797	7,950	8,330	4.500	4.180	160,000	9,710	2,030	2,570	3,110	4,670
		L/N-80				11,560	12,120			233,000	14,140	2,940	3,735	4,530	6,790
		C-90				13,010	13,640			262,000	15,900	3,310	4,205	5,100	7,640
		C-95				13,730	14,390			277,000	16,810	3,500	4,440	5,380	8,070
		P-110				15,900	16,670			321,000	19,480	4,050	5,140	6,230	9,340
3-1/2	12.95	J-55	0.375	2.750	2.625	10,310	10,520	4.500	4.180	202,000	9,750	3,390	3,705	4,020	6,020
		L/N-80				15,000	15,310			295,000	14,240	4,920	5,380	5,840	8,750
		C-90				16,880	17,220			331,000	15,970	5,540	6,055	6,570	9,850
		C-95				17,810	18,180			350,000	16,890	5,850	6,395	6,940	10,400
		P-110				20,630	21,050			405,000	19,550	6,770	7,400	8,030	12,040
4	11.00	J-55	0.262	3.476	3.351	6,300	6,590	5.000	4.594	169,000	9,600	1,870	2,745	3,620	5,430
		L/N-80				9,170	8,800			246,000	13,980	2,720	3,995	5,270	7,900
		C-90				10,320	9,600			277,000	15,740	3,060	4,495	5,930	8,890
		C-95				10,890	9,980			292,000	16,590	3,230	4,745	6,260	9,380
		P-110				12,610	11,060			338,000	19,200	3,740	5,495	7,250	10,870
4-1/2	12.75	J-55	0.271	3.958	3.833	5,800	5,730	5.563	5.094	198,000	9,710	2,220	3,450	4,680	7,020
		L/N-80				8,430	7,500			288,000	14,120	3,230	5,020	6,810	10,210
		C-90				9,490	8,120			324,000	15,880	3,630	5,645	7,660	11,490
		C-95				10,010	8,410			342,000	16,760	3,830	5,960	8,090	12,130
		P-110				11,590	9,210			396,000	19,410	4,440	6,900	9,360	14,040

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Hunting: TKC LTC Connection Database

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Max Rec Set Dpth	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	SF/or ft	ft-lb		
4-1/2	11.60	J-55	0.250	4.000	3.875	5,350	4,960	5.000	4.875	162,000	8,730	600	1,350	2,100
		K-55								180,000	9,700			
		L-80				7,780	6,350			212,000	11,420	900	2,000	3,100
		N-80								223,000	12,020			
		C-90				8,750	6,820					1,000	2,250	3,500
		C-95				9,240	7,030			234,000	12,610	1,100	2,400	3,700
		P-110				10,690	7,580			279,000	15,030	1,300	2,800	4,300
		Q-125				12,150	8,000			301,000	16,220	1,400	3,150	4,900
4-1/2	12.60	J-55	0.271	3.958	3.833	5,800	5,730	5.000	4.875	180,000	8,930	900	1,800	2,700
		K-55								200,000	9,920			
		L-80				8,430	7,500			235,000	11,660	1,300	2,650	4,000
		N-80								248,000	12,300			
		C-90				9,490	8,120					1,400	2,950	4,500
		C-95				10,010	8,410			260,000	12,900	1,500	3,100	4,700
		P-110				11,590	9,210			310,000	15,380	1,700	3,600	5,500
		Q-125				13,170	9,890			335,000	16,620	2,000	4,100	6,200
4-1/2	13.50	J-55	0.290	3.920	3.795	6,200	6,420	5.000	4.875	196,000	9,070	1,100	2,150	3,200
		K-55								218,000	10,090			
		L-80				9,020	8,540			257,000	11,900	1,600	3,150	4,700
		N-80				9,020	8,540			270,000	12,500	1,600	3,150	4,700
		C-90				10,150	9,300					1,800	3,550	5,300
		C-95				10,710	9,660			284,000	13,150	1,900	3,750	5,600
		P-110				12,410	10,690			338,000	15,650	2,200	4,350	6,500
		Q-125				14,100	11,600			365,000	16,900	2,500	4,950	7,400
4-1/2	15.10	J-55	0.337	3.826	3.701	7,210	7,620	5.000	4.875	236,000	9,770	1,800	3,150	4,500
		K-55								261,000	10,800			
		L-80				10,480	11,080			308,000	12,750	2,600	4,550	6,500
		N-80								325,000	13,450			
		C-90				11,800	12,220					2,900	5,150	7,400
		C-95				12,450	12,760			341,000	14,110	3,100	5,450	7,800
		P-110				14,420	14,340			406,000	16,800	3,500	6,250	9,000
		Q-125				16,380	15,830			438,000	18,130	4,000	7,100	10,200
5	13.00	J-55	0.253	4.494	4.369	4,870	4,140	5.563	5.375	182,000	8,750	600	1,500	2,400
		K-55								201,000	9,660			
		L-80				7,080	5,140			241,000	11,590	900	2,150	3,400
		N-80								254,000	12,210			
		C-90				7,970	5,430					1,000	2,400	3,800
		C-95				8,410	5,560			266,000	12,790	1,100	2,600	4,100
		P-110				9,740	5,840			317,000	15,240	1,200	2,950	4,700
		Q-125				11,070	6,050			342,000	16,440	1,400	3,350	5,300
5	15.00	J-55	0.296	4.408	4.283	5,700	5,560	5.563	5.375	223,000	9,290	1,200	2,500	3,800
		K-55								246,000	10,250			
		L-80				8,290	7,250			295,000	12,290	1,700	3,650	5,600
		N-80								311,000	12,960			
		C-90				9,320	7,830					2,000	4,150	6,300
		C-95				9,840	8,110			326,000	13,580	2,100	4,350	6,600
		P-110				11,400	8,850			388,000	16,170	2,400	5,050	7,700
		Q-125				12,950	9,480			420,000	17,500	2,700	5,700	8,700

Data provided by Hunting Tubular Systems; TKC-PEUE-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TKC LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Max Rec Set Dpth	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	SF/or ft	ft-lb		
5	18.00	J-55	0.362	4.276	4.151	6,970	7,390	5.563	5.375	284,000	9,860	2,300	4,150	6,000
		K-55								314,000	10,900			
		L-80				10,140	10,490			376,000	13,060	3,300	6,050	8,800
		N-80								396,000	13,750			
		C-90				11,400	11,520					3,700	6,750	9,800
		C-95				12,040	12,030			416,000	14,440	4,000	7,200	10,400
		P-110				13,940	13,470			495,000	17,190	4,600	8,300	12,000
		Q-125				15,840	14,820			535,000	18,580	5,200	9,450	13,700
5	21.40	J-55	0.437	4.126	4.001	8,410	8,770	5.563	5.375	352,000	10,280	3,900	6,150	8,400
		K-55				8,410	8,770			389,000	11,360	3,900	6,150	8,400
		L-80				12,240	12,760			466,000	13,610	5,600	8,900	12,200
		N-80								490,000	14,310			
		C-90				13,770	14,360					6,300	10,000	13,700
		C-95				14,530	15,150			515,000	15,040	6,700	10,600	14,500
		P-110				16,820	17,550			613,000	17,900	7,700	12,250	16,800
		Q-125				19,120	19,940			662,000	19,330	8,800	13,950	19,100
5	23.20	J-55	0.478	4.044	3.919	9,200	9,510	5.563	5.375	388,000	10,450	4,800	7,200	9,600
		K-55								428,000	11,530			
		L-80				13,380	13,830			513,000	13,820	7,000	10,500	14,000
		N-80								540,000	14,550			
		C-90				15,060	15,560					7,900	11,850	15,800
		C-95				15,890	16,430			567,000	15,270	8,400	12,550	16,700
		P-110				18,400	19,020			675,000	18,180	9,700	14,500	19,300
		Q-125				20,910	21,620			729,000	19,640	11,000	16,450	21,900
5	24.10	J-55	0.500	4.000	3.875	9,630	9,900	5.563	5.375	407,000	10,550	5,400	7,850	10,300
		K-55								449,000	11,640			
		L-80				14,000	14,400			523,000	13,560	7,900	11,450	15,000
		N-80								550,000	14,260			
		C-90				15,750	16,200					8,900	12,900	16,900
		C-95				16,630	17,100			578,000	14,990	9,300	13,550	17,800
		P-110				19,250	19,800			688,000	17,840	10,800	15,700	20,600
		Q-125				21,880	22,500			743,000	19,270	12,300	17,850	23,400
5-1/2	15.50	J-55	0.275	4.950	4.825	4,810	4,040	6.050	5.875	217,000	8,750	900	2,250	3,600
		K-55								239,000	9,640			
		L-80				7,000	4,990			298,000	12,020	1,400	3,350	5,300
		N-80								306,000	12,340			
		C-90				7,880	5,260			313,000	12,620	1,500	3,700	5,900
		C-95				8,310	5,380			329,000	13,270	1,700	4,000	6,300
		P-110				9,630	5,630			392,000	15,810	1,900	4,600	7,300
		Q-125				10,940	5,890			423,000	17,060	2,200	5,200	8,200
5-1/2	17.00	J-55	0.304	4.892	4.767	5,320	4,910	6.050	5.875	247,000	9,080	1,400	3,100	4,800
		K-55								272,000	10,000			
		L-80				7,740	6,290			338,000	12,430	2,000	4,500	7,000
		N-80								348,000	12,790			
		C-90				8,710	6,740			356,000	13,090	2,300	5,100	7,900
		C-95				9,190	6,940			374,000	13,750	2,400	5,400	8,400
		P-110				10,640	7,480			445,000	16,360	2,800	6,250	9,700
		Q-125				12,090	7,890			481,000	17,680	3,200	7,100	11,000

Data provided by Hunting Tubular Systems; TKC-PEUE-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TKC LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Max Rec Set Dpth	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	SF/or ft	ft-lb		
5-1/2	20.00	J-55	0.361	4.778	4.653	6,320	6,620	6.050	5.875	304,000	9,500	2,500	4,850	7,200
		K-55								334,000	10,440			
		L-80				9,190	8,830			416,000	13,000	3,600	7,000	10,400
		N-80								428,000	13,380			
		C-90				10,340	9,630			438,000	13,690	4,000	7,850	11,700
		C-95				10,910	10,020			460,000	14,380	4,300	8,350	12,400
		P-110				12,640	11,100			548,000	17,130	4,900	9,600	14,300
		Q-125				14,360	12,080			592,000	18,500	5,600	10,950	16,300
5-1/2	23.00	J-55	0.415	4.670	4.545	7,260	7,670	6.050	5.875	356,000	9,670	3,700	6,500	9,300
		K-55				7,260	7,670			392,000	10,650	3,700	6,500	9,300
		L-80				10,560	11,160			489,000	13,290	5,300	9,400	13,500
		N-80								502,000	13,640			
		C-90				11,880	12,380			514,000	13,970	6,000	10,600	15,200
		C-95				12,540	12,930			540,000	14,670	6,300	11,150	16,000
		P-110				14,530	14,540			643,000	17,470	7,400	13,000	18,600
		Q-125				16,510	16,060			694,000	18,860	8,400	14,750	21,100
6-5/8	20.00	J-55	0.288	6.049	5.924	4,180	2,970	7.390	7	266,000	8,310	1,200	3,300	5,400
		K-55								290,000	9,060			
		L-80				6,090	3,470			369,000	11,530	1,800	4,800	7,800
		N-80								375,000	11,720			
		C-90				6,850	3,700			405,000	12,650	2,000	5,400	8,800
		C-95				7,230	3,790			426,000	13,310	2,100	5,700	9,300
		P-110				8,370	4,030			500,000	15,620	2,500	6,650	10,800
		Q-125				9,510	4,170			547,000	17,090	2,800	7,500	12,200
6-5/8	24.00	J-55	0.352	5.921	5.796	5,110	4,560	7.390	7	340,000	8,850	2,600	5,950	9,300
		K-55								372,000	9,690			
		L-80				7,440	5,760			473,000	12,320	3,800	8,650	13,500
		N-80								481,000	12,530			
		C-90				8,370	6,140			520,000	13,540	4,200	9,700	15,200
		C-95				8,830	6,310			546,000	14,220	4,500	10,250	16,000
		P-110				10,230	6,730			641,000	16,690	5,200	11,900	18,600
		Q-125				11,620	7,020			702,000	18,280	5,900	13,500	21,100
6-5/8	28.00	J-55	0.417	5.791	5.666	6,060	6,170	7.390	7	415,000	9,260	4,300	8,700	13,100
		K-55								454,000	10,130			
		L-80				8,810	8,170			576,000	12,860	6,300	12,700	19,100
		N-80								586,000	13,080			
		C-90				9,910	8,880			633,000	14,130	7,100	14,300	21,500
		C-95				10,460	9,220			665,000	14,840	7,500	15,100	22,700
		P-110				12,120	10,160			781,000	17,430	8,700	17,500	26,300
		Q-125				13,770	10,990			855,000	19,080	9,800	19,800	29,800
6-5/8	32.00	J-55	0.475	5.675	5.550	6,900	7,320	7.390	7	480,000	9,380	6,200	11,300	16,400
		K-55								525,000	10,250			
		L-80				10,040	10,320			666,000	13,010	9,000	16,450	23,900
		N-80								678,000	13,240			
		C-90				11,290	11,330			732,000	14,300	10,100	18,500	26,900
		C-95				11,920	11,820			769,000	15,020	10,700	19,550	28,400
		P-110				13,800	13,220			904,000	17,660	12,400	22,650	32,900
		Q-125				15,680	14,540			989,000	19,320	14,100	25,750	37,400

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Hunting: TKC LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Max Rec Set Dpth	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	SF/or ft	ft-lb		
7	23.00	J-55	0.317	6.366	6.241	4,360	3,270	7.656	7.375	313,000	8,500	1,900	4,850	7,800
		K-55								341,000	9,260			
		L-80				6,340	3,830			435,000	11,820	2,700	7,000	11,300
		N-80								442,000	12,010			
		C-90				7,130	4,030			479,000	13,010	3,000	7,850	12,700
		C-95				7,530	4,140			505,000	13,720	3,200	8,300	13,400
		P-110				8,720	4,440			590,000	16,030	3,700	9,600	15,500
		Q-125				9,910	4,650			655,000	17,800	4,200	10,900	17,600
7	26.00	J-55	0.362	6.276	6.151	4,980	4,330	7.656	7.375	367,000	8,820	2,900	6,850	10,800
		K-55								401,000	9,640			
		L-80				7,240	5,410			511,000	12,280	4,300	10,000	15,700
		N-80								519,000	12,480			
		C-90				8,150	5,740			563,000	13,530	4,800	11,250	17,700
		C-95				8,600	5,890			593,000	14,250	5,100	11,900	18,700
		P-110				9,960	6,230			693,000	16,660	5,900	13,750	21,600
		Q-125				11,310	6,450			769,000	18,490	6,700	15,650	24,600
7	29.00	J-55	0.408	6.184	6.059	5,610	5,410	7.656	7.375	423,000	9,120	4,300	9,100	13,900
		K-55								461,000	9,940			
		L-80				8,160	7,030			587,000	12,650	6,200	13,200	20,200
		N-80								597,000	12,870			
		C-90				9,180	7,580			648,000	13,970	6,900	14,800	22,700
		C-95				9,690	7,840			683,000	14,720	7,300	15,650	24,000
		P-110				11,220	8,530			797,000	17,180	8,500	18,100	27,700
		Q-125				12,750	9,110			885,000	19,070	9,600	20,550	31,500
7	32.00	J-55	0.453	6.094	5.969	6,230	6,460	7.656	7.375	476,000	9,300	5,700	11,250	16,800
		K-55								519,000	10,140			
		L-80				9,060	8,600			661,000	12,910	8,300	16,350	24,400
		N-80				9,060	8,600			672,000	13,120			
		C-90				10,190	9,380			729,000	14,240	9,300	18,400	27,500
		C-95				10,760	9,740			768,000	15,000	9,900	19,450	29,000
		P-110				12,460	10,780			897,000	17,520	11,400	22,500	33,600
		Q-125				14,160	11,710			996,000	19,450	13,000	25,600	38,200
7	35.00	J-55	0.498	6.004	5.879	6,850	7,270	7.656	7.375	528,000	9,430	7,400	13,550	19,700
		K-55								576,000	10,290			
		L-80				9,960	10,180			734,000	13,110	10,700	19,650	28,600
		N-80								746,000	13,320			
		C-90				11,210	11,170			809,000	14,450	12,000	22,100	32,200
		C-95				11,830	11,650			853,000	15,230	12,700	23,350	34,000
		P-110				13,700	13,030			996,000	17,790	14,700	27,000	39,300
		Q-125				15,560	14,310			1,106,000	19,750	16,700	30,700	44,700
7	38.00	J-55	0.540	5.920	5.795	7,430	7,830	7.656	7.375	576,000	9,470	9,000	15,650	22,300
		K-55								629,000	10,350	9,000	15,650	22,300
		L-80				10,800	11,390			801,000	13,170	13,100	22,750	32,400
		N-80								814,000	13,390			
		C-90				12,150	12,810			883,000	14,520	14,800	25,650	36,500
		C-95				12,830	13,430			931,000	15,310	15,600	27,050	38,500
		P-110				14,850	15,130			1,087,000	17,880	18,100	31,350	44,600
		Q-125				16,880	16,740			1,207,000	19,850	20,500	35,550	50,600

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Hunting: TKC LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Max Rec Set Dpth	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	SF/or ft	ft-lb		
7-5/8	26.40	J-55	0.328	6.969	6.844	4,140	2,900	8.500	8.125	346,000	8,190	2,200	6,000	9,800
		K-55								377,000	8,930			
		L-80				6,020	3,400			482,000	11,410	3,200	8,750	14,300
		N-80								490,000	11,600			
		C-90				6,780	3,610			532,000	12,590	3,600	9,850	16,100
		C-95				7,150	3,710			560,000	13,260	3,800	10,400	17,000
		P-110				8,280	3,920			654,000	15,480	4,400	12,050	19,700
		Q-125				9,410	4,050			733,000	17,350	5,000	13,650	22,300
7-5/8	29.70	J-55	0.375	6.875	6.750	4,730	3,910	8.500	8.125	407,000	8,560	3,500	8,550	13,600
		K-55								443,000	9,320			
		L-80				6,890	4,790			567,000	11,930	5,100	12,450	19,800
		N-80								575,000	12,100			
		C-90				7,750	5,030			625,000	13,150	5,800	14,050	22,300
		C-95				8,180	5,130			659,000	13,870	6,100	14,800	23,500
		P-110				9,470	5,350			769,000	16,180	7,100	17,200	27,300
		Q-125				10,760	5,670			861,000	18,120	8,000	19,500	31,000
7-5/8	33.70	J-55	0.430	6.765	6.64	5,430	5,100	8.500	8.125	477,000	8,850	5,300	11,650	18,000
		K-55								519,000	9,630			
		L-80				7,900	6560			664,000	12,310	7,800	17,000	26,200
		N-80								674,000	12,500			
		C-90				8,880	7,050			733,000	13,590	8,700	19,050	29,400
		C-95				9,380	7,280			772,000	14,320	9,200	20,150	31,100
		P-110				10,860	7,870			901,000	16,710	10,700	23,350	36,000
		Q-125				12,340	8,340			1,009,000	18,710	12,100	26,500	40,900
7-5/8	39.00	J-55	0.500	6.625	6.500	6,310	6,610	8.500	8.125	564,000	9,040	8,100	15,750	23,400
		K-55								614,000	9,840			
		L-80				9,180	8,820			786,000	12,600	11,700	22,850	34,000
		N-80								798,000	12,790			
		C-90				10,330	9,620			867,000	13,890	13,200	25,750	38,300
		C-95				10,900	10,000			914,000	14,650	13,900	27,150	40,400
		P-110				12,620	11,080			1,066,000	17,080	16,100	31,450	46,800
		Q-125				14,340	12,060			1,194,000	19,130	18,300	35,700	53,100
7-5/8	42.80	J-55	0.562	6.501	6.376	7,090	7,510	8.500	8.125	640,000	9,350	10,800	19,400	28,000
		K-55								696,000	10,160			
		L-80				10,320	10,810			891,000	13,010	15,800	28,300	40,800
		N-80								906,000	13,230	15,800	28,300	40,800
		C-90				11,610	11,890			984,000	14,370	17,800	31,850	45,900
		C-95				12,250	12,410			1,037,000	15,140	18,700	33,550	48,400
		P-110				14,190	13,930			1,210,000	17,670	21,700	38,850	56,000
		Q-125				16,120	15,350			1,355,000	19,790	24,600	44,150	63,700
7-5/8	45.30	J-55	0.595	6.435	6.310	7,510	7,910	8.500	8.125	680,000	9,380	12,500	21,450	30,400
		K-55								740,000	10,210			
		L-80				10,920	11,510			947,000	13,070	18,100	31,200	44,300
		N-80								962,000	13,270			
		C-90				12,290	12,950			1,045,000	14,420	20,400	35,100	49,800
		C-95				12,970	13,670			1,101,000	15,190	21,500	37,050	52,600
		P-110				15,020	15,440			1,285,000	17,730	24,900	42,900	60,900
		Q-125				17,070	17,100			1,439,000	19,850	28,300	48,750	69,200

Data provided by Hunting Tubular Systems; TKC-PEUE-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TKC LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Max Rec Set Dpth	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	SF/or ft	ft-lb		
7-5/8	47.10	J-55	0.625	6.375	6.250	7,890	8,280	8.500	8.125	716,000	9,500	14,000	23,300	32,600
		K-55								779,000	10,340			
		L-80				11,480	12,040			997,000	13,230	20,400	33,900	47,400
		N-80								1,013,000	13,440			
		C-90				12,910	13,540			1,100,000	14,600	23,000	38,200	53,400
		C-95				13,630	14,300			1,159,000	15,380	24,200	40,250	56,300
		P-110				15,780	16,550			1,353,000	17,950	28,100	46,650	65,200
		Q-125				17,930	18,700			1,515,000	20,100	31,900	53,000	74,100
8-5/8	32.00	J-55	0.352	7.921	7.796	3,930	2,530	9.625	9.125	417,000	8,140	3,000	8,450	13,900
		K-55								452,000	8,830			
		L-80				5,710	3,050			583,000	11,390	4,300	12,300	20,300
		N-80								591,000	11,540			
		C-90				6,430	3,210			643,000	12,560	4,900	13,850	22,800
		C-95				6,780	3,280			678,000	13,240	5,200	14,650	24,100
		P-110				7,860	3,420			791,000	15,450	6,000	16,950	27,900
		Q-125				8,930	3,470			887,000	17,320	6,800	19,250	31,700
8-5/8	36.00	J-55	0.400	7.825	7.700	4,460	3,450	9.625	9.125	486,000	8,440	4,600	11,750	18,900
		K-55								526,000	9,130			
		L-80				6,490	4,100			678,000	11,770	6,700	17,100	27,500
		N-80								688,000	11,940			
		C-90				7,300	4,250			749,000	13,000	7,500	19,250	31,000
		C-95				7,710	4,350			789,000	13,700	8,000	20,350	32,700
		P-110				8,930	4,690			921,000	15,990	9,200	23,500	37,800
		Q-125				10,140	4,930			1,032,000	17,920	10,500	26,750	43,000
8-5/8	40.00	J-55	0.450	7.725	7.600	5,020	4,400	9.625	9.125	556,000	8,690	6,600	15,300	24,000
		K-55								603,000	9,420			
		L-80				7,300	5,520			776,000	12,130	9,600	22,250	34,900
		N-80								788,000	12,310			
		C-90				8,220	5,870			858,000	13,410	10,800	25,050	39,300
		C-95				8,670	6,020			904,000	14,130	11,400	26,450	41,500
		P-110				10,040	6,390			1,055,000	16,480	13,100	30,550	48,000
		Q-125				11,410	6,630			1,182,000	18,470	15,000	34,800	54,600
8-5/8	44.00	J-55	0.500	7.625	7.500	5,580	5,360	9.625	9.125	626,000	8,890	8,800	18,900	29,000
		K-55								678,000	9,630			
		L-80				8,120	6,950			874,000	12,410	12,800	27,500	42,200
		N-80								887,000	12,600			
		C-90				9,130	7,490			965,000	13,710	14,500	31,000	47,500
		C-95				9,640	7,740			1,017,000	14,450	15,300	32,700	50,100
		P-110				11,160	8,420			1,186,000	16,850	17,700	37,900	58,100
		Q-125				12,680	8,980			1,330,000	18,890	20,100	43,050	66,000
8-5/8	49.00	J-55	0.557	7.511	7.386	6,220	6,440	9.625	9.125	704,000	8,980	11,700	23,150	34,600
		K-55								763,000	9,730			
		L-80				9,040	8,570			983,000	12,540	17,100	33,750	50,400
		N-80								997,000	12,720			
		C-90				10,170	9,340			1,085,000	13,840	19,200	37,950	56,700
		C-95				10,740	9,700			1,144,000	14,590	20,300	40,050	59,800
		P-110				12,430	10,730			1,335,000	17,030	23,500	46,350	69,200
		Q-125				14,130	11,660			1,496,000	19,080	26,700	52,700	78,700

Data provided by Hunting Tubular Systems; TKC-PEUE-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TKC LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Max Rec Set Dpth	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	SF/or ft	ft-lb		
9-5/8	36.00	J-55	0.352	8.921	8.765	3,520	2,020	10.625	10.125	453,000	7,860	3,100	9,750	16,400
		K-55								489,000	8,490			
		L-80				5,120	2,370			634,000	11,010	4,600	14,250	23,900
		N-80								643,000	11,160			
		C-90				5,760	2,440			700,000	12,150	5,200	16,050	26,900
		C-95				6,080	2,460			738,000	12,810	5,500	16,950	28,400
		P-110				7,040	2,470			861,000	14,950	6,300	19,550	32,800
		Q-125				8,000				966,000	16,770	7,200	22,250	37,300
9-5/8	40.00	J-55	0.395	8.835	8.679	3,950	2,570	10.625	10.125	520,000	8,120	4,700	13,350	22,000
		K-55								561,000	8,760			
		L-80				5,750	3,090			727,000	11,360	6,900	19,500	32,100
		N-80								737,000	11,510			
		C-90				6,460	3,260			804,000	12,560	7,800	21,950	36,100
		C-95				6,820	3,330			847,000	13,230	8,200	23,150	38,100
		P-110				7,900	3,470			988,000	15,440	9,500	26,800	44,100
		Q-125				8,980	3,530			1,108,000	17,310	10,800	30,450	50,100
9-5/8	43.50	J-55	0.435	8.755	8.599	4,350	3,250	10.625	10.125	582,000	8,360	6,500	16,850	27,200
		K-55								628,000	9,020			
		L-80				6,330	3,810			813,000	11,680	9,400	24,500	39,600
		N-80								825,000	11,850			
		C-90				7,120	4,010			899,000	12,920	10,600	27,550	44,500
		C-95				7,510	4,130			948,000	13,620	11,100	29,050	47,000
		P-110				8,700	4,420			1,105,000	15,880	12,900	33,650	54,400
		Q-125				9,890	4,620			1,240,000	17,820	14,700	38,250	61,800
9-5/8	47.00	J-55	0.472	8.681	8.525	4,720	3,890	10.625	10.125	638,000	8,480	8,200	20,050	31,900
		K-55								689,000	9,160			
		L-80				6,870	4,750			893,000	11,880	12,000	29,200	46,400
		N-80								905,000	12,030			
		C-90				7,720	4,990			987,000	13,130	13,500	32,900	52,300
		C-95				8,150	5,090			1,040,000	13,830	14,200	34,700	55,200
		P-110				9,440	5,300			1,213,000	16,130	16,500	40,200	63,900
		Q-125				10,730	5,630			1,361,000	18,100	18,700	45,650	72,600
9-5/8	53.50	J-55	0.545	8.535	8.379	5,450	5,130	10.625	10.125	748,000	8,740	12,200	26,650	41,100
		K-55								808,000	9,440			
		L-80				7,930	6,620			1,047,000	12,230	17,800	38,750	59,700
		N-80								1,062,000	12,410			
		C-90				8,920	7,110			1,157,000	13,520	20,000	43,600	67,200
		C-95				9,410	7,340			1,220,000	14,250	21,100	46,000	70,900
		P-110				10,900	7,950			1,422,000	16,610	24,400	53,300	82,200
		Q-125				12,390	8,440			1,595,000	18,630	27,800	60,600	93,400
9-5/8	58.40	J-55	0.595	8.435	8.279	5,950	5,990	10.625	10.125	823,000	8,810	14,000	28,500	43,000
		K-55								888,000	9,500			
		L-80				8,650	7,890			1,151,000	12,320	20,300	41,400	62,500
		N-80								1,167,000	12,490			
		C-90				9,740	8,570			1,272,000	13,610	22,800	46,550	70,300
		C-95				10,280	8,890			1,341,000	14,350	24,100	49,150	74,200
		P-110				11,900	9,770			1,564,000	16,740	27,900	56,900	85,900
		Q-125				13,520	10,540			1,754,000	18,770	31,700	64,650	97,600

Data provided by Hunting Tubular Systems; TKC-PEUE-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TKC LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Max Rec Set Dpth	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	SF/or ft	ft-lb		
20	94.00	J-55	0.438	19.124	18.936	2,110	520	21.000	N/A	907,000	6,030	13,200	64,000	114,800
		K-55								955,000	6,350			
		L-80				3,070				1,285,000	8,540	19,200	93,100	167,000
		N-80								1,297,000	8,620			
		C-90				3,450				1,429,000	9,500	21,600	104,750	187,900
		C-95				3,640				1,507,000	10,020	22,800	110,550	198,300
		P-110				4,220				1,753,000	11,660	26,400	128,000	229,600
		Q-125				4,790				1,976,000	13,140	30,000	145,500	261,000
20	106.50	J-55	0.500	19.000	18.812	2,410	770	21.000	N/A	1,057,000	6,200	19,900	85,500	151,100
		K-55								1,113,000	6,530			
		L-80				3,500				1,498,000	8,790	28,800	124,300	219,800
		N-80								1,512,000	8,870			
		C-90				3,940				1,665,000	9,770	32,500	139,900	247,300
		C-95				4,160				1,756,000	10,310	34,300	147,650	261,000
		P-110				4,810				2,043,000	11,990	39,600	170,900	302,200
		Q-125				5,470				2,302,000	13,510	45,100	194,250	343,400
20	133.00	J-55	0.635	18.730	18.542	3,060	1,500	21.000	N/A	1,380,000	6,480	38,200	133,550	228,900
		K-55								1,453,000	6,830			
		L-80				4,450	1,600			1,955,000	9,190	55,600	194,300	333,000
		N-80								1,974,000	9,280			
		C-90				5,000				2,175,000	10,220	62,400	218,500	374,600
		C-95				5,280				2,293,000	10,780	65,900	230,650	395,400
		P-110				6,110				2,668,000	12,540	76,300	267,100	457,900
		Q-125				6,950				3,006,000	14,130	86,800	303,550	520,300

Data provided by Hunting Tubular Systems; TKC-PEUE-V2.2; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TS-HP / TS-HD Database

Size	Wt	Grade	Pipe				Standard Connection				Make-Up Torque			
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Bored ID	Turned Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Min	Opt	Max	Yield
in.	lb/ft		in.	in.	in.	psi	in.	in.	lb	in.	ft-lb			
3/4 (1.050)	1.20	J-55	.113	.824	*.672	10,360	0.687	1.327	25,000	1.300	200	230	250	300
		L-80				15,070			31,600		300	340	375	400
		N-80							33,300					
		C-90				16,950								500
		T-95				17,890			35,000					
		P-110				20,720			41,600					600
3/4 (1.050)	1.50	J-55	.154	.742	.648	14,120	0.687	1.327	32,500	N/A	200	230	250	300
		L-80				20,530			41,100		300	340	375	400
		N-80							43,300					
		C-90				23,100								500
		T-95				24,380			45,500					
		P-110				28,230			54,100					600
1 (1.315)	1.80	J-55	.133	1.049	.955	9,730	0.970	1.552	37,100	1.525	300	350	400	400
		L-80				14,160			46,900		400	450	500	500
		N-80							49,400					
		C-90				15,930								600
		T-95				16,810			51,900					
		P-110				19,470			61,800					700
1 (1.315)	2.25	J-55	.179	.957	*.848	13,100	0.864	1.600	47,900	N/A	300	350	400	700
		L-80				19,060			60,700		400	450	500	900
		N-80				19,060			63,900					900
		C-90				21,440								1,000
		T-95				22,630			67,100					1,100
		P-110				26,200			79,900					1,300
1-1/4 (1.660)	2.40	J-55	.140	1.380	1.286	8,120	1.300	1.883	50,200	1.858	350	400	450	600
		L-80				11,810			63,600		550	625	700	800
		N-80							66,900					
		C-90				13,280								900
		T-95				14,020			70,200					
		P-110				16,230			83,600		600	675	750	1,100
1-1/4 (1.660)	3.02	J-55	.191	1.278	1.184	11,070	1.218	1.927	66,100	N/A	350	400	450	1,100
		L-80				16,110			83,700		550	625	700	1,400
		N-80							88,100					
		C-90				18,120								1,500
		T-95				19,130			92,500					1,600
		P-110				22,150			110,100		600	675	750	1,900
1-1/4 (1.660)	3.24	J-55	.198	1.264	1.170	11,480	1.200	1.927	68,200	N/A	350	400	450	1,200
		L-80				16,700			86,400		550	625	700	1,400
		N-80							90,900					
		C-90				18,790								1,600
		T-95				19,830			95,400					1,700
		P-110				22,960			113,600		600	675	750	2,000
1-1/2 (1.900)	2.90	J-55	.145	1.610	1.516	7,350	1.530	2.113	59,900	2.094	600	675	750	800
		L-80				10,680			75,900		800	900	1,000	1,000
		N-80							79,900					
		C-90				12,020								1,200
		T-95				12,690			83,900					
		P-110				14,690			99,900					1,400

* Special API drifts

Data provided by Hunting Tubular Systems; TS-HP&HD-V2.1; Product Data Sheet Application Collection, send edition, revision 2.2; September 13, 2005

Hunting: TS-HP / TS-HD Database (Continued)

Size	Wt	Grade	Pipe				Standard Connection				Make-Up Torque			
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Bored ID	Turned Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Min	Opt	Max	Yield
in.	lb/ft		in.	in.	in.	psi	in.	in.	lb	in.	ft-lb			
1-1/2 (1.900)	3.64	J-55	.200	1.500	1.406	10,130	1.440	2.162	80,100	N/A	600	675	750	1,500
		L-80				14,740			101,500		800	900	1,000	1,900
		N-80							106,800					
		C-90				16,580			106,800					2,100
		T-95				17,500			112,100					2,200
		P-110				20,260			133,500					2,600
1-1/2 (1.900)	4.19	J-55	.219	1.462	1.368	11,090	1.390	2.179	86,800	N/A	600	675	750	1,800
		L-80				16,140			109,900		800	900	1,000	2,200
		N-80							115,700					
		C-90				18,150								2,500
		T-95				19,160			121,500					2,600
		P-110				22,190			144,600					3,100
2-1/16	3.25	J-55	.156	1.751	1.657	7,280	1.700	2.335	70,100	2.295	800	900	1,000	1,400
		L-80				10,590			88,800		1,000	1,075	1,150	1,700
		N-80							93,500					
		C-90				11,910								1,900
		T-95				12,570			98,200					2,000
		P-110				14,560			116,900			1,100	1,200	2,300
2-1/16	4.50	J-55	.225	1.613	1.519	10,500	1.550	2.460	97,400	2.407	800	900	1,000	3,200
		L-80				15,270			123,400		1,000	1,075	1,150	3,900
		N-80							129,900					
		C-90				17,180						1,075	1,150	4,400
		T-95				18,130			136,400					4,600
		P-110				20,990			162,400			1,100	1,200	5,400
2-3/8	4.70	J-55	.190	1.995	1.901	7,700	1.945	2.705	97,800	2.655	1,000	1,075	1,150	1,400
		L-80				11,200			123,900		1,400	1,500	1,600	1,700
		N-80							130,400					
		13 CR-85				11,900								1,800
		C-90				12,600								2,000
		T-95				13,300			136,900					2,100
		P-110				15,400			163,000					2,400
2-3/8	5.30	J-55	.218	1.939	1.845	8,830	1.890	2.750	110,800	2.700	1,000	1,075	1,150	1,600
		L-80				12,850			140,300		1,400	1,500	1,600	2,000
		N-80				12,850			147,700					
		C-90				14,460								2,300
		T-95				15,260			155,100					2,400
		P-110				17,670			184,600					2,800
2-3/8	5.95	J-55	.254	1.867	1.773	10,290	1.805	2.906	126,900	2.782	1,500	1,625	1,750	2,600
		L-80				14,970			160,700		2,200	2,350	2,500	3,200
		N-80							169,200					
		13 CR-85				15,910					2,350	2,500	2,650	3,400
		C-90				16,840					2,500	2,650	2,800	3,600
		T-95				17,780			177,700		2,600	2,775	2,950	3,800
		P-110				20,590			211,500		2,750	2,925	3,100	4,400
2-3/8	6.20	J-55	.261	1.853	1.759	10,580	1.795	2.938	130,000	2.794	1,500	1,625	1,750	2,600
		L-80				15,390			164,600		2,200	2,350	2,500	3,200
		N-80							173,300					
		C-90				17,310					2,500	2,650	2,800	3,600
		T-95				18,270			182,000		2,600	2,775	2,950	3,800
		P-110				21,150			216,600		2,750	2,925	3,100	4,500

* Special API drifts

Data provided by Hunting Tubular Systems; TS-HP&HD-V2.1; Product Data Sheet Application Collection, send edition, revision 2.2; September 13, 2005

Hunting: TS-HP / TS-HD Database (Continued)

Size	Wt	Grade	Pipe				Standard Connection				Make-Up Torque			
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Bored ID	Turned Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Min	Opt	Max	Yield
in.	lb/ft		in.	in.	in.	psi	in.	in.	lb	in.	ft-lb			
2-3/8	7.70	J-55	.336	1.703	1.609	13,620	1.645	3.125	161,400	3.002	1,500	1,625	1,750	3,100
		L-80				19,810			204,400		2,200	2,350	2,500	3,800
		N-80							215,200					
		C-90				22,280					2,500	2,650	2,800	4,300
		T-95				23,520			226,000		2,600	2,775	2,950	4,600
		P-110				27,230			269,000		2,750	2,925	3,100	5,300
2-7/8	6.50	J-55	.217	2.441	2.347	7,260	2.371	3.220	135,900	3.166	1,400	1,475	1,550	2,500
		L-80				10,570			172,100		2,100	2,225	2,350	3,100
		N-80							181,200					
		13 CR-85				11,230								3,300
		C-90				11,890								3,500
		T-95				12,550			190,300					3,700
		P-110				14,530			226,500		2,200	2,350	2,500	4,300
		KO-HP-13 CR110							217,400					
		13 CR-110							226,500					
2-7/8	7.90	J-55	.276	2.323	2.229	9,240	2.265	3.438	169,100	3.312	1,900	2,100	2,300	4,400
		L-80				13,440			214,100		3,000	3,200	3,400	5,400
		N-80							225,400					
		13 CR-85				14,280					3,100	3,300	3,500	5,700
		C-90				15,120					3,200	3,400	3,600	6,000
		C-95				15,960			236,700		3,300	3,500	3,700	6,400
		T-95												
		KO-HP-13 CR110				18,480			270,500		3,500	3,700	3,900	7,400
		P-110							281,800					
2-7/8	8.70	J-55	.308	2.259	2.165	10,310	2.200	3.500	186,300	3.365	1,900	2,100	2,300	4,700
		L-80				15,000			236,000		3,000	3,200	3,400	5,800
		N-80							248,400					
		C-90				16,870					3,200	3,400	3,600	6,500
		T-95				17,810			260,800		3,300	3,500	3,700	6,900
		P-110				20,620			310,500		3,500	3,700	3,900	8,000
2-7/8	9.50	J-55	.340	2.195	2.101	11,380	2.130	3.625	203,100	3.419	2,900	3,150	3,400	5,100
		L-80				16,560			257,300		4,400	4,700	5,000	6,200
		N-80							270,800					
		C-90				18,630					4,700	5,000	5,300	7,000
		T-95				19,660			284,300		4,900	5,200	5,500	7,400
		P-110				22,770			338,500		5,400	5,700	6,000	8,600
2-7/8	10.70	J-55	.392	2.091	1.997	13,120	2.030	3.688	229,400	3.595	2,900	3,150	3,400	5,500
		L-80				19,090			290,500		4,400	4,700	5,000	6,800
		N-80							305,800					
		C-90				21,470					4,700	5,000	5,300	7,700
		T-95				22,670			321,100		4,900	5,200	5,500	8,100
		P-110				26,250			382,300		5,400	5,700	6,000	9,400
3-1/2	9.30	J-55	.254	2.992	2.867	6,990	2.920	3.915	194,300	3.859	2,700	2,850	3,000	4,500
		N-80				10,160			259,000		3,000	3,200	3,400	5,500
		L-80							246,100					5,500
		13 CR-85				10,800			259,000					5,900
		C-90				11,430								6,200
		T-95				12,070			272,000					6,600

* Special API drifts

Data provided by Hunting Tubular Systems; TS-HP&HD-V2.1; Product Data Sheet Application Collection, send edition, revision 2.2; September 13, 2005

Hunting: TS-HP / TS-HD Database (Continued)

Size	Wt	Grade	Pipe				Standard Connection				Make-Up Torque			
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Bored ID	Turned Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Min	Opt	Max	Yield
in.	lb/ft		in.	in.	in.	psi	in.	in.	lb	in.	ft-lb			
3-1/2	9.30	KO-HP-13 CR110	.254	2.992	2.867	13,970	2.920	3.915	310,800	3.859	3,000	3,200	3,400	7,600
		P-110							323,800					
		Super 13 CR-110							336,700					
3-1/2	10.30	J-55	.289	2.922	2.797	7,950	2.870	3.980	218,600	3.914	2,700	2,850	3,000	5,000
		N-80				11,560			291,500		3,000	3,200	3,400	6,100
		L-80							276,900					
		C-90				13,010			291,500					6,900
		T-95				13,730			306,100					7,300
		P-110				15,900			364,400					8,400
3-1/2	12.95	J-55	.375	2.750	2.625	10,310	2.687	4.313	276,200	4.189	3,900	4,150	4,400	12,200
		N-80				15,000			368,200		5,400	5,700	6,000	15,000
		L-80							349,800					
		13 CR-85				15,940			368,200		5,600	5,900	6,200	16,000
		C-90				16,880					5,900	6,200	6,500	16,900
		T-95				17,810			386,600		6,100	6,400	6,700	17,900
		13 CR-95												
		KO-HP-13 CR110				20,630			441,800		6,800	7,100	7,400	20,700
		P-110							460,300					
3-1/2	15.80	J-55	.476	2.548	2.423	13,090	2.485	4.500	339,200	4.474	3,900	4,150	4,400	13,700
		N-80				19,040			452,200		5,400	5,700	6,000	16,800
		L-80							429,600					
		C-90				21,420			452,200		5,900	6,200	6,500	18,900
		T-95				22,610			474,800		6,100	6,400	6,700	20,000
		P-110				26,180			565,300		6,800	7,100	7,400	23,200
4	11.00	J-55	.262	3.476	3.351	6,300	3.395	4.417	230,800	4.359	2,800	2,975	3,150	6,300
		N-80				9,170			307,700		3,500	3,750	4,000	7,700
		L-80							292,300					
		C-90				10,320			307,700					8,700
		T-95				10,890			323,100					9,200
		P-110				12,610			384,600					10,600
4	13.40	J-55	.330	3.340	3.215	7,940	3.275	4.625	285,400	4.514	4,000	4,250	4,500	11,000
		N-80				11,550			380,500		5,500	5,800	6,100	13,600
		L-80							361,500					
		C-90				12,990			380,500		6,000	6,300	6,600	15,300
		T-95				13,720			399,500		6,200	6,500	6,800	16,100
		P-110				15,880			475,600		7,000	7,400	7,800	18,600
4-1/2	12.75	J-55	.271	3.958	3.833	5,800	3.865	4.920	270,000	4.861	3,500	3,750	4,000	8,700
		N-80				8,430			360,000		4,500	4,750	5,000	10,700
		L-80							342,000					
		C-90				9,490			360,000					12,100
		T-95				10,010			378,000					12,700
		P-110				11,590			450,000					14,700
		Super 13 CR-110							468,000					

* Special API drifts

Data provided by Hunting Tubular Systems; TS-HP&HD-V2.1; Product Data Sheet Application Collection, send edition, revision 2.2; September 13, 2005

Hunting: TS-HP / TS-HD Database (Continued)

Size	Wt	Grade	Pipe				Standard Connection				Make-Up Torque			
			Nominal Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Bored ID	Turned Outside Diameter	Longitudinal Joint Strength	Special Clearance OD	Min	Opt	Max	Yield
in.	lb/ft		in.	in.	in.	psi	in.	in.	lb	in.	ft-lb			
4-1/2	13.50	J-55	.290	3.920	3.795	6,200	3.840	4.955	287,700	4.890	3,500	3,750	4,000	9,100
		N-80				9,020			383,600		4,500	4,750	5,000	11,200
		L-80							364,400					
		C-90				10,150			383,600					12,600
		T-95				10,710			402,800					13,300
		13 CR-95												
		P-110				12,410			479,500					15,400
		Super 13 CR-110							498,700					
4-1/2	15.50	J-55	.337	3.826	3.701	7,210	3.765	5.125	330,500	5.021	4,500	4,750	5,000	14,100
		N-80				10,480			440,700		6,000	6,300	6,600	17,300
		L-80							418,700					
		C-90				11,800			440,700		6,500	6,800	7,100	19,500
		T-95				12,450			462,700		6,700	7,000	7,300	20,600
		P-110				14,420			550,900		7,500	7,800	8,100	23,800
		Super 13 CR-110				14,420			572,900					
4-1/2	17.00	L-80	.380	3.740	3.615	11,820	3.665	5.250	467,200	5.100	6,800	7,200	7,600	19,200
		P-110				16,260			614,800		8,500	9,000	9,500	26,400
		Q-125				18,470			663,900		9,400	9,900	10,400	29,900
		Q-125	.402	3.696	3.571	19,540			698,600					30,800
4-1/2	19.20	J-55	.430	3.640	3.515	9,200	3.560	5.313	412,400	5.170	5,500	5,750	6,000	17,100
		N-80				13,380			549,800		7,500	7,950	8,400	21,000
		L-80							522,300					
		C-90				15,050			549,800		8,200	8,650	9,100	23,600
		T-95				15,890			577,300		8,500	9,000	9,500	24,900
		P-110				18,390			687,300		9,500	10,050	10,600	28,900

* Special API drifts

Data provided by Hunting Tubular Systems; TS-HP&HD-V2.1; Product Data Sheet Application Collection, send edition, revision 2.2; September 13, 2005

Hunting: Convertible Buttress Connection

Size	Wt	Grade	Pipe					Connection			Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Make-Up Torque		
											Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft-lb		
4-1/2	10.50	J-55	0.224	4.052	3.927	4,790	4,010	5.000	4.875	203,000	700	1,600	2500
		K-55								249,000			
		L-80				6,970	4,940			262,000	900	2,300	3600
		N-80								274,000			
		C-90				7,840	5,200			279,000	1,000	2,500	4,000
		C-95				8,280	5,310			293,000	1,100	2,700	4,200
		P-110				9,580	5,550			347,000	1,300	3,100	4,900
		Q-125				10,890	5,830			378,000	1,500	3,600	5,600
4-1/2	11.60	J-55	0.250	4.000	3.875	5,350	4,960	5.000	4.875	225,000	900	2,100	3,200
		K-55								277,000			
		L-80				7,780	6,350			291,000	1,300	3,000	4,600
		N-80								304,000			
		C-90				8,750	6,820			309,000	1,500	3,400	5,200
		C-95				9,240	7,030			325,000	1,600	3,500	5,400
		P-110				10,690	7,580			385,000	1,800	4,100	6,300
		Q-125				12,150	8,000			420,000	2,100	4,700	7,200
4-1/2	12.60	J-55	0.271	3.958	3.833	5,800	5,730	5.000	4.875	243,000	1,200	2,500	3,700
		K-55								298,000			
		L-80				8,430	7,500			314,000	1,700	3,600	5,400
		N-80								328,000			
		C-90				9,490	8,120			334,000	1,900	4,000	6,100
		C-95				10,010	8,410			351,000	2,000	4,200	6,400
		P-110				11,590	9,210			416,000	2,300	4,900	7,400
		Q-125				13,170	9,890			453,000	2,700	5,600	8,400
4-1/2	13.50	J-55	0.290	3.920	3.795	6,200	6,420	5.000	4.875	258,000	1,400	2,800	4,200
		K-55								318,000			
		L-80				9,020	8,540			334,000	2,100	4,100	6,100
		N-80								349,000			
		C-90				10,150	9,300			355,000	2,300	4,600	6,900
		C-95				10,710	9,660			374,000	2,500	4,900	7,300
		P-110				12,410	10,690			443,000	2,800	5,600	8,400
		Q-125				14,100	11,600			482,000	3,200	6,400	9,600
4-1/2	15.10	J-55	0.337	3.826	3.701	7,210	7,620	5.000	4.875	297,000	2,100	3,800	5,400
		K-55								365,000			
		L-80				10,480	11,080			384,000	3,100	5,500	7,900
		N-80								401,000			
		C-90				11,800	12,220			408,000	3,500	6,200	8,900
		C-95				12,450	12,760			429,000	3,700	6,500	9,300
		P-110				14,420	14,340			509,000	4,200	7,500	10,800
		Q-125				16,380	15,830			554,000	4,800	8,600	12,300
5	13.00	J-55	0.253	4.494	4.369	4,870	4,140	5.563	5.375	252,000	1,300	3,200	5,000
		K-55								309,000			
		L-80				7,080	5,140			327,000	1,900	4,600	7,200
		N-80								341,000			
		C-90				7,970	5,430			348,000	2,200	5,200	8,200
		C-95				8,410	5,560			366,000	2,300	5,500	8,600
		P-110				9,740	5,840			434,000	2,700	6,400	10,000
		Q-125				11,070	6,050			473,000	3,000	7,200	11,300
5	15.00	J-55	0.296	4.408	4.283	5,700	5,560	5.563	5.375	293,000	1,600	3,500	5,300
		K-55								359,000			
		L-80				8,290	7,250			379,000	2,400	5,100	7,700

Data provided by Hunting Tubular Systems; CONVBTC-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection			Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Make-Up Torque		
											Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft-lb		
5	15.00	N-80	0.296	4.408	4.283	8,290	7,250	5.563	5.375	396,000	2,400	5,100	7,700
		C-90				9,320	7,830			404,000	2,700	5,700	8,600
		C-95				9,840	8,110			424,000	2,800	6,000	9,100
		P-110				11,400	8,850			503,000	3,300	7,000	10,600
		Q-125				12,950	9,480			548,000	3,700	7,900	12,000
5	18.00	J-55	0.362	4.276	4.151	6,970	7,390	5.563	5.375	353,000	2,800	5,100	7,400
		K-55								432,000			
		L-80				10,140	10,490			457,000	4,100	7,400	10,700
		N-80								477,000			
		C-90				11,400	11,520			487,000	4,600	8,400	12,100
		C-95				12,040	12,030			512,000	4,800	8,800	12,700
		P-110				13,940	13,470			606,000	5,600	10,200	14,800
		Q-125				15,840	14,820			661,000	6,400	11,600	16,800
5	21.40	J-55	0.437	4.126	4.001	8,410	8,770	5.563	5.375	403,000	4,400	7,000	9,600
		K-55								510,000			
		L-80				12,240	12,760				6,400	10,200	14,000
		N-80								537,000			
		C-90				13,770	14,360				7,300	11,600	15,800
		C-95				14,530	15,150			564,000	7,700	12,200	16,700
		P-110				16,820	17,550			671,000	8,900	14,100	19,300
		Q-125				19,120	19,940			725,000	10,000	16,000	21,900
5	23.20	J-55	0.478	4.044	3.919	9,200	9,510	5.563	5.375	403,000	5,400	8,100	10,800
		K-55								510,000			
		L-80				13,380	13,830			510,000	7,900	11,900	15,800
		N-80								537,000			
		C-90				15,060	15,560				8,900	13,300	17,700
		C-95				15,890	16,430			564,000	9,400	14,100	18,700
		P-110				18,400	19,020			671,000	10,900	16,300	21,700
		Q-125				20,910	21,620			725,000	12,300	18,500	24,600
5	24.10	J-55	0.500	4.000	3.875	9,630	9,900	5.563	5.375	403,000	6,000	8,800	11,500
		K-55								510,000			
		L-80				14,000	14,400				8,800	12,800	16,700
		N-80								537,000			
		C-90				15,750	16,200				9,900	14,400	18,800
		C-95				16,630	17,100			564,000	10,400	15,100	19,800
		P-110				19,250	19,800			671,000	12,000	17,500	22,900
		Q-125				21,880	22,500			725,000	13,700	19,900	26,000
5-1/2	15.50	J-55	0.275	4.950	4.825	4,810	4,040	6.050	5.875	300,000	1,400	3,500	5,500
		K-55								366,000			
		L-80				7,000	4,990			389,000	2,100	5,100	8,000
		N-80								406,000			
		C-90				7,880	5,260			415,000	2,400	5,700	9,000
		C-95				8,310	5,380			436,000	2,500	6,000	9,500
		P-110				9,630	5,630			517,000	2,900	7,000	11,000
		Q-125				10,940	5,890			564,000	3,300	7,900	12,500

Data provided by Hunting Tubular Systems; CONVBTC-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection			Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Make-Up Torque		
											Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft-lb		
5-1/2	17.00	J-55	0.304	4.892	4.767	5,320	4,910	6.050	5.875	329,000	1,900	4,300	6,700
		K-55								402,000			
		L-80				7,740	6,290			428,000	2,800	6,300	9,700
		N-80								446,000			
		C-90				8,710	6,740			456,000	3,200	7,100	10,900
		C-95				9,190	6,940			480,000	3,300	7,400	11,500
		P-110				10,640	7,480			568,000	3,900	8,600	13,300
		Q-125				12,090	7,890			620,000	4,400	9,800	15,100
5-1/2	20.00	J-55	0.361	4.778	4.653	6,320	6,620	6.050	5.875	387,000	3,100	6,000	8,900
		K-55								472,000			
		L-80				9,190	8,830			503,000	4,400	8,700	12,900
		N-80								524,000			
		C-90				10,340	9,630			536,000	5,000	9,800	14,500
		C-95				10,910	10,020			563,000	5,300	10,300	15,300
		P-110				12,640	11,100			667,000	6,100	11,900	17,700
		Q-125				14,360	12,080			728,000	7,000	13,600	20,200
5-1/2	23.00	J-55	0.415	4.670	4.545	7,260	7,670	6.050	5.875	435,000	4,300	7,600	10,900
		K-55								537,000			
		L-80				10,560	11,160			551,000	6,300	11,100	15,800
		N-80								580,000			
		C-90				11,880	12,380				7,000	12,400	17,800
		C-95				12,540	12,930			609,000	7,400	13,100	18,800
		P-110				14,530	14,540			725,000	8,600	15,200	21,800
		Q-125				16,510	16,060			783,000	9,800	17,300	24,800
6-5/8	20.00	J-55	0.288	6.049	5.924	4,180	2,970	7.390	7	374,000	1,900	5,200	8,500
		K-55								453,000			
		L-80				6,090	3,470			489,000	2,800	7,600	12,300
		N-80								509,000			
		C-90				6,850	3,700			523,000	3,200	8,500	13,800
		C-95				7,230	3,790			550,000	3,300	9,000	14,600
		P-110				8,370	4,030			650,000	3,900	10,400	16,900
		Q-125				9,510	4,170			711,000	4,400	11,800	19,200
6-5/8	24.00	J-55	0.352	5.921	5.796	5,110	4,560	7.390	7	453,000	3,400	7,800	12,200
		K-55								548,000			
		L-80				7,440	5,760			592,000	4,900	11,300	17,700
		N-80								615,000			
		C-90				8,370	6,140			633,000	5,600	12,800	19,900
		C-95				8,830	6,310			665,000	5,900	13,500	21,000
		P-110				10,230	6,730			786,000	6,800	15,600	24,300
		Q-125				11,620	7,020			860,000	7,700	17,700	27,600
6-5/8	28.00	J-55	0.417	5.791	5.666	6,060	6,170	7.390	7	531,000	5,200	10,500	15,800
		K-55								643,000			
		L-80				8,810	8,170			693,000	7,600	15,300	23,000
		N-80								721,000			
		C-90				9,910	8,880			742,000	8,500	17,200	25,800
		C-95				10,460	9,220			780,000	9,000	18,200	27,300
		P-110				12,120	10,160			922,000	10,400	21,000	31,600
		Q-125				13,770	10,990			1,008,000	11,900	23,900	35,900

Data provided by Hunting Tubular Systems; CONVBTC-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection			Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Make-Up Torque		
											Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft-lb		
6-5/8	32.00	J-55	0.475	5.675	5.550	6,900	7,320	7.390	7	599,000	7,100	13,000	18,900
		K-55								725,000			
		L-80				10,040	10,320			783,000	10,400	19,000	27,500
		N-80								814,000			
		C-90				11,290	11,330			837,000	11,700	21,400	31,000
		C-95				11,920	11,820			880,000	12,300	22,500	32,700
		P-110				13,800	13,220			1,040,000	14,300	26,100	37,900
		Q-125				15,680	14,540			1,138,000	16,200	29,600	43,000
7	23.00	J-55	0.317	6.366	6.241	4,360	3,270	7.656	7.375	432,000	2,600	6,800	10,900
		K-55								522,000			
		L-80				6,340	3,830			565,000	3,800	9,900	15,900
		N-80								588,000			
		C-90				7,130	4,030			605,000	4,300	11,100	17,900
		C-95				7,530	4,140			636,000	4,500	11,700	18,900
		P-110				8,720	4,440			752,000	5,200	13,600	21,900
		Q-125				9,910	4,650			823,000	5,900	15,400	24,900
7	26.00	J-55	0.362	6.276	6.151	4,980	4,330	7.656	7.375	490,000	3,700	8,800	13,800
		K-55								592,000			
		L-80				7,240	5,410			641,000	5,500	12,800	20,100
		N-80								667,000			
		C-90				8,150	5,740			687,000	6,100	14,400	22,600
		C-95				8,600	5,890			722,000	6,500	15,200	23,900
		P-110				9,960	6,230			853,000	7,500	17,600	27,700
		Q-125				11,310	6,450			934,000	8,500	20,000	31,400
7	29.00	J-55	0.408	6.184	6.059	5,610	5,410	7.656	7.375	548,000	5,100	10,900	16,700
		K-55								662,000			
		L-80				8,160	7,030			718,000	7,400	15,900	24,300
		N-80								746,000			
		C-90				9,180	7,580			768,000	8,400	17,900	27,400
		C-95				9,690	7,840			808,000	8,800	18,900	28,900
		P-110				11,220	8,530			955,000	10,300	21,900	33,500
		Q-125				12,750	9,110			1,045,000	11,600	24,800	38,000
7	32.00	J-55	0.453	6.094	5.969	6,230	6,460	7.656	7.375	605,000	6,600	13,100	19,500
		K-55								730,000			
		L-80				9,060	8,600			791,000	9,600	19,000	28,400
		N-80								823,000			
		C-90				10,190	9,380			847,000	10,800	21,400	31,900
		C-95				10,760	9,740			891,000	11,500	22,600	33,700
		P-110				12,460	10,780			1,053,000	13,300	26,200	39,000
		Q-125				14,160	11,710			1,152,000	15,100	29,700	44,300
7	35.00	J-55	0.498	6.004	5.879	6,850	7,270	7.656	7.375	657,000	11,700	15,300	18,900
		K-55								797,000			
		L-80				9,960	10,180			832,000	17,100	22,300	27,500
		N-80				9,960	10,180			876,000	17,100	22,300	27,500
		C-90				11,210	11,170				19,200	25,100	31,000
		C-95				11,830	11,650			920,000	20,300	26,500	32,700
		P-110				13,700	13,030			1,095,000	23,500	30,700	37,900
		Q-125				15,560	14,310			1,183,000	26,700	34,900	43,000

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Hunting: Convertible Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection			Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Make-Up Torque		
											Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft-lb		
7	38.00	J-55	0.540	5.920	5.795	7,430	7,830	7.656	7.375	657,000	10,000	17,400	24,700
		K-55								832,000			
		L-80				10,800	11,390				14,500	25,200	35,900
		N-80								876,000			
		C-90				12,150	12,810				16,400	28,400	40,400
		C-95				12,830	13,430			920,000	17,300	30,000	42,700
		P-110				14,850	15,130			1,095,000	20,000	34,700	49,400
		Q-125				16,880	16,740			1,183,000	22,700	39,400	56,100
7-5/8	26.40	J-55	0.328	6.969	6.844	4,140	2,900	8.500	8.125	483,000	3,000	8,200	13,400
		K-55								581,000			
		L-80				6,020	3,400			635,000	4,400	12,000	19,500
		N-80								659,000			
		C-90				6,780	3,610			681,000	4,900	13,400	21,900
		C-95				7,150	3,710			716,000	5,200	14,200	23,200
		P-110				8,280	3,920			845,000	6,100	16,500	26,800
		Q-125				9,410	4,050			926,000	6,900	18,700	30,500
7-5/8	29.70	J-55	0.375	6.875	6.750	4,730	3,910	8.500	8.125	549,000	4,400	10,700	17,000
		K-55								660,000			
		L-80				6,890	4,790			721,000	6,400	15,600	24,700
		N-80								749,000			
		C-90				7,750	5,030			773,000	7,200	17,500	27,800
		C-95				8,180	5,130			813,000	7,600	18,500	29,400
		P-110				9,470	5,350			960,000	8,800	21,400	34,000
		Q-125				10,760	5,670			1,052,000	10,000	24,300	38,600
7-5/8	33.70	J-55	0.430	6.765	6.640	5,430	5,100	8.500	8.125	625,000	6,200	13,700	21,100
		K-55								751,000			
		L-80				7,900	6,560			820,000	9,100	19,900	30,700
		N-80								852,000			
		C-90				8,880	7,050			880,000	10,200	22,400	34,600
		C-95				9,380	7,280			925,000	10,800	23,700	36,500
		P-110				10,860	7,870			1,093,000	12,500	27,400	42,200
		Q-125				12,340	8,340			1,197,000	14,200	31,100	48,000
7-5/8	39.00	J-55	0.500	6.625	6.500	6,310	6,610	8.500	8.125	720,000	9,000	17,600	26,200
		K-55								864,000			
		L-80				9,180	8,820			945,000	13,100	25,600	38,100
		N-80								981,000			
		C-90				10,330	9,620			1,013,000	14,800	28,900	42,900
		C-95				10,900	10,000			1,065,000	15,600	30,500	45,300
		P-110				12,620	11,080			1,258,000	18,000	35,200	52,400
		Q-125				14,340	12,060			1,379,000	20,500	40,100	59,600
7-5/8	42.80	J-55	0.562	6.501	6.376	7,090	7,510	8.500	8.125	802,000	11,800	21,200	30,600
		K-55								963,000			
		L-80				10,320	10,810			1,053,000	17,200	30,900	44,500
		N-80								1,093,000			
		C-90				11,610	11,890			1,129,000	19,400	34,800	50,100
		C-95				12,250	12,410			1,187,000	20,500	36,700	52,900
		P-110				14,190	13,930			1,402,000	23,700	42,500	61,200
		Q-125				16,120	15,350			1,536,000	26,900	48,300	69,600

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Hunting: Convertible Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection			Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Make-Up Torque		
											Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft-lb		
7-5/8	45.30	J-55	0.595	6.435	6.310	7,510	7,910	8.500	8.125	845,000	13,500	23,200	32,900
		K-55								1,015,000			
		L-80				10,920	11,510			1,109,000	19,600	33,700	47,800
		N-80								1,152,000			
		C-90				12,290	12,950			1,189,000	22,000	37,900	53,800
		C-95				12,970	13,670			1,251,000	23,300	40,100	56,800
		P-110				15,020	15,440			1,477,000	27,000	46,400	65,800
		Q-125				17,070	17,100			1,619,000	30,600	52,700	74,700
7-5/8	47.10	J-55	0.625	6.375	6.25	7,890	8,280	8.500	8.125	884,000	15,000	25,000	34,900
		K-55								1,062,000			
		L-80				11,480	12,040			1,160,000	21,900	36,400	50,800
		N-80								1,205,000			
		C-90				12,910	13,540			1,239,000	24,600	40,900	57,200
		C-95				13,630	14,300			1,301,000	26,000	43,200	60,300
		P-110				15,780	16,550			1,545,000	30,100	50,000	69,900
		Q-125				17,930	18,700			1,673,000	34,200	56,800	79,400
8-5/8	32.00	J-55	0.352	7.921	7.796	3,930	2,530	9.625	9.125	579,000	4,100	11,700	19,200
		K-55								690,000			
		L-80				5,710	3,050			764,000	6,000	17,000	28,000
		N-80								792,000			
		C-90				6,430	3,210			822,000	6,700	19,100	31,400
		C-95				6,780	3,280			864,000	7,100	20,200	33,200
		P-110				7,860	3,420			1,020,000	8,200	23,300	38,400
		Q-125				8,930	3,470			1,120,000	9,400	26,600	43,700
8-5/8	36.00	J-55	0.400	7.825	7.700	4,460	3,450	9.625	9.125	654,000	5,800	14,900	23,900
		K-55								780,000			
		L-80				6,490	4,100			864,000	8,500	21,700	34,800
		N-80								895,000			
		C-90				7,300	4,250			928,000	9,500	24,400	39,200
		C-95				7,710	4,350			976,000	10,100	25,700	41,300
		P-110				8,930	4,690			1,152,000	11,700	29,800	47,900
		Q-125				10,140	4,930			1,265,000	13,200	33,800	54,400
8-5/8	40.00	J-55	0.450	7.725	7.600	5,020	4,400	9.625	9.125	732,000	7,900	18,300	28,700
		K-55								872,000			
		L-80				7,300	5,520			966,000	11,400	26,600	41,800
		N-80								1,001,000			
		C-90				8,220	5,870			1,038,000	12,900	30,000	47,000
		C-95				8,670	6,020			1,092,000	13,600	31,600	49,600
		P-110				10,040	6,390			1,288,000	15,700	36,600	57,500
		Q-125				11,410	6,630			1,415,000	17,900	41,600	65,300
8-5/8	44.00	J-55	0.500	7.625	7.500	5,580	5,360	9.625	9.125	808,000	10,200	21,900	33,500
		K-55								963,000			
		L-80				8,120	6,950			1,066,000	14,800	31,800	48,700
		N-80								1,105,000			
		C-90				9,130	7,490			1,146,000	16,700	35,800	54,800
		C-95				9,640	7,740			1,206,000	17,600	37,700	57,800
		P-110				11,160	8,420			1,423,000	20,400	43,700	66,900
		Q-125				12,680	8,980			1,562,000	23,100	49,600	76,000

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Hunting: Convertible Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection			Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Make-Up Torque		
											Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft-lb		
8-5/8	49.00	J-55	0.557	7.511	7.386	6,220	6,440	9.625	9.125	894,000	13,100	25,900	38,700
		K-55								1,065,000			
		L-80				9,040	8,570			1,180,000	19,100	37,700	56,300
		N-80								1,222,000			
		C-90				10,170	9,340			1,268,000	21,500	42,500	63,400
		C-95				10,740	9,700			1,334,000	22,700	44,800	66,900
		P-110				12,430	10,730			1,574,000	26,300	51,900	77,500
		Q-125				14,130	11,660			1,728,000	29,800	58,900	88,000
9-5/8	36.00	J-55	0.352	8.921	8.765	3,520	2,020	10.625	10.125	639,000	4,600	14,400	24,100
		K-55								755,000			
		L-80				5,120	2,370			848,000	6,700	20,900	35,000
		N-80								877,000			
		C-90				5,760	2,440			914,000	7,600	23,500	39,400
		C-95				6,080	2,460			962,000	8,000	24,800	41,500
		P-110				7,040	2,470			1,133,000	9,200	28,700	48,100
		Q-125				8,000				1,247,000	10,500	32,600	54,700
9-5/8	40.00	J-55	0.395	8.835	8.679	3,950	2,570	10.625	10.125	714,000	6,300	17,900	29,400
		K-55								843,000			
		L-80				5,750	3,090			947,000	9,200	26,000	42,700
		N-80								979,000			
		C-90				6,460	3,260			1,021,000	10,300	29,200	48,000
		C-95				6,820	3,330			1,074,000	10,900	30,800	50,700
		P-110				7,900	3,470			1,266,000	12,600	35,700	58,700
		Q-125				8,980	3,530			1,393,000	14,400	40,600	66,700
9-5/8	43.50	J-55	0.435	8.755	8.599	4,350	3,250	10.625	10.125	783,000	8,100	21,200	34,200
		K-55								925,000			
		L-80				6,330	3,810			1,038,000	11,800	30,800	49,800
		N-80								1,074,000			
		C-90				7,120	4,010			1,119,000	13,300	34,700	56,000
		C-95				7,510	4,130			1,178,000	14,000	36,600	59,100
		P-110				8,700	4,420			1,388,000	16,200	42,300	68,400
		Q-125				9,890	4,620			1,527,000	18,500	48,200	77,800
9-5/8	47.00	J-55	0.472	8.681	8.525	4,720	3,890	10.625	10.125	846,000	10,000	24,400	38,700
		K-55								999,000			
		L-80				6,870	4,750			1,122,000	14,500	35,400	56,200
		N-80								1,161,000			
		C-90				7,720	4,990			1,210,000	16,300	39,800	63,300
		C-95				8,150	5,090			1,273,000	17,200	42,000	66,800
		P-110				9,440	5,300			1,500,000	19,900	48,600	77,300
		Q-125				10,730	5,630			1,650,000	22,600	55,300	87,900
9-5/8	53.50	J-55	0.545	8.535	8.379	5,450	5,130	10.625	10.125	969,000	14,100	30,700	47,300
		K-55								1,145,000			
		L-80				7,930	6,620			1,285,000	20,500	44,700	68,800
		N-80								1,329,000			
		C-90				8,920	7,110			1,386,000	23,000	50,200	77,400
		C-95				9,410	7,340			1,458,000	24,300	53,000	81,700
		P-110				10,900	7,950			1,718,000	28,100	61,400	94,600
		Q-125				12,390	8,440			1,890,000	31,900	69,700	107,400

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Hunting: Convertible Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection			Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Make-Up Torque		
											Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft-lb		
9-5/8	58.40	J-55	0.595	8.435	8.279	5,950	5,990	10.625	10.125	1,052,000	15,900	32,400	48,900
		K-55								1,243,000			
		L-80				8,650	7,890			1,396,000	23,100	47,200	71,200
		N-80				8,650	7,890			1,443,000	23,100	47,200	71,200
		C-90				9,740	8,570			1,505,000	26,000	53,100	80,100
		C-95				10,280	8,890			1,583,000	27,400	56,000	84,500
		P-110				11,900	9,770			1,865,000	31,800	64,900	97,900
		Q-125				13,520	10,540			2,052,000	36,100	73,700	111,200
10-3/4	40.50	J-55	0.350	10.050	9.894	3,130	1,580	11.750	11.25	700,000	5,100	17,500	29,800
		K-55								819,000			
		L-80				4,560	1,730			934,000	7,400	25,400	43,400
		N-80								964,000			
		C-90				5,130				1,010,000	8,300	28,600	48,800
		C-95				5,410				1,063,000	8,800	30,200	51,500
		P-110				6,270				1,251,000	10,200	34,900	59,600
		Q-125				7,120				1,380,000	11,600	39,700	67,800
10-3/4	45.50	J-55	0.400	9.950	9.794	3,580	2,090	11.750	11.25	796,000	7,300	22,500	37,600
		K-55								931,000			
		L-80				5,210	2,470			1,063,000	10,700	32,700	54,700
		N-80								1,097,000			
		C-90				5,860	2,560			1,149,000	12,000	36,800	61,500
		C-95				6,190	2,590			1,209,000	12,700	38,800	64,900
		P-110				7,160	2,610			1,423,000	14,700	45,000	75,200
		Q-125				8,140				1,570,000	16,700	51,100	85,400
10-3/4	51.00	J-55	0.450	9.850	9.694	4,030	2,710	11.750	11.25	891,000	9,900	27,600	45,200
		K-55								1,043,000			
		L-80				5,860	3,220			1,190,000	14,500	40,200	65,800
		N-80								1,228,000			
		C-90				6,590	3,400			1,287,000	16,300	45,200	74,000
		C-95				6,960	3,480			1,354,000	17,200	47,700	78,100
		P-110				8,060	3,660			1,594,000	19,900	55,200	90,400
		Q-125				9,160	3,740			1,758,000	22,600	62,700	102,800
10-3/4	55.50	J-55	0.495	9.760	9.604	4,430	3,390	11.750	11.25	976,000	12,600	32,300	52,000
		K-55								1,142,000			
		L-80				6,450	4,020			1,303,000	18,300	47,000	75,600
		N-80								1,345,000			
		C-90				7,250	4,160			1,409,000	20,600	52,900	85,100
		C-95				7,660	4,290			1,483,000	21,700	55,800	89,800
		P-110				8,860	4,610			1,745,000	25,100	64,600	104,000
		Q-125				10,070	4,850			1,925,000	28,600	73,400	118,200
10-3/4	60.70	J-55	0.545	9.660	9.504	4,880	4,160	11.750	11.25	1,070,000	21,500	46,200	70,800
		K-55				4,880	4,160			1,251,000			
		L-80				7,100	5,160			1,428,000	31,300	67,200	103,000
		N-80								1,473,000			
		C-90				7,980	5,460			1,544,000	35,300	75,600	115,900
		C-95				8,430	5,580			1,625,000	37,200	79,800	122,300
		P-110				9,760	5,880			1,912,000	43,100	92,400	141,600
		Q-125				11,090	6,070			2,109,000	49,000	105,000	160,900

Data provided by Hunting Tubular Systems; CONVBTC-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection			Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Make-Up Torque		
											Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft-lb		
10-3/4	65.70	J-55	0.595	9.560	9.404	5,330	4,920	11.750	11.25	1,162,000	25,600	51,800	77,900
		K-55								1,359,000			
		L-80				7,750	6,300			1,551,000	37,300	75,400	113,400
		N-80								1,600,000			
		C-90				8,720	6,760			1,677,000	41,900	84,700	127,500
		C-95				9,200	6,970			1,765,000	44,200	89,400	134,600
		P-110				10,650	7,500			2,077,000	51,200	103,600	155,900
		Q-125				12,110	7,920			2,291,000	58,200	117,700	177,100
11-3/4	47.00	J-55	0.375	11.000	10.844	3,070	1,10	12.750	N/A	807,000	6,800	23,600	40,400
		K-55								935,000			
		L-80				4,470	1,630			1,084,000	9,900	34,400	58,800
		N-80								1,116,000			
		C-90				5,030				1,175,000	11,100	38,600	66,100
		C-95				5,310				1,237,000	11,700	40,800	69,800
		P-110				6,140				1,454,000	13,500	47,200	80,800
		Q-125				6,980				1,607,000	15,400	53,700	91,900
11-3/4	54.00	J-55	0.435	10.880	10.724	3,560	2,070	12.750	N/A	931,000	10,000	30,800	51,500
		K-55								1,079,000			
		L-80				5,180	2,440			1,250,000	14,500	44,700	74,900
		N-80								1,287,000			
		C-90				5,830	2,530			1,356,000	16,400	50,400	84,300
		C-95				6,150	2,550			1,427,000	17,300	53,200	89,000
		P-110				7,130	2,570			1,677,000	20,000	61,500	103,000
		Q-125				8,100				1,854,000	22,800	70,000	117,100
11-3/4	60.00	J-55	0.489	10.772	10.616	4,010	2,670	12.750	N/A	1,042,000	13,400	37,400	6,1400
		K-55								1,208,000			
		L-80				5,830	3,180			1,399,000	19,500	54,400	8,9200
		N-80								1,440,000			
		C-90				6,550	3,360			1,517,000	21,900	61,200	100,400
		C-95				6,920	3,440			1,596,000	23,200	64,600	106,000
		P-110				8,010	3,610			1,877,000	26,800	74,800	122,700
		Q-125				9,100	3,680			2,074,000	30,400	84,900	139,400
13-3/8	54.50	J-55	0.380	12.615	12.459	2,730	1,130	14.375	N/A	909,000	8,400	32,300	5,6200
		K-55								1,038,000			
		L-80				3,980	1,140			1,233,000	12,200	47,000	8,1800
		N-80								1,265,000			
		C-90				4,470				1,343,000	13,700	52,900	92,000
		C-95				4,720				1,414,000	14,500	55,800	97,100
		P-110				5,470				1,659,000	16,800	64,700	112,500
		Q-125				6,210				1,840,000	19,000	73,400	127,800
13-3/8	61.00	J-55	0.430	12.515	12.359	3,090	1,540	14.375	N/A	1,025,000	11,500	39,900	68,300
		K-55								1,170,000			
		L-80				4,500	1,670			1,389,000	16,800	58,100	99,400
		N-80								1,426,000			
		C-90				5,060				1,514,000	18,900	65,400	111,800
		C-95				5,340				1,594,000	19,900	69,000	118,000
		P-110				6,190				1,870,000	23,100	79,900	136,600
		Q-125				7,030				2,074,000	26,200	90,800	155,300

Data provided by Hunting Tubular Systems; CONVBTC-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection			Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Make-Up Torque		
											Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft-lb		
13-3/8	68.00	J-55	0.480	12.415	12.259	3,450	1,950	14.375	N/A	1,140,000	15,100	47,700	80,300
		K-55								1,300,000			
		L-80				5,020	2,260			1,545,000	22,000	69,400	116,800
		N-80								1,585,000			
		C-90				5,650	2,320			1,683,000	24,700	78,100	131,400
		C-95				5,970				1,772,000	26,100	82,400	138,700
		P-110				6,910				2,079,000	30,200	95,400	160,500
		Q-125				7,850				2,306,000	34,400	108,400	182,400
13-3/8	72.00	J-55	0.514	12.347	12.191	3,700	2,230	14.375	N/A	1,217,000	17,800	53,100	88,300
		K-55								1,389,000			
		L-80				5,380	2,670			1,650,000	25,900	77,200	128,500
		N-80								1,693,000			
		C-90				6,050	2,780			1,797,000	29,100	86,800	144,500
		C-95				6,390	2,820			1,893,000	30,800	91,700	152,600
		P-110				7,400	2,880			2,221,000	35,600	106,100	176,600
		Q-125				8,410				2,463,000	40,500	120,600	200,700
16	75.00	J-55	0.438	15.124	14.936	2,630	1,020	17.000	N/A	1,200,000	12,600	50,300	87,900
		K-55								1,331,000			
		L-80				3,830				1,653,000	18,400	73,200	127,900
		N-80								1,686,000			
		C-90				4,310				1,815,000	20,700	82,300	143,900
		C-95				4,550				1,912,000	21,800	86,900	151,900
		P-110				5,270				2,236,000	25,300	100,600	175,900
		Q-125				5,990				2,495,000	28,700	114,300	199,900
16	84.00	J-55	0.495	15.010	14.822	2,980	1,410	17.000	N/A	1,351,000	17,500	62,600	107,600
		K-55								1,499,000			
		L-80				4,330	1,480			1,861,000	25,400	91,000	156,600
		N-80								1,898,000			
		C-90				4,870				2,0430,00	28,600	102,400	176,100
		C-95				5,140				2,153,000	30,200	108,100	185,900
		P-110				5,960				2,518,000	35,000	125,200	215,300
		Q-125				6,770				2,809,000	39,700	142,200	244,600
18-5/8	87.50	J-55	0.435	17.755	17.567	2,250	630	20.000	N/A	1,329,000	14,500	66,500	118,400
		K-55								1,427,000			
		L-80				3,270				1,863,000	21,100	96,700	172,200
		N-80								1,888,000			
		C-90				3,680				2,062,000	23,800	108,800	193,700
		C-95				3,880				2,173,000	25,000	114,700	204,400
		P-110				4,500				2,534,000	29,000	132,900	236,700
		Q-125				5,110				2,844,000	33,000	151,000	269,000
20	94.00	J-55	0.438	19.124	18.936	2,110	520	21.000	N/A	1,402,000	15,900	77,200	138,400
		K-55								1,479,000			
		L-80				3,070				1,985,000	23,200	112,300	201,300
		N-80								2,004,000			
		C-90				3,450				2,207,000	26,000	126,300	226,500
		C-95				3,640				2,327,000	27,500	133,300	239,100
		P-110				4,220				2,708,000	31,900	154,400	276,800
		Q-125				4,790				3,050,000	36,200	175,400	314,600

Data provided by Hunting Tubular Systems; CONVBTC-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible Buttress Connection (Continued)

Size	Wt	Grade	Pipe					Connection			Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Longitudinal Joint Strength	Make-Up Torque		
											Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	lb	ft-lb		
20	106.50	J-55	0.500	19.000	18.812	2,410	770	21.000	N/A	1,595,000	22,600	97,500	172,300
		K-55								1,683,000			
		L-80				3,500				2,259,000	32,900	141,800	250,700
		N-80								2,281,000			
		C-90				3,940				2,511,000	37,000	159,500	282,000
		C-95				4,160				2,649,000	39,100	168,400	297,600
		P-110				4,810				3,082,000	45,200	194,900	344,600
		Q-125				5,470				3,471,000	51,400	221,500	391,600
20	133.00	J-55	0.635	18.730	18.542	3,060	1,500	21.000	N/A	2,012,000	40,900	143,000	245,000
		K-55								2,123,000			
		L-80				4,450	1,600			2,849,000	59,500	208,000	356,400
		N-80				4,450				2,877,000			
		C-90				5,000				3,167,000	66,800	233,900	401,000
		C-95				5,280				3,340,000	70,600	246,900	423,200
		P-110				6,110				3,887,000	81,700	285,900	490,100
		Q-125				6,950				4,378,000	92,900	324,900	556,900

Data provided by Hunting Tubular Systems; CONVBTC-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible EUE 8 Round Connection Database

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
1-9/10	2.75	J-55	0.145	1.610	1.516	7,350	7,750	2.500	2.125	7,350	44,000	280	490	700
		L/N-80				10,680	11,280			10,680	64,000	410	715	1,020
		C-90				12,020	12,620			12,020	72,000	460	805	1,150
2-3/8	4.70	J-55	0.190	1.995	1.901	7,700	8,100	3.063	2.910	7,700	72,000	570	960	1,350
		L/N-80				11,200	11,780			11,200	104,000	820	1,390	1,960
		C-90				12,600	13,250			12,600	117,000	920	1,560	2,200
		C-95				13,300	13,980			13,300	124,000	980	1,655	2,330
		P-110				15,400	16,130			15,400	143,000	1,130	1,910	2,690
2-3/8	5.95	J-55	0.254	1.867	1.773	10,290	10,510	3.063	2.910	10,290	93,000	1,030	1,430	1,830
		L/N-80				14,970	15,280			14,970	135,000	1,490	2,075	2,660
		C-90				16,840	17,190			16,840	152,000	1,680	2,340	3,000
		C-95				17,780	18,150			17,780	161,000	1,770	2,465	3,160
		P-110				20,590	21,010			20,590	1860,00	2,060	2,860	3,660
2-7/8	6.50	J-55	0.217	2.441	2.347	7,260	7,680	3.668	3.460	7,260	100,000	880	1,545	2,210
		L/N-80				10,570	11,170			10,570	145,000	1,270	2,240	3,210
		C-90				11,890	12,390			11,890	163,000	1,430	2,520	3,610
		C-95				12,550	12,940			12,550	172,000	1,510	2,665	3,820
		P-110				14,530	14,550			14,530	199,000	1,750	3,085	4,420
2-7/8	7.90	J-55	0.276	2.323	2.229	9,240	9,550	3.668	3.460	9,240	124,000	1,440	2,150	2,860
		L/N-80				13,440	13,890			13,440	180,000	2,100	3,135	4,170
		C-90				15,120	15,620			15,120	203,000	2,360	3,525	4,690
		C-95				15,960	16,490			15,960	214,000	2,490	3,720	4,950
		P-110				18,480	19,090			18,480	248,000	2,890	4,310	5,730
2-7/8	8.70	J-55	0.308	2.259	2.165	10,310	10,520	3.668	3.460	10,310	137,000	1,800	2,500	3,200
		L/N-80				15,000	15,300			15,000	199,000	26,20	3,635	4,650
		C-90				16,870	17,220			16,870	224,000	2,950	4,095	5,240
		C-95				17,810	18,170			17,810	236,000	3,110	4,320	5,530
		P-110				20,620	21,040			20,620	273,000	3,600	5,000	6,400

Data provided by Hunting Tubular Systems; CONVEUE8-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible EUE 8 Round Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
3-1/2	9.30	J-55	0.254	2.992	2.867	6,990	7,400	4.500	4.180	6,990	142,000	1,560	2,825	4,090
		L/N-80				10,160	10,540			10,160	207,000	2,270	4,110	5,950
		C-90				11,430	11,570			11,430	233,000	2,550	4,620	6,690
		C-95				12,070	12,080			12,070	246,000	2,690	4,880	7,070
		P-110				13,970	13,530			13,970	285,000	3,120	5,650	8,180
3-1/2	10.30	J-55	0.289	2.922	2.797	7,950	8,330	4.500	4.180	7,950	160,000	2,030	3,350	4,670
		L/N-80				11,560	12,120			11,560	233,000	2,940	4,865	6,790
		C-90				13,010	13,640			13,010	262,000	3,310	5,475	7,640
		C-95				13,730	14,390			13,730	277,000	3,500	5,785	8,070
		P-110				15,900	16,670			15,900	321,000	4,050	6,695	9,340
3-1/2	12.95	J-55	0.375	2.750	2.625	10,310	10,520	4.500	4.180	10,310	202,000	3,390	4,705	6,020
		L/N-80				15,000	15,310			15,000	295,000	4,920	6,835	8,750
		C-90				16,880	17,220			16,880	331,000	5,540	7,695	9,850
		C-95				17,810	18,180			17,810	350,000	5,850	8,125	10,400
		P-110				20,630	21,050			20,630	405,000	6,770	9,405	12,040
4	11.00	J-55	0.262	3.476	3.351	6,300	6,590	5.000	4.594	6,300	169,000	1,870	3,650	5,430
		L/N-80				9,170	8,800			9,170	246,000	2,720	5,310	7,900
		C-90				10,320	9,600			10,320	277,000	3,060	5,975	8,890
		C-95				10,890	9,980			10,890	292,000	3,230	6,305	9,380
		P-110				12,610	11,060			12,610	338,000	3,740	7,305	10,870
4-1/2	12.75	J-55	0.271	3.958	3.833	5,800	5,730	5.563	5.094	5,800	198,000	2,220	4,620	7,020
		L/N-80				8,430	7,500			8,430	288,000	3,230	6,720	10,210
		C-90				9,490	8,120			9,490	324,000	3,630	7,560	11,490
		C-95				10,010	8,410			10,010	342,000	3,830	7,980	12,130
		P-110				11,590	9,210			11,590	396,000	4,440	9,240	14,040

Data provided by Hunting Tubular Systems; CONVEUE8-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible LTC Connection Database

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
4-1/2	11.60	J-55	0.250	4.000	3.875	5,350	4,960	5.000	4.875	5,350	162,000	600	1,350	2,100
		K-55									180,000			
		L-80				7,780	6,350			7,780	212,000	900	2,000	3,100
		N-80									223,000			
		C-90				8,750	6,820			8,750		1,000	2,250	3,500
		C-95				9,240	7,030			9,240	234,000	1,100	2,400	3,700
		P-110				10,690	7,580			10,690	279,000	1,300	2,800	4,300
		Q-125				12,150	8,000			12,150	301,000	1,400	3,150	4,900
4-1/2	12.60	J-55	0.271	3.958	3.833	5,800	5,730	5.000	4.875	5,800	180,000	900	1,800	2,700
		K-55									200,000			
		L-80				8,430	7,500			8,430	235,000	1,300	2,650	4,000
		N-80					7,500				248,000			
		C-90				9,490	8,120			9,490		1,400	2,950	4,500
		C-95				10,010	8,410			10,010	260,000	1,500	3,100	4,700
		P-110				11,590	9,210			11,590	310,000	1,700	3,600	5,500
		Q-125				13,170	9,890			13,170	335,000	2,000	4,100	6,200
4-1/2	13.50	J-55	0.290	3.920	3.795	6,200	6,420	5.000	4.875	6,200	196,000	1,100	2,150	3,200
		K-55									218,000			
		L-80				9,020	8,540			9,020	257,000	1,600	3,150	4,700
		N-80									270,000			
		C-90				10,150	9,300			10,150	270,000	1,800	3,550	5,300
		C-95				10,710	9,660			10,710	284,000	1,900	3,750	5,600

Data provided by Hunting Tubular Systems; CONVEUE8-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
4-1/2	13.50	P-110	0.290	3.920	3.795	12,410	10,690	5.000	4.875	12,410	338,000	2,200	4,350	6,500
		Q-125				14,100	11,600			14,100	365,000	2,500	4,950	7,400
4-1/2	15.10	J-55	0.337	3.826	3.701	7,210	7,620	5.000	4.875	7,210	236,000	1,800	3,150	4,500
		K-55									261,000			
		L-80				10,480	11,080			10,480	308,000	2,600	4,550	6,500
		N-80									325,000			
		C-90				11,800	12,220			11,800	325,000	2,900	5,150	7,400
		C-95				12,450	12,760			12,450	341,000	3,100	5,450	7,800
		P-110				14,420	14,340			14,420	406,000	3,500	6,250	9,000
		Q-125				16,380	15,830			16,380	438,000	4,000	7,100	10,200
5	13.00	J-55	0.253	4.494	4.369	4,870	4,140	5.563	5.375	4,870	182,000	600	1,500	2,400
		K-55									201,000			
		L-80				7,080	5,140			7,080	241,000	900	2,150	3,400
		N-80									254,000			
		C-90				7,970	5,430			7,970	254,000	1,000	2,400	3,800
		C-95				8,410	5,560			8,410	266,000	1,100	2,600	4,100
		P-110				9,740	5,840			9,740	317,000	1,200	2,950	4,700
		Q-125				11,070	6,050			11,070	342,000	1,400	3,350	5,300
5	15.00	J-55	0.296	4.408	4.283	5,700	5,560	5.563	5.375	5,700	223,000	1,200	2,500	3,800
		K-55									246,000			
		L-80				8,290	7,250			8,290	295,000	1,700	3,650	5,600
		N-80									311,000			
		C-90				9,320	7,830			9,320		2,000	4,150	6,300
		C-95				9,840	8,110			9,840	326,000	2,100	4,350	6,600
		P-110				11,400	8,850			11,400	388,000	2,400	5,050	7,700
		Q-125				12,950	9,480			12,950	420,000	2,700	5,700	8,700
5	18.00	J-55	0.362	4.276	4.151	6,970	7,390	5.563	5.375	6,970	284,000	2,300	4,150	6,000
		K-55									314,000			
		L-80				10,140	10,490			10,140	376,000	3,300	6,050	8,800
		N-80									396,000			
		C-90				11,400	11,520			11,400		3,700	6,750	9,800
		C-95				12,040	12,030			12,040	416,000	4,000	7,200	10,400
		P-110				13,940	13,470			13,940	495,000	4,600	8,300	12,000
		Q-125				15,840	14,820			15,840	535,000	5,200	9,450	13,700
5	21.40	J-55	0.437	4.126	4.001	8,410	8,770	5.563	5.375	8,410	352,000	3,900	6,150	8,400
		K-55									389,000			
		L-80				12,240	12,760			12,240	466,000	5,600	8,900	12,200
		N-80									490,000			
		C-90				13,770	14,360			13,770		6,300	10,000	13,700
		C-95				14,530	15,150			14,530	515,000	6,700	10,600	14,500
		P-110				16,820	17,550			16,820	612,000	7,700	12,250	16,800
		Q-125				19,120	19,940			19,120	662,000	8,800	13,950	19,100
5	23.20	J-55	0.478	4.044	3.919	9,200	9,510	5.563	5.375	9,200	388,000	4,800	7,200	9,600
		K-55									428,000			
		L-80				13,380	13,830			13,380	513,000	7,000	10,500	14,000
		N-80									540,000			
		C-90				15,060	15,560			15,060		7,900	11,850	15,800
		C-95				15,890	16,430			15,890	567,000	8,400	12,550	16,700
		P-110				18,400	19,020			18,400	675,000	9,700	14,500	19,300
		Q-125				20,910	21,620			20,910	729,000	11,000	16,450	21,900
5	24.10	J-55	0.500	4.000	3.875	9,630	9,900	5.563	5.375	9,630	407,000	5,400	7,850	10,300
		K-55									449,000			
		L-80				14,000	14,400			14,000	538,000	7,900	11,450	15,000
		N-80									567,000			
		C-90				15,750	16,200			15,750		8,900	12,900	16,900
		C-95				16,630	17,100			16,630	595,000	9,300	13,550	17,800
		P-110				19,250	19,800			19,250	708,000	10,800	15,700	20,600

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Hunting: Convertible LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
5	24.10	Q-125	0.500	4.000	3.875	21,880	22,500	5.563	5.375	21,880	765,000	12,300	17,850	23,400
5-1/2	15.50	J-55	0.275	4.950	4.825	4,810	4,040	6.050	5.875	4,810	217,000	900	2,250	3,600
		K-55									239,000			
		L-80				7,000	4,990			7,000	298,000	1,400	3,350	5,300
		N-80									306,000			
		C-90				7,880	5,260			7,880	313,000	1,500	3,700	5,900
		C-95				8,310	5,380			8,310	329,000	1,700	4,000	6,300
		P-110				9,630	5,630			9,630	392,000	1,900	4,600	7,300
		Q-125				10,940	5,890			10,940	423,000	2,200	5,200	8,200
5-1/2	17.00	J-55	0.304	4.892	4.767	5,320	4,910	6.050	5.875	5,320	247,000	1,400	3,100	4,800
		K-55									272,000			
		L-80				7,740	6,290			7,740	338,000	2,000	4,500	7,000
		N-80									348,000			
		C-90				8,710	6,740			8,710	356,000	2,300	5,100	7,900
		C-95				9,190	6,940			9,190	374,000	2,400	5,400	8,400
		P-110				10,640	7,480			10,640	445,000	2,800	6,250	9,700
		Q-125				12,090	7,890			12,090	481,000	3,200	7,100	11,000
5-1/2	20.00	J-55	0.361	4.778	4.653	6,320	6,620	6.050	5.875	6,320	304,000	2,500	4,850	7,200
		K-55									334,000			
		L-80				9,190	8,830			9,190	416,000	3,600	7,000	10,400
		N-80									428,000			
		C-90				10,340	9,630			10,340	438,000	4,000	7,850	11,700
		C-95				10,910	10,020			10,910	460,000	4,300	8,350	12,400
		P-110				12,640	11,100			12,640	548,000	4,900	9,600	14,300
		Q-125				14,360	12,080			14,360	592,000	5,600	10,950	16,300
5-1/2	23.00	J-55	0.415	4.670	4.545	7,260	7,670	6.050	5.875	7,260	356,000	3,700	6,500	9,300
		K-55								7,260	392,000			
		L-80				10,560	11,160			10,560	489,000	5,300	9,400	13,500
		N-80									502,000			
		C-90				11,880	12,380			11,880	514,000	6,000	10,600	15,200
		C-95				12,540	12,930			12,540	540,000	6,300	11,150	16,000
		P-110				14,530	14,540			14,530	643,000	7,400	13,000	18,600
		Q-125				16,510	16,060			16,510	694,000	8,400	14,750	21,100
6-5/8	20.00	J-55	0.288	6.049	5.924	4,180	2,970	7.390	7.000	4,180	266,000	1,200	3,300	5,400
		K-55									290,000			
		L-80				6,090	3,470			6,090	369,000	1,800	4,800	7,800
		N-80									375,000			
		C-90				6,850	3,700			6,850	405,000	2,000	5,400	8,800
		C-95				7,230	3,790			7,230	426,000	2,100	5,700	9,300
		P-110				8,370	4,030			8,370	500,000	2,500	6,650	10,800
		Q-125				9,510	4,170			9,510	547,000	2,800	7,500	12,200
6-5/8	24.00	J-55	0.352	5.921	5.796	5,110	4,560	7.390	7.000	5,110	340,000	2,600	5,950	9,300
		K-55									372,000			
		L-80				7,440	5,760			7,440	473,000	3,800	8,650	13,500
		N-80									481,000			
		C-90				8,370	6,140			8,370	520,000	4,200	9,700	15,200
		C-95				8,830	6,310			8,830	546,000	4,500	10,250	16,000
		P-110				10,230	6,730			10,230	641,000	5,200	11,900	18,600
		Q-125				11,620	7,020			11,620	702,000	5,900	13,500	21,100
6-5/8	28.00	J-55	0.417	5.791	5.666	6,060	6,170	7.390	7	6,060	415,000	4,300	8,700	13,100
		K-55									454,000			
		L-80				8,810	8,170			8,810	576,000	6,300	12,700	19,100
		N-80									586,000			
		C-90				9,910	8,880			9,910	633,000	7,100	14,300	21,500
		C-95				10,460	9,220			10,460	665,000	7,500	15,100	22,700
		P-110				12,120	10,160			12,120	781,000	8,700	17,500	26,300
		Q-125				13,770	10,990			13,770	855,000	9,800	19,800	29,800

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Hunting: Convertible LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
6-5/8	32.00	J-55	0.475	5.675	5.55	6,900	7,320	7.390	7	6,900	480,000	6,200	11,300	16,400
		K-55									525,000			
		L-80				10,040	10,320			10,040	666,000	9,000	16,450	23,900
		N-80									678,000			
		C-90				11,290	11,330			11,290	732,000	10,100	18,500	26,900
		C-95				11,920	11,820			11,920	769,000	10,700	19,550	28,400
		P-110				13,800	13,220			13,800	904,000	12,400	22,650	32,900
		Q-125				15,680	14,540			15,680	989,000	14,100	25,750	37,400
7	23.00	J-55	0.317	6.366	6.241	4,360	3,270	7.656	7.375	4,360	313,000	1,900	4,850	7,800
		K-55									341,000			
		L-80				6,340	3,830			6,340	435,000	2,700	7,000	11,300
		N-80									442,000			
		C-90				7,130	4,030			7,130	479,000	3,000	7,850	12,700
		C-95				7,530	4,140			7,530	505,000	3,200	8,300	13,400
		P-110				8,720	4,440			8,720	590,000	3,700	9,600	15,500
		Q-125				9,910	4,650			9,910	655,000	4,200	10,900	17,600
7	26.00	J-55	0.362	6.276	6.151	4,980	4,330	7.656	7.375	4,980	367,000	2,900	6,850	10,800
		K-55									401,000			
		L-80				7,240	5,410			7,240	511,000	4,300	10,000	15,700
		N-80									519,000			
		C-90				8,150	5,740			8,150	563,000	4,800	11,250	17,700
		C-95				8,600	5,890			8,600	593,000	5,100	11,900	18,700
		P-110				9,960	6,230			9,960	693,000	5,900	13,750	21,600
		Q-125				11,310	6,450			11,310	769,000	6,700	15,650	24,600
7	29.00	J-55	0.408	6.184	6.059	5,610	5,410	7.656	7.375	5,610	423,000	4,300	9,100	13,900
		K-55									461,000			
		L-80				8,160	7,030			8,160	587,000	6,200	13,200	20,200
		N-80									597,000			
		C-90				9,180	7,580			9,180	648,000	6,900	14,800	22,700
		C-95				9,690	7,840			9,690	683,000	7,300	15,650	24,000
		P-110				11,220	8,530			11,220	797,000	8,500	18,100	27,700
		Q-125				12,750	9,110			12,750	885,000	9,600	20,550	31,500
7	32.00	J-55	0.453	6.094	5.969	6,230	6,460	7.656	7.375	6,230	476,000	5,700	11,250	16,800
		K-55									519,000			
		L-80				9,060	8,600			9,060	661,000	8,300	16,350	24,400
		N-80									672,000			
		C-90				10,190	9,380			10,190	729,000	9,300	18,400	27,500
		C-95				10,760	9,740			10,760	768,000	9,900	19,450	29,000
		P-110				12,460	10,780			12,460	897,000	11,400	22,500	33,600
		Q-125				14,160	11,710			14,160	996,000	13,000	25,600	38,200
7	35.00	J-55	0.498	6.004	5.879	6,850	7,270	7.656	7.375	6,850	528,000	7,400	13,550	19,700
		K-55									576,000			
		L-80				9,960	10,180			9960	734,000	10,700	19,650	28,600
		N-80									746,000			
		C-90				11,210	11,170			11,210	809,000	12,000	22,100	32,200
		C-95				11,830	11,650			11,830	853,000	12,700	23,350	34,000
		P-110				13,700	13,030			13,700	996,000	14,700	27,000	39,300
		Q-125				15,560	14,310			15,560	1,106,000	16,700	30,700	44,700
7	38.00	J-55	0.540	5.920	5.795	7,430	7,830	7.656	7.375	7,430	576,000	9,000	15,650	22,300
		K-55									629,000			
		L-80				10,800	11,390			10,800	801,000	13,100	22,750	32,400
		N-80									814,000			
		C-90				12,150	12,810			12,150	883,000	14,800	25,650	36,500
		C-95				12,830	13,430			12,830	931,000	15,600	27,050	38,500
		P-110				14,850	15,130			14,850	1,087,000	18,100	31,350	44,600
		Q-125				16,880	16,740			16,880	1,207,000	20,500	35,550	50,600

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Hunting: Convertible LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
7-5/8	26.40	J-55	0.328	6.969	6.844	4,140	2,900	8.500	8.125	4,140	346,000	2,200	6,000	9,800
		K-55									377,000			
		L-80				6,020	3,400			6,020	482,000	3,200	8,750	14,300
		N-80									490,000			
		C-90				6,780	3,610			6,780	532,000	3,600	9,850	16,100
		C-95				7,150	3,710			7,150	560,000	3,800	10,400	17,000
		P-110				8,280	3,920			8,280	654,000	4,400	12,050	19,700
		Q-125				9,410	4,050			9,410	733,000	5,000	13,650	22,300
7-5/8	29.70	J-55	0.375	6.875	6.750	4,730	3,910	8.500	8.125	4,730	407,000	3,500	8,550	13,600
		K-55									443,000			
		L-80				6,890	4,790			6,890	567,000	5,100	12,450	19,800
		N-80									575,000			
		C-90				7,750	5,030			7,750	625,000	5,800	14,050	22,300
		C-95				8,180	5,130			8,180	659,000	6,100	14,800	23,500
		P-110				9,470	5,350			9,470	769,000	7,100	17,200	27,300
		Q-125				10,760	5,670			10,760	861,000	8,000	19,500	31,000
7-5/8	33.70	J-55	0.430	6.765	6.640	5,430	5,100	8.500	8.125	5,430	477,000	5,300	11,650	18,000
		K-55									519,000			
		L-80				7,900	6,560			7,900	664,000	7,800	17,000	26,200
		N-80									674,000			
		C-90				8,880	7,050			8,880	733,000	8,700	19,050	29,400
		C-95				9,380	7,280			9,380	772,000	9,200	20,150	31,100
		P-110				10,860	7,870			10,860	901,000	10,700	23,350	36,000
		Q-125				12,340	8,340			12,340	1,009,000	12,100	26,500	40,900
7-5/8	39.00	J-55	0.500	6.625	6.500	6,310	6,610	8.500	8.125	6,310	564,000	8,100	15,750	23,400
		K-55									614,000			
		L-80				9,180	8,820			9,180	786,000	11,700	22,850	34,000
		N-80									798,000			
		C-90				10,330	9,620			10,330	867,000	13,200	25,750	38,300
		C-95				10,900	10,000			10,900	914,000	13,900	27,150	40,400
		P-110				12,620	11,080			12,620	1,066,000	16,100	31,450	46,800
		Q-125				14,340	12,060			14,340	1,194,000	18,300	35,700	53,100
7-5/8	42.80	J-55	0.562	6.501	6.376	7,090	7,510	8.500	8.125	7,090	640,000	10,800	19,400	28,000
		K-55									696,000			
		L-80				10,320	10,810			10,320	891,000	15,800	28,300	40,800
		N-80									906,000			
		C-90				11,610	11,890			11,610	984,000	17,800	31,850	45,900
		C-95				12,250	12,410			12,250	1,037,000	18,700	33,550	48,400
		P-110				14,190	13,930			14,190	1,210,000	21,700	38,850	56,000
		Q-125				16,120	15,350			16,120	1,355,000	24,600	44,150	63,700
7-5/8	45.30	J-55	0.595	6.435	6.31	7,510	7,910	8.500	8.125	7,510	680,000	12,500	21,450	30,400
		K-55									740,000			
		L-80				10,920	11,510			10,920	947,000	18,100	31,200	44,300
		N-80									962,000			
		C-90				12,290	12,950			12,290	1,045,000	20,400	35,100	49,800
		C-95				12,970	13,670			12,970	1,101,000	21,500	37,050	52,600
		P-110				15,020	15,440			15,020	1,285,000	24,900	42,900	60,900
		Q-125				17,070	17,100			17,070	1,439,000	28,300	48,750	69,200
7-5/8	47.10	J-55	0.625	6.375	6.25	7,890	8,280	8.500	8.125	7,890	716,000	14,000	23,300	32,600
		K-55									779,000			
		L-80				11,480	12,040			11,480	997,000	20,400	33,900	47,400
		N-80									1,013,000			
		C-90				12,910	13,540			12,910	1,100,000	23,000	38,200	53,400
		C-95				13,630	14,300			13,630	1,159,000	24,200	40,250	56,300
		P-110				15,780	16,550			15,780	1,353,000	28,100	46,650	65,200
		Q-125				17,930	18,700			17,930	1,515,000	31,900	53,000	74,100

Data provided by Hunting Tubular Systems; CONVEUE8-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
8-5/8	32.00	J-55	0.352	7.921	7.796	3,930	2,530	9.625	9.125	3,930	417,000	3,000	8,450	13,900
		K-55									452,000			
		L-80				5,710	3,050			5,710	583,000	4,300	12,300	20,300
		N-80									591,000			
		C-90				6,430	3,210			6,430	643,000	4,900	13,850	22,800
		C-95				6,780	3,280			6,780	678,000	5,200	14,650	24,100
		P-110				7,860	3,420			7,860	791,000	6,000	16,950	27,900
		Q-125				8,930	3,470			8,930	887,000	6,800	19,250	31,700
8-5/8	36.00	J-55	0.400	7.825	7.700	4,460	3,450	9.625	9.125	4,460	486,000	4,600	11,750	18,900
		K-55									526,000			
		L-80				6,490	4,100			6,490	678,000	6,700	17,100	27,500
		N-80									688,000			
		C-90				7,300	4,250			7,300	749,000	7,500	19,250	31,000
		C-95				7,710	4,350			7,710	789,000	8,000	20,350	32,700
		P-110				8,930	4,690			8,930	921,000	9,200	23,500	37,800
		Q-125				10,140	4,930			10,140	1,032,000	10,500	26,750	43,000
8-5/8	40.00	J-55	0.450	7.725	7.600	5,020	4,400	9.625	9.125	5,020	556,000	6,600	15,300	24,000
		K-55									603,000			
		L-80				7,300	5,520			7,300	776,000	9,600	22,250	34,900
		N-80									788,000			
		C-90				8,220	5,870			8,220	858,000	10,800	25,050	39,300
		C-95				8,670	6,020			8,670	904,000	11,400	26,450	41,500
		P-110				10,040	6,390			10,040	1,055,000	13,100	30,550	48,000
		Q-125				11,410	6,630			11410	1,182,000	15,000	34,800	54,600
8-5/8	44.00	J-55	0.500	7.625	7.500	5,580	5,360	9.625	9.125	5,580	626,000	8,800	18,900	29,000
		K-55									678,000			
		L-80				8,120	6,950			8,120	874,000	12,800	27,500	42,200
		N-80									887,000			
		C-90				9,130	7,490			9,130	965,000	14,500	31,000	47,500
		C-95				9,640	7,740			9,640	1,017,000	15,300	32,700	50,100
		P-110				11,160	8,420			11,160	1,186,000	17,700	37,900	58,100
		Q-125				12,680	8,980			12,680	1,330,000	20,100	43,050	66,000
8-5/8	49.00	J-55	0.557	7.511	7.386	6,220	6,440	9.625	9.125	6,220	704,000	11,700	23,150	34,600
		K-55									763,000			
		L-80				9,040	8,570			9,040	983,000	17,100	33,750	50,400
		N-80									997,000			
		C-90				10,170	9,340			10,170	1,085,000	19,200	37,950	56,700
		C-95				10,740	9,700			10,740	1,144,000	20,300	40,050	59,800
		P-110				12,430	10,730			12,430	1,335,000	23,500	46,350	69,200
		Q-125				14,130	11,660			14,130	1,496,000	26,700	52,700	78,700
9-5/8	36.00	J-55	0.352	8.921	8.765	3,520	2,020	10.625	10.125	3,520	453,000	3,100	9,750	16,400
		K-55									489,000			
		L-80				5,120	2,370			5,120	634,000	4,600	14,250	23,900
		N-80									643,000			
		C-90				5,760	2,440			5,760	700,000	5,200	16,050	26,900
		C-95				6,080	2,460			6,080	738,000	5,500	16,950	28,400
		P-110				7,040	2,470			7,040	861,000	6,300	19,550	32,800
		Q-125				8,000				8,000	966,000	7,200	22,250	37,300
9-5/8	40.00	J-55	0.395	8.835	8.679	3,950	2,570	10.625	10.125	3,950	520,000	4,700	13,350	22,000
		K-55									561,000			
		L-80				5,750	3,090			5,750	727,000	6,900	19,500	32,100
		N-80									737,000			
		C-90				6,460	3,260			6,460	804,000	7,800	21,950	36,100
		C-95				6,820	3,330			6,820	847,000	8,200	23,150	38,100
		P-110				7,900	3,470			7,900	988,000	9,500	26,800	44,100
		Q-125				8,980	3,530			8,980	1,108,000	10,800	30,450	50,100

Data provided by Hunting Tubular Systems; CONVEUE8-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: Convertible LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
9-5/8	43.50	J-55	0.435	8.755	8.599	4,350	3,250	10.625	10.125	4,350	582,000	6,500	16,850	27,200
		K-55									628,000			
		L-80				6,330	3,810			6,330	813,000	9,400	24,500	39,600
		N-80									825,000			
		C-90				7,120	4,010			7,120	899,000	10,600	27,550	44,500
		C-95				7,510	4,130			7,510	948,000	11,100	29,050	47,000
		P-110				8,700	4,420			8,700	1,105,000	12,900	33,650	54,400
		Q-125				9,890	4,620			9,890	1,240,000	14,700	38,250	61,800
9-5/8	47.00	J-55	0.472	8.681	8.525	4,720	3,890	10.625	10.125	4,720	638,000	8,200	20,050	31,900
		K-55									689,000			
		L-80				6,870	4,750			6,870	893,000	12,000	29,200	46,400
		N-80									905,000			
		C-90				7,720	4,990			7,720	987,000	13,500	32,900	52,300
		C-95				8,150	5,090			8,150	1,040,000	14,200	34,700	55,200
		P-110				9,440	5,300			9,440	1,213,000	16,500	40,200	63,900
		Q-125				10,730	5,630			10,730	1,361,000	18,700	45,650	72,600
9-5/8	53.50	J-55	0.545	8.535	8.379	5,450	5,130	10.625	10.125	5,450	748,000	12,200	26,650	41,100
		K-55									808,000			
		L-80				7,930	6,620			7,930	1,047,000	17,800	38,750	59,700
		N-80									1,062,000			
		C-90				8,920	7,110			8,920	1,157,000	20,000	43,600	67,200
		C-95				9,410	7,340			9,410	1,220,000	21,100	46,000	70,900
		P-110				10,900	7,950			10,900	1,422,000	24,400	53,300	82,200
		Q-125				12,390	8,440			12,390	1,595,000	27,800	60,600	93,400
9-5/8	58.40	J-55	0.595	8.435	8.279	5,950	5,990	10.625	10.125	5,950	823,000	14,000	28,500	43,000
		K-55									888,000			
		L-80				8,650	7,890			8,650	1,151,000	20,300	41,400	62,500
		N-80									1,167,000			
		C-90				9,740	8,570			9,740	1,272,000	22,800	46,550	70,300
		C-95				10,280	8,890			10,280	1,341,000	24,100	49,150	74,200
		P-110				11,900	9,770			11,900	1,564,000	27,900	56,900	85,900
		Q-125				13,520	10,540			13,520	1,754,000	31,700	64,650	97,600
20	94.00	J-55	0.438	19.124	18.936	2,110	520	21.000	N/A	2,110	907,000	13,200	64000	114,800
		K-55									955,000			
		L-80				3,070				3,070	1,285,000	19,200	93,100	167,000
		N-80									1,297,000			
		C-90				3,450				3,450	1,429,000	21,600	104,750	187,900
		C-95				3,640				3,640	1,507,000	22,800	110,550	198,300
		P-110				4,220				4,220	1,753,000	26,400	128,000	2296,00
		Q-125				4,790				4,790	1,976,000	30,000	145,500	261,000
20	106.50	J-55	0.500	19.000	18.812	2,410	770	21.000	N/A	2,410	1,057,000	19,900	85,500	151,100
		K-55									1,113,000			
		L-80				3,500				3,500	1,498,000	28,800	124,300	219,800
		N-80									1,512,000			
		C-90				3,940				3,940	1,665,000	32,500	139,900	247,300
		C-95				4,160				4,160	1,756,000	34,300	147,650	261,000
		P-110				4,810				4,810	2,043,000	39,600	170,900	302,200
		Q-125				5,470				5,470	2,302,000	45,100	194,250	343,400
20	133.00	J-55	0.635	18.730	18.542	3,060	1,500	21.000	N/A	3,060	1,380,000	38,200	133,550	228,900
		K-55									1,453,000			
		L-80				4,450	1,600			4,450	1,955,000	55,600	194,300	333,000
		N-80									1974000			
		C-90				5,000				5,000	2,175,000	62,400	218,500	374,600
		C-95				5,280				5,280	2,293,000	65,900	230,650	395,400
		P-110				6,110				6,110	2,668,000	76,300	267,100	457,900
		Q-125				6,950				6,950	3,006,000	86,800	303,550	520,300

Data provided by Hunting Tubular Systems; CONVEUE8-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: MMS EUE 8 Round Connection Database

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
2-3/8	4.70	J-55	0.190	1.995	1.901	7,700	8,100	3.063	2.910	7700	72000	650	1290	1940
		L/N-80				11,200	11,780			11200	104000	880	1760	2640
		C-90				12,600	13,250			12600	117000	960	1920	2880
		C-95				13,300	13,980			13300	124000	1020	2030	3050
		P-110				15,400	16,130			15400	143000	1190	2380	3570
2-3/8	5.95	J-55	0.254	1.867	1.773	10,290	10,510	3.063	2.910	10290	93000	810	1610	2420
		L/N-80				14,970	15,280			14970	135000	1100	2190	3290
		C-90				16,840	17,190			16840	152000	1200	2390	3590
		C-95				17,780	18,150			17780	161000	1260	2520	3780
		P-110				20,590	21,010			20590	186000	1480	2950	4430
2-7/8	6.50	J-55	0.217	2.441	2.347	7,260	7,680	3.668	3.460	7260	100000	830	1650	2480
		L/N-80				10,570	11,170			10570	145000	1130	2250	3380
		C-90				11,890	12,390			11890	163000	1230	2460	3690
		C-95				12,550	12,940			12550	172000	1300	2600	3900
		P-110				14,530	14,550			14530	199000	1520	3040	4560
2-7/8	7.90	J-55	0.276	2.323	2.229	9,240	9,550	3.668	3.460	9240	124000	990	1980	2970
		L/N-80				13,440	13,890			13,440	180,000	1,360	2,710	4,070
		C-90				15,120	15,620			15,120	203,000	1,490	2,970	4,460
		C-95				15,960	16,490			15,960	214,000	1,560	3,120	4,680
		P-110				18,480	19,090			18,480	248,000	1,830	3,660	5,490
2-7/8	8.70	J-55	0.308	2.259	2.165	10,310	10,520	3.668	3.460	10,310	137,000	1,080	2,160	3,240
		L/N-80				15,000	15,300			15,000	199,000	1,480	2,950	4,430
		C-90				16,870	17,220			16,870	224,000	1,620	3,230	4,850
		C-95				17,810	18,170			17,810	236,000	1,700	3,400	5,100
		P-110				20,620	21,040			20,620	273,000	1,990	3,980	5,970
3-1/2	9.30	J-55	0.254	2.992	2.867	6,990	7,400	4.500	4.180	6,990	142,000	1,140	2,280	3,420
		L/N-80				10,160	10,540			10,160	207,000	1,570	3,130	4,700
		C-90				11,430	11,570			11,430	233,000	1,720	3,430	5,150
		C-95				12,070	12,080			12,070	246,000	1,810	3,620	5,430
		P-110				13,970	13,530			13,970	285,000	2,120	4,230	6,350
3-1/2	10.30	J-55	0.289	2.922	2.797	7,950	8,330	4.500	4.180	7,950	160,000	1,260	2,510	3,770
		L/N-80				11,560	12,120			11,560	233,000	1,730	3,450	5,180
		C-90				13,010	13,640			13,010	262,000	1,890	3,780	5,670
		C-95				13,730	14,390			13,730	277,000	1,990	3,980	5,970
		P-110				15,900	16,670			15,900	321,000	2,330	4,660	6,990
3-1/2	12.95	J-55	0.375	2.750	2.625	10,310	10,520	4.500	4.180	10,310	203,000	1,530	3,060	4,590
		L/N-80				15,000	15,310			15,000	295,000	2,100	4,200	6,300
		C-90				16,880	17,220			16,880	331,000	2,310	4,610	6,920
		C-95				17,810	18,180			17,810	350,000	2,430	4,850	7,280
		P-110				20,630	21,050			20,630	405,000	2,840	5,680	8,520
4	11.00	J-55	0.262	3.476	3.351	6,300	6,590	5.000	4.594	6,300	169,000	1,280	2,560	3,840
		L/N-80				9,170	8,800			9,170	246,000	1,770	3,530	5,300
		C-90				10,320	9,600			10,320	277,000	1,940	3,870	5,810
		C-95				10,890	9,980			10,890	292,000	2,040	4,080	6,120
		P-110				12,610	11,060			12,610	338,000	2,390	4,770	7,160
4-1/2	12.75	J-55	0.271	3.958	3.833	5,800	5,730	5.563	5.094	5,800	198,000	1,430	2,860	4,290
		L/N-80				8,430	7,500			8,430	288,000	1,970	3,940	5,910
		C-90				9,490	8,120			9,490	324,000	2,170	4,330	6,500
		C-95				10,010	8,410			10,010	342,000	2,280	4,560	6,840
		P-110				11,590	9,210			11,590	396,000	2,670	5,340	8,010

Data provided by Hunting Tubular Systems; MMSEUE8R-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005

Hunting: TKC MMS LTC Connection Database

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
4-1/2	11.60	J-55	0.250	4.000	3.875	5,350	4,960	5.000	4.875	5,350	162,000	810	1,620	2,430
		K-55									180,000	900	1,800	2,700
		L-80				7,780	6,350			7,780	212,000	1,115	2,230	3,345
		N-80									223,000	1,140	2,280	3,420
		C-90				8,750	6,820			8,750		1,225	2,450	3,675
		C-95				9,240	7,030			9,240	234,000	1,290	2,580	3,870
		P-110				10,690	7,580			10,690	279,000	1,510	3,020	4,530
		Q-125				12,150	8,000			12,150	301,000	1,685	3,370	5,055
4-1/2	12.60	J-55	0.271	3.958	3.833	5,800	5,730	5.000	4.875	5,800	180,000	900	1,800	2,700
		K-55									200,000	1,000	2,000	3,000
		L-80				8,430	7,500			8,430	235,000	1,240	2,480	3,720
		N-80									248,000	1,265	2,530	3,795
		C-90				9,490	8,120			9,490	248,000	1,365	2,730	4,095
		C-95				10,010	8,410			10,010	260,000	1,435	2,870	4,305
		P-110				11,590	9,210			11,590	310,000	1,680	3,360	5,040
		Q-125				13,170	9,890			13,170	335,000	1,875	3,750	5,625
4-1/2	13.50	J-55	0.290	3.920	3.795	6,200	6,420	5.000	4.875	6,200	196,000	980	1,960	2,940
		K-55									218,000	1,090	2,180	3,270
		L-80				9,020	8,540			9,020	257,000	1,355	2,710	4,065
		N-80				9,020	8,540			9,020	270,000	1,380	2,760	4,140
		C-90				10,150	9,300			10,150	270,000	1,485	2,970	4,455
		C-95				10,710	9,660			10,710	284,000	1,565	3,130	4,695
		P-110				12,410	10,690			12,410	338,000	1,830	3,660	5,490
		Q-125				14,100	11,600			14,100	365,000	2,045	4,090	6,135
4-1/2	15.10	J-55	0.337	3.826	3.701	7,210	7,620	5.000	4.875	7,210	236,000	1,180	2,360	3,540
		K-55									261,000	1,305	2,610	3,915
		L-80				10,480	11,080			10,480	308,000	1,625	3,250	4,875
		N-80									325,000	1,655	3,310	4,965
		C-90				11,800	12,220			11,800	325,000	1,785	3,570	5,355
		C-95				12,450	12,760			12,450	341,000	1,880	3,760	5,640
		P-110				14,420	14,340			14,420	406,000	2,200	4,400	6,600
		Q-125				16,380	15,830			16,380	438,000	2,455	4,910	7,365
5	13.00	J-55	0.253	4.494	4.369	4,870	4,140	5.563	5.375	4,870	182,000	910	1,820	2,730
		K-55									201,000	1,005	2,010	3,015
		L-80				7,080	5,140			7,080	241,000	1,255	2,510	3,765
		N-80									254,000	1,280	2,560	3,840
		C-90				7,970	5,430			7,970		1,380	2,760	4,140
		C-95				8,410	5,560			8,410	266,000	1,455	2,910	4,365
		P-110				9,740	5,840			9,740	317,000	1,700	3,400	5,100
		Q-125				11,070	6,050			11,070	342,000	1,900	3,800	5,700
5	15.00	J-55	0.296	4.408	4.283	5,700	5,560	5.563	5.375	5,700	223,000	1,115	2,230	3,345
		K-55									246,000	1,230	2,460	3,690
		L-80				8,290	7,250			8,290	295,000	1,540	3,080	4,620
		N-80									311,000	1,570	3,140	4,710
		C-90				9,320	7,830			9,320		1,690	3,380	5,070
		C-95				9,840	8,110			9,840	326,000	1,780	3,560	5,340
		P-110				11,400	8,850			11,400	388,000	2,085	4,170	6,255
		Q-125				12,950	9,480			12,950	420,000	2,325	4,650	6,975

Data provided by Hunting Tubular Systems; MMSEUE8R-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005.

Hunting: TKC MMS LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
5	18.00	J-55	0.362	4.276	4.151	6,970	7,390	5.563	5.375	6,970	284,000	1,420	2,840	4,260
		K-55									314,000	1,570	3,140	4,710
		L-80				10,140	10,490			10,140	376,000	1,965	3,930	5,895
		N-80									396,000	2,000	4,000	6,000
		C-90				11,400	11,520			11,400		2,155	4,310	6,465
		C-95				12,040	12,030			12,040	416,000	2,275	4,550	6,825
		P-110				13,940	13,470			13,940	495,000	2,655	5,310	7,965
		Q-125				15,840	14,820			15,840	535,000	2,965	5,930	8,895
5	21.40	J-55	0.437	4.126	4.001	8,410	8,770	5.563	5.375	8,410	352,000	1,760	3,520	5,280
		K-55				8,410	8,770			8,410	389,000	1,945	3,890	5,835
		L-80				12,240	12,760			12,240	466,000	2,430	4,860	7,290
		N-80									490,000	2,475	4,950	7,425
		C-90				13,770	14,360			13,770		2,670	5,340	8,010
		C-95				14,530	15,150			14,530	515,000	2,810	5,620	8,430
		P-110				16,820	17,550			16,820	612,000	3,290	6,580	9,870
		Q-125				19,120	19,940			19,120	662,000	3,670	7,340	11,010
5	23.20	J-55	0.478	4.044	3.919	9,200	9,510	5.563	5.375	9,200	388,000	1,940	3,880	5,820
		K-55									428,000	2,140	4,280	6,420
		L-80				13,380	13,830			13,380	513,000	2,675	5,350	8,025
		N-80									540,000	2,725	5,450	8,175
		C-90				15,060	15,560			15,060		2,940	5,880	8,820
		C-95				15,890	16,430			15,890	567,000	3,100	6,200	9,300
		P-110				18,400	19,020			18,400	675,000	3,625	7,250	10,875
		Q-125				20,910	21,620			20,910	729,000	4,045	8,090	12,135
5	24.10	J-55	0.500	4.000	3.875	9,630	9,900	5.563	5.375	9,630	407,000	2,035	4,070	6,105
		K-55									449,000	2,245	4,490	6,735
		L-80				14,000	14,400			14,000	538,000	2,805	5,610	8,415
		N-80									567,000	2,860	5,720	8,580
		C-90				15,750	16,200			15,750	567,000	3,085	6,170	9,255
		C-95				16,630	17,100			16,630	595,000	3,250	6,500	9,750
		P-110				19,250	19,800			19,250	708,000	3,800	7,600	11,400
		Q-125				21,880	22,500			21,880	765,000	4,245	8,490	12,735
5-1/2	15.50	J-55	0.275	4.950	4.825	4,810	4,040	6.050	5.875	4,810	217,000	1,085	2,170	3,255
		K-55									239,000	1,195	2,390	3,585
		L-80				7,000	4,990			7,000	298,000	1,505	3,010	4,515
		N-80									306,000	1,530	3,060	4,590
		C-90				7,880	5,260			7,880	313,000	1,655	3,310	4,965
		C-95				8,310	5,380			8,310	329,000	1,740	3,480	5,220
		P-110				9,630	5,630			9,630	392,000	2,035	4,070	6,105
		Q-125				10,940	5,890			10,940	423,000	2,275	4,550	6,825
5-1/2	17.00	J-55	0.304	4.892	4.767	5,320	4,910	6.050	5.875	5,320	247,000	1,235	2,470	3,705
		K-55									272,000	1,360	2,720	4,080
		L-80				7,740	6,290			7,740	338,000	1,705	3,410	5,115
		N-80									348,000	1,740	3,480	5,220
		C-90				8,710	6,740			8,710	356,000	1,875	3,750	5,625
		C-95				9,190	6,940			9,190	374,000	1,980	3,960	5,940
		P-110				10,640	7,480			10,640	445,000	2,310	4,620	6,930
		Q-125				12,090	7,890			12,090	481,000	2,585	5,170	7,755

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Hunting: TKC MMS LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
5-1/2	20.00	J-55	0.361	4.778	4.653	6,320	6,620	6.050	5.875	6,320	304,000	1,520	3,040	4,560
		K-55									334,000	1,670	3,340	5,010
		L-80				9,190	8,830			9,190	416,000	2,100	4,200	6,300
		N-80									428,000	2,140	4,280	6,420
		C-90				10,340	9,630			10,340	438,000	2,310	4,620	6,930
		C-95				10,910	10,020			10,910	460,000	2,435	4,870	7,305
		P-110				12,640	11,100			12,640	548,000	2,845	5,690	8,535
		Q-125				14,360	12,080			14,360	592,000	3,180	6,360	9,540
5-1/2	23.00	J-55	0.415	4.670	4.545	7,260	7,670	6.050	5.875	7,260	356,000	1,780	3,560	5,340
		K-55									392,000	1,960	3,920	5,880
		L-80				10,560	11,160			10,560	489,000	2,465	4,930	7,395
		N-80									502,000	2,510	5,020	7,530
		C-90				11,880	12,380			11,880	514,000	2,715	5,430	8,145
		C-95				12,540	12,930			12,540	540,000	2,860	5,720	8,580
		P-110				14,530	14,540			14,530	643,000	3,340	6,680	10,020
		Q-125				16,510	16,060			16,510	694,000	3,735	7,470	11,205
6-5/8	20.00	J-55	0.288	6.049	5.924	4,180	2,970	7.390	7.000	4,180	266,000	1,330	2,660	3,990
		K-55									290,000	1,450	2,900	4,350
		L-80				6,090	3,470			6,090	369,000	1,845	3,690	5,535
		N-80									375,000	1,875	3,750	5,625
		C-90				6,850	3,700			6,850	405,000	2,030	4,060	6,090
		C-95				7,230	3,790			7,230	426,000	2,140	4,280	6,420
		P-110				8,370	4,030			8,370	500,000	2,500	5,000	7,500
		Q-125				9,510	4,170			9,510	547,000	2,795	5,590	8,385
6-5/8	24.00	J-55	0.352	5.921	5.796	5,110	4,560	7.390	7.000	5,110	340,000	1,700	3,400	5,100
		K-55									372,000	1,860	3,720	5,580
		L-80				7,440	5,760			7,440	473,000	2,365	4,730	7,095
		N-80									481,000	2,405	4,810	7,215
		C-90				8,370	6,140			8,370	520,000	2,605	5,210	7,815
		C-95				8,830	6,310			8,830	546,000	2,745	5,490	8,235
		P-110				10,230	6,730			10,230	641,000	3,205	6,410	9,615
		Q-125				11,620	7,020			11,620	702,000	3,585	7,170	10,755
6-5/8	28.00	J-55	0.417	5.791	5.666	6,060	6,170	7.390	7.000	6,060	415,000	2,075	4,150	6,225
		K-55									454,000	2,270	4,540	6,810
		L-80				8,810	8,170			8,810	576,000	2,880	5,760	8,640
		N-80									586,000	2,930	5,860	8,790
		C-90				9,910	8,880			9,910	633,000	3,175	6,350	9,525
		C-95				10,460	9,220			10,460	665,000	3,345	6,690	10,035
		P-110				12,120	10,160			12,120	781,000	3,905	7,810	11,715
		Q-125				13,770	10,990			13,770	855,000	4,370	8,740	13,110
6-5/8	32.00	J-55	0.475	5.675	5.550	6,900	7,320	7.390	7.000	6,900	480,000	2,400	4,800	7,200
		K-55									525,000	2,625	5,250	7,875
		L-80				10,040	10,320			10,040	666,000	3,330	6,660	9,990
		N-80									678,000	3,390	6,780	10,170
		C-90				11,290	11,330			11,290	732,000	3,670	7,340	11,010
		C-95				11,920	11,820			11,920	769,000	3,870	7,740	11,610
		P-110				13,800	13,220			13,800	904,000	4,520	9,040	13,560
		Q-125				15,680	14,540			15,680	989,000	5,055	10,110	15,165

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Hunting: TKC MMS LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
7	23.00	J-55	0.317	6.366	6.241	4,360	3,270	7.656	7.375	4,360	313,000	1,565	3,130	4,695
		K-55									341,000	1,705	3,410	5,115
		L-80				6,340	3,830			6,340	435,000	2,175	4,350	6,525
		N-80									442,000	2,210	4,420	6,630
		C-90				7,130	4,030			7,130	479,000	2,395	4,790	7,185
		C-95				7,530	4,140			7,530	505,000	2,525	5,050	7,575
		P-110				8,720	4,440			8,720	590,000	2,950	5,900	8,850
		Q-125				9,910	4,650			9,910	655,000	3,300	6,600	9,900
7	26.00	J-55	0.362	6.276	6.151	4,980	4,330	7.656	7.375	4,980	367,000	1,835	3,670	5,505
		K-55									401,000	2,005	4,010	6,015
		L-80				7,240	5,410			7,240	511,000	2,555	5,110	7,665
		N-80									519,000	2,595	5,190	7,785
		C-90				8,150	5,740			8,150	563,000	2,815	5,630	8,445
		C-95				8,600	5,890			8,600	593,000	2,965	5,930	8,895
		P-110				9,960	6,230			9,960	693,000	3,465	6,930	10,395
		Q-125				11,310	6,450			11,310	769,000	3,880	7,760	11,640
7	29.00	J-55	0.408	6.184	6.059	5,610	5,410	7.656	7.375	5,610	423,000	2,115	4,230	6,345
		K-55									461,000	2,305	4,610	6,915
		L-80				8,160	7,030			8,160	587,000	2,935	5,870	8,805
		N-80									597,000	2,985	5,970	8,955
		C-90				9,180	7,580			9,180	648,000	3,240	6,480	9,720
		C-95				9,690	7,840			9,690	683,000	3,415	6,830	10,245
		P-110				11,220	8,530			11,220	797,000	3,985	7,970	11,955
		Q-125				12,750	9,110			12,750	885,000	4,460	8,920	13,380
7	32.00	J-55	0.453	6.094	5.969	6,230	6,460	7.656	7.375	6,230	476,000	2,380	4,760	7,140
		K-55									519,000	2,595	5,190	7,785
		L-80				9,060	8,600			9,060	661,000	3,305	6,610	9,915
		N-80									672,000	3,360	6,720	10,080
		C-90				10,190	9,380			10,190	729,000	3,645	7,290	10,935
		C-95				10,760	9,740			10,760	768,000	3,840	7,680	11,520
		P-110				12,460	10,780			12,460	897,000	4,485	8,970	13,455
		Q-125				14,160	11,710			14,160	996,000	5,020	10,040	15,060
7	35.00	J-55	0.498	6.004	5.879	6,850	7,270	7.656	7.375	6,850	528,000	2,640	5,280	7,920
		K-55									576,000	2,880	5,760	8,640
		L-80				9,960	10,180			9,960	734,000	3,670	7,340	11,010
		N-80									746,000	3,730	7,460	11,190
		C-90				11,210	11,170			11,210	809,000	4,045	8,090	12,135
		C-95				11,830	11,650			11,830	853,000	4,265	8,530	12,795
		P-110				13,700	13,030			13,700	996,000	4,980	9,960	14,940
		Q-125				15,560	14,310			15,560	1,106,000	5,575	11,150	16,725
7	38.00	J-55	0.540	5.920	5.795	7,430	7,830	7.656	7.375	7,430	576,000	2,880	5,760	8,640
		K-55									629,000	3,145	6,290	9,435
		L-80				10,800	11,390			10,800	801,000	4,005	8,010	12,015
		N-80									814,000	4,070	8,140	12,210
		C-90				12,150	12,810			12,150	883,000	4,415	8,830	13,245
		C-95				12,830	13,430			12,830	931,000	4,655	9,310	13,965
		P-110				14,850	15,130			14,850	1,087,000	5,435	10,870	16,305
		Q-125				16,880	16,740			16,880	1,207,000	6,080	12,160	18,240

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Hunting: TKC MMS LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
7-5/8	26.40	J-55	0.328	6.969	6.844	4,140	2,900	8.500	8.125	4,140	346,000	1,730	3,460	5,190
		K-55									377,000	1,885	3,770	5,655
		L-80				6,020	3,400			6,020	482,000	2,410	4,820	7,230
		N-80									490,000	2,450	4,900	7,350
		C-90				6,780	3,610			6,780	532,000	2,660	5,320	7,980
		C-95				7,150	3,710			7,150	560,000	2,800	5,600	8,400
		P-110				8,280	3,920			8,280	654,000	3,270	6,540	9,810
		Q-125				9,410	4,050			9,410	733,000	3,665	7,330	10,995
7-5/8	29.70	J-55	0.375	6.875	6.750	4,730	3,910	8.500	8.125	4,730	407,000	2,035	4,070	6,105
		K-55									443,000	2,215	4,430	6,645
		L-80				6,890	4,790			6,890	567,000	2,835	5,670	8,505
		N-80									575,000	2,875	5,750	8,625
		C-90				7,750	5,030			7,750	625,000	3,125	6,250	9,375
		C-95				8,180	5,130			8,180	659,000	3,295	6,590	9,885
		P-110				9,470	5,350			9,470	769,000	3,845	7,690	11,535
		Q-125				10,760	5,670			10,760	861,000	4,305	8,610	12,915
7-5/8	33.70	J-55	0.430	6.765	6.640	5,430	5,100	8.500	8.125	5,430	477,000	2,385	4,770	7,155
		K-55									519,000	2,595	5,190	7,785
		L-80				7,900	6,560			7,900	664,000	3,320	6,640	9,960
		N-80									674,000	3,370	6,740	10,110
		C-90				8,880	7,050			8,880	733,000	3,665	7,330	10,995
		C-95				9,380	7,280			9,380	772,000	3,860	7,720	11,580
		P-110				10,860	7,870			10,860	901,000	4,505	9,010	13,515
		Q-125				12,340	8,340			12,340	1,009,000	5,045	10,090	15,135
7-5/8	39.00	J-55	0.500	6.625	6.500	6,310	6,610	8.500	8.125	6,310	564,000	2,820	5,640	8,460
		K-55									614,000	3,070	6,140	9,210
		L-80				9,180	8,820			9,180	786,000	3,930	7,860	11,790
		N-80									798,000	3,990	7,980	11,970
		C-90				10,330	9,620			10,330	867,000	4,335	8,670	13,005
		C-95				10,900	10,000			10,900	914,000	4,570	9,140	13,710
		P-110				12,620	11,080			12,620	1,066,000	5,330	10,660	15,990
		Q-125				14,340	12,060			14,340	1,194,000	5,970	11,940	17,910
7-5/8	42.80	J-55	0.562	6.501	6.376	7,090	7,510	8.500	8.125	7,090	640,000	3,200	6,400	9,600
		K-55									696,000	3,480	6,960	10,440
		L-80				10,320	10,810			10,320	891,000	4,455	8,910	13,365
		N-80									906,000	4,530	9,060	13,590
		C-90				11,610	11,890			11,610	984,000	4,920	9,840	14,760
		C-95				12,250	12,410			12,250	1,037,000	5,185	10,370	15,555
		P-110				14,190	13,930			14,190	1,210,000	6,050	12,100	18,150
		Q-125				16,120	15,350			16,120	1,355,000	6,775	13,550	20,325
7-5/8	45.30	J-55	0.595	6.435	6.310	7,510	7,910	8.500	8.125	7,510	680,000	3,400	6,800	10,200
		K-55									740,000	3,700	7,400	11,100
		L-80				10,920	11,510			10,920	947,000	4,735	9,470	14,205
		N-80									962,000	4,810	9,620	14,430
		C-90				12,290	12,950			12,290	1,045,000	5,225	10,450	15,675
		C-95				12,970	13,670			12,970	1,101,000	5,505	11,010	16,515
		P-110				15,020	15,440			15,020	1,285,000	6,425	12,850	19,275
		Q-125				17,070	17,100			17,070	1,439,000	7,195	14,390	21,585

Data provided by Hunting Tubular Systems; MMSEUE8R-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005.

Hunting: TKC MMS LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
7-5/8	47.10	J-55	0.625	6.375	6.250	7,890	8,280	8.500	8.125	7,890	716,000	3,580	7,160	10,740
		K-55									779,000	3,895	7,790	11,685
		L-80				11,480	12,040			11,480	997,000	4,985	9,970	14,955
		N-80									1,013,000	5,065	10,130	15,195
		C-90				12,910	13,540			12,910	1,100,000	5,500	11,000	16,500
		C-95				13,630	14,300			13,630	1,159,000	5,795	11,590	17,385
		P-110				15,780	16,550			15,780	1,353,000	6,765	13,530	20,295
		Q-125				17,930	18,700			17,930	1,515,000	7,575	15,150	22,725
8-5/8	32.00	J-55	0.352	7.921	7.796	3,930	2,530	9.625	9.125	3,930	417,000	2,085	4,170	6,255
		K-55									452,000	2,260	4,520	6,780
		L-80				5,710	3,050			5,710	583,000	2,915	5,830	8,745
		N-80									591,000	2,955	5,910	8,865
		C-90				6,430	3,210			6,430	643,000	3,215	6,430	9,645
		C-95				6,780	3,280			6,780	678,000	3,390	6,780	10,170
		P-110				7,860	3,420			7,860	791,000	3,955	7,910	11,865
		Q-125				8,930	3,470			8,930	887,000	4,435	8,870	13,305
8-5/8	36.00	J-55	0.400	7.825	7.700	4,460	3,450	9.625	9.125	4,460	486,000	2,430	4,860	7,290
		K-55									526,000	2,630	5,260	7,890
		L-80				6,490	4,100			6,490	678,000	3,390	6,780	10,170
		N-80									688,000	3,440	6,880	10,320
		C-90				7,300	4,250			7,300	749,000	3,745	7,490	11,235
		C-95				7,710	4,350			7,710	789,000	3,945	7,890	11,835
		P-110				8,930	4,690			8,930	921,000	4,605	9,210	13,815
		Q-125				10,140	4,930			10,140	1,032,000	5,160	10,320	15,480
8-5/8	40.00	J-55	0.450	7.725	7.600	5,020	4,400	9.625	9.125	5,020	556,000	2,780	5,560	8,340
		K-55									603,000	3,015	6,030	9,045
		L-80				7,300	5,520			7,300	776,000	3,880	7,760	11,640
		N-80									788,000	3,940	7,880	11,820
		C-90				8,220	5,870			8,220	858,000	4,290	8,580	12,870
		C-95				8,670	6,020			8,670	904,000	4,520	9,040	13,560
		P-110				10,040	6,390			10,040	1,055,000	5,275	10,550	15,825
		Q-125				11,410	6,630			11,410	1,182,000	5,910	11,820	17,730
8-5/8	44.00	J-55	0.500	7.625	7.500	5,580	5,360	9.625	9.125	5,580	626,000	3,130	6,260	9,390
		K-55									678,000	3,390	6,780	10,170
		L-80				8,120	6,950			8,120	874,000	4,370	8,740	13,110
		N-80									887,000	4,435	8,870	13,305
		C-90				9,130	7,490			9,130	965,000	4,825	9,650	14,475
		C-95				9,640	7,740			9,640	1,017,000	5,085	10,170	15,255
		P-110				11,160	8,420			11,160	1,186,000	5,930	11,860	17,790
		Q-125				12,680	8,980			12,680	1,330,000	6,650	13,300	19,950
8-5/8	49.00	J-55	0.557	7.511	7.386	6,220	6,440	9.625	9.125	6,220	704,000	3,520	7,040	10,560
		K-55									763,000	3,815	7,630	11,445
		L-80				9,040	8,570			9,040	983,000	4,915	9,830	14,745
		N-80									997,000	4,985	9,970	14,955
		C-90				10,170	9,340			10,170	1,085,000	5,425	10,850	16,275
		C-95				10,740	9,700			10,740	1,144,000	5,720	11,440	17,160
		P-110				12,430	10,730			12,430	1,335,000	6,675	13,350	20,025
		Q-125				14,130	11,660			14,130	1,496,000	7,480	14,960	22,440

Data provided by Hunting Tubular Systems; MMSEUE8R-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005.

Hunting: TKC MMS LTC Connection Database (Continued)

Size	Wt	Grade	Pipe					Connection				Torque		
			Wall Thickness	Inside Diameter	Drift Diameter	Internal Yield Pressure	Collapse Pressure	Standard Outside Diameter	Special Clearance Outside Diameter	Internal Pressure Resistance	Longitudinal Joint Strength	Make-Up Torque		
												Min	Opt	Max
in.	lb/ft		in.	in.	in.	psi	psi	in.	in.	psi	lb	ft-lb		
9-5/8	36.00	J-55	0.352	8.921	8.765	3,520	2,020	10.625	10.125	3,520	453,000	2,265	4,530	6,795
		K-55									489,000	2,445	4,890	7,335
		L-80				5,120	2,370			5,120	634,000	3,170	6,340	9,510
		N-80									643,000	3,215	6,430	9,645
		C-90				5,760	2,440			5,760	700,000	3,500	7,000	10,500
		C-95				6,080	2,460			6,080	738,000	3,690	7,380	11,070
		P-110				7,040	2,470			7,040	861,000	4,305	8,610	12,915
		Q-125				8,000	2,470			8,000	966,000	4,830	9,660	14,490
9-5/8	40.00	J-55	0.395	8.835	8.679	3,950	2,570	10.625	10.125	3,950	520,000	2,600	5,200	7,800
		K-55									561,000	2,805	5,610	8,415
		L-80				5,750	3,090			5,750	727,000	3,635	7,270	10,905
		N-80									737,000	3,685	7,370	11,055
		C-90				6,460	3,260			6,460	804,000	4,020	8,040	12,060
		C-95				6,820	3,330			6,820	847,000	4,235	8,470	12,705
		P-110				7,900	3,470			7,900	988,000	4,940	9,880	14,820
		Q-125				8,980	3,530			8,980	1,108,000	5,540	11,080	16,620
9-5/8	43.50	J-55	0.435	8.755	8.599	4,350	3,250	10.625	10.125	4,350	582,000	2,910	5,820	8,730
		K-55									628,000	3,140	6,280	9,420
		L-80				6,330	3,810			6,330	813,000	4,065	8,130	12,195
		N-80									825,000	4,125	8,250	12,375
		C-90				7,120	4,010			7,120	899,000	4,495	8,990	13,485
		C-95				7,510	4,130			7,510	948,000	4,740	9,480	14,220
		P-110				8,700	4,420			8,700	1,105,000	5,525	11,050	16,575
		Q-125				9,890	4,620			9,890	1,240,000	6,200	12,400	18,600
9-5/8	47.00	J-55	0.472	8.681	8.525	4,720	3,890	10.625	10.125	4,720	638,000	3,190	6,380	9,570
		K-55									689,000	3,445	6,890	10,335
		L-80				6,870	4,750			6,870	893,000	4,465	8,930	13,395
		N-80									905,000	4,525	9,050	13,575
		C-90				7,720	4,990			7,720	987,000	4,935	9,870	14,805
		C-95				8,150	5,090			8,150	1,040,000	5,200	10,400	15,600
		P-110				9,440	5,300			9,440	1,213,000	6,065	12,130	18,195
		Q-125				10,730	5,630			10,730	1,361,000	6,805	13,610	20,415
9-5/8	53.50	J-55	0.545	8.535	8.379	5,450	5,130	10.625	10.125	5,450	748,000	3,740	7,480	11,220
		K-55									808,000	4,040	8,080	12,120
		L-80				7,930	6,620			7,930	1,047,000	5,235	10,470	15,705
		N-80									1,062,000	5,310	10,620	15,930
		C-90				8,920	7,110			8,920	1,157,000	5,785	11,570	17,355
		C-95				9,410	7,340			9,410	1,220,000	6,100	12,200	18,300
		P-110				10,900	7,950			10,900	1,422,000	7,110	14,220	21,330
		Q-125				12,390	8,440			12,390	1,595,000	7,975	15,950	23,925
9-5/8	58.40	J-55	0.595	8.435	8.279	5,950	5,990	10.625	10.125	5,950	823,000	4,115	8,230	12,345
		K-55									888,000	4,440	8,880	13,320
		L-80				8,650	7,890			8,650	1,151,000	5,755	11,510	17,265
		N-80									1,167,000	5,835	11,670	17,505
		C-90				9,740	8,570			9,740	1,272,000	6,360	12,720	19,080
		C-95				10,280	8,890			10,280	1,341,000	6,705	13,410	20,115
		P-110				11,900	9,770			11,900	1,564,000	7,820	15,640	23,460
		Q-125				13,520	10,540			13,520	1,754,000	8,770	17,540	26,310

Data provided by Hunting Tubular Systems; MMSEUE8R-V2.1; Product Data Sheet Application Collection, second edition, revision 2.2; September 13, 2005.

TenarisBlue® Tubing

Type: Coupled									Minimum Joint Yield Strength							
OD	Nom Wt	Drift Diameter	Wall Thickness	Joint Reg OD		Pipe Body Area	Critical Area	Lm	J-55	K-55	L-80	N-80	C-90	C/T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	*Nm*	in.	in.^{2}	in.	1,000 lb							
2-3/8	4.60	1.901	0.190	2.776	*70.51*	1.305	1.638	2.654	72		104		117	124	144	163
	5.10	1.845	0.218			1.477			81		118		133	140	162	185
	5.80	1.773	0.254	2.827	*71.80*	1.691	1.860		93		135		152	161	186	211
	6.30	1.759	0.280	2.846	*72.28*	1.841	1.951		101		147		166	175	203	230
	6.60	1.691	0.295	2.862	*72.69*	1.927	2.023		106		154		173	183	212	241
	7.35	1.609	0.336	2.913	*73.99*	2.150	2.258		118		172		194	204	237	269
2-7/8	6.40	2.347	0.217	3.307	*83.99*	1.812	2.248	3.201	100		145		163	172	199	226
	7.80	2.229	0.276	3.346	*84.98*	2.254	2.454		124		180		203	214	248	282
	8.60	2.165	0.308	3.386	*86.00*	2.483	2.661		137		199		223	236	273	310
	9.35	2.101	0.340	3.437	*87.29*	2.708	2.939		149		217		244	257	298	339
	9.80	2.057	0.362	3.449	*87.60*	2.857	2.999		157		229		257	271	314	357
	10.50	1.997	0.392	3.488	*88.59*	3.058	3.212		168		245		275	291	336	382
	10.70	1.971	0.405	3.504	*89.00*	3.143	3.300		173		251		283	299	346	393
3-1/2	6.50	3.035	0.170	3.937	*99.99*	1.779	2.841	3.614	98		142		160	169	196	222
	7.70	2.943	0.216			2.230			123		178		201	212	245	279
	9.20	2.867	0.254			2.590	2.838		142		207		233	246	285	324
	10.20	2.797	0.289	4.016	*102.00*	2.916	3.333		160		233		262	277	321	364
	12.70	2.625	0.375	4.150	*105.41*	3.683	4.191		203		295		331	350	405	460
	13.70	2.549	0.413			4.005	4.190		220		320		360	380	441	501
	14.30	2.515	0.430	4.169	*105.89*	4.146	4.312		228		332		373	394	456	518
	14.70	2.477	0.449	4.193	*106.50*	4.303	4.475		237		344		387	409	473	538
	15.50	2.423	0.476	4.228	*107.39*	4.521	4.703		249		362		407	430	497	565
4	8.20	3.495	0.190	4.441	*112.80*	2.275	3.295	3.803	125		182		205	216	250	284
	9.50	3.423	0.226			2.680	3.292		147		214		241	255	295	335
	10.90	3.351	0.262	4.441	*112.80*	3.075	3.292	3.803	169		246		277	292	338	384
	13.20	3.215	0.330	4.567	*116.00*	3.804	4.185		209		304		342	361	418	475
	14.85	3.115	0.380	4.610	*117.09*	4.321	4.493		238		346		389	410	475	540
	16.10	3.045	0.415	4.661	*118.38*	4.673	4.861		257		374		421	444	514	584
	16.50	3.015	0.430	4.681	*118.89*	4.822	5.014		265		386		434	458	530	603
	18.90	2.875	0.500	4.776	*121.31*	5.498	5.718		302		440		495	522	605	687
4-1/2	10.50	3.927	0.224	4.921	*124.99*	3.009	3.599	4.012	166		241		271	286	331	376
	11.60	3.875	0.250			3.339	3.598		184		267		300	317	367	417
	12.60	3.833	0.271	4.961	*126.00*	3.599	3.901		198		288		324	342	396	450
	13.50	3.795	0.290	5.000	*127.00*	3.838	4.213		211		307		345	365	422	480
	15.20	3.701	0.337	5.047	*128.19*	4.408	4.583		242		353		397	419	485	551
	17.00	3.615	0.380	5.114	*129.89*	4.918	5.115		270		393		443	467	541	615
	17.70	3.571	0.402	5.146	*130.70*	5.175	5.382		285		414		466	492	569	647
	18.90	3.515	0.430	5.189	*131.80*	5.498	5.716		302		440		495	522	605	687
	21.50	3.375	0.500	5.287	*134.28*	6.284	6.535		346		503		565	597	691	785

Data provided by TenarisConnections; October, 2005

TenarisBlue® Casing

Pipe Diameter	Nom Wt	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area (Regular)	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.²	%	%	1,000 lb				
5	13.00	4.494	0.253	5.512	3.776	4.985	132	100	208	302	359	415	472
	15.00	4.408	0.296		4.376	4.988	114		241	350	416	481	547
	18.00	4.276	0.362	5.630	5.272	6.009			290	422	501	580	659
	20.30	4.184	0.408	5.650	5.884	6.178	105		324	471	559	647	735
	20.80	4.156	0.422	5.673	6.070	6.374			334	486	577	668	759
	21.40	4.126	0.437	5.693	6.265	6.578			345	501	595	689	783
	23.20	4.044	0.478	5.756	6.791	7.130			373	543	645	747	849
	24.10	4.000	0.500	5.787	7.068	7.421			389	565	671	777	884
5-1/2	15.50	4.950	0.275	6.063	4.517	5.961	132	100	248	361	429	497	565
	17.00	4.892	0.304		4.962	5.954	120		273	397	471	546	620
	20.00	4.778	0.361	6.102	5.828	6.352	109		321	466	554	641	729
	23.00	4.670	0.415	6.181	6.629	7.093	107		365	530	630	729	829
	26.80	4.500	0.500	6.307	7.854	8.325	106		432	628	746	864	982
	28.40	4.440	0.530	6.350	8.274	8.770			455	662	786	910	1,034
	29.70	4.376	0.562	6.382	8.716	9.064	104		479	697	828	959	1089
	32.60	4.250	0.625	6.469	9.574	9.957			527	766	910	1053	1197
6-5/8	20.00	6.049	0.288	7.283	5.735	8.144	142	100	315	459	545	631	717
	23.20	5.965	0.330		6.522	8.153	125		359	522	620	717	815
	24.00	5.921	0.352		6.935	8.182	118		381	555	659	763	867
	28.00	5.791	0.417	7.390	8.130	9.430	116		447	650	772	894	1,016
	32.00	5.675	0.475	7.409	9.179	9.638	105		505	734	872	1,010	1,147
	35.00	5.575	0.525	7.492	10.063	10.566			553	805	956	1,107	1,258
	36.70	5.502	0.562	7.539	10.700	11.127	104		588	856	1,016	1,177	1,337
7	23.00	6.366	0.317	7.677	6.654	9.049	136	100	366	532	632	732	832
	24.75	6.314	0.343		7.172	9.037	126		394	574	681	789	896
	26.00	6.276	0.362		7.545	9.055	120		415	604	717	830	943
	29.00	6.184	0.408		8.448	9.040	107		465	676	803	929	1,056
	32.00	6.094	0.453	7.732	9.320	9.694	104		513	746	885	1,025	1,165
	35.00	6.004	0.498	7.807	10.173	10.580			559	814	966	1,119	1,272
	38.00	5.920	0.540	7.870	10.962	11.400			603	877	1,041	1,206	1,370
	41.00	5.820	0.590	7.949	11.884	12.360			654	951	1,129	1,307	1,485
7-5/8	29.70	6.875	0.375	8.425	8.544	11.619	136	100	470	683	812	940	1,068
	33.70	6.765	0.430	8.465	9.715	12.144	125		534	777	923	1,069	1,214
	35.80	6.695	0.465		10.456	12.129	116		575	837	993	1,150	1,307
	39.00	6.625	0.500	8.496	11.189	12.532	112		615	895	1,063	1,231	1,399
	42.80	6.502	0.562	8.539	12.465	13.088	105		686	997	1,184	1,371	1,558
	45.30	6.435	0.595	8.591	13.136	13.793			722	1,051	1,248	1,445	1,642
7-3/4	46.10	6.560	0.595	8.740	13.372	14.976	112	100	735	1,070	1,270	1,471	1,671
	47.60	6.500	0.625		13.993	14.973	107		770	1,119	1,329	1,539	1,749
	48.60	6.470	0.640	8.772	14.299	15.013	105		786	1,144	1,358	1,573	1,787
	51.80	6.376	0.687	8.843	15.244	16.007			838	1,220	1,448	1,677	1,906
	56.10	6.250	0.750	8.937	16.494	17.318			907	1,319	1,567	1,814	2,062
8-5/8	36.00	7.825	0.400	9.488	10.334	14.054	136	100	568	827	982	1,137	1,292
	40.00	7.725	0.450		11.555	14.097	122		636	924	1,098	1,271	1,444
	44.00	7.625	0.500		12.760	14.035	110		702	1,021	1,212	1,404	1,595
	49.00	7.511	0.557	9.626	14.117	16.094	114		776	1,129	1,341	1,553	1,765
	52.00	7.435	0.595	9.626	15.006	16.205	108		825	1,200	1,426	1,651	1,876
	54.00	7.375	0.625	9.638	15.711	16.339	104		864	1,257	1,493	1,728	1,964
	58.70	7.251	0.687	9.736	17.131	17.816	104		942	1,370	1,627	1,884	2,141
9-5/8	36.00	8.921	0.352	10.626	10.250	18.245	178	100	564	820	974	1,128	1,281
	40.00	8.835	0.395		11.448	17.974	157		630	916	1,088	1,259	1,431
	43.50	8.755	0.435		12.558	17.958	143		691	1,005	1,193	1,381	1,570
	47.00	8.681	0.472		13.570	17.913	132		746	1,086	1,289	1,493	1,696
	53.50	8.535	0.545		15.540	17.872	115		855	1,243	1,476	1,709	1,943
	58.40	8.435	0.595		16.873	17.885	106		928	1,350	1,603	1,856	2,109
	59.40	8.407	0.609		17.248	17.938	104		949	1,380	1,639	1,897	2,156
	61.10	8.375	0.625	10.654	17.675	18.381			972	1,414	1,679	1,944	2,209
	64.90	8.281	0.672	10.728	18.899	19.656			1,039	1,512	1,795	2,079	2,362
	70.30	8.157	0.734	10.827	20.496	21.316			1,127	1,640	1,947	2,255	2,562

Data provided by TenarisConnections; October, 2005

TenarisBlue® Casing (Continued)

Pipe Diameter	Nom Wt	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area (Regular)	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.^{2}	%	%	1,000 lb				
9-7/8	62.80	8.625	0.625	10.984	18.164	20.708	114	100	999	1,453	1,726	1,998	2,271
	68.80	8.475	0.700		20.175	20.578	102		1,110	1,614	1,917	2,219	2,522
	70.40	8.461	0.707		20.362	20.565	101		1,120	1,629	1,934	2,240	2,545
	72.10	8.425	0.725	11.031	20.843	21.468	103		1,146	1,667	1,980	2,293	2,605
10-3/4	40.50	10.050	0.350	11.575	11.436	16.467	144	100	629	915	1,086	1,258	1,429
	45.50	9.950	0.400		13.006	16.388	126		715	1,040	1,236	1,431	1,626
	51.00	9.850	0.450	11.654	14.561	17.910	123		801	1,165	1,383	1,602	1,820
	55.50	9.760	0.495	11.693	15.943	18.654	117		877	1,275	1,515	1,754	1,993
	60.70	9.660	0.545	11.748	17.469	19.564	112		961	1,397	1,660	1,922	2,184
	65.70	9.560	0.595	11.890	18.978	22.204	117		1,044	1,518	1,803	2,088	2,372
	76.60	9.350	0.700	11.929	22.101	22.985	104		1,216	1,768	2,100	2,431	2,763
	79.20	9.282	0.734	11.984	23.092	24.016			1,270	1,847	2,194	2,540	2,886
11-3/4	54.00	10.880	0.435	12.752	15.464	21.340	138	100	851	1,237	1,469	1,701	1,933
	60.00	10.772	0.489	12.752	17.298	21.277	123		951	1,384	1,643	1,903	2,162
	65.00	10.682	0.534		18.811	21.257	113		1,035	1,505	1,787	2,069	2,351
	71.00	10.586	0.582		20.417	21.438	105		1,123	1,633	1,940	2,246	2,552
11-7/8	58.80	10.935	0.470	12.854	16.839	21.554	128	100	926	1,347	1,600	1,852	2,105
	71.80	10.711	0.582		20.641	21.468	104		1,135	1,651	1,961	2,271	2,580
13-3/8	54.50	12.615	0.380	14.173	15.506	20.468	132	100	853	1,240	1,473	1,706	1,938
	61.00	12.515	0.430		17.481	20.452	117		961	1,398	1,661	1,923	2,185
	68.00	12.415	0.480	14.252	19.439	22.160	114		1,069	1,555	1,847	2138	2,430
	72.00	12.347	0.514		20.770	22.224	107		1,142	1,662	1,973	2,285	2,596
	77.00	12.275	0.550	14.299	22.156	23.264	105		1,219	1,772	2,105	2,437	2,769
	80.70	12.215	0.580	14.354	23.307	24.473			1,282	1,865	2,214	2,564	2,913
	85.00	12.159	0.608	14.402	24.377	25.595			1,341	1,950	2,316	2,681	3,047
	86.00	12.125	0.625	14.433	25.039	26.291			1,377	2,003	2,379	2,754	3,130
	98.00	11.937	0.719	14.598	28.581	30.010			1,572	2,286	2,715	3,144	3,573
13-5/8	88.20	12.375	0.625	14.665	25.529	26.806	105	100	1,404	2,042	2,425	2,808	3,191

Data provided by TenarisConnections; October, 2005

Tenaris 3SB™ Tubing

Type: Coupled										Minimum Joint Yield Strength							
OD	Nom Wt	Drift Diameter	Wall Thickness	Joint Reg OD		Special OD		Pipebody	Critical Area	Lm	J-55	K-55	L-80	N-80	C-90	C/T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	*Nm*	in.	*Nm*	in.	in.^{2}	in.	1,000 lb							
2-3/8	4.70	1.901	0.190	2.875	*73.02*	2.700	*68.58*	1.304	2.370	3.743	72		104		117	124	143	163
	5.30	1.845	0.218					1.477			81		118		133	140	162	185
	5.95	1.773	0.254			2.732	*69.30*	1.693			93		135		152	161	186	212
	6.20	1.759	0.261			2.744	*69.69*	1.733			95		139		156	165	191	217
	7.70	1.609	0.336			-	-	2.151			118		172		194	204	237	269
2-7/8	6.50	2.347	0.217	3.500	*88.90*	3.220	*81.78*	1.812	3.503	3.743	100		145		163	172	199	227
	7.80	2.229	0.276			3.280	*83.31*	2.254			124		180		203	214	248	282
	8.60	2.165	0.308			3.323	*84.40*	2.485			137		199		224	236	273	311
	9.50	2.101	0.340			3.366	*85.49*	2.708			149		217		244	257	298	339
	10.70	1.997	0.392			-	-	3.058			168		245		275	290	336	382
	11.00	1.971	0.405					3.143			173		251		283	299	346	393
	11.65	1.901	0.440					3.367			185		269		303	320	370	421
3-1/2	9.30	2.867	0.254	4.250	*107.95*	3.882	*98.60*	2.590	5.031	3.775	142		207		233	246	285	324
	10.30	2.797	0.289			3.933	*99.89*	2.916			160		233		262	277	321	364
	12.80	2.639	0.368			4.051	*102.89*	3.621			199		290		326	344	398	453
	12.95	2.625	0.375			4.059	*103.09*	3.681			203		295		331	350	405	460
	15.10	2.477	0.449			-	-	4.304			237		344		387	409	473	538
	15.80	2.423	0.476					4.521			249		362		407	430	497	565
	16.70	2.355	0.510					4.791			264		383		431	455	527	599
	17.05	2.315	0.530					4.945			272		396		445	470	544	618
4	11.00	3.351	0.262	4.750	*120.65*	4.402	*111.81*	3.077	5.792	4.056	169		246		277	292	338	385
	13.40	3.215	0.330			4.492	*114.09*	3.805			209		304		342	361	419	476
	19.00	2.875	0.500			-	-	5.498			302		440		495	522	605	687
	22.50	2.655	0.610					6.498			319		463		521	550	637	724
4-1/2	12.75	3.833	0.271	5.200	*132.08*	4.921	*124.99*	3.601	6.163	4.306	198		288		324	342	396	450
	13.50	3.795	0.290					3.836			211		307		345	364	422	480
	15.50	3.701	0.337			4.996	*126.89*	4.407			242		353		397	419	485	551
	19.20	3.515	0.430			-	-	5.498			302		440		495	522	605	687
	21.60	3.375	0.500					6.284			339		493		555	585	678	770
	24.00	3.255	0.560					6.932										
	26.50	3.115	0.630					7.660										

Data provided by TenarisConnections; October, 2005

Tenaris 3SB™ Casing

Pipe Diameter	Nom Wt	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Yield Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.^{2}	%	%	1,000 lb				
5	15.00	4.408	0.296	5.563	4.376	5.410	124	100	241	350	416	481	547
	18.00	4.276	0.362		5.272		103		290	422	501	580	659
	20.30	4.184	0.408	5.736	5.884	6.946	118		324	471	559	647	735
	23.20	4.044	0.478		6.791		102		373	543	645	747	849
	24.10	4.000	0.500	5.768	7.068	7.234	102		389	565	671	777	884
5-1/2	15.50	4.950	0.275	6.051	4.511	5.820	129	100	248	361	428	496	564
	17.00	4.892	0.304		4.962	5.820	117		273	397	471	546	620
	20.00	4.778	0.361		5.828	5.820	100		320	466	553	640	728
	23.00	4.670	0.415	6.150	6.629	6.778	102		365	530	630	729	829
	26.00	4.548	0.476	6.260	7.513	7.851	104		413	601	714	826	939
6	18.80	5.392	0.304	6.500	5.439	5.484	101	100	299	435	517	598	680
6-5/8	20.00	6.049	0.288	7.390	5.735	0.000	-	100	-	-	-	-	-
	24.00	5.921	0.352		6.935	9.607	139		381	555	659	763	867
	28.00	5.791	0.417		8.130		118		447	650	772	894	1,016
	32.00	5.676	0.475		9.171		105		504	734	871	1,009	1,146
7	23.00	6.366	0.317	7.657	6.654	9.010	135	100	366	532	632	732	832
	26.00	6.276	0.362		7.545		119		415	604	717	830	943
	29.00	6.184	0.408		8.448		107		465	676	803	929	1,056
	32.00	6.094	0.453	7.772	9.320	10.416	112		513	746	885	1,025	1,165
	35.00	6.004	0.498		10.173		102		559	814	966	1,119	1,272
	38.00	5.920	0.540	7.894	10.962	11.819	108		603	877	1,041	1,206	1,370
	41.00	5.820	0.590		11.884		99		650	946	1,123	1,300	1,477
7-5/8	26.40	6.969	0.328	8.500	7.516	12.660	168	100	413	601	714	827	939
	29.70	6.876	0.375		8.534		148		469	683	811	939	1,067
	33.70	6.765	0.430		9.715		130		534	777	923	1,069	1,214

Data provided by TenarisConnections; October, 2005

Tenaris 3SB™ Casing (Continued)

Pipe Diameter	Nom Wt	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Yield Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	$in.^2$	%	%	1,000 lb				
7-5/8	39.00	6.625	0.500	8.500	11.189	12.660	113	100	615	895	1,063	1,231	1,399
	42.80	6.502	0.562		12.465		102		686	997	1,184	1,371	1,558
	47.10	6.376	0.624	8.626	13.730	14.355	105		755	1,098	1,304	1,510	1,716
	63.20	5.876	0.875	8.823	18.549	0.000	-		-	-	-	-	-
7-3/4	46.10	6.560	0.595	8.500	13.372	11.865	89	100	653	949	1,127	1,305	1,483
8-5/8	32.00	7.921	0.352	9.626	9.145	16.136	176	100	503	732	869	1,006	1,143
	36.00	7.825	0.400		10.334		156		568	827	982	1,137	1,292
	40.00	7.725	0.450		11.555		140		636	924	1,098	1,271	1,444
	44.00	7.625	0.500		12.760		126		702	1,021	1,212	1,404	1,595
	49.00	7.511	0.557		14.117		114		776	1,129	1,341	1,553	1,765
	52.00	7.435	0.595		15.006		108		825	1,200	1,426	1,651	1,876
9-5/8	36.00	8.921	0.352	10.626	10.250	18.095	177	100	564	820	974	1,128	1,281
	40.00	8.835	0.395		11.448		158		630	916	1,088	1,259	1,431
	43.50	8.755	0.435		12.558		144		691	1,005	1,193	1,381	1,570
	47.00	8.681	0.472		13.570		133		746	1,086	1,289	1,493	1,696
	53.50	8.535	0.545		15.540		116		855	1,243	1,476	1,709	1,943
	58.40	8.435	0.595		16.873		107		928	1,350	1,603	1,856	2,109
	61.10	8.375	0.625		17.675		102		972	1,414	1,679	1,944	2,209
9-3/4	59.20	8.560	0.595	10.626	17.110	15.212	89	100	837	1,217	1,445	1,673	1,901
9-7/8	62.80	8.625	0.625	10.626	18.164	14.334	79	100	788	1,147	1,362	1,577	1,792
	70.40	8.459	0.708		20.384	0.000	-		-	-	-	-	-
10-1/4	82.00	8.650	0.800	11.516	23.751	0.000	-	100	-	-	-	-	-
10-3/4	40.50	10.050	0.350	11.748	11.436	20.104	176	100	629	915	1,086	1,258	1,429
	51.00	9.850	0.450		14.561		138		801	1,165	1,383	1,602	1,820
	55.50	9.760	0.495		15.943		126		877	1,275	1,515	1,754	1,993
	60.70	9.660	0.545		17.469		115		961	1,397	1,660	1,922	2,184
	65.70	9.560	0.595		18.978		106		1,044	1,518	1,803	2,088	2,372
	71.10	9.450	0.650		20.624		97		1,106	1,608	1,910	2,211	2,513
	73.20	9.406	0.672		21.277		94						
11-3/4	47.00	11.000	0.375	12.748	13.394	21.902	164	100	737	1,071	1,272	1,473	1,674
	54.00	10.880	0.435		15.464		142		851	1,237	1,469	1,701	1,933
	60.00	10.772	0.489		17.298		127		951	1,384	1,643	1,903	2,162
	65.00	10.682	0.534		18.811	0.000	-		-	-	-	-	-
13-3/8	54.50	12.615	0.380	14.374	15.506	24.887	160	100	853	1,240	1,473	1,706	1,938
	61.00	12.515	0.430		17.481		142		961	1,398	1,661	1,923	2,185
	68.00	12.415	0.480		19.439		128		1,069	1,555	1,847	2,138	2,430
	72.00	12.347	0.514	14.400	20.770		120		1,142	1,662	1,973	2,285	2,596
	86.00	12.125	0.625		25.039	0.000	-		-	-	-	-	-
13-1/2	81.40	12.340	0.580	14.374	23.538	20.903	89	100	1,150	1,672	1,986	2,299	2,613
13-5/8	88.20	12.375	0.625	14.374	25.529	20.224	79	100	1,112	1,618	1,921	2,225	2,528

Data provided by TenarisConnections; October, 2005

Tenaris MS™ Tubing

Type: Coupled										Minimum Joint Yield Strength							
OD	Nom Wt	Drift Diameter	Wall Thickness	Joint Reg OD		Dsc		Pipebody	Critical Area	Lm	J-55	K-55	L-80	N-80	C-90	C/T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	*Nm*	in.	*Nm*	in.	in.²	in.	1,000 lb							
2-3/8	4.60	1.901	0.190	2.776	*70.51*	-	-	1.300	1.734	2.520	72		104		117	124	143	163
	5.10	1.845	0.218					1.476			81		118		133	140	162	185
	5.80	1.773	0.254	2.815	*71.50*			1.690	1.903		93		135		152	161	186	212
2-7/8	6.40	2.347	0.217	3.337	*84.75*	-	-	1.812	2.503	2.835	100		145		163	172	199	227
	7.80	2.229	0.276	3.406	*86.51*			2.254	2.868		124		180		203	214	248	282
	8.60	2.165	0.308					2.483			137		199		224	236	273	311
	9.80	2.057	0.362					2.857			157		229		257	272	314	357
3-1/2	7.70	2.943	0.216	3.917	*99.49*	-	-	2.227	2.891	3.386	123		178		201	212	245	279
	9.20	2.867	0.254					2.590			142		207		233	246	285	324
	10.20	2.797	0.289	3.996	*101.49*			2.916	3.382		160		233		262	277	321	364
	12.70	2.625	0.375	4.134	*105.00*			3.680	4.261		203		295		331	350	405	460
	13.70	2.548	0.413					4.008			220		321		361	381	441	501
	14.70	2.475	0.449	4.142	*105.20*			4.312	4.312		237		344		387	409	473	538
	15.50	2.423	0.476	4.173	*105.99*			4.521	4.521		249		362		407	430	497	565
4	9.50	3.423	0.226	4.421	*112.29*	-	-	2.680	3.463	3.701	147		214		241	255	295	335
	10.90	3.352	0.262					3.075			169		246		277	292	338	385
	13.20	3.215	0.330	4.551	*115.59*			3.804	4.349		209		304		342	361	419	476
	14.85	3.115	0.380	4.646	*118.00*			4.321	5.033		238		346		389	411	475	540
	16.50	3.015	0.430					4.822			265		386		434	458	530	603
4-1/2	10.50	3.927	0.224	4.921	*124.99*	4.875	*123.82*	3.009	3.984	4.016	165		241		271	286	331	376
	11.60	3.875	0.250					3.339			184		267		300	317	367	417
	12.60	3.833	0.271					3.601			198		288		324	342	396	450
	13.50	3.795	0.290	4.961	*126.00*			3.835	4.289		211		307		345	364	422	480
	15.10	3.701	0.337	5.079	*129.00*			4.408	5.220		242		353		397	419	485	551
	16.60	3.625	0.375					4.859			267		389		437	462	535	608
	17.00	3.615	0.380					4.918			271		393		443	467	541	615
	18.90	3.515	0.430	5.114	*129.89*			5.498	5.498		302		440		495	522	605	687
	21.50	3.375	0.500	5.211	*132.35*			6.284	6.284		346		503		566	597	691	785
	23.70	3.255	0.560	5.289	*134.40*			6.932	6.932		381		555		624	659	762	866

Data provided by TenarisConnections; October, 2005

Tenaris MS™ Casing

Pipe Diameter	Nominal Weight	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.²	%	%	1,000 lb				
5	13.00	4.494	0.253	5.563	3.776	5.513	146	74	208	302	359	415	472
	15.00	4.408	0.296		4.376		126	63	241	350	416	481	547
	18.00	4.276	0.362		5.272		105	63	290	422	501	580	659
	20.30	4.184	0.408		5.884		94	74	303	441	524	606	689
	20.80	4.156	0.422		6.070		91	71					
	21.40	4.126	0.437		6.265		88	69					
	23.20	4.044	0.478		6.791		81	64					
	24.10	4.000	0.500		7.068		78	61					
5-1/2	14.00	5.012	0.244	6.051	4.030	5.929	147	79	222	322	383	443	504
	15.50	4.950	0.275		4.511		131	70	248	361	428	496	564
	17.00	4.892	0.304		4.962		119	76	273	397	471	546	620
	20.00	4.778	0.361		5.828		102	70	321	466	554	641	729
	23.00	4.670	0.415	6.146	6.629	6.834	103	72	365	530	630	729	829
	26.00	4.548	0.476	6.260	7.513	7.947	106	63	413	601	714	826	939
	26.80	4.500	0.500		7.854		101	68	432	628	746	864	982
	28.40	4.440	0.530	6.346	8.274	8.804	106	65	455	662	786	910	1,034
	29.70	4.376	0.562		8.716		101	68	479	697	828	959	1,089
	32.60	4.250	0.625	6.425	9.574	9.593	100	62	527	766	910	1,053	1,197
6-5/8	24.00	5.921	0.352	7.390	6.935	9.911	143	53	381	555	659	763	867
	28.00	5.791	0.417		8.130		122	66	447	650	772	894	1,016
	32.00	5.676	0.475		9.171		108	58	504	734	871	1,009	1,146
7	23.00	6.366	0.317	7.657	6.654	9.302	140	58	366	532	632	732	832
	26.00	6.276	0.362		7.545		123	67	415	604	717	830	943
	29.00	6.184	0.408		8.448		110	60	465	676	803	929	1,056
	32.00	6.094	0.453		9.320		100	54	512	744	884	1,023	1,163
	35.00	6.004	0.498		10.173		91	49					
	38.00	5.920	0.540		10.962		85	46					
	41.00	5.820	0.590		11.884		78	51					

Data provided by TenarisConnections; October, 2005

Tenaris MS™ Casing (Continued)

Pipe Diameter	Nominal Weight	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.^{2}	%	%	1,000 lb				
7-5/8	26.40	6.969	0.328	8.500	7.516	13.158	175	56	413	601	714	827	939
	29.70	6.876	0.375		8.534		154	49	469	683	811	939	1,067
	33.70	6.765	0.430		9.715		135	61	534	777	923	1069	1,214
	39.00	6.625	0.500		11.189		118	53	615	895	1063	1231	1,399
	42.80	6.502	0.562		12.465		106	48	686	997	1184	1371	1,558
	45.30	6.435	0.595		13.136		100	45	722	1051	1248	1445	1,642
	47.10	6.375	0.625		13.747		96	43	724	1053	1250	1447	1,645
7-3/4	46.10	6.560	0.595	8.626	13.372	13.325	100	76	733	1066	1266	1466	1,666
	47.60	6.500	0.625		13.993		95						
	48.60	6.470	0.640		14.299		93						
8-5/8	32.00	7.921	0.352	9.626	9.145	16.830	184	55	503	732	869	1,006	1,143
	36.00	7.825	0.400		10.334		163	66	568	827	982	1,137	1,292
	40.00	7.725	0.450		11.555		146	59	636	924	1,098	1,271	1,444
	44.00	7.625	0.500		12.760		132	54	702	1,021	1,212	1,404	1,595
	49.00	7.511	0.557		14.117		119	49	776	1,129	1,341	1,553	1,765
9-5/8	36.00	8.921	0.352	10.626	10.250	18.693	182	54	564	820	974	1,128	1,281
	40.00	8.835	0.395		11.448		163	67	630	916	1,088	1,259	1,431
	43.50	8.755	0.435		12.558		149	61	691	1,005	1,193	1,381	1,570
	47.00	8.681	0.472		13.570		138	56	746	1,086	1,289	1,493	1,696
	53.50	8.535	0.545		15.540		120	49	855	1,243	1,476	1,709	1,943
	58.40	8.435	0.595		16.873		111	45	928	1,350	1,603	1,856	2,109
	64.90	8.281	0.672		18.899		99	47	1,028	1,495	1,776	2,056	2,337
9-7/8	62.80	8.625	0.625	10.827	18.164	18.350	101	45	999	1,453	1,726	1,998	2,271
	67.30	8.539	0.668	10.984	19.322	21.047	109	48	1,063	1,546	1,836	2,125	2,415
	68.80	8.475	0.700		20.175		104	46	1,110	1,614	1,917	2,219	2,522
	70.40	8.461	0.707		20.362		103		1,120	1,629	1,934	2,240	2,545
	72.10	8.425	0.725		20.843		101	44	1,146	1,667	1,980	2,293	2,605
10-3/4	40.50	10.050	0.350	11.748	11.436	20.719	181	53	629	915	1,086	1,258	1,429
	45.50	9.950	0.400		13.006		159	68	715	1,040	1,236	1,431	1,626
	51.00	9.850	0.450		14.561		142	61	801	1,165	1,383	1,602	1,820
	55.50	9.760	0.495		15.943		130	56	877	1,275	1,515	1,754	1,993
	60.70	9.660	0.545		17.469		119	51	961	1,397	1,660	1,922	2,184
	65.70	9.560	0.595		18.978		109	47	1,044	1,518	1,803	2,088	2,372
	73.20	9.406	0.672		21.277		97	61	1,140	1,658	1,968	2,279	2,590
	76.60	9.350	0.700		22.101		94	59					
11-3/4	47.00	11.000	0.375	12.752	13.408	22.653	169	60	737	1,073	1,274	1,475	1,676
	54.00	10.880	0.435	12.752	15.464		146	74	851	1,237	1,469	1,701	1,933
	60.00	10.772	0.489		17.298		131	66	951	1,384	1,643	1,903	2,162
11-7/8	71.80	10.711	0.582	12.764	20.641	20.662	100	69	1,135	1,651	1,961	2,271	2,580
13-3/8	54.50	12.615	0.380	14.374	15.506	25.676	166	60	853	1,240	1,473	1,706	1,938
	61.00	12.515	0.430		17.481		147	73	961	1,398	1,661	1,923	2,185
	68.00	12.415	0.480		19.439		132	66	1,069	1,555	1,847	2,138	2,430
	72.00	12.347	0.514		20.770		124	61	1,142	1,662	1,973	2,285	2,596
13-1/2	80.40	12.348	0.576	14.500	23.386	25.911	111	68	1,286	1,871	2,222	2,573	2,923
13-5/8	88.20	12.375	0.625	14.626	25.529	26.145	102	63	1,404	2,042	2,425	2,808	3,191
14	82.50	12.876	0.562	15.000	23.718	32.226	136	63	1,304	1,897	2,253	2,609	2,965
	94.80	12.688	0.656		27.497		117	69	1,512	2,200	2,612	3,025	3,437
	99.30	12.624	0.688		28.780		112	66	1,583	2,302	2,734	3,166	3,598
	110.00	12.456	0.772		32.084		100		1,765	2,567	3,048	3,529	4,010
	111.00	12.442	0.779		32.361				1,772	2,578	3,061	3,545	4,028

Data provided by TenarisConnections; October, 2005

Tenaris MS28™ Tubing

Type: Coupled										Minimum Joint Yield Strength							
OD	Nom Wt	Drift Diameter	Wall Thickness	Joint Reg OD		DSC		Pipebody	Critical Area	Lm	J-55	K-55	L-80	N-80	C-90	C/T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	*Nm*	in.	*Nm*	in.	in.²	in.	1,000 lb							
2-3/8	4.60	1.901	0.190	2.703	*68.65*	-	-	1.304	1.507	3.307	72		104		117	124	143	163
	5.10	1.845	0.218	2.756	*70.00*			1.477	1.734		81		118		133	140	162	185
	5.80	1.773	0.254	2.827	*71.80*			1.691	2.046		93		135		152	161	186	212
	6.30	1.721	0.280					1.843			101		147		166	175	203	230
	6.60	1.691	0.295					1.928			106		154		174	183	212	241
	7.35	1.609	0.336					2.151			113		164		184	194	225	256
2-7/8	6.40	2.347	0.217	3.244	*82.39*	-	-	1.812	2.072	3.543	100		145		163	172	119	227
	7.80	2.229	0.276	3.354	*85.19*			2.254	2.644		124		180		203	214	248	282
	8.60	2.165	0.308	3.406	*86.51*			2.485	2.916		137		199		224	236	273	311
	9.35	2.101	0.340					2.708			149		217		244	257	298	339
	9.80	2.057	0.362					2.858			157		229		257	272	314	357
	10.50	1.997	0.392					3.058			160		233		262	277	321	365
	10.70	1.971	0.405					3.143										
	11.50	1.901	0.440					3.367										
3-1/2	6.50	3.035	0.170	3.937	*99.99*	-	-	1.778	2.954	3.858	98		142		160	169	196	222
	7.70	2.943	0.216					2.227			123		178		201	212	245	279
	9.20	2.867	0.254					2.590			142		207		233	246	285	324
	10.20	2.797	0.289	4.000	*101.60*			2.916	3.346		160		233		262	277	321	364
	12.70	2.625	0.375	4.142	*105.20*			3.681	4.253		203		295		331	350	405	460
	13.70	2.549	0.413					4.005			220		320		360	380	441	501
	14.30	2.515	0.430					4.146			228		332		373	394	456	518
	14.70	2.477	0.449					4.304			234		340		383	404	468	532
	15.50	2.423	0.476					4.521										
	16.70	2.355	0.510					4.791										
4	8.20	3.495	0.190	4.441	*112.80*	-	-	2.274	3.455	4.252	125		182		205	216	250	284
	9.50	3.423	0.226					2.680			147		214		241	255	295	335
	10.90	3.351	0.262					3.077			169		246		277	292	338	385
	13.20	3.215	0.330	4.567	*116.00*			3.805	4.346		209		304		342	361	419	467
	14.85	3.115	0.380	4.665	*118.49*			4.321	5.061		238		346		389	411	475	540
	16.10	3.045	0.415					4.673			257		374		421	444	514	584
	16.50	3.015	0.430					4.824			265		386		434	458	531	603
	18.90	2.875	0.500					5.498			278		405		455	481	557	633
	22.20	2.655	0.610					6.496										
4-1/2	10.50	3.927	0.224	4.921	*124.99*	4.875	*123.82*	3.009	3.853	4.646	165		241		271	286	331	376
	11.60	3.875	0.250					3.339			184		267		300	317	367	417
	12.60	3.833	0.271	4.961	*126.00*			3.601	4.159		198		288		324	342	396	450
	13.50	3.795	0.290	5.000	*127.00*			3.836	4.467		211		307		345	364	422	480
	15.20	3.701	0.337	5.079	*129.00*			4.407	5.090		242		353		397	419	485	551
	17.00	3.615	0.380					4.918			270		393		433	467	541	615
	17.70	3.571	0.402					5.175			280		407		458	484	560	636
	18.90	3.515	0.430					5.498										
	21.50	3.375	0.500					6.284										
	23.70	3.255	0.560					6.932										

Data provided by TenarisConnections; October, 2005

Tenaris MS28™ Casing

Pipe Diameter	Nominal Weight	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.²	%	%	1,000 lb				
5	13.00	4.494	0.253	5.512	3.776	5.014	133	81	208	302	359	415	472
	15.00	4.408	0.296		4.376		115	70	241	350	416	481	547
	18.00	4.276	0.362	5.630	5.272	6.047	115	81	290	422	501	580	659
	20.30	4.184	0.408		5.884		103	73	324	471	559	647	735
	20.80	4.156	0.422	5.756	6.070	7.173	118	71	334	486	577	668	759
	21.40	4.126	0.437		6.265		114	68	345	501	595	689	783
	23.20	4.044	0.478		6.791		106	63	373	543	645	747	849
	24.10	4.000	0.500		7.068		101	61	389	565	671	777	884
5-1/2	15.50	4.950	0.275	6.043	4.517	5.794	128	77	248	361	429	497	565
	17.00	4.892	0.304		4.962		117	70	273	397	471	546	620
	20.00	4.778	0.361	6.146	5.828	6.774	116	83	321	466	554	641	729
	23.00	4.670	0.415		6.629		102	73	365	530	630	729	829
	26.00	4.548	0.476	6.260	7.513	7.885	105	64	413	601	714	826	939
	26.80	4.500	0.500		7.854		100	62	432	628	746	864	982
	28.40	4.440	0.530	6.346	8.274	8.744	106	66	455	662	786	910	1,034
	29.70	4.376	0.562		8.716		100	62	479	697	828	959	1,089
	32.60	4.250	0.625	6.417	9.574	9.453	99	61	520	756	898	1,040	1,182

Data provided by TenarisConnections; October, 2005

Tenaris MS28™ Casing (Continued)

Pipe Diameter	Nominal Weight	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.^{2}	%	%	1,000 lb				
6-5/8	24.00	5.921	0.352	7.390	6.935	10.142	146	58	381	555	659	763	867
	28.00	5.791	0.417		8.130		125	62	447	650	772	894	1,016
	32.00	5.675	0.475		9.179		110		505	734	872	1,010	1,147
	35.00	5.575	0.525		10.063		101		553	805	956	1,107	1,258
7	23.00	6.366	0.317	7.657	6.654	9.509	143	54	366	532	632	732	832
	24.75	6.314	0.343		7.172		133	58	394	574	681	789	896
	26.00	6.276	0.362		7.545		126	63	415	604	717	830	943
	29.00	6.184	0.408		8.448		113	56	465	676	803	929	1,056
	32.00	6.094	0.453		9.320		102	51	513	746	885	1,025	1,165
	35.00	6.004	0.498	7.795	10.173	11.183	110	47	559	814	966	1,119	1,272
	38.00	5.920	0.540		10.962		102	43	603	877	1,041	1,206	1,370
	41.00	5.820	0.590	7.854	11.884	11.909	100	60	654	951	1,129	1,307	1,485
8-5/8	32.00	7.921	0.352	9.626	9.145	17.087	187	54	503	732	869	1,006	1,143
	36.00	7.825	0.400		10.334		165	64	568	827	982	1,137	1,292
	40.00	7.725	0.450		11.555		148	67	636	924	1,098	1,271	1,444
	44.00	7.625	0.500		12.760		134	61	702	1,021	1,212	1,404	1,595
	49.00	7.511	0.557		14.117		121	65	776	1,129	1,341	1,553	1,765
	52.00	7.435	0.595		15.006		114	61	825	1,200	1,426	1,651	1,876
9-5/8	36.00	8.921	0.352	10.626	10.250	18.981	185	48	564	820	974	1,128	1,281
	40.00	8.835	0.395		11.448		166	59	630	916	1,088	1,259	1,431
	43.50	8.755	0.435		12.558		151	67	691	1,005	1,193	1,381	1,570
	47.00	8.681	0.472		13.570		140	72	746	1,086	1,289	1,493	1,696
	53.50	8.535	0.545		15.540		122	63	855	1,243	1,476	1,709	1,943
	58.40	8.435	0.595		16.873		112	58	928	1,350	1,603	1,856	2,109
	59.40	8.407	0.609		17.248		110	57	949	1,380	1,639	1,897	2,156
	61.10	8.375	0.625		17.675		107	56	972	1,414	1,679	1,944	2,209
	64.90	8.281	0.672	10.650	18.899	19.377	103	58	1,039	1,512	1,795	2,079	2,362
	71.80	8.125	0.750	10.748	20.908	21.030	101	60	1,150	1,673	1,986	2,300	2,613

Data provided by TenarisConnections; October, 2005

Tenaris MS XT/XC™ Tubing

Type: Coupled											Minimum Joint Yield Strength							
OD	Nom Wt	Drift Diameter	Wall Thickness	Joint Reg OD		Dsc		Pipebody	Critical Area	Lm	J-55	K-55	L-80	N-80	C-90	C/T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	*Nm*	in.	*Nm*	in.	in.^{2}	in.	1,000 lb							
3-1/2	9.20	2.867	0.254	3.917	*99.49*	-	-	2.590	2.850	3.386	142		207		233	246	285	324
4-1/2	10.50	3.927	0.224	4.921	*124.99*	4.875	*123.82*	3.009	3.929	4.016	165		241		271	286	331	376
	11.60	3.875	0.250					3.339			184		267		300	317	367	417
	12.60	3.833	0.271					3.601			198		288		324	342	396	450
	13.50	3.795	0.290	4.961	*126.00*			3.835	4.235		211		307		345	364	422	480
	15.10	3.701	0.337	5.079	*129.00*			4.408	5.166		242		353		397	419	485	551
	17.00	3.615	0.380					4.918			271		393		443	467	541	615
	23.70	3.255	0.560	5.299	*134.59*			6.932	6.964		381		555		624	659	762	866

Data provided by TenarisConnections; October, 2005

Tenaris MS XT/XC™ Casing

Pipe Diameter	Nom Wt	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.^{2}	%	%	1,000 lb				
5	13.00	4.494	0.253	5.563	3.776	5.453	144	100	208	302	359	415	472
	15.00	4.408	0.296		4.376		125		241	350	416	481	547
	18.00	4.276	0.362		5.272		103		290	422	501	580	659
	20.30	4.184	0.408		5.884		93		300	436	518	600	682
	20.80	4.156	0.422		6.070		90						
	21.40	4.126	0.437		6.265		87						
	23.20	4.044	0.478		6.791		80						
	24.10	4.000	0.500		7.068		77						
5-1/2	15.50	4.950	0.275	6.051	4.517	5.861	130	100	248	361	429	497	565
	17.00	4.892	0.304		4.962		118		273	397	471	546	620
	20.00	4.778	0.361		5.828		101		321	466	554	641	729
	23.00	4.670	0.415		6.629		88		322	469	557	645	733
	26.80	4.500	0.500		7.854		75						
6-5/8	24.00	5.921	0.352	7.390	6.935	9.830	142	100	381	555	659	763	867
	28.00	5.791	0.417		8.130		121		447	650	772	894	1,016
	32.00	5.675	0.475		9.179		107		505	734	872	1,010	1,147

Data provided by TenarisConnections; October, 2005

Tenaris MS XT/XC™ Casing (Continued)

Pipe Diameter	Nom Wt	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.^{2}	%	%	1,000 lb				
7	23.00	6.366	0.317	7.657	6.654	9.216	139	100	366	532	632	732	832
	26.00	6.276	0.362		7.545		122		415	604	717	830	943
	29.00	6.184	0.408		8.448		109		465	676	803	929	1,056
	32.00	6.094	0.453		9.320		99		507	737	876	1,014	1,152
	35.00	6.004	0.498		10.173		91						
	38.00	5.920	0.540		10.962		84						
	41.00	5.820	0.590		11.884		78						
7-5/8	26.40	6.969	0.328	8.500	7.516	13.062	174	100	413	601	714	827	939
	29.70	6.875	0.375		8.544		153		470	683	812	940	1,068
	33.70	6.765	0.430		9.715		134		534	777	923	1,069	1,214
	39.00	6.625	0.500		11.189		117		615	895	1,063	1,231	1,399
	42.80	6.502	0.562		12.465		105		686	997	1,184	1,371	1,558
	45.30	6.435	0.595		13.136		99		718	1,045	1,241	1,437	1,633
	47.10	6.375	0.625		13.747		95						
7-3/4	46.10	6.560	0.595	8.634	13.372	13.400	100	100	735	1,070	1,270	1,471	1,671
8-5/8	32.00	7.921	0.352	9.626	9.145	16.726	183	100	503	732	869	1,006	1,143
	36.00	7.825	0.400		10.334		162		568	827	982	1,137	1,292
	40.00	7.725	0.450		11.555		145		636	924	1,098	1,271	1,444
	44.00	7.625	0.500		12.760		131		702	1,021	1,212	1,404	1,595
	49.00	7.511	0.557		14.117		118		776	1,129	1,341	1,553	1,765
9-5/8	36.00	8.921	0.352	10.626	10.250	18.577	181	100	564	820	974	1,128	1,281
	40.00	8.835	0.395		11.448		162		630	916	1,088	1,259	1,431
	43.50	8.755	0.435		12.558		148		691	1,005	1,193	1,381	1,570
	47.00	8.681	0.472		13.570		137		746	1,086	1,289	1,493	1,696
	53.50	8.535	0.545		15.540		120		855	1,243	1,476	1,709	1,943
	58.40	8.435	0.595		16.873		110		928	1,350	1,603	1,856	2,109
	64.90	8.281	0.672		18.899		98		1,022	1,486	1,765	2,043	2,322
9-7/8	62.80	8.625	0.625	10.827	18.164	18.230	100	100	999	1,453	1,726	1,998	2,271
	67.30	8.539	0.668	10.984	19.322	20.928	108		1,063	1,546	1,836	2,125	2,415
	68.80	8.475	0.700		20.175		104		1,110	1,614	1,917	2,219	2,522
	70.40	8.461	0.707		20.362		103		1,120	1,629	1,934	2,240	2,545
	72.10	8.425	0.725		20.843		100		1,146	1,667	1,980	2,293	2,605
10-3/4	40.50	10.050	0.350	11.748	11.436	20.587	180	100	629	915	1,086	1,258	1,429
	45.50	9.950	0.400		13.006		158		715	1,040	1,236	1,431	1,626
	51.00	9.850	0.450		14.561		141		801	1,165	1,383	1,602	1,820
	55.50	9.760	0.495		15.943		129		877	1,275	1,515	1,754	1,993
	60.70	9.660	0.545		17.469		118		961	1,397	1,660	1,922	2,184
	65.70	9.560	0.595		18.978		108		1,044	1,518	1,803	2,088	2,372
11-3/4	47.00	11.000	0.375	12.752	13.401	22.511	168	100	737	1,072	1,273	1,474	1,675
	54.00	10.880	0.435		15.464		146		851	1,237	1,469	1,701	1,933
	60.00	10.772	0.489		17.298		130		951	1,384	1,643	1,903	2,162
	65.00	10.682	0.534		18.819		120		1,035	1,505	1,788	2,070	2,352
13-3/8	54.50	12.615	0.380	14.374	15.506	25.513	165	100	853	1,240	1,473	1,706	1,938
	61.00	12.515	0.430		17.481		146		961	1,398	1,661	1,923	2,185
	68.00	12.415	0.480		19.439		131		1,069	1,555	1,847	2,138	2,430
	72.00	12.347	0.514		20.770		123		1,142	1,662	1,973	2,285	2,596
13-5/8	88.20	12.375	0.625	14.626	25.529	25.980	102	100	1,404	2,042	2,425	2,808	3,191

Data provided by TenarisConnections; October, 2005

Tenaris PJD™ Tubing

Type: Upset, Integral									Minimum Joint Yield Strength							
(OD)	Nom Wt	Drift Diameter	Wall Thickness	Joint Reg OD Dsc	*Special OD Dsc*	Pipebody	Critical Area	Lm	J-55	K-55	L-80	N-80	C-90	C/T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	*Nm*	in.	in.²	in.	1,000 lb							
2-3/8	4.70	1.901	0.190	2.795	*70.99*	1.300	1.325	2.362	72		104		117	124	143	163
	5.30	1.845	0.218			1.477	1.494		81		118		133	140	162	185
	5.95	1.773	0.254	2.913	*73.99*	1.690	1.714		93		135		152	161	186	212
2-7/8	6.50	2.347	0.217	3.307	*83.99*	1.812	1.838	2.756	100		145		163	172	199	227
	7.90	2.229	0.276	3.425	*86.99*	2.254	2.275		124		180		203	214	248	282
	8.70	2.166	0.308	3.484	*88.99*	2.482	2.499		137		199		224	236	273	311
	9.60	2.101	0.340	3.543	*89.99*	2.706	2.717		149		217		244	257	298	339
3-1/2	9.30	2.867	0.254	4.000	*101.60*	2.590	2.688	3.228	142		207		233	246	285	324
	10.30	2.797	0.289			2.916	3.013		160		233		262	277	321	364
	12.95	2.625	0.375	4.291	*108.99*	3.681	3.757		203		295		331	350	405	460
4	11.00	3.351	0.262	4.469	*113.51*	3.075	3.191	3.543	169		246		277	292	338	385
	13.40	3.215	0.330	4.528	*115.01*	3.804	3.900		209		304		342	361	419	476
4-1/2	12.75	3.833	0.271	4.961	*126.00*	3.601	3.718	3.937	198		288		324	342	396	450
	13.50	3.795	0.290			3.835	3.960		211		307		345	364	422	480
	15.50	3.701	0.337	5.059	*128.49*	4.408	4.529		242		353		397	419	485	551

Data provided by TenarisConnections; October, 2005

Tenaris HW™ Casing

Pipe Diameter	Nominal Weight	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.²	%	%	1,000 lb				
5	26.70	3.876	0.562	5.650	7.835	8.384	107	100	431	627	744	862	979
	29.20	3.750	0.625	5.772	8.590	9.192			472	687	816	945	1,074
	31.60	3.626	0.687	5.874	9.309	9.960			512	745	884	1,024	1,164
	34.00	3.500	0.750	5.976	10.015	10.715			551	801	951	1,102	1,252
5-1/2	28.40	4.440	0.530	6.094	8.274	8.854	107	100	455	662	786	910	1,034
	29.70	4.376	0.562	6.146	8.719	9.329			480	698	828	959	1,090
	32.00	4.276	0.612	6.232	9.398	10.055			517	752	893	1,034	1,175
	32.60	4.250	0.625	6.256	9.571	10.241			526	766	909	1,053	1,196
	35.30	4.126	0.687	6.362	10.388	11.115			571	831	987	1,143	1,299
	36.40	4.090	0.705	6.390	10.619	11.363			584	850	1,009	1,168	1,327
	38.00	4.000	0.750	6.465	11.193	11.975			616	895	1,063	1,231	1,399
	40.50	3.876	0.812	6.567	11.957	12.794			658	957	1,136	1,315	1,495
	43.10	3.750	0.875	6.669	12.713	13.603			699	1,017	1,208	1,398	1,589
6-5/8	34.50	5.575	0.525	7.390	10.063	10.766	107	100	553	805	956	1,107	1,258
	36.70	5.502	0.562		10.700	11.448			588	856	1,016	1,177	1,337
	40.20	5.375	0.625		11.780	12.605			648	942	1,119	1,296	1,473
	43.70	5.251	0.687	7.504	12.814	13.711			705	1,025	1,217	1,410	1,602
	46.00	5.165	0.730	7.579	13.519	14.466			744	1,082	1,284	1,487	1,690
	47.10	5.125	0.750	7.614	13.842	14.810			761	1,107	1,315	1,523	1,730
	50.40	5.002	0.812	7.720	14.824	15.861			815	1,186	1,408	1,631	1,853
7	38.00	5.920	0.540	7.656	10.962	11.729	107	100	603	877	1,041	1,206	1,370
	41.00	5.820	0.590	7.717	11.884	12.716			654	951	1,129	1,307	1,485
	42.70	5.750	0.625	7.772	12.518	13.394			688	1,001	1,189	1,377	1,565
	44.00	5.720	0.640	7.799	12.788	13.683			703	1,023	1,215	1,407	1,598
	46.00	5.660	0.670	7.850	13.325	14.258			733	1,066	1,266	1,466	1,666
	46.40	5.626	0.687	7.878	13.626	14.579			749	1,090	1,294	1,499	1,703
	49.50	5.540	0.730	7.957	14.378	15.384			791	1,150	1,366	1,582	1,797
	50.10	5.500	0.750	7.992	14.727	15.757			810	1,178	1,399	1,620	1,841
	53.60	5.376	0.812	8.098	15.785	16.890			868	1,263	1,500	1,736	1,973
	57.10	5.250	0.875	8.213	16.838	18.016			926	1,347	1,600	1,852	2,105
7-5/8	42.80	6.502	0.562	8.500	12.465	13.338	107	100	686	997	1,184	1,371	1,558
	45.30	6.435	0.595		13.136	14.055			722	1,051	1,248	1,445	1,642
	47.10	6.375	0.625		13.747	14.710			756	1,100	1,306	1,512	1,718
	51.20	6.251	0.687	8.512	14.973	16.021			824	1,198	1,422	1,647	1,872
	52.80	6.202	0.712	8.559	15.458	16.540			850	1,237	1,469	1,700	1,932
	55.30	6.125	0.750	8.626	16.198	17.332			891	1,296	1,539	1,782	2,025
	59.20	6.002	0.812	8.736	17.374	18.591			956	1,390	1,651	1,911	2,172
8-5/8	49.00	7.511	0.557	9.625	14.117	15.106	107	100	776	1,129	1,341	1,553	1,765
	49.10	7.502	0.562		14.229	15.226			783	1,138	1,352	1,565	1,779
	52.00	7.435	0.595		15.010	16.061			826	1,201	1,426	1,651	1,876
	54.00	7.375	0.625		15.706	16.805			864	1,256	1,492	1,728	1,963
	58.70	7.251	0.687		17.131	18.330			942	1,370	1,627	1,884	2,141
	63.50	7.125	0.750		18.554	19.852			1,020	1,484	1,763	2,041	2,319
	68.10	7.002	0.812	9.744	19.924	21.319			1,096	1,594	1,893	2,192	2,490

Data provided by TenarisConnections; October, 2005

Tenaris HW™ Casing (Continued)

Pipe Diameter	Nominal Weight	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.^{2}	%	%	1,000 lb				
9-5/8	58.40	8.435	0.595	10.625	16.880	18.061	107	100	928	1,350	1,604	1,857	2,110
	59.40	8.407	0.609		17.248	18.456			949	1,380	1,639	1,897	2,156
	61.10	8.375	0.625		17.668	18.905			972	1,413	1,679	1,944	2,209
	64.90	8.281	0.672		18.899	20.223			1,039	1,512	1,795	2,079	2,362
	70.30	8.157	0.734		20.496	21.931			1,127	1,640	1,947	2,255	2,562
	75.60	8.031	0.797	10.705	22.098	23.645			1,215	1,768	2,099	2,431	2,762
	80.80	7.907	0.859	10.815	23.655	25.310			1,301	1,892	2,247	2,602	2,957
10-3/4	65.70	9.560	0.595	11.750	18.978	20.307	107	100	1,044	1,518	1,803	2,088	2,372
	73.20	9.406	0.672		21.277	22.766			1,170	1,702	2,021	2,340	2,660
	79.20	9.282	0.734		23.092	24.709			1,270	1,847	2,194	2,540	2,886
	85.30	9.156	0.797	11.839	24.916	26.660			1,370	1,993	2,367	2,741	3,115
	91.20	9.032	0.859	11.949	26.694	28.563			1,468	2,136	2,536	2,936	3,337
14	86.00	12.800	0.600	14.843	25.259	27.027	107	100	1,389	2,021	2,400	2,778	3,157
	93.00	12.700	0.650		27.261	29.170			1,499	2,181	2,590	2,999	3,408
	100.00	12.600	0.700	14.953	29.249	31.296			1,609	2,340	2,779	3,217	3,656
	106.00	12.500	0.750	15.043	31.220	33.406			1,717	2,498	2,966	3,434	3,903
	112.00	12.400	0.800	15.130	33.175	35.497			1,825	2,654	3,152	3,649	4,147
	120.00	12.300	0.850	15.220	35.115	37.574			1,931	2,809	3,336	3,863	4,389

Data provided by TenarisConnections; October, 2005

Tenaris ER™ Casing

Pipe Diameter	Nominal Weight	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.^{2}	%	%	1,000 lb				
7	23.00	6.366	0.317	7.657	6.654	9.517	143	100	366	532	632	732	832
	26.00	6.276	0.362		7.545		126		415	604	717	830	943
	29.00	6.184	0.408		8.448		113		465	676	803	929	1,056
	32.00	6.094	0.453		9.320		102		513	746	885	1,025	1,165
	35.00	6.004	0.498		10.173		94		523	761	904	1,047	1,190
	38.00	5.920	0.540		10.962		87						
	41.00	5.820	0.590		11.884		80						
	44.00	5.720	0.640		12.791		74						
	46.00	5.660	0.670		13.325		71						
8-5/8	24.00	8.097	0.264	9.626	6.936	17.095	246	100	381	555	659	763	867
	28.00	8.017	0.304		7.942		215		437	635	755	874	993
	32.00	7.921	0.352		9.145		187		503	732	869	1,006	1,143
	36.00	7.825	0.400		10.334		165		568	827	982	1,137	1,292
	40.00	7.725	0.450		11.555		148		636	924	1098	1,271	1,444
	44.00	7.625	0.500		12.760		134		702	1,021	1,212	1,404	1,595
	49.00	7.511	0.557		14.117		121		776	1,129	1,341	1,553	1,765
	52.00	7.435	0.595		15.006		114		825	1,200	1,426	1,651	1,876
	54.00	7.375	0.625		15.711		109		864	1,257	1,493	1,728	1,964
	58.70	7.251	0.687		17.131		100		940	1,368	1,624	1,880	2,137
9-5/8	36.00	8.921	0.352	10.626	10.250	19.015	186	100	564	820	974	1,128	1,281
	40.00	8.835	0.395		11.448		166		630	916	1,088	1,259	1,431
	43.50	8.755	0.435		12.558		151		691	1,005	1,193	1,381	1,570
	47.00	8.681	0.472		13.570		140		746	1,086	1,289	1,493	1,696
	53.50	8.535	0.545		15.540		122		855	1,243	1,476	1,709	1,943
	58.40	8.435	0.595		16.873		113		928	1,350	1,603	1,856	2,109
	59.40	8.407	0.609		17.248		110		949	1,380	1,639	1,897	2,156
	61.10	8.375	0.625		17.675		108		972	1,414	1,679	1,944	2,209
	64.90	8.281	0.672		18.899		101		1,039	1,512	1,795	2,079	2,362
9-7/8	62.80	8.625	0.625	10.827	18.164	18.654	103	100	999	1,453	1,726	1,998	2,271
10-3/4	45.50	9.950	0.400	11.748	13.006	21.051	162	100	715	1,040	1,236	1,431	1,626
	51.00	9.850	0.450		14.561		145		801	1,165	1,383	1,602	1,820
	55.50	9.760	0.495		15.943		132		877	1,275	1,515	1,754	1,993
	60.70	9.660	0.545		17.469		121		961	1,397	1,660	1,922	2,184
	65.70	9.560	0.595		18.978		111		1044	1,518	1,803	2,088	2,372
11-7/8	71.80	10.711	0.582	12.756	20.641	20.872	101	100	1,135	1,651	1,961	2,271	2,580
13-3/8	54.50	12.615	0.380	14.374	15.506	26.091	168	100	853	1,240	1,473	1,706	1,938
	61.00	12.515	0.430		17.481		149		961	1,398	1,661	1,923	2,185
	68.00	12.415	0.480		19.439		134		1,069	1,555	1,847	2,138	2,430
	72.00	12.347	0.514		20.770		126		1,142	1,662	1,973	2,285	2,596
13-1/2	80.40	12.348	0.576	14.500	23.386	26.330	113	100	1,286	1,871	2,222	2,573	2,923
13-5/8	88.20	12.375	0.625	14.626	25.529	26.569	104	100	1,404	2,042	2,425	2,808	3,191
	105.00	12.106	0.760		30.707		87		1,461	2,125	2,524	2,923	3,321

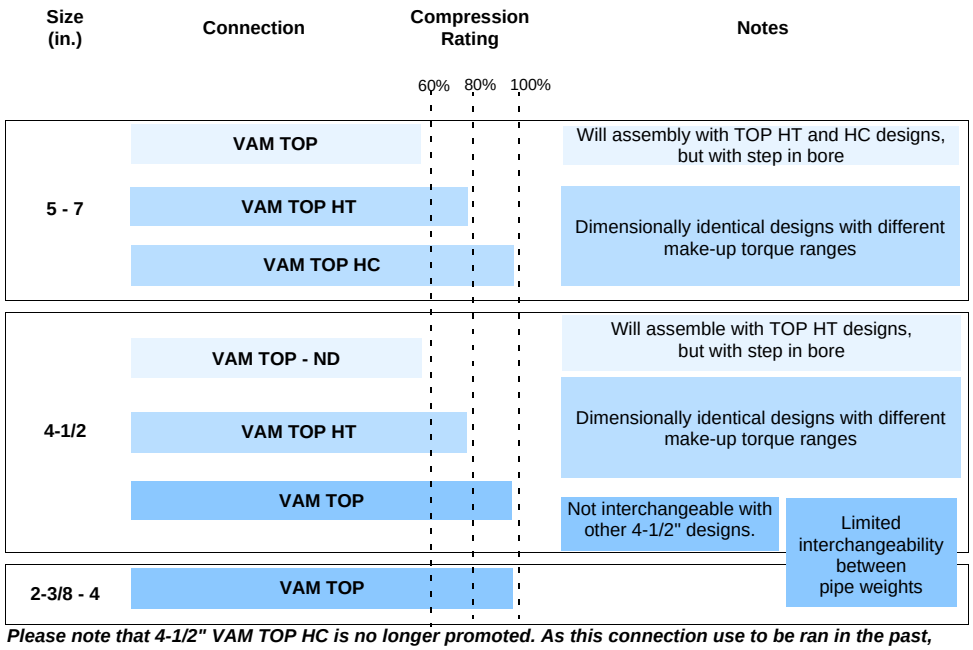
Data provided by TenarisConnections; October, 2005

Tenaris ER™ Casing (Continued)

Pipe Diameter	Nominal Weight	Internal Diameter	Wall Thickness	OD Regular	Pipe Body Area	Critical Area Regular	Tensile Efficiency	Compression Efficiency	Joint Strength				
									K-55	L-80	T-95	P-110	Q-125
in.	lb/ft	in.	in.	in.	in.	in.^{2}	%	%	1,000 lb				
14	82.50	12.876	0.562	15.000	23.718	30.597	129	100	1,304	1,897	2,253	2,609	2,965
	94.80	12.688	0.656		27.497		111		1,512	2,200	2,612	3,025	3,437
	99.30	12.624	0.688		28.780		106		1,583	2,302	2,734	3,166	3,598
	110.00	12.456	0.772		32.084		95	95	1,683	2,448	2,907	3,366	3,825
	111.00	12.442	0.779		32.361		95						
	114.00	12.400	0.800		33.175		92						
15	109.00	13.570	0.715	16.000	32.087	34.089	106	100	1,765	2,567	3,048	3,530	4,011
16	65.00	15.250	0.375	17.000	18.417	33.356	181	100	1,013	1,473	1,750	2,026	2,302
	75.00	15.124	0.438		21.423		156		1,178	1,714	2,035	2,356	2,678
	84.00	15.010	0.495		24.106	34.870	145		1,326	1,928	2,290	2,652	3,013
	94.50	14.876	0.562		27.248		128		1,499	2,180	2,589	2,997	3,406
	109.00	14.688	0.656		31.619		110		1,739	2,529	3,004	3,478	3,952
	118.00	14.570	0.715		34.333	37.281	109		1,888	2,747	3,262	3,777	4,292
	128.00	14.438	0.781		37.346		100		2,050	2,982	3,542	4,101	4,660
18-5/8	87.50	17.755	0.435	20.000	24.854	50.353	203	100	1,367	1,988	2,361	2,734	3,107
	94.50	17.689	0.468		26.696		189		1,468	2,136	2,536	2,937	3,337
	96.50	17.655	0.485		27.637		182		1,520	2,211	2,625	3,040	3,455
	99.00	17.625	0.500		28.466	52.120	183		1,566	2,277	2,704	3,131	3,558
	114.00	17.467	0.579		32.828		159		1,806	2,626	3,119	3,611	4,103
	115.00	17.437	0.594		33.647		155		1,851	2,692	3,197	3,701	4,206
	126.00	17.354	0.636		35.928		145		1,976	2,874	3,413	3,952	4,491
	136.00	17.239	0.693		39.031		134		2,147	3,122	3,708	4,293	4,879
	139.00	17.185	0.720		40.498	54.937	136		2,227	3,240	3,847	4,455	5,062
20	94.00	19.124	0.438	21.000	26.930	41.515	154	100	1,481	2,154	2,558	2,962	3,366
	106.50	19.000	0.500		30.631	43.416	142		1,685	2,450	2,910	3,369	3,829
	118.50	18.874	0.563		34.378		126		1,891	2,750	3,266	3,782	4,297
	131.50	18.750	0.625		38.054		114		2,093	3,044	3,615	4,186	4,757
	133.00	18.730	0.635		38.634		112		2,125	3,091	3,670	4,250	4,829
	147.00	18.582	0.709		42.972		101		2,363	3,438	4,082	4,727	5,372
	169.00	18.376	0.812		48.937		89		2,388	3,473	4,124	4,776	5,427
24	159.20	22.750	0.625	25.000	45.911	51.964	113	100	2,525	3,673	4,362	5,050	5,739
	162.00	22.730	0.635		46.613		111		2,564	3,729	4,428	5,127	5,827
	174.00	22.624	0.688		50.400		103		2,772	4,032	4,788	5,544	6,300
24-1/2	133.00	23.500	0.500	25.591	37.699	54.329	144	100	2,073	3,016	3,581	4,147	4,712
	140.00	23.438	0.531		39.992	56.665	142		2,200	3,199	3,799	4,399	4,999
	162.00	23.250	0.625		46.892		121		2,579	3,751	4,455	5,158	5,862
	165.00	23.230	0.635		47.611		119		2,619	3,809	4,523	5,237	5,951

Data provided by TenarisConnections; October, 2005

Compression Rating for VAM TOP



Please note that 4-1/2" VAM TOP HC is no longer promoted. As this connection use to be ran in the past, please contact VAM Services in case of any questions relative to this product.

VAM TOP Make-Up Torques

Size (OD)	Nom Wt	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opti	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																							
2-3/8 *60.33*	4.60	0.190 *4.83*	-			960 *1300*	1010 *1370*	1060 *1440*	1110 *1490*	1160 *1570*	1210 *1650*	1170 *1580*	1290 *1760*	1410 *1940*	1240 *1670*	1370 *1860*	1500 *2050*	1310 *1770*	1450 *1970*	1590 *2170*	1340 *1810*	1480 *2010*	1620 *2210*	1350 *1840*	1500 *2040*	1650 *2240*
	5.10	0.218 *5.54*	-			1190 *1620*	1250 *1700*	1310 *1780*	1360 *1850*	1430 *1940*	1500 *2030*	1430 *1930*	1580 *2150*	1730 *2370*	1520 *2050*	1680 *2280*	1840 *2510*	1560 *2110*	1730 *2340*	1900 *2570*	1590 *2150*	1760 *2390*	1930 *2630*	1620 *2190*	1790 *2430*	1960 *2670*
	5.80	0.254 *6.45*	-			1560 *2120*	1640 *2230*	1720 *2340*	1680 *2270*	1760 *2390*	1840 *2510*	1800 *2430*	1990 *2700*	2180 *2970*	1950 *2640*	2160 *2930*	2370 *3220*	2050 *2770*	2270 *3080*	2490 *3390*	2120 *2870*	2350 *3190*	2580 *3510*	2180 *2960*	2420 *3290*	2660 *3620*
	6.30	0.280 *7.11*	-			1790 *2420*	1880 *2550*	1970 *2680*	1940 *2630*	2040 *2770*	2140 *2910*	2070 *2790*	2290 *3100*	2510 *3410*	2230 *3010*	2470 *3350*	2710 *3690*	2340 *3180*	2600 *3530*	2860 *3880*	2430 *3280*	2690 *3650*	2950 *4020*	2510 *3390*	2780 *3770*	3050 *4150*
	6.60	0.295 *7.49*	-			1900 *2590*	2000 *2720*	2100 *2850*	2090 *2820*	2190 *2970*	2290 *3120*	2210 *2990*	2450 *3320*	2690 *3650*	2390 *3240*	2650 *3600*	2910 *3960*	2520 *3410*	2790 *3790*	3060 *4170*	2600 *3510*	2880 *3900*	3160 *4290*	2680 *3630*	2970 *4030*	3260 *4430*
	7.35	0.336 *8.53*	-			2280 *3090*	2390 *3250*	2500 *3410*	2490 *3370*	2620 *3550*	2750 *3730*	2640 *3570*	2930 *3970*	3220 *4370*	2840 *3850*	3150 *4280*	3460 *4710*	2980 *4040*	3310 *4490*	3640 *4940*	3070 *4170*	3410 *4630*	3750 *5090*	3170 *4300*	3520 *4780*	3870 *5260*
2-7/8 *73.03*	6.40	0.217 *5.51*	-			1530 *2080*	1610 *2190*	1690 *2300*	1670 *2260*	1850 *2510*	2030 *2760*	1800 *2430*	1990 *2700*	2180 *2970*	1860 *2510*	2060 *2790*	2260 *3070*	1920 *2590*	2130 *2880*	2340 *3170*	1960 *2650*	2170 *2940*	2380 *3230*	1990 *2690*	2210 *2990*	2430 *3290*
	7.80	0.276 *7.01*	-			2170 *2940*	2280 *3090*	2390 *3240*	2360 *3190*	2620 *3550*	2880 *3910*	2670 *3610*	2960 *4010*	3250 *4410*	2830 *3830*	3140 *4260*	3450 *4690*	3000 *4060*	3330 *4510*	3660 *4960*	3060 *4140*	3390 *4600*	3720 *5060*	3110 *4210*	3450 *4680*	3790 *5150*
	8.60	0.308 *7.82*	-			2510 *3400*	2640 *3580*	2770 *3760*	2750 *3730*	3050 *4140*	3350 *4550*	3090 *4180*	3430 *4650*	3770 *5120*	3290 *4400*	3650 *4900*	4010 *5400*	3480 *4700*	3860 *5200*	4240 *5700*	3540 *4800*	3930 *5300*	4320 *5800*	3600 *4900*	4000 *5400*	4400 *5900*
	9.35	0.340 *8.64*	-			2890 *3920*	3040 *4120*	3190 *4320*	3150 *4270*	3490 *4740*	3830 *5210*	3520 *4800*	3910 *5300*	4300 *5800*	3740 *5000*	4150 *5600*	4560 *6200*	3960 *5400*	4390 *6000*	4820 *6600*	4040 *5500*	4480 *6100*	4920 *6700*	4110 *5600*	4560 *6200*	5010 *6800*
	9.80	0.362 *9.19*	-			3120 *4220*	3280 *4440*	3440 *4660*	3420 *4700*	3800 *5200*	4180 *5700*	3830 *5200*	4250 *5800*	4670 *6400*	4060 *5500*	4510 *6100*	4960 *6700*	4290 *5800*	4760 *6500*	5230 *7200*	4370 *5900*	4850 *6600*	5330 *7300*	4450 *6000*	4940 *6700*	5430 *7400*
	10.50	0.392 *9.96*	-			3440 *4650*	3620 *4900*	3800 *5150*	3780 *5100*	4190 *5700*	4600 *6300*	4240 *5800*	4710 *6400*	5180 *7000*	4500 *6100*	4990 *6800*	5480 *7500*	4750 *6400*	5270 *7100*	5790 *7800*	4840 *6600*	5370 *7300*	5900 *8000*	4930 *6700*	5470 *7400*	6010 *8100*
	10.70	0.405 *10.29*	-			3520 *4750*	3700 *5000*	3880 *5250*	3900 *5300*	4330 *5900*	4760 *6500*	4410 *5900*	4900 *6600*	5390 *7300*	4680 *6300*	5190 *7000*	5700 *7700*	4940 *6700*	5480 *7400*	6020 *8100*	5040 *6800*	5590 *7600*	6140 *8400*	5130 *6900*	5690 *7700*	6250 *8500*
	11.50	0.440 *11.18*	-			3970 *5300*	4170 *5600*	4370 *5900*	4200 *5700*	4660 *6300*	5120 *6900*	4790 *6500*	5320 *7200*	5850 *7900*	5290 *7200*	5870 *8000*	6450 *8800*	5580 *7600*	6190 *8400*	6800 *9200*	5760 *7800*	6400 *8700*	7040 *9600*	5950 *8100*	6610 *9000*	7270 *9900*
3-1/2 *88.90*	6.50	0.170 *4.32*	-			1290 *1730*	1350 *1820*	1410 *1910*	1380 *1860*	1530 *2070*	1680 *2280*	1440 *1940*	1590 *2160*	1740 *2380*	1500 *2020*	1660 *2250*	1820 *2480*	1540 *2080*	1710 *2310*	1880 *2540*	1570 *2120*	1740 *2360*	1910 *2600*	1620 *2200*	1800 *2440*	1980 *2680*
	7.70	0.216 *5.49*	-			2040 *2760*	2140 *2900*	2240 *3040*	2040 *2750*	2260 *3060*	2480 *3370*	2130 *2880*	2360 *3200*	2590 *3520*	2220 *3000*	2460 *3330*	2700 *3660*	2350 *3190*	2610 *3540*	2870 *3890*	2440 *3310*	2710 *3680*	2980 *4050*	2530 *3430*	2810 *3810*	3090 *4190*
	9.20	0.254 *6.45*	-			2630 *3560*	2760 *3740*	2890 *3920*	2610 *3540*	2900 *3930*	3190 *4320*	2720 *3690*	3020 *4100*	3320 *4510*	2860 *3870*	3170 *4300*	3480 *4730*	3030 *4100*	3360 *4560*	3690 *5020*	3150 *4260*	3490 *4730*	3830 *5200*	3260 *4400*	3620 *4900*	3980 *5400*
	10.20	0.289 *7.34*	-			3210 *4340*	3370 *4570*	3530 *4800*	3200 *4320*	3550 *4820*	3900 *5320*	3330 *4500*	3700 *5000*	4070 *5500*	3500 *4800*	3880 *5300*	4260 *5800*	3710 *5000*	4120 *5600*	4530 *6200*	3860 *5200*	4280 *5800*	4700 *6400*	3990 *5400*	4430 *6000*	4870 *6600*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP Make-Up Torques (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opti	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																							
3-1/2 *88.90*	12.70	0.375 *9.53*	-			4660 *6250*	4900 *6600*	5140 *6950*	4950 *6700*	5500 *7500*	6050 *8300*	5310 *7200*	5890 *8000*	6470 *8800*	5510 *7500*	6120 *8300*	6730 *9100*	5680 *7700*	6310 *8600*	6940 *9500*	5800 *7800*	6440 *8700*	7080 *9600*	5900 *8000*	6550 *8900*	7200 *9800*
	13.70	0.413 *10.49*	-			5200 *7050*	5470 *7400*	5740 *7750*	5610 *7600*	6230 *8500*	6850 *9400*	6020 *8200*	6680 *9100*	7340 *10000*	6230 *8500*	6920 *9400*	7610 *10300*	6440 *8700*	7150 *9700*	7860 *10700*	6570 *8900*	7290 *9900*	8010 *10900*	6680 *9100*	7420 *10100*	8160 *11100*
	14.30	0.430 *10.92*	-			5440 *7400*	5720 *7800*	6000 *8200*	5900 *8000*	6550 *8900*	7200 *9800*	6340 *8500*	7040 *9500*	7740 *10500*	6570 *8900*	7300 *9900*	8030 *10900*	6790 *9200*	7540 *10200*	8290 *11200*	6920 *9400*	7680 *10400*	8440 *11400*	7040 *9500*	7820 *10600*	8600 *11700*
	14.70	0.449 *11.40*	-			5700 *7700*	6000 *8100*	6300 *8500*	6210 *8400*	6890 *9300*	7570 *10200*	6690 *9100*	7430 *10100*	8170 *11100*	6930 *9400*	7700 *10400*	8470 *11400*	7170 *9700*	7960 *10800*	8750 *11900*	7300 *9900*	8110 *11000*	8920 *12100*	7440 *10100*	8260 *11200*	9080 *12300*
	15.50	0.476 *12.09*	-			6020 *8150*	6330 *8600*	6640 *9050*	6670 *9000*	7410 *10000*	8150 *11000*	7310 *9900*	8120 *11000*	8930 *12100*	7790 *10600*	8650 *11800*	9510 *13000*	8060 *10900*	8950 *12100*	9840 *13300*	8240 *11200*	9150 *12400*	10060 *13600*	8370 *11300*	9300 *12600*	10230 *13900*
	16.70	0.510 *12.95*	-			6470 *8750*	6810 *9200*	7150 *9650*	7160 *9700*	7950 *10800*	8740 *11900*	7880 *10700*	8750 *11900*	9620 *13100*	8420 *11400*	9350 *12700*	10280 *14000*	8690 *11800*	9650 *13100*	10610 *14400*	8950 *12100*	9850 *13400*	10750 *14700*	9000 *12200*	10000 *13600*	11000 *15000*
4 *101.60*	8.20	0.190 *4.83*	-			1940 *2630*	2040 *2770*	2140 *2910*	2020 *2740*	2240 *3040*	2460 *3340*	2110 *2860*	2340 *3180*	2570 *3500*	2190 *2970*	2430 *3300*	2670 *3630*	2260 *3060*	2510 *3400*	2760 *3740*	2350 *3190*	2610 *3540*	2870 *3890*	2440 *3300*	2710 *3670*	2980 *4040*
	9.50	0.226 *5.74*	-			2670 *3610*	2810 *3800*	2950 *3990*	2660 *3600*	2950 *4000*	3240 *4400*	2780 *3760*	3080 *4180*	3380 *4600*	2950 *3990*	3270 *4430*	3590 *4870*	3140 *4250*	3480 *4720*	3820 *5190*	3260 *4400*	3620 *4900*	3980 *5400*	3380 *4600*	3750 *5100*	4120 *5600*
	10.90	0.262 *6.65*	-			3390 *4570*	3560 *4820*	3730 *5070*	3380 *4600*	3750 *5100*	4120 *5600*	3520 *4800*	3910 *5300*	4300 *5800*	3740 *5000*	4150 *5600*	4560 *6200*	3980 *5400*	4420 *6000*	4860 *6600*	4140 *5600*	4600 *6200*	5060 *6800*	4300 *5800*	4770 *6500*	5240 *7200*
	12.10	0.299 *7.59*	-			4140 *5600*	4350 *5900*	4560 *6200*	4130 *5600*	4580 *6200*	5030 *6800*	4310 *5800*	4780 *6500*	5250 *7200*	4570 *6200*	5070 *6900*	5570 *7600*	4860 *6600*	5400 *7300*	5940 *8000*	5050 *6800*	5610 *7600*	6170 *8400*	5240 *7100*	5820 *7900*	6400 *8700*
	13.20	0.330 *8.38*	-			4750 *6450*	4990 *6800*	5230 *7150*	4730 *6400*	5250 *7100*	5770 *7800*	4940 *6700*	5480 *7400*	6020 *8100*	5220 *7100*	5790 *7900*	6360 *8700*	5550 *7600*	6160 *8400*	6770 *9200*	5760 *7800*	6400 *8700*	7040 *9600*	5970 *8100*	6630 *9000*	7290 *9900*
	14.80	0.380 *9.65*	-			5910 *8000*	6220 *8400*	6530 *8800*	6250 *8500*	6940 *9400*	7630 *10300*	6530 *8800*	7250 *9800*	7970 *10800*	6770 *9200*	7520 *10200*	8270 *11200*	7000 *9400*	7770 *10500*	8540 *11600*	7130 *9600*	7920 *10700*	8710 *11800*	7320 *9900*	8130 *11000*	8940 *12100*
	16.10	0.415 *10.54*	-			6650 *9000*	6990 *9500*	7330 *10000*	7070 *9500*	7850 *10600*	8630 *11700*	7380 *10000*	8190 *11100*	9000 *12200*	7650 *10300*	8500 *11500*	9350 *12700*	7880 *10700*	8750 *11900*	9620 *13100*	8060 *10900*	8950 *12100*	9840 *13300*	8240 *11200*	9150 *12400*	10060 *13600*
	16.50	0.430 *10.92*	-			6920 *9400*	7280 *9900*	7640 *10400*	7400 *10100*	8220 *11200*	9040 *12300*	7740 *10400*	8600 *11600*	9460 *12800*	8010 *10900*	8900 *12100*	9790 *13300*	8280 *11200*	9200 *12500*	10120 *13800*	8420 *11400*	9350 *12700*	10280 *14000*	8640 *11700*	9600 *13000*	10560 *14300*
	18.90	0.500 *12.70*	-			8030 *10850*	8450 *11400*	8870 *11950*	9000 *12100*	9900 *13400*	10800 *14700*	9800 *13200*	10800 *14700*	11800 *16200*	10150 *13700*	11250 *15200*	12350 *16700*	10500 *14100*	11600 *15700*	12700 *17300*	10700 *14400*	11800 *16000*	12900 *17600*	10850 *14700*	12050 *16300*	13250 *17900*
	22.20	0.610 *15.49*	-			9900 *13400*	10400 *14100*	10900 *14800*	11000 *14800*	12200 *16500*	13400 *18200*	12300 *16600*	13600 *18400*	14900 *20200*	13100 *17600*	14500 *19600*	15900 *21600*	13550 *18300*	14950 *20300*	16350 *22300*	13750 *18600*	15250 *20700*	16750 *22800*	14000 *18900*	15500 *21000*	17000 *23100*
4-1/2 *114.30*	10.50	0.224 *5.69*	-			2890 *3930*	3040 *4130*	3190 *4340*	2890 *3910*	3210 *4350*	3530 *4790*	3150 *4260*	3490 *4730*	3830 *5200*	3390 *4600*	3760 *5100*	4130 *5600*	3620 *4900*	4020 *5500*	4420 *6100*	3780 *5100*	4200 *5700*	4620 *6300*	3940 *5300*	4370 *5900*	4800 *6500*
	11.60	0.250 *6.35*	-			3440 *4650*	3620 *4900*	3800 *5150*	3500 *4800*	3880 *5300*	4260 *5800*	3800 *5100*	4220 *5700*	4640 *6300*	4090 *5600*	4540 *6200*	4990 *6800*	4380 *5900*	4860 *6600*	5340 *7300*	4570 *6200*	5070 *6900*	5570 *7600*	4760 *6500*	5280 *7200*	5800 *7900*
	12.60	0.271 *6.88*	-			3890 *5200*	4090 *5500*	4290 *5800*	4000 *5400*	4440 *6000*	4880 *6600*	4340 *5800*	4820 *6500*	5300 *7200*	4680 *6300*	5200 *7000*	5720 *7700*	5010 *6700*	5560 *7500*	6110 *8300*	5220 *7100*	5800 *7900*	6380 *8700*	5430 *7400*	6030 *8200*	6630 *9000*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP Make-Up Torques (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opti	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																							
4-1/2 *114.30*	13.50	0.290 *7.37*	-			4370 *5900*	4600 *6200*	4830 *6500*	4450 *6000*	4940 *6700*	5430 *7400*	4830 *6600*	5360 *7300*	5890 *8000*	5200 *7000*	5770 *7800*	6340 *8600*	5560 *7600*	6170 *8400*	6780 *9200*	5790 *7800*	6430 *8700*	7070 *9600*	6030 *8200*	6690 *9100*	7350 *10000*
	15.10	0.337 *8.56*	-			5490 *7400*	5770 *7800*	6060 *8200*	5550 *7500*	6160 *8300*	6770 *9100*	6010 *8100*	6670 *9000*	7330 *9900*	6460 *8700*	7170 *9700*	7880 *10700*	6890 *9400*	7650 *10400*	8410 *11400*	7180 *9700*	7970 *10800*	8760 *11900*	7470 *10100*	8290 *11200*	9110 *12300*
	17.00	0.380 *9.65*	-			6880 *9300*	7240 *9800*	7600 *10300*	6620 *9000*	7350 *10000*	8080 *11000*	7140 *9600*	7930 *10700*	8720 *11800*	7650 *10300*	8500 *11500*	9350 *12700*	8150 *11000*	9050 *12200*	9950 *13400*	8460 *11400*	9400 *12700*	10340 *14000*	8780 *11900*	9750 *13200*	10720 *14500*
	17.70	0.402 *10.21*	-			7500 *10150*	7890 *10700*	8280 *11250*	7190 *9700*	7980 *10800*	8770 *11900*	7740 *10500*	8600 *11700*	9460 *12900*	8280 *11200*	9200 *12500*	10120 *13800*	8900 *12000*	9800 *13300*	10700 *14600*	9200 *12400*	10200 *13800*	11200 *15200*	9550 *12900*	10550 *14300*	11550 *15700*
	18.90	0.430 *10.92*	-			8270 *11200*	8700 *11800*	9140 *12400*	7920 *10800*	8800 *12000*	9680 *13200*	8550 *11600*	9500 *12900*	10450 *14200*	9200 *12400*	10200 *13800*	11200 *15200*	9850 *13200*	10850 *14700*	11850 *16200*	10150 *13800*	11250 *15300*	12350 *16800*	10550 *14200*	11650 *15800*	12750 *17400*
	21.50	0.500 *12.70*	-			10100 *13700*	10600 *14400*	11100 *15100*	9950 *13500*	11050 *15000*	12150 *16500*	10400 *14000*	11500 *15600*	12600 *17200*	11150 *15000*	12350 *16700*	13550 *18400*	11800 *16000*	13100 *17800*	14400 *19600*	12300 *16600*	13600 *18400*	14900 *20200*	12650 *17200*	14050 *19100*	15450 *21000*
	23.70	0.560 *14.22*	-			11350 *15300*	11900 *16100*	12450 *16900*	11450 *15400*	12650 *17100*	13850 *18800*	11750 *15900*	13050 *17700*	14350 *19500*	12600 *17100*	14000 *19000*	15400 *20900*	13450 *18200*	14850 *20200*	16250 *22200*	13950 *18800*	15450 *20900*	16950 *23000*	14400 *19500*	16000 *21700*	17600 *23900*
5 *127.00*	13.00	0.253 *6.43*	3000 *4060*	3330 *4510*	3660 *4960*	3330 *4500*	3690 *5000*	4050 *5500*	3710 *5000*	4120 *5600*	4530 *6200*	4230 *5800*	4700 *6400*	5170 *7000*	4560 *6200*	5060 *6900*	5560 *7600*	5220 *7000*	5790 *7800*	6360 *8600*	5540 *7500*	6150 *8300*	6760 *9100*	5860 *7900*	6510 *8800*	7160 *9700*
	15.00	0.296 *7.52*	3910 *5300*	4340 *5900*	4770 *6500*	4230 *5800*	4700 *6400*	5170 *7000*	4560 *6200*	5060 *6900*	5560 *7600*	5220 *7000*	5790 *7800*	6360 *8600*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*
	18.00	0.362 *9.19*	4560 *6200*	5060 *6900*	5560 *7600*	4880 *6700*	5420 *7400*	5960 *8100*	5220 *7000*	5790 *7800*	6360 *8600*	5540 *7500*	6150 *8300*	6760 *9100*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*
	20.30	0.408 *10.36*	5540 *7500*	6150 *8300*	6760 *9100*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	10100 *13700*	11200 *15200*	12300 *16700*
	20.80	0.422 *10.72*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*
	21.40	0.437 *11.10*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10850 *14600*	11950 *16200*	13050 *17800*	11700 *15900*	13000 *17700*	14300 *19500*
	23.20	0.478 *12.14*	7170 *9700*	7960 *10800*	8750 *11900*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	10850 *14600*	11950 *16200*	13050 *17800*	12100 *16300*	13400 *18100*	14700 *19900*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*
	24.10	0.500 *12.70*	8010 *10800*	8900 *12000*	9790 *13200*	8730 *11900*	9700 *13200*	10670 *14500*	9900 *13400*	11000 *14900*	12100 *16400*	11050 *14900*	12250 *16600*	13450 *18300*	12300 *16600*	13600 *18400*	14900 *20200*	13500 *18200*	14900 *20200*	16300 *22200*	14400 *19500*	16000 *21700*	17600 *23900*	15400 *20900*	17100 *23200*	18800 *25500*
5-1/2 *139.70*	14.00	0.244 *6.20*	3190 *4330*	3540 *4810*	3890 *5290*	3590 *4900*	3980 *5400*	4370 *5900*	4040 *5500*	4480 *6100*	4920 *6700*	4560 *6200*	5060 *6900*	5560 *7600*	5080 *6800*	5640 *7600*	6200 *8400*	5670 *7600*	6290 *8500*	6910 *9400*	6120 *8300*	6800 *9200*	7480 *10100*	6510 *8800*	7230 *9800*	7950 *10800*
	15.50	0.275 *6.99*	3590 *4900*	3980 *5400*	4370 *5900*	4230 *5800*	4700 *6400*	5170 *7000*	4560 *6200*	5060 *6900*	5560 *7600*	5220 *7000*	5790 *7800*	6360 *8600*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*
	17.00	0.304 *7.72*	3910 *5300*	4340 *5900*	4770 *6500*	4560 *6200*	5060 *6900*	5560 *7600*	4880 *6700*	5420 *7400*	5960 *8100*	5540 *7500*	6150 *8300*	6760 *9100*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*
	20.00	0.361 *9.17*	4880 *6700*	5420 *7400*	5960 *8100*	5220 *7000*	5790 *7800*	6360 *8600*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	8460 *11400*	9400 *12700*	10340 *14000*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP Make-Up Torques (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opti	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																							
5-1/2 *139.70*	23.00	0.415 *10.54*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	9500 *12800*	10500 *14200*	11500 *15600*	10100 *13700*	11200 *15200*	12300 *16700*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*
	26.00	0.476 *12.09*	7830 *10600*	8700 *11800*	9570 *13000*	8780 *11900*	9750 *13200*	10720 *14500*	9850 *13200*	10850 *14700*	11850 *16200*	10850 *14600*	11950 *16200*	13050 *17800*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	15050 *20300*	16650 *22600*	18250 *24900*	15650 *21100*	17350 *23500*	19050 *25900*
	26.80	0.500 *12.70*	8730 *11900*	9700 *13200*	10670 *14500*	9700 *13000*	10700 *14500*	11700 *16000*	11000 *14800*	12200 *16500*	13400 *18200*	12400 *16700*	13700 *18600*	15000 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	15200 *20400*	16800 *22700*	18400 *25000*	16300 *22000*	18100 *24500*	19900 *27000*	17500 *23700*	19400 *26300*	21300 *28900*
	28.40	0.530 *13.46*	9750 *13100*	10750 *14600*	11750 *16100*	10750 *14400*	11850 *16000*	12950 *17600*	12200 *16500*	13500 *18300*	14800 *20100*	13650 *18500*	15150 *20600*	16650 *22700*	15250 *20600*	16850 *22900*	18450 *25200*	16800 *22700*	18600 *25200*	20400 *27700*	18050 *24500*	20050 *27200*	22050 *29900*	19400 *26200*	21500 *29100*	23600 *32000*
	29.70	0.562 *14.27*	10600 *14300*	11700 *15900*	12800 *17500*	11750 *15900*	13050 *17700*	14350 *19500*	13500 *18200*	14900 *20200*	16300 *22200*	15200 *20500*	16800 *22800*	18400 *25100*	16850 *22800*	18650 *25300*	20450 *27800*	18600 *25100*	20600 *27900*	22600 *30700*	20000 *27100*	22200 *30100*	24400 *33100*	20850 *28300*	23150 *31400*	25450 *34500*
5-3/4 *146.05*	18.10	0.304 *7.72*	4370 *5900*	4850 *6600*	5330 *7300*	5540 *7500*	6150 *8300*	6760 *9100*	6250 *8500*	6940 *9400*	7630 *10300*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	8780 *11900*	9750 *13200*	10720 *14500*	9150 *12300*	10150 *13700*	11150 *15100*
6-5/8 *168.28*	20.00	0.288 *7.32*	4230 *5800*	4700 *6400*	5170 *7000*	4880 *6700*	5420 *7400*	5960 *8100*	5540 *7500*	6150 *8300*	6760 *9100*	6190 *8400*	6870 *9300*	7550 *10200*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*
	23.20	0.330 *8.38*	4560 *6200*	5060 *6900*	5560 *7600*	5220 *7000*	5790 *7800*	6360 *8600*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*
	24.00	0.352 *8.94*	4880 *6700*	5420 *7400*	5960 *8100*	5540 *7500*	6150 *8300*	6760 *9100*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*
	28.00	0.417 *10.59*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	10100 *13700*	11200 *15200*	12300 *16700*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*
	32.00	0.475 *12.07*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	10850 *14600*	11950 *16200*	13050 *17800*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	15300 *20700*	17000 *23000*	18700 *25300*	16300 *22000*	18100 *24500*	19900 *27000*
	36.70	0.562 *14.27*	11700 *15900*	13000 *17700*	14300 *19500*	12700 *17200*	14100 *19100*	15500 *21000*	14400 *19400*	15900 *21600*	17400 *23800*	16000 *21600*	17700 *24000*	19400 *26400*	17650 *23800*	19550 *26500*	21450 *29200*	19600 *26500*	21700 *29400*	23800 *32300*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
7 *177.80*	23.00	0.317 *8.05*	5540 *7500*	6150 *8300*	6760 *9100*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	10100 *13700*	11200 *15200*	12300 *16700*	10850 *14600*	11950 *16200*	13050 *17800*
	26.00	0.362 *9.19*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10850 *14600*	11950 *16200*	13050 *17800*	11450 *15500*	12650 *17200*	13850 *18900*
	29.00	0.408 *10.36*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*
	32.00	0.453 *11.51*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	10100 *13700*	11200 *15200*	12300 *16700*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13400 *18100*	14800 *20100*	16200 *22100*	14400 *19400*	15900 *21600*	17400 *23800*	15050 *20300*	16650 *22600*	18250 *24900*
	35.00	0.498 *12.65*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	12100 *16300*	13400 *18100*	14700 *19900*	13700 *18500*	15200 *20600*	16700 *22700*	15050 *20300*	16650 *22600*	18250 *24900*	16300 *22000*	18100 *24500*	19900 *27000*	17600 *23800*	19500 *26500*	21400 *29200*	18900 *25600*	21000 *28400*	23100 *31200*
	38.00	0.540 *13.72*	11450 *15500*	12650 *17200*	13850 *18900*	12700 *17200*	14100 *19100*	15500 *21000*	14050 *19000*	15550 *21100*	17050 *23200*	15650 *21100*	17350 *23500*	19050 *25900*	17000 *22900*	18800 *25500*	20600 *28100*	18900 *25600*	21000 *28400*	23100 *31200*	20200 *27400*	22400 *30400*	24600 *33400*	20850 *28300*	23150 *31400*	25450 *34500*
	41.00	0.590 *14.99*	13050 *17600*	14450 *19600*	15850 *21600*	15050 *20300*	16650 *22600*	18250 *24900*	16300 *22000*	18100 *24500*	19900 *27000*	18250 *24700*	20250 *27500*	22250 *30300*	19600 *26500*	21700 *29400*	23800 *32300*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	42.70	0.625 *15.88*	15050 *20300*	16650 *22600*	18250 *24900*	16300 *22000*	18100 *24500*	19900 *27000*	18250 *24700*	20250 *27500*	22250 *30300*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP Make-Up Torques (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opti	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																							
7-5/8 *193.68*	26.40	0.328 *8.33*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11450 *15500*	12650 *17200*	13850 *18900*	12450 *16700*	13750 *18600*	15050 *20500*	13450 *18100*	14850 *20100*	16250 *22100*
	29.70	0.375 *9.53*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*
	33.70	0.430 *10.92*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13400 *18100*	14800 *20100*	16200 *22100*	14400 *19400*	15900 *21600*	17400 *23800*
	35.80	0.465 *11.81*	9150 *12300*	10150 *13700*	11150 *15100*	10100 *13700*	11200 *15200*	12300 *16700*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	15050 *20300*	16650 *22600*	18250 *24900*	16300 *22000*	18100 *24500*	19900 *27000*	17600 *23800*	19500 *26500*	21400 *29200*
	39.00	0.500 *12.70*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	16300 *22000*	18100 *24500*	19900 *27000*	18250 *24700*	20250 *27500*	22250 *30300*	19600 *26500*	21700 *29400*	23800 *32300*	20850 *28300*	23150 *31400*	25450 *34500*
	42.80	0.562 *14.27*	13700 *18500*	15200 *20600*	16700 *22700*	14650 *19900*	16250 *22100*	17850 *24300*	17000 *22900*	18800 *25500*	20600 *28100*	18900 *25600*	21000 *28400*	23100 *31200*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	45.30	0.595 *15.11*	15050 *20300*	16650 *22600*	18250 *24900*	16300 *22000*	18100 *24500*	19900 *27000*	18900 *25600*	21000 *28400*	23100 *31200*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	47.10	0.625 *15.88*	16300 *22000*	18100 *24500*	19900 *27000*	18000 *24300*	19900 *27000*	21800 *29700*	20200 *27400*	22400 *30400*	24600 *33400*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
7-3/4 *196.85*	46.10	0.595 *15.11*	15050 *20300*	16650 *22600*	18250 *24900*	17000 *22900*	18800 *25500*	20600 *28100*	18250 *24700*	20250 *27500*	22250 *30300*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
8-5/8 *219.08*	36.00	0.400 *10.16*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*
	40.00	0.450 *11.43*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	15050 *20300*	16650 *22600*	18250 *24900*	16300 *22000*	18100 *24500*	19900 *27000*	17600 *23800*	19500 *26500*	21400 *29200*
	44.00	0.500 *12.70*	11700 *15900*	13000 *17700*	14300 *19500*	13400 *18100*	14800 *20100*	16200 *22100*	15050 *20300*	16650 *22600*	18250 *24900*	16300 *22000*	18100 *24500*	19900 *27000*	18250 *24700*	20250 *27500*	22250 *30300*	19600 *26500*	21700 *29400*	23800 *32300*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	49.00	0.557 *14.15*	15050 *20300*	16650 *22600*	18250 *24900*	17000 *22900*	18800 *25500*	20600 *28100*	18900 *25600*	21000 *28400*	23100 *31200*	20200 *27400*	22400 *30400*	24600 *33400*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	52.00	0.595 *15.11*	17000 *22900*	18800 *25500*	20600 *28100*	18900 *25600*	21000 *28400*	23100 *31200*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
9-5/8 *244.48*	40.00	0.395 *10.03*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*
	43.50	0.435 *11.05*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	15650 *21100*	17350 *23500*	19050 *25900*	16650 *22500*	18450 *25000*	20250 *27500*	17600 *23800*	19500 *26500*	21400 *29200*
	47.00	0.472 *11.99*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	15650 *21100*	17350 *23500*	19050 *25900*	18250 *24700*	20250 *27500*	22250 *30300*	19600 *26500*	21700 *29400*	23800 *32300*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	53.50	0.545 *13.84*	16300 *22000*	18100 *24500*	19900 *27000*	18250 *24700*	20250 *27500*	22250 *30300*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	58.40	0.595 *15.11*	19600 *26500*	21700 *29400*	23800 *32300*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*

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VAM TOP Make-Up Torques (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opti	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																							
9-7/8 *250.83*	62.80	0.625 *15.88*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	65.30	0.650 *16.51*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	66.40	0.661 *16.79*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	66.90	0.668 *16.97*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	67.50	0.678 *17.22*	22800 *30900*	25300 *34300*	27800 *37700*	22800 *30900*	25300 *34300*	27800 *37700*	22800 *30900*	25300 *34300*	27800 *37700*	22800 *30900*	25300 *34300*	27800 *37700*	22800 *30900*	25300 *34300*	27800 *37700*	22800 *30900*	25300 *34300*	27800 *37700*	22800 *30900*	25300 *34300*	27800 *37700*	22800 *30900*	25300 *34300*	27800 *37700*
	68.00	0.694 *17.63*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*
	68.90	0.700 *17.78*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*	24800 *33600*	27500 *37300*	30200 *41000*
	70.50	0.720 *18.29*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	72.00	0.725 *18.42*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
10 *254.00*	67.20	0.672 *17.07*	25400 *34400*	28200 *38200*	31000 *42000*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	68.70	0.688 *17.48*	26700 *36200*	29650 *40200*	32600 *44200*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	71.80	0.722 *18.34*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
10-3/4 *273.05*	45.50	0.400 *10.16*	7830 *10600*	8700 *11800*	9570 *13000*	8780 *11900*	9750 *13200*	10720 *14500*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	27000 *36600*	30000 *40700*	33000 *44800*
	51.00	0.450 *11.43*	11100 *15000*	12300 *16700*	13500 *18400*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	15650 *21100*	17350 *23500*	19050 *25900*	17600 *23800*	19500 *26500*	21400 *29200*	19600 *26500*	21700 *29400*	23800 *32300*	20200 *27400*	22400 *30400*	24600 *33400*	14400 *19400*	15900 *21600*	17400 *23800*
	55.50	0.495 *12.57*	14400 *19400*	15900 *21600*	17400 *23800*	16300 *22000*	18100 *24500*	19900 *27000*	18250 *24700*	20250 *27500*	22250 *30300*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	60.70	0.545 *13.84*	18250 *24700*	20250 *27500*	22250 *30300*	20200 *27400*	22400 *30400*	24600 *33400*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	65.70	0.595 *15.11*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	71.10	0.650 *16.51*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
11-3/4 *298.45*	54.00	0.435 *11.05*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	15050 *20300*	16650 *22600*	18250 *24900*	17000 *22900*	18800 *25500*	20600 *28100*	18900 *25600*	21000 *28400*	23100 *31200*	20200 *27400*	22400 *30400*	24600 *33400*	20850 *28300*	23150 *31400*	25450 *34500*
	60.00	0.489 *12.42*	15050 *20300*	16650 *22600*	18250 *24900*	17600 *23800*	19500 *26500*	21400 *29200*	19600 *26500*	21700 *29400*	23800 *32300*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP Make-Up Torques (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opti	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																							
11-3/4 *298.45*	65.00	0.534 *13.56*	18900 *25600*	21000 *28400*	23100 *31200*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	71.00	0.582 *14.78*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
11-7/8 *301.63*	67.80	0.550 *13.97*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	71.80	0.582 *14.78*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
13-3/8 *339.73*	61.00	0.430 *10.92*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	15050 *20300*	16650 *22600*	18250 *24900*	17000 *22900*	18800 *25500*	20600 *28100*	18900 *25600*	21000 *28400*	23100 *31200*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	68.00	0.480 *12.19*	17000 *22900*	18800 *25500*	20600 *28100*	18900 *25600*	21000 *28400*	23100 *31200*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	72.00	0.514 *13.06*	19600 *26500*	21700 *29400*	23800 *32300*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	77.00	0.550 *13.97*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	80.70	0.580 *14.73*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	85.00	0.608 *15.44*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	86.00	0.625 *15.88*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*	20850 *28300*	23150 *31400*	25450 *34500*
	92.00	0.672 *17.07*	36000 48800	40000 54200	44000 59600	36000 48800	40000 54200	44000 59600	36000 48800	40000 54200	44000 59600	36000 48800	40000 54200	44000 59600	36000 48800	40000 54200	44000 59600	36000 48800	40000 54200	44000 59600	36000 48800	40000 54200	44000 59600	36000 48800	40000 54200	44000 59600
13-5/8 *346.08*	88.20	0.625 *15.88*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	118.20	0.850 *21.59*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
14 *355.60*	86.00	0.600 *15.24*	22550 *30400*	24950 *33800*	27350 *37200*	25750 *34800*	28550 *38700*	31350 *42600*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	93.00	0.650 *16.51*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	100.00	0.700 *17.78*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	106.00	0.750 *19.05*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP Make-Up Torques (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opti	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																							
14 *355.60*	112.00	0.797 *20.24*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	114.00	0.800 *20.32*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	120.00	0.850 *21.59*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
15 *381.00*	92.50	0.578 *14.73*	30000 *40600*	33300 *45100*	36600 *49600*	30000 *40600*	33300 *45100*	36600 *49600*	30000 *40600*	33300 *45100*	36600 *49600*	30000 *40600*	33300 *45100*	36600 *49600*	30000 *40600*	33300 *45100*	36600 *49600*	30000 *40600*	33300 *45100*	36600 *49600*	30000 *40600*	33300 *45100*	36600 *49600*	30000 *40600*	33300 *45100*	36600 *49600*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

Baker Hughes

VAM TOP HT For CRA <Pt. 1>

Size (OD)	Nom Wt	Wall Thickness	65 ksi						75-80-85 ksi						90-95-100 ksi					
			Field				Mill & Licensee		Field				Mill & Licensee		Field				Mill& licensee	
			Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max	Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max	Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																	
4-1/2 *114.30*	10.50	0.224	2220	2460	2700	2750	2750	3020	2540	2820	3100	3110	3110	3420	2800	3110	3420	3620	3620	3980
		5.69	*3000*	*3330*	*3660*	*3730*	*3730*	*4100*	*3440*	*3820*	*4200*	*4220*	*4220*	*4640*	*3800*	*4220*	*4640*	*4900*	*4900*	*5400*
	11.60	0.250	2800	3110	3420	3470	3470	3810	3260	3620	3980	3980	3980	4370	3650	4050	4450	4560	4560	5010
		6.35	*3800*	*4220*	*4640*	*4710*	*4710*	*5180*	*4400*	*4900*	*5400*	*5400*	*5400*	*5900*	*4900*	*5500*	*6100*	*6200*	*6200*	*6800*
	12.60	0.271	3060	3400	3740	3830	3830	4210	3590	3980	4370	4630	4630	5090	3910	4340	4770	5420	5420	5960
		6.88	*4150*	*4610*	*5070*	*5200*	*5200*	*5700*	*4900*	*5400*	*5900*	*6300*	*6300*	*6900*	*5300*	*5900*	*6500*	*7400*	*7400*	*8100*
	13.50	0.290	3450	3830	4210	4410	4410	4850	3850	4270	4690	5280	5280	5800	4690	5210	5730	6220	6220	6840
		7.37	*4700*	*5200*	*5700*	*6000*	*6000*	*6600*	*5200*	*5800*	*6400*	*7200*	*7200*	*7900*	*6400*	*7100*	*7800*	*8400*	*8400*	*9200*
	15.10	0.337	4300	4770	5240	5500	5500	6050	4760	5280	5800	6650	6650	7310	5860	6510	7160	7740	7740	8510
		8.56	*5800*	*6500*	*7200*	*7500*	*7500*	*8300*	*6500*	*7200*	*7900*	*9000*	*9000*	*9900*	*7900*	*8800*	*9700*	*10500*	*10500*	*11600*
	17.00	0.380	5220	5790	6360	6650	6650	7310	5800	6440	7080	7960	7960	8750	6390	7090	7790	9350	9350	10280
		9.65	*7000*	*7800*	*8600*	*9000*	*9000*	*9900*	*7800*	*8700*	*9600*	*10800*	*10800*	*11900*	*8600*	*9600*	*10600*	*12700*	*12700*	*14000*
	17.70	0.402	5670	6290	6910	7230	7230	7950	6390	7090	7790	8700	8700	9570	6840	7590	8340	10050	10050	11050
		10.21	*7600*	*8500*	*9400*	*9800*	*9800*	*10800*	*8600*	*9600*	*10600*	*11800*	*11800*	*13000*	*9300*	*10300*	*11300*	*13600*	*13600*	*15000*
	18.90	0.430	6320	7020	7720	7960	7960	8750	7170	7960	8750	9500	9500	10450	7830	8700	9570	11050	11050	12150
		10.92	*8500*	*9500*	*10500*	*10800*	*10800*	*11900*	*9700*	*10800*	*11900*	*12800*	*12800*	*14100*	*10600*	*11800*	*13000*	*15000*	*15000*	*16500*
	21.50	0.500	7470	8300	9130	9250	9250	10170	8780	9750	10720	11200	11200	12300	9500	10500	11500	13250	13250	14550
		12.70	*10200*	*11300*	*12400*	*12600*	*12600*	*13900*	*11900*	*13200*	*14500*	*15200*	*15200*	*16700*	*12800*	*14200*	*15600*	*17900*	*17900*	*19700*
	23.70	0.560	8460	9400	10340	10350	10350	11350	9850	10850	11850	12450	12450	13650	11100	12300	13500	14600	14600	16000
		14.22	*11400*	*12700*	*14000*	*14000*	*14000*	*15400*	*13200*	*14700*	*16200*	*16900*	*16900*	*18600*	*15000*	*16700*	*18400*	*19800*	*19800*	*21800*
5 *127.00*	15.00	0.296	4230	4700	5170	5210	5210	5730	4560	5060	5560	6050	6050	6650	5220	5790	6360	7020	7020	7720
		7.52	*5800*	*6400*	*7000*	*7060*	*7060*	*7760*	*6200*	*6900*	*7600*	*8200*	*8200*	*9000*	*7000*	*7800*	*8600*	*9520*	*9520*	*10470*
	18.00	0.362	5340	5930	6520	7160	7160	7870	6450	7160	7870	8500	8500	9350	7170	7960	8750	9900	9900	10800
		9.19	*7200*	*8000*	*8800*	*9710*	*9710*	*10680*	*8700*	*9700*	*10700*	*11500*	*11500*	*12600*	*9700*	*10800*	*11900*	*13400*	*13400*	*14700*
	20.30	0.408	6450	7160	7870	8600	8600	9460	7830	8700	9570	10200	10200	11200	8460	9400	10340	11850	11850	12950
		10.36	*8700*	*9700*	*10700*	*11650*	*11650*	*12750*	*10600*	*11800*	*13000*	*13850*	*13850*	*15150*	*11400*	*12700*	*14000*	*16050*	*16050*	*17550*
	20.80	0.422	6840	7590	8340	9050	9050	9900	8150	9050	9950	10700	10700	11700	9150	10150	11150	12300	12300	13500
		10.72	*9300*	*10300*	*11300*	*12250*	*12250*	*13400*	*11100*	*12300*	*13500*	*14500*	*14500*	*15900*	*12300*	*13700*	*15100*	*16700*	*16700*	*18300*
	21.40	0.437	7170	7960	8750	9500	9500	10400	8780	9750	10720	11200	11200	12300	9500	10500	11500	12900	12900	14100
		11.10	*9700*	*10800*	*11900*	*12900*	*12900*	*14100*	*11900*	*13200*	*14500*	*15200*	*15200*	*16700*	*12800*	*14200*	*15600*	*17500*	*17500*	*19200*
	23.20	0.478	8460	9400	10340	10500	10500	11500	9850	10850	11850	12600	12600	13800	11100	12300	13500	14550	14550	16000
		12.14	*11400*	*12700*	*14000*	*14250*	*14250*	*15600*	*13200*	*14700*	*16200*	*17100*	*17100*	*18800*	*15000*	*16700*	*18400*	*19750*	*19750*	*21700*
5-1/2 *139.70*	17.00	0.304	4820	5350	5880	6220	6220	6870	5340	5930	6520	7450	7450	8190	5930	6580	7230	8700	8700	9570
		7.72	*6600*	*7300*	*8000*	*8430*	*8430*	*9310*	*7200*	*8000*	*8800*	*10100*	*10100*	*11100*	*8000*	*8900*	*9800*	*11800*	*11800*	*12900*
	20.00	0.361	6250	6940	7630	8000	8000	8800	7170	7960	8750	9600	9600	10500	7830	8700	9570	11200	11200	12300
		9.17	*8500*	*9400*	*10300*	*10850*	*10850*	*11950*	*9700*	*10800*	*11900*	*13000*	*13000*	*14300*	*10600*	*11800*	*13000*	*15200*	*15200*	*16700*
	23.00	0.415	7830	8700	9570	9900	9900	10800	8780	9750	10720	11800	11800	12900	9850	10850	11850	13750	13750	15050
		10.54	*10600*	*11800*	*13000*	*13400*	*13400*	*14700*	*11900*	*13200*	*14500*	*16000*	*16000*	*17600*	*13200*	*14700*	*16200*	*18650*	*18650*	*20450*
	26.00	0.476	9150	10150	11150	11850	11850	12950	11100	12300	13500	14100	14100	15500	12100	13400	14700	16300	16300	17900
		12.09	*12300*	*13700*	*15100*	*16100*	*16100*	*17550*	*15000*	*16700*	*18400*	*19100*	*19100*	*21000*	*16300*	*18100*	*19900*	*22100*	*22100*	*24300*
6-5/8 *168.28*	23.20	0.330	6840	7590	8340	9500	9500	10450	7830	8700	9570	11400	11400	12500	8780	9750	10720	13500	13500	14800
		8.38	*9300*	*10300*	*11300*	*12900*	*12900*	*14100*	*10600*	*11800*	*13000*	*15450*	*15450*	*16950*	*11900*	*13200*	*14500*	*18300*	*18300*	*20100*
	24.00	0.352	7830	8700	9570	10500	10500	11500	8780	9750	10720	12700	12700	13900	10100	11200	12300	14900	14900	16300
		8.94	*10600*	*11800*	*13000*	*14250*	*14250*	*15650*	*11900*	*13200*	*14500*	*17200*	*17200*	*18900*	*13700*	*15200*	*16700*	*20200*	*20200*	*22200*
	28.00	0.417	9150	10150	11150	13100	13100	14400	11700	13000	14300	15800	15800	17300	13050	14450	15850	18450	18450	20250
		10.59	*12300*	*13700*	*15100*	*17750*	*17750*	*19450*	*15900*	*17700*	*19500*	*21400*	*21400*	*23450*	*17600*	*19600*	*21600*	*25000*	*25000*	*27500*
	32.00	0.475	11100	12300	13500	15500	15500	17000	14400	15900	17400	18600	18600	20400	16300	18100	19900	21700	21700	23800
		12.07	*15000*	*16700*	*18400*	*21000*	*21000*	*23100*	*19400*	*21600*	*23800*	*25200*	*25200*	*27650*	*22000*	*24500*	*27000*	*29400*	*29400*	*32300*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP HT For CRA <Pt. 1> (Continued)

Size (OD)	Nom Wt	Wall Thickness	65 ksi						75-80-85 ksi						90-95-100 ksi					
			Field				Mill & Licensee		Field				Mill & Licensee		Field				Mill& licensee	
			Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max	Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max	Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																	
6-5/8 *168.28*	36.70	0.562 *14.27*	14050 *19000*	15550 *21100*	17050 *23200*	17850 *24200*	17850 *24200*	19650 *26600*	16000 *21600*	17700 *24000*	19400 *26400*	21600 *29300*	21600 *29300*	23750 *32200*	18000 *24300*	19900 *27000*	21800 *29700*	25350 *34400*	25350 *34400*	27900 *37800*
7 *177.80*	26.00	0.362 *9.19*	8460 *11400*	9400 *12700*	10340 *14000*	11100 *15050*	11100 *15050*	12200 *16550*	9500 *12800*	10500 *14200*	11500 *15600*	13400 *18150*	13400 *18150*	14700 *19950*	10850 *14600*	11950 *16200*	13050 *17800*	15700 *21300*	15700 *21300*	17200 *23300*
	29.00	0.408 *10.36*	10450 *14100*	11550 *15700*	12650 *17300*	13400 *18150*	13400 *18150*	14700 *19950*	11700 *15900*	13000 *17700*	14300 *19500*	16100 *21800*	16100 *21800*	17700 *24000*	13450 *18100*	14850 *20100*	16250 *22100*	18800 *25500*	18800 *25500*	20600 *28000*
	32.00	0.453 *11.51*	10850 *14600*	11950 *16200*	13050 *17800*	14900 *20200*	14900 *20200*	16400 *22250*	14050 *19000*	15550 *21100*	17050 *23200*	17900 *24250*	17900 *24250*	19600 *26650*	16000 *21600*	17700 *24000*	19400 *26400*	20900 *28350*	20900 *28350*	22900 *31150*
	35.00	0.498 *12.65*	12700 *17200*	14100 *19100*	15500 *21000*	17200 *23300*	17200 *23300*	18900 *25600*	15650 *21100*	17350 *23500*	19050 *25900*	20600 *27950*	20600 *27950*	22600 *30650*	18250 *24700*	20250 *27500*	22250 *30300*	24000 *32550*	24000 *32550*	26400 *35800*
	38.00	0.540 *13.72*	14400 *19400*	15900 *21600*	17400 *23800*	18600 *25200*	18600 *25200*	20400 *27650*	16300 *22000*	18100 *24500*	19900 *27000*	22400 *30350*	22400 *30350*	24600 *33350*	18900 *25600*	21000 *28400*	23100 *31200*	26050 *35300*	26050 *35300*	28650 *38800*
	41.00	0.590 *14.99*	15650 *21100*	17350 *23500*	19050 *25900*	19800 *26850*	19800 *26850*	21800 *29550*	18600 *25100*	20600 *27900*	22600 *30700*	23850 *32350*	23850 *32350*	26150 *35550*	20850 *28300*	23150 *31400*	25450 *34500*	28000 *37950*	28000 *37950*	30800 *41750*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP HT for CRA Material <Pt. 2>

Size (OD)	Nom Wt	Wall Thickness	105-110-115 ksi						120-125-130 ksi						135-140 ksi						145-150-155 ksi					
			Field				Mill & Licensee		Field				Mill & Licensee		Field				Mill & Licensee		Field				Mill & Licensee	
			Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max	Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max	Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max	Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																							
4-1/2 *114.30*	10.50	0.224 *5.690*	3130 *4240*	3470 *4710*	3810 *5180*	4120 *5600*	4120 *5600*	4530 *6200*	3450 *4700*	3830 *5200*	4210 *5700*	4630 *6300*	4630 *6300*	5090 *6900*	3710 *5000*	4120 *5600*	4530 *6200*	5140 *7000*	5140 *7000*	5650 *7700*	3970 *5400*	4410 *6000*	4850 *6600*	5570 *7600*	5570 *7600*	6120 *8400*
	11.60	0.250 *6.350*	4040 *5500*	4480 *6100*	4920 *6700*	5280 *7200*	5280 *7200*	5800 *7900*	4500 *6100*	4990 *6800*	5480 *7500*	5930 *8000*	5930 *8000*	6520 *8800*	4820 *6600*	5350 *7300*	5880 *8000*	6510 *8800*	6510 *8800*	7160 *9700*	5220 *7000*	5790 *7800*	6360 *8600*	7090 *9600*	7090 *9600*	7790 *10600*
	12.60	0.271 *6.880*	4560 *6200*	5060 *6900*	5560 *7600*	6220 *8400*	6220 *8400*	6840 *9200*	5020 *6800*	5570 *7600*	6120 *8400*	7020 *9500*	7020 *9500*	7720 *10500*	5400 *7300*	6000 *8100*	6600 *8900*	7740 *10500*	7740 *10500*	8510 *11600*	5800 *7800*	6440 *8700*	7080 *9600*	8400 *11400*	8400 *11400*	9240 *12500*
	13.50	0.290 *7.370*	5220 *7000*	5790 *7800*	6360 *8600*	7090 *9600*	7090 *9600*	7790 *10600*	5740 *7700*	6370 *8600*	7000 *9500*	8030 *10900*	8030 *10900*	8830 *12000*	6120 *8300*	6800 *9200*	7480 *10100*	8800 *12000*	8800 *12000*	9680 *13200*	6510 *8800*	7230 *9800*	7950 *10800*	9600 *13000*	9600 *13000*	10560 *14300*
	15.10	0.337 *8.56*	6450 *8700*	7160 *9700*	7870 *10700*	8900 *12100*	8900 *12100*	9790 *13300*	7170 *9700*	7960 *10800*	8750 *11900*	10050 *13600*	10050 *13600*	11050 *15000*	7830 *10600*	8700 *11800*	9570 *13000*	11000 *14900*	11000 *14900*	12100 *16400*	8150 *11100*	9050 *12300*	9950 *13500*	12000 *16300*	12000 *16300*	13200 *17900*
	17.00	0.380 *9.65*	7830 *10600*	8700 *11800*	9570 *13000*	10650 *14400*	10650 *14400*	11650 *15800*	8780 *11900*	9750 *13200*	10720 *14500*	12000 *16300*	12000 *16300*	13200 *17900*	9500 *12800*	10500 *14200*	11500 *15600*	13150 *17800*	13150 *17800*	14450 *19600*	10100 *13700*	11200 *15200*	12300 *16700*	14300 *19400*	14300 *19400*	15700 *21300*
	17.70	0.402 *10.21*	8460 *11400*	9400 *12700*	10340 *14000*	11550 *15700*	11550 *15700*	12650 *17300*	9500 *12800*	10500 *14200*	11500 *15600*	13000 *17700*	13000 *17700*	14300 *19500*	10100 *13700*	11200 *15200*	12300 *16700*	14250 *19300*	14250 *19300*	15650 *21200*	10850 *14600*	11950 *16200*	13050 *17800*	15500 *21000*	15500 *21000*	17000 *23100*
	18.90	0.430 *10.92*	9500 *12800*	10500 *14200*	11500 *15600*	12650 *17200*	12650 *17200*	13850 *18900*	10450 *14100*	11550 *15700*	12650 *17300*	14250 *19300*	14250 *19300*	15650 *21200*	11450 *15500*	12650 *17200*	13850 *18900*	15600 *21200*	15600 *21200*	17100 *23300*	12100 *16300*	13400 *18100*	14700 *19900*	16950 *22900*	16950 *22900*	18550 *25200*
	21.50	0.500 *12.70*	10450 *14100*	11550 *15700*	12650 *17300*	15200 *20600*	15200 *20600*	16700 *22700*	11450 *15500*	12650 *17200*	13850 *18900*	17050 *23100*	17050 *23100*	18750 *25400*	14050 *19000*	15550 *21100*	17050 *23200*	18650 *25300*	18650 *25300*	20450 *27800*	15050 *20300*	16650 *22600*	18250 *24900*	20300 *27600*	20300 *27600*	22300 *30400*
	23.70	0.560 *14.22*	12450 *16700*	13750 *18600*	15050 *20500*	16800 *22800*	16800 *22800*	18400 *25100*	13700 *18500*	15200 *20600*	16700 *22700*	19000 *25800*	19000 *25800*	20900 *28400*	14650 *19900*	16250 *22100*	17850 *24300*	20900 *28300*	20900 *28300*	22900 *31100*	15650 *21100*	17350 *23500*	19050 *25900*	22800 *30900*	22800 *30900*	25000 *34000*
5 *127.00*	15.00	0.296 *7.52*	6060 *8200*	6730 *9100*	7400 *10000*	7960 *10800*	7960 *10800*	8750 *11800*	6510 *8800*	7230 *9800*	7950 *10800*	9050 *11250*	9050 *11250*	9950 *12350*	7170 *9700*	7960 *10800*	8750 *11900*	9800 *13300*	9800 *13300*	10700 *14600*	7470 *10200*	8300 *11300*	9130 *12400*	10700 *14500*	10700 *14500*	11700 *15900*
	18.00	0.362 *9.19*	7830 *10600*	8700 *11800*	9570 *13000*	11300 *15300*	11300 *15300*	12400 *16800*	9500 *12800*	10500 *14200*	11500 *15600*	13000 *17650*	13000 *17650*	14300 *19350*	10450 *14100*	11550 *15700*	12650 *17300*	13900 *18850*	13900 *18850*	15200 *20650*	11100 *15000*	12300 *16700*	13500 *18400*	15100 *20450*	15100 *20450*	16600 *22450*
	20.30	0.408 *10.36*	9500 *12800*	10500 *14200*	11500 *15600*	13500 *18300*	13500 *18300*	14800 *20100*	10100 *13700*	11200 *15200*	12300 *16700*	15100 *20450*	15100 *20450*	16600 *22450*	11100 *15000*	12300 *16700*	13500 *18400*	16600 *22500*	16600 *22500*	18200 *24700*	13450 *18100*	14850 *20100*	16250 *22100*	17900 *24250*	17900 *24250*	19600 *26650*
	20.80	0.422 *10.72*	9850 *13200*	10850 *14700*	11850 *16200*	14100 *19100*	14100 *19100*	15500 *21000*	10850 *14600*	11950 *16200*	13050 *17800*	15800 *21400*	15800 *21400*	17300 *23500*	11450 *15500*	12650 *17200*	13850 *18900*	17300 *23450*	17300 *23450*	19000 *25750*	14050 *19000*	15550 *21100*	17050 *23200*	18800 *25500*	18800 *25500*	20600 *28000*
	21.40	0.437 *11.10*	10450 *14100*	11550 *15700*	12650 *17300*	14800 *20050*	14800 *20050*	16200 *22050*	11450 *15500*	12650 *17200*	13850 *18900*	16600 *22500*	16600 *22500*	18200 *24700*	12100 *16300*	13400 *18100*	14700 *19900*	18100 *24550*	18100 *24550*	19900 *26950*	14650 *19900*	16250 *22100*	17850 *24300*	19700 *26700*	19700 *26700*	21600 *29300*
	23.20	0.478 *12.14*	12100 *16300*	13400 *18100*	14700 *19900*	16500 *22350*	16500 *22350*	18100 *24550*	13050 *17600*	14450 *19600*	15850 *21600*	18500 *25100*	18500 *25100*	20300 *27600*	14050 *19000*	15550 *21100*	17050 *23200*	20200 *27400*	20200 *27400*	22200 *30100*	15050 *20300*	16650 *22600*	18250 *24900*	21900 *29700*	21900 *29700*	24000 *32600*
5-1/2 *139.70*	17.00	0.304 *7.72*	7470 *10200*	8300 *11300*	9130 *12400*	10000 *13550*	10000 *13550*	11000 *14850*	8150 *11100*	9050 *12300*	9950 *13500*	11300 *15300*	11300 *15300*	12400 *16800*	8780 *11900*	9750 *13200*	10720 *14500*	12300 *16700*	12300 *16700*	13500 *18300*	9500 *12800*	10500 *14200*	11500 *15600*	13400 *18150*	13400 *18150*	14700 *19950*
	20.00	0.361 *9.17*	8460 *11400*	9400 *12700*	10340 *14000*	12800 *17350*	12800 *17350*	14000 *19050*	10850 *14600*	11950 *16200*	13050 *17800*	14400 *19500*	14400 *19500*	15800 *21400*	11450 *15500*	12650 *17200*	13850 *18900*	15800 *21400*	15800 *21400*	17300 *23500*	12450 *16700*	13750 *18600*	15050 *20500*	17100 *23200*	17100 *23200*	18800 *25500*
	23.00	0.415 *10.54*	10850 *14600*	11950 *16200*	13050 *17800*	15700 *21300*	15700 *21300*	17200 *23300*	11700 *15900*	13000 *17700*	14300 *19500*	17600 *23850*	17600 *23850*	19300 *26150*	12700 *17200*	14100 *19100*	15500 *21000*	19400 *26300*	19400 *26300*	21300 *28900*	13700 *18500*	15200 *20600*	16700 *22700*	21000 *28450*	21000 *28450*	23100 *31250*
	26.00	0.476 *12.09*	13050 *17600*	14450 *19600*	15850 *21600*	18700 *25350*	18700 *25350*	20500 *27850*	13700 *18500*	15200 *20600*	16700 *22700*	21000 *28450*	21000 *28450*	23100 *31250*	15300 *20700*	17000 *23000*	18700 *25300*	23000 *31200*	23000 *31200*	25300 *34300*	16650 *22500*	18450 *25000*	20250 *27500*	24950 *33850*	24950 *33850*	27350 *37150*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP HT for CRA Material <Pt. 2> (Continued)

Size (OD)	Nom Wt	Wall Thickness	105-110-115 ksi						120-125-130 ksi						135-140 ksi						145-150-155 ksi					
			Field				Mill & Licensee		Field				Mill & Licensee		Field				Mill & Licensee		Field				Mill & Licensee	
			Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max	Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max	Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max	Tubing Min	+ Liner Opt	Tubing Max	Liner Max	Min	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																							
6-5/8 *168.28*	23.20	0.330 *8.38*	11450 *15500*	12650 *17200*	13850 *18900*	15500 *21000*	15500 *21000*	17000 *23100*	12700 *17200*	14100 *19100*	15500 *21000*	17500 *23750*	17500 *23750*	19200 *26050*	13700 *18500*	15200 *20600*	16700 *22700*	19200 *26050*	19200 *26050*	21100 *28650*	15050 *20300*	16650 *22600*	18250 *24900*	20950 *28400*	20950 *28400*	22950 *31200*
	24.00	0.352 *8.94*	13050 *17600*	14450 *19600*	15850 *21600*	17100 *23200*	17100 *23200*	18800 *25500*	14400 *19400*	15900 *21600*	17400 *23800*	19400 *26300*	19400 *26300*	21300 *28900*	15050 *20300*	16650 *22600*	18250 *24900*	21350 *28950*	21350 *28950*	23450 *31750*	15650 *21100*	17350 *23500*	19050 *25900*	23200 *31450*	23200 *31450*	25500 *34550*
	28.00	0.417 *10.59*	14650 *19900*	16250 *22100*	17850 *24300*	21200 *28750*	21200 *28750*	23300 *31550*	16000 *21600*	17700 *24000*	19400 *26400*	23900 *32400*	23900 *32400*	26300 *35650*	17250 *23400*	19150 *26000*	21050 *28600*	26250 *35600*	26250 *35600*	28850 *39100*	18600 *25100*	20600 *27900*	22600 *30700*	28650 *38850*	28650 *38850*	31450 *42650*
	32.00	0.475 *12.07*	18000 *24300*	19900 *27000*	21800 *29700*	24900 *33750*	24900 *33750*	23300 *37000*	19850 *26900*	22050 *29900*	24250 *32900*	28100 *38100*	28100 *38100*	30900 *41900*	20850 *28300*	23150 *31400*	25450 *34500*	30800 *41750*	30800 *41750*	33800 *45850*	20850 *28300*	23150 *31400*	25450 *34500*	33500 *45400*	33500 *45400*	36800 *49900*
	36.70	0.562 *14.27*	19600 *26500*	21700 *29400*	23800 *32300*	28950 *39300*	28950 *39300*	31850 *43200*	20850 *28300*	23150 *31400*	25450 *34500*	32600 *44200*	32600 *44200*	35900 *48600*	20850 *28300*	23150 *31400*	25450 *34500*	35700 *48400*	35700 *48400*	39200 *53200*	20850 *28300*	23150 *31400*	25450 *34500*	38800 *52600*	38800 *52600*	42600 *57800*
7 *177.80*	26.00	0.362 *9.19*	11700 *15900*	13000 *17700*	14300 *19500*	18000 *24400*	18000 *24400*	19800 *26800*	13050 *17600*	14450 *19600*	15850 *21600*	20400 *27650*	20400 *27650*	22400 *30350*	14050 *19000*	15550 *21100*	17050 *23200*	22300 *30250*	22300 *30250*	24500 *33250*	15050 *20300*	16650 *22600*	18250 *24900*	24400 *33100*	24400 *33100*	26800 *36350*
	29.00	0.408 *10.36*	14650 *19900*	16250 *22100*	17850 *24300*	21600 *29300*	21600 *29300*	23700 *32200*	16300 *22000*	18100 *24500*	19900 *27000*	24400 *33100*	24400 *33100*	26800 *36350*	17650 *23800*	19550 *26500*	21450 *29200*	26750 *36250*	26750 *36250*	29350 *39850*	18900 *25600*	21000 *28400*	23100 *31200*	29150 *39500*	29150 *39500*	32050 *43450*
	32.00	0.453 *11.51*	17650 *23800*	19550 *26500*	21450 *29200*	23950 *32450*	23950 *32450*	26250 *35600*	19600 *26500*	21700 *29400*	23800 *32300*	27100 *36750*	27100 *36750*	29800 *40400*	20850 *28300*	23150 *31400*	25450 *34500*	29650 *40200*	29650 *40200*	32550 *44200*	20850 *28300*	23150 *31400*	25450 *34500*	33250 *45100*	33250 *45100*	36550 *49550*
	35.00	0.498 *12.65*	20600 *27800*	22800 *30900*	25000 *34000*	27500 *37300*	27500 *37300*	30200 *41000*	20850 *28300*	23150 *31400*	25450 *34500*	31000 *42050*	31000 *42050*	34100 *46250*	20850 *28300*	23150 *31400*	25450 *34500*	34000 *46100*	34000 *46100*	37400 *50700*	20850 *28300*	23150 *31400*	25450 *34500*	36900 *50050*	36900 *50050*	40500 *54900*
	38.00	0.540 *13.72*	20850 *28300*	23150 *31400*	25450 *34500*	29800 *40400*	29800 *40400*	32700 *44350*	20850 *28300*	23150 *31400*	25450 *34500*	33600 *45550*	33600 *45550*	36900 *50050*	20850 *28300*	23150 *31400*	25450 *34500*	36750 *49850*	36750 *49850*	40350 *54700*	20850 *28300*	23150 *31400*	25450 *34500*	39900 *54100*	39900 *54100*	43800 *59400*
	41.00	0.590 *14.99*	20850 *28300*	23150 *31400*	25450 *34500*	32100 *43500*	32100 *43500*	35300 *47850*	20850 *28300*	23150 *31400*	25450 *34500*	36200 *49100*	36200 *49100*	39800 *53950*	20850 *28300*	23150 *31400*	25450 *34500*	39550 *53600*	39550 *53600*	43450 *58900*	20850 *28300*	23150 *31400*	25450 *34500*	42950 *58250*	42950 *58250*	47150 *63900*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP HT <Except For CRA> 65 ksi - 105-110-115 ksi

Size	Nominal Wt	Wall Thickness	65 ksi						75-80-85 ksi						90-95-100 ksi						105-110-115 ksi					
			Tubing + Liner		Tubing	Liner	Mill & Licensee		Tubing + Liner		Tubing	Liner	Mill & Licensee		Tubing + Liner		Tubing	Liner	Mill & Licensee		Tubing + Liner		Tubing	Liner	Mill & Licensee	
			Min	Opti	Max	Max	Min	Max	Min	Opti	Max	Max	Min	Max	Min	Opti	Max	Max	Min	Max	Min	Opti	Max	Max	Min	Max
in. *mm*	lb/ft	in. *mm*	ft- lb *Nm*																							
4-1/2 *114.30*	10.50	0.224 *5.69*	2220 *3000*	2460 *3330*	2700 *3660*	2890 *3920*	2890 *3920*	3170 *4310*	2540 *3440*	2820 *3820*	3100 *4200*	3470 *4710*	3470 *4710*	3810 *5180*	2800 *3800*	3110 *4220*	3420 *4640*	4120 *5600*	4120 *5600*	4530 *6200*	3130 *4240*	3470 *4710*	3810 *5180*	4770 *6500*	4770 *6500*	5240 *7200*
	11.60	0.250 *6.35*	2800 *3800*	3110 *4220*	3420 *4640*	3760 *5100*	3760 *5100*	4130 *5600*	3260 *4400*	3620 *4900*	3980 *5400*	4560 *6200*	4560 *6200*	5010 *6800*	3650 *4900*	4050 *5500*	4450 *6100*	5350 *7300*	5350 *7300*	5880 *8000*	4040 *5500*	4480 *6100*	4920 *6700*	6150 *8300*	6150 *8300*	6760 *9100*
	12.60	0.271 *6.88*	3260 *4400*	3620 *4900*	3980 *5400*	4410 *6000*	4410 *6000*	4850 *6600*	3710 *5000*	4120 *5600*	4530 *6200*	5420 *7400*	5420 *7400*	5960 *8100*	4110 *5600*	4560 *6200*	5010 *6800*	6370 *8600*	6370 *8600*	7000 *9500*	4560 *6200*	5060 *6900*	5560 *7600*	7310 *9900*	7310 *9900*	8040 *10900*
	13.50	0.290 *7.37*	3710 *5000*	4120 *5600*	4530 *6200*	5060 *6900*	5060 *6900*	5560 *7600*	4170 *5700*	4630 *6300*	5090 *6900*	6150 *8300*	6150 *8300*	6760 *9100*	4690 *6400*	5210 *7100*	5730 *7800*	7230 *9800*	7230 *9800*	7950 *10800*	5220 *7000*	5790 *7800*	6360 *8600*	8300 *11300*	8300 *11300*	9130 *12400*
	15.10	0.337 *8.56*	4630 *6300*	5140 *7000*	5650 *7700*	6370 *8600*	6370 *8600*	7000 *9500*	5220 *7000*	5790 *7800*	6360 *8600*	7670 *10400*	7670 *10400*	8430 *11400*	5860 *7900*	6510 *8800*	7160 *9700*	9050 *12300*	9050 *12300*	9950 *13500*	6450 *8700*	7160 *9700*	7870 *10700*	10400 *14100*	10400 *14100*	11400 *15500*
	17.00	0.380 *9.65*	5600 *7600*	6220 *8400*	6840 *9200*	7810 *10600*	7810 *10600*	8590 *11700*	6390 *8600*	7090 *9600*	7790 *10600*	9400 *12700*	9400 *12700*	10340 *14000*	7170 *9700*	7960 *10800*	8750 *11900*	11050 *15000*	11050 *15000*	12150 *16500*	7830 *10600*	8700 *11800*	9570 *13000*	12750 *17300*	12750 *17300*	13950 *19000*
	17.70	0.402 *10.21*	6120 *8300*	6800 *9200*	7480 *10100*	8550 *11600*	8550 *11600*	9400 *12800*	6840 *9300*	7590 *10300*	8340 *11300*	10350 *14000*	10350 *14000*	11350 *15400*	7830 *10600*	8700 *11800*	9570 *13000*	12100 *16400*	12100 *16400*	13300 *18000*	8460 *11400*	9400 *12700*	10340 *14000*	13950 *18900*	13950 *18900*	15250 *20800*
	18.90	0.430 *10.92*	6840 *9300*	7590 *10300*	8340 *11300*	9500 *12800*	9500 *12800*	10450 *14100*	7830 *10600*	8700 *11800*	9570 *13000*	11450 *15500*	11450 *15500*	12550 *17100*	8460 *11400*	9400 *12700*	10340 *14000*	13400 *18100*	13400 *18100*	14700 *19900*	9500 *12800*	10500 *14200*	11500 *15600*	15400 *20900*	15400 *20900*	16900 *23000*
	21.50	0.500 *12.70*	8150 *11100*	9050 *12300*	9950 *13500*	11200 *15200*	11200 *15200*	12300 *16700*	9500 *12800*	10500 *14200*	11500 *15600*	13900 *18800*	13900 *18800*	15200 *20700*	10850 *14600*	11950 *16200*	13050 *17800*	16500 *22400*	16500 *22400*	18100 *24600*	11700 *15900*	13000 *17700*	14300 *19500*	19100 *25900*	19100 *25900*	21000 *28500*
	23.70	0.560 *14.22*	9150 *12300*	10150 *13700*	11150 *15100*	12650 *17200*	12650 *17200*	13850 *18900*	10850 *14600*	11950 *16200*	13050 *17800*	15600 *21200*	15600 *21200*	17100 *23300*	12100 *16300*	13400 *18100*	14700 *19900*	18600 *25200*	18600 *25200*	20400 *27700*	13700 *18500*	15200 *20600*	16700 *22700*	21650 *29300*	21650 *29300*	23750 *32200*
5 *127.00*	15.00	0.296 *7.52*	4370 *5900*	4850 *6600*	5330 *7300*	5930 *8040*	5930 *8040*	6510 *8830*	4950 *6700*	5500 *7500*	6050 *8300*	7090 *9610*	7090 *9610*	7800 *10600*	5480 *7400*	6080 *8200*	6680 *9000*	8300 *11250*	8300 *11250*	9200 *12450*	6060 *8200*	6730 *9100*	7400 *10000*	9400 *12750*	9400 *12750*	10300 *13950*
	18.00	0.362 *9.19*	6190 *8400*	6870 *9300*	7550 *10200*	8700 *11800*	8700 *11800*	9500 *12900*	7170 *9700*	7960 *10800*	8750 *11900*	10150 *13750*	10150 *13750*	11100 *15050*	7830 *10600*	8700 *11800*	9570 *13000*	11950 *16200*	11950 *16200*	13100 *17750*	8780 *11900*	9750 *13200*	10720 *14500*	13750 *18650*	13750 *18650*	15100 *20450*
	20.30	0.408 *10.36*	7470 *10200*	8300 *11300*	9130 *12400*	10500 *14250*	10500 *14250*	11500 *15600*	8460 *11400*	9400 *12700*	10340 *14000*	12650 *17150*	12650 *17150*	14000 *19000*	9500 *12800*	10500 *14200*	11500 *15600*	14800 *20050*	14800 *20050*	16300 *22100*	10850 *14600*	11950 *16200*	13050 *17800*	17000 *20350*	17000 *20350*	18700 *25350*
	20.80	0.422 *10.72*	7830 *10600*	8700 *11800*	9570 *13000*	10850 *14700*	10850 *14700*	11950 *16200*	9150 *12300*	10150 *13700*	11150 *15100*	13400 *18150*	13400 *18150*	14800 *20050*	10100 *13700*	11200 *15200*	12300 *16700*	15550 *21100*	15550 *21100*	17100 *23200*	11100 *15000*	12300 *16700*	13500 *18400*	18100 *24550*	18100 *24550*	19900 *27000*
	21.40	0.437 *11.10*	8460 *11400*	9400 *12700*	10340 *14000*	11550 *15650*	11550 *15650*	12700 *17200*	9500 *12800*	10500 *14200*	11500 *15600*	14100 *19100*	14100 *19100*	15550 *21100*	10850 *14600*	11950 *16200*	13050 *17800*	16650 *22550*	16650 *22550*	18300 *24800*	11700 *15900*	13000 *17700*	14300 *19500*	19150 *25950*	19150 *25950*	21000 *28450*
	23.20	0.478 *12.14*	9500 *12800*	10500 *14200*	11500 *15600*	13000 *17650*	13000 *17650*	14300 *19400*	10850 *14600*	11950 *16200*	13050 *17800*	16250 *22050*	16250 *22050*	17900 *24250*	12100 *16300*	13400 *18100*	14700 *19900*	19150 *25950*	19150 *25950*	21000 *28450*	13450 *18100*	14850 *20100*	16250 *22100*	21700 *29400*	21700 *29400*	23850 *32350*
5-1/2 *139.70*	17.00	0.304 *7.72*	5220 *7000*	5790 *7800*	6360 *8600*	7230 *9800*	7230 *9800*	7960 *10800*	5930 *8000*	6580 *8900*	7230 *9800*	8700 *11800*	8700 *11800*	9500 *12900*	6510 *8800*	7230 *9800*	7950 *10800*	10500 *14250*	10500 *14250*	11500 *15600*	7470 *10200*	8300 *11300*	9130 *12400*	11950 *16200*	11950 *16200*	13100 *17750*
	20.00	0.361 *9.17*	6840 *9300*	7590 *10300*	8340 *11300*	9750 *13200*	9750 *13200*	10800 *14750*	7830 *10600*	8700 *11800*	9570 *13000*	11950 *16200*	11950 *16200*	13100 *17750*	8780 *11900*	9750 *13200*	10720 *14500*	13750 *18650*	13750 *18650*	15100 *20450*	9850 *13200*	10850 *14700*	11850 *16200*	15900 *21550*	15900 *21550*	17500 *23750*
	23.00	0.415 *10.54*	8780 *11900*	9750 *13200*	10720 *14500*	12300 *16700*	12300 *16700*	13500 *18300*	9850 *13200*	10850 *14700*	11850 *16200*	15200 *20600*	15200 *20600*	16700 *22650*	11100 *15000*	12300 *16700*	13500 *18400*	17700 *24000*	17700 *24000*	19500 *26450*	12450 *16700*	13750 *18600*	15050 *20500*	20600 *27950*	20600 *27950*	22700 *30800*
	26.00	0.476 *12.09*	10850 *14600*	11950 *16200*	13050 *17800*	15550 *21100*	15550 *21100*	17100 *23200*	12100 *16300*	13400 *18100*	14700 *19900*	18800 *25500*	18800 *25500*	20700 *28050*	13700 *18500*	15200 *20600*	16700 *22700*	22050 *29900*	22050 *29900*	24250 *32900*	15050 *20300*	16650 *22600*	18250 *24900*	25450 *34500*	25450 *34500*	28000 *37950*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP HT <Except For CRA> 65 ksi - 105-110-115 ksi (Continued)

Size	Nominal Wt	Wall Thickness	65 ksi						75-80-85 ksi						90-95-100 ksi						105-110-115 ksi					
			Tubing + Liner		Tubing	Liner	Mill & Licensee		Tubing + Liner		Tubing	Liner	Mill & Licensee		Tubing + Liner		Tubing	Liner	Mill & Licensee		Tubing + Liner		Tubing	Liner	Mill & Licensee	
			Min	Opti	Max	Max	Min	Max	Min	Opti	Max	Max	Min	Max	Min	Opti	Max	Max	Min	Max	Min	Opti	Max	Max	Min	Max
in. *mm*	lb/ft	in. *mm*	ft- lb *Nm*																							
6-5/8 *168.28*	23.20	0.330 *8.38*	7830 *10600*	8700 *11800*	9570 *13000*	11950 *16200*	11950 *16200*	13100 *17750*	9150 *12300*	10150 *13700*	11150 *15100*	14800 *20050*	14800 *20050*	16300 *22100*	10100 *13700*	11200 *15200*	12300 *16700*	17350 *23500*	17350 *23500*	19100 *25900*	11450 *15500*	12650 *17200*	13850 *18900*	20250 *27450*	20250 *27450*	22300 *30250*
	24.00	0.352 *8.94*	8780 *11900*	9750 *13200*	10720 *14500*	13400 *18150*	13400 *18150*	14800 *20050*	10100 *13700*	11200 *15200*	12300 *16700*	16650 *22550*	16650 *22550*	18300 *24800*	11450 *15500*	12650 *17200*	13850 *18900*	19500 *26450*	19500 *26450*	21500 *29150*	13050 *17600*	14450 *19600*	15850 *21600*	22800 *30900*	22800 *30900*	25100 *34050*
	28.00	0.417 *10.59*	10100 *13700*	11200 *15200*	12300 *16700*	17700 *24000*	17700 *24000*	19500 *26450*	13050 *17600*	14450 *19600*	15850 *21600*	21700 *29400*	21700 *29400*	23850 *32350*	13700 *18500*	15200 *20600*	16700 *22700*	25600 *34700*	25600 *34700*	28200 *38250*	14650 *19900*	16250 *22100*	17850 *24300*	29600 *40150*	29600 *40150*	32650 *44250*
	32.00	0.475 *12.07*	14050 *19000*	15550 *21100*	17050 *23200*	22050 *29900*	22050 *29900*	24250 *32900*	14400 *19400*	15900 *21600*	17400 *23800*	27000 *36600*	27000 *36600*	29650 *40200*	16300 *22000*	18100 *24500*	19900 *27000*	32100 *43500*	32100 *43500*	35350 *47950*	18000 *24300*	19900 *27000*	21800 *29700*	37150 *50350*	37150 *50350*	40850 *55400*
	36.70	0.562 *14.27*	15650 *21100*	17350 *23500*	19050 *25900*	27100 *36700*	27100 *36700*	30050 *40700*	18000 *24300*	19900 *27000*	21800 *29700*	33500 *45400*	33500 *45400*	37150 *50400*	20600 *27800*	22800 *30900*	25000 *34000*	39900 *54200*	39900 *54200*	44300 *60100*	20850 *28300*	23150 *31400*	25450 *34500*	46100 *62500*	46100 *62500*	51200 *69400*
7 ***177.80***	26.00	0.362 *9.19*	9500 *12800*	10500 *14200*	11500 *15600*	14100 *19100*	14100 *19100*	15500 *21100*	10850 *14600*	11950 *16200*	13050 *17800*	17350 *23500*	17350 *23500*	19100 *25900*	12450 *16700*	13750 *18600*	15050 *20500*	20600 *27950*	20600 *27950*	22700 *30800*	13700 *18500*	15200 *20600*	16700 *22700*	24000 *32550*	24000 *32550*	26450 *35850*
	29.00	0.408 *10.36*	11700 *15900*	13000 *17700*	14300 *19500*	18100 *24550*	18100 *24550*	19900 *27000*	13450 *18100*	14850 *20100*	16250 *22100*	22050 *29900*	22050 *29900*	24250 *32900*	15300 *20700*	17000 *23000*	18700 *25300*	26050 *35300*	26050 *35300*	28650 *38850*	16000 *21600*	17700 *24000*	19400 *26400*	30100 *40800*	30100 *40800*	33150 *44950*
	32.00	0.453 *11.51*	13050 *17600*	14450 *19600*	15850 *21600*	20600 *27950*	20600 *27950*	22700 *30800*	14050 *19000*	15550 *21100*	17050 *23200*	25450 *34500*	25450 *34500*	28000 *37950*	16000 *21600*	17700 *24000*	19400 *26400*	31400 *42550*	31400 *42550*	33050 *44800*	17650 *23800*	19550 *26500*	21450 *29200*	34700 *47050*	34700 *47050*	38200 *51800*
	35.00	0.498 *12.65*	14400 *19400*	15900 *21600*	17400 *23800*	25100 *34050*	25100 *34050*	27700 *37550*	16300 *22000*	18100 *24500*	19900 *27000*	30600 *41500*	30600 *41500*	33750 *45750*	18600 *25100*	20600 *27900*	22600 *30700*	36150 *49050*	36150 *49050*	39800 *53950*	20600 *27800*	22800 *30900*	25000 *34000*	41800 *56650*	41800 *56650*	46050 *62450*
	38.00	0.540 *13.72*	16300 *22000*	18100 *24500*	19900 *27000*	27900 *37850*	27900 *37850*	31000 *42050*	18600 *25100*	20600 *27900*	22600 *30700*	35150 *47650*	35150 *47650*	38250 *51850*	20850 *28300*	23150 *31400*	25450 *34500*	41000 *55600*	41000 *55600*	45150 *61200*	20850 *28300*	23150 *31400*	25450 *34500*	47300 *64150*	47300 *64150*	52150 *70700*
	41.00	0.590 *14.99*	18250 *24700*	20250 *27500*	22250 *30300*	31250 *42350*	31250 *42350*	34400 *46650*	20850 *28300*	23150 *31400*	25450 *34500*	38450 *52150*	38450 *52150*	42600 *57750*	20850 *28300*	23150 *31400*	25450 *34500*	46150 *62600*	46150 *62600*	50750 *68800*	20850 *28300*	23150 *31400*	25450 *34500*	53750 *72900*	53750 *72900*	59150 *80200*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP HT <Except For CRA> 120-125-130 ksi - 145-150-155 ksi

Size	Nominal Wt	Wall Thickness	120-125-130 ksi						135-140 ksi						145-150-155 ksi					
			Tubing + Liner		Tubing	Liner	Mill & Licensee		Tubing + Liner		Tubing	Liner	Mill & Licensee		Tubing + Liner		Tubing	Liner	Mill & Licensee	
			Min	Opti	Max	Max	Min	Max	Min	Opti	Max	Max	Min	Max	Min	Opti	Max	Max	Min	Max
in. *mm*	lb/ft	in. *mm*	ft- lb *Nm*																	
4-1/2 *114.30*	10.50	0.224 *5.69*	3450 *4700*	3830 *5200*	4210 *5700*	5420 *7400*	5420 *7400*	5960 *8100*	3710 *5000*	4120 *5600*	4530 *6200*	5930 *8000*	5930 *8000*	6520 *8800*	3970 *5400*	4410 *6000*	4850 *6600*	6440 *8700*	6440 *8700*	7080 *9600*
	11.60	0.250 *6.35*	4500 *6100*	4990 *6800*	5480 *7500*	7020 *9500*	7020 *9500*	7720 *10500*	4820 *6600*	5350 *7300*	5880 *8000*	7740 *10500*	7740 *10500*	8510 *11600*	5220 *7000*	5790 *7800*	6360 *8600*	8400 *11400*	8400 *11400*	9240 *12500*
	12.60	0.271 *6.88*	5020 *6800*	5570 *7600*	6120 *8400*	8300 *11300*	8300 *11300*	9130 *12400*	5400 *7300*	6000 *8100*	6600 *8900*	9100 *12400*	9100 *12400*	10010 *13600*	5800 *7800*	6440 *8700*	7080 *9600*	10000 *13500*	10000 *13500*	11000 *14900*
	13.50	0.290 *7.37*	5740 *7700*	6370 *8600*	7000 *9500*	9500 *12800*	9500 *12800*	10450 *14100*	6120 *8300*	6800 *9200*	7480 *10100*	10400 *14100*	10400 *14100*	11400 *15500*	6510 *8800*	7230 *9800*	7950 *10800*	11350 *15400*	11350 *15400*	12450 *16900*
	15.10	0.337 *8.56*	7170 *9700*	7960 *10800*	8750 *11900*	11800 *16000*	11800 *16000*	12900 *17600*	7830 *10600*	8700 *11800*	9570 *13000*	13000 *17700*	13000 *17700*	14300 *19500*	8150 *11100*	9050 *12300*	9950 *13500*	14200 *19200*	14200 *19200*	15600 *21100*
	17.00	0.380 *9.65*	8780 *11900*	9750 *13200*	10720 *14500*	14450 *19600*	14450 *19600*	15850 *21600*	9500 *12800*	10500 *14200*	11500 *15600*	15900 *21600*	15900 *21600*	17400 *23800*	10100 *13700*	11200 *15200*	12300 *16700*	17300 *23400*	17300 *23400*	19000 *25700*
	17.70	0.402 *10.21*	9500 *12800*	10500 *14200*	11500 *15600*	15750 *21400*	15750 *21400*	17250 *23500*	10100 *13700*	11200 *15200*	12300 *16700*	17350 *23500*	17350 *23500*	19050 *25900*	10850 *14600*	11950 *16200*	13050 *17800*	18900 *25600*	18900 *25600*	20700 *28200*
	18.90	0.430 *10.92*	10450 *14100*	11550 *15700*	12650 *17300*	17500 *23700*	17500 *23700*	19200 *26100*	11450 *15500*	12650 *17200*	13850 *18900*	19150 *26000*	19150 *26000*	21050 *28600*	12100 *16300*	13400 *18100*	14700 *19900*	20900 *28300*	20900 *28300*	22900 *31100*
	21.50	0.500 *12.70*	13050 *17600*	14450 *19600*	15850 *21600*	21650 *29300*	21650 *29300*	23750 *32200*	14050 *19000*	15550 *21100*	17050 *23200*	23700 *32200*	23700 *32200*	26000 *35400*	15050 *20300*	16650 *22600*	18250 *24900*	25800 *35000*	25800 *35000*	28300 *38500*
	23.70	0.560 *14.22*	15050 *20300*	16650 *22600*	18250 *24900*	24650 *33400*	24650 *33400*	27050 *36700*	15300 *20700*	17000 *23000*	18700 *25300*	27250 *37000*	27250 *37000*	29950 *40700*	15650 *21100*	17350 *23500*	19050 *25900*	29850 *40500*	29850 *40500*	32750 *44600*
5 *127.00*	15.00	0.296 *7.52*	6510 *8800*	7230 *9800*	7950 *10800*	10850 *14700*	10850 *14700*	11850 *16200*	7170 *9700*	7960 *10800*	8750 *11900*	11950 *16200*	11950 *16200*	13100 *17750*	7470 *10200*	8300 *11300*	9130 *12400*	13000 *17650*	13000 *17650*	14300 *19400*
	18.00	0.362 *9.19*	9500 *12800*	10500 *14200*	11500 *15600*	15550 *21100*	15550 *21100*	17100 *23200*	10450 *14100*	11550 *15700*	12650 *17300*	17350 *23500*	17350 *23500*	19100 *25900*	11100 *15000*	12300 *16700*	13500 *18400*	18800 *25500*	18800 *25500*	20700 *28050*
	20.30	0.408 *10.36*	11700 *15900*	13000 *17700*	14300 *19500*	19150 *25950*	19150 *25950*	21050 *28450*	12450 *16700*	13750 *18600*	15050 *20500*	20950 *28400*	20950 *28400*	23100 *31300*	13450 *18100*	14850 *20100*	16250 *22100*	23150 *31400*	23150 *31400*	25400 *34450*
	20.80	0.422 *10.72*	12450 *16700*	13750 *18600*	15050 *20500*	20250 *27450*	20250 *27450*	22300 *30250*	13050 *17600*	14450 *19600*	15850 *21600*	22400 *30350*	22400 *30350*	24650 *33400*	14050 *19000*	15550 *21100*	17050 *23200*	24400 *33100*	24400 *33100*	26850 *36400*
	21.40	0.437 *11.10*	13050 *17600*	14450 *19600*	15850 *21600*	21350 *28950*	21350 *28950*	23500 *31850*	14050 *19000*	15550 *21100*	17050 *23200*	23500 *31850*	23500 *31850*	25900 *35100*	15050 *20300*	16650 *22600*	18250 *24900*	25800 *35000*	25800 *35000*	28350 *38450*
	23.20	0.478 *12.14*	14400 *19400*	15900 *21600*	17400 *23800*	24650 *33450*	24650 *33450*	27150 *36750*	15050 *20300*	16650 *22600*	18250 *24900*	27050 *36650*	27050 *36650*	29750 *40350*	16000 *21600*	17700 *24000*	19400 *26400*	29400 *39850*	29400 *39850*	32350 *43850*
5-1/2 *139.70*	17.00	0.304 *7.72*	8150 *11100*	9050 *12300*	9950 *13500*	13750 *18650*	13750 *18650*	15050 *20450*	8780 *11900*	9750 *13200*	10720 *14500*	15200 *20600*	15200 *20600*	16700 *22650*	9500 *12800*	10500 *14200*	11500 *15600*	16650 *22550*	16650 *22550*	18300 *24800*
	20.00	0.361 *9.17*	10850 *14600*	11950 *16200*	13050 *17800*	18100 *24450*	18100 *24450*	19900 *27000*	11700 *15900*	13000 *17700*	14300 *19500*	19900 *27000*	19900 *27000*	21900 *29700*	12450 *16700*	13750 *18600*	15050 *20500*	21700 *29400*	21700 *29400*	23850 *32350*
	23.00	0.415 *10.54*	13700 *18500*	15200 *20600*	16700 *22700*	23150 *31400*	23150 *31400*	25650 *34700*	14400 *19400*	15900 *21600*	17400 *23800*	25600 *34700*	25600 *34700*	28150 *38150*	15050 *20300*	16650 *22600*	18250 *24900*	27900 *37850*	27900 *37850*	30650 *41550*
	26.00	0.476 *12.09*	15650 *21100*	17350 *23500*	19050 *25900*	28850 *39150*	28850 *39150*	31800 *43050*	16300 *22000*	18100 *24500*	19900 *27000*	31700 *43000*	31700 *43000*	34850 *47250*	17000 *22900*	18800 *25500*	20600 *28100*	34600 *46900*	34600 *46900*	38050 *51600*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP HT <Except For CRA> 120-125-130 ksi - 145-150-155 ksi (Continued)

Size	Nominal Wt	Wall Thickness	120-125-130 ksi						135-140 ksi						145-150-155 ksi					
			Tubing + Liner		Tubing	Liner	Mill & Licensee		Tubing + Liner		Tubing	Liner	Mill & Licensee		Tubing + Liner		Tubing	Liner	Mill & Licensee	
			Min	Opti	Max	Max	Min	Max	Min	Opti	Max	Max	Min	Max	Min	Opti	Max	Max	Min	Max
in. *mm*	lb/ft	in. *mm*	ft- lb *Nm*																	
6-5/8 *168.28*	23.20	0.330 *8.38*	12700 *17200*	14100 *19100*	15500 *21000*	22800 *30900*	22800 *30900*	25100 *34050*	13700 *18500*	15200 *20600*	16700 *22700*	25250 *34250*	25250 *34250*	27750 *37600*	15050 *20300*	16650 *22600*	18250 *24900*	27600 *37400*	27600 *37400*	30400 *41200*
	24.00	0.352 *8.94*	14400 *19400*	15900 *21600*	17400 *23800*	25950 *35200*	25950 *35200*	28600 *38700*	15050 *20300*	16650 *22600*	18250 *24900*	28550 *38700*	28550 *38700*	31450 *42650*	15650 *21100*	17350 *23500*	19050 *25900*	31250 *42350*	31250 *42350*	34350 *46500*
	28.00	0.417 *10.59*	16000 *21600*	17700 *24000*	19400 *26400*	33700 *45700*	33700 *45700*	37150 *50300*	17250 *23400*	19150 *26000*	21050 *28600*	37200 *50450*	37200 *50450*	40850 *55400*	18600 *25100*	20600 *27900*	22600 *30700*	40550 *55000*	40550 *55000*	44650 *60550*
	32.00	0.475 *12.07*	19850 *26900*	22050 *29900*	24250 *32900*	42250 *57250*	42250 *57250*	46450 *62950*	20850 *28300*	23150 *31400*	25450 *34500*	46500 *63050*	46500 *63050*	51150 *69350*	20850 *28300*	23150 *31400*	25450 *34500*	50750 *68800*	50750 *68800*	55850 *75700*
	36.70	0.562 *14.27*	20850 *28300*	23150 *31400*	25450 *34500*	52400 *71000*	52400 *71000*	58100 *78800*	20850 *28300*	23150 *31400*	25450 *34500*	57600 *78200*	57600 *78200*	63900 *86700*	20850 *28300*	23150 *31400*	25450 *34500*	62900 *85300*	62900 *85300*	69800 *94600*
7 *177.80*	26.00	0.362 *9.19*	15050 *20300*	16650 *22600*	18250 *24900*	27350 *37050*	27350 *37050*	30100 *40800*	16000 *21600*	17700 *24000*	19400 *26400*	30100 *40800*	30100 *40800*	33150 *44950*	16300 *22000*	18100 *24500*	19900 *27000*	32850 *44550*	32850 *44550*	36150 *49000*
	29.00	0.408 *10.36*	16300 *22000*	18100 *24500*	19900 *27000*	34300 *46500*	34300 *46500*	37750 *51100*	17650 *23800*	19550 *26500*	21450 *29200*	37750 *51200*	37750 *51200*	41500 *56250*	18900 *25600*	21000 *28400*	23100 *31200*	41250 *55950*	41250 *55950*	45350 *61500*
	32.00	0.453 *11.51*	19600 *26500*	21700 *29400*	23800 *32300*	39400 *53450*	39400 *53450*	43400 *58850*	20850 *28300*	23150 *31400*	25450 *34500*	43400 *58850*	43400 *58850*	47750 *64750*	20850 *28300*	23150 *31400*	25450 *34500*	47500 *64400*	47500 *64400*	52200 *70750*
	35.00	0.498 *12.65*	20850 *28300*	23150 *31400*	25450 *34500*	47500 *64450*	47500 *64450*	52350 *70900*	20850 *28300*	23150 *31400*	25450 *34500*	52350 *71000*	52350 *71000*	57550 *78050*	20850 *28300*	23150 *31400*	25450 *34500*	57200 *77550*	57200 *77550*	62950 *85350*
	38.00	0.540 *13.72*	20850 *28300*	23150 *31400*	25450 *34500*	53800 *72950*	53800 *72950*	59150 *80200*	20850 *28300*	23150 *31400*	25450 *34500*	59250 *80350*	59250 *80350*	65200 *88400*	20850 *28300*	23150 *31400*	25450 *34500*	64700 *87700*	64700 *87700*	71150 *96450*
	41.00	0.590 *14.99*	20850 *28300*	23150 *31400*	25450 *34500*	61250 *83050*	61250 *83050*	67420 *91400*	20850 *28300*	23150 *31400*	25450 *34500*	67400 *91400*	67400 *91400*	74150 *100550*	20850 *28300*	23150 *31400*	25450 *34500*	73500 *99650*	73500 *99650*	80850 *109600*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM ACE

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
2-3/8 *60.33*	4.60	0.190 *4.83*	850 *1140*	940 *1270*	1270 *1720*	910 *1230*	1010 *1370*	1350 *1830*	980 *1320*	1080 *1470*	1460 *1980*	1050 *1410*	1160 *1570*	1480 *2010*	1110 *1500*	1230 *1670*	1540 *2090*	1240 *1670*	1370 *1860*	1640 *2220*	1310 *1760*	1450 *1960*	1700 *2300*
	5.10	0.218 *5.54*	850 *1140*	940 *1270*	1270 *1720*	910 *1230*	1010 *1370*	1350 *1830*	980 *1320*	1080 *1470*	1460 *1980*	1050 *1410*	1160 *1570*	1480 *2010*	1110 *1500*	1230 *1670*	1540 *2090*	1240 *1670*	1370 *1860*	1640 *2220*	1310 *1760*	1450 *1960*	1700 *2300*
	5.80	0.254 *6.45*	1050 *1410*	1160 *1570*	1570 *2130*	1170 *1590*	1300 *1770*	1660 *2250*	1240 *1670*	1370 *1860*	1850 *2510*	1370 *1850*	1520 *2060*	1940 *2630*	1440 *1940*	1590 *2160*	1990 *2700*	1570 *2110*	1740 *2350*	2090 *2830*	1630 *2200*	1810 *2450*	2170 *2940*
	6.30	0.280 *7.11*	1310 *1760*	1450 *1960*	1960 *2660*	1440 *1940*	1590 *2160*	2050 *2780*	1500 *2030*	1660 *2260*	2240 *3040*	1630 *2200*	1810 *2450*	2310 *3130*	1830 *2470*	2030 *2750*	2540 *3440*	1960 *2650*	2170 *2940*	2600 *3530*	2020 *2740*	2240 *3040*	2680 *3630*
	6.60	0.295 *7.49*	1370 *1850*	1520 *2060*	1990 *2700*	1630 *2200*	1810 *2450*	2170 *2940*	1760 *2380*	1950 *2650*	2140 *2920*	1960 *2650*	2170 *2940*	2380 *3230*	2080 *2830*	2310 *3140*	2680 *3630*	2220 *3000*	2460 *3330*	2700 *3660*	2340 *3180*	2600 *3530*	2860 *3880*
	7.35	0.336 *8.53*	1630 *2200*	1810 *2450*	1990 *2700*	1960 *2650*	2170 *2940*	2380 *3230*	2020 *2740*	2240 *3040*	2460 *3340*	2160 *2920*	2390 *3240*	2620 *3560*	2280 *3090*	2530 *3430*	2780 *3770*	2480 *3360*	2750 *3730*	3020 *4100*	2610 *3530*	2890 *3920*	3170 *4310*
2-7/8 *73.03*	6.40	0.217 *5.51*	1310 *1760*	1450 *1960*	1680 *2280*	1630 *2200*	1810 *2450*	2100 *2850*	1760 *2380*	1950 *2650*	2490 *3380*	1960 *2650*	2170 *2940*	2600 *3530*	2080 *2830*	2310 *3140*	2660 *3610*	2220 *3000*	2460 *3330*	2830 *3840*	2280 *3090*	2530 *3430*	2890 *3920*
	7.80	0.276 *7.01*	1630 *2200*	1810 *2450*	2170 *2940*	1830 *2470*	2030 *2750*	2440 *3310*	2020 *2740*	2240 *3040*	2860 *3880*	2220 *3000*	2460 *3330*	2950 *4000*	2340 *3180*	2600 *3530*	2990 *4050*	2480 *3360*	2750 *3730*	3160 *4280*	2610 *3530*	2890 *3920*	3290 *4460*
	8.60	0.308 *7.82*	1960 *2650*	2170 *2940*	2600 *3530*	2220 *3000*	2460 *3330*	2950 *4000*	2420 *3270*	2680 *3630*	3420 *4640*	2610 *3530*	2890 *3920*	3470 *4700*	2800 *3800*	3110 *4220*	3580 *4850*	3000 *4060*	3330 *4510*	3830 *5190*	3130 *4240*	3470 *4710*	3980 *5400*
	9.35	0.340 *8.64*	2160 *2920*	2390 *3240*	2870 *3890*	2540 *3440*	2820 *3820*	3380 *4580*	2800 *3800*	3110 *4220*	3970 *5380*	3000 *4060*	3330 *4510*	4000 *5420*	3260 *4400*	3620 *4900*	4160 *5640*	3450 *4700*	3830 *5200*	4400 *5970*	3590 *4900*	3980 *5400*	4560 *6180*
	9.80	0.362 *9.19*	2280 *3090*	2530 *3430*	3040 *4120*	2800 *3800*	3110 *4220*	3420 *4640*	3060 *4150*	3400 *4610*	4090 *5550*	3260 *4400*	3620 *4900*	4310 *5840*	3590 *4900*	3980 *5400*	4370 *5900*	3780 *5100*	4200 *5700*	4620 *6300*	3910 *5300*	4340 *5900*	4770 *6500*
	10.50	0.392 *9.96*	2540 *3440*	2820 *3820*	3100 *4200*	3060 *4150*	3400 *4610*	3740 *5070*	3330 *4500*	3690 *5000*	4120 *5590*	3590 *4900*	3980 *5400*	4370 *5900*	3910 *5300*	4340 *5900*	4770 *6500*	4170 *5700*	4630 *6300*	5090 *6900*	4230 *5800*	4700 *6400*	5170 *7000*
	10.70	0.405 *10.29*	2610 *3530*	2890 *3920*	3170 *4310*	3130 *4240*	3470 *4710*	3810 *5180*	3450 *4700*	3830 *5200*	4210 *5700*	3780 *5100*	4200 *5700*	4620 *6300*	4110 *5600*	4560 *6200*	5010 *6800*	4370 *5900*	4850 *6600*	5330 *7300*	4560 *6200*	5060 *6900*	5560 *7600*
	11.50	0.440 *11.18*	2930 *3970*	3250 *4410*	3570 *4850*	3330 *4500*	3690 *5000*	4050 *5500*	3590 *4900*	3980 *5400*	4370 *5900*	3970 *5400*	4410 *6000*	4850 *6600*	4230 *5800*	4700 *6400*	5170 *7000*	4560 *6200*	5060 *6900*	5560 *7600*	4880 *6700*	5420 *7400*	5960 *8100*
3-1/2 *88.90*	6.50	0.170 *4.32*	1370 *1850*	1520 *2060*	2050 *2780*	1570 *2110*	1740 *2350*	2350 *3190*	1700 *2290*	1880 *2550*	2400 *3250*	1890 *2560*	2100 *2840*	2520 *3420*	2020 *2740*	2240 *3040*	2580 *3500*	2080 *2830*	2310 *3140*	2660 *3610*	2250 *3040*	2500 *3380*	2750 *3720*
	7.70	0.216 *5.49*	1570 *2110*	1740 *2350*	2350 *3190*	1760 *2380*	1950 *2650*	2630 *3570*	1890 *2560*	2100 *2840*	2680 *3630*	2080 *2830*	2310 *3140*	2770 *3760*	2220 *3000*	2460 *3330*	2830 *3840*	2340 *3180*	2600 *3530*	2990 *4050*	2480 *3360*	2750 *3730*	3020 *4100*
	9.20	0.254 *6.45*	2220 *3000*	2460 *3330*	3320 *4500*	2540 *3440*	2820 *3820*	3810 *5170*	2740 *3710*	3040 *4120*	3880 *5260*	2930 *3970*	3250 *4410*	3900 *5290*	3130 *4240*	3470 *4710*	3990 *5410*	3260 *4400*	3620 *4900*	4160 *5640*	3390 *4600*	3760 *5100*	4200 *5700*
	10.20	0.289 *7.34*	2800 *3800*	3110 *4220*	4200 *5690*	3130 *4240*	3470 *4710*	4680 *6340*	3330 *4500*	3690 *5000*	4700 *6370*	3590 *4900*	3980 *5400*	4780 *6480*	3850 *5200*	4270 *5800*	4910 *6660*	4040 *5500*	4480 *6100*	5150 *6980*	4230 *5800*	4700 *6400*	5170 *7000*
	12.70	0.375 *9.53*	3910 *5300*	4340 *5900*	5860 *7950*	4430 *6000*	4920 *6700*	6640 *9000*	4760 *6500*	5280 *7200*	6730 *9100*	5080 *6800*	5640 *7600*	6770 *9180*	5540 *7500*	6150 *8300*	7070 *9590*	6190 *8400*	6870 *9300*	7900 *10700*	6510 *8800*	7230 *9800*	7950 *10800*
	13.70	0.413 *10.49*	4230 *5800*	4700 *6400*	5880 *7970*	4880 *6700*	5420 *7400*	6810 *9230*	5220 *7000*	5790 *7800*	7140 *9700*	5860 *7900*	6510 *8800*	7160 *9700*	6190 *8400*	6870 *9300*	7550 *10200*	6510 *8800*	7230 *9800*	7950 *10800*	6840 *9300*	7590 *10300*	8340 *11300*
	14.30	0.430 *10.92*	4560 *6200*	5060 *6900*	5960 *8080*	5480 *7400*	6080 *8200*	6870 *9310*	6060 *8200*	6730 *9100*	7400 *10000*	6510 *8800*	7230 *9800*	7950 *10800*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*
	14.70	0.449 *11.40*	4880 *6700*	5420 *7400*	5960 *8100*	5540 *7500*	6150 *8300*	6980 *9460*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*
	15.50	0.476 *12.09*	5220 *7000*	5790 *7800*	6360 *8600*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*	8460 *11400*	9400 *12700*	10340 *14000*
	16.70	0.510 *12.95*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*
4 *101.60*	8.20	0.190 *4.83*	1830 *2470*	2030 *2750*	2230 *3030*	2120 *2870*	2350 *3190*	2580 *3510*	2380 *3220*	2640 *3580*	2900 *3940*	2680 *3620*	2970 *4020*	3260 *4420*	2930 *3970*	3250 *4410*	3570 *4850*	3060 *4150*	3400 *4610*	3740 *5070*	3190 *4330*	3540 *4810*	3890 *5290*
	9.50	0.226 *5.74*	2280 *3090*	2530 *3430*	2780 *3770*	2610 *3530*	2890 *3920*	3170 *4310*	2930 *3970*	3250 *4410*	3570 *4850*	3260 *4400*	3620 *4900*	3980 *5400*	3590 *4900*	3980 *5400*	4370 *5900*	3780 *5100*	4200 *5700*	4620 *6300*	3910 *5300*	4340 *5900*	4770 *6500*
	10.90	0.262 *6.65*	2930 *3970*	3250 *4410*	3570 *4850*	3450 *4700*	3830 *5200*	4210 *5700*	3780 *5100*	4200 *5700*	4620 *6300*	4110 *5600*	4560 *6200*	5010 *6800*	4430 *6000*	4920 *6700*	5410 *7400*	4690 *6400*	5210 *7100*	5730 *7800*	4880 *6700*	5420 *7400*	5960 *8100*
	11.60	0.286 *7.26*	3060 *4150*	3400 *4610*	3740 *5070*	3650 *4900*	4050 *5500*	4450 *6100*	4040 *5500*	4480 *6100*	4920 *6700*	4300 *5800*	4770 *6500*	5240 *7200*	4690 *6400*	5210 *7100*	5730 *7800*	5020 *6800*	5570 *7600*	6120 *8400*	5220 *7000*	5790 *7800*	6360 *8600*
	13.20	0.330 *8.38*	3260 *4400*	3620 *4900*	3980 *5400*	3910 *5300*	4340 *5900*	4770 *6500*	4230 *5800*	4700 *6400*	5170 *7000*	4560 *6200*	5060 *6900*	5560 *7600*	4880 *6700*	5420 *7400*	5960 *8100*	5220 *7000*	5790 *7800*	6360 *8600*	5540 *7500*	6150 *8300*	6760 *9100*
	14.80	0.380 *9.65*	4230 *5800*	4700 *6400*	5170 *7000*	5080 *6800*	5640 *7600*	6200 *8400*	5540 *7500*	6150 *8300*	6760 *9100*	6060 *8200*	6730 *9100*	7400 *10000*	6510 *8800*	7230 *9800*	7950 *10800*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM ACE (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
4 *101.60*	16.10	0.415 *10.54*	4760 *6500*	5280 *7200*	5800 *7900*	5740 *7700*	6370 *8600*	7000 *9500*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*
	16.50	0.430 *10.92*	4880 *6700*	5420 *7400*	5960 *8100*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*	8460 *11400*	9400 *12700*	10340 *14000*
	18.90	0.500 *12.70*	5860 *7900*	6510 *8800*	7160 *9700*	6350 *8600*	7050 *9600*	7750 *10600*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	8780 *11900*	9750 *13200*	10720 *14500*
	22.20	0.610 *15.49*	7470 *10200*	8300 *11300*	9130 *12400*	9150 *12300*	10150 *13700*	11150 *15100*	10100 *13700*	11200 *15200*	12300 *16700*	11100 *15000*	12300 *16700*	13500 *18400*	12100 *16300*	13400 *18100*	14700 *19900*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*
4-1/2 *114.30*	10.50	0.224 *5.69*	2480 *3360*	2750 *3730*	3020 *4100*	3000 *4060*	3330 *4510*	3660 *4960*	3260 *4400*	3620 *4900*	3980 *5400*	3590 *4900*	3980 *5400*	4370 *5900*	3910 *5300*	4340 *5900*	4770 *6500*	4110 *5600*	4560 *6200*	5010 *6800*	4230 *5800*	4700 *6400*	5170 *7000*
	11.60	0.250 *6.35*	2930 *3970*	3250 *4410*	3570 *4850*	3590 *4900*	3980 *5400*	4370 *5900*	3910 *5300*	4340 *5900*	4770 *6500*	4230 *5800*	4700 *6400*	5170 *7000*	4560 *6200*	5060 *6900*	5560 *7600*	4880 *6700*	5420 *7400*	5960 *8100*	5220 *7000*	5790 *7800*	6360 *8600*
	12.60	0.271 *6.88*	2930 *3970*	3250 *4410*	3570 *4850*	3260 *4400*	3620 *4900*	3980 *5400*	3590 *4900*	3980 *5400*	4370 *5900*	3910 *5300*	4340 *5900*	4770 *6500*	4230 *5800*	4700 *6400*	5170 *7000*	4560 *6200*	5060 *6900*	5560 *7600*	4880 *6700*	5420 *7400*	5960 *8100*
	13.50	0.290 *7.37*	3260 *4400*	3620 *4900*	3980 *5400*	3780 *5100*	4200 *5700*	4620 *6300*	4110 *5600*	4560 *6200*	5010 *6800*	4430 *6000*	4920 *6700*	5410 *7400*	4880 *6700*	5420 *7400*	5960 *8100*	5220 *7000*	5790 *7800*	6360 *8600*	5540 *7500*	6150 *8300*	6760 *9100*
	14.50	0.320 *8.13*	3650 *4900*	4050 *5500*	4450 *6100*	4500 *6100*	4990 *6800*	5480 *7500*	4820 *6600*	5350 *7300*	5880 *8000*	5140 *6900*	5710 *7700*	6280 *8500*	5340 *7200*	5930 *8000*	6520 *8800*	5860 *7900*	6510 *8800*	7160 *9700*	6190 *8400*	6870 *9300*	7550 *10200*
	15.10	0.337 *8.56*	3910 *5300*	4340 *5900*	4770 *6500*	4880 *6700*	5420 *7400*	5960 *8100*	5220 *7000*	5790 *7800*	6360 *8600*	5540 *7500*	6150 *8300*	6760 *9100*	5860 *7900*	6510 *8800*	7160 *9700*	6190 *8400*	6870 *9300*	7550 *10200*	6510 *8800*	7230 *9800*	7950 *10800*
	17.00	0.380 *9.65*	4880 *6700*	5420 *7400*	5960 *8100*	5860 *7900*	6510 *8800*	7160 *9700*	6190 *8400*	6870 *9300*	7550 *10200*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*
	17.70	0.402 *10.21*	5220 *7000*	5790 *7800*	6360 *8600*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*	9150 *12300*	10150 *13700*	11150 *15100*
	18.90	0.430 *10.92*	5860 *7900*	6510 *8800*	7160 *9700*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	9850 *13200*	10850 *14700*	11850 *16200*
	21.50	0.500 *12.70*	7170 *9700*	7960 *10800*	8750 *11900*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*
	23.70	0.560 *14.22*	8460 *11400*	9400 *12700*	10340 *14000*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*
5 *127.00*	13.00	0.253 *6.43*	3260 *4400*	3620 *4900*	3980 *5400*	3590 *4900*	3980 *5400*	4370 *5900*	3910 *5300*	4340 *5900*	4770 *6500*	4230 *5800*	4700 *6400*	5170 *7000*	4560 *6200*	5060 *6900*	5560 *7600*	4880 *6700*	5420 *7400*	5960 *8100*	5220 *7000*	5790 *7800*	6360 *8600*
	15.00	0.296 *7.52*	3260 *4400*	3620 *4900*	3980 *5400*	3590 *4900*	3980 *5400*	4370 *5900*	3910 *5300*	4340 *5900*	4770 *6500*	4230 *5800*	4700 *6400*	5170 *7000*	4560 *6200*	5060 *6900*	5560 *7600*	4880 *6700*	5420 *7400*	5960 *8100*	5220 *7000*	5790 *7800*	6360 *8600*
	18.00	0.362 *9.19*	4230 *5800*	4700 *6400*	5170 *7000*	5220 *7000*	5790 *7800*	6360 *8600*	5860 *7900*	6510 *8800*	7160 *9700*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*
	20.30	0.408 *10.36*	5220 *7000*	5790 *7800*	6360 *8600*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*
	20.80	0.422 *10.72*	5540 *7500*	6150 *8300*	6760 *9100*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	9850 *13200*	10850 *14700*	11850 *16200*
	21.40	0.437 *11.10*	5860 *7900*	6510 *8800*	7160 *9700*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*
	23.20	0.478 *12.14*	6510 *8800*	7230 *9800*	7950 *10800*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	10100 *13700*	11200 *15200*	12300 *16700*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*
	24.10	0.500 *12.70*	7170 *9700*	7960 *10800*	8750 *11900*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*
5-1/2 *139.70*	15.50	0.275 *6.99*	2610 *3530*	2890 *3920*	3170 *4310*	3260 *4400*	3620 *4900*	3980 *5400*	3590 *4900*	3980 *5400*	4370 *5900*	3910 *5300*	4340 *5900*	4770 *6500*	4230 *5800*	4700 *6400*	5170 *7000*	4560 *6200*	5060 *6900*	5560 *7600*	4560 *6200*	5060 *6900*	5560 *7600*
	17.00	0.304 *7.72*	3590 *4900*	3980 *5400*	4370 *5900*	4560 *6200*	5060 *6900*	5560 *7600*	4880 *6700*	5420 *7400*	5960 *8100*	5220 *7000*	5790 *7800*	6360 *8600*	5540 *7500*	6150 *8300*	6760 *9100*	5860 *7900*	6510 *8800*	7160 *9700*	6190 *8400*	6870 *9300*	7550 *10200*
	20.00	0.361 *9.17*	4880 *6700*	5420 *7400*	5960 *8100*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*
	23.00	0.415 *10.54*	5860 *7900*	6510 *8800*	7160 *9700*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	10100 *13700*	11200 *15200*	12300 *16700*	10450 *14100*	11550 *15700*	12650 *17300*
	26.00	0.476 *12.09*	7470 *10200*	8300 *11300*	9130 *12400*	9500 *12800*	10500 *14200*	11500 *15600*	10450 *14100*	11550 *15700*	12650 *17300*	11450 *15500*	12650 *17200*	13850 *18900*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*
	26.80	0.500 *12.70*	8460 *11400*	9400 *12700*	10340 *14000*	10450 *14100*	11550 *15700*	12650 *17300*	12450 *16700*	13750 *18600*	15050 *20500*	14050 *19000*	15550 *21100*	17050 *23200*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	28.40	0.530 *13.46*	9150 *12300*	10150 *13700*	11150 *15100*	11450 *15500*	12650 *17200*	13850 *18900*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	29.70	0.562 *14.27*	9850 *13200*	10850 *14700*	11850 *16200*	12450 *16700*	13750 *18600*	15050 *20500*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM ACE (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
6-5/8 *168.28*	20.00	0.288 *7.32*	3590 *4900*	3980 *5400*	4370 *5900*	4560 *6200*	5060 *6900*	5560 *7600*	4880 *6700*	5420 *7400*	5960 *8100*	5220 *7000*	5790 *7800*	6360 *8600*	5540 *7500*	6150 *8300*	6760 *9100*	5860 *7900*	6510 *8800*	7160 *9700*	5860 *7900*	6510 *8800*	7160 *9700*
	24.00	0.352 *8.94*	5220 *7000*	5790 *7800*	6360 *8600*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*	9150 *12300*	10150 *13700*	11150 *15100*
	28.00	0.417 *10.59*	7170 *9700*	7960 *10800*	8750 *11900*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*
	32.00	0.475 *12.07*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	35.00	0.525 *13.34*	10450 *14100*	11550 *15700*	12650 *17300*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
7 *177.80*	23.00	0.317 *8.05*	4230 *5800*	4700 *6400*	5170 *7000*	5220 *7000*	5790 *7800*	6360 *8600*	5540 *7500*	6150 *8300*	6760 *9100*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*
	24.75	0.343 *8.71*	5220 *7000*	5790 *7800*	6360 *8600*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*
	26.00	0.362 *9.19*	5860 *7900*	6510 *8800*	7160 *9700*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*
	29.00	0.408 *10.36*	7170 *9700*	7960 *10800*	8750 *11900*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*
	32.00	0.453 *11.51*	8460 *11400*	9400 *12700*	10340 *14000*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*
	35.00	0.498 *12.65*	9850 *13200*	10850 *14700*	11850 *16200*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	38.00	0.540 *13.72*	11100 *15000*	12300 *16700*	13500 *18400*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	41.00	0.590 *14.99*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
7-5/8 *193.68*	26.40	0.328 *8.33*	4880 *6700*	5420 *7400*	5960 *8100*	5540 *7500*	6150 *8300*	6760 *9100*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*
	29.70	0.375 *9.53*	6510 *8800*	7230 *9800*	7950 *10800*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	10850 *14600*	11950 *16200*	13050 *17800*
	33.70	0.430 *10.92*	7830 *10600*	8700 *11800*	9570 *13000*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*
	35.80	0.465 *11.81*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*
	39.00	0.500 *12.70*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	42.80	0.562 *14.27*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	45.30	0.595 *15.11*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
7-3/4 *196.85*	46.10	0.595 *15.11*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	47.60	0.625 *15.88*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	48.60	0.640 *16.26*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
8-5/8 *219.08*	28.00	0.304 *7.72*	4880 *6700*	5420 *7400*	5960 *8100*	5540 *7500*	6150 *8300*	6760 *9100*	5860 *7900*	6510 *8800*	7160 *9700*	6190 *8400*	6870 *9300*	7550 *10200*	6510 *8800*	7230 *9800*	7950 *10800*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*
	32.00	0.352 *8.94*	5860 *7900*	6510 *8800*	7160 *9700*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9500 *12800*	10500 *14200*	11500 *15600*
	36.00	0.400 *10.16*	7170 *9700*	7960 *10800*	8750 *11900*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*
	40.00	0.450 *11.43*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*
	44.00	0.500 *12.70*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	49.00	0.557 *14.15*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	52.00	0.595 *15.11*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM ACE (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
9-5/8 *244.48*	36.00	0.352 *8.94*	6510 *8800*	7230 *9800*	7950 *10800*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*
	40.00	0.395 *10.03*	7830 *10600*	8700 *11800*	9570 *13000*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*
	43.50	0.435 *11.05*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	47.00	0.472 *11.99*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	53.50	0.545 *13.84*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	58.40	0.595 *15.11*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	59.40	0.609 *15.47*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	61.10	0.625 *15.88*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
9-7/8 *250.83*	62.80	0.625 *15.88*	18800 *25500*	20300 *27500*	21700 *29400*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*
	66.40	0.661 *16.79*	20300 *27500*	21700 *29400*	23100 *31500*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*
	70.50	0.720 *18.29*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*	21700 *29400*	23500 *31900*	25300 *34300*
10-3/4 *273.05*	40.50	0.350 *8.89*	7170 *9700*	7960 *10800*	8750 *11900*	8460 *11400*	9400 *12700*	10340 *14000*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*
	45.50	0.400 *10.16*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	51.00	0.450 *11.43*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	55.50	0.495 *12.57*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	60.70	0.545 *13.84*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	65.70	0.595 *15.11*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
11-3/4 *298.45*	47.00	0.375 *9.53*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	54.00	0.435 *11.05*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	60.00	0.489 *12.42*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	65.00	0.534 *13.56*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 23800
11-7/8 *301.63*	71.80	0.582 *14.78*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
13-3/8 *339.73*	54.50	0.380 *9.65*	11100 *15000*	12300 *16700*	13500 *18400*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	61.00	0.430 *10.92*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	68.00	0.480 *12.19*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	72.00	0.514 *13.06*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	77.00	0.550 *13.97*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	80.70	0.580 *14.73*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	85.00	0.608 *15.44*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	86.00	0.625 *15.88*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

NEW VAM

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
2-3/8 *60.33*	4.60	0.190 *4.83*	1050 *1410*	1160 *1570*	1270 *1730*	1440 *1940*	1590 *2160*	1740 *2380*	1630 *2200*	1810 *2450*	1990 *2700*	1830 *2470*	2030 *2750*	2230 *3030*	2080 *2830*	2310 *3140*	2540 *3450*	2280 *3090*	2530 *3430*	2780 *3770*	2420 *3270*	2680 *3630*	2940 *3990*
	5.10	0.218 *5.54*	1050 *1410*	1160 *1570*	1270 *1730*	1440 *1940*	1590 *2160*	1740 *2380*	1700 *2290*	1880 *2550*	2060 *2810*	1890 *2560*	2100 *2840*	2310 *3120*	2080 *2830*	2310 *3140*	2540 *3450*	2280 *3090*	2530 *3430*	2780 *3770*	2480 *3360*	2750 *3730*	3020 *4100*
	5.80	0.254 *6.45*	1110 *1500*	1230 *1670*	1350 *1840*	1500 *2030*	1660 *2260*	1820 *2490*	1760 *2380*	1950 *2650*	2140 *2920*	1960 *2650*	2170 *2940*	2380 *3230*	2160 *2920*	2390 *3240*	2620 *3560*	2340 *3180*	2600 *3530*	2860 *3880*	2540 *3440*	2820 *3820*	3100 *4200*
2-7/8 *73.03*	6.40	0.217 *5.51*	1570 *2110*	1740 *2350*	1910 *2590*	2160 *2920*	2390 *3240*	2620 *3560*	2540 *3440*	2820 *3820*	3100 *4200*	2870 *3880*	3180 *4310*	3490 *4740*	3190 *4330*	3540 *4810*	3890 *5290*	3520 *4800*	3910 *5300*	4300 *5800*	3780 *5100*	4200 *5700*	4620 *6300*
	7.80	0.276 *7.01*	1700 *2290*	1880 *2550*	2060 *2810*	2280 *3090*	2530 *3430*	2780 *3770*	2610 *3530*	2890 *3920*	3170 *4310*	3000 *4060*	3330 *4510*	3660 *4960*	3330 *4500*	3690 *5000*	4050 *5500*	3650 *4900*	4050 *5500*	4450 *6100*	3910 *5300*	4340 *5900*	4770 *6500*
	8.60	0.308 *7.82*	1890 *2560*	2100 *2840*	2310 *3120*	2540 *3440*	2820 *3820*	3100 *4200*	2930 *3970*	3250 *4410*	3570 *4850*	3390 *4600*	3760 *5100*	4130 *5600*	3780 *5100*	4200 *5700*	4620 *6300*	4110 *5600*	4560 *6200*	5010 *6800*	4430 *6000*	4920 *6700*	5410 *7400*
	9.35	0.340 *8.64*	2020 *2740*	2240 *3040*	2460 *3340*	2740 *3710*	3040 *4120*	3340 *4530*	3190 *4330*	3540 *4810*	3890 *5290*	3650 *4900*	4050 *5500*	4450 *6100*	4040 *5500*	4480 *6100*	4920 *6700*	4430 *6000*	4920 *6700*	5410 *7400*	4760 *6500*	5280 *7200*	5800 *7900*
	9.80	0.362 *9.19*	2160 *2920*	2390 *3240*	2620 *3560*	2930 *3970*	3250 *4410*	3570 *4850*	3390 *4600*	3760 *5100*	4130 *5600*	3850 *5200*	4270 *5800*	4690 *6400*	4300 *5800*	4770 *6500*	5240 *7200*	4690 *6400*	5210 *7100*	5730 *7800*	5080 *6800*	5640 *7600*	6200 *8400*
3-1/2 *88.90*	7.70	0.216 *5.49*	2080 *2830*	2310 *3140*	2540 *3450*	2800 *3800*	3110 *4220*	3420 *4640*	3260 *4400*	3620 *4900*	3980 *5400*	3650 *4900*	4050 *5500*	4450 *6100*	4110 *5600*	4560 *6200*	5010 *6800*	4430 *6000*	4920 *6700*	5410 *7400*	4760 *6500*	5280 *7200*	5800 *7900*
	9.20	0.254 *6.45*	2160 *2920*	2390 *3240*	2620 *3560*	2930 *3970*	3250 *4410*	3570 *4850*	3390 *4600*	3760 *5100*	4130 *5600*	3850 *5200*	4270 *5800*	4690 *6400*	4300 *5800*	4770 *6500*	5240 *7200*	4630 *6300*	5140 *7000*	5650 *7700*	4950 *6700*	5500 *7500*	6050 *8300*
	10.20	0.289 *7.34*	2420 *3270*	2680 *3630*	2940 *3990*	3330 *4500*	3690 *5000*	4050 *5500*	3850 *5200*	4270 *5800*	4690 *6400*	4370 *5900*	4850 *6600*	5330 *7300*	4880 *6700*	5420 *7400*	5960 *8100*	5340 *7200*	5930 *8000*	6520 *8800*	5740 *7700*	6370 *8600*	7000 *9500*
	12.70	0.375 *9.53*	2870 *3880*	3180 *4310*	3490 *4740*	3850 *5200*	4270 *5800*	4690 *6400*	4430 *6000*	4920 *6700*	5410 *7400*	5020 *6800*	5570 *7600*	6120 *8400*	5670 *7600*	6290 *8500*	6910 *9400*	6120 *8300*	6800 *9200*	7480 *10100*	6510 *8800*	7230 *9800*	7950 *10800*
	13.70	0.413 *10.49*	3330 *4500*	3690 *5000*	4050 *5500*	4500 *6100*	4990 *6800*	5480 *7500*	5220 *7000*	5790 *7800*	6360 *8600*	5930 *8000*	6580 *8900*	7230 *9800*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*
	14.70	0.449 *11.40*	3850 *5200*	4270 *5800*	4690 *6400*	5280 *7100*	5860 *7900*	6440 *8700*	5860 *7900*	6510 *8800*	7160 *9700*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*
	15.50	0.476 *12.09*	3910 *5300*	4340 *5900*	4770 *6500*	5340 *7200*	5930 *8000*	6520 *8800*	5860 *7900*	6510 *8800*	7160 *9700*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*
4 *101.60*	9.50	0.226 *5.74*	2610 *3530*	2890 *3920*	3170 *4310*	3590 *4900*	3980 *5400*	4370 *5900*	4170 *5700*	4630 *6300*	5090 *6900*	4690 *6400*	5210 *7100*	5730 *7800*	5220 *7000*	5790 *7800*	6360 *8600*	5670 *7600*	6290 *8500*	6910 *9400*	6120 *8300*	6800 *9200*	7480 *10100*
	10.90	0.262 *6.65*	2740 *3710*	3040 *4120*	3340 *4530*	3710 *5000*	4120 *5600*	4530 *6200*	4300 *5800*	4770 *6500*	5240 *7200*	4880 *6700*	5420 *7400*	5960 *8100*	5400 *7300*	6000 *8100*	6600 *8900*	5860 *7900*	6510 *8800*	7160 *9700*	6320 *8500*	7020 *9500*	7720 *10500*
	13.20	0.330 *8.38*	3130 *4240*	3470 *4710*	3810 *5180*	4300 *5800*	4770 *6500*	5240 *7200*	4950 *6700*	5500 *7500*	6050 *8300*	5600 *7600*	6220 *8400*	6840 *9200*	6320 *8500*	7020 *9500*	7720 *10500*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*
	14.80	0.380 *9.65*	3910 *5300*	4340 *5900*	4770 *6500*	5400 *7300*	6000 *8100*	6600 *8900*	6250 *8500*	6940 *9400*	7630 *10300*	7170 *9700*	7960 *10800*	8750 *11900*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*
	16.50	0.430 *10.92*	4040 *5500*	4480 *6100*	4920 *6700*	5480 *7400*	6080 *8200*	6680 *9000*	6390 *8600*	7090 *9600*	7790 *10600*	7170 *9700*	7960 *10800*	8750 *11900*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

NEW VAM (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
4-1/2 *114.30*	10.50	0.224 *5.69*	3060 *4150*	3400 *4610*	3740 *5070*	4040 *5500*	4480 *6100*	4920 *6700*	4690 *6400*	5210 *7100*	5730 *7800*	5280 *7100*	5860 *7900*	6440 *8700*	5930 *8000*	6580 *8900*	7230 *9800*	6390 *8600*	7090 *9600*	7790 *10600*	6840 *9300*	7590 *10300*	8340 *11300*
	11.60	0.250 *6.35*	3130 *4240*	3470 *4710*	3810 *5180*	4170 *5700*	4630 *6300*	5090 *6900*	4820 *6600*	5350 *7300*	5880 *8000*	5400 *7300*	6000 *8100*	6600 *8900*	6060 *8200*	6730 *9100*	7400 *10000*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*
	12.60	0.271 *6.88*	3190 *4330*	3540 *4810*	3890 *5290*	4300 *5800*	4770 *6500*	5240 *7200*	4950 *6700*	5500 *7500*	6050 *8300*	5540 *7500*	6150 *8300*	6760 *9100*	6190 *8400*	6870 *9300*	7550 *10200*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*
	13.50	0.290 *7.37*	3330 *4500*	3690 *5000*	4050 *5500*	4430 *6000*	4920 *6700*	5410 *7400*	5080 *6800*	5640 *7600*	6200 *8400*	5740 *7700*	6370 *8600*	7000 *9500*	6320 *8500*	7020 *9500*	7720 *10500*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*
	15.10	0.337 *8.56*	3780 *5100*	4200 *5700*	4620 *6300*	5220 *7000*	5790 *7800*	6360 *8600*	5990 *8100*	6650 *9000*	7310 *9900*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*
	17.00	0.380 *9.65*	4560 *6200*	5060 *6900*	5560 *7600*	6250 *8500*	6940 *9400*	7630 *10300*	7170 *9700*	7960 *10800*	8750 *11900*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*	10100 *13700*	11200 *15200*	12300 *16700*	11100 *15000*	12300 *16700*	13500 *18400*
	18.90	0.430 *10.92*	4690 *6400*	5210 *7100*	5730 *7800*	6390 *8600*	7090 *9600*	7790 *10600*	7470 *10200*	8300 *11300*	9130 *12400*	8460 *11400*	9400 *12700*	10340 *14000*	9500 *12800*	10500 *14200*	11500 *15600*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*
	21.50	0.500 *12.70*	5540 *7500*	6150 *8300*	6760 *9100*	7830 *10600*	8700 *11800*	9570 *13000*	9150 *12300*	10150 *13700*	11150 *15100*	10850 *14600*	11950 *16200*	13050 *17800*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*
	23.70	0.560 *14.22*	5670 *7600*	6290 *8500*	6910 *9400*	8150 *11100*	9050 *12300*	9950 *13500*	9500 *12800*	10500 *14200*	11500 *15600*	10850 *14600*	11950 *16200*	13050 *17800*	12100 *16300*	13400 *18100*	14700 *19900*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*
5 *127.00*	13.00	0.253 *6.43*	3780 *5100*	4200 *5700*	4620 *6300*	4110 *5600*	4560 *6200*	5010 *6800*	4370 *5900*	4850 *6600*	5330 *7300*	4560 *6200*	5060 *6900*	5560 *7600*	4760 *6500*	5280 *7200*	5800 *7900*	4950 *6700*	5500 *7500*	6050 *8300*	5140 *6900*	5710 *7700*	6280 *8500*
	15.00	0.296 *7.52*	4230 *5800*	4700 *6400*	5170 *7000*	4630 *6300*	5140 *7000*	5650 *7700*	4820 *6600*	5350 *7300*	5880 *8000*	5020 *6800*	5570 *7600*	6120 *8400*	5280 *7100*	5860 *7900*	6440 *8700*	5480 *7400*	6080 *8200*	6680 *9000*	5670 *7600*	6290 *8500*	6910 *9400*
	18.00	0.362 *9.19*	5140 *6900*	5710 *7700*	6280 *8500*	5540 *7500*	6150 *8300*	6760 *9100*	5800 *7800*	6440 *8700*	7080 *9600*	6060 *8200*	6730 *9100*	7400 *10000*	6390 *8600*	7090 *9600*	7790 *10600*	6510 *8800*	7230 *9800*	7950 *10800*	6840 *9300*	7590 *10300*	8340 *11300*
	20.30	0.408 *10.36*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*	8460 *11400*	9400 *12700*	10340 *14000*
	20.80	0.422 *10.72*	6320 *8500*	7020 *9500*	7720 *10500*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*	8460 *11400*	9400 *12700*	10340 *14000*	8780 *11900*	9750 *13200*	10720 *14500*
	21.40	0.437 *11.10*	6450 *8700*	7160 *9700*	7870 *10700*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*	8460 *11400*	9400 *12700*	10340 *14000*	8780 *11900*	9750 *13200*	10720 *14500*
	23.20	0.478 *12.14*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*	8460 *11400*	9400 *12700*	10340 *14000*	8780 *11900*	9750 *13200*	10720 *14500*	9150 *12300*	10150 *13700*	11150 *15100*
	24.10	0.500 *12.70*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	8780 *11900*	9750 *13200*	10720 *14500*	9150 *12300*	10150 *13700*	11150 *15100*	9500 *12800*	10500 *14200*	11500 *15600*
5-1/2 *139.70*	14.00	0.244 *6.20*	3590 *4900*	3980 *5400*	4370 *5900*	4300 *5800*	4770 *6500*	5240 *7200*	4560 *6200*	5060 *6900*	5560 *7600*	4820 *6600*	5350 *7300*	5880 *8000*	5080 *6800*	5640 *7600*	6200 *8400*	5340 *7200*	5930 *8000*	6520 *8800*	5540 *7500*	6150 *8300*	6760 *9100*
	15.50	0.275 *6.99*	4230 *5800*	4700 *6400*	5170 *7000*	4630 *6300*	5140 *7000*	5650 *7700*	4880 *6700*	5420 *7400*	5960 *8100*	5140 *6900*	5710 *7700*	6280 *8500*	5400 *7300*	6000 *8100*	6600 *8900*	5670 *7600*	6290 *8500*	6910 *9400*	5860 *7900*	6510 *8800*	7160 *9700*
	17.00	0.304 *7.72*	4560 *6200*	5060 *6900*	5560 *7600*	4950 *6700*	5500 *7500*	6050 *8300*	5220 *7000*	5790 *7800*	6360 *8600*	5480 *7400*	6080 *8200*	6680 *9000*	5740 *7700*	6370 *8600*	7000 *9500*	5990 *8100*	6650 *9000*	7310 *9900*	6190 *8400*	6870 *9300*	7550 *10200*
	20.00	0.361 *9.17*	5340 *7200*	5930 *8000*	6520 *8800*	5860 *7900*	6510 *8800*	7160 *9700*	6120 *8300*	6800 *9200*	7480 *10100*	6450 *8700*	7160 *9700*	7870 *10700*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*	7170 *9700*	7960 *10800*	8750 *11900*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

NEW VAM (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
5-1/2 *139.70*	23.00	0.415 *10.54*	6390 *8600*	7090 *9600*	7790 *10600*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	8780 *11900*	9750 *13200*	10720 *14500*	9150 *12300*	10150 *13700*	11150 *15100*
	26.00	0.476 *12.09*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	8460 *11400*	9400 *12700*	10340 *14000*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	9850 *13200*	10850 *14700*	11850 *16200*
6-5/8 *168.28*	20.00	0.288 *7.32*	5080 *6800*	5640 *7600*	6200 *8400*	5740 *7700*	6370 *8600*	7000 *9500*	6060 *8200*	6730 *9100*	7400 *10000*	6450 *8700*	7160 *9700*	7870 *10700*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*
	23.20	0.330 *8.38*	5600 *7600*	6220 *8400*	6840 *9200*	6250 *8500*	6940 *9400*	7630 *10300*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*
	24.00	0.352 *8.94*	6250 *8500*	6940 *9400*	7630 *10300*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	8780 *11900*	9750 *13200*	10720 *14500*	9150 *12300*	10150 *13700*	11150 *15100*
	28.00	0.417 *10.59*	7830 *10600*	8700 *11800*	9570 *13000*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	10100 *13700*	11200 *15200*	12300 *16700*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*
	32.00	0.475 *12.07*	8150 *11100*	9050 *12300*	9950 *13500*	9500 *12800*	10500 *14200*	11500 *15600*	10100 *13700*	11200 *15200*	12300 *16700*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*
	35.00	0.525 *13.34*	8780 *11900*	9750 *13200*	10720 *14500*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	12700 *17200*	14100 *19100*	15500 *21000*
7 *177.80*	23.00	0.317 *8.05*	5600 *7600*	6220 *8400*	6840 *9200*	6320 *8500*	7020 *9500*	7720 *10500*	6840 *9300*	7590 *10300*	8340 *11300*	7170 *9700*	7960 *10800*	8750 *11900*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	8460 *11400*	9400 *12700*	10340 *14000*
	26.00	0.362 *9.19*	6510 *8800*	7230 *9800*	7950 *10800*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9500 *12800*	10500 *14200*	11500 *15600*	9850 *13200*	10850 *14700*	11850 *16200*
	29.00	0.408 *10.36*	7470 *10200*	8300 *11300*	9130 *12400*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11450 *15500*	12650 *17200*	13850 *18900*
	32.00	0.453 *11.51*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12100 *16300*	13400 *18100*	14700 *19900*
	35.00	0.498 *12.65*	8460 *11400*	9400 *12700*	10340 *14000*	9500 *12800*	10500 *14200*	11500 *15600*	10100 *13700*	11200 *15200*	12300 *16700*	10850 *14600*	11950 *16200*	13050 *17800*	11450 *15500*	12650 *17200*	13850 *18900*	12100 *16300*	13400 *18100*	14700 *19900*	12450 *16700*	13750 *18600*	15050 *20500*
	38.00	0.540 *13.72*	8780 *11900*	9750 *13200*	10720 *14500*	10100 *13700*	11200 *15200*	12300 *16700*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*
	41.00	0.590 *14.99*	9500 *12800*	10500 *14200*	11500 *15600*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*
	44.00	0.640 *16.26*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	46.00	0.670 *17.02*	11700 *15900*	13000 *17700*	14300 *19500*	12700 *17200*	14100 *19100*	15500 *21000*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
7-5/8 *193.68*	26.40	0.328 *8.33*	6450 *8700*	7160 *9700*	7870 *10700*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	9850 *13200*	10850 *14700*	11850 *16200*
	29.70	0.375 *9.53*	7470 *10200*	8300 *11300*	9130 *12400*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11450 *15500*	12650 *17200*	13850 *18900*
	33.70	0.430 *10.92*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	12100 *16300*	13400 *18100*	14700 *19900*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*
	35.80	0.465 *11.81*	9500 *12800*	10500 *14200*	11500 *15600*	10850 *14600*	11950 *16200*	13050 *17800*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*

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NEW VAM (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
	39.00	0.500 *12.70*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	12100 *16300*	13400 *18100*	14700 *19900*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	42.80	0.562 *14.27*	10850 *14600*	11950 *16200*	13050 *17800*	12100 *16300*	13400 *18100*	14700 *19900*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
7-5/8 *193.68*	45.30	0.595 *15.11*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	47.10	0.625 *15.88*	11450 *15500*	12650 *17200*	13850 *18900*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	51.20	0.687 *17.45*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
7-3/4 *196.85*	46.10	0.595 *15.11*	11450 *15500*	12650 *17200*	13850 *18900*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	28.00	0.304 *7.72*	6840 *9300*	7590 *10300*	8340 *11300*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	10850 *14600*	11950 *16200*	13050 *17800*
	32.00	0.352 *8.94*	7470 *10200*	8300 *11300*	9130 *12400*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*
	36.00	0.400 *10.16*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	12100 *16300*	13400 *18100*	14700 *19900*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*
8-5/8 *219.08*	40.00	0.450 *11.43*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	12100 *16300*	13400 *18100*	14700 *19900*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	44.00	0.500 *12.70*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	49.00	0.557 *14.15*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	52.00	0.595 *15.11*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	36.00	0.352 *8.94*	7830 *10600*	8700 *11800*	9570 *13000*	9150 *12300*	10150 *13700*	11150 *15100*	10100 *13700*	11200 *15200*	12300 *16700*	10850 *14600*	11950 *16200*	13050 *17800*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*
	40.00	0.395 *10.03*	9500 *12800*	10500 *14200*	11500 *15600*	11100 *15000*	12300 *16700*	13500 *18400*	12100 *16300*	13400 *18100*	14700 *19900*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	43.50	0.435 *11.05*	10850 *14600*	11950 *16200*	13050 *17800*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
9-5/8 *244.48*	47.00	0.472 *11.99*	11100 *15000*	12300 *16700*	13500 *18400*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	53.50	0.545 *13.84*	12100 *16300*	13400 *18100*	14700 *19900*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	58.40	0.595 *15.11*	12700 *17200*	14100 *19100*	15500 *21000*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	59.40	0.609 *15.47*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	61.10	0.625 *15.88*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
9-7/8 *250.83*	62.80	0.625 *15.88*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

NEW VAM (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
10-3/4 *273.05*	40.50	0.350 *8.89*	8460 *11400*	9400 *12700*	10340 *14000*	10100 *13700*	11200 *15200*	12300 *16700*	11100 *15000*	12300 *16700*	13500 *18400*	12100 *16300*	13400 *18100*	14700 *19900*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*
	45.50	0.400 *10.16*	10450 *14100*	11550 *15700*	12650 *17300*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	51.00	0.450 *11.43*	11100 *15000*	12300 *16700*	13500 *18400*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	55.50	0.495 *12.57*	11700 *15900*	13000 *17700*	14300 *19500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	60.70	0.545 *13.84*	12450 *16700*	13750 *18600*	15050 *20500*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	65.70	0.595 *15.11*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	71.10	0.650 *16.51*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	73.20	0.672 *17.07*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
11-3/4 *298.45*	47.00	0.375 *9.53*	9500 *12800*	10500 *14200*	11500 *15600*	11450 *15500*	12650 *17200*	13850 *18900*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	54.00	0.435 *11.05*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	60.00	0.489 *12.42*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	65.00	0.534 *13.56*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
11-7/8 *301.63*	71.80	0.582 *14.78*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
13-3/8 *339.73*	54.50	0.380 *9.65*	10450 *14100*	11550 *15700*	12650 *17300*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	61.00	0.430 *10.92*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	68.00	0.480 *12.19*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	72.00	0.514 *13.06*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	77.00	0.550 *13.97*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	80.70	0.580 *14.73*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	85.00	0.608 *15.44*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	86.00	0.625 *15.88*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
13-5/8 *346.08*	88.20	0.625 *15.88*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM HWST Make-Up Torques

Size (OD)	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	in. *mm*	ft-lb *Nm*																							
5 *127.00*	0.600 *15.24*	N/A									9400 *12700*	10400 *14100*	11400 *15500*	10300 *13900*	11400 *15400*	12500 *16900*	11200 *15100*	12400 *16800*	13600 *18500*	11900 *16100*	13200 *17900*	14500 *19700*	12700 *17200*	14100 *19100*	15500 *21000*
	0.650 *16.51*	N/A									10700 *14600*	11900 *16200*	13100 *17800*	11700 *15900*	13000 *17700*	14300 *19500*	12800 *17400*	14200 *19300*	15600 *21200*	13700 *18500*	15200 *20600*	16700 *22700*	14500 *19700*	16100 *21900*	17700 *24100*
	0.700 *17.78*	N/A									12100 *16500*	13500 *18300*	14900 *20100*	13200 *18000*	14700 *20000*	16200 *22000*	14400 *19500*	16000 *21700*	17600 *23900*	15400 *20900*	17100 *23200*	18800 *25500*	16400 *22100*	18200 *24600*	20000 *27100*
	0.750 *19.05*	N/A									13500 *18300*	15000 *20300*	16500 *22300*	14800 *20000*	16400 *22200*	18000 *24400*	16000 *21700*	17800 *24100*	19600 *26500*	17100 *23200*	19000 *25800*	20900 *28400*	18200 *24700*	20200 *27400*	22200 *30100*
	0.800 *20.32*	N/A									14800 *20200*	16500 *22400*	18200 *24600*	16200 *22000*	18000 *24500*	19800 *27000*	17600 *23900*	19600 *26600*	21600 *29300*	18800 *25500*	20900 *28300*	23000 *31100*	20000 *27100*	22200 *30100*	24400 *33100*
	0.850 *21.59*	N/A												17700 *24000*	19700 *26700*	21700 *29400*	19300 *26000*	21400 *28900*	23500 *31800*	20400 *27700*	22700 *30800*	25000 *33900*	20800 *28300*	23100 *31400*	25400 *34500*
	0.900 *22.86*	N/A												19200 *26000*	21300 *28900*	23400 *31800*	20800 *28200*	23100 *31300*	25400 *34400*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.950 *24.13*	N/A												20600 *28000*	22900 *31100*	25200 *34200*	22300 *30300*	24800 *33700*	27300 *37100*	22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*
5-1/2 *139.70*	0.600 *15.24*	N/A									9900 *13400*	11000 *14900*	12100 *16400*	10900 *14800*	12100 *16400*	13300 *18000*	11900 *16000*	13200 *17800*	14500 *19600*	12700 *17200*	14100 *19100*	15500 *21000*	13500 *18300*	15000 *20300*	16500 *22300*
	0.625 *15.88*	N/A									10900 *14800*	12100 *16400*	13300 *18000*	12000 *16200*	13300 *18000*	14600 *19800*	13000 *17700*	14500 *19700*	16000 *21700*	14000 *19000*	15600 *21100*	17200 *23200*	14900 *20200*	16600 *22500*	18300 *24800*
	0.650 *16.51*	N/A			10700 *14500*	11900 *16100*	13100 *17700*	11900 *16100*	13200 *17900*	14500 *19700*	13000 *17700*	14500 *19700*	16000 *21700*	14300 *19300*	15900 *21500*	17500 *23700*	15300 *20800*	17000 *23100*	18700 *25400*	16400 *22100*	18200 *24600*	20000 *27100*			
	0.687 *17.45*	N/A			12000 *16300*	13300 *18100*	14600 *19900*	13300 *18100*	14800 *20100*	16300 *22100*	14800 *20000*	16400 *22200*	18000 *24400*	16100 *21900*	17900 *24300*	19700 *26700*	17300 *23400*	19200 *26000*	21100 *28600*	18400 *25000*	20500 *27800*	22600 *30600*			
	0.700 *17.78*	N/A			12300 *16700*	13700 *18600*	15100 *20500*	13800 *18600*	15300 *20700*	16800 *22800*	15100 *20500*	16800 *22800*	18500 *25100*	16600 *22500*	18400 *25000*	20200 *27500*	17700 *24100*	19700 *26800*	21700 *29500*	19000 *25700*	21100 *28600*	23200 *31500*			
	0.750 *19.05*	N/A			13800 *18700*	15300 *20800*	16800 *22900*	15300 *20800*	17000 *23100*	18700 *25400*	16800 *22900*	18700 *25400*	20600 *27900*	18400 *25000*	20500 *27800*	22600 *30600*	19800 *26800*	22000 *29800*	24200 *32800*	20800 *28300*	23100 *31400*	25400 *34500*			
	0.800 *20.32*	N/A			15200 *20700*	16900 *23000*	18600 *25300*	16900 *22900*	18800 *25500*	20700 *28100*	18600 *25200*	20700 *28000*	22800 *30800*	20300 *27500*	22600 *30600*	24900 *33700*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*			
	0.812 *20.62*	N/A			15700 *21100*	17400 *23500*	19100 *25900*	17300 *23500*	19200 *26100*	21100 *28700*	19100 *25800*	21200 *28700*	23300 *31600*	20800 *28200*	23100 *31300*	25400 *34400*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*			
	0.850 *21.59*	N/A						18400 *25000*	20500 *27800*	22600 *30600*	20300 *27500*	22600 *30600*	24900 *33700*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*			
	0.875 *22.23*	N/A						19300 *26100*	21400 *29000*	23500 *31900*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*			

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VAM HWST Make-Up Torques (Continued)

Size (OD)	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	in. *mm*	ft-lb *Nm*																							
5-1/2 *139.70*	0.900 *22.86*	N/A									20100 *27200*	22300 *30200*	24500 *33200*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.925 *23.50*	N/A									20800 *28300*	23100 *31400*	25400 *34500*	22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	0.950 *24.13*	N/A									20800 *28300*	23100 *31400*	25400 *34500*	22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
6-5/8 *168.28*	0.650 *16.51*	11200 *15100*	12400 *16800*	13600 *18500*	12300 *16700*	13700 *18600*	15100 *20500*	14100 *19200*	15700 *21300*	17300 *23400*	15900 *21700*	17700 *24100*	19500 *26500*	17800 *24200*	19800 *26900*	21800 *29600*	19700 *26700*	21900 *29700*	24100 *32700*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.700 *17.78*	12700 *17200*	14100 *19100*	15500 *21000*	14000 *19000*	15600 *21100*	17200 *23200*	16100 *21800*	17900 *24200*	19700 *26600*	18100 *24600*	20100 *27300*	22100 *30000*	20200 *27400*	22500 *30500*	24800 *33600*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.750 *19.05*	14200 *19300*	15800 *21400*	17400 *23500*	15700 *21300*	17500 *23700*	19300 *26100*	18000 *24400*	20000 *27100*	22000 *29800*	20300 *27500*	22600 *30600*	24900 *33700*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.800 *20.32*	N/A			17500 *23700*	19400 *26300*	21300 *28900*	19900 *27000*	22100 *30000*	24300 *33000*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.850 *21.59*	N/A			18500 *25100*	20600 *27900*	22700 *30700*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.900 *22.86*	N/A			20600 *28000*	22900 *31100*	25200 *34200*	22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	0.950 *24.13*	N/A			22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	1.000 *25.40*	N/A						20800 *28200*	23100 *31300*	25400 *34400*	22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	1.050 *26.67*	N/A						22400 *30400*	24900 *33800*	27400 *37200*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	1.100 *27.94*	N/A						24000 *32600*	26700 *36200*	29400 *39800*	26700 *36200*	29700 *40200*	32700 *44200*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	1.125 *28.58*	N/A						24800 *33700*	27600 *37400*	30400 *41100*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	1.150 *29.21*	N/A						25600 *34700*	28500 *38600*	31400 *42500*	27000 *36600*	30000 *40700*	33000 *44800*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*
	1.200 *30.48*	N/A						27300 *36900*	30300 *41000*	33300 *45100*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*
	0.650 *16.51*	N/A			12300 *16700*	13700 *18600*	15100 *20500*	14000 *19100*	15600 *21200*	17200 *23300*	15800 *21500*	17600 *23900*	19400 *26300*	17600 *23900*	19600 *26600*	21600 *29300*	19400 *26400*	21600 *29300*	23800 *32200*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.670 *17.02*	N/A			13000 *17600*	14500 *19600*	16000 *21600*	14900 *20300*	16600 *22600*	18300 *24900*	16600 *22600*	18500 *25100*	20400 *27600*	18500 *25200*	20600 *28000*	22700 *30800*	20160 *27300*	22400 *30400*	24600 *33400*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
7 *177.80*	0.687 *17.45*	N/A			13700 *18500*	15200 *20600*	16700 *22700*	15700 *21100*	17400 *23500*	19100 *25900*	17500 *23800*	19500 *26500*	21500 *29200*	19500 *26500*	21700 *29400*	23900 *32300*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.700 *17.78*	N/A			14100 *19200*	15700 *21300*	17300 *23400*	16100 *21900*	17900 *24300*	19700 *26700*	18200 *24600*	20200 *27300*	22200 *30000*	20200 *27400*	22400 *30400*	24600 *33400*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.730 *18.54*	N/A			15200 *20600*	16900 *22900*	18600 *25200*	17400 *23600*	19300 *26200*	21200 *28800*	19500 *26500*	21700 *29400*	23900 *32300*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM HWST Make-Up Torques (Continued)

Size (OD)	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	in. *mm*	ft-lb *Nm*																							
7 *177.80*	0.750 *19.05*	N/A			15900 *21600*	17700 *24000*	19500 *26400*	18200 *24700*	20200 *27400*	22200 *30100*	20400 *27700*	22700 *30800*	25000 *33900*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.800 *20.32*	N/A			17700 *24100*	19700 *26800*	21700 *29500*	20200 *27400*	22500 *30500*	24800 *33600*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.812 *20.62*	N/A			18200 *24700*	20200 *27400*	22200 *30100*	20700 *28100*	23000 *31200*	25300 *34300*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.850 *21.59*	N/A			19600 *26500*	21800 *29500*	24000 *32500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.875 *22.23*	N/A			20500 *27800*	22800 *30900*	25100 *34000*	22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	0.900 *22.86*	N/A			21400 *29100*	23800 *32300*	26200 *35500*	22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	0.937 *23.80*	N/A			22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	0.950 *24.13*	N/A			23300 *31600*	25900 *35100*	28500 *38600*	24700 *33600*	27500 *37300*	30300 *41000*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	1.000 *25.40*	N/A						22000 *29800*	24400 *33100*	26800 *36400*	22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	1.050 *26.67*	N/A						23800 *32200*	26400 *35800*	29000 *39400*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	1.062 *26.97*	N/A						24200 *32800*	26900 *36400*	29600 *40000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	1.100 *27.94*	N/A						25500 *34500*	28300 *38300*	31100 *42100*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	1.150 *29.21*	N/A						27300 *36900*	30300 *41000*	33300 *45100*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*
	1.175 *29.85*	N/A						28100 *38000*	31200 *42200*	34300 *46400*	29200 *39700*	32500 *44100*	35800 *48500*	31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*
	1.200 *30.48*	N/A						28900 *39200*	32100 *43600*	35300 *48000*	31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*
	1.250 *31.75*	N/A						30700 *41700*	34100 *46300*	37500 *50900*	34000 *46200*	37800 *51300*	41600 *56400*	34500 *46800*	38300 *52000*	42100 *57200*	34500 *46800*	38300 *52000*	42100 *57200*	34500 *46800*	38300 *52000*	42100 *57200*	34500 *46800*	38300 *52000*	42100 *57200*
7-5/8 *193.68*	0.650 *16.51*	12300 *16700*	13700 *18600*	15100 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	15700 *21400*	17500 *23800*	19300 *26200*	17900 *24200*	19900 *26900*	21900 *29600*	20000 *27200*	22200 *30200*	24400 *33200*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.687 *17.45*	13700 *18500*	15200 *20600*	16700 *22700*	15200 *20600*	16900 *22900*	18600 *25200*	17500 *23800*	19500 *26400*	21500 *29000*	19900 *26900*	22100 *29900*	24300 *32900*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.700 *17.78*	14100 *19200*	15700 *21300*	17300 *23400*	15700 *21200*	17400 *23600*	19100 *26000*	18100 *24600*	20100 *27300*	22100 *30000*	20500 *27800*	22800 *30900*	25100 *34000*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.750 *19.05*	16000 *21700*	17800 *24100*	19600 *26500*	17700 *24000*	19700 *26700*	21700 *29400*	20400 *27700*	22700 *30800*	25000 *33900*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.800 *20.32*	17800 *24200*	19800 *26900*	21800 *29600*	19800 *26800*	22000 *29800*	24200 *32800*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*

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VAM HWST Make-Up Torques (Continued)

Size (OD)	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	in. *mm*	ft-lb *Nm*																							
7-5/8 *193.68*	0.812 *20.62*	18300 *24700*	20300 *27500*	22300 *30300*	20200 *27400*	22500 *30500*	24800 *33600*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.850 *21.59*	19700 *26700*	21900 *29700*	24100 *32700*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.900 *22.86*	21600 *29300*	24000 *32600*	26400 *35900*	22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	0.905 *22.99*	21800 *29500*	24200 *32800*	26600 *36100*	22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	0.950 *24.13*	23500 *31900*	26100 *35400*	28700 *38900*	26000 *35300*	28900 *39200*	31800 *43100*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	1.000 *25.40*	N/A			21700 *29300*	24100 *32600*	26500 *35900*	22800 *30900*	25300 *34300*	27800 *37700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	1.050 *26.67*	N/A			23400 *31700*	26000 *35200*	28600 *38700*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	1.100 *27.94*	N/A			25200 *34200*	28000 *38000*	30800 *41800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	1.150 *29.21*	N/A			26900 *36500*	29900 *40600*	32900 *44700*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*
8-5/8 *219.08*	1.200 *30.48*	N/A						31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*	31200 *42400*	34700 *47100*	38200 *51800*
	1.250 *31.75*	N/A						34500 *46800*	38300 *52000*	42100 *57200*	34500 *46800*	38300 *52000*	42100 *57200*	34500 *46800*	38300 *52000*	42100 *57200*	34500 *46800*	38300 *52000*	42100 *57200*	34500 *46800*	38300 *52000*	42100 *57200*	34500 *46800*	38300 *52000*	42100 *57200*
	0.700 *17.78*	15600 *21100*	17300 *23500*	19000 *25900*	17400 *23600*	19300 *26200*	21200 *28800*	N/A			20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.750 *19.05*	17800 *24100*	19800 *26800*	21800 *29500*	19900 *26900*	22100 *29900*	24300 *32900*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.800 *20.32*	20100 *27200*	22300 *30200*	24500 *33200*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*	20800 *28300*	23100 *31400*	25400 *34500*
	0.850 *21.59*	22200 *30200*	24700 *33600*	27200 *37000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	0.875 *22.23*	N/A			24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	0.900 *22.86*	24500 *33200*	27200 *36900*	29900 *40600*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	0.950 *24.13*	26800 *36400*	29800 *40400*	32800 *44400*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	1.000 *25.40*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*	24700 *33600*	27500 *37300*	30300 *41000*
	1.050 *26.67*	25200 *34100*	28000 *37900*	30800 *41700*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*	27000 *36600*	30000 *40700*	33000 *44800*
	1.100 *27.94*	27200 *36900*	30200 *41000*	33200 *45100*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*	29200 *39700*	32500 *44100*	35800 *48500*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM HWST Make-Up Torques (Continued)

Size (OD)	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	in. *mm*	ft-lb *Nm*																							
	1.150	29200	32400	35600	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
	29.21	*39500*	*43900*	*48300*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*
8-5/8	1.200	31100	34600	38100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100
219.08	*30.48*	*42300*	*47000*	*51700*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*
	1.250	32800	36500	40200	36600	40700	44800	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600
	31.75	*44500*	*49500*	*54500*	*49600*	*55100*	*60600*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*
	0.672	16600	18500	20400	18700	20800	22900	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	17.07	*22500*	*25000*	*27500*	*25400*	*28200*	*31000*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.700	18100	20100	22100	20300	22600	24900	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	17.78	*24500*	*27200*	*29900*	*27500*	*30600*	*33700*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.734	20000	22200	24400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	18.64	*27000*	*30000*	*33000*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.750	20700	23000	25300	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	19.05	*28000*	*31100*	*34200*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.797	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	20.24	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.800	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	20.32	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
	21.59	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*
9-5/8	0.900	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
244.48	*22.86*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*
	0.950	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
	24.13	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*
	1.000	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
	25.40	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*
	1.050	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
	26.67	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*
	1.100	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
	27.94	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*
	1.150	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800
	29.21	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*
	1.200	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100
	30.48	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*
	1.250	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600
	31.75	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*
	0.688	18500	20600	22700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	17.48	*25100*	*27900*	*30700*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
10	0.700	19300	21500	23700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
254.00	*17.78*	*26200*	*29100*	*32000*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.732	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	18.59	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM HWST Make-Up Torques (Continued)

Size (OD)	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	in. *mm*	ft-lb *Nm*																							
	0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	19.05	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.800	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	20.32	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
	21.59	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*
	0.900	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
	22.86	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*
	0.950	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
	24.13	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*
10	1.000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
254.00	*25.40*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*
	1.050	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
	26.67	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*
	1.100	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
	27.94	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*
	1.150	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800
	29.21	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*
	1.200	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600
	30.48	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*
	1.250	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600
	31.75	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*
	0.595	13900	15400	16900	15600	17300	19000	18300	20300	22300	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	15.11	*18700*	*20800*	*22900*	*21100*	*23500*	*25900*	*24700*	*27500*	*30300*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.650	17200	19100	21000	19400	21600	23800	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	16.51	*23300*	*25900*	*28500*	*26300*	*29200*	*32100*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.672	18800	20900	23000	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	17.06	*25500*	*28300*	*31100*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.700	20200	22400	24600	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	17.78	*27400*	*30400*	*33400*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.734	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	18.64	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
10-3/4	0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
273.05	*19.05*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.797	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	20.24	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.800	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
	20.32	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*
	0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
	21.59	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*
	0.859	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
	21.82	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*
	0.900	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
	22.86	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM HWST Make-Up Torques (Continued)

Size (OD)	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	in. *mm*	ft-lb *Nm*																							
	0.950	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
	24.13	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*
	0.960	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
	24.38	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*
	0.984	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
	24.99	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*
	1.000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
	25.40	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*
10-3/4	1.050	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
273.05	*26.67*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*
	1.100	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
	27.94	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*
	1.150	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100	34500	38300	42100
	29.21	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*	*46800*	*52000*	*57200*
	1.200	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600
	30.48	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*
	1.250	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600	36400	40500	44600
	31.75	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*	*49400*	*54900*	*60400*
	0.650	19300	21500	23700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	16.51	*26200*	*29100*	*32000*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	17.78	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	19.05	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.800	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
11-3/4	*20.32*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*
298.45	0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
	21.59	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*
	0.860	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
	21.84	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*
	0.900	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
	22.86	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*
	0.950	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
	24.13	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*
	0.650	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	16.51	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
13-3/8	*17.78*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
339.73	0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	19.05	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.800	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
	20.32	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM HWST Make-Up Torques (Continued)

Size (OD)	Wall Thickness	55 ksi			65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
		Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	in. *mm*	ft-lb *Nm*																							
13-3/8 *339.73*	0.850	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
	21.59	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*
	0.900	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
	22.86	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*
	0.917	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
	23.29	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*
	0.950	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200	31200	34700	38200
	24.13	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*	*42400*	*47100*	*51800*
14 *355.60*	0.600	19600	21800	24000	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	15.24	*26600*	*29600*	*32600*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.650	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	16.51	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.700	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	17.78	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.750	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400	20800	23100	25400
	19.05	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*	*28300*	*31400*	*34500*
	0.800	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300	24700	27500	30300
	20.32	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*	*33600*	*37300*	*41000*
	0.850	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000	27000	30000	33000
	21.59	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*	*36600*	*40700*	*44800*
	0.900	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800	29200	32500	35800
	22.86	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*	*39700*	*44100*	*48500*
	0.950	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800	32600	36200	39800
	24.13	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*	*44100*	*49000*	*53900*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

Make-up Torque Values for VAM SW

Size (OD)		Nom Wt	Wall Thickness		55 ksi				75-80-85 ksi				90-95-100 ksi				105-110-115 ksi			
					Min	Opt		Max	Min	Opt		Max	Min	Opt		Max	Min	Opt		Max
in.	*mm*	lb/ft	in.	*mm*	ft-lb *Nm*															
7	*177.80*	23.00	0.317	*8.05*	5020	5570	*7600*	6120	6840	7590	*10300*	8340	7830	8700	*11800*	9570	8780	9750	*13200*	10720
		26.00	0.362	*9.19*	5930	6580	*8900*	7230	7830	8700	*11800*	9570	9150	10150	*13700*	11150	10450	11550	*15700*	12650
		29.00	0.408	*10.36*	6840	7590	*10300*	8340	9500	10500	*14200*	11500	10850	11950	*16200*	13050	12100	13400	*18100*	14700
9-5/8	*244.48*	40.00	0.395	*10.03*	11700	13000	*17700*	14300	16650	18450	*25000*	20250	19250	21350	*28900*	23450	20850	23150	*31400*	25450
13-3/8	*339.73*	61.00	0.430	*10.92*	22550	24950	*33800*	27350	27000	30000	*40700*	33000	27000	30000	*40700*	33000	27000	30000	*40700*	33000
		68.00	0.480	*12.19*	26150	28950	*39200*	31750	27000	30000	*40700*	33000	27000	30000	*40700*	33000	27000	30000	*40700*	33000
		72.00	0.514	*13. 06*	27000	30000	*40700*	33000	27000	30000	*40700*	33000	27000	30000	*40700*	33000	27000	30000	*40700*	33000

Data provided by Vallourec and Mannesmann Tubes - OCTG Division

DINO VAM Field Side And Accessories

Size (OD)	Nom Wt	Wall Thickness	55-65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in.	lb/ft	in. *mm*	ft-lb *Nm*																				
9-5/8	36.00	0.352 *8.94*	4240 *5750*	4990 *6800*	5740 *7850*	5590 *7550*	6580 *8900*	7570 *10250*	6460 *8800*	7600 *10300*	8740 *11800*	7050 *9650*	8300 *11300*	9550 *12950*	8000 *10750*	9400 *12700*	10800 *14650*	8650 *11600*	10150 *13700*	11650 *15800*	9500 *12950*	11200 *15200*	12900 *17450*
	40.00	0.395 *10.03*	5780 *7850*	6800 *9200*	7820 *10550*	7700 *10500*	9050 *12300*	10400 *14100*	8900 *12100*	10500 *14200*	12100 *16300*	10150 *13800*	11950 *16200*	13750 *18600*	11400 *15400*	13400 *18100*	15400 *20800*	12300 *16600*	14450 *19600*	16600 *22600*	13500 *18300*	15900 *21600*	18300 *24900*
	43.50	0.435 *11.05*	7400 *10000*	8700 *11800*	10000 *13600*	9800 *13300*	11550 *15700*	13300 *18100*	11400 *15400*	13400 *18100*	15400 *20800*	12900 *17450*	15200 *20600*	17500 *23750*	14750 *19900*	17350 *23500*	19950 *27100*	16000 *21600*	18800 *25500*	21600 *29400*	17200 *23300*	20250 *27500*	23300 *31700*
	47.00	0.472 *11.99*	8650 *11600*	10150 *13700*	11650 *15800*	11700 *15750*	13750 *18600*	15800 *21450*	13500 *18300*	15900 *21600*	18300 *24900*	15700 *21250*	18450 *25000*	21200 *28750*	17500 *23700*	20600 *27900*	23700 *32100*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	53.50	0.545 *13.84*	11050 *15000*	13000 *17700*	14950 *20400*	15400 *20750*	18100 *24500*	20800 *28250*	17850 *24200*	21000 *28400*	24150 *32600*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	58.40	0.595 *15.11*	12600 *17100*	14850 *20100*	17100 *23100*	17850 *24200*	21000 *28400*	24150 *32600*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	59.40	0.609 *15.47*	10450 *14150*	12300 *16700*	14150 *19250*	14150 *19150*	16650 *22600*	19150 *26050*	16300 *22100*	19150 *26000*	22000 *29900*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	61.10	0.625 *15.88*	10750 *14650*	12650 *17200*	14550 *19750*	14750 *19900*	17350 *23500*	19950 *27100*	17200 *23300*	20250 *27500*	23300 *31700*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	64.90	0.672 *17.07*	12300 *16600*	14450 *19600*	16600 *22600*	16900 *22950*	19900 *27000*	22900 *31050*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	70.30	0.734 *18.64*	14450 *19550*	17000 *23000*	19550 *26450*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	71.80	0.750 *19.05*	14750 *19900*	17350 *23500*	19950 *27100*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
9-3/4	59.20	0.595 *15.11*	10750 *14650*	12650 *17200*	14550 *19750*	14750 *19900*	17350 *23500*	19950 *27100*	17200 *23300*	20250 *27500*	23300 *31700*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	60.20	0.609 *15.47*	11050 *15000*	13000 *17700*	14950 *20400*	15400 *20750*	18100 *24500*	20800 *28250*	18150 *24550*	21350 *28900*	24550 *33250*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
9-7/8	62.80	0.625 *15.88*	11700 *15750*	13750 *18600*	15800 *21450*	15700 *21250*	18450 *25000*	21200 *28750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	66.40	0.661 *16.79*	12900 *17450*	15200 *20600*	17500 *23750*	17500 *23700*	20600 *27900*	23700 *32100*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	67.50	0.678 *17.22*	13200 *17950*	15550 *21100*	17900 *24250*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	68.90	0.700 *17.78*	14150 *19150*	16650 *22600*	19150 *26050*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	70.50	0.720 *18.29*	14750 *19900*	17350 *23500*	19950 *27100*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
10-3/4	40.50	0.350 *8.89*	4610 *6350*	5420 *7400*	6230 *8450*	6090 *8200*	7160 *9700*	8230 *11200*	6760 *9150*	7950 *10800*	9140 *12450*	7700 *10500*	9050 *12300*	10400 *14100*	8650 *11600*	10150 *13700*	11650 *15800*	9200 *12450*	10850 *14700*	12500 *16950*	9800 *13300*	11550 *15700*	13300 *18100*
	45.50	0.400 *10.16*	7050 *9650*	8300 *11300*	9550 *12950*	9200 *12450*	10850 *14700*	12500 *16950*	10750 *14650*	12650 *17200*	14550 *19750*	12000 *16250*	14100 *19100*	16200 *21950*	13500 *18300*	15900 *21600*	18300 *24900*	14750 *19900*	17350 *23500*	19950 *27100*	16000 *21600*	18800 *25500*	21600 *29400*
	51.00	0.450 *11.43*	9200 *12450*	10850 *14700*	12500 *16950*	12300 *16600*	14450 *19600*	16600 *22600*	14450 *19550*	17000 *23000*	19550 *26450*	16300 *22100*	19150 *26000*	22000 *29900*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	55.50	0.495 *12.57*	11050 *15000*	13000 *17700*	14950 *20400*	15050 *20400*	17700 *24000*	20350 *27600*	17850 *24200*	21000 *28400*	24150 *32600*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	60.70	0.545 *13.84*	13200 *17950*	15550 *21100*	17900 *24250*	18150 *24550*	21350 *28900*	24550 *33250*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	65.70	0.595 *15.11*	15400 *20750*	18100 *24500*	20800 *28250*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	66.15	0.611 *15.52*	12300 *16600*	14450 *19600*	16600 *22600*	16300 *22100*	19150 *26000*	22000 *29900*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	73.20	0.672 *17.07*	14750 *19900*	17350 *23500*	19950 *27100*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	76.10	0.709 *18.01*	16300 *22100*	19150 *26000*	22000 *29900*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	79.20	0.734 *18.64*	17200 *23300*	20250 *27500*	23300 *31700*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
11-3/4	47.00	0.375 *9.53*	7700 *10500*	9050 *12300*	10400 *14100*	10450 *14150*	12300 *16700*	14150 *19250*	12300 *16600*	14450 *19600*	16600 *22600*	14150 *19150*	16650 *22600*	19150 *26050*	15700 *21250*	18450 *25000*	21200 *28750*	17200 *23300*	20250 *27500*	23300 *31700*	18450 *25050*	21700 *29400*	24950 *33750*
	54.00	0.435 *11.05*	10750 *14650*	12650 *17200*	14550 *19750*	15050 *20400*	17700 *24000*	20350 *27600*	17500 *23700*	20600 *27900*	23700 *32100*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

DINO VAM Field Side And Accessories (Continued)

Size (OD)	Nom Wt	Wall Thickness	55-65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in.	lb/ft	in. *mm*	ft-lb *Nm*																				
11-3/4	60.00	0.489 *12.42*	9500 *12950*	11200 *15200*	12900 *17450*	12900 *17450*	15200 *20600*	17500 *23750*	14750 *19900*	17350 *23500*	19950 *27100*	16900 *22950*	19900 *27000*	22900 *31050*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	65.00	0.534 *13.56*	12000 *16250*	14100 *19100*	16200 *21950*	16300 *22100*	19150 *26000*	22000 *29900*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	71.00	0.582 *14.78*	14150 *19150*	16650 *22600*	19150 *26050*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
11-7/8	71.80	0.582 *14.78*	14150 *19150*	16650 *22600*	19150 *26050*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
13-3/8	54.50	0.380 *9.65*	9500 *12950*	11200 *15200*	12900 *17450*	12900 *17450*	15200 *20600*	17500 *23750*	14750 *19900*	17350 *23500*	19950 *27100*	16900 *22950*	19900 *27000*	22900 *31050*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	61.00	0.430 *10.92*	12900 *17450*	15200 *20600*	17500 *23750*	17850 *24200*	21000 *28400*	24150 *32600*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	68.00	0.480 *12.19*	16000 *21600*	18800 *25500*	21600 *29400*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	72.00	0.514 *13.06*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	77.00	0.550 *13.97*	15400 *20750*	18100 *24500*	20800 *28250*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	80.70	0.580 *14.73*	17500 *23700*	20600 *27900*	23700 *32100*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	85.00	0.608 *15.44*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	86.00	0.625 *15.88*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
13-5/8	88.20	0.625 *15.88*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
14	82.50	0.562 *14.27*	13800 *18800*	16250 *22100*	18700 *25400*	18150 *24550*	21350 *28900*	24550 *33250*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	86.00	0.600 *15.24*	16600 *22450*	19550 *26500*	22500 *30550*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	93.00	0.650 *16.51*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	94.80	0.656 *16.66*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	99.00	0.688 *17.48*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	100.00	0.700 *17.78*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	106.00	0.750 *19.05*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	114.00	0.800 *20.32*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
16	65.00	0.375 *9.53*	10750 *14650*	12650 *17200*	14550 *19750*	14450 *19550*	17000 *23000*	19550 *26450*	16600 *22450*	19550 *26500*	22500 *30550*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	75.00	0.438 *11.13*	16600 *22450*	19550 *26500*	22500 *30550*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	84.00	0.495 *12.57*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	84.80	0.500 *12.70*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	94.50	0.562 *14.27*	15700 *21250*	18450 *25000*	21200 *28750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	97.00	0.575 *14.61*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	104.00	0.625 *15.88*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	109.00	0.656 *16.66*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*
	128.00	0.781 *19.84*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*	18450 *25050*	21700 *29400*	24950 *33750*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

DINO VAM Millside

Size (OD)	Nom Wt	Wall Thickness	55-65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in.	lb/ft	in. *mm*	ft-lb *Nm*														
9-5/8	36.00	0.352 *8.94*	4690 *6400*	5210 *7100*	5730 *7800*	6060 *8200*	6730 *9100*	7400 *10000*	6510 *8800*	7230 *9800*	7950 *10800*	7470 *10200*	8300 *11300*	9130 *12400*	8450 *11400*	9400 *12700*	10350 *14000*
	40.00	0.395 *10.03*	4950 *6700*	5500 *7500*	6050 *8300*	6510 *8800*	7230 *9800*	7950 *10800*	6840 *9300*	7600 *10300*	8360 *11300*	7830 *10600*	8700 *11800*	9570 *13000*	8750 *11900*	9750 *13200*	10750 *14500*
	43.50	0.435 *11.05*	6120 *8300*	6800 *9200*	7480 *10100*	6840 *9300*	7600 *10300*	8360 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*
	47.00	0.472 *11.99*	6320 *8500*	7020 *9500*	7720 *10500*	6840 *9300*	7600 *10300*	8360 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*
	53.50	0.545 *13.84*	6510 *8800*	7230 *9800*	7950 *10800*	7470 *10200*	8300 *11300*	9130 *12400*	7830 *10600*	8700 *11800*	9570 *13000*	8750 *11900*	9750 *13200*	10750 *14500*	9450 *12800*	10500 *14200*	11550 *15600*
	58.40	0.595 *15.11*	7150 *9700*	7950 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*
	59.40	0.609 *15.47*	6840 *9300*	7600 *10300*	8360 *11300*	8450 *11400*	9400 *12700*	10350 *14000*	8750 *11900*	9750 *13200*	10750 *14500*	9150 *12300*	10150 *13700*	11150 *15100*	9450 *12800*	10500 *14200*	11550 *15600*
	61.10	0.625 *15.88*	7150 *9700*	7950 *10800*	8750 *11900*	8750 *11900*	9750 *13200*	10750 *14500*	9150 *12300*	10150 *13700*	11150 *15100*	9450 *12800*	10500 *14200*	11550 *15600*	9850 *13200*	10850 *14700*	11850 *16200*
	64.90	0.672 *17.07*	7830 *10600*	8700 *11800*	9570 *13000*	9150 *12300*	10150 *13700*	11150 *15100*	9450 *12800*	10500 *14200*	11550 *15600*	9850 *13200*	10850 *14700*	11850 *16200*	10100 *13700*	11200 *15200*	12300 *16700*
	70.30	0.734 *18.64*	8150 *11100*	9050 *12300*	9950 *13500*	9450 *12800*	10500 *14200*	11550 *15600*	9850 *13200*	10850 *14700*	11850 *16200*	10100 *13700*	11200 *15200*	12300 *16700*	10450 *14100*	11550 *15700*	12650 *17300*
	71.80	0.750 *19.05*	8150 *11100*	9050 *12300*	9950 *13500*	9850 *13200*	10850 *14700*	11850 *16200*	10100 *13700*	11200 *15200*	12300 *16700*	10450 *14100*	11550 *15700*	12650 *17300*	10850 *14600*	11950 *16200*	13050 *17800*
9-3/4	59.20	0.595 *15.11*	6840 *9300*	7600 *10300*	8360 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	8750 *11900*	9750 *13200*	10750 *14500*	9450 *12800*	10500 *14200*	11550 *15600*
	60.20	0.609 *15.47*	7150 *9700*	7950 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8450 *11400*	9400 *12700*	10350 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*
9-7/8	62.80	0.625 *15.88*	7470 *10200*	8300 *11300*	9130 *12400*	8750 *11900*	9750 *13200*	10750 *14500*	9150 *12300*	10150 *13700*	11150 *15100*	9450 *12800*	10500 *14200*	11550 *15600*	10100 *13700*	11200 *15200*	12300 *16700*
	66.40	0.661 *16.79*	7830 *10600*	8700 *11800*	9570 *13000*	9150 *12300*	10150 *13700*	11150 *15100*	9450 *12800*	10500 *14200*	11550 *15600*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*
	67.50	0.678 *17.22*	7830 *10600*	8700 *11800*	9570 *13000*	9450 *12800*	10500 *14200*	11550 *15600*	9850 *13200*	10850 *14700*	11850 *16200*	10100 *13700*	11200 *15200*	12300 *16700*	10850 *14600*	11950 *16200*	13050 *17800*
	68.90	0.700 *17.78*	7830 *10600*	8700 *11800*	9570 *13000*	9450 *12800*	10500 *14200*	11550 *15600*	9850 *13200*	10850 *14700*	11850 *16200*	10100 *13700*	11200 *15200*	12300 *16700*	10850 *14600*	11950 *16200*	13050 *17800*
	70.50	0.720 *18.29*	7830 *10600*	8700 *11800*	9570 *13000*	9850 *13200*	10850 *14700*	11850 *16200*	10100 *13700*	11200 *15200*	12300 *16700*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*
10-3/4	40.50	0.350 *8.89*	5860 *7900*	6510 *8800*	7160 *9700*	7470 *10200*	8300 *11300*	9130 *12400*	8450 *11400*	9400 *12700*	10350 *14000*	9450 *12800*	10500 *14200*	11550 *15600*	10850 *14600*	11950 *16200*	13050 *17800*
	45.50	0.400 *10.16*	6510 *8800*	7230 *9800*	7950 *10800*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*
	51.00	0.450 *11.43*	7150 *9700*	7950 *10800*	8750 *11900*	8450 *11400*	9400 *12700*	10350 *14000*	9450 *12800*	10500 *14200*	11550 *15600*	10100 *13700*	11200 *15200*	12300 *16700*	11450 *15500*	12650 *17200*	13850 *18900*
	55.50	0.495 *12.57*	7830 *10600*	8700 *11800*	9570 *13000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*
	60.70	0.545 *13.84*	8450 *11400*	9400 *12700*	10350 *14000*	9850 *13200*	10850 *14700*	11850 *16200*	10100 *13700*	11200 *15200*	12300 *16700*	11100 *15000*	12300 *16700*	13500 *18400*	12100 *16300*	13400 *18100*	14700 *19900*
	65.70	0.595 *15.11*	8750 *11900*	9750 *13200*	10750 *14500*	10100 *13700*	11200 *15200*	12300 *16700*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*
	66.15	0.611 *15.52*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	11450 *15500*	12650 *17200*	13850 *18900*	12450 *16700*	13750 *18600*	15050 *20500*
	73.20	0.672 *17.07*	9450 *12800*	10500 *14200*	11550 *15600*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12100 *16300*	13400 *18100*	14700 *19900*	12700 *17200*	14100 *19100*	15500 *21000*
	76.10	0.709 *18.01*	9850 *13200*	10850 *14700*	11850 *16200*	11450 *15500*	12650 *17200*	13850 *18900*	12100 *16300*	13400 *18100*	14700 *19900*	12700 *17200*	14100 *19100*	15500 *21000*	13000 *17600*	14450 *19600*	15900 *21600*
	79.20	0.734 *18.64*	10100 *13700*	11200 *15200*	12300 *16700*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13000 *17600*	14450 *19600*	15900 *21600*	13700 *18500*	15200 *20600*	16700 *22700*
11-3/4	47.00	0.375 *9.53*	6840 *9300*	7600 *10300*	8360 *11300*	8750 *11900*	9750 *13200*	10750 *14500*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*
	54.00	0.435 *11.05*	7150 *9700*	7950 *10800*	8750 *11900*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	13000 *17600*	14450 *19600*	15900 *21600*
	60.00	0.489 *12.42*	7830 *10600*	8700 *11800*	9570 *13000*	9850 *13200*	10850 *14700*	11850 *16200*	10850 *14600*	11950 *16200*	13050 *17800*	11700 *15900*	13000 *17700*	14300 *19500*	13000 *17600*	14450 *19600*	15900 *21600*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

DINO VAM Millside (Continued)

Size (OD)	Nom Wt	Wall Thickness	55-65 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in.	lb/ft	in. *mm*	ft-lb *Nm*														
11-3/4	65.00	0.534 *13.56*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13350 *18100*	14850 *20100*	16350 *22100*
	71.00	0.582 *14.78*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	13000 *17600*	14450 *19600*	15900 *21600*	13700 *18500*	15200 *20600*	16700 *22700*
11-7/8	71.80	0.582 *14.78*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*
13-3/8	54.50	0.380 *9.65*	8750 *11900*	9750 *13200*	10750 *14500*	11450 *15500*	12650 *17200*	13850 *18900*	12700 *17200*	14100 *19100*	15500 *21000*	14300 *19400*	15900 *21600*	17500 *23800*	16300 *22000*	18100 *24500*	19900 *27000*
	61.00	0.430 *10.92*	9150 *12300*	10150 *13700*	11150 *15100*	11700 *15900*	13000 *17700*	14300 *19500*	13000 *17600*	14450 *19600*	15900 *21600*	15000 *20300*	16650 *22600*	18300 *24900*	16600 *22500*	18450 *25000*	20300 *27500*
	68.00	0.480 *12.19*	9450 *12800*	10500 *14200*	11550 *15600*	12100 *16300*	13400 *18100*	14700 *19900*	13350 *18100*	14850 *20100*	16350 *22100*	15300 *20700*	17000 *23000*	18700 *25300*	16900 *22900*	18800 *25500*	20700 *28100*
	72.00	0.514 *13.06*	10100 *13700*	11200 *15200*	12300 *16700*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	15600 *21100*	17350 *23500*	19100 *25900*	17250 *23400*	19150 *26000*	21050 *28600*
	77.00	0.550 *13.97*	10450 *14100*	11550 *15700*	12650 *17300*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	15600 *21100*	17350 *23500*	19100 *25900*	16900 *22900*	18800 *25500*	20700 *28100*
	80.70	0.580 *14.73*	11700 *15900*	13000 *17700*	14300 *19500*	13000 *17600*	14450 *19600*	15900 *21600*	14000 *19000*	15550 *21100*	17100 *23200*	15950 *21600*	17700 *24000*	19450 *26400*	17250 *23400*	19150 *26000*	21050 *28600*
	85.00	0.608 *15.44*	12100 *16300*	13400 *18100*	14700 *19900*	13350 *18100*	14850 *20100*	16350 *22100*	14300 *19400*	15900 *21600*	17500 *23800*	16300 *22000*	18100 *24500*	19900 *27000*	17600 *23800*	19550 *26500*	21500 *29200*
	86.00	0.625 *15.88*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14600 *19900*	16250 *22100*	17900 *24300*	16600 *22500*	18450 *25000*	20300 *27500*	17900 *24300*	19900 *27000*	21900 *29700*
13-5/8	88.20	0.625 *15.88*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14300 *19400*	15900 *21600*	17500 *23800*	16300 *22000*	18100 *24500*	19900 *27000*	18200 *24700*	20250 *27500*	22300 *30300*
14	82.50	0.562 *14.27*	13700 *18500*	15200 *20600*	16700 *22700*	15600 *21100*	17350 *23500*	19100 *25900*	16300 *22000*	18100 *24500*	19900 *27000*	17600 *23800*	19550 *26500*	21500 *29200*	19550 *26500*	21700 *29400*	23850 *32300*
	86.00	0.600 *15.24*	14300 *19400*	15900 *21600*	17500 *23800*	16300 *22000*	18100 *24500*	19900 *27000*	16900 *22900*	18800 *25500*	20700 *28100*	18200 *24700*	20250 *27500*	22300 *30300*	19550 *26500*	21700 *29400*	23850 *32300*
	93.00	0.650 *16.51*	15000 *20300*	16650 *22600*	18300 *24900*	16900 *22900*	18800 *25500*	20700 *28100*	17600 *23800*	19550 *26500*	21500 *29200*	18900 *25600*	21000 *28400*	23100 *31200*	19550 *26500*	21700 *29400*	23850 *32300*
	94.80	0.656 *16.66*	15600 *21100*	17350 *23500*	19100 *25900*	17600 *23800*	19550 *26500*	21500 *29200*	18200 *24700*	20250 *27500*	22300 *30300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	99.00	0.688 *17.48*	16300 *22000*	18100 *24500*	19900 *27000*	18200 *24700*	20250 *27500*	22300 *30300*	18900 *25600*	21000 *28400*	23100 *31200*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	100.00	0.700 *17.78*	16600 *22500*	18450 *25000*	20300 *27500*	18900 *25600*	21000 *28400*	23100 *31200*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	106.00	0.750 *19.05*	16900 *22900*	18800 *25500*	20700 *28100*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	114.00	0.800 *20.32*	16900 *22900*	18800 *25500*	20700 *28100*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
16	65.00	0.375 *9.53*	12450 *16700*	13750 *18600*	15050 *20500*	15600 *21100*	17350 *23500*	19100 *25900*	17600 *23800*	19550 *26500*	21500 *29200*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	75.00	0.438 *11.13*	13000 *17600*	14450 *19600*	15900 *21600*	16300 *22000*	18100 *24500*	19900 *27000*	18200 *24700*	20250 *27500*	22300 *30300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	84.00	0.495 *12.57*	13700 *18500*	15200 *20600*	16700 *22700*	16900 *22900*	18800 *25500*	20700 *28100*	18900 *25600*	21000 *28400*	23100 *31200*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	84.80	0.500 *12.70*	14000 *19000*	15550 *21100*	17100 *23200*	17250 *23400*	19150 *26000*	21050 *28600*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	94.50	0.562 *14.27*	16900 *22900*	18800 *25500*	20700 *28100*	18900 *25600*	21000 *28400*	23100 *31200*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	97.00	0.575 *14.61*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	104.00	0.625 *15.88*	17600 *23800*	19550 *26500*	21500 *29200*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	109.00	0.656 *16.66*	18900 *25600*	21000 *28400*	23100 *31200*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*
	128.00	0.781 *19.84*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*	19550 *26500*	21700 *29400*	23850 *32300*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

Make-up Torque Values for VAM SLIJ-II

Size (OD)		Nom Wt	Wall Thickness		75-80-85 ksi				90-95-100 ksi				105-110-115 ksi				120-125-130 ksi			
					Min	Opt		Max	Min	Opt		Max	Min	Opt		Max	Min	Opt		Max
in.	*mm*	lb/ft	in.	*mm*	ft-lb *Nm*															
5	*127.00*	18.00	0.362	*9.19*	4400	4900	*6700*	5400	4700	5200	*7000*	5700	4900	5400	*7400*	5900	5100	5700	*7700*	6300
		20.30	0.408	*10.36*	5100	5700	*7800*	6300	5500	6100	*8300*	6700	5800	6500	*8800*	7200	6100	6800	*9300*	7500
		20.80	0.422	*10.72*	5500	6100	*8300*	6700	5800	6500	*8800*	7200	6200	6900	*9300*	7600	6600	7300	*9900*	8000
		21.40	0.437	*11.10*	5800	6400	*8700*	7000	6100	6800	*9200*	7500	6500	7200	*9800*	7900	6900	7700	*10400*	8500
		23.20	0.478	*12.14*	6400	7100	*9600*	7800	6700	7500	*10200*	8300	7200	8000	*10900*	8800	7600	8500	*11500*	9400
		24.10	0.500	*12.70*	6700	7400	*10100*	8100	7200	8000	*10800*	8800	7600	8500	*11500*	9400	8100	9000	*12100*	9900
		26.70	0.562	*14.27*	7600	8400	*11400*	9200	8100	9000	*12200*	9900	8600	9600	*13000*	10600	9200	10200	*13800*	11200
		29.20	0.625	*15.88*	8500	9500	*12900*	10500	9200	10200	*13800*	11200	9700	10800	*14700*	11900	10300	11500	*15600*	12700
5-1/2	*139.70*	20.00	0.361	*9.17*	5300	5900	*8000*	6500	5600	6200	*8400*	6800	5800	6500	*8800*	7200	6100	6800	*9200*	7500
		23.00	0.415	*10.54*	6500	7200	*9800*	7900	6800	7600	*10400*	8400	7300	8100	*11000*	8900	7700	8600	*11600*	9500
		23.80	0.437	*11.10*	6900	7700	*10500*	8500	7400	8200	*11200*	9000	7900	8800	*11900*	9700	8400	9300	*12500*	10200
		26.00	0.476	*12.09*	7800	8700	*11800*	9600	8400	9300	*12600*	10200	8900	9900	*13400*	10900	9400	10500	*14200*	11600
		26.80	0.500	*12.70*	8300	9200	*12400*	10100	8800	9800	*13300*	10800	9400	10400	*14100*	11400	9900	11000	*14900*	12100
		28.40	0.530	*13.46*	8800	9800	*13300*	10800	9400	10500	*14200*	11600	10100	11200	*15200*	12300	10700	11900	*16100*	13100
		29.70	0.562	*14.27*	9400	10500	*14300*	11600	10200	11300	*15300*	12400	10800	12000	*16300*	13200	11500	12800	*17300*	14100
		32.00	0.612	*15.54*	10400	11600	*15700*	12800	11200	12400	*16800*	13600	11900	13200	*17900*	14500	12600	14000	*19000*	15400
		32.60	0.625	*15.88*	10700	11900	*16100*	13100	11400	12700	*17200*	14000	12200	13600	*18400*	15000	13000	14400	*19500*	15800
6-5/8	*168.28*	28.00	0.417	*10.59*	8600	9600	*13000*	10600	9200	10200	*13900*	11200	9800	10900	*14800*	12000	10300	11500	*15700*	12700
		32.00	0.475	*12.07*	10400	11600	*15700*	12800	11200	12400	*16900*	13600	12000	13300	*18000*	14600	12700	14100	*19100*	15500
		33.00	0.500	*12.70*	11000	12200	*16600*	13400	11800	13100	*17800*	14400	12600	14000	*19000*	15400	13400	14900	*20200*	16400
		34.50	0.525	*13.34*	11800	13100	*17700*	14400	12600	14000	*19000*	15400	13500	15000	*20300*	16500	14400	16000	*21600*	17600
		36.70	0.562	*14.27*	12900	14300	*19400*	15700	13900	15400	*20900*	16900	14800	16500	*22400*	18200	15800	17600	*23900*	19400
		40.20	0.625	*15.88*	14800	16400	*22300*	18000	15900	17700	*24000*	19500	17100	19000	*25700*	20900	18200	20200	*27400*	22200
		43.70	0.687	*17.45*	16600	18400	*25000*	18400	17800	19800	*26900*	21800	19200	21300	*28800*	23400	20400	22700	*30700*	25000
7	*177.80*	26.00	0.362	*9.19*	8700	9700	*13100*	10700	9100	10100	*13700*	11100	9500	10600	*14300*	11700	9900	11000	*15000*	12100
		29.00	0.408	*10.36*	10400	11600	*15700*	12800	10900	12100	*16500*	13300	11400	12700	*17200*	14000	12000	13300	*18000*	14600
		32.00	0.453	*11.51*	11900	13200	*17900*	14500	12600	14000	*19000*	15400	13400	14900	*20200*	16400	14100	15700	*21300*	17300
		35.00	0.498	*12.65*	13600	15100	*20500*	16600	14600	16200	*21900*	17800	15500	17200	*23300*	18900	16400	18200	*24600*	20000
		38.00	0.540	*13.72*	15300	17000	*23000*	18700	16300	18100	*21600*	19900	17400	19300	*26200*	21200	18400	20400	*27700*	22400
		41.00	0.590	*14.99*	17100	19000	*25800*	20900	18400	20400	*27700*	22400	19600	21800	*29500*	24000	20800	23100	*31400*	25400
		42.70	0.625	*15.88*	18500	20600	*28000*	22700	19800	22000	*29900*	24200	21100	23500	*31900*	25900	22800	25300	*34300*	27800
		44.00	0.640	*16.26*	19100	21200	*28800*	23300	20400	22700	*30800*	25000								
		45.40	0.670	*17.02*	20200	22400	*30300*	24600	21100	23500	*31900*	25900	22800	25300	*34300*	27800	24400	27100	*36800*	29800
		46.40	0.687	*17.45*	20800	32100	*31300*	25400	22800	25300	*34300*	27800	24400	27100	*36800*	29800	26000	28900	*39200*	31800
		49.50	0.730	*18.54*	22800	25300	*34300*	27800	24400	27100	*36800*	29800	26000	28900	*39200*	31800	27600	30700	*41700*	33800
7-5/8	*193.68*	29.70	0.375	*9.53*	10300	11400	*15500*	12500	10800	1200	*16300*	13200	11300	12600	*17100*	13900	11900	13200	*17900*	14500
		33.70	0.430	*10.92*	12600	14000	*18900*	15400	13200	14700	*20000*	16200	13900	15500	*21000*	17100	14700	16300	*22100*	17900
		39.00	0.500	*12.70*	15400	17100	*23200*	18800	16500	18300	*24800*	20100	17500	19400	*26300*	21300	18500	20600	*27900*	22700
		42.80	0.562	*14.27*	18100	20100	*27300*	22100	19400	21600	*29300*	23800	20800	23100	*31300*	25400	22800	25300	*34300*	27800
		45.30	0.595	*15.11*	19600	21800	*29500*	24000	21100	23500	*31900*	25900	22800	25300	*34300*	27800	24400	27100	*36800*	29800
		47.10	0.625	*15.88*	21100	23500	*31900*	25900	22800	25300	*34300*	27800	24400	27100	*36800*	29800	26000	28900	*39200*	31800
		51.20	0.687	*17.45*	24400	27100	*36800*	29800	26000	28900	*39200*	31800	27600	30700	*41700*	33800	29200	32500	*44100*	35800
		52.10	0.700	*17.78*																
		52.80	0.712	*18.08*																
		55.30	0.750	*19.05*	26000	28900	*39200*	31800	27600	30700	*71400*	33800	29200	32500	*4410*	35800	31000	34400	*46600*	37800
		59.20	0.812	*20.62*	29200	32500	*44100*	35800	31000	34400	*46600*	37800	32600	36200	*49000*	39800	34200	38000	*51500*	41800
7-3/4	*196.85*	46.10	0.595	*15.11*	19400	21600	*29300*	23800	20800	23100	*31300*	25400	22800	25300	*34300*	27800	24400	27100	*36800*	29800
		46.90	0.615	*15.62*	20500	22800	*30900*	25100	22800	25300	*34300*	27800	24400	27100	*36800*	29800	26000	28900	*39200*	31800
		47.60	0.625	*15.88*	21100	23500	*31900*	25900												
		48.60	0.640	*16.26*																
8-5/8	*219.08*	36.00	0.400	*10.16*	11500	12800	*17400*	14100	12300	13700	*18500*	15100	13000	14500	*19600*	16000	13800	15300	*20800*	16800
		40.00	0.450	*11.43*	13600	15100	*20500*	16600	14700	16300	*22000*	17900	15700	17400	*23600*	19100	16600	18500	*25100*	20400
		44.00	0.500	*12.70*	15700	17500	*23700*	19300	17100	19000	*25700*	20900	18400	20400	*27700*	22400	19700	21900	*29700*	24100
		49.00	0.557	*14.15*	18300	20300	*27500*	22300	19900	22100	*30000*	24300	21100	23500	*31900*	25900	22800	25300	*34300*	27800
		49.10	0.562	*14.27*	18500	20600	*28000*	22700	20200	22500	*30500*	24800								
		52.00	0.595	*15.11*	20100	22300	*30200*	24500	21100	23500	*31900*	25900	22800	25300	*34300*	27800	24400	27100	*36800*	29800
		54.00	0.625	*15.88*	21100	23500	*31900*	25900	22800	25300	*34300*	27800	24400	27100	*36800*	29800	26000	28900	*39200*	31800
		58.70	0.687	*17.45*	24400	27100	*36800*	29800	26000	28900	*39200*	31800	27600	30700	*41700*	33800	29200	32500	*44100*	35800
		63.50	0.750	*19.05*	27600	30700	*41700*	33800	29200	32500	*44100*	35800	31000	34400	*46600*	37800	32600	36200	*49000*	39800

Data provided by Vallourec and Mannesmann Tubes - OCTG Division

Baker Hughes

Make-up Torque Values for VAM SLIJ-II (Continued)

Size (OD)		Nom Wt	Wall Thickness		75-80-85 ksi				90-95-100 ksi				105-110-115 ksi				120-125-130 ksi			
					Min	Opt		Max	Min	Opt		Max	Min	Opt		Max	Min	Opt		Max
in.	mm	lb/ft	in.	mm	ft-lb Nm															
9-5/8	244.48	43.50	0.435	11.05	13400	14900	20200	16400	14400	16000	21800	17600	15500	17200	23300	18900	16500	18300	24900	20100
		47.00	0.472	11.99	15100	16800	22800	18500	16400	18200	24600	20000	17500	19500	26400	21500	18700	20800	28300	22900
		53.50	0.545	13.84	18300	20300	27500	22300	20000	22200	30200	24400	21100	23500	31900	25900	22800	25300	34300	27800
		58.40	0.595	15.11	20700	23000	31100	25300	22800	25300	34300	27800	24400	27100	36800	29800	26000	28900	39200	31800
		59.40	0.609	15.47	21100	23500	31900	25900												
		61.10	0.625	15.88	22800	25300	34300	27800	24400	27100	36800	29800	26000	28900	39200	31800	27600	30700	41700	33800
		64.90	0.672	17.07	24400	27100	36800	29800	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800
		70.30	0.734	18.64	27600	30700	41700	33800	29200	32500	44100	35800	31000	34400	46600	37800	32600	36200	49000	39800
		71.80	0.750	19.05	29200	32500	44100	35800	31000	34400	46600	37800	32600	36200	49000	39800	34200	38000	51500	41800
		75.60	0.797	20.27	31000	34400	46600	37800	32600	36200	49000	39800	34200	38000	51500	41800	35800	39800	53900	43800
9-3/4	247.65	59.20	0.595	15.11	20700	23000	31200	25300	22800	25300	34300	27800	24400	27100	36800	29800	26000	28900	39200	31800
9-7/8	250.83	62.80	0.625	15.88	22800	25300	34300	27800	24400	27100	36800	29800	26000	28900	39200	31800	27600	30700	41700	33800
		65.30	0.650	16.51	24400	27100	36800	29800	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800
		66.90	0.668	16.97																
		68.90	0.700	17.78	27600	30700	41700	33800	29200	32500	44100	35800	31000	34400	46600	37800	32600	36200	49000	39800
10	254.00	67.20	0.672	17.07	24400	27100	36800	29800	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800
		68.70	0.688	17.48	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800	31000	34400	46600	37800
10-3/4	273.05	51.00	0.450	11.43	14800	16400	22200	18000	16200	18000	24400	19800	17700	19700	26700	21700	19200	21300	28900	23400
		55.50	0.495	12.57	16900	18800	25500	20700	18700	20800	28200	22900	20400	22700	30800	2500a	22800	25300	34300	27800
		60.70	0.545	13.84	19400	21600	29300	23800	21100	23500	31900	25900	22800	25300	34300	27800	24400	27100	36800	29800
		65.70	0.595	15.11	21100	23500	31900	25900	22800	25300	34300	27800	24400	27100	36800	29800	26000	28900	39200	31800
		71.10	0.650	16.51	24400	27100	36800	29800	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800
		73.20	0.672	17.07	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800	31000	34400	46600	37800
		75.90	0.700	17.78	27600	30700	41700	33800	29200	32500	44100	35800	31000	34400	46600	37800	32600	36200	49000	39800
		79.20	0.734	18.64	29200	32500	44100	35800	31000	34400	46600	37800	32600	36200	49000	39800	34200	38000	51500	41800
		80.80	0.750	19.05																
		85.30	0.797	20.24	32600	36200	49000	39800	34200	38000	51500	41800	35800	39800	53900	43800	37400	41600	56400	45800
		97.10	0.922	23.42	39100	43400	58800	47700	40700	45200	61300	49700	42300	47000	63700	51700	43900	48800	66200	53700
11-3/4	298.45	54.00	0.435	11.05	14800	16400	22200	18000	16300	18100	24500	19900	17700	19700	26700	21700	19300	21400	29000	23500
		60.00	0.489	12.42	17500	19440	26300	21300	19300	21500	29100	23700	21100	23500	31900	25900	22800	25300	34300	27800
		65.00	0.534	13.56	19300	21500	29100	23700	21100	23500	31900	25900	22800	25300	34300	27800	24400	27100	36800	29800
		71.00	0.582	14.78	22800	25300	34300	27800	24400	27100	36800	29800	26000	28900	39200	31800	27600	30700	41700	33800
		74.60	0.618	15.70	24400	27100	36800	29800	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800
		75.40	0.625	15.88																
		78.80	0.656	16.66	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800	31000	34400	46600	37800
		80.50	0.672	17.07	27600	30700	41700	33800	29200	32500	44100	35800	31000	34400	46600	37800	32600	36200	49000	39800
		82.60	0.691	17.55	29200	32500	44100	35800	31000	34400	46600	37800	32600	36200	49000	39800	34200	38000	51500	41800
		87.40	0.734	18.64	31000	34400	46600	37800	32600	36200	49000	39800	34200	38000	51500	41800	35800	39800	53900	43800
11-7/8	301.63	71.80	0.582	14.78	22800	25300	34300	27800	24400	27100	36800	29800	26000	28900	39200	31800	27600	30700	41700	33800
12-1/16	306.40	78.08	0.640	16.26	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800	31000	34400	46600	37800
12-1/8	307.98	87.70	0.720	18.29	29200	32500	44100	35800	31000	34400	46600	37800	32600	36200	49000	39800	34200	38000	51500	41800
13-3/8	339.73	68.00	0.480	12.19	18100	20100	27300	22100	20300	22600	30600	24900	22800	25300	34300	27800	24400	27100	36800	29800
		72.00	0.514	13.06	19300	21400	29000	23500	21100	23500	31900	25900								
		77.00	0.550	13.97	21100	23500	31900	25900	22800	25300	34300	27800	24400	27100	36800	29800	26000	28900	39200	31800
		80.70	0.580	14.73	22800	25300	34300	27800	24400	27100	36800	29800	26000	28900	39200	31800	27600	30700	41700	33800
		85.00	0.608	15.44	24400	27100	36800	29800	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800
		86.00	0.625	15.88	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800	31000	34400	46600	37800
		92.00	0.672	17.07	29200	32500	44100	35800	31000	34400	46600	37800	32600	36200	49000	39800	34200	38000	51500	41800
		98.00	0.719	18.26	31000	34400	46600	37800	32600	36200	49000	39800	34200	38000	51500	41800	35800	39800	53900	43800
13-5/8	346.08	88.20	0.625	15.88	26000	28900	39200	31800	27600	30700	41700	33800	29200	32500	44100	35800	31000	34400	46600	37800
14	355.60	115.00	0.812	20.62	44900	49900	67700	54900	44900	49900	67700	54900	44900	49900	67700	54900	44900	49900	67700	54900

Data provided by Vallourec and Mannesmann Tubes - OCTG Division

VAM FJL Make-Up Torques

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
2-3/8 *60.33*	4.60	0.190 *4.83*	460 *620*	510 *690*	560 *760*	530 *700*	580 *780*	630 *860*	590 *790*	650 *880*	710 *970*	630 *840*	690 *930*	750 *1020*	650 *880*	720 *980*	790 *1080*	690 *930*	760 *1030*	830 *1130*	750 *1020*	830 *1130*	910 *1240*
	5.10	0.218 *5.54*	490 *670*	540 *740*	590 *810*	590 *790*	650 *880*	710 *970*	630 *840*	690 *930*	750 *1020*	720 *970*	800 *1080*	880 *1190*	750 *1020*	830 *1130*	910 *1240*	790 *1060*	870 *1180*	950 *1300*	850 *1140*	940 *1270*	1030 *1400*
	5.80	0.254 *6.45*	490 *670*	540 *740*	590 *810*	650 *880*	720 *980*	790 *1080*	720 *970*	800 *1080*	880 *1190*	790 *1060*	870 *1180*	950 *1300*	850 *1140*	940 *1270*	1030 *1400*	890 *1190*	980 *1320*	1070 *1450*	1010 *1370*	1120 *1520*	1230 *1670*
	6.30	0.280 *7.11*	650 *880*	720 *980*	790 *1080*	720 *970*	800 *1080*	880 *1190*	790 *1060*	870 *1180*	950 *1300*	850 *1140*	940 *1270*	1030 *1400*	950 *1280*	1050 *1420*	1150 *1560*	980 *1320*	1080 *1470*	1180 *1620*	1170 *1590*	1300 *1770*	1430 *1950*
	7.35	0.336 *8.53*	720 *970*	800 *1080*	880 *1190*	790 *1060*	870 *1180*	950 *1300*	850 *1140*	940 *1270*	1030 *1400*	910 *1230*	1010 *1370*	1110 *1510*	1050 *1410*	1160 *1570*	1270 *1730*	1170 *1590*	1300 *1770*	1430 *1950*	1310 *1760*	1450 *1960*	1590 *2160*
2-7/8 *73.03*	6.40	0.217 *5.51*	650 *880*	720 *980*	790 *1080*	790 *1060*	870 *1180*	950 *1300*	850 *1140*	940 *1270*	1030 *1400*	890 *1190*	980 *1320*	1070 *1450*	980 *1320*	1080 *1470*	1180 *1620*	1050 *1410*	1160 *1570*	1270 *1730*	1110 *1500*	1230 *1670*	1350 *1840*
	7.80	0.276 *7.01*	750 *1020*	830 *1130*	910 *1240*	910 *1230*	1010 *1370*	1110 *1510*	1050 *1410*	1160 *1570*	1270 *1730*	1170 *1590*	1300 *1770*	1430 *1950*	1310 *1760*	1450 *1960*	1590 *2160*	1370 *1850*	1520 *2060*	1670 *2270*	1500 *2030*	1660 *2260*	1820 *2490*
	8.60	0.308 *7.82*	980 *1320*	1080 *1470*	1180 *1620*	1170 *1590*	1300 *1770*	1430 *1950*	1310 *1760*	1450 *1960*	1590 *2160*	1500 *2030*	1660 *2260*	1820 *2490*	1630 *2200*	1810 *2450*	1990 *2700*	1700 *2290*	1880 *2550*	2060 *2810*	1830 *2470*	2030 *2750*	2230 *3030*
	9.80	0.362 *9.19*	1010 *1370*	1120 *1520*	1230 *1670*	1370 *1850*	1520 *2060*	1670 *2270*	1500 *2030*	1660 *2260*	1820 *2490*	1630 *2200*	1810 *2450*	1990 *2700*	1830 *2470*	2030 *2750*	2230 *3030*	1890 *2560*	2100 *2840*	2310 *3120*	2080 *2830*	2310 *3140*	2540 *3450*
	10.70	0.405 *10.29*	1050 *1410*	1160 *1570*	1270 *1730*	1500 *2030*	1660 *2260*	1820 *2490*	1630 *2200*	1810 *2450*	1990 *2700*	1760 *2380*	1950 *2650*	2140 *2920*	1960 *2650*	2170 *2940*	2380 *3230*	2080 *2830*	2310 *3140*	2540 *3450*	2340 *3180*	2600 *3530*	2860 *3880*
3-1/2 *88.90*	7.70	0.216 *5.49*	850 *1140*	940 *1270*	1030 *1400*	980 *1320*	1080 *1470*	1180 *1620*	1050 *1410*	1160 *1570*	1270 *1730*	1170 *1590*	1300 *1770*	1430 *1950*	1310 *1760*	1450 *1960*	1590 *2160*	1370 *1850*	1520 *2060*	1670 *2270*	1500 *2030*	1660 *2260*	1820 *2490*
	9.20	0.254 *6.45*	980 *1320*	1080 *1470*	1180 *1620*	1110 *1500*	1230 *1670*	1350 *1840*	1170 *1590*	1300 *1770*	1430 *1950*	1240 *1670*	1370 *1860*	1500 *2050*	1370 *1850*	1520 *2060*	1670 *2270*	1440 *1940*	1590 *2160*	1740 *2380*	1570 *2110*	1740 *2350*	1910 *2590*
	10.20	0.289 *7.34*	1050 *1410*	1160 *1570*	1270 *1730*	1240 *1670*	1370 *1860*	1500 *2050*	1310 *1760*	1450 *1960*	1590 *2160*	1440 *1940*	1590 *2160*	1740 *2380*	1500 *2030*	1660 *2260*	1820 *2490*	1570 *2110*	1740 *2350*	1910 *2590*	1700 *2290*	1880 *2550*	2060 *2810*
	12.70	0.375 *9.53*	1170 *1590*	1300 *1770*	1430 *1950*	1570 *2110*	1740 *2350*	1910 *2590*	1760 *2380*	1950 *2650*	2140 *2920*	1960 *2650*	2170 *2940*	2380 *3230*	2160 *2920*	2390 *3240*	2620 *3560*	2280 *3090*	2530 *3430*	2780 *3770*	2480 *3360*	2750 *3730*	3020 *4100*
	13.70	0.413 *10.49*	1240 *1670*	1370 *1860*	1500 *2050*	1700 *2290*	1880 *2550*	2060 *2810*	1890 *2560*	2100 *2840*	2310 *3120*	2160 *2920*	2390 *3240*	2620 *3560*	2340 *3180*	2600 *3530*	2860 *3880*	2480 *3360*	2750 *3730*	3020 *4100*	2740 *3710*	3040 *4120*	3340 *4530*
	14.70	0.449 *11.40*	1310 *1760*	1450 *1960*	1590 *2160*	1830 *2470*	2030 *2750*	2230 *3030*	2020 *2740*	2240 *3040*	2460 *3340*	2280 *3090*	2530 *3430*	2780 *3770*	2540 *3440*	2820 *3820*	3100 *4200*	2680 *3620*	2970 *4020*	3260 *4420*	2870 *3880*	3180 *4310*	3490 *4740*
	15.50	0.476 *12.09*	1370 *1850*	1520 *2060*	1670 *2270*	1960 *2650*	2170 *2940*	2380 *3230*	2160 *2920*	2390 *3240*	2620 *3560*	2480 *3360*	2750 *3730*	3020 *4100*	2740 *3710*	3040 *4120*	3340 *4530*	2870 *3880*	3180 *4310*	3490 *4740*	3130 *4240*	3470 *4710*	3810 *5180*
4 *101.60*	9.50	0.226 *5.74*	910 *1230*	1010 *1370*	1110 *1510*	1170 *1590*	1300 *1770*	1430 *1950*	1370 *1850*	1520 *2060*	1670 *2270*	1570 *2110*	1740 *2350*	1910 *2590*	1700 *2290*	1880 *2550*	2060 *2810*	1830 *2470*	2030 *2750*	2230 *3030*	2020 *2740*	2240 *3040*	2460 *3340*
	10.90	0.262 *6.65*	1050 *1410*	1160 *1570*	1270 *1730*	1310 *1760*	1450 *1960*	1590 *2160*	1440 *1940*	1590 *2160*	1740 *2380*	1630 *2200*	1810 *2450*	1990 *2700*	1830 *2470*	2030 *2750*	2230 *3030*	1960 *2650*	2170 *2940*	2380 *3230*	2160 *2920*	2390 *3240*	2620 *3560*
	11.30	0.286 *7.26*	1310 *1760*	1450 *1960*	1590 *2160*	1370 *1850*	1520 *2060*	1670 *2270*	1500 *2030*	1660 *2260*	1820 *2490*	1700 *2290*	1880 *2550*	2060 *2810*	1890 *2560*	2100 *2840*	2310 *3120*	2020 *2740*	2240 *3040*	2460 *3340*	2220 *3000*	2460 *3330*	2700 *3660*
	13.20	0.330 *8.38*	1760 *2380*	1950 *2650*	2140 *2920*	2020 *2740*	2240 *3040*	2460 *3340*	2280 *3090*	2530 *3430*	2780 *3770*	2480 *3360*	2750 *3730*	3020 *4100*	2680 *3620*	2970 *4020*	3260 *4420*	2740 *3710*	3040 *4120*	3340 *4530*	3130 *4240*	3470 *4710*	3810 *5180*
	14.80	0.380 *9.65*	2020 *2740*	2240 *3040*	2460 *3340*	2340 *3180*	2600 *3530*	2860 *3880*	2540 *3440*	2820 *3820*	3100 *4200*	2740 *3710*	3040 *4120*	3340 *4530*	2930 *3970*	3250 *4410*	3570 *4850*	3060 *4150*	3400 *4610*	3740 *5070*	3330 *4500*	3690 *5000*	4050 *5500*
	16.50	0.430 *10.92*	2160 *2920*	2390 *3240*	2620 *3560*	2610 *3530*	2890 *3920*	3170 *4310*	2800 *3800*	3110 *4220*	3420 *4640*	3000 *4060*	3330 *4510*	3660 *4960*	3260 *4400*	3620 *4900*	3980 *5400*	3390 *4600*	3760 *5100*	4130 *5600*	3590 *4900*	3980 *5400*	4370 *5900*
4-1/2 *114.30*	11.60	0.250 *6.35*	1570 *2110*	1740 *2350*	1910 *2590*	1960 *2650*	2170 *2940*	2380 *3230*	2160 *2920*	2390 *3240*	2620 *3560*	2420 *3270*	2680 *3630*	2940 *3990*	2680 *3620*	2970 *4020*	3260 *4420*	2930 *3970*	3250 *4410*	3570 *4850*	3190 *4330*	3540 *4810*	3890 *5290*
	12.60	0.271 *6.88*	1630 *2200*	1810 *2450*	1990 *2700*	2020 *2740*	2240 *3040*	2460 *3340*	2220 *3000*	2460 *3330*	2700 *3660*	2480 *3360*	2750 *3730*	3020 *4100*	2740 *3710*	3040 *4120*	3340 *4530*	3000 *4060*	3330 *4510*	3660 *4960*	3260 *4400*	3620 *4900*	3980 *5400*
	13.50	0.290 *7.37*	1700 *2290*	1880 *2550*	2060 *2810*	2080 *2830*	2310 *3140*	2540 *3450*	2280 *3090*	2530 *3430*	2780 *3770*	2540 *3440*	2820 *3820*	3100 *4200*	2800 *3800*	3110 *4220*	3420 *4640*	3060 *4150*	3400 *4610*	3740 *5070*	3330 *4500*	3690 *5000*	4050 *5500*
	15.10	0.337 *8.56*	1960 *2650*	2170 *2940*	2380 *3230*	2280 *3090*	2530 *3430*	2780 *3770*	2480 *3360*	2750 *3730*	3020 *4100*	2740 *3710*	3040 *4120*	3340 *4530*	3000 *4060*	3330 *4510*	3660 *4960*	3190 *4330*	3540 *4810*	3890 *5290*	3520 *4800*	3910 *5300*	4300 *5800*
	17.00	0.380 *9.65*	2080 *2830*	2310 *3140*	2540 *3450*	2480 *3360*	2750 *3730*	3020 *4100*	2740 *3710*	3040 *4120*	3340 *4530*	3000 *4060*	3330 *4510*	3660 *4960*	3260 *4400*	3620 *4900*	3980 *5400*	3520 *4800*	3910 *5300*	4300 *5800*	3850 *5200*	4270 *5800*	4690 *6400*
	18.90	0.430 *10.92*	2220 *3000*	2460 *3330*	2700 *3660*	2680 *3620*	2970 *4020*	3260 *4420*	2930 *3970*	3250 *4410*	3570 *4850*	3330 *4500*	3690 *5000*	4050 *5500*	3590 *4900*	3980 *5400*	4370 *5900*	3850 *5200*	4270 *5800*	4690 *6400*	4230 *5800*	4700 *6400*	5170 *7000*
	21.50	0.500 *12.70*	2340 *3180*	2600 *3530*	2860 *3880*	3000 *4060*	3330 *4510*	3660 *4960*	3260 *4400*	3620 *4900*	3980 *5400*	3650 *4900*	4050 *5500*	4450 *6100*	3910 *5300*	4340 *5900*	4770 *6500*	4300 *5800*	4770 *6500*	5240 *7200*	4560 *6200*	5060 *6900*	5560 *7600*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM FJL Make-Up Torques (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
4-1/2 *114.30*	23.70	0.560 *14.22*	2480 *3360*	2750 *3730*	3020 *4100*	3000 *4060*	3330 *4510*	3660 *4960*	3520 *4800*	3910 *5300*	4300 *5800*	3910 *5300*	4340 *5900*	4770 *6500*	4230 *5800*	4700 *6400*	5170 *7000*	4560 *6200*	5060 *6900*	5560 *7600*	4880 *6700*	5420 *7400*	5960 *8100*
5 *127.00*	13.00	0.253 *6.43*	1310 *1760*	1450 *1960*	1590 *2160*	1630 *2200*	1810 *2450*	1990 *2700*	1890 *2560*	2100 *2840*	2310 *3120*	2160 *2920*	2390 *3240*	2620 *3560*	2420 *3270*	2680 *3630*	2940 *3990*	2610 *3530*	2890 *3920*	3170 *4310*	2800 *3800*	3110 *4220*	3420 *4640*
	15.00	0.296 *7.52*	1760 *2380*	1950 *2650*	2140 *2920*	1760 *2380*	1950 *2650*	2140 *2920*	2020 *2740*	2240 *3040*	2460 *3340*	2280 *3090*	2530 *3430*	2780 *3770*	2480 *3360*	2750 *3730*	3020 *4100*	2680 *3620*	2970 *4020*	3260 *4420*	2930 *3970*	3250 *4410*	3570 *4850*
	18.00	0.362 *9.19*	2160 *2920*	2390 *3240*	2620 *3560*	2870 *3880*	3180 *4310*	3490 *4740*	3000 *4060*	3330 *4510*	3660 *4960*	3260 *4400*	3620 *4900*	3980 *5400*	3590 *4900*	3980 *5400*	4370 *5900*	3850 *5200*	4270 *5800*	4690 *6400*	4170 *5700*	4630 *6300*	5090 *6900*
	20.30	0.408 *10.36*	2340 *3180*	2600 *3530*	2860 *3880*	3190 *4330*	3540 *4810*	3890 *5290*	3390 *4600*	3760 *5100*	4130 *5600*	3590 *4900*	3980 *5400*	4370 *5900*	3780 *5100*	4200 *5700*	4620 *6300*	4040 *5500*	4480 *6100*	4920 *6700*	4370 *5900*	4850 *6600*	5330 *7300*
	20.80	0.422 *10.72*	2420 *3270*	2680 *3630*	2940 *3990*	3450 *4700*	3830 *5200*	4210 *5700*	3590 *4900*	3980 *5400*	4370 *5900*	3710 *5000*	4120 *5600*	4530 *6200*	3850 *5200*	4270 *5800*	4690 *6400*	4110 *5600*	4560 *6200*	5010 *6800*	4430 *6000*	4920 *6700*	5410 *7400*
	21.40	0.437 *11.10*	2480 *3360*	2750 *3730*	3020 *4100*	3520 *4800*	3910 *5300*	4300 *5800*	3780 *5100*	4200 *5700*	4620 *6300*	3910 *5300*	4340 *5900*	4770 *6500*	4040 *5500*	4480 *6100*	4920 *6700*	4230 *5800*	4700 *6400*	5170 *7000*	4500 *6100*	4990 *6800*	5480 *7500*
	23.20	0.478 *12.14*	N/A			3590 *4900*	3980 *5400*	4370 *5900*	3910 *5300*	4340 *5900*	4770 *6500*	4230 *5800*	4700 *6400*	5170 *7000*	4630 *6300*	5140 *7000*	5650 *7700*	4760 *6500*	5280 *7200*	5800 *7900*	4880 *6700*	5420 *7400*	5960 *8100*
	24.10	0.500 *12.70*	N/A			3650 *4900*	4050 *5500*	4450 *6100*	4040 *5500*	4480 *6100*	4920 *6700*	4430 *6000*	4920 *6700*	5410 *7400*	4760 *6500*	5280 *7200*	5800 *7900*	4880 *6700*	5420 *7400*	5960 *8100*	5020 *6800*	5570 *7600*	6120 *8400*
5-1/2 *139.70*	15.50	0.275 *6.99*	1890 *2560*	2100 *2840*	2310 *3120*	2420 *3270*	2680 *3630*	2940 *3990*	2740 *3710*	3040 *4120*	3340 *4530*	3130 *4240*	3470 *4710*	3810 *5180*	3450 *4700*	3830 *5200*	4210 *5700*	3780 *5100*	4200 *5700*	4620 *6300*	4040 *5500*	4480 *6100*	4920 *6700*
	17.00	0.304 *7.72*	2020 *2740*	2240 *3040*	2460 *3340*	2540 *3440*	2820 *3820*	3100 *4200*	2870 *3880*	3180 *4310*	3490 *4740*	3190 *4330*	3540 *4810*	3890 *5290*	3590 *4900*	3980 *5400*	4370 *5900*	3850 *5200*	4270 *5800*	4690 *6400*	4170 *5700*	4630 *6300*	5090 *6900*
	20.00	0.361 *9.17*	2480 *3360*	2750 *3730*	3020 *4100*	3190 *4330*	3540 *4810*	3890 *5290*	3650 *4900*	4050 *5500*	4450 *6100*	4040 *5500*	4480 *6100*	4920 *6700*	4500 *6100*	4990 *6800*	5480 *7500*	4880 *6700*	5420 *7400*	5960 *8100*	5340 *7200*	5930 *8000*	6520 *8800*
	23.00	0.415 *10.54*	3130 *4240*	3470 *4710*	3810 *5180*	3850 *5200*	4270 *5800*	4690 *6400*	3970 *5400*	4410 *6000*	4850 *6600*	4370 *5900*	4850 *6600*	5330 *7300*	4760 *6500*	5280 *7200*	5800 *7900*	5140 *6900*	5710 *7700*	6280 *8500*	5540 *7500*	6150 *8300*	6760 *9100*
	26.00	0.476 *12.09*	3450 *4700*	3830 *5200*	4210 *5700*	4170 *5700*	4630 *6300*	5090 *6900*	4430 *6000*	4920 *6700*	5410 *7400*	4690 *6400*	5210 *7100*	5730 *7800*	5080 *6800*	5640 *7600*	6200 *8400*	5480 *7400*	6080 *8200*	6680 *9000*	5860 *7900*	6510 *8800*	7160 *9700*
	28.40	0.530 *13.46*	3520 *4800*	3910 *5300*	4300 *5800*	4430 *6000*	4920 *6700*	5410 *7400*	5080 *6800*	5640 *7600*	6200 *8400*	5280 *7100*	5860 *7900*	6440 *8700*	5400 *7300*	6000 *8100*	6600 *8900*	5800 *7800*	6440 *8700*	7080 *9600*	6190 *8400*	6870 *9300*	7550 *10200*
	29.70	0.562 *14.27*	N/A			5080 *6800*	5640 *7600*	6200 *8400*	5340 *7200*	5930 *8000*	6520 *8800*	5670 *7600*	6290 *8500*	6910 *9400*	5860 *7900*	6510 *8800*	7160 *9700*	6190 *8400*	6870 *9300*	7550 *10200*	6510 *8800*	7230 *9800*	7950 *10800*
	32.00	0.610 *15.50*	4760 *6500*	5280 *7200*	5800 *7900*	5930 *8000*	6580 *8900*	7230 *9800*	6120 *8300*	6800 *9200*	7480 *10100*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *10900*	7830 *10600*	8700 *11800*	9750 *13000*	8460 *11400*	9400 *12700*	10340 *14000*
6-5/8 *168.28*	23.20	0.300 *8.38*	3130 *4240*	3470 *4710*	3810 *5180*	4230 *5800*	4700 *6400*	5170 *7000*	4880 *6700*	5420 *7400*	5960 *8100*	5540 *7500*	6150 *8300*	6760 *9100*	6190 *8400*	6870 *9300*	7550 *10200*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*
	24.00	0.352 *8.94*	3330 *4500*	3690 *5000*	4050 *5500*	4370 *5900*	4850 *6600*	5330 *7300*	5020 *6800*	5570 *7600*	6120 *8400*	5670 *7600*	6290 *8500*	6910 *9400*	6320 *8500*	7020 *9500*	7720 *10500*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*
	28.00	0.417 *10.59*	3590 *4900*	3980 *5400*	4370 *5900*	4690 *6400*	5210 *7100*	5730 *7800*	5340 *7200*	5930 *8000*	6520 *8800*	5990 *8100*	6650 *9000*	7310 *9900*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*
	32.00	0.475 *12.07*	4560 *6200*	5060 *6900*	5560 *7600*	5020 *6800*	5570 *7600*	6120 *8400*	5670 *7600*	6290 *8500*	6910 *9400*	6320 *8500*	7020 *9500*	7720 *10500*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*
	35.00	0.525 *13.34*	4630 *6300*	5140 *7000*	5650 *7700*	5340 *7200*	5930 *8000*	6520 *8800*	5990 *8100*	6650 *9000*	7310 *9900*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*
7 *177.80*	23.00	0.317 *8.05*	3520 *4800*	3910 *5300*	4300 *5800*	5280 *7100*	5860 *7900*	6440 *8700*	6060 *8200*	6730 *9100*	7400 *10000*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*
	26.00	0.362 *9.19*	3780 *5100*	4200 *5700*	4620 *6300*	5480 *7400*	6080 *8200*	6680 *9000*	6250 *8500*	6940 *9400*	7630 *10300*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*
	29.00	0.408 *10.36*	4040 *5500*	4480 *6100*	4920 *6700*	5740 *7700*	6370 *8600*	7000 *9500*	6510 *8800*	7230 *9800*	7950 *10800*	7170 *9700*	7960 *10800*	8750 *11900*	8150 *11100*	9050 *12300*	9950 *13500*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*
	32.00	0.453 *11.51*	4300 *5800*	4770 *6500*	5240 *7200*	6060 *8200*	6730 *9100*	7400 *10000*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8460 *11400*	9400 *12700*	10340 *14000*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*
	35.00	0.498 *12.65*	4950 *6700*	5500 *7500*	6050 *8300*	6390 *8600*	7090 *9600*	7790 *10600*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	10100 *13700*	11200 *15200*	12300 *16700*
	38.00	0.540 *13.72*	5540 *7500*	6150 *8300*	6760 *9100*	6840 *9300*	7590 *10300*	8340 *11300*	7470 *10200*	8300 *11300*	9130 *12400*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*	9850 *13200*	10850 *14700*	11850 *16200*	10450 *14100*	11550 *15700*	12650 *17300*
	41.00	0.590 *14.99*	5600 *7600*	6220 *8400*	6840 *9200*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	8780 *11900*	9750 *13200*	10720 *14500*	9500 *12800*	10500 *14200*	11500 *15600*	10100 *13700*	11200 *15200*	12300 *16700*	10850 *14600*	11950 *16200*	13050 *17800*
7-5/8 *193.68*	26.40	0.328 *8.33*	4300 *5800*	4770 *6500*	5240 *7200*	6390 *8600*	7090 *9600*	7790 *10600*	7470 *10200*	8300 *11300*	9130 *12400*	8460 *11400*	9400 *12700*	10340 *14000*	9500 *12800*	10500 *14200*	11500 *15600*	10100 *13700*	11200 *15200*	12300 *16700*	11100 *15000*	12300 *16700*	13500 *18400*
	29.70	0.375 *9.53*	4500 *6100*	4990 *6800*	5480 *7500*	6510 *8800*	7230 *9800*	7950 *10800*	7470 *10200*	8300 *11300*	9130 *12400*	8460 *11400*	9400 *12700*	10340 *14000*	9500 *12800*	10500 *14200*	11500 *15600*	10450 *14100*	11550 *15700*	12650 *17300*	11450 *15500*	12650 *17200*	13850 *18900*
	33.70	0.430 *10.92*	4820 *6600*	5350 *7300*	5880 *8000*	6840 *9300*	7590 *10300*	8340 *11300*	7830 *10600*	8700 *11800*	9570 *13000*	8780 *11900*	9750 *13200*	10720 *14500*	9850 *13200*	10850 *14700*	11850 *16200*	10850 *14600*	11950 *16200*	13050 *17800*	11450 *15500*	12650 *17200*	13850 *18900*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM FJL Make-Up Torques (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
7-5/8 *193.68*	35.80	0.465 *11.81*	5020 *6800*	5570 *7600*	6120 *8400*	7170 *9700*	7960 *10800*	8750 *11900*	8150 *11100*	9050 *12300*	9950 *13500*	9150 *12300*	10150 *13700*	11150 *15100*	10100 *13700*	11200 *15200*	12300 *16700*	10850 *14600*	11950 *16200*	13050 *17800*	11700 *15900*	13000 *17700*	14300 *19500*
	39.00	0.500 *12.70*	5340 *7200*	5930 *8000*	6520 *8800*	7470 *10200*	8300 *11300*	9130 *12400*	8460 *11400*	9400 *12700*	10340 *14000*	9500 *12800*	10500 *14200*	11500 *15600*	10450 *14100*	11550 *15700*	12650 *17300*	11100 *15000*	12300 *16700*	13500 *18400*	12100 *16300*	13400 *18100*	14700 *19900*
	42.80	0.562 *14.27*	6250 *8500*	6940 *9400*	7630 *10300*	7830 *10600*	8700 *11800*	9570 *13000*	8780 *11900*	9750 *13200*	10720 *14500*	9850 *13200*	10850 *14700*	11850 *16200*	10850 *14600*	11950 *16200*	13050 *17800*	11700 *15900*	13000 *17700*	14300 *19500*	12450 *16700*	13750 *18600*	15050 *20500*
	45.30	0.595 *15.11*	7170 *9700*	7960 *10800*	8750 *11900*	7830 *10600*	8700 *11800*	9570 *13000*	9150 *12300*	10150 *13700*	11150 *15100*	10100 *13700*	11200 *15200*	12300 *16700*	11450 *15500*	12650 *17200*	13850 *18900*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*
	47.10	0.625 *15.88*	7830 *10600*	8700 *11800*	9570 *13000*	9500 *12800*	10500 *14200*	11500 *15600*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	15050 *20300*	16650 *22600*	18250 *24900*
8-5/8 *219.08*	32.00	0.352 *8.94*	5480 *7400*	6080 *8200*	6680 *9000*	8150 *11100*	9050 *12300*	9950 *13500*	9500 *12800*	10500 *14200*	11500 *15600*	10850 *14600*	11950 *16200*	13050 *17800*	12100 *16300*	13400 *18100*	14700 *19900*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*
	36.00	0.400 *10.16*	5740 *7700*	6370 *8600*	7000 *9500*	8460 *11400*	9400 *12700*	10340 *14000*	9850 *13200*	10850 *14700*	11850 *16200*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*
	40.00	0.450 *11.43*	5990 *8100*	6650 *9000*	7310 *9900*	8780 *11900*	9750 *13200*	10720 *14500*	10100 *13700*	11200 *15200*	12300 *16700*	11100 *15000*	12300 *16700*	13500 *18400*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*
	44.00	0.500 *12.70*	6390 *8600*	7090 *9600*	7790 *10600*	9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*
	49.00	0.557 *14.15*	6840 *9300*	7590 *10300*	8340 *11300*	9850 *13200*	10850 *14700*	11850 *16200*	10850 *14600*	11950 *16200*	13050 *17800*	12100 *16300*	13400 *18100*	14700 *19900*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	52.00	0.595 *15.11*	7170 *9700*	7960 *10800*	8750 *11900*	10100 *13700*	11200 *15200*	12300 *16700*	11450 *15500*	12650 *17200*	13850 *18900*	12700 *17200*	14100 *19100*	15500 *21000*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
9-3/8 *238.13*	40.00	0.420 *10.67*	N/A			9150 *12300*	10150 *13700*	11150 *15100*	10450 *14100*	11550 *15700*	12650 *17300*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	15650 *21100*	17350 *23500*	19050 *15900*
9-5/8 *244.48*	36.00	0.352 *8.94*	7170 *9700*	7960 *10800*	8750 *11900*	10100 *13700*	11200 *15200*	12300 *16700*	11700 *15900*	13000 *17700*	14300 *19500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	40.00	0.395 *10.03*	7470 *10200*	8300 *11300*	9130 *12400*	10450 *14100*	11550 *15700*	12650 *17300*	12100 *16300*	13400 *18100*	14700 *19900*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	43.50	0.435 *11.05*	7830 *10600*	8700 *11800*	9570 *13000*	10850 *14600*	11950 *16200*	13050 *17800*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	47.00	0.472 *11.99*	8150 *11100*	9050 *12300*	9950 *13500*	11100 *15000*	12300 *16700*	13500 *18400*	12700 *17200*	14100 *19100*	15500 *21000*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	53.50	0.545 *13.84*	8460 *11400*	9400 *12700*	10340 *14000*	11700 *15900*	13000 *17700*	14300 *19500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	58.40	0.595 *15.11*	8780 *11900*	9750 *13200*	10720 *14500*	12100 *16300*	13400 *18100*	14700 *19900*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	59.40	0.609 *15.47*	8780 *11900*	9750 *13200*	10720 *14500*	12100 *16300*	13400 *18100*	14700 *19900*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	61.10	0.625 *15.88*	9150 *12300*	10150 *13700*	11150 *15100*	12450 *16700*	13750 *18600*	15050 *20500*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
9-7/8 *250.83*	62.80	0.625 *15.88*	9850 *13200*	10850 *14700*	11850 *16200*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	66.40	0.661 *16.79*	10450 *14100*	11550 *15700*	12650 *17300*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	67.50	0.678 *17.22*	10850 *14600*	11950 *16200*	13050 *17800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
10-3/4 *273.05*	40.50	0.350 *8.89*	8460 *11400*	9400 *12700*	10340 *14000*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	45.50	0.400 *10.16*	8780 *11900*	9750 *13200*	10720 *14500*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	51.00	0.450 *11.43*	9150 *12300*	10150 *13700*	11150 *15100*	13050 *17600*	14450 *19600*	15850 *21600*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	55.50	0.495 *12.57*	9500 *12800*	10500 *14200*	11500 *15600*	13700 *18500*	15200 *20600*	16700 *22700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	60.70	0.545 *13.84*	9850 *13200*	10850 *14700*	11850 *16200*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	65.70	0.595 *15.11*	10450 *14100*	11550 *15700*	12650 *17300*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM FJL Make-Up Torques (Continued)

Size (OD)	Nom Wt	Wall Thickness	55 ksi			75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			135-140 ksi			145-150-155 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*																				
11-3/4 *298.45*	47.00	0.375 *9.53*	10100 *13700*	11200 *15200*	12300 *16700*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	54.00	0.435 *11.05*	10450 *14100*	11550 *15700*	12650 *17300*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	60.00	0.489 *12.42*	11100 *15000*	12300 *16700*	13500 *18400*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
	65.00	0.534 *13.56*	11450 *15500*	12650 *17200*	13850 *18900*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*
11-7/8 *301.63*	71.80	0.582 *14.78*	11700 *15900*	13000 *17700*	14300 *19500*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*	14400 *19400*	15900 *21600*	17400 *23800*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM MUST Recommended Make-up Torque

Size (OD)		Nom Wt	Wall Thickness		75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi			120-125-130 ksi		
					Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in.	*mm*	lb/ft	in.	*mm*	ft-lb *Nm*														
7-5/8	*193.675*	59.20	0.812	*20.62*	16650	18450 *25000*	20250	-			20850	23150 *31400*	25450	-			-		
10-3/4	*273.050*	109.00	1.033	*26.24*	31500	35000 *47500*	38500	-			31500	35000 *47500*	38500	-			-		

Data provided by Vallourec and Mannesmann Tubes - OCTG Division

VAM TOP FE - Standard Make-Up Torque Values

Size (OD)	Nom Wt	Wall Thickness	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*											
7 *177.80*	23.00	0.317 *8.05*	9,180 *12,450*	10,200 *13,830*	11,220 *15,210*	10,080 *13,660*	11,200 *15,180*	12,320 *16,700*	10,960 *14,860*	12,180 *16,510*	13,400 *18,160*	11,880 *16,110*	13,200 *17,900*	14,520 *19,690*
	26.00	0.362 *9.19*	9,780 *13,270*	10,870 *14,740*	11,960 *16,210*	10,680 *14,480*	11,870 *16,090*	13,060 *17,700*	11,570 *15,690*	12,860 *17,430*	14,150 *19,170*	12,490 *16,940*	13,880 *18,820*	15,270 *20,700*
	29.00	0.408 *10.36*	10,240 *13,890*	11,380 *15,430*	12,520 *16,970*	11,140 *15,100*	12,380 *16,780*	13,620 *18,460*	12,030 *16,320*	13,370 *18,130*	14,710 *19,940*	12,950 *17,560*	14,390 *19,510*	15,830 *21,460*
	32.00	0.453 *11.51*	12,780 *17,320*	14,200 *19,250*	15,620 *21,180*	14,000 *18,990*	15,560 *21,100*	17,120 *23,210*	15,210 *20,620*	16,900 *22,910*	18,590 *25,200*	16,460 *22,320*	18,290 *24,800*	20,120 *27,280*
	35.00	0.498 *12.65*	15,070 *20,430*	16,740 *22,700*	18,410 *24,970*	16,600 *22,510*	18,450 *25,010*	20,300 *27,510*	18,120 *24,560*	20,130 *27,290*	22,140 *30,020*	19,690 *26,690*	21,880 *29,660*	24,070 *32,630*
	38.00	0.540 *13.72*	17,180 *23,290*	19,090 *25,880*	21,000 *28,470*	19,000 *25,760*	21,110 *28,620*	23,220 *31,480*	20,810 *28,210*	23,120 *31,340*	25,430 *34,470*	22,670 *30,740*	25,190 *34,150*	27,710 *37,560*
	41.00	0.590 *14.99*	19,680 *26,680*	21,870 *29,650*	24,060 *32,620*	21,850 *29,630*	24,280 *32,920*	26,710 *36,210*	24,010 *32,550*	26,680 *36,170*	29,350 *39,790*	26,230 *35,560*	29,140 *39,510*	32,050 *43,460*
	42.70	0.625 *15.88*	21,640 *29,350*	24,050 *32,610*	26,460 *35,870*	24,060 *32,620*	26,730 *36,240*	29,400 *39,860*	26,450 *35,860*	29,390 *39,850*	32,330 *43,840*	28,920 *39,200*	32,130 *43,560*	35,340 *47,920*
7-5/8 *193.68*	26.40	0.328 *8.33*	11,090 *15,030*	12,320 *16,700*	13,550 *18,370*	12,320 *16,700*	13,690 *18,560*	15,060 *20,420*	13,540 *18,360*	15,050 *20,400*	16,560 *22,440*	14,800 *20,070*	16,450 *22,300*	18,100 *24,530*
	29.70	0.375 *9.53*	11,740 *15,920*	13,050 *17,690*	14,360 *19,460*	12,980 *17,600*	14,420 *19,550*	15,860 *21,500*	14,200 *19,250*	15,780 *21,390*	17,360 *23,530*	15,470 *20,980*	17,190 *23,310*	18,910 *25,640*
	33.70	0.430 *10.92*	12,490 *16,940*	13,880 *18,820*	15,270 *20,700*	13,720 *18,610*	15,250 *20,680*	16,780 *22,750*	14,960 *20,280*	16,620 *22,530*	18,280 *24,780*	16,220 *21,990*	18,020 *24,430*	19,820 *26,870*
	35.80	0.465 *11.81*	14,540 *19,720*	16,160 *21,910*	17,780 *24,100*	16,060 *21,780*	17,850 *24,200*	19,640 *26,620*	17,590 *23,840*	19,540 *26,490*	21,490 *29,140*	19,150 *25,960*	21,280 *28,850*	23,410 *31,740*
	39.00	0.500 *12.70*	16,580 *22,470*	18,420 *24,970*	20,260 *27,470*	18,400 *24,940*	20,440 *27,710*	22,480 *30,480*	20,200 *27,400*	22,450 *30,440*	24,700 *33,480*	22,080 *29,930*	24,530 *33,260*	26,980 *36,590*
	42.80	0.562 *14.27*	20,110 *27,260*	22,340 *30,290*	24,570 *33,320*	22,450 *30,430*	24,940 *33,810*	27,430 *37,190*	24,770 *33,580*	27,520 *37,310*	30,270 *41,040*	27,150 *36,810*	30,170 *40,900*	33,190 *44,990*
	45.30	0.595 *15.11*	22,040 *29,880*	24,490 *33,200*	26,940 *36,520*	24,660 *33,440*	27,400 *37,150*	30,140 *40,860*	27,260 *36,960*	30,290 *41,070*	33,320 *45,180*	29,930 *40,580*	33,260 *45,090*	36,590 *49,600*
	47.10	0.625 15.88	23,910 32,420	26,570 36,020	29,230 39,620	26,790 36,320	29,770 40,360	32,750 44,400	29,640 40,180	32,930 44,640	36,220 49,100	32,570 44,150	36,190 49,060	39,810 53,970
7-3/4 *196.85*	46.10	0.595 *15.11*	22,460 *30,450*	24,950 *33,830*	27,450 *37,210*	25,110 *34,050*	27,900 *37,830*	30,690 *41,610*	27,740 *37,600*	30,820 *41,780*	33,900 *45,960*	30,440 *41,260*	33,820 *45,850*	37,200 *50,440*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP FE - Standard Make-Up Torque Values (Continued)

Size (OD)	Nom Wt	Wall Thickness	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*											
8-5/8 *219.075*	36.00	0.400 *10.16*	11,960 *16,220*	13,290 *18,020*	14,620 *19,820*	12,850 *17,420*	14,280 *19,360*	15,710 *21,300*	13,730 *18,620*	15,260 *20,690*	16,790 *22,760*	14,650 *19,860*	16,280 *22,070*	17,910 *24,280*
	40.00	0.450 *11.43*	15,760 *21,370*	17,510 *23,740*	19,260 *26,110*	17,190 *23,300*	19,100 *25,890*	21,010 *28,480*	18,600 *25,220*	20,670 *28,020*	22,740 *30,820*	20,070 *27,210*	22,300 *30,230*	24,530 *33,250*
	44.00	0.500 *12.70*	19,570 *26,520*	21,740 *29,470*	23,910 *32,420*	21,550 *29,210*	23,940 *32,460*	26,330 *35,710*	23,500 *31,860*	26,110 *35,400*	28,720 *38,940*	25,520 *34,600*	28,350 *38,440*	31,190 *42,280*
	49.00	0.557 *14.15*	23,870 *32,360*	26,520 *35,950*	29,170 *39,540*	26,440 *35,850*	29,380 *39,830*	32,320 *43,810*	29,020 *39,340*	32,240 *43,710*	35,460 *48,080*	31,650 *42,910*	35,170 *47,680*	38,690 *52,450*
	52.00	0.595 *15.11*	26,670 *36,150*	29,630 *40,170*	32,590 *44,190*	29,650 *40,190*	32,940 *44,660*	36,230 *49,130*	32,620 *44,220*	36,240 *49,130*	39,860 *54,040*	35,670 *48,360*	39,630 *53,730*	43,590 *59,100*
9-5/8 *244.475*	40.00	0.395 *10.03*	11,540 *15,640*	12,820 *17,380*	14,100 *19,120*	12,400 *16,810*	13,780 *18,680*	15,160 *20,550*	13,270 *17,980*	14,740 *19,980*	16,210 *21,980*	14,150 *19,180*	15,720 *21,310*	17,290 *23,440*
	43.50	0.435 *11.05*	15,110 *20,480*	16,790 *22,760*	18,470 *25,040*	16,510 *22,370*	18,340 *24,860*	20,170 *27,350*	17,900 *24,270*	19,890 *26,970*	21,880 *29,670*	19,330 *26,210*	21,480 *29,120*	23,630 *32,030*
	47.00	0.472 *11.99*	18,430 *24,990*	20,480 *27,770*	22,530 *30,550*	20,320 *27,550*	22,580 *30,610*	24,840 *33,670*	22,210 *30,110*	24,680 *33,460*	27,150 *36,810*	24,150 *32,730*	26,830 *36,370*	29,510 *40,010*
	53.50	0.545 *13.84*	25,000 *33,890*	27,780 *37,660*	30,560 *41,430*	27,890 *37,810*	30,990 *42,010*	34,090 *46,210*	30,740 *41,680*	34,160 *46,310*	37,580 *50,940*	33,700 *45,690*	37,450 *50,770*	41,200 *55,850*
	58.40	0.595 *15.11*	29,420 *39,890*	32,690 *44,320*	35,960 *48,750*	32,980 *44,700*	36,640 *49,670*	40,300 *54,640*	36,500 *49,490*	40,560 *54,990*	44,620 *60,490*	40,130 *54,400*	44,590 *60,450*	49,050 *66,500*
9-7/8 *250.825*	62.80	0.625 *15.88*	34,050 *46,160*	37,830 *51,290*	41,610 *56,420*	38,440 *52,110*	42,710 *57,900*	46,980 *63,690*	42,800 *58,020*	47,550 *64,470*	52,310 *70,920*	45,000 *61,010*	50,000 *67,790*	57,770 *78,320*
	65.30	0.650 *16.51*	36,370 *49,310*	40,410 *54,790*	44,450 *60,270*	41,120 *55,750*	45,690 *61,940*	50,260 *68,130*	45,000 *61,010*	50,000 *67,790*	56,010 *75,930*	45,000 *61,010*	50,000 *67,790*	61,940 *83,970*
	66.40	0.661 *16.79*	37,390 *50,690*	41,540 *56,320*	45,690 *61,950*	42,290 *57,340*	46,990 *63,710*	51,690 *70,080*	45,000 *61,010*	50,000 *67,790*	57,640 *78,140*	45,000 *61,010*	50,000 *67,790*	63,760 *86,440*
	66.90	0.668 *16.97*	38,000 *51,520*	42,220 *57,240*	46,440 *62,960*	43,000 *58,300*	47,780 *64,780*	52,560 *71,260*	45,000 *61,010*	50,000 *67,790*	58,610 *79,450*	45,000 *61,010*	50,000 *67,790*	64,850 *87,910*
	67.50	0.678 *17.22*	38,910 *52,750*	43,230 *58,610*	47,550 *64,470*	44,050 *59,720*	48,940 *66,350*	53,830 *72,980*	45,000 *61,010*	50,000 *67,790*	60,060 *81,420*	45,000 *61,010*	50,000 *67,790*	66,470 *90,120*
	68.00	0.694 *17.63*	40,410 *54,780*	44,900 *60,870*	49,390 *66,960*	45,000 *61,010*	50,000 *67,790*	55,960 *75,870*	45,000 *61,010*	50,000 *67,790*	62,470 *84,690*	45,000 *61,010*	50,000 *67,790*	69,180 *93,790*
	68.90	0.700 *17.78*	40,900 *55,460*	45,450 *61,620*	50,000 *67,780*	45,000 *61,010*	50,000 *67,790*	56,660 *76,810*	45,000 *61,010*	50,000 *67,790*	63,270 *85,780*	45,000 *61,010*	50,000 *67,790*	70,070 *95,000*
	70.50	0.720 *18.29*	42,800 *58,030*	47,560 *64,480*	52,320 *70,930*	45,000 *61,010*	50,000 *67,790*	59,330 *80,440*	45,000 *61,010*	50,000 *67,790*	66,300 *89,880*	45,000 *61,010*	50,000 *67,790*	73,480 *99,620*
	72.00	0.725 *18.42*	43,230 *58,610*	48,030 *65,120*	52,830 *71,630*	45,000 *61,010*	50,000 *67,790*	59,940 *81,260*	45,000 *61,010*	50,000 *67,790*	66,970 *90,790*	45,000 *61,010*	50,000 *67,790*	74,230 *100,640*
10-3/4 *273.05*	45.50	0.400 *10.16*	13,620 *18,460*	15,130 *20,510*	16,640 *22,560*	14,860 *20,140*	16,510 *22,380*	18,160 *24,620*	16,090 *21,820*	17,880 *24,240*	19,670 *26,660*	17,370 *23,550*	19,300 *26,170*	21,230 *28,790*
	51.00	0.450 *11.43*	19,010 *25,770*	21,120 *28,630*	23,230 *31,490*	21,090 *28,590*	23,430 *31,770*	25,770 *34,950*	23,160 *31,390*	25,730 *34,880*	28,300 *38,370*	25,290 *34,290*	28,100 *38,100*	30,910 *41,910*
	55.50	0.495 *12.57*	23,860 *32,350*	26,510 *35,940*	29,160 *39,530*	26,700 *36,210*	29,670 *40,230*	32,640 *44,250*	29,520 *40,020*	32,800 *44,470*	36,080 *48,920*	32,440 *43,970*	36,040 *48,860*	39,640 *53,750*
	60.70	0.545 *13.84*	29,230 *39,630*	32,480 *44,030*	35,730 *48,430*	32,910 *44,620*	36,570 *49,580*	40,230 *54,540*	36,560 *49,560*	40,620 *55,070*	44,680 *60,580*	40,340 *54,680*	44,820 *60,760*	49,300 *66,840*
	65.70	0.595 *15.11*	34,670 *47,000*	38,520 *52,220*	42,370 *57,440*	39,210 *53,160*	43,570 *59,070*	47,930 *64,980*	43,720 *59,270*	48,580 *65,860*	53,440 *72,450*	45,000 *61,010*	50,000 *67,790*	59,130 *80,160*
	71.10	0.650 *16.51*	40,690 *55,160*	45,210 *61,290*	49,730 *67,420*	45,000 *61,010*	50,000 *67,790*	56,460 *76,550*	45,000 *61,010*	50,000 *67,790*	63,130 *85,590*	45,000 *61,010*	50,000 *67,790*	70,020 *94,920*
11-3/4 *298.45*	54.00	0.435 *11.05*	18,080 *24,520*	20,090 *27,240*	22,100 *29,960*	20,000 *27,110*	22,220 *30,120*	24,440 *33,130*	21,910 *29,700*	24,340 *33,000*	26,770 *36,300*	23,870 *32,360*	26,520 *35,950*	29,170 *39,540*
	60.00	0.489 *12.42*	24,810 *33,640*	27,570 *37,380*	30,330 *41,120*	27,810 *37,700*	30,900 *41,890*	33,990 *46,080*	30,790 *41,740*	34,210 *46,380*	37,630 *51,020*	33,850 *45,890*	37,610 *50,990*	41,370 *56,090*
	65.00	0.534 *13.56*	30,500 *41,360*	33,890 *45,950*	37,280 *50,550*	34,400 *46,640*	38,220 *51,820*	42,040 *57,000*	38,300 *51,920*	42,550 *57,690*	46,810 *63,460*	42,300 *57,350*	47,000 *63,720*	51,700 *70,090*
	71.00	0.582 *14.78*	36,590 *49,610*	40,660 *55,120*	44,730 *60,630*	41,480 *56,240*	46,090 *62,490*	50,700 *68,740*	45,000 *61,010*	50,000 *67,790*	56,650 *76,800*	45,000 *61,010*	50,000 *67,790*	62,800 *85,140*
11-7/8 *301.625*	67.80	0.550 *13.97*	32,490 *44,050*	36,100 *48,940*	39,710 *53,830*	36,730 *49,800*	40,810 *55,330*	44,890 *60,860*	40,950 *55,520*	45,500 *61,690*	50,050 *67,860*	45,000 *61,010*	50,000 *67,790*	55,370 *75,080*
	71.80	0.582 *14.78*	36,580 *49,590*	40,640 *55,100*	44,700 *60,610*	41,470 *56,220*	46,080 *62,470*	50,690 *68,720*	45,000 *61,010*	50,000 *67,790*	56,660 *76,810*	45,000 *61,010*	50,000 *67,790*	62,820 *85,170*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM TOP FE - Standard Make-Up Torque Values (Continued)

Size (OD)	Nom Wt	Wall Thickness	75-80-85 ksi			90-95-100 ksi			105-110-115 ksi			120-125-130 ksi		
			Min	Opt	Max	Min	Opt	Max	Min	Opt	Max	Min	Opt	Max
in. *mm*	lb/ft	in. *mm*	ft-lb *Nm*											
13-3/8 *339.725*	61.00	0.430 *10.92*	21,500 *29,150*	23,890 *32,390*	26,280 *35,630*	24,080 *32,650*	26,760 *36,280*	29,440 *39,910*	26,660 *36,140*	29,620 *40,160*	32,580 *44,180*	29,300 *39,730*	32,560 *44,140*	35,820 *48,550*
	68.00	0.480 *12.19*	29,470 *39,950*	32,740 *44,390*	36,010 *48,830*	33,380 *45,250*	37,090 *50,280*	40,800 *55,310*	37,260 *50,520*	41,400 *56,130*	45,540 *61,740*	41,280 *55,970*	45,870 *62,190*	50,460 *68,410*
	72.00	0.514 *13.06*	34,890 *47,300*	38,770 *52,560*	42,650 *57,820*	39,720 *53,850*	44,130 *59,830*	48,540 *65,810*	44,500 *60,340*	49,450 *67,040*	54,400 *73,740*	45,000 *61,010*	50,000 *67,790*	60,420 *81,920*
	77.00	0.550 *13.97*	40,690 *55,160*	45,210 *61,290*	49,730 *67,420*	45,000 *61,010*	50,000 *67,790*	56,830 *77,040*	45,000 *61,010*	50,000 *67,790*	63,860 *86,570*	45,000 *61,010*	50,000 *67,790*	71,080 *96,370*
	80.70	0.580 *14.73*	45,000 *61,010*	50,000 *67,790*	55,780 *75,620*	45,000 *61,010*	50,000 *67,790*	63,880 *86,600*	45,000 *61,010*	50,000 *67,790*	71,930 *97,520*	45,000 *61,010*	50,000 *67,790*	75,000 *101,670*
	85.00	0.608 *15.44*	45,000 *61,010*	50,000 *67,790*	61,180 *82,950*	45,000 *61,010*	50,000 *67,790*	70,190 *95,160*	45,000 *61,010*	50,000 *67,790*	75,000 *101,670*	45,000 *61,010*	50,000 *67,790*	75,000 *101,670*
	86.00	0.625 *15.88*	45,000 *61,010*	50,000 *67,790*	64,650 *87,650*	45,000 *61,010*	50,000 *67,790*	74,240 *100,650*	45,000 *61,010*	50,000 *67,790*	75,000 *101,670*	45,000 *61,010*	50,000 *67,790*	75,000 *101,670*
13-5/8 *346.075*	88.20	0.625 *15.88*	45,000 *61,010*	50,000 *67,790*	65,010 *88,130*	45,000 *61,010*	50,000 *67,790*	74,660 *101,210*	45,000 *61,010*	50,000 *67,790*	75,000 *101,670*	45,000 *61,010*	50,000 *67,790*	75,000 *101,670*
	109.40	0.750 *19.05*	45,000 *61,010*	50,000 *67,790*	75,000 *101,670*	45,000 *61,010*	50,000 *67,790*	75,000 *101,670*	45,000 *61,010*	50,000 *67,790*	75,000 *101,670*	45,000 *61,010*	50,000 *67,790*	75,000 *101,670*

Data provided by Vallourec and Mannesmann Tubes - OCTG Division; August, 2005

VAM Top FL-D, Grade 25-80-85 thru 105-110-115

Size (OD)		Nom Wt	Wall Thickness		25-80-85 ksi				90-95-100 ksi				105-110-115 ksi			
					Min	Opt		Max	Min	Opt		Max	Min	Opt		Max
in.	*mm*	lb/ft	in.	*mm*	ft-lb *Nm*											
5	*127.00*	18.00	0.362	*9.19*	5100	5660	*7700*	6220	5790	6430	*8700*	7070	6420	7130	*9700*	7840
5-1/2	*139.70*	17.00	0.304	*7.72*	4590	5090	*6900*	5590	5040	5600	*7600*	6160	5400	5990	*8100*	6580
		20.00	0.361	*9.17*	5640	6260	*8500*	6880	6390	7090	*9600*	7790	6790	7540	*10200*	8290
		23.00	0.415	*10.54*	6420	7130	*9700*	7840	7290	8100	*11000*	8910	8150	9050	*12300*	9950
7	*177.80*	29.00	0.408	*10.36*	9450	10450	*14200*	11450	10200	11300	*15300*	12400	10900	12100	*16400*	13300
		32.00	0.453	*11.51*	11100	12300	*16700*	13500	11950	13250	*18000*	14550	12800	14200	*19300*	15600

Information provided by Vallourec & Mannesmann Tubes; May 17, 2004

VAM FIT, Grade 25-80-85 thru 75-80-85

Size (OD)		Nom Wt	Wall Thickness		25-80-85 ksi							65 ksi							75-80-85 ksi						
					Field					Mill & Licensee		Field					Mill & Licensee		Field					Mill & Licensee	
					Tubing Application			Work-string Application				Tubing Application			Work-string Application				Tubing Application			Workstring Application			
					Min	Opt	Max	Min	Max	Min	Max	Min	Opt	Max	Min	Max	Min	Max	Min	Opt	Max	Min	Max	Min	Max
in.	*mm*	lb/ft	in.	*mm*	ft-lb *Nm*																				
3-1/2	*88.9*	9.30	0.254	*6.45*	2470	2750 *3730*	3030	3030	3240	3240	3600	2670	2970 *4020*	3270	3380	3750	3750	4160	3060	3400 *4610*	3740	4080	4530	4530	5020
		10.30	0.289	*7.34*	-			-		-		-			-		-		-			-		-	
		12.95	0.375	*9.53*	5470	6080 *8240*	6690	6750	7500	7500	8320	6060	6730 *9120*	7400	7810	8680	8680	9630	6830	7590 *10300*	8350	9420	10470	10470	11610

Information provided by Vallourec & Mannesmann Tubes, October 29, 2003

VAM FIT, Grade 90-95-100 thru 105-110-115

Size (OD)		Nom Wt	Wall Thickness		90-95-100 ksi							105-110-115 ksi						
					Field					Mill & Licensee		Field					Mill & Licensee	
					Tubing Application			Workstring Application				Tubing Application			Workstring Application			
					Min	Opt	Max	Min	Max	Min	Max	Min	Opt	Max	Min	Max	Min	Max
in.	*mm*	lb/ft	in.	*mm*	ft-lb *Nm*													
3-1/2	*88.9*	9.30	0.254	*6.45*	3380	3760 *5100*	4140	4780	5310	5310	5890	3780	4200 *5690*	4620	5480	6090	6090	6760
		10.30	0.289	*7.34*	-			-		-		-			-		-	
		12.95	0.375	*9.53*	7810	8680 *11769*	9550	11040	12270	12270	13600	8460	9400 *12750*	10340	12660	14070	14070	15600

Information provided by Vallourec & Mannesmann Tubes, October 29, 2003

Dope Quantity for Make-up For VAM SLIJ-II

Nominal OD	Nominal Weight	Minimum Dope Volume		Maximum Dope Volume	
in.	lb/ft	cm^3	$in.^3$	cm^3	$in.^3$
9-7/8	-	34	2.07	45	2.75
10	-	-	-	-	-
10-3/4	less than or equal to 60.70	-	-	-	-
	65.7 to 79.2				
	greater than 79.2				
11-3/4	less than or equal to 65.0	34	2.07	50	3.05
	71.0 to 78.8	-	-	-	-
	greater than 78.8				
11-7/8	-	39	2.38	54	3.30
12-1/16	-	-	-	-	-
12-1/8	-	-	-	-	-
13-3/8	less than or equal to 80.7	-	-	-	-
	greater than 80.7				
13-5/8	-	-	-	-	-

The weight of dope to apply on a connection depends of the specific gravity of the used dope
For example, the make up dope quantity in 7" 35# will be:
18*1.89 = 34g as minimum and 24*1.89 = 45g as maximum with a dope having a gravity of 1.89 g/cm^3 or
1.10*1.10 =1.21 oz as minimum and 1.46*1.10 = 1.61 oz as maximum with a dope having a gravity of 1.10 oz/in^3
Information provided by Vallourec & Mannesmann Tubes, December 5, 2003

VAM SFC

Size (OD)		Nom Wt	Wall Thickness		75-80-85 ksi				90-95-100 ksi				105-110-115 ksi				120-125-130 ksi			
					Min	Opt		Max	Min	Opt		Max	Min	Opt		Max	Min	Opt		Max
in.	*mm*	lb/ft	in.	*mm*	ft-lb *Nm*															
5	*127.00*	23.20	0.478	*12.14*	6400	7100	*9600*	7800	6800	7600	*10300*	8400	7200	8000	*10900*	8800	7600	8500	*11600*	9400
		24.10	0.500	*12.70*	6700	7400	*10000*	8100	7100	7900	*10700*	8700	7600	8400	*11400*	9200	8100	9000	*12200*	9900
		2670	0.562	*14.27*	7500	8300	*11300*	9100	8000	8900	*12100*	9800	8500	9500	*12900*	10500	9400	10400	*14100*	11400
		29.20	0.625	*15.88*	8400	9300	*12700*	10200	9100	10100	*13600*	11100	9700	10800	*14600*	11900	10300	11400	*15500*	12500
5-1/2	*139.70*	23.00	0.415	*10.54*	6700	7500	*10100*	8300	7100	7900	*10700*	8700	7400	8200	*11200*	9000	7800	8700	*11800*	9600
		29.70	0.562	*14.27*	8800	9800	*13300*	10800	9500	10600	*14400*	11700	10300	11400	*15400*	12500	10900	12100	*16400*	13300
7	*177.80*	32.00	0.453	*11.51*	11200	12400	*16800*	13600	11800	13100	*17800*	14400	12500	13900	*18800*	15300	13200	14700	*19900*	16200
		35.00	0.498	*12.65*	-															
		38.00	0.540	*13.72*																
		41.00	0.590	*14.99*																
7-5/8	*193.68*	29.70	0.375	*9.53*	10000	11100	*15100*	12200	10500	11700	*15900*	12900	11000	12200	*16600*	13400	11500	12800	*17400*	14100
		33.70	0.430	*10.92*	-															
		39.00	0.500	*12.70*	13600	15100	*20500*	16600	14600	16200	*22000*	17800	15500	17200	*23300*	18900	16400	18200	*24600*	20000
7-3/4	*196.85*	46.10	0.595	*15.11*	16300	18100	*24500*	19900	17500	19500	*26500*	21500	18900	21000	*28500*	23100	20200	22500	*30500*	24800
8-5/8	*219.08*	54.00	0.625	*15.88*	-															
		58.70	0.687	*17.45*																
		63.50	0.750	*19.05*	21100	23500	*31900*	25900	22800	25300	*34300*	27800	24400	27100	*36800*	29800	26000	28900	*39200*	31800
		72.70	0.875	*22.23*	-															
9-5/8	*244.48*	47.00	0.472	*11.99*	14700	16300	*22100*	17900	15800	17600	*23900*	19400	17100	19000	*25800*	20900	17500	19500	*26500*	21500
		53.50	0.545	*13.84*	16100	17900	*24200*	19700	17500	19500	*26400*	21500	18900	21000	*28400*	23100	20300	22600	*30600*	24900
9-7/8	*250.83*	62.80	0.625	*15.88*	19700	21900	*29700*	24100	21100	23500	*31900*	25900	22800	25300	*34300*	27800	24400	27100	*36800*	29800
		65.30	0.650	*16.51*	20600	22900	*31100*	25200	22800	25300	*34300*	27800	24400	27100	*36800*	29800	26000	28900	*39200*	31800
11-3/4	*298.45*	65.00	0.534	*13.56*	17200	19100	*25900*	21000	19200	21300	*28900*	23400	21100	23500	*31900*	25900	22800	25300	*34300*	27800
11-7/8	*71.80*	71.80	0.582	*14.78*	34200	38000	*51500*	41800	35800	39800	*54000*	43800	38800	43100	*58500*	47400	41300	45900	*62200*	50500

Information provided by Vallourec and Mannesmann Tubes; December 5, 2003

VAM TOP

OD		Weight	T		Yield Strength (1,000 lb)										Yield Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
2.375	60.33	4.60	0.190	4.83	72	104	111	117	124	130	143	163	183	196	320	463	494	520	552	578	636	725	814	872
		5.10	0.218	5.54	81	118	126	133	140	148	162	185	207	222	360	525	560	592	623	658	721	823	921	988
		5.80	0.254	6.45	93	135	144	152	161	169	186	212	237	254	414	601	641	676	716	752	827	943	1054	1130
		6.30	0.280	7.11	101	147	157	166	175	184	203	230	258	276	449	654	698	738	778	818	903	1023	1148	1228
		6.60	0.295	7.49	106	154	164	174	183	193	212	241	270	289	472	685	730	774	814	859	943	1072	1201	1286
		7.35	0.336	8.53	118	172	183	194	204	215	237	269	301	323	525	765	814	863	907	956	1054	1197	1339	1437
2.875	73.03	6.40	0.217	5.51	100	145	154	163	172	181	199	227	254	272	445	645	685	725	765	805	885	1010	1130	1210
		7.80	0.276	7.01	124	180	192	203	214	225	248	282	316	338	552	801	854	903	952	1001	1103	1254	1406	1503
		8.60	0.308	7.82	137	199	211	224	236	248	273	311	348	373	609	885	939	996	1050	1103	1214	1383	1548	1659
		9.35	0.340	8.64	149	217	230	244	257	271	298	339	379	406	663	965	1023	1085	1143	1205	1326	1508	1686	1806
		9.80	0.362	9.19	157	229	243	257	272	286	314	357	400	429	698	1019	1081	1143	1210	1272	1397	1588	1779	1908
		10.50	0.392	9.96	168	245	260	275	291	306	336	382	428	459	747	1090	1157	1223	1294	1361	1495	1699	1904	2042
		10.70	0.405	10.29	173	251	267	283	299	314	346	393	440	471	770	1117	1188	1259	1330	1397	1539	1748	1957	2095
		11.50	0.440	11.18	185	269	286	303	320	337	370	421	471	505	823	1197	1272	1348	1423	1499	1646	1873	2095	2246
3.500	88.90	6.50	0.170	4.32	98	142	151	160	169	178	196	222	249	267	436	632	672	712	752	792	872	988	1108	1188
		7.70	0.216	5.49	123	178	189	201	212	223	245	279	312	334	547	792	841	894	943	992	1090	1241	1388	1486
		9.20	0.254	6.45	142	207	220	233	246	259	285	324	363	389	632	921	979	1036	1094	1152	1268	1441	1615	1730
		10.20	0.289	7.34	160	233	248	262	277	292	321	364	408	437	712	1036	1103	1165	1232	1299	1428	1619	1815	1944
		12.70	0.375	9.53	203	295	313	331	350	368	405	460	515	552	903	1312	1392	1472	1557	1637	1802	2046	2291	2455
		13.70	0.413	10.49	220	320	340	360	380	401	441	501	561	601	979	1423	1512	1601	1690	1784	1962	2229	2495	2673
		14.30	0.430	10.92	228	332	352	373	394	415	456	518	581	622	1014	1477	1566	1659	1753	1846	2028	2304	2584	2767
		14.70	0.449	11.40	237	344	366	387	409	430	473	538	603	646	1054	1530	1628	1721	1819	1913	2104	2393	2682	2874
		15.50	0.476	12.09	249	362	384	407	430	452	497	565	633	678	1108	1610	1708	1810	1913	2011	2211	2513	2816	3016
		16.70	0.510	12.95	264	383	407	431	455	479	527	599	671	719	1174	1704	1810	1917	2024	2131	2344	2664	2985	3198
4.000	101.60	8.20	0.190	4.83	125	182	193	205	216	227	250	284	318	341	556	810	859	912	961	1010	1112	1263	1415	1517
		9.50	0.226	5.74	147	214	228	241	255	268	295	335	375	402	654	952	1014	1072	1134	1192	1312	1490	1668	1788
		10.90	0.262	6.65	169	246	262	277	292	308	338	385	431	462	752	1094	1165	1232	1299	1370	1503	1713	1917	2055
		12.10	0.299	7.59	191	278	295	313	330	348	382	435	487	521	850	1237	1312	1392	1468	1548	1699	1935	2166	2318
		13.20	0.330	8.38	209	304	323	342	361	381	419	476	533	571	930	1352	1437	1521	1606	1695	1864	2117	2371	2540
		14.80	0.380	9.65	238	346	367	389	411	432	475	540	605	648	1059	1539	1632	1730	1828	1922	2113	2402	2691	2882
		16.10	0.415	10.54	257	374	397	421	444	467	514	584	654	701	1143	1664	1766	1873	1975	2077	2286	2598	2909	3118
		16.50	0.430	10.92	265	386	410	434	458	482	531	603	675	723	1179	1717	1824	1931	2037	2144	2362	2682	3003	3216
		18.90	0.500	12.70	302	440	467	495	522	550	605	687	770	825	1343	1957	2077	2202	2322	2447	2691	3056	3425	3670
		22.20	0.610	15.49	357	520	552	585	617	650	715	812	909	974	1588	2313	2455	2602	2745	2891	3180	3612	4043	4333
4.500	114.30	10.50	0.224	5.69	165	241	256	271	286	301	331	376	421	451	734	1072	1139	1205	1272	1339	1472	1673	1873	2006
		11.60	0.250	6.35	184	267	284	300	317	334	367	417	467	501	818	1188	1263	1334	1410	1486	1632	1855	2077	2229
		12.60	0.271	6.88	198	288	306	324	342	360	396	450	504	540	881	1281	1361	1441	1521	1601	1761	2002	2242	2402
		13.50	0.290	7.37	211	307	326	345	364	384	422	480	537	575	939	1366	1450	1535	1619	1708	1877	2135	2389	2558
		15.10	0.337	8.56	242	353	375	397	419	441	485	551	617	661	1076	1570	1668	1766	1864	1962	2157	2451	2745	2940
		17.00	0.380	9.65	270	393	418	443	467	492	541	615	689	738	1201	1748	1859	1971	2077	2189	2406	2736	3065	3283
		17.70	0.402	10.21	285	414	440	466	492	518	569	647	725	776	1268	1842	1957	2073	2189	2304	2531	2878	3225	3452
		18.90	0.430	10.92	302	440	467	495	522	550	605	687	770	825	1343	1957	2077	2202	2322	2447	2691	3056	3425	3670
		21.50	0.500	12.70	346	503	534	565	597	628	691	785	880	942	1539	2237	2375	2513	2656	2793	3074	3492	3914	4190
		23.70	0.560	14.22	381	555	589	624	659	693	763	867	970	1040	1695	2469	2620	2776	2931	3083	3394	3857	4315	4626
5.000	127.00	13.00	0.253	6.430	208	302	321	340	358	377	415	472	528	566	925	1343	1428	1512	1592	1677	1846	2100	2349	2518
		15.00	0.296	7.520	241	350	372	394	416	437	481	547	612	656	1072	1557	1655	1753	1850	1944	2140	2433	2722	2918
		18.00	0.362	9.190	290	422	448	475	501	528	580	659	739	791	1290	1877	1993	2113	2229	2349	2580	2931	3287	3519
		20.30	0.408	10.36	324	471	500	530	559	589	647	736	824	883	1441	2095	2224	2358	2487	2620	2878	3274	3665	3928
		20.80	0.422	10.72	334	486	516	546	577	607	668	759	850	910	1486	2162	2295	2429	2567	2700	2971	3376	3781	4048
		21.40	0.437	11.10	345	501	532	564	595	626	689	783	877	940	1535	2229	2366	2509	2647	2785	3065	3483	3901	4181
		23.20	0.478	12.14	374	543	577	611	645	679	747	849	951	1019	1664	2415	2567	2718	2869	3020	3323	3777	4230	4533
		24.10	0.500	12.70	389	566	601	636	672	707	778	884	990	1060	1730	2518	2673	2829	2989	3145	3461	3932	4404	4715

Data provided by Vallourec & Mannesmann; September, 2005

VAM TOP (Continued)

OD		Weight	T		Yield Strength (1,000 lb)										Yield Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
5.500	139.70	14.00	0.244	6.20	222	322	342	363	383	403	443	504	564	604	988	1432	1521	1615	1704	1793	1971	2242	2509	2687
		15.50	0.275	6.99	248	361	384	406	429	451	497	564	632	677	1103	1606	1708	1806	1908	2006	2211	2509	2811	3011
		17.00	0.304	7.72	273	397	422	447	471	496	546	620	695	744	1214	1766	1877	1988	2095	2206	2429	2758	3092	3309
		20.00	0.361	9.17	321	466	495	525	554	583	641	729	816	874	1428	2073	2202	2335	2464	2593	2851	3243	3630	3888
		23.00	0.415	10.54	365	530	564	597	630	663	729	829	928	995	1624	2358	2509	2656	2802	2949	3243	3688	4128	4426
		26.00	0.476	12.09	413	601	639	676	714	751	826	939	1052	1127	1837	2673	2842	3007	3176	3341	3674	4177	4680	5013
		26.80	0.500	12.70	432	628	668	707	746	785	864	982	1100	1178	1922	2793	2971	3145	3318	3492	3843	4368	4893	5240
		28.40	0.530	13.46	455	662	703	745	786	828	910	1034	1159	1241	2024	2945	3127	3314	3496	3683	4048	4599	5155	5520
		29.70	0.562	14.27	479	697	741	785	828	872	959	1090	1221	1308	2131	3100	3296	3492	3683	3879	4266	4849	5431	5818
5.750	146.05	18.10	0.304	7.72	286	416	442	468	494	520	572	650	728	780	1272	1850	1966	2082	2197	2313	2544	2891	3238	3470
6.625	168.28	20.00	0.288	7.32	315	459	487	516	545	573	631	717	803	860	1401	2042	2166	2295	2424	2549	2807	3189	3572	3825
		23.20	0.330	8.38	359	522	555	587	620	653	718	816	914	979	1597	2322	2469	2611	2758	2905	3194	3630	4066	4355
		24.00	0.352	8.94	382	555	590	624	659	694	763	867	971	1041	1699	2469	2624	2776	2931	3087	3394	3857	4319	4631
		28.00	0.417	10.59	447	651	691	732	773	813	895	1017	1139	1220	1988	2896	3074	3256	3438	3616	3981	4524	5067	5427
		32.00	0.475	12.07	505	734	780	826	872	918	1009	1147	1285	1377	2246	3265	3470	3674	3879	4083	4488	5102	5716	6125
		36.70	0.562	14.27	589	856	910	963	1017	1071	1178	1338	1499	1606	2620	3808	4048	4284	4524	4764	5240	5952	6668	7144
7.000	177.80	23.00	0.317	8.05	366	532	566	599	632	666	732	832	932	998	1628	2366	2518	2664	2811	2963	3256	3701	4146	4439
		26.00	0.362	9.19	415	604	642	679	717	755	830	944	1057	1132	1846	2687	2856	3020	3189	3358	3692	4199	4702	5035
		29.00	0.408	10.36	465	676	718	760	803	845	929	1056	1183	1267	2068	3007	3194	3381	3572	3759	4132	4697	5262	5636
		32.00	0.453	11.51	512	745	792	839	885	932	1025	1165	1304	1398	2277	3314	3523	3732	3937	4146	4559	5182	5800	6219
		35.00	0.498	12.65	559	814	865	915	966	1017	1119	1272	1424	1526	2487	3621	3848	4070	4297	4524	4978	5658	6334	6788
		38.00	0.540	13.72	603	877	932	986	1041	1096	1205	1370	1534	1644	2682	3901	4146	4386	4631	4875	5360	6094	6824	7313
		41.00	0.590	14.99	653	950	1010	1069	1129	1188	1307	1485	1663	1782	2905	4226	4493	4755	5022	5284	5814	6606	7397	7927
		42.70	0.625	15.88	688	1001	1064	1127	1189	1252	1377	1565	1752	1878	3060	4453	4733	5013	5289	5569	6125	6961	7793	8354
7.625	193.68	26.40	0.328	8.33	414	602	639	677	714	752	827	940	1053	1128	1842	2678	2842	3011	3176	3345	3679	4181	4684	5018
		29.70	0.375	9.53	470	683	726	769	811	854	940	1068	1196	1281	2091	3038	3229	3421	3608	3799	4181	4751	5320	5698
		33.70	0.430	10.92	535	778	826	875	923	972	1069	1215	1361	1458	2380	3461	3674	3892	4106	4324	4755	5405	6054	6486
		35.80	0.465	11.81	575	837	889	941	994	1046	1151	1308	1464	1569	2558	3723	3954	4186	4422	4653	5120	5818	6512	6979
		39.00	0.500	12.70	616	895	951	1007	1063	1119	1231	1399	1567	1679	2740	3981	4230	4479	4728	4978	5476	6223	6970	7469
		42.80	0.562	14.27	686	998	1060	1122	1185	1247	1372	1559	1746	1871	3051	4439	4715	4991	5271	5547	6103	6935	7767	8323
		45.30	0.595	15.11	723	1051	1117	1183	1248	1314	1446	1643	1840	1971	3216	4675	4969	5262	5551	5845	6432	7308	8185	8767
		47.10	0.625	15.88	756	1100	1168	1237	1306	1374	1512	1718	1924	2062	3363	4893	5196	5502	5809	6112	6726	7642	8558	9172
7.750	196.85	46.10	0.595	15.11	736	1070	1137	1204	1271	1337	1471	1672	1872	2006	3274	4760	5058	5356	5654	5947	6543	7437	8327	8923
8.625	219.08	36.00	0.400	10.16	568	827	879	930	982	1034	1137	1292	1447	1550	2527	3679	3910	4137	4368	4599	5058	5747	6437	6895
		40.00	0.450	11.43	636	925	982	1040	1098	1156	1271	1445	1618	1734	2829	4115	4368	4626	4884	5142	5654	6428	7197	7713
		44.00	0.500	12.70	702	1021	1085	1149	1212	1276	1404	1595	1787	1914	3123	4542	4826	5111	5391	5676	6245	7095	7949	8514
		49.00	0.557	14.15	776	1129	1200	1271	1341	1412	1553	1765	1977	2118	3452	5022	5338	5654	5965	6281	6908	7851	8794	9421
		52.00	0.595	15.11	826	1201	1276	1351	1426	1501	1651	1876	2101	2252	3674	5342	5676	6010	6343	6677	7344	8345	9346	10017
9.625	244.48	40.00	0.395	10.03	630	916	974	1031	1088	1145	1260	1432	1604	1718	2802	4075	4333	4586	4840	5093	5605	6370	7135	7642
		43.50	0.435	11.05	691	1005	1068	1130	1193	1256	1381	1570	1758	1884	3074	4470	4751	5026	5307	5587	6143	6984	7820	8380
		47.00	0.472	11.99	746	1086	1154	1221	1289	1357	1493	1697	1900	2036	3318	4831	5133	5431	5734	6036	6641	7549	8452	9057
		53.50	0.545	13.84	855	1244	1321	1399	1477	1555	1710	1943	2176	2332	3803	5534	5876	6223	6570	6917	7606	8643	9679	10373
		58.40	0.595	15.11	928	1350	1435	1519	1604	1688	1857	2110	2363	2532	4128	6005	6383	6757	7135	7509	8260	9386	10511	11263
9.875	250.83	62.80	0.625	15.88	999	1453	1544	1635	1725	1816	1998	2270	2543	2724	4444	6463	6868	7273	7673	8078	8888	10097	11312	12117
		65.30	0.650	16.51	1036	1507	1601	1695	1790	1884	2072	2355	2637	2826	4608	6703	7122	7540	7962	8380	9217	10476	11730	12571
		66.40	0.661	16.79	1052	1531	1626	1722	1818	1913	2105	2392	2679	2870	4680	6810	7233	7660	8087	8509	9364	10640	11917	12766
		66.90	0.668	16.97	1063	1546	1642	1739	1836	1932	2125	2415	2705	2898	4728	6877	7304	7735	8167	8594	9452	10742	12032	12891
		67.50	0.678	17.22	1077	1567	1665	1763	1861	1959	2155	2449	2743	2939	4791	6970	7406	7842	8278	8714	9586	10894	12201	13073
		68.00	0.694	17.63	1101	1601	1701	1802	1902	2002	2202	2502	2802	3003	4897	7122	7566	8016	8461	8905	9795	11129	12464	13358
		68.90	0.700	17.78	1110	1614	1715	1816	1917	2018	2219	2522	2825	3027	4938	7179	7629	8078	8527	8977	9871	11218	12566	13465
		70.50	0.720	18.29	1139	1657	1760	1864	1967	2071	2278	2589	2899	3106	5067	7371	7829	8291	8750	9212	10133	11516	12895	13816
		72.00	0.725	18.42	1146	1667	1771	1876	1980	2084	2293	2605	2918	3126	5098	7415	7878	8345	8807	9270	10200	11588	12980	13905
10.000	254.00	67.20	0.672	17.07	1083	1575	1674	1772	1871	1969	2166	2462	2757	2954	4817	7006	7446	7882	8323	8759	9635	10952	12264	13140
		68.70	0.688	17.48	1107	1610	1711	1811	1912	2013	2214	2516	2818	3019	4924	7162	7611	8056	8505	8954	9848	11192	12535	13429
		71.80	0.722	18.34	1157	1684	1789	1894	1999	2105	2315	2631	2946	3157	5147	7491	7958	8425	8892	9364	10298	11703	13104	14043

Data provided by Vallourec & Mannesmann; September, 2005

VAM TOP (Continued)

OD		Weight	T		Yield Strength (1,000 lb)										Yield Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
10.750	273.05	45.50	0.400	10.16	715	1040	1106	1171	1236	1301	1431	1626	1821	1951	3180	4626	4920	5209	5498	5787	6365	7233	8100	8678
		51.00	0.450	11.43	801	1165	1238	1310	1383	1456	1602	1820	2039	2184	3563	5182	5507	5827	6152	6477	7126	8096	9070	9715
		55.50	0.495	12.57	877	1276	1355	1435	1515	1595	1754	1993	2233	2392	3901	5676	6027	6383	6739	7095	7802	8865	9933	10640
		60.70	0.545	13.84	961	1398	1485	1573	1660	1747	1922	2184	2446	2621	4275	6219	6606	6997	7384	7771	8549	9715	10880	11659
		65.70	0.595	15.11	1044	1519	1613	1708	1803	1898	2088	2373	2657	2847	4644	6757	7175	7598	8020	8443	9288	10556	11819	12664
		71.10	0.650	16.51	1134	1650	1753	1856	1959	2063	2269	2578	2888	3094	5044	7340	7798	8256	8714	9177	10093	11468	12846	13763
11.750	298.45	54.00	0.435	11.05	850	1237	1314	1392	1469	1546	1701	1933	2165	2319	3781	5502	5845	6192	6534	6877	7566	8598	9630	10315
		60.00	0.489	12.42	952	1384	1471	1557	1644	1730	1903	2163	2422	2595	4235	6156	6543	6926	7313	7695	8465	9621	10774	11543
		65.00	0.534	13.56	1035	1505	1599	1693	1788	1882	2070	2352	2634	2822	4604	6695	7113	7531	7953	8372	9208	10462	11717	12553
		71.00	0.582	14.78	1123	1634	1736	1838	1940	2042	2246	2553	2859	3063	4995	7268	7722	8176	8630	9083	9991	11356	12717	13625
11.875	301.63	67.80	0.550	13.97	1076	1565	1663	1761	1859	1957	2152	2446	2740	2935	4786	6961	7397	7833	8269	8705	9573	10880	12188	13056
		71.80	0.582	14.78	1136	1652	1755	1858	1962	2065	2271	2581	2891	3097	5053	7348	7807	8265	8727	9186	10102	11481	12860	13776
13.375	339.73	61.00	0.430	10.92	962	1399	1486	1574	1661	1749	1924	2186	2448	2623	4279	6223	6610	7001	7388	7780	8558	9724	10889	11668
		68.00	0.480	12.19	1069	1556	1653	1750	1847	1945	2139	2431	2722	2917	4755	6921	7353	7784	8216	8652	9515	10814	12108	12975
		72.00	0.514	13.06	1142	1661	1765	1869	1973	2077	2284	2596	2908	3115	5080	7388	7851	8314	8776	9239	10160	11548	12935	13856
		77.00	0.550	13.97	1219	1773	1884	1994	2105	2216	2438	2770	3102	3324	5422	7887	8380	8870	9364	9857	10845	12322	13798	14786
		80.70	0.580	14.73	1282	1865	1982	2098	2215	2331	2565	2914	3264	3497	5703	8296	8816	9332	9853	10369	11410	12962	14519	15555
		85.00	0.608	15.44	1341	1951	2073	2195	2317	2439	2682	3048	3414	3658	5965	8678	9221	9764	10307	10849	11930	13558	15186	16272
		86.00	0.625	15.88	1377	2003	2128	2253	2378	2504	2754	3129	3505	3755	6125	8910	9466	10022	10578	11138	12250	13918	15591	16703
13.625	346.08	88.20	0.625	15.88	1404	2042	2170	2297	2425	2553	2808	3191	3574	3829	6245	9083	9653	10218	10787	11356	12491	14194	15898	17032
		118.20	0.850	21.59	1876	2729	2900	3070	3241	3411	3753	4264	4776	5117	8345	12139	12900	13656	14417	15173	16694	18967	21245	22762
14.000	355.60	86.00	0.600	15.24	1389	2021	2147	2273	2400	2526	2778	3157	3536	3789	6179	8990	9550	10111	10676	11236	12357	14043	15729	16854
		93.00	0.650	16.51	1499	2181	2317	2453	2590	2726	2999	3408	3817	4089	6668	9702	10307	10911	11521	12126	13340	15160	16979	18189
		100.00	0.700	17.78	1609	2340	2486	2632	2779	2925	3217	3656	4095	4387	7157	10409	11058	11708	12362	13011	14310	16263	18215	19514
		106.00	0.750	19.05	1717	2498	2654	2810	2966	3122	3434	3903	4371	4683	7638	11112	11806	12499	13193	13887	15275	17361	19443	20831
		112.00	0.797	20.24	1818	2645	2810	2975	3141	3306	3636	4132	4628	4959	8087	11766	12499	13233	13972	14706	16174	18380	20586	22059
		114.00	0.800	20.32	1825	2654	2820	2986	3152	3318	3649	4147	4645	4976	8118	11806	12544	13282	14021	14759	16232	18447	20662	22134
		120.00	0.850	21.59	1931	2809	2985	3160	3336	3512	3863	4389	4916	5267	8590	12495	13278	14056	14839	15622	17183	19523	21867	23429
15.000	381.00	92.50	0.580	14.73	1445	2102	2233	2365	2496	2628	2890	3284	3679	3941	6428	9350	9933	10520	11103	11690	12855	14608	16365	17530

Data provided by Vallourec & Mannesmann; September, 2005

VAM TOP HC

OD		Weight	T		Yield Strength (1,000 lb)									Yield Strength (kn)								
in.	mm	lb/ft	in.	mm	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
4.500	114.3	10.5	0.224	5.69	241	256	271	286	301	331	376	421	451	1072	1139	1205	1272	1339	1472	1673	1873	2006
		11.6	0.250	6.35	267	284	300	317	334	367	417	467	501	1188	1263	1334	1410	1486	1632	1855	2077	2229
		12.6	0.271	6.88	288	306	324	342	360	396	450	504	540	1281	1361	1441	1521	1601	1761	2002	2242	2402
		13.5	0.290	7.37	307	326	345	364	384	422	480	537	575	1366	1450	1535	1619	1708	1877	2135	2389	2558
		15.1	0.337	8.56	353	375	397	419	441	485	551	617	661	1570	1668	1766	1864	1962	2157	2451	2745	2940
		17.0	0.380	9.65	393	418	443	467	492	541	615	689	738	1748	1859	1971	2077	2189	2406	2736	3065	3283
		17.7	0.402	10.21	414	440	466	492	518	569	647	725	776	1842	1957	2073	2189	2304	2531	2878	3225	3452
		18.9	0.430	10.92	440	467	495	522	550	605	687	770	825	1957	2077	2202	2322	2447	2691	3056	3425	3670
		21.5	0.500	12.70	503	534	565	597	628	691	785	880	942	2237	2375	2513	2656	2793	3074	3492	3914	4190
		23.7	0.560	14.22	555	589	624	659	693	763	867	970	1040	2469	2620	2776	2931	3083	3394	3857	4315	4626
5.000	127.0	15.0	0.296	7.52	350	372	394	416	437	481	547	612	656	1557	1655	1753	1850	1944	2140	2433	2722	2918
		18.0	0.362	9.19	422	448	475	501	528	580	659	739	791	1877	1993	2113	2229	2349	2580	2931	3287	3519
		20.3	0.408	10.36	471	500	530	559	589	647	736	824	883	2095	2224	2358	2487	2620	2878	3274	3665	3928
		20.8	0.422	10.72	486	516	546	577	607	668	759	850	910	2162	2295	2429	2567	2700	2971	3376	3781	4048
		21.4	0.437	11.10	501	532	564	595	626	689	783	877	940	2229	2366	2509	2647	2785	3065	3483	3901	4181
		23.2	0.478	12.14	543	577	611	645	679	747	849	951	1019	2415	2567	2718	2869	3020	3323	3777	4230	4533
		24.1	0.500	12.70	566	601	636	672	707	778	884	990	1060	2518	2673	2829	2989	3145	3461	3932	4404	4715
5.500	139.7	17.0	0.304	7.72	397	422	447	471	496	546	620	695	744	1766	1877	1988	2095	2206	2429	2758	3092	3309
		20.0	0.361	9.17	466	495	525	554	583	641	729	816	874	2073	2202	2335	2464	2593	2851	3243	3630	3888
		23.0	0.415	10.54	530	564	597	630	663	729	829	928	995	2358	2509	2656	2802	2949	3243	3688	4128	4426
		26.0	0.476	12.09	601	639	676	714	751	826	939	1052	1127	2673	2842	3007	3176	3341	3674	4177	4680	5013
		26.8	0.500	12.70	628	668	707	746	785	864	982	1100	1178	2793	2971	3145	3318	3492	3843	4368	4893	5240
		28.4	0.530	13.46	662	703	745	786	828	910	1034	1159	1241	2945	3127	3314	3496	3683	4048	4599	5155	5520
		29.7	0.562	14.27	697	741	785	828	872	959	1090	1221	1308	3100	3296	3492	3683	3879	4266	4849	5431	5818
		32.6	0.625	15.88	766	814	861	909	957	1053	1197	1340	1436	3407	3621	3830	4043	4257	4684	5325	5961	6388
6.625	168.27	23.2	0.330	8.38	522	555	587	620	653	718	816	914	979	2322	2469	2611	2758	2905	3194	3630	4066	4355
		24.0	0.352	8.94	555	590	624	659	694	763	867	971	1041	2469	2624	2776	2931	3087	3394	3857	4319	4631
		28.0	0.417	10.59	651	691	732	773	813	895	1017	1139	1220	2896	3074	3256	3438	3616	3981	4524	5067	5427
		32.0	0.475	12.06	734	780	826	872	918	1009	1147	1285	1377	3265	3470	3674	3879	4083	4488	5102	5716	6125
7.000	177.8	26.0	0.362	9.19	604	642	679	717	755	830	944	1057	1132	2687	2856	3020	3189	3358	3692	4199	4702	5035
		29.0	0.408	10.36	676	718	760	803	845	929	1056	1183	1267	3007	3194	3381	3572	3759	4132	4697	5262	5636
		32.0	0.453	11.51	745	792	839	885	932	1025	1165	1304	1398	3314	3523	3732	3937	4146	4559	5182	5800	6219
		35.0	0.498	12.65	814	865	915	966	1017	1119	1272	1424	1526	3621	3848	4070	4297	4524	4978	5658	6334	6788
		38.0	0.540	13.72	877	932	986	1041	1096	1205	1370	1534	1644	3901	4146	4386	4631	4875	5360	6094	6824	7313
		41.0	0.590	14.99	950	1010	1069	1129	1188	1307	1485	1663	1782	4226	4493	4755	5022	5284	5814	6606	7397	7927
7.625	193.68	29.7	0.375	9.52	683	726	769	811	854	940	1068	1196	1281	3038	3229	3421	3608	3799	4181	4751	5320	5698
		33.7	0.430	10.92	776	825	873	922	970	1067	1213	1358	1455	3452	3670	3883	4101	4315	4746	5396	6041	6472
		35.8	0.465	11.81	837	889	941	994	1046	1151	1308	1464	1569	3723	3954	4186	4422	4653	5120	5818	6512	6979
		39.0	0.500	12.70	895	951	1007	1063	1119	1231	1399	1567	1679	3981	4230	4479	4728	4978	5476	6223	6970	7469
		42.8	0.562	14.27	998	1060	1122	1185	1247	1372	1559	1746	1871	4439	4715	4991	5271	5547	6103	6935	7767	8323
		45.3	0.595	15.11	1051	1117	1183	1248	1314	1446	1643	1840	1971	4675	4969	5262	5551	5845	6432	7308	8185	8767
		47.1	0.625	15.88	1100	1168	1237	1306	1374	1512	1718	1924	2062	4893	5196	5502	5809	6112	6726	7642	8558	9172
7.75	196.85	46.1	0.595	15.11	1070	1137	1204	1271	1337	1471	1672	1872	2006	4760	5058	5356	5654	5947	6543	7437	8327	8923

Data provided by Vallourec & Mannesmann; September, 2005

VAM TOP HT

OD		Weight	T		Yield Strength (1,000 lb)										Yield Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
4.500	114.3	10.5	0.224	5.69	165	241	256	271	286	301	331	376	421	451	734	1072	1139	1205	1272	1339	1472	1673	1873	2006
		11.6	0.250	6.35	184	267	284	300	317	334	367	417	467	501	818	1188	1263	1334	1410	1486	1632	1855	2077	2229
		12.6	0.271	6.88	198	288	306	324	342	360	396	450	504	540	881	1281	1361	1441	1521	1601	1761	2002	2242	2402
		13.5	0.290	7.37	211	307	326	345	364	384	422	480	537	575	939	1366	1450	1535	1619	1708	1877	2135	2389	2558
		15.1	0.337	8.56	242	353	375	397	419	441	485	551	617	661	1076	1570	1668	1766	1864	1962	2157	2451	2745	2940
		17.0	0.380	9.65	270	393	418	443	467	492	541	615	689	738	1201	1748	1859	1971	2077	2189	2406	2736	3065	3283
		17.7	0.402	10.21	285	414	440	466	492	518	569	647	725	776	1268	1842	1957	2073	2189	2304	2531	2878	3225	3452
		18.9	0.430	10.92	302	440	467	495	522	550	605	687	770	825	1343	1957	2077	2202	2322	2447	2691	3056	3425	3670
		21.5	0.500	12.7	346	503	534	565	597	628	691	785	880	942	1539	2237	2375	2513	2656	2793	3074	3492	3914	4190
		23.7	0.560	14.22	381	555	589	624	659	693	763	867	970	1040	1695	2469	2620	2776	2931	3083	3394	3857	4315	4626
5.000	127.0	15.0	0.296	7.52	241	350	372	394	416	437	481	547	612	656	1072	1557	1655	1753	1850	1944	2140	2433	2722	2918
		18.0	0.362	9.19	290	422	448	475	501	528	580	659	739	791	1290	1877	1993	2113	2229	2349	2580	2931	3287	3519
		20.3	0.408	10.36	324	471	500	530	559	589	647	736	824	883	1441	2095	2224	2358	2487	2620	2878	3274	3665	3928
		20.8	0.422	10.72	334	486	516	546	577	607	668	759	850	910	1486	2162	2295	2429	2567	2700	2971	3376	3781	4048
		21.4	0.437	11.1	345	501	532	564	595	626	689	783	877	940	1535	2229	2366	2509	2647	2785	3065	3483	3901	4181
		23.2	0.478	12.14	374	543	577	611	645	679	747	849	951	1019	1664	2415	2567	2718	2869	3020	3323	3777	4230	4533
		26.7	0.562	14.27	431	627	666	705	744	784	862	980	1097	1175	1917	2789	2963	3136	3309	3487	3834	4359	4880	5227
5.500	139.7	17.0	0.304	7.72	273	397	422	447	471	496	546	620	695	744	1214	1766	1877	1988	2095	2206	2429	2758	3092	3309
		20.0	0.361	9.17	321	466	495	525	554	583	641	729	816	874	1428	2073	2202	2335	2464	2593	2851	3243	3630	3888
		23.0	0.415	10.54	365	530	564	597	630	663	729	829	928	995	1624	2358	2509	2656	2802	2949	3243	3688	4128	4426
		26.0	0.476	12.09	413	601	639	676	714	751	826	939	1052	1127	1837	2673	2842	3007	3176	3341	3674	4177	4680	5013
		29.7	0.562	14.27	479	697	741	785	828	872	959	1090	1221	1308	2131	3100	3296	3492	3683	3879	4266	4849	5431	5818
		32.6	0.625	15.88	526	766	814	861	909	957	1053	1197	1340	1436	2340	3407	3621	3830	4043	4257	4684	5325	5961	6388
6.625	168.28	23.2	0.33	8.38	359	522	555	587	620	653	718	816	914	979	1597	2322	2469	2611	2758	2905	3194	3630	4066	4355
		24.0	0.652	16.56	382	555	590	624	659	694	763	867	971	1041	1699	2469	2624	2776	2931	3087	3394	3857	4319	4631
		28.0	0.417	10.59	447	651	691	732	773	813	895	1017	1139	1220	1988	2896	3074	3256	3438	3616	3981	4524	5067	5427
		32.0	0.475	12.07	505	734	780	826	872	918	1009	1147	1285	1377	2246	3265	3470	3674	3879	4083	4488	5102	5716	6125
		36.7	0.562	14.27	589	856	910	963	1017	1071	1178	1338	1499	1606	2620	3808	4048	4284	4524	4764	5240	5952	6668	7144
7.000	177.8	26.0	0.362	9.19	415	604	642	679	717	755	830	944	1057	1132	1846	2687	2856	3020	3189	3358	3692	4199	4702	5035
		29.0	0.408	10.36	465	676	718	760	803	845	929	1056	1183	1267	2068	3007	3194	3381	3572	3759	4132	4697	5262	5636
		32.0	0.453	11.51	512	745	792	839	885	932	1025	1165	1304	1398	2277	3314	3523	3732	3937	4146	4559	5182	5800	6219
		35.0	0.498	12.65	559	814	865	915	966	1017	1119	1272	1424	1526	2487	3621	3848	4070	4297	4524	4978	5658	6334	6788
		38.0	0.54	13.72	603	877	932	986	1041	1096	1205	1370	1534	1644	2682	3901	4146	4386	4631	4875	5360	6094	6824	7313
		41.0	0.59	14.99	653	950	1010	1069	1129	1188	1307	1485	1663	1782	2905	4226	4493	4755	5022	5284	5814	6606	7397	7927

Data provided by Vallourec & Mannesmann; September, 2005

VAM ACE

OD		Weight	T		Joint Strength (1,000 lb)										Joint Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
2.375	60.33	4.60	0.190	4.83	72	104	111	117	124	130	143	163	183	196	320	463	494	520	552	578	636	725	814	872
		5.10	0.218	5.54	81	118	126	133	140	148	162	185	207	222	360	525	560	592	623	658	721	823	921	988
		5.80	0.254	6.45	93	135	144	152	161	169	186	212	237	254	414	601	641	676	716	752	827	943	1054	1130
		6.30	0.280	7.11	101	147	157	166	175	184	203	230	258	276	449	654	698	738	778	818	903	1023	1148	1228
		6.60	0.295	7.49	106	154	164	174	183	193	212	241	270	289	472	685	730	774	814	859	943	1072	1201	1286
		7.35	0.336	8.53	118	172	183	194	204	215	237	269	301	323	525	765	814	863	907	956	1054	1197	1339	1437
2.875	73.03	6.40	0.217	5.51	100	145	154	163	172	181	199	227	254	272	445	645	685	725	765	805	885	1010	1130	1210
		7.80	0.276	7.01	124	180	192	203	214	225	248	282	316	338	552	801	854	903	952	1001	1103	1254	1406	1503
		8.60	0.308	7.82	137	199	211	224	236	248	273	311	348	373	609	885	939	996	1050	1103	1214	1383	1548	1659
		9.35	0.340	8.64	149	217	230	244	257	271	298	339	379	406	663	965	1023	1085	1143	1205	1326	1508	1686	1806
		9.80	0.362	9.19	157	229	243	257	272	286	314	357	400	429	698	1019	1081	1143	1210	1272	1397	1588	1779	1908
		10.50	0.392	9.96	168	245	260	275	291	306	336	382	428	459	747	1090	1157	1223	1294	1361	1495	1699	1904	2042
		10.70	0.405	10.29	173	251	267	283	299	314	346	393	440	471	770	1117	1188	1259	1330	1397	1539	1748	1957	2095
		11.50	0.440	11.18	185	269	286	303	320	337	370	421	471	505	823	1197	1272	1348	1423	1499	1646	1873	2095	2246
3.500	88.90	6.50	0.170	4.32	98	142	151	160	169	178	196	222	249	267	436	632	672	712	752	792	872	988	1108	1188
		7.70	0.216	5.49	122	178	189	200	212	223	245	278	312	334	543	792	841	890	943	992	1090	1237	1388	1486
		8.19	0.235	5.97	133	193	205	217	229	241	265	301	337	362	592	859	912	965	1019	1072	1179	1339	1499	1610
		9.20	0.254	6.45	142	207	220	233	246	259	285	324	363	389	632	921	979	1036	1094	1152	1268	1441	1615	1730
		10.20	0.289	7.34	160	233	248	262	277	292	321	364	408	437	712	1036	1103	1165	1232	1299	1428	1619	1815	1944
		10.65	0.313	7.95	172	251	266	282	298	313	345	392	439	470	765	1117	1183	1254	1326	1392	1535	1744	1953	2091
		12.70	0.375	9.53	202	294	313	331	350	368	405	460	515	552	899	1308	1392	1472	1557	1637	1802	2046	2291	2455
		13.70	0.413	10.49	220	320	340	360	380	401	441	501	561	601	979	1423	1512	1601	1690	1784	1962	2229	2495	2673
		14.30	0.430	10.92	228	332	352	373	394	415	456	518	580	622	1014	1477	1566	1659	1753	1846	2028	2304	2580	2767
		14.70	0.449	11.4	237	344	366	387	409	430	473	538	603	646	1054	1530	1628	1721	1819	1913	2104	2393	2682	2874
		15.50	0.476	12.09	249	362	384	407	429	452	497	565	633	678	1108	1610	1708	1810	1908	2011	2211	2513	2816	3016
		16.70	0.510	12.95	264	383	407	431	455	479	527	599	671	719	1174	1704	1810	1917	2024	2131	2344	2664	2985	3198
4.000	101.60	8.20	0.190	4.83	125	182	193	205	216	227	250	284	318	341	556	810	859	912	961	1010	1112	1263	1415	1517
		9.50	0.226	5.74	147	214	228	241	255	268	295	335	375	402	654	952	1014	1072	1134	1192	1312	1490	1668	1788
		10.90	0.262	6.65	169	246	262	277	292	308	338	385	431	462	752	1094	1165	1232	1299	1370	1503	1713	1917	2055
		11.30	0.286	7.26	184	267	284	300	317	334	367	417	467	501	818	1188	1263	1334	1410	1486	1632	1855	2077	2229
		13.20	0.330	8.38	209	304	323	342	361	380	418	476	533	571	930	1352	1437	1521	1606	1690	1859	2117	2371	2540
		14.80	0.380	9.65	238	346	367	389	410	432	475	540	605	648	1059	1539	1632	1730	1824	1922	2113	2402	2691	2882
		16.10	0.415	10.54	257	374	397	421	444	467	514	584	654	701	1143	1664	1766	1873	1975	2077	2286	2598	2909	3118
		16.50	0.430	10.92	265	386	410	434	458	482	530	603	675	723	1179	1717	1824	1931	2037	2144	2358	2682	3003	3216
		18.90	0.500	12.7	302	440	467	495	522	550	605	687	770	825	1343	1957	2077	2202	2322	2447	2691	3056	3425	3670
		22.20	0.610	15.49	357	520	552	585	617	650	715	812	909	974	1588	2313	2455	2602	2745	2891	3180	3612	4043	4333
4.500	114.30	10.50	0.224	5.69	165	241	256	271	286	301	331	376	421	451	734	1072	1139	1205	1272	1339	1472	1673	1873	2006
		11.60	0.250	6.35	184	267	284	300	317	334	367	417	467	501	818	1188	1263	1334	1410	1486	1632	1855	2077	2229
		12.60	0.271	6.88	198	288	306	324	342	360	396	450	504	540	881	1281	1361	1441	1521	1601	1761	2002	2242	2402
		13.50	0.290	7.37	211	307	326	345	364	384	422	479	537	575	939	1366	1450	1535	1619	1708	1877	2131	2389	2558
		14.50	0.320	8.13	231	336	357	378	399	420	462	525	588	630	1028	1495	1588	1681	1775	1868	2055	2335	2616	2802
		15.10	0.337	8.56	242	353	375	397	419	441	485	551	617	661	1076	1570	1668	1766	1864	1962	2157	2451	2745	2940
		17.00	0.380	9.65	270	393	418	443	467	492	541	615	689	738	1201	1748	1859	1971	2077	2189	2406	2736	3065	3283
		17.70	0.402	10.21	285	414	440	466	492	518	569	647	725	776	1268	1842	1957	2073	2189	2304	2531	2878	3225	3452
		18.90	0.430	10.92	302	440	467	495	522	550	605	687	770	825	1343	1957	2077	2202	2322	2447	2691	3056	3425	3670
		21.50	0.500	12.70	346	503	534	565	597	628	691	785	880	942	1539	2237	2375	2513	2656	2793	3074	3492	3914	4190
		23.70	0.560	14.22	381	555	589	624	659	693	763	867	970	1040	1695	2469	2620	2776	2931	3083	3394	3857	4315	4626

Data provided by Vallourec & Mannesmann; September, 2005

VAM ACE (Continued)

OD		Weight	T		Joint Strength (1,000 lb)										Joint Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
5.000	127.00	13.00	0.253	6.43	208	302	321	340	358	377	415	472	528	566	925	1343	1428	1512	1592	1677	1846	2100	2349	2518
		15.00	0.296	7.52	241	350	372	394	416	437	481	547	612	656	1072	1557	1655	1753	1850	1944	2140	2433	2722	2918
		18.00	0.362	9.19	290	422	448	475	501	528	580	659	739	791	1290	1877	1993	2113	2229	2349	2580	2931	3287	3519
		20.30	0.408	10.36	324	471	500	530	559	589	647	736	824	883	1441	2095	2224	2358	2487	2620	2878	3274	3665	3928
		20.80	0.422	10.72	334	486	516	546	577	607	668	759	850	910	1486	2162	2295	2429	2567	2700	2971	3376	3781	4048
		21.40	0.437	11.10	345	501	532	564	595	626	689	783	877	940	1535	2229	2366	2509	2647	2785	3065	3483	3901	4181
		23.20	0.478	12.14	374	543	577	611	645	679	747	849	951	1019	1664	2415	2567	2718	2869	3020	3323	3777	4230	4533
		24.10	0.500	12.70	389	565	601	636	671	707	777	884	990	1060	1730	2513	2673	2829	2985	3145	3456	3932	4404	4715
5.500	139.70	15.50	0.275	6.99	248	361	384	406	429	451	497	564	632	677	1103	1606	1708	1806	1908	2006	2211	2509	2811	3011
		17.00	0.304	7.72	273	397	422	447	471	496	546	620	695	744	1214	1766	1877	1988	2095	2206	2429	2758	3092	3309
		20.00	0.361	9.17	321	466	495	525	554	583	641	729	816	874	1428	2073	2202	2335	2464	2593	2851	3243	3630	3888
		23.00	0.415	10.54	365	530	563	597	630	663	729	829	928	994	1624	2358	2504	2656	2802	2949	3243	3688	4128	4422
		26.00	0.476	12.09	413	601	639	676	714	751	826	939	1052	1127	1837	2673	2842	3007	3176	3341	3674	4177	4680	5013
		26.80	0.500	12.70	432	628	668	707	746	785	864	982	1100	1178	1922	2793	2971	3145	3318	3492	3843	4368	4893	5240
		28.40	0.530	13.46	455	662	703	745	786	827	910	1034	1158	1241	2024	2945	3127	3314	3496	3679	4048	4599	5151	5520
		29.70	0.562	14.27	479	697	741	785	828	872	959	1090	1221	1308	2131	3100	3296	3492	3683	3879	4266	4849	5431	5818
6.625	168.28	20.00	0.288	7.32	315	459	487	516	545	573	631	717	803	860	1401	2042	2166	2295	2424	2549	2807	3189	3572	3825
		24.00	0.352	8.94	382	555	590	624	659	694	763	867	971	1041	1699	2469	2624	2776	2931	3087	3394	3857	4319	4631
		28.00	0.417	10.59	447	651	691	732	773	813	895	1017	1139	1220	1988	2896	3074	3256	3438	3616	3981	4524	5067	5427
		32.00	0.475	12.07	505	734	780	826	872	918	1009	1147	1285	1377	2246	3265	3470	3674	3879	4083	4488	5102	5716	6125
		35.00	0.525	13.34	553	805	855	905	956	1006	1107	1258	1409	1509	2460	3581	3803	4026	4252	4475	4924	5596	6268	6712
7.000	177.80	23.00	0.317	8.05	366	532	566	599	632	665	732	832	932	998	1628	2366	2518	2664	2811	2958	3256	3701	4146	4439
		24.75	0.343	8.71	394	574	610	645	681	717	789	897	1004	1076	1753	2553	2713	2869	3029	3189	3510	3990	4466	4786
		26.00	0.362	9.19	415	604	642	679	717	755	830	944	1057	1132	1846	2687	2856	3020	3189	3358	3692	4199	4702	5035
		29.00	0.408	10.36	465	676	718	760	803	845	929	1056	1183	1267	2068	3007	3194	3381	3572	3759	4132	4697	5262	5636
		32.00	0.453	11.51	512	745	792	839	885	932	1025	1165	1304	1398	2277	3314	3523	3732	3937	4146	4559	5182	5800	6219
		35.00	0.498	12.65	559	814	865	915	966	1017	1119	1272	1424	1526	2487	3621	3848	4070	4297	4524	4978	5658	6334	6788
		38.00	0.540	13.72	603	877	932	986	1041	1096	1205	1370	1534	1644	2682	3901	4146	4386	4631	4875	5360	6094	6824	7313
		41.00	0.590	14.99	653	950	1010	1069	1129	1188	1307	1485	1663	1782	2905	4226	4493	4755	5022	5284	5814	6606	7397	7927
		42.70	0.625	15.88	688	1001	1064	1127	1189	1252	1377	1565	1752	1878	3060	4453	4733	5013	5289	5569	6125	6961	7793	8354
7.625	193.68	26.40	0.328	8.33	414	602	639	677	714	752	827	940	1053	1128	1842	2678	2842	3011	3176	3345	3679	4181	4684	5018
		29.70	0.375	9.53	470	683	726	769	811	854	940	1068	1196	1281	2091	3038	3229	3421	3608	3799	4181	4751	5320	5698
		33.70	0.430	10.92	535	778	826	875	923	972	1069	1215	1361	1458	2380	3461	3674	3892	4106	4324	4755	5405	6054	6486
		35.80	0.465	11.81	575	837	889	941	994	1046	1151	1308	1464	1569	2558	3723	3954	4186	4422	4653	5120	5818	6512	6979
		39.00	0.500	12.7	616	895	951	1007	1063	1119	1231	1399	1567	1679	2740	3981	4230	4479	4728	4978	5476	6223	6970	7469
		42.80	0.562	14.27	686	998	1060	1122	1185	1247	1372	1559	1746	1871	3051	4439	4715	4991	5271	5547	6103	6935	7767	8323
		45.30	0.595	15.11	723	1051	1117	1183	1248	1314	1446	1643	1840	1971	3216	4675	4969	5262	5551	5845	6432	7308	8185	8767
7.750	196.85	46.10	0.595	15.11	736	1070	1137	1204	1271	1337	1471	1672	1872	2006	3274	4760	5058	5356	5654	5947	6543	7437	8327	8923
		47.60	0.625	15.88	769	1119	1189	1259	1329	1399	1539	1749	1959	2099	3421	4978	5289	5600	5912	6223	6846	7780	8714	9337
		48.60	0.640	16.26	786	1144	1215	1286	1358	1429	1572	1787	2001	2144	3496	5089	5405	5720	6041	6357	6993	7949	8901	9537
8.625	219.08	28.00	0.304	7.72	437	636	675	715	755	795	874	993	1113	1192	1944	2829	3003	3180	3358	3536	3888	4417	4951	5302
		32.00	0.352	8.94	503	732	778	823	869	915	1006	1144	1281	1372	2237	3256	3461	3661	3866	4070	4475	5089	5698	6103
		36.00	0.400	10.16	568	827	878	930	982	1034	1137	1292	1447	1550	2527	3679	3906	4137	4368	4599	5058	5747	6437	6895
		40.00	0.450	11.43	636	925	982	1040	1098	1156	1271	1445	1618	1734	2829	4115	4368	4626	4884	5142	5654	6428	7197	7713
		44.00	0.500	12.7	702	1021	1085	1149	1212	1276	1404	1595	1787	1914	3123	4542	4826	5111	5391	5676	6245	7095	7949	8514
		49.00	0.557	14.15	776	1129	1200	1271	1341	1412	1553	1765	1977	2118	3452	5022	5338	5654	5965	6281	6908	7851	8794	9421
		52.00	0.595	15.11	826	1201	1276	1351	1426	1501	1651	1876	2101	2252	3674	5342	5676	6010	6343	6677	7344	8345	9346	10017

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VAM ACE (Continued)

OD		Weight	T		Joint Strength (1,000 lb)										Joint Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
9.625	244.48	36.00	0.352	8.94	564	820	872	923	974	1025	1128	1282	1436	1538	2509	3648	3879	4106	4333	4559	5018	5703	6388	6841
		40.00	0.395	10.03	630	916	974	1031	1088	1145	1260	1432	1604	1718	2802	4075	4333	4586	4840	5093	5605	6370	7135	7642
		43.50	0.435	11.05	691	1005	1068	1130	1193	1256	1381	1570	1758	1884	3074	4470	4751	5026	5307	5587	6143	6984	7820	8380
		47.00	0.472	11.99	746	1086	1154	1221	1289	1357	1493	1697	1900	2036	3318	4831	5133	5431	5734	6036	6641	7549	8452	9057
		53.50	0.545	13.84	855	1244	1321	1399	1477	1555	1710	1943	2176	2332	3803	5534	5876	6223	6570	6917	7606	8643	9679	10373
		58.40	0.595	15.11	928	1350	1435	1519	1604	1688	1857	2110	2363	2532	4128	6005	6383	6757	7135	7509	8260	9386	10511	11263
		59.40	0.609	15.47	949	1380	1466	1553	1639	1725	1898	2156	2415	2588	4221	6139	6521	6908	7291	7673	8443	9590	10742	11512
		61.10	0.625	15.88	972	1414	1502	1590	1679	1767	1944	2209	2474	2651	4324	6290	6681	7073	7469	7860	8647	9826	11005	11792
9.875	250.83	62.80	0.625	15.88	999	1453	1544	1635	1725	1816	1998	2270	2543	2724	4444	6463	6868	7273	7673	8078	8888	10097	11312	12117
		66.40	0.661	16.79	1052	1531	1626	1722	1818	1913	2105	2392	2679	2870	4680	6810	7233	7660	8087	8509	9364	10640	11917	12766
		70.50	0.720	18.29	1139	1657	1760	1864	1967	2071	2278	2589	2899	3106	5067	7371	7829	8291	8750	9212	10133	11516	12895	13816
10.750	273.05	40.50	0.350	8.89	629	915	972	1029	1086	1144	1258	1429	1601	1715	2798	4070	4324	4577	4831	5089	5596	6357	7122	7629
		45.50	0.400	10.16	715	1040	1106	1171	1236	1301	1431	1626	1821	1951	3180	4626	4920	5209	5498	5787	6365	7233	8100	8678
		51.00	0.450	11.43	801	1165	1238	1310	1383	1456	1602	1820	2039	2184	3563	5182	5507	5827	6152	6477	7126	8096	9070	9715
		55.50	0.495	12.57	877	1276	1355	1435	1515	1595	1754	1993	2233	2392	3901	5676	6027	6383	6739	7095	7802	8865	9933	10640
		60.70	0.545	13.84	961	1398	1485	1573	1660	1747	1922	2184	2446	2621	4275	6219	6606	6997	7384	7771	8549	9715	10880	11659
		65.70	0.595	15.11	1044	1519	1613	1708	1803	1898	2088	2373	2657	2847	4644	6757	7175	7598	8020	8443	9288	10556	11819	12664
11.750	298.45	47.00	0.375	9.53	737	1072	1139	1206	1273	1340	1474	1675	1876	2010	3278	4768	5067	5365	5663	5961	6557	7451	8345	8941
		54.00	0.435	11.05	850	1237	1314	1392	1469	1546	1701	1933	2165	2319	3781	5502	5845	6192	6534	6877	7566	8598	9630	10315
		60.00	0.489	12.42	951	1384	1470	1557	1643	1730	1903	2162	2422	2595	4230	6156	6539	6926	7308	7695	8465	9617	10774	11543
		65.00	0.534	13.56	1035	1505	1599	1693	1788	1882	2070	2352	2634	2822	4604	6695	7113	7531	7953	8372	9208	10462	11717	12553
11.875	301.63	71.80	0.582	14.78	1136	1652	1755	1858	1962	2065	2271	2581	2891	3097	5053	7348	7807	8265	8727	9186	10102	11481	12860	13776
13.375	339.73	54.50	0.380	9.65	853	1241	1319	1396	1474	1551	1706	1939	2172	2327	3794	5520	5867	6210	6557	6899	7589	8625	9662	10351
		61.00	0.430	10.92	962	1399	1486	1574	1661	1749	1924	2186	2448	2623	4279	6223	6610	7001	7388	7780	8558	9724	10889	11668
		68.00	0.480	12.19	1069	1556	1653	1750	1847	1945	2139	2431	2722	2917	4755	6921	7353	7784	8216	8652	9515	10814	12108	12975
		72.00	0.514	13.06	1142	1661	1765	1869	1973	2077	2284	2596	2908	3115	5080	7388	7851	8314	8776	9239	10160	11548	12935	13856
		77.00	0.550	13.97	1219	1773	1884	1994	2105	2216	2438	2770	3102	3324	5422	7887	8380	8870	9364	9857	10845	12322	13798	14786
		80.70	0.580	14.73	1282	1865	1982	2098	2215	2331	2565	2914	3264	3497	5703	8296	8816	9332	9853	10369	11410	12962	14519	15555
		85.00	0.608	15.44	1341	1951	2073	2195	2317	2439	2682	3048	3414	3658	5965	8678	9221	9764	10307	10849	11930	13558	15186	16272
		86.00	0.625	15.88	1377	2003	2128	2253	2378	2504	2754	3129	3505	3755	6125	8910	9466	10022	10578	11138	12250	13918	15591	16703
		103.40	0.750	19.05	1355	1971	2094	2218	2341	2464	2710	3080	3450	3696	6027	8767	9315	9866	10413	10960	12055	13701	15346	16441

Data provided by Vallourec & Mannesmann; September, 2005

NEW VAM

OD		Weight	T		Yield Strength (1,000 lb)										Yield Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
2.375	60.33	4.60	0.190	4.83	72	104	111	117	124	130	143	163	183	196	320	463	494	520	552	578	636	725	814	872
		5.10	0.218	5.54	81	118	126	133	140	148	162	185	207	222	360	525	560	592	623	658	721	823	921	988
		5.80	0.254	6.45	93	135	144	152	161	169	186	212	237	254	414	601	641	676	716	752	827	943	1054	1130
2.875	73.03	6.40	0.217	5.51	100	145	154	163	172	181	199	227	254	272	445	645	685	725	765	805	885	1010	1130	1210
		7.80	0.276	7.01	124	180	192	203	214	225	248	282	316	338	552	801	854	903	952	1001	1103	1254	1406	1503
		8.60	0.308	7.82	137	199	211	224	236	248	273	311	348	373	609	885	939	996	1050	1103	1214	1383	1548	1659
		9.35	0.340	8.64	149	217	230	244	257	271	298	339	379	406	663	965	1023	1085	1143	1205	1326	1508	1686	1806
		9.80	0.362	9.19	157	229	243	257	272	286	314	357	400	429	698	1019	1081	1143	1210	1272	1397	1588	1779	1908
3.500	88.90	7.70	0.216	5.49	123	178	189	201	212	223	245	279	312	334	547	792	841	894	943	992	1090	1241	1388	1486
		9.20	0.254	6.45	142	207	220	233	246	259	285	324	363	389	632	921	979	1036	1094	1152	1268	1441	1615	1730
		10.20	0.289	7.34	160	233	248	262	277	292	321	364	408	437	712	1036	1103	1165	1232	1299	1428	1619	1815	1944
		12.70	0.375	9.53	203	295	313	331	350	368	405	460	515	552	903	1312	1392	1472	1557	1637	1802	2046	2291	2455
		13.70	0.413	10.49	220	320	340	360	380	401	441	501	561	601	979	1423	1512	1601	1690	1784	1962	2229	2495	2673
		14.70	0.449	11.40	237	344	366	387	409	430	473	538	603	646	1054	1530	1628	1721	1819	1913	2104	2393	2682	2874
		15.50	0.476	12.09	249	362	384	407	430	452	497	565	633	678	1108	1610	1708	1810	1913	2011	2211	2513	2816	3016
4.000	101.60	9.50	0.226	5.74	147	214	228	241	255	268	295	335	375	402	654	952	1014	1072	1134	1192	1312	1490	1668	1788
		10.90	0.262	6.65	169	246	262	277	292	308	338	385	431	462	752	1094	1165	1232	1299	1370	1503	1713	1917	2055
		13.20	0.330	8.38	209	304	323	342	361	381	419	476	533	571	930	1352	1437	1521	1606	1695	1864	2117	2371	2540
		14.80	0.380	9.65	238	346	367	389	411	432	475	540	605	648	1059	1539	1632	1730	1828	1922	2113	2402	2691	2882
		16.50	0.430	10.92	265	386	410	434	458	482	531	603	675	723	1179	1717	1824	1931	2037	2144	2362	2682	3003	3216
4.500	114.30	10.50	0.224	5.69	165	241	256	271	286	301	331	376	421	451	734	1072	1139	1205	1272	1339	1472	1673	1873	2006
		11.60	0.250	6.35	184	267	284	300	317	334	367	417	467	501	818	1188	1263	1334	1410	1486	1632	1855	2077	2229
		12.60	0.271	6.88	198	288	306	324	342	360	396	450	504	540	881	1281	1361	1441	1521	1601	1761	2002	2242	2402
		13.50	0.290	7.37	211	307	326	345	364	384	422	480	537	575	939	1366	1450	1535	1619	1708	1877	2135	2389	2558
		15.10	0.337	8.56	242	353	375	397	419	441	485	551	617	661	1076	1570	1668	1766	1864	1962	2157	2451	2745	2940
		17.00	0.380	9.65	270	393	418	443	467	492	541	615	689	738	1201	1748	1859	1971	2077	2189	2406	2736	3065	3283
		18.90	0.430	10.92	302	440	467	495	522	550	605	687	770	825	1343	1957	2077	2202	2322	2447	2691	3056	3425	3670
		21.50	0.500	12.70	346	503	534	565	597	628	691	785	880	942	1539	2237	2375	2513	2656	2793	3074	3492	3914	4190
		23.70	0.560	14.22	381	555	589	624	659	693	763	867	970	1040	1695	2469	2620	2776	2931	3083	3394	3857	4315	4626
5.000	127.00	13.00	0.253	6.43	208	302	321	340	358	377	415	472	528	566	925	1343	1428	1512	1592	1677	1846	2100	2349	2518
		15.00	0.296	7.52	241	350	372	394	416	437	481	547	612	656	1072	1557	1655	1753	1850	1944	2140	2433	2722	2918
		18.00	0.362	9.19	290	422	448	475	501	528	580	659	739	791	1290	1877	1993	2113	2229	2349	2580	2931	3287	3519
		20.30	0.408	10.36	324	471	500	530	559	589	647	736	824	883	1441	2095	2224	2358	2487	2620	2878	3274	3665	3928
		20.80	0.422	10.72	334	486	516	546	577	607	668	759	850	910	1486	2162	2295	2429	2567	2700	2971	3376	3781	4048
		21.40	0.437	11.10	345	501	532	564	595	626	689	783	877	940	1535	2229	2366	2509	2647	2785	3065	3483	3901	4181
		23.20	0.478	12.14	374	543	577	611	645	679	747	849	951	1019	1664	2415	2567	2718	2869	3020	3323	3777	4230	4533
		24.10	0.500	12.70	389	566	601	636	672	707	778	884	990	1060	1730	2518	2673	2829	2989	3145	3461	3932	4404	4715
5.500	139.70	14.00	0.244	6.20	222	322	342	363	383	403	443	504	564	604	988	1432	1521	1615	1704	1793	1971	2242	2509	2687
		15.50	0.275	6.99	248	361	384	406	429	451	497	564	632	677	1103	1606	1708	1806	1908	2006	2211	2509	2811	3011
		17.00	0.304	7.72	273	397	422	447	471	496	546	620	695	744	1214	1766	1877	1988	2095	2206	2429	2758	3092	3309
		20.00	0.361	9.17	321	466	495	525	554	583	641	729	816	874	1428	2073	2202	2335	2464	2593	2851	3243	3630	3888
		23.00	0.415	10.54	365	530	564	597	630	663	729	829	928	995	1624	2358	2509	2656	2802	2949	3243	3688	4128	4426
		26.00	0.476	12.09	413	601	639	676	714	751	826	939	1052	1127	1837	2673	2842	3007	3176	3341	3674	4177	4680	5013

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NEW VAM (Continued)

OD		Weight	T		Yield Strength (1,000 lb)										Yield Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
6.625	168.28	20.00	0.288	7.32	315	459	487	516	545	573	631	717	803	860	1401	2042	2166	2295	2424	2549	2807	3189	3572	3825
		23.20	0.330	8.38	359	522	555	587	620	653	718	816	914	979	1597	2322	2469	2611	2758	2905	3194	3630	4066	4355
		24.00	0.352	8.94	382	555	590	624	659	694	763	867	971	1041	1699	2469	2624	2776	2931	3087	3394	3857	4319	4631
		28.00	0.417	10.59	447	651	691	732	773	813	895	1017	1139	1220	1988	2896	3074	3256	3438	3616	3981	4524	5067	5427
		32.00	0.475	12.07	505	734	780	826	872	918	1009	1147	1285	1377	2246	3265	3470	3674	3879	4083	4488	5102	5716	6125
		35.00	0.525	13.34	553	805	855	905	956	1006	1107	1258	1409	1509	2460	3581	3803	4026	4252	4475	4924	5596	6268	6712
7.000	177.80	23.00	0.317	8.05	366	532	566	599	632	666	732	832	932	998	1628	2366	2518	2664	2811	2963	3256	3701	4146	4439
		26.00	0.362	9.19	415	604	642	679	717	755	830	944	1057	1132	1846	2687	2856	3020	3189	3358	3692	4199	4702	5035
		29.00	0.408	10.36	465	676	718	760	803	845	929	1056	1183	1267	2068	3007	3194	3381	3572	3759	4132	4697	5262	5636
		32.00	0.453	11.51	512	745	792	839	885	932	1025	1165	1304	1398	2277	3314	3523	3732	3937	4146	4559	5182	5800	6219
		35.00	0.498	12.65	559	814	865	915	966	1017	1119	1272	1424	1526	2487	3621	3848	4070	4297	4524	4978	5658	6334	6788
		38.00	0.540	13.72	603	877	932	986	1041	1096	1205	1370	1534	1644	2682	3901	4146	4386	4631	4875	5360	6094	6824	7313
		41.00	0.590	14.99	653	950	1010	1069	1129	1188	1307	1485	1663	1782	2905	4226	4493	4755	5022	5284	5814	6606	7397	7927
		44.00	0.640	16.26	703	1023	1087	1151	1215	1279	1407	1599	1790	1918	3127	4551	4835	5120	5405	5689	6259	7113	7962	8532
		46.00	0.670	17.02	733	1066	1133	1199	1266	1332	1466	1666	1865	1999	3261	4742	5040	5333	5631	5925	6521	7411	8296	8892
7.625	193.68	26.40	0.328	8.33	414	602	639	677	714	752	827	940	1053	1128	1842	2678	2842	3011	3176	3345	3679	4181	4684	5018
		29.70	0.375	9.53	470	683	726	769	811	854	940	1068	1196	1281	2091	3038	3229	3421	3608	3799	4181	4751	5320	5698
		33.70	0.430	10.92	535	778	826	875	923	972	1069	1215	1361	1458	2380	3461	3674	3892	4106	4324	4755	5405	6054	6486
		35.80	0.465	11.81	575	837	889	941	994	1046	1151	1308	1464	1569	2558	3723	3954	4186	4422	4653	5120	5818	6512	6979
		39.00	0.500	12.70	616	895	951	1007	1063	1119	1231	1399	1567	1679	2740	3981	4230	4479	4728	4978	5476	6223	6970	7469
		42.80	0.562	14.27	686	998	1060	1122	1185	1247	1372	1559	1746	1871	3051	4439	4715	4991	5271	5547	6103	6935	7767	8323
		45.30	0.595	15.11	723	1051	1117	1183	1248	1314	1446	1643	1840	1971	3216	4675	4969	5262	5551	5845	6432	7308	8185	8767
		47.10	0.625	15.88	756	1100	1168	1237	1306	1374	1512	1718	1924	2062	3363	4893	5196	5502	5809	6112	6726	7642	8558	9172
		51.20	0.687	17.45	824	1198	1273	1348	1423	1497	1647	1872	2096	2246	3665	5329	5663	5996	6330	6659	7326	8327	9323	9991
7.750	196.85	46.10	0.595	15.11	736	1070	1137	1204	1271	1337	1471	1672	1872	2006	3274	4760	5058	5356	5654	5947	6543	7437	8327	8923
8.625	219.08	28.00	0.304	7.72	437	636	675	715	755	795	874	993	1113	1192	1944	2829	3003	3180	3358	3536	3888	4417	4951	5302
		32.00	0.352	8.94	503	732	778	823	869	915	1006	1144	1281	1372	2237	3256	3461	3661	3866	4070	4475	5089	5698	6103
		36.00	0.400	10.16	568	827	879	930	982	1034	1137	1292	1447	1550	2527	3679	3910	4137	4368	4599	5058	5747	6437	6895
		40.00	0.450	11.43	636	925	982	1040	1098	1156	1271	1445	1618	1734	2829	4115	4368	4626	4884	5142	5654	6428	7197	7713
		44.00	0.500	12.70	702	1021	1085	1149	1212	1276	1404	1595	1787	1914	3123	4542	4826	5111	5391	5676	6245	7095	7949	8514
		49.00	0.557	14.15	776	1129	1200	1271	1341	1412	1553	1765	1977	2118	3452	5022	5338	5654	5965	6281	6908	7851	8794	9421
		52.00	0.595	15.11	826	1201	1276	1351	1426	1501	1651	1876	2101	2252	3674	5342	5676	6010	6343	6677	7344	8345	9346	10017
9.625	244.48	36.00	0.352	8.94	564	820	872	923	974	1025	1128	1282	1436	1538	2509	3648	3879	4106	4333	4559	5018	5703	6388	6841
		40.00	0.395	10.03	630	916	974	1031	1088	1145	1260	1432	1604	1718	2802	4075	4333	4586	4840	5093	5605	6370	7135	7642
		43.50	0.435	11.05	691	1005	1068	1130	1193	1256	1381	1570	1758	1884	3074	4470	4751	5026	5307	5587	6143	6984	7820	8380
		47.00	0.472	11.99	746	1086	1154	1221	1289	1357	1493	1697	1900	2036	3318	4831	5133	5431	5734	6036	6641	7549	8452	9057
		53.50	0.545	13.84	855	1244	1321	1399	1477	1555	1710	1943	2176	2332	3803	5534	5876	6223	6570	6917	7606	8643	9679	10373
		58.40	0.595	15.11	928	1350	1435	1519	1604	1688	1857	2110	2363	2532	4128	6005	6383	6757	7135	7509	8260	9386	10511	11263
		59.40	0.609	15.47	949	1380	1466	1553	1639	1725	1898	2156	2415	2588	4221	6139	6521	6908	7291	7673	8443	9590	10742	11512
		61.10	0.625	15.88	972	1414	1502	1590	1679	1767	1944	2209	2474	2651	4324	6290	6681	7073	7469	7860	8647	9826	11005	11792
9.875	250.83	62.80	0.625	15.88	999	1453	1544	1635	1725	1816	1998	2270	2543	2724	4444	6463	6868	7273	7673	8078	8888	10097	11312	12117
10.750	273.05	40.50	0.350	8.89	629	915	972	1029	1086	1144	1258	1429	1601	1715	2798	4070	4324	4577	4831	5089	5596	6357	7122	7629
		45.50	0.400	10.16	715	1040	1106	1171	1236	1301	1431	1626	1821	1951	3180	4626	4920	5209	5498	5787	6365	7233	8100	8678
		51.00	0.450	11.43	801	1165	1238	1310	1383	1456	1602	1820	2039	2184	3563	5182	5507	5827	6152	6477	7126	8096	9070	9715
		55.50	0.495	12.57	877	1276	1355	1435	1515	1595	1754	1993	2233	2392	3901	5676	6027	6383	6739	7095	7802	8865	9933	10640
		60.70	0.545	13.84	961	1398	1485	1573	1660	1747	1922	2184	2446	2621	4275	6219	6606	6997	7384	7771	8549	9715	10880	11659
		65.70	0.595	15.11	1044	1519	1613	1708	1803	1898	2088	2373	2657	2847	4644	6757	7175	7598	8020	8443	9288	10556	11819	12664
		71.10	0.650	16.51	1134	1650	1753	1856	1959	2063	2269	2578	2888	3094	5044	7340	7798	8256	8714	9177	10093	11468	12846	13763
		73.20	0.672	17.07	1170	1702	1808	1915	2021	2128	2340	2660	2979	3191	5204	7571	8042	8518	8990	9466	10409	11832	13251	14194

Data provided by Vallourec & Mannesmann; September, 2005

NEW VAM (Continued)

OD		Weight	T		Yield Strength (1,000 lb)										Yield Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
11.750	298.45	47.00	0.375	9.53	737	1072	1139	1206	1273	1340	1474	1675	1876	2010	3278	4768	5067	5365	5663	5961	6557	7451	8345	8941
		54.00	0.435	11.05	850	1237	1314	1392	1469	1546	1701	1933	2165	2319	3781	5502	5845	6192	6534	6877	7566	8598	9630	10315
		60.00	0.489	12.42	952	1384	1471	1557	1644	1730	1903	2163	2422	2595	4235	6156	6543	6926	7313	7695	8465	9621	10774	11543
		65.00	0.534	13.56	1035	1505	1599	1693	1788	1882	2070	2352	2634	2822	4604	6695	7113	7531	7953	8372	9208	10462	11717	12553
11.875	301.63	71.80	0.582	14.78	1136	1652	1755	1858	1962	2065	2271	2581	2891	3097	5053	7348	7807	8265	8727	9186	10102	11481	12860	13776
13.375	339.73	54.50	0.380	9.65	853	1241	1319	1396	1474	1551	1706	1939	2172	2327	3794	5520	5867	6210	6557	6899	7589	8625	9662	10351
		61.00	0.430	10.92	962	1399	1486	1574	1661	1749	1924	2186	2448	2623	4279	6223	6610	7001	7388	7780	8558	9724	10889	11668
		68.00	0.480	12.19	1069	1556	1653	1750	1847	1945	2139	2431	2722	2917	4755	6921	7353	7784	8216	8652	9515	10814	12108	12975
		72.00	0.514	13.06	1142	1661	1765	1869	1973	2077	2284	2596	2908	3115	5080	7388	7851	8314	8776	9239	10160	11548	12935	13856
		77.00	0.550	13.97	1219	1773	1884	1994	2105	2216	2438	2770	3102	3324	5422	7887	8380	8870	9364	9857	10845	12322	13798	14786
		80.70	0.580	14.73	1282	1865	1982	2098	2215	2331	2565	2914	3264	3497	5703	8296	8816	9332	9853	10369	11410	12962	14519	15555
		85.00	0.608	15.44	1341	1951	2073	2195	2317	2439	2682	3048	3414	3658	5965	8678	9221	9764	10307	10849	11930	13558	15186	16272
		86.00	0.625	15.88	1377	2003	2128	2253	2378	2504	2754	3129	3505	3755	6125	8910	9466	10022	10578	11138	12250	13918	15591	16703
13.625	346.08	88.20	0.625	15.88	1404	2042	2170	2297	2425	2553	2808	3191	3574	3829	6245	9083	9653	10218	10787	11356	12491	14194	15898	17032

Data provided by Vallourec & Mannesmann; September, 2005

VAM HWST

OD		T		Joint Strength (1,000 lb)										Joint Strength (kn)									
in.	mm	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
5.000	127.00	0.600	15.24	-	-	-	746	788	829	912	1037	1161	1244	-	-	-	3318	3505	3688	4057	4613	5164	5534
		0.650	16.51				799	844	888	977	1110	1244	1332				3554	3754	3950	4346	4938	5534	5925
		0.700	17.78				851	898	946	1040	1182	1324	1418				3785	3995	4208	4626	5258	5889	6308
		0.750	19.05				901	951	1001	1102	1252	1402	1502				4008	4230	4453	4902	5569	6236	6681
		0.800	20.32				950	1003	1056	1161	1320	1478	1583				4226	4462	4697	5164	5872	6574	7042
		0.850	21.59				-	-	1108	1219	1385	1551	1662				-	-	-	5422	6161	6899	7393
		0.900	22.86						1159	1275	1449	1623	1739							5671	6445	7219	7735
		0.950	24.13						1209	1330	1511	1692	1813							5916	6721	7526	8065
5.500	139.70	0.600	15.24	-	-	-	831	877	924	1016	1155	1293	1385	-	-	-	3696	3901	4110	4519	5138	5752	6161
		0.625	15.88				861	909	957	1053	1197	1340	1436				3830	4043	4257	4684	5325	5961	6388
		0.650	16.51		792	842	891	941	990	1089	1238	1387	1486		3523	3745	3963	4186	4404	4844	5507	6170	6610
		0.687	17.45		831	883	935	987	1039	1143	1299	1454	1558		3696	3928	4159	4390	4622	5084	5778	6468	6930
		0.700	17.78		844	897	950	1003	1056	1161	1320	1478	1583		3754	3990	4226	4462	4697	5164	5872	6574	7042
		0.750	19.05		895	951	1007	1063	1119	1231	1399	1567	1679		3981	4230	4479	4728	4978	5476	6223	6970	7469
		0.800	20.32		945	1004	1063	1122	1181	1299	1477	1654	1772		4204	4466	4728	4991	5253	5778	6570	7357	7882
		0.812	20.62		957	1017	1076	1136	1196	1315	1495	1674	1794		4257	4524	4786	5053	5320	5849	6650	7446	7980
		0.850	21.59				1118	1180	1242	1366	1552	1738	1863				4973	5249	5525	6076	6904	7731	8287
		0.875	22.23				1144	1208	1271	1399	1589	1780	1907				5089	5373	5654	6223	7068	7918	8483
		0.900	22.86		-	-	1171	1236	1301	1431	1626	1821	1951		-	-	5209	5498	5787	6365	7233	8100	8678
		0.925	23.5				1197	1263	1330	1462	1662	1861	1994				5325	5618	5916	6503	7393	8278	8870
		0.950	24.13				1222	1290	1358	1494	1698	1901	2037				5436	5738	6041	6646	7553	8456	9061

Data provided by Vallourec & Mannesmann; September, 2005

VAM HWST (Continued)

OD		T		Joint Strength (1,000 lb)										Joint Strength (kn)									
in.	mm	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
		0.650	16.51	671	976	1037	1098	1159	1220	1342	1525	1708	1830	2985	4341	4613	4884	5155	5427	5970	6784	7598	8140
		0.700	17.78	717	1042	1108	1173	1238	1303	1433	1629	1824	1955	3189	4635	4929	5218	5507	5796	6374	7246	8114	8696
		0.750	19.05	761	1107	1177	1246	1315	1384	1523	1730	1938	2076	3385	4924	5236	5542	5849	6156	6775	7695	8621	9235
		0.800	20.32		1171	1244	1318	1391	1464	1610	1830	2050	2196		5209	5534	5863	6187	6512	7162	8140	9119	9768
		0.850	21.59		1234	1311	1388	1465	1542	1696	1928	2159	2313		5489	5832	6174	6517	6859	7544	8576	9604	10289
		0.900	22.86		1295	1376	1457	1538	1619	1781	2023	2266	2428		5760	6121	6481	6841	7202	7922	8999	10080	10800
6.625	168.28	0.950	24.13		1355	1440	1524	1609	1694	1863	2117	2371	2541		6027	6405	6779	7157	7535	8287	9417	10547	11303
		1.000	25.40		1414	1502	1590	1679	1767	1944	2209	2474	2651		6290	6681	7073	7469	7860	8647	9826	11005	11792
		1.050	26.67	-	1471	1563	1655	1747	1839	2023	2299	2575	2759	-	6543	6953	7362	7771	8180	8999	10226	11454	12273
		1.100	27.94		1527	1623	1718	1814	1909	2100	2387	2673	2864		6792	7219	7642	8069	8492	9341	10618	11890	12740
		1.125	28.58		1555	1652	1750	1847	1944	2138	2430	2721	2916		6917	7348	7784	8216	8647	9510	10809	12104	12971
		1.150	29.21		1582	1681	1780	1879	1978	2176	2473	2769	2967		7037	7477	7918	8358	8799	9679	11000	12317	13198
		1.200	30.48		1636	1738	1841	1943	2045	2250	2557	2863	3068		7277	7731	8189	8643	9097	10008	11374	12735	13647
		0.650	16.51		1037	1102	1167	1232	1297	1426	1621	1815	1945		4613	4902	5191	5480	5769	6343	7211	8074	8652
		0.670	17.02		1066	1133	1199	1266	1332	1466	1666	1865	1999		4742	5040	5333	5631	5925	6521	7411	8296	8892
		0.687	17.45		1090	1158	1226	1294	1363	1499	1703	1908	2044		4849	5151	5454	5756	6063	6668	7575	8487	9092
		0.700	17.78		1108	1178	1247	1316	1385	1524	1732	1940	2078		4929	5240	5547	5854	6161	6779	7704	8630	9243
		0.730	18.54		1150	1222	1294	1366	1438	1582	1797	2013	2157		5115	5436	5756	6076	6397	7037	7993	8954	9595
		0.750	19.05		1178	1252	1325	1399	1473	1620	1841	2062	2209		5240	5569	5894	6223	6552	7206	8189	9172	9826
		0.800	20.32		1247	1324	1402	1480	1558	1714	1948	2181	2337		5547	5889	6236	6583	6930	7624	8665	9702	10395
		0.812	20.62		1263	1342	1421	1500	1579	1736	1973	2210	2368		5618	5970	6321	6672	7024	7722	8776	9831	10533
		0.850	21.59		1314	1396	1478	1560	1642	1807	2053	2299	2463		5845	6210	6574	6939	7304	8038	9132	10226	10956
		0.875	22.23		1347	1431	1515	1600	1684	1852	2105	2357	2526		5992	6365	6739	7117	7491	8238	9364	10484	11236
7.000	177.80	0.900	22.86	-	1380	1466	1552	1638	1725	1897	2156	2415	2587	-	6139	6521	6904	7286	7673	8438	9590	10742	11508
		0.937	23.80		1428	1517	1606	1695	1785	1963	2231	2499	2677		6352	6748	7144	7540	7940	8732	9924	11116	11908
		0.950	24.13		1444	1535	1625	1715	1806	1986	2257	2528	2708		6423	6828	7228	7629	8033	8834	10040	11245	12046
		1.000	25.40		1508	1602	1697	1791	1885	2074	2356	2639	2828		6708	7126	7549	7967	8385	9226	10480	11739	12580
		1.050	26.67		1570	1668	1766	1865	1963	2159	2453	2748	2944		6984	7420	7856	8296	8732	9604	10911	12224	13096
		1.062	26.97		1585	1684	1783	1882	1981	2179	2476	2774	2972		7050	7491	7931	8372	8812	9693	11014	12339	13220
		1.100	27.94		1631	1733	1835	1937	2039	2243	2549	2854	3058		7255	7709	8162	8616	9070	9977	11339	12695	13603
		1.150	29.21		1691	1796	1902	2008	2114	2325	2642	2959	3170		7522	7989	8461	8932	9404	10342	11752	13162	14101
		1.175	29.85		1720	1828	1935	2043	2150	2365	2688	3010	3225		7651	8131	8607	9088	9564	10520	11957	13389	14346
		1.200	30.48		1749	1859	1968	2077	2187	2405	2733	3061	3280		7780	8269	8754	9239	9728	10698	12157	13616	14590
		1.250	31.75		1806	1919	2032	2145	2258	2484	2823	3161	3387		8033	8536	9039	9541	10044	11049	12557	14061	15066
		0.650	16.51	783	1139	1211	1282	1353	1424	1567	1780	1994	2136	3483	5067	5387	5703	6018	6334	6970	7918	8870	9501
		0.687	17.45	824	1198	1273	1348	1423	1497	1647	1872	2096	2246	3665	5329	5663	5996	6330	6659	7326	8327	9323	9991
		0.700	17.78	838	1218	1294	1371	1447	1523	1675	1904	2132	2284	3728	5418	5756	6099	6437	6775	7451	8469	9484	10160
		0.750	19.05	891	1296	1377	1458	1539	1620	1782	2025	2268	2430	3963	5765	6125	6486	6846	7206	7927	9008	10089	10809
7.625	193.68	0.800	20.32	943	1372	1458	1544	1630	1715	1887	2144	2401	2573	4195	6103	6486	6868	7251	7629	8394	9537	10680	11445
		0.812	20.62	956	1390	1477	1564	1651	1738	1912	2173	2433	2607	4252	6183	6570	6957	7344	7731	8505	9666	10823	11597
		0.850	21.59	995	1447	1538	1628	1719	1809	1990	2262	2533	2714	4426	6437	6841	7242	7646	8047	8852	10062	11267	12072
		0.900	22.86	1046	1521	1616	1711	1806	1901	2092	2377	2662	2852	4653	6766	7188	7611	8033	8456	9306	10573	11841	12686
		0.905	22.99	1051	1528	1624	1720	1815	1911	2102	2388	2675	2866	4675	6797	7224	7651	8074	8501	9350	10622	11899	12749
		0.950	24.13	1096	1594	1693	1793	1893	1992	2191	2490	2789	2988	4875	7090	7531	7976	8420	8861	9746	11076	12406	13291

Data provided by Vallourec & Mannesmann; September, 2005

VAM HWST (Continued)

OD		T		Joint Strength (1,000 lb)										Joint Strength (kn)									
in.	mm	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
7.625	193.68	1.000	25.40	-	1665	1769	1873	1977	2081	2289	2602	2914	3122	-	7406	7869	8332	8794	9257	10182	11574	12962	13887
		1.050	26.67		1735	1844	1952	2060	2169	2386	2711	3036	3253		7718	8203	8683	9163	9648	10613	12059	13505	14470
		1.100	27.94		1804	1917	2029	2142	2255	2480	2819	3157	3382		8025	8527	9025	9528	10031	11032	12540	14043	15044
		1.150	29.21		1871	1988	2105	2222	2339	2573	2924	3275	3509		8323	8843	9364	9884	10404	11445	13007	14568	15609
		1.200	30.48		1938	2059	2180	2301	2422	2664	3028	3391	3633		8621	9159	9697	10235	10774	11850	13469	15084	16160
		1.250	31.75		2003	2128	2253	2378	2504	2754	3129	3505	3755		8910	9466	10022	10578	11138	12250	13918	15591	16703
8.625	219.08	0.700	17.78	959	1394	1481	1569	1656	1743	1917	2179	2440	2614	4266	6201	6588	6979	7366	7753	8527	9693	10854	11628
		0.750	19.05	1021	1484	1577	1670	1763	1856	2041	2319	2598	2783	4542	6601	7015	7429	7842	8256	9079	10315	11556	12379
		0.800	20.32	1082	1573	1672	1770	1868	1967	2163	2458	2753	2950	4813	6997	7437	7873	8309	8750	9621	10934	12246	13122
		0.850	21.59	1142	1661	1765	1869	1972	2076	2284	2595	2907	3114	5080	7388	7851	8314	8772	9235	10160	11543	12931	13852
		0.900	22.86	1201	1747	1857	1966	2075	2184	2403	2730	3058	3276	5342	7771	8260	8745	9230	9715	10689	12144	13603	14572
		0.950	24.13	1260	1832	1947	2062	2176	2291	2520	2863	3207	3436	5605	8149	8661	9172	9679	10191	11210	12735	14265	15284
		1.000	25.40	1318	1916	2036	2156	2276	2396	2635	2994	3354	3593	5863	8523	9057	9590	10124	10658	11721	13318	14919	15982
		1.050	26.67	1374	1999	2124	2249	2374	2499	2749	3123	3498	3748	6112	8892	9448	10004	10560	11116	12228	13892	15560	16672
		1.100	27.94	1430	2080	2210	2340	2470	2601	2861	3251	3641	3901	6361	9252	9831	10409	10987	11570	12726	14461	16196	17353
		1.150	29.21	1485	2160	2296	2431	2566	2701	2971	3376	3781	4051	6606	9608	10213	10814	11414	12015	13216	15017	16819	18020
		1.200	30.48	1540	2239	2379	2519	2659	2799	3079	3499	3919	4199	6850	9960	10582	11205	11828	12451	13696	15564	17433	18678
		1.250	31.75	1593	2317	2462	2607	2751	2896	3186	3620	4055	4344	7086	10307	10952	11597	12237	12882	14172	16103	18038	19323
9.625	244.48	0.672	17.07	1040	1512	1607	1701	1796	1890	2079	2363	2646	2835	4626	6726	7148	7566	7989	8407	9248	10511	11770	12611
		0.700	17.78	1079	1570	1668	1766	1865	1963	2159	2453	2748	2944	4800	6984	7420	7856	8296	8732	9604	10911	12224	13096
		0.734	18.64	1128	1640	1743	1845	1948	2050	2255	2563	2870	3075	5018	7295	7753	8207	8665	9119	10031	11401	12766	13678
		0.750	19.05	1150	1673	1777	1882	1987	2091	2300	2614	2928	3137	5115	7442	7904	8372	8839	9301	10231	11628	13024	13954
		0.797	20.24	1216	1768	1879	1989	2100	2210	2431	2763	3095	3316	5409	7864	8358	8848	9341	9831	10814	12290	13767	14750
		0.800	20.32	1220	1774	1885	1996	2107	2218	2440	2773	3105	3327	5427	7891	8385	8879	9372	9866	10854	12335	13812	14799
		0.850	21.59	1289	1875	1992	2109	2226	2343	2578	2929	3280	3515	5734	8340	8861	9381	9902	10422	11468	13029	14590	15635
		0.900	22.86	1357	1974	2097	2220	2344	2467	2714	3084	3454	3700	6036	8781	9328	9875	10427	10974	12072	13718	15364	16458
		0.950	24.13	1424	2071	2201	2330	2460	2589	2848	3236	3625	3884	6334	9212	9791	10364	10943	11516	12669	14394	16125	17277
		1.000	25.40	1490	2168	2303	2439	2574	2710	2981	3387	3793	4064	6628	9644	10244	10849	11450	12055	13260	15066	16872	18078
		1.050	26.67	1556	2263	2404	2546	2687	2829	3111	3536	3960	4243	6921	10066	10694	11325	11952	12584	13838	15729	17615	18874
		1.100	27.94	1620	2357	2504	2651	2799	2946	3241	3683	4124	4419	7206	10484	11138	11792	12451	13104	14417	16383	18344	19657
		1.150	29.21	1684	2450	2603	2756	2909	3062	3368	3827	4287	4593	7491	10898	11579	12259	12940	13620	14982	17023	19070	20431
		1.200	30.48	1747	2541	2700	2859	3017	3176	3494	3970	4447	4764	7771	11303	12010	12717	13420	14128	15542	17659	19781	21191
		1.250	31.75	1809	2631	2796	2960	3124	3289	3618	4111	4604	4933	8047	11703	12437	13167	13896	14630	16094	18287	20480	21943
10.000	254.00	0.688	17.48	1107	1610	1711	1811	1912	2013	2214	2516	2818	3019	4924	7162	7611	8056	8505	8954	9848	11192	12535	13429
		0.700	17.78	1125	1636	1738	1841	1943	2045	2250	2557	2863	3068	5004	7277	7731	8189	8643	9097	10008	11374	12735	13647
		0.732	18.59	1172	1705	1812	1918	2025	2131	2344	2664	2984	3197	5213	7584	8060	8532	9008	9479	10427	11850	13273	14221
		0.750	19.05	1199	1744	1853	1962	2071	2180	2397	2724	3051	3269	5333	7758	8243	8727	9212	9697	10662	12117	13572	14541
		0.800	20.32	1272	1850	1965	2081	2197	2312	2543	2890	3237	3468	5658	8229	8741	9257	9773	10284	11312	12855	14399	15426
		0.850	21.59	1344	1955	2077	2199	2321	2443	2688	3054	3421	3665	5978	8696	9239	9782	10324	10867	11957	13585	15217	16303
		0.900	22.86	1415	2058	2187	2316	2444	2573	2830	3216	3602	3860	6294	9154	9728	10302	10871	11445	12588	14305	16022	17170
		0.950	24.13	1486	2161	2296	2431	2566	2701	2971	3376	3781	4052	6610	9613	10213	10814	11414	12015	13216	15017	16819	18024
		1.000	25.40	1555	2262	2403	2545	2686	2827	3110	3534	3958	4241	6917	10062	10689	11321	11948	12575	13834	15720	17606	18865
		1.050	26.67	1624	2362	2509	2657	2805	2952	3248	3690	4133	4428	7224	10507	11161	11819	12477	13131	14448	16414	18384	19697
		1.100	27.94	1692	2460	2614	2768	2922	3076	3383	3845	4306	4613	7526	10943	11628	12313	12998	13683	15048	17103	19154	20520
		1.150	29.21	1759	2558	2718	2878	3038	3197	3517	3997	4476	4796	7824	11379	12090	12802	13514	14221	15644	17780	19910	21334
		1.200	30.48	1825	2654	2820	2986	3152	3318	3649	4147	4645	4976	8118	11806	12544	13282	14021	14759	16232	18447	20662	22134
		1.250	31.75	1890	2749	2921	3092	3264	3436	3780	4295	4811	5154	8407	12228	12993	13754	14519	15284	16814	19105	21400	22926

Data provided by Vallourec & Mannesmann; September, 2005

VAM HWST (Continued)

OD		T		Joint Strength (1,000 lb)										Joint Strength (kn)									
in.	mm	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
10.750	273.05	0.595	15.11	1044	1519	1613	1708	1803	1898	2088	2373	2657	2847	4644	6757	7175	7598	8020	8443	9288	10556	11819	12664
		0.650	16.51	1134	1650	1753	1856	1959	2063	2269	2578	2888	3094	5044	7340	7798	8256	8714	9177	10093	11468	12846	13763
		0.672	17.07	1170	1702	1808	1915	2021	2128	2340	2660	2979	3191	5204	7571	8042	8518	8990	9466	10409	11832	13251	14194
		0.700	17.78	1216	1768	1879	1989	2100	2210	2431	2763	3094	3315	5409	7864	8358	8848	9341	9831	10814	12290	13763	14746
		0.734	18.64	1270	1848	1963	2079	2194	2310	2541	2887	3233	3464	5649	8220	8732	9248	9759	10275	11303	12842	14381	15409
		0.750	19.05	1296	1885	2003	2121	2238	2356	2592	2945	3299	3534	5765	8385	8910	9435	9955	10480	11530	13100	14675	15720
		0.797	20.24	1371	1994	2118	2243	2367	2492	2741	3115	3489	3738	6099	8870	9421	9977	10529	11085	12193	13856	15520	16627
		0.800	20.32	1375	2001	2126	2251	2376	2501	2751	3126	3501	3751	6116	8901	9457	10013	10569	11125	12237	13905	15573	16685
		0.850	21.59	1454	2115	2247	2379	2512	2644	2908	3305	3701	3966	6468	9408	9995	10582	11174	11761	12935	14701	16463	17642
		0.859	21.82	1468	2135	2269	2402	2536	2669	2936	3337	3737	4004	6530	9497	10093	10685	11281	11872	13060	14844	16623	17811
		0.900	22.86	1532	2228	2367	2507	2646	2785	3064	3481	3899	4178	6815	9911	10529	11152	11770	12388	13629	15484	17344	18585
		0.950	24.13	1609	2340	2486	2632	2779	2925	3217	3656	4095	4387	7157	10409	11058	11708	12362	13011	14310	16263	18215	19514
		0.960	24.38	1624	2362	2510	2657	2805	2953	3248	3691	4134	4429	7224	10507	11165	11819	12477	13136	14448	16418	18389	19701
		0.984	24.99	1660	2415	2566	2717	2868	3019	3321	3774	4227	4529	7384	10742	11414	12086	12757	13429	14773	16788	18803	20146
		1.000	25.40	1685	2450	2604	2757	2910	3063	3369	3829	4288	4595	7495	10898	11583	12264	12944	13625	14986	17032	19074	20440
		1.050	26.67	1760	2560	2720	2880	3040	3200	3520	4000	4480	4800	7829	11387	12099	12811	13523	14234	15658	17793	19928	21351
		1.100	27.94	1834	2668	2835	3001	3168	3335	3668	4169	4669	5002	8158	11868	12611	13349	14092	14835	16316	18545	20769	22250
		1.150	29.21	1908	2775	2948	3121	3295	3468	3815	4335	4856	5202	8487	12344	13113	13883	14657	15426	16970	19283	21601	23140
		1.200	30.48	1980	2880	3060	3240	3420	3600	3960	4500	5040	5400	8807	12811	13612	14412	15213	16014	17615	20017	22419	24020
		1.250	31.75	2052	2984	3171	3358	3544	3731	4104	4663	5223	5596	9128	13273	14105	14937	15764	16596	18255	20742	23233	24892
11.750	298.45	0.650	16.51	1247	1813	1927	2040	2153	2267	2493	2833	3173	3400	5547	8065	8572	9074	9577	10084	11089	12602	14114	15124
		0.700	17.78	1337	1944	2066	2187	2309	2430	2673	3038	3402	3645	5947	8647	9190	9728	10271	10809	11890	13514	15133	16214
		0.750	19.05	1425	2073	2203	2333	2462	2592	2851	3240	3629	3888	6339	9221	9799	10378	10952	11530	12682	14412	16143	17295
		0.800	20.32	1514	2202	2339	2477	2614	2752	3027	3440	3853	4128	6735	9795	10404	11018	11628	12242	13465	15302	17139	18362
		0.850	21.59	1601	2329	2474	2620	2765	2911	3202	3638	4075	4366	7122	10360	11005	11654	12299	12949	14243	16183	18126	19421
		0.860	21.84	1618	2354	2501	2648	2795	2942	3236	3678	4119	4413	7197	10471	11125	11779	12433	13087	14394	16361	18322	19630
		0.900	22.86	1687	2454	2608	2761	2914	3068	3375	3835	4295	4602	7504	10916	11601	12282	12962	13647	15013	17059	19105	20471
		0.950	24.13	1773	2579	2740	2901	3062	3223	3546	4029	4513	4835	7887	11472	12188	12904	13620	14337	15773	17922	20075	21507
12.750	323.85	0.984	-	2001	2910	3092	3274	3455	3637	4001	4547	5092	5456	8901	12944	13754	14563	15369	16178	17797	20226	22650	24269
13.375	339.73	0.650	16.51	1429	2079	2209	2339	2469	2599	2858	3248	3638	3898	6357	9248	9826	10404	10983	11561	12713	14448	16183	17339
		0.700	17.78	1533	2230	2369	2509	2648	2787	3066	3484	3902	4181	6819	9920	10538	11161	11779	12397	13638	15498	17357	18598
		0.750	19.05	1636	2380	2528	2677	2826	2975	3272	3718	4165	4462	7277	10587	11245	11908	12571	13233	14555	16538	18527	19848
		0.800	20.32	1738	2528	2686	2844	3002	3160	3476	3951	4425	4741	7731	11245	11948	12651	13354	14056	15462	17575	19683	21089
		0.850	21.59	1840	2676	2843	3010	3177	3345	3679	4181	4682	5017	8185	11903	12646	13389	14132	14879	16365	18598	20827	22317
		0.900	22.86	1940	2822	2998	3174	3351	3527	3880	4409	4938	5291	8630	12553	13336	14119	14906	15689	17259	19612	21965	23536
		0.917	23.29	1974	2871	3051	3230	3410	3589	3948	4486	5025	5384	8781	12771	13572	14368	15168	15965	17562	19955	22352	23949
		0.950	24.13	2040	2967	3152	3337	3523	3708	4079	4635	5192	5562	9074	13198	14021	14844	15671	16494	18144	20617	23095	24741
14.000	355.60	0.600	15.24	1389	2021	2147	2273	2400	2526	2778	3157	3536	3789	6179	8990	9550	10111	10676	11236	12357	14043	15729	16854
		0.650	16.51	1499	2181	2317	2453	2590	2726	2999	3408	3817	4089	6668	9702	10307	10911	11521	12126	13340	15160	16979	18189
		0.700	17.78	1609	2340	2486	2632	2779	2925	3217	3656	4095	4387	7157	10409	11058	11708	12362	13011	14310	16263	18215	19514
		0.750	19.05	1717	2498	2654	2810	2966	3122	3434	3903	4371	4683	7638	11112	11806	12499	13193	13887	15275	17361	19443	20831
		0.800	20.32	1825	2654	2820	2986	3152	3318	3649	4147	4645	4976	8118	11806	12544	13282	14021	14759	16232	18447	20662	22134
		0.850	21.59	1931	2809	2985	3160	3336	3512	3863	4389	4916	5267	8590	12495	13278	14056	14839	15622	17183	19523	21867	23429
		0.900	22.86	2037	2963	3148	3334	3519	3704	4074	4630	5185	5556	9061	13180	14003	14830	15653	16476	18122	20595	23064	24714
		0.950	24.13	2142	3116	3311	3505	3700	3895	4284	4869	5453	5842	9528	13861	14728	15591	16458	17326	19056	21658	24256	25987

Data provided by Vallourec & Mannesmann; September, 2005

VAM SW

OD		Weight	T		Joint Strength (1,000 lb)							Joint Strength (kn)						
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi
7.000	177.80	23.00	0.317	8.05	366	532	566	599	632	666	732	1628	2366	2518	2664	2811	2963	3256
		26.00	0.362	9.19	415	604	642	679	717	755	830	1846	2687	2856	3020	3189	3358	3692
		29.00	0.408	10.36	465	676	718	760	803	845	929	2068	3007	3194	3381	3572	3759	4132
8.625	219.08	28.00	0.304	7.72	437	636	675	715	755	795	874	1944	2829	3003	3180	3358	3536	3888
		32.00	0.352	8.94	503	732	778	824	869	915	1007	2237	3256	3461	3665	3866	4070	4479
		36.00	0.400	10.16	568	827	878	930	982	1034	1137	2527	3679	3906	4137	4368	4599	5058
		40.00	0.450	11.43	636	925	982	1040	1098	1156	1271	2829	4115	4368	4626	4884	5142	5654
9.625	244.48	40.00	0.395	10.03	630	916	974	1031	1088	1146	1260	2802	4075	4333	4586	4840	5098	5605
		43.50	0.435	11.05	691	1005	1068	1130	1193	1256	1382	3074	4470	4751	5026	5307	5587	6147
		47.00	0.472	11.99	746	1086	1154	1221	1289	1357	1493	3318	4831	5133	5431	5734	6036	6641
		53.50	0.545	13.84	855	1244	1321	1399	1477	1555	1710	3803	5534	5876	6223	6570	6917	7606
13.375	339.73	61.00	0.430	10.92	962	1399	1486	1574	1661	1749	1924	4279	6223	6610	7001	7388	7780	8558
		68.00	0.480	12.19	1069	1556	1653	1750	1847	1945	2139	4755	6921	7353	7784	8216	8652	9515
		72.00	0.514	13.06	1142	1661	1765	1869	1973	2077	2284	5080	7388	7851	8314	8776	9239	10160

Data provided by Vallourec & Mannesmann; September, 2005

DINO VAM

OD		Weight	T		Yield Strength (1,000 lb)								Yield Strength (kn)							
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi
9.625	244.48	36.00	0.352	8.94	564	820	872	923	974	1025	1128	1282	2509	3648	3879	4106	4333	4559	5018	5703
		40.00	0.395	10.03	630	916	974	1031	1088	1145	1260	1432	2802	4075	4333	4586	4840	5093	5605	6370
		43.50	0.435	11.05	691	1005	1068	1130	1193	1256	1381	1570	3074	4470	4751	5026	5307	5587	6143	6984
		47.00	0.472	11.99	746	1086	1154	1221	1289	1357	1493	1697	3318	4831	5133	5431	5734	6036	6641	7549
		53.50	0.545	13.84	855	1244	1321	1399	1477	1555	1710	1943	3803	5534	5876	6223	6570	6917	7606	8643
		58.40	0.595	15.11	928	1350	1435	1519	1604	1688	1857	2110	4128	6005	6383	6757	7135	7509	8260	9386
		59.40	0.609	15.47	949	1380	1466	1553	1639	1725	1898	2156	4221	6139	6521	6908	7291	7673	8443	9590
		61.10	0.625	15.88	972	1414	1502	1590	1679	1767	1944	2209	4324	6290	6681	7073	7469	7860	8647	9826
		64.90	0.672	17.07	1040	1512	1607	1701	1796	1890	2079	2363	4626	6726	7148	7566	7989	8407	9248	10511
		70.30	0.734	18.64	1122	1632	1734	1836	1938	2040	2244	2550	4991	7259	7713	8167	8621	9074	9982	11343
		71.80	0.750	19.05																
9.750	247.65	59.20	0.595	15.11	941	1369	1455	1540	1626	1711	1882	2139	4186	6090	6472	6850	7233	7611	8372	9515
		60.20	0.609	15.47	962	1399	1487	1574	1661	1749	1924	2186	4279	6223	6615	7001	7388	7780	8558	9724
9.875	250.83	62.80	0.625	15.88	999	1453	1544	1635	1725	1816	1998	2270	4444	6463	6868	7273	7673	8078	8888	10097
		66.40	0.661	16.79	1052	1531	1626	1722	1818	1913	2105	2392	4680	6810	7233	7660	8087	8509	9364	10640
		67.50	0.678	17.22	1077	1567	1665	1763	1861	1959	2155	2449	4791	6970	7406	7842	8278	8714	9586	10894
		68.90	0.700	17.78	1110	1614	1715	1816	1917	2018	2219	2522	4938	7179	7629	8078	8527	8977	9871	11218
		70.50	0.720	18.29	1136	1652	1756	1859	1962	2066	2272	2582	5053	7348	7811	8269	8727	9190	10106	11485
10.750	273.05	40.50	0.350	8.89	629	915	972	1029	1086	1144	1258	1429	2798	4070	4324	4577	4831	5089	5596	6357
		45.50	0.400	10.16	715	1040	1106	1171	1236	1301	1431	1626	3180	4626	4920	5209	5498	5787	6365	7233
		51.00	0.450	11.43	801	1165	1238	1310	1383	1456	1602	1820	3563	5182	5507	5827	6152	6477	7126	8096
		55.50	0.495	12.57	877	1276	1355	1435	1515	1595	1754	1993	3901	5676	6027	6383	6739	7095	7802	8865
		60.70	0.545	13.84	961	1398	1485	1573	1660	1747	1922	2184	4275	6219	6606	6997	7384	7771	8549	9715
		65.70	0.595	15.11	1044	1519	1613	1708	1803	1898	2088	2373	4644	6757	7175	7598	8020	8443	9288	10556
		66.15	0.611	15.52	1070	1557	1654	1752	1849	1946	2141	2433	4760	6926	7357	7793	8225	8656	9524	10823
		73.20	0.672	17.07	1170	1702	1808	1915	2021	2128	2340	2660	5204	7571	8042	8518	8990	9466	10409	11832
		76.10	0.709	18.01	1230	1789	1901	2013	2125	2237	2460	2796	5471	7958	8456	8954	9452	9951	10943	12437
		79.20	0.734	18.64	1270	1848	1963	2079	2194	2310	2541	2887	5649	8220	8732	9248	9759	10275	11303	12842
11.625	295.28	71.80	0.582	14.78	1111	1615	1716	1817	1918	2019	2221	2524	4942	7184	7633	8082	8532	8981	9879	11227

Data provided by Vallourec & Mannesmann; September, 2005

DINO VAM (Continued)

OD		Weight	T		Yield Strength (1,000 lb)								Yield Strength (kn)							
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi
11.750	298.45	47.00	0.375	9.53	737	1072	1139	1206	1273	1340	1474	1675	3278	4768	5067	5365	5663	5961	6557	7451
		54.00	0.435	11.05	850	1237	1314	1392	1469	1546	1701	1933	3781	5502	5845	6192	6534	6877	7566	8598
		60.00	0.489	12.42	952	1384	1471	1557	1644	1730	1903	2163	4235	6156	6543	6926	7313	7695	8465	9621
		65.00	0.534	13.56	1035	1505	1599	1693	1788	1882	2070	2352	4604	6695	7113	7531	7953	8372	9208	10462
		71.00	0.582	14.78	1123	1634	1736	1838	1940	2042	2246	2553	4995	7268	7722	8176	8630	9083	9991	11356
13.375	339.73	54.50	0.380	9.65	853	1241	1319	1396	1474	1551	1706	1939	3794	5520	5867	6210	6557	6899	7589	8625
		61.00	0.430	10.92	962	1399	1486	1574	1661	1749	1924	2186	4279	6223	6610	7001	7388	7780	8558	9724
		68.00	0.480	12.19	1069	1556	1653	1750	1847	1945	2139	2431	4755	6921	7353	7784	8216	8652	9515	10814
		72.00	0.514	13.06	1142	1661	1765	1869	1973	2077	2284	2596	5080	7388	7851	8314	8776	9239	10160	11548
		77.00	0.550	13.97	1219	1773	1884	1994	2105	2216	2438	2770	5422	7887	8380	8870	9364	9857	10845	12322
		80.70	0.580	14.73	1282	1865	1982	2098	2215	2331	2565	2914	5703	8296	8816	9332	9853	10369	11410	12962
		85.00	0.608	15.44	1341	1951	2073	2195	2317	2439	2682	3048	5965	8678	9221	9764	10307	10849	11930	13558
		86.00	0.625	15.88	1377	2003	2128	2253	2378	2504	2754	3129	6125	8910	9466	10022	10578	11138	12250	13918
13.625	346.08	88.20	0.625	15.88	1400	2036	2164	2291	2418	2545	2800	3182	6228	9057	9626	10191	10756	11321	12455	14154
14.000	355.60	82.50	0.562	14.27	1305	1898	2017	2135	2254	2373	2610	2966	5805	8443	8972	9497	10026	10556	11610	13193
		86.00	0.600	15.24	1389	2021	2147	2273	2400	2526	2778	3157	6179	8990	9550	10111	10676	11236	12357	14043
		93.00	0.650	16.51	1499	2181	2317	2453	2590	2726	2999	3408	6668	9702	10307	10911	11521	12126	13340	15160
		94.80	0.656	16.66	1513	2200	2338	2475	2613	2750	3025	3438	6730	9786	10400	11009	11623	12233	13456	15293
		99.00	0.688	17.48	1583	2302	2446	2590	2733	2877	3165	3597	7042	10240	10880	11521	12157	12798	14079	16000
		100.00	0.700	17.78	1609	2340	2486	2632	2779	2925	3217	3656	7157	10409	11058	11708	12362	13011	14310	16263
		106.00	0.750	19.05	1717	2498	2654	2810	2966	3122	3434	3903	7638	11112	11806	12499	13193	13887	15275	17361
		114.00	0.800	20.32	1820	2648	2813	2978	3144	3309	3640	4137	8096	11779	12513	13247	13985	14719	16192	18402
16.000	406.40	65.00	0.375	9.53	1012	1473	1565	1657	1749	1841	2025	2301	4502	6552	6961	7371	7780	8189	9008	10235
		75.00	0.438	11.13	1178	1713	1820	1927	2034	2141	2356	2677	5240	7620	8096	8572	9048	9524	10480	11908
		84.00	0.495	12.57	1326	1929	2050	2170	2291	2411	2652	3014	5898	8581	9119	9653	10191	10725	11797	13407
		84.80	0.500	12.70	1339	1948	2069	2191	2313	2435	2678	3043	5956	8665	9203	9746	10289	10831	11912	13536
		94.50	0.562	14.27	1499	2181	2317	2453	2589	2726	2998	3407	6668	9702	10307	10911	11516	12126	13336	15155
		97.00	0.575	14.61	1533	2229	2368	2508	2647	2786	3065	3483	6819	9915	10533	11156	11774	12393	13634	15493
		104.00	0.625	15.88	1660	2415	2566	2717	2868	3019	3321	3774	7384	10742	11414	12086	12757	13429	14773	16788
		109.00	0.656	16.66	1739	2530	2688	2846	3004	3162	3478	3953	7735	11254	11957	12660	13362	14065	15471	17584
		128.00	0.781	19.84	2054	2987	3174	3361	3547	3734	4108	4668	9137	13287	14119	14950	15778	16610	18273	20764

Data provided by Vallourec & Mannesmann; September, 2005

VAM SLIJ - II

OD		Weight	T		Yield Strength (1,000 lb)							Yield Strength (kn)						
in.	*mm*	lb/ft	in.	*mm*	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi
4.500	*114.30*	15.10	0.337	*8.56*	250	266	281	297	313	344	391	1112	1183	1250	1321	1392	1530	1739
		17.00	0.380	*9.65*	290	308	326	344	363	399	453	1290	1370	1450	1530	1615	1775	2015
		18.90	0.430	*10.92*	326	347	367	388	408	449	510	1450	1544	1632	1726	1815	1997	2269
		21.50	0.500	*12.70*	380	404	428	451	475	523	594	1690	1797	1904	2006	2113	2326	2642
5.000	*127.00*	18.00	0.362	*9.19*	302	321	340	359	378	415	472	1343	1428	1512	1597	1681	1846	2100
		20.30	0.408	*10.36*	354	376	398	420	442	486	553	1575	1673	1770	1868	1966	2162	2460
		20.80	0.422	*10.72*	370	393	416	439	462	508	577	1646	1748	1850	1953	2055	2260	2567
		21.40	0.437	*11.10*	386	411	435	459	483	531	604	1717	1828	1935	2042	2148	2362	2687
		23.20	0.478	*12.14*	419	446	472	498	524	577	655	1864	1984	2100	2215	2331	2567	2914
		24.10	0.500	*12.70*	437	465	492	519	547	601	684	1944	2068	2189	2309	2433	2673	3043
		26.70	0.562	*14.27*	486	517	547	578	608	669	760	2162	2300	2433	2571	2705	2976	3381
		29.20	0.625	*15.88*	535	568	602	635	669	736	836	2380	2527	2678	2825	2976	3274	3719
5.500	*139.70*	20.00	0.361	*9.17*	330	351	371	392	413	454	516	1468	1561	1650	1744	1837	2019	2295
		23.00	0.415	*10.54*	397	421	446	471	496	545	620	1766	1873	1984	2095	2206	2424	2758
		23.80	0.437	*11.10*	424	451	477	504	530	583	663	1886	2006	2122	2242	2358	2593	2949
		26.00	0.476	*12.09*	467	496	525	554	583	642	729	2077	2206	2335	2464	2593	2856	3243
		26.80	0.500	*12.70*	491	521	552	583	614	675	767	2184	2318	2455	2593	2731	3003	3412
		28.40	0.530	*13.46*	521	553	586	618	651	716	813	2318	2460	2607	2749	2896	3185	3616
		29.70	0.562	*14.27*	553	587	622	656	691	760	863	2460	2611	2767	2918	3074	3381	3839
		32.00	0.612	*15.54*	596	633	671	708	745	820	932	2651	2816	2985	3149	3314	3648	4146
		32.60	0.625	*15.88*	610	648	686	724	762	838	953	2713	2882	3051	3221	3390	3728	4239
6.625	*168.28*	28.00	0.417	*10.59*	478	507	537	567	597	657	746	2126	2255	2389	2522	2656	2922	3318
		32.00	0.475	*12.07*	565	601	636	671	707	777	883	2513	2673	2829	2985	3145	3456	3928
		33.00	0.500	*12.70*	592	629	666	703	740	814	925	2633	2798	2963	3127	3292	3621	4115
		34.50	0.525	*13.34*	758	805	852	900	947	1042	1184	3372	3581	3790	4003	4212	4635	5267
		36.70	0.562	*14.27*	681	724	767	809	852	937	1065	3029	3221	3412	3599	3790	4168	4737
		40.20	0.625	*15.88*	757	804	852	899	946	1041	1183	3367	3576	3790	3999	4208	4631	5262
		43.70	0.687	*17.45*	833	885	937	989	1041	1145	1301	3705	3937	4168	4399	4631	5093	5787
6.875	*174.63*	32.70	0.478	*12.14*	580	616	653	689	725	798	907	2580	2740	2905	3065	3225	3550	4035
7.000	*177.80*	26.00	0.362	*9.19*	416	442	468	494	520	572	650	1850	1966	2082	2197	2313	2544	2891
		29.00	0.408	*10.36*	491	521	552	583	614	675	767	2184	2318	2455	2593	2731	3003	3412
		32.00	0.453	*11.51*	553	588	622	657	692	761	865	2460	2616	2767	2922	3078	3385	3848
		35.00	0.498	*12.65*	625	664	703	742	781	860	977	2780	2954	3127	3301	3474	3825	4346
		38.00	0.540	*13.72*	692	736	779	822	865	952	1082	3078	3274	3465	3656	3848	4235	4813
		41.00	0.590	*14.99*	761	808	856	903	951	1046	1189	3385	3594	3808	4017	4230	4653	5289
		42.70	0.625	*15.88*	807	857	908	958	1009	1109	1261	3590	3812	4039	4261	4488	4933	5609
		44.00	0.640	*16.26*	827	879	930	982	1034	1137	1292	3679	3910	4137	4368	4599	5058	5747
		45.40	0.670	*17.02*	863	917	971	1025	1079	1187	1349	3839	4079	4319	4559	4800	5280	6001
		46.40	0.687	*17.45*	882	937	993	1048	1103	1213	1379	3923	4168	4417	4662	4906	5396	6134
		49.50	0.730	*18.54*	931	989	1047	1105	1164	1280	1455	4141	4399	4657	4915	5178	5694	6472

Data provided by Vallourec & Mannesmann; September, 2005

VAM SLIJ - II (Continued)

OD		Weight	T		Yield Strength (1,000 lb)							Yield Strength (kn)						
in.	*mm*	lb/ft	in.	*mm*	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi
7.625	*193.68*	29.70	0.375	*9.53*	473	503	532	562	591	650	739	2104	2237	2366	2500	2629	2891	3287
		33.70	0.430	*10.92*	570	605	641	676	712	783	890	2535	2691	2851	3007	3167	3483	3959
		39.00	0.500	*12.70*	682	724	767	810	852	938	1065	3034	3221	3412	3603	3790	4172	4737
		42.80	0.562	*14.27*	789	838	887	937	986	1084	1232	3510	3728	3946	4168	4386	4822	5480
		45.30	0.595	*15.11*	842	895	948	1000	1053	1158	1316	3745	3981	4217	4448	4684	5151	5854
		47.10	0.625	*15.88*	881	936	991	1046	1101	1211	1376	3919	4164	4408	4653	4897	5387	6121
		51.20	0.687	*17.45*	975	1036	1097	1158	1219	1341	1524	4337	4608	4880	5151	5422	5965	6779
		52.10	0.700	*17.78*	994	1056	1118	1180	1242	1366	1553	4422	4697	4973	5249	5525	6076	6908
		52.80	0.712	*18.08*	1014	1077	1141	1204	1267	1394	1584	4510	4791	5075	5356	5636	6201	7046
		55.30	0.750	*19.05*	1067	1134	1201	1267	1334	1468	1668	4746	5044	5342	5636	5934	6530	7420
		59.20	0.812	*20.62*	1130	1201	1271	1342	1412	1554	1766	5026	5342	5654	5970	6281	6913	7856
7.750	*196.85*	46.10	0.595	*15.11*	843	896	948	1001	1054	1159	1317	3750	3986	4217	4453	4688	5155	5858
		46.90	0.615	*15.62*	877	932	987	1041	1096	1206	1370	3901	4146	4390	4631	4875	5365	6094
		47.60	0.625	*15.88*	895	951	1007	1063	1119	1231	1399	3981	4230	4479	4728	4978	5476	6223
		48.60	0.640	*16.26*	921	979	1036	1094	1151	1266	1439	4097	4355	4608	4866	5120	5631	6401
8.625	*219.08*	36.00	0.400	*10.16*	579	615	651	687	723	796	904	2576	2736	2896	3056	3216	3541	4021
		40.00	0.450	*11.43*	667	709	751	792	834	917	1042	2967	3154	3341	3523	3710	4079	4635
		44.00	0.500	*12.70*	766	814	862	910	958	1053	1197	3407	3621	3834	4048	4261	4684	5325
		49.00	0.557	*14.15*	879	934	989	1044	1099	1209	1374	3910	4155	4399	4644	4889	5378	6112
		49.10	0.562	*14.27*	888	944	999	1055	1110	1221	1388	3950	4199	4444	4693	4938	5431	6174
		52.00	0.595	*15.11*	944	1003	1062	1121	1180	1298	1475	4199	4462	4724	4986	5249	5774	6561
		54.00	0.625	*15.88*	992	1054	1116	1178	1240	1364	1550	4413	4688	4964	5240	5516	6067	6895
		58.70	0.687	*17.45*	1105	1174	1243	1312	1381	1519	1726	4915	5222	5529	5836	6143	6757	7678
		63.50	0.750	*19.05*	1205	1280	1355	1431	1506	1657	1883	5360	5694	6027	6365	6699	7371	8376
9.625	*244.48*	43.50	0.435	*11.05*	698	741	785	828	872	959	1090	3105	3296	3492	3683	3879	4266	4849
		47.00	0.472	*11.99*	780	829	878	927	976	1073	1220	3470	3688	3906	4123	4341	4773	5427
		53.50	0.545	*13.84*	927	985	1043	1101	1159	1275	1449	4123	4381	4639	4897	5155	5671	6445
		58.40	0.595	*15.11*	1037	1102	1166	1231	1296	1426	1620	4613	4902	5187	5476	5765	6343	7206
		59.40	0.609	*15.47*	1068	1135	1202	1268	1335	1469	1669	4751	5049	5347	5640	5938	6534	7424
		61.10	0.625	*15.88*	1100	1169	1238	1307	1376	1513	1719	4893	5200	5507	5814	6121	6730	7646
		64.90	0.672	*17.07*	1199	1273	1348	1423	1498	1648	1873	5333	5663	5996	6330	6663	7331	8332
		70.30	0.734	*18.64*	1319	1402	1484	1566	1649	1814	2061	5867	6236	6601	6966	7335	8069	9168
		71.80	0.750	*19.05*	1354	1439	1523	1608	1692	1862	2116	6023	6401	6775	7153	7526	8283	9412
		75.60	0.797	*20.24*	1446	1537	1627	1718	1808	1989	2260	6432	6837	7237	7642	8042	8848	10053
		80.80	0.859	*21.82*	1514	1608	1703	1798	1892	2081	2365	6735	7153	7575	7998	8416	9257	10520
9.750	*247.65*	59.20	0.595	*15.11*	1049	1114	1180	1245	1311	1442	1639	4666	4955	5249	5538	5832	6414	7291
		62.80	0.625	*15.88*	1128	1198	1269	1339	1410	1551	1762	5018	5329	5645	5956	6272	6899	7838
		65.30	0.650	*16.51*	1185	1259	1333	1408	1482	1630	1852	5271	5600	5929	6263	6592	7251	8238
		66.90	0.668	*16.97*	1225	1301	1378	1454	1531	1684	1914	5449	5787	6130	6468	6810	7491	8514
		68.90	0.700	*17.78*	1284	1364	1444	1524	1604	1765	2006	5712	6067	6423	6779	7135	7851	8923
10.000	*254.00*	67.20	0.672	*17.07*	1249	1327	1405	1483	1561	1717	1951	5556	5903	6250	6597	6944	7638	8678
		68.70	0.688	*17.48*	1286	1366	1447	1527	1607	1768	2009	5720	6076	6437	6792	7148	7864	8936

Data provided by Vallourec & Mannesmann; September, 2005

VAM SLIJ - II (Continued)

OD		Weight	T		Yield Strength (1,000 lb)							Yield Strength (kn)						
in.	*mm*	lb/ft	in.	*mm*	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi
10.750	*273.05*	51.00	0.450	*11.43*	813	864	915	966	1017	1118	1271	3616	3843	4070	4297	4524	4973	5654
		55.50	0.495	*12.57*	926	984	1042	1100	1157	1273	1447	4119	4377	4635	4893	5147	5663	6437
		60.70	0.545	*13.84*	1033	1097	1162	1226	1291	1420	1614	4595	4880	5169	5454	5743	6316	7179
		65.70	0.595	*15.11*	1157	1229	1301	1374	1446	1590	1807	5147	5467	5787	6112	6432	7073	8038
		71.10	0.650	*16.51*	1293	1374	1454	1535	1616	1778	2020	5752	6112	6468	6828	7188	7909	8985
		73.20	0.672	*17.07*	1347	1432	1516	1600	1684	1853	2105	5992	6370	6744	7117	7491	8243	9364
		75.90	0.700	*17.78*	1402	1490	1577	1665	1752	1928	2191	6236	6628	7015	7406	7793	8576	9746
		79.20	0.734	*18.64*	1468	1560	1652	1744	1836	2019	2294	6530	6939	7348	7758	8167	8981	10204
		80.80	0.750	*19.05*	1505	1599	1693	1787	1881	2070	2352	6695	7113	7531	7949	8367	9208	10462
		85.30	0.797	*20.24*	1614	1715	1816	1917	2018	2220	2523	7179	7629	8078	8527	8977	9875	11223
		97.10	0.922	*23.42*	1862	1979	2095	2211	2328	2561	2910	8283	8803	9319	9835	10355	11392	12944
11.750	*298.45*	54.00	0.435	*11.05*	837	889	941	994	1046	1150	1307	3723	3954	4186	4422	4653	5115	5814
		60.00	0.489	*12.42*	985	1047	1109	1170	1232	1355	1540	4381	4657	4933	5204	5480	6027	6850
		65.00	0.534	*13.56*	1088	1156	1224	1292	1360	1496	1700	4840	5142	5445	5747	6050	6655	7562
		71.00	0.582	*14.78*	1218	1294	1371	1447	1523	1675	1904	5418	5756	6099	6437	6775	7451	8469
		74.60	0.618	*15.70*	1317	1399	1481	1564	1646	1810	2057	5858	6223	6588	6957	7322	8051	9150
		75.40	0.625	*15.88*	1336	1419	1502	1586	1669	1836	2087	5943	6312	6681	7055	7424	8167	9283
		78.80	0.656	*16.66*	1418	1507	1596	1684	1773	1950	2216	6308	6703	7099	7491	7887	8674	9857
		80.50	0.672	*17.07*	1462	1553	1645	1736	1828	2010	2284	6503	6908	7317	7722	8131	8941	10160
		82.60	0.691	*17.55*	1513	1608	1702	1797	1892	2081	2364	6730	7153	7571	7993	8416	9257	10516
		87.40	0.734	*18.64*	1629	1731	1833	1935	2036	2240	2546	7246	7700	8154	8607	9057	9964	11325
11.875	*301.63*	71.80	0.582	*14.78*	1226	1302	1379	1455	1532	1685	1915	5454	5792	6134	6472	6815	7495	8518
12.063	*306.40*	78.08	0.640	*16.26*	1401	1489	1576	1664	1751	1926	2189	6232	6623	7010	7402	7789	8567	9737
12.125	*307.98*	87.70	0.720	*18.29*	1626	1727	1829	1930	2032	2235	2540	7233	7682	8136	8585	9039	9942	11298
12.750	*323.85*	86.70	0.672	*17.07*	1516	1610	1705	1800	1895	2084	2368	6744	7162	7584	8007	8429	9270	10533
13.375	*339.73*	68.00	0.480	*12.19*	1054	1119	1185	1251	1317	1449	1646	4688	4978	5271	5565	5858	6445	7322
		72.00	0.514	*13.06*	1162	1234	1307	1380	1452	1597	1815	5169	5489	5814	6139	6459	7104	8074
		77.00	0.550	*13.97*	1275	1355	1434	1514	1594	1753	1992	5671	6027	6379	6735	7090	7798	8861
		80.70	0.580	*14.73*	1366	1451	1537	1622	1707	1878	2134	6076	6454	6837	7215	7593	8354	9493
		85.00	0.608	*15.44*	1451	1542	1632	1723	1814	1995	2267	6454	6859	7259	7664	8069	8874	10084
		86.00	0.625	*15.88*	1505	1599	1693	1787	1881	2069	2351	6695	7113	7531	7949	8367	9203	10458
		92.00	0.672	*17.07*	1649	1752	1855	1958	2062	2268	2577	7335	7793	8251	8710	9172	10089	11463
		98.00	0.719	*18.26*	1793	1906	2018	2130	2242	2466	2802	7976	8478	8977	9475	9973	10969	12464
13.625	*346.08*	88.20	0.625	*15.88*	1531	1627	1723	1818	1914	2106	2393	6810	7237	7664	8087	8514	9368	10645
14.000	*355.60*	115.00	0.812	*20.62*	2064	2193	2322	2451	2580	2838	3226	9181	9755	10329	10903	11476	12624	14350

Data provided by Vallourec & Mannesmann; September, 2005

VAM FJL

OD		Weight	T		Yield Strength (1,000 lb)										Yield Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
2.375	60.33	4.60	0.190	4.83	32	47	50	53	56	59	64	73	82	88	142	209	222	236	249	262	285	325	365	391
		5.10	0.218	5.54	42	61	65	68	72	76	84	95	106	114	187	271	289	302	320	338	374	423	472	507
		5.80	0.254	6.45	51	75	80	84	89	94	103	117	131	140	227	334	356	374	396	418	458	520	583	623
		6.30	0.280	7.11	56	81	86	91	96	102	112	127	142	152	249	360	383	405	427	454	498	565	632	676
		7.35	0.336	8.53	65	95	101	106	112	118	130	148	166	177	289	423	449	472	498	525	578	658	738	787
		6.40	0.217	5.51	49	71	75	80	84	89	98	111	124	133	218	316	334	356	374	396	436	494	552	592
		7.80	0.276	7.01	64	94	100	105	111	117	129	147	164	176	285	418	445	467	494	520	574	654	730	783
		8.60	0.308	7.82	76	110	117	124	131	138	152	172	193	207	338	489	520	552	583	614	676	765	859	921
		9.80	0.362	9.19	87	126	134	142	149	157	173	197	220	236	387	560	596	632	663	698	770	876	979	1050
		10.70	0.405	10.29	112	163	173	183	194	204	224	255	285	306	498	725	770	814	863	907	996	1134	1268	1361
3.500	88.90	7.70	0.216	5.49	58	85	90	95	101	106	116	132	148	159	258	378	400	423	449	472	516	587	658	707
		9.20	0.254	6.45	78	114	121	128	135	142	156	178	199	213	347	507	538	569	601	632	694	792	885	947
		10.20	0.289	7.34	88	128	136	144	152	160	176	200	224	240	391	569	605	641	676	712	783	890	996	1068
		12.70	0.375	9.53	132	191	203	215	227	239	263	299	335	359	587	850	903	956	1010	1063	1170	1330	1490	1597
		13.70	0.413	10.49	149	217	231	244	258	271	298	339	380	407	663	965	1028	1085	1148	1205	1326	1508	1690	1810
		14.70	0.449	11.40	161	234	249	264	278	293	322	366	410	440	716	1041	1108	1174	1237	1303	1432	1628	1824	1957
		15.50	0.476	12.09	169	246	261	277	292	308	338	384	431	461	752	1094	1161	1232	1299	1370	1503	1708	1917	2051
4.000	101.60	9.50	0.226	5.74	71	103	109	116	122	129	142	161	180	193	316	458	485	516	543	574	632	716	801	859
		10.90	0.262	6.65	93	135	143	152	160	169	185	211	236	253	414	601	636	676	712	752	823	939	1050	1125
		11.30	0.286	7.26	101	147	156	165	175	184	202	230	257	276	449	654	694	734	778	818	899	1023	1143	1228
		13.20	0.330	8.38	115	168	178	188	199	209	230	262	293	314	512	747	792	836	885	930	1023	1165	1303	1397
		14.80	0.380	9.65	144	209	222	235	248	261	287	326	365	392	641	930	988	1045	1103	1161	1277	1450	1624	1744
		16.50	0.430	10.92	171	249	265	280	296	311	342	389	436	467	761	1108	1179	1246	1317	1383	1521	1730	1939	2077
4.500	114.30	11.60	0.250	6.35	84	123	130	138	146	153	169	192	215	230	374	547	578	614	649	681	752	854	956	1023
		12.60	0.271	6.88	99	144	153	162	171	180	197	224	251	269	440	641	681	721	761	801	876	996	1117	1197
		13.50	0.290	7.37	112	162	172	183	193	203	223	254	284	304	498	721	765	814	859	903	992	1130	1263	1352
		15.10	0.337	8.56	143	208	221	234	247	260	286	325	364	390	636	925	983	1041	1099	1157	1272	1446	1619	1735
		17.00	0.380	9.65	171	249	265	280	296	311	342	389	436	467	761	1108	1179	1246	1317	1383	1521	1730	1939	2077
		18.90	0.430	10.92	197	286	304	322	340	358	393	447	501	537	876	1272	1352	1432	1512	1592	1748	1988	2229	2389
		21.50	0.500	12.70	225	327	347	368	388	409	449	511	572	613	1001	1455	1544	1637	1726	1819	1997	2273	2544	2727
		23.70	0.560	14.22	248	361	384	406	429	451	497	564	632	677	1103	1606	1708	1806	1908	2006	2211	2509	2811	3011
5.000	127.00	13.00	0.253	6.43	115	167	177	187	198	208	229	260	291	312	512	743	787	832	881	925	1019	1157	1294	1388
		15.00	0.296	7.52	133	193	205	217	229	241	265	301	337	362	592	859	912	965	1019	1072	1179	1339	1499	1610
		18.00	0.362	9.19	176	256	272	288	304	321	353	401	449	481	783	1139	1210	1281	1352	1428	1570	1784	1997	2140
		20.30	0.408	10.36	210	305	325	344	363	382	420	477	535	573	934	1357	1446	1530	1615	1699	1868	2122	2380	2549
		20.80	0.422	10.72	220	320	340	360	380	400	440	500	560	600	979	1423	1512	1601	1690	1779	1957	2224	2491	2669
		21.40	0.437	11.10	225	327	347	367	388	408	449	510	572	612	1001	1455	1544	1632	1726	1815	1997	2269	2544	2722
		23.20	0.478	12.14	-	366	389	412	435	457	503	572	640	686	-	1628	1730	1833	1935	2033	2237	2544	2847	3051
		24.10	0.500	12.70																				
5.500	139.70	15.50	0.275	6.99	137	199	211	224	236	249	274	311	348	373	609	885	939	996	1050	1108	1219	1383	1548	1659
		17.00	0.304	7.72	151	219	233	247	260	274	301	342	383	411	672	974	1036	1099	1157	1219	1339	1521	1704	1828
		20.00	0.361	9.17	188	273	291	308	325	342	376	427	479	513	836	1214	1294	1370	1446	1521	1673	1899	2131	2282
		23.00	0.415	10.54	232	338	359	380	401	422	464	527	591	633	1032	1503	1597	1690	1784	1877	2064	2344	2629	2816
		26.00	0.476	12.09	277	402	428	453	478	503	553	629	704	755	1232	1788	1904	2015	2126	2237	2460	2798	3132	3358
		28.40	0.530	13.46	297	431	458	485	512	539	593	674	755	809	1321	1917	2037	2157	2277	2398	2638	2998	3358	3599
		29.70	0.562	14.27	-	455	484	512	541	569	626	711	797	854	-	2024	2153	2277	2406	2531	2785	3163	3545	3799
		32.00	0.612	15.54	337	491	521	552	583	613	675	767	858	920	1499	2184	2318	2455	2593	2727	3003	3412	3817	4092
6.625	168.28	23.20	0.330	8.38	197	286	304	322	340	358	394	448	501	537	876	1272	1352	1432	1512	1592	1753	1993	2229	2389
		24.00	0.352	8.94	220	319	339	359	379	399	439	499	559	599	979	1419	1508	1597	1686	1775	1953	2220	2487	2664
		28.00	0.417	10.59	285	415	441	467	493	519	570	648	726	778	1268	1846	1962	2077	2193	2309	2535	2882	3229	3461
		32.00	0.475	12.07	332	483	513	543	574	604	664	755	845	906	1477	2148	2282	2415	2553	2687	2954	3358	3759	4030
		35.00	0.525	13.34	373	542	576	610	644	678	745	847	949	1017	1659	2411	2562	2713	2865	3016	3314	3768	4221	4524

Data provided by Vallourec & Mannesmann; September, 2005

VAM FJL (Continued)

OD		Weight	T		Yield Strength (1,000 lb)										Yield Strength (kn)									
in.	mm	lb/ft	in.	mm	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi	55 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	140 ksi	150 ksi
7.000	177.80	23.00	0.317	8.05	187	272	289	306	323	340	374	425	476	510	832	1210	1286	1361	1437	1512	1664	1890	2117	2269
		26.00	0.362	9.19	236	344	365	387	408	430	473	537	602	645	1050	1530	1624	1721	1815	1913	2104	2389	2678	2869
		29.00	0.408	10.36	286	416	442	468	494	520	572	650	728	780	1272	1850	1966	2082	2197	2313	2544	2891	3238	3470
		32.00	0.453	11.51	334	485	515	546	576	606	667	758	849	910	1486	2157	2291	2429	2562	2696	2967	3372	3777	4048
		35.00	0.498	12.65	365	531	565	598	631	664	731	830	930	996	1624	2362	2513	2660	2807	2954	3252	3692	4137	4430
		38.00	0.540	13.72	393	572	608	644	679	715	787	894	1001	1073	1748	2544	2705	2865	3020	3180	3501	3977	4453	4773
		41.00	0.590	14.99	425	619	657	696	735	774	851	967	1083	1160	1890	2753	2922	3096	3269	3443	3785	4301	4817	5160
7.625	193.68	26.40	0.328	8.33	214	312	331	350	370	389	428	487	545	584	952	1388	1472	1557	1646	1730	1904	2166	2424	2598
		29.70	0.375	9.53	270	393	418	442	467	491	540	614	688	737	1201	1748	1859	1966	2077	2184	2402	2731	3060	3278
		33.70	0.430	10.92	335	487	518	548	579	609	670	762	853	914	1490	2166	2304	2438	2576	2709	2980	3390	3794	4066
		35.80	0.465	11.81	375	545	580	614	648	682	750	852	955	1023	1668	2424	2580	2731	2882	3034	3336	3790	4248	4551
		39.00	0.500	12.70	401	584	620	657	693	730	803	912	1021	1094	1784	2598	2758	2922	3083	3247	3572	4057	4542	4866
		42.80	0.562	14.27	446	649	690	730	771	811	892	1014	1136	1217	1984	2887	3069	3247	3430	3608	3968	4510	5053	5413
		45.30	0.595	15.11	477	693	737	780	823	867	953	1083	1213	1300	2122	3083	3278	3470	3661	3857	4239	4817	5396	5783
		47.10	0.625	15.88	498	725	770	815	861	906	997	1133	1268	1359	2215	3225	3425	3625	3830	4030	4435	5040	5640	6045
8.625	219.08	32.00	0.352	8.94	274	399	424	448	473	498	548	623	698	747	1219	1775	1886	1993	2104	2215	2438	2771	3105	3323
		36.00	0.400	10.16	339	493	524	555	586	617	678	771	863	925	1508	2193	2331	2469	2607	2745	3016	3430	3839	4115
		40.00	0.450	11.43	406	591	628	665	702	739	813	924	1034	1108	1806	2629	2793	2958	3123	3287	3616	4110	4599	4929
		44.00	0.500	12.70	459	668	709	751	793	834	918	1043	1168	1252	2042	2971	3154	3341	3527	3710	4083	4639	5196	5569
		49.00	0.557	14.15	537	781	830	879	928	977	1074	1221	1367	1465	2389	3474	3692	3910	4128	4346	4777	5431	6081	6517
		52.00	0.595	15.11	537	781	830	879	928	977	1074	1221	1367	1465	2389	3474	3692	3910	4128	4346	4777	5431	6081	6517
9.375	238.13	40.00	0.420	10.67	380	553	587	622	657	691	760	864	968	1037	1690	2460	2611	2767	2922	3074	3381	3843	4306	4613
9.625	244.48	36.00	0.352	8.94	302	439	466	494	521	549	603	686	768	823	1343	1953	2073	2197	2318	2442	2682	3051	3416	3661
		40.00	0.395	10.03	368	535	568	601	635	668	735	835	935	1002	1637	2380	2527	2673	2825	2971	3269	3714	4159	4457
		43.50	0.435	11.05	428	623	662	701	740	779	856	973	1090	1168	1904	2771	2945	3118	3292	3465	3808	4328	4849	5196
		47.00	0.472	11.99	484	704	748	792	836	880	968	1100	1232	1320	2153	3132	3327	3523	3719	3914	4306	4893	5480	5872
		53.50	0.545	13.84	557	810	861	911	962	1013	1114	1266	1418	1519	2478	3603	3830	4052	4279	4506	4955	5631	6308	6757
		58.40	0.595	15.11	632	920	977	1035	1092	1150	1265	1437	1609	1724	2811	4092	4346	4604	4857	5115	5627	6392	7157	7669
		59.40	0.609	15.47																				
		61.10	0.625	15.88																				
9.875	250.83	62.80	0.625	15.88	680	990	1051	1113	1175	1237	1361	1546	1732	1855	3025	4404	4675	4951	5227	5502	6054	6877	7704	8251
		66.40	0.661	16.79																				
		67.50	0.678	17.22	717	1043	1108	1174	1239	1304	1434	1630	1825	1956	3189	4639	4929	5222	5511	5800	6379	7251	8118	8701
10.750	273.05	40.50	0.350	8.89	329	479	509	538	568	598	658	748	838	897	1463	2131	2264	2393	2527	2660	2927	3327	3728	3990
		45.50	0.400	10.16	416	604	642	680	718	756	831	944	1058	1133	1850	2687	2856	3025	3194	3363	3696	4199	4706	5040
		51.00	0.450	11.43	501	729	774	820	865	911	1002	1139	1275	1366	2229	3243	3443	3648	3848	4052	4457	5067	5671	6076
		55.50	0.495	12.57	572	832	884	936	988	1040	1144	1300	1456	1560	2544	3701	3932	4164	4395	4626	5089	5783	6477	6939
		60.70	0.545	13.84	630	917	974	1031	1089	1146	1261	1433	1605	1719	2802	4079	4333	4586	4844	5098	5609	6374	7139	7646
		65.70	0.595	15.11	685	996	1058	1121	1183	1245	1370	1556	1743	1868	3047	4430	4706	4986	5262	5538	6094	6921	7753	8309
11.750	298.45	47.00	0.375	9.53	412	599	636	674	711	749	824	936	1048	1123	1833	2664	2829	2998	3163	3332	3665	4164	4662	4995
		54.00	0.435	11.05	508	739	785	831	877	923	1016	1154	1293	1385	2260	3287	3492	3696	3901	4106	4519	5133	5752	6161
		60.00	0.489	12.42	604	879	934	989	1044	1099	1208	1373	1538	1648	2687	3910	4155	4399	4644	4889	5373	6107	6841	7331
		65.00	0.534	13.56	668	972	1033	1094	1154	1215	1337	1519	1701	1823	2971	4324	4595	4866	5133	5405	5947	6757	7566	8109
11.875	301.63	71.80	0.582	14.78	743	1081	1148	1216	1283	1351	1486	1689	1891	2027	3305	4809	5107	5409	5707	6010	6610	7513	8412	9017

Data provided by Vallourec & Mannesmann; September, 2005

VAM MUST

OD		Weight	T		Joint Strength (1,000 lb)							Joint Strength (kn)						
in.	*mm*	lb/ft	in.	*mm*	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi
5.500	*139.70*	32.00	0.612	*15.54*	376	400	423	447	470	517	588	1673	1779	1882	1988	2091	2300	2616
7.625	*193.68*	55.30	0.750	*19.05*	732	778	824	870	915	1007	1144	3256	3461	3665	3870	4070	4479	5089
		59.20	0.812	*20.62*	802	852	903	953	1003	1103	1254	3567	3790	4017	4239	4462	4906	5578
10.750	*273.05*	109.00	1.033	*26.24*	1418	1506	1595	1684	1772	1950	2215	6308	6699	7095	7491	7882	8674	9853

Data provided by Vallourec & Mannesmann; September, 2005

VAM TOP FE

OD		Weight	T		Yield Strength (1,000 lb)							Yield Strength (kn)						
in.	*mm*	lb/ft	in.	*mm*	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi
7.000	*177.80*	23.0	0.317	*8.05*	532	566	599	632	666	732	832	2366	2518	2664	2811	2963	3256	3701
		26.0	0.362	*9.19*	604	642	679	717	755	830	944	2687	2856	3020	3189	3358	3692	4199
		29.0	0.408	*10.36*	676	718	760	803	845	929	1056	3007	3194	3381	3572	3759	4132	4697
		32.0	0.453	*11.51*	745	792	839	885	932	1025	1165	3314	3523	3732	3937	4146	4559	5182
		35.0	0.498	*12.65*	814	865	915	966	1017	1119	1272	3621	3848	4070	4297	4524	4978	5658
		38.0	0.540	*13.72*	877	932	986	1041	1096	1205	1370	3901	4146	4386	4631	4875	5360	6094
		41.0	0.590	*14.99*	950	1010	1069	1129	1188	1307	1485	4226	4493	4755	5022	5284	5814	6606
		42.7	0.625	*15.88*	1001	1064	1127	1189	1252	1377	1565	4453	4733	5013	5289	5569	6125	6961
7.625	*193.68*	26.4	0.328	*8.33*	602	639	677	714	752	827	940	2678	2842	3011	3176	3345	3679	4181
		29.7	0.375	*9.52*	683	726	769	811	854	940	1068	3038	3229	3421	3608	3799	4181	4751
		33.7	0.430	*10.92*	778	826	875	923	972	1069	1215	3461	3674	3892	4106	4324	4755	5405
		35.8	0.465	*11.81*	837	889	941	994	1046	1151	1308	3723	3954	4186	4422	4653	5120	5818
		39.0	0.500	*12.7*	895	951	1007	1063	1119	1231	1399	3981	4230	4479	4728	4978	5476	6223
		42.8	0.562	*14.27*	998	1060	1122	1185	1247	1372	1559	4439	4715	4991	5271	5547	6103	6935
		45.3	0.595	*15.11*	1051	1117	1183	1248	1314	1446	1643	4675	4969	5262	5551	5845	6432	7308
		47.1	0.625	*15.88*	1100	1168	1237	1306	1374	1512	1718	4893	5196	5502	5809	6112	6726	7642
7.750	*196.85*	46.1	0.595	*15.11*	1070	1137	1204	1271	1337	1471	1672	4760	5058	5356	5654	5947	6543	7437
8.625	*219.08*	36.0	0.400	*10.16*	827	879	930	982	1034	1137	1292	3679	3910	4137	4368	4599	5058	5747
		40.0	0.450	*11.43*	925	982	1040	1098	1156	1271	1445	4115	4368	4626	4884	5142	5654	6428
		44.0	0.500	*12.7*	1021	1085	1149	1212	1276	1404	1595	4542	4826	5111	5391	5676	6245	7095
		49.0	0.557	*14.15*	1129	1200	1271	1341	1412	1553	1765	5022	5338	5654	5965	6281	6908	7851
		52.0	0.595	*15.11*	1201	1276	1351	1426	1501	1651	1876	5342	5676	6010	6343	6677	7344	8345
9.625	*244.48*	40.0	0.395	*10.03*	916	974	1031	1088	1145	1260	1432	4075	4333	4586	4840	5093	5605	6370
		43.5	0.435	*11.05*	1005	1068	1130	1193	1256	1381	1570	4470	4751	5026	5307	5587	6143	6984
		47.0	0.472	*11.99*	1086	1154	1221	1289	1357	1493	1697	4831	5133	5431	5734	6036	6641	7549
		53.5	0.545	*13.84*	1244	1321	1399	1477	1555	1710	1943	5534	5876	6223	6570	6917	7606	8643
		58.4	0.595	*15.11*	1350	1435	1519	1604	1688	1857	2110	6005	6383	6757	7135	7509	8260	9386
9.875	*250.82*	62.8	0.625	*15.88*	1453	1544	1635	1725	1816	1998	2270	6463	6868	7273	7673	8078	8888	10097
		65.3	0.650	*16.51*	1507	1601	1695	1790	1884	2072	2355	6703	7122	7540	7962	8380	9217	10476
		66.4	0.661	*16.79*	1531	1626	1722	1818	1913	2105	2392	6810	7233	7660	8087	8509	9364	10640
		66.9	0.668	*16.97*	1546	1642	1739	1836	1932	2125	2415	6877	7304	7735	8167	8594	9452	10742
		67.5	0.678	*17.22*	1567	1665	1763	1861	1959	2155	2449	6970	7406	7842	8278	8714	9586	10894
		68.0	0.694	*17.63*	1601	1701	1802	1902	2002	2202	2502	7122	7566	8016	8461	8905	9795	11129
		68.9	0.700	*17.78*	1614	1715	1816	1917	2018	2219	2522	7179	7629	8078	8527	8977	9871	11218
		70.5	0.720	*18.29*	1657	1760	1864	1967	2071	2278	2589	7371	7829	8291	8750	9212	10133	11516
		72.0	0.725	*18.42*	1667	1771	1876	1980	2084	2293	2605	7415	7878	8345	8807	9270	10200	11588

Data provided by Vallourec & Mannesmann; September, 2005

VAM TOP FE (Continued)

OD		Weight	T		Yield Strength (1,000 lb)							Yield Strength (kn)						
in.	*mm*	lb/ft	in.	*mm*	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi	80 ksi	85 ksi	90 ksi	95 ksi	100 ksi	110 ksi	125 ksi
10.750	*273.05*	45.5	0.400	*10.16*	1040	1106	1171	1236	1301	1431	1626	4626	4920	5209	5498	5787	6365	7233
		51.0	0.450	*11.43*	1165	1238	1310	1383	1456	1602	1820	5182	5507	5827	6152	6477	7126	8096
		55.5	0.495	*12.57*	1276	1355	1435	1515	1595	1754	1993	5676	6027	6383	6739	7095	7802	8865
		60.7	0.545	*13.84*	1398	1485	1573	1660	1747	1922	2184	6219	6606	6997	7384	7771	8549	9715
		65.7	0.595	*15.11*	1519	1613	1708	1803	1898	2088	2373	6757	7175	7598	8020	8443	9288	10556
		71.1	0.650	*16.51*	1650	1753	1856	1959	2063	2269	2578	7340	7798	8256	8714	9177	10093	11468
11.750	*298.45*	54.0	0.435	*11.05*	1237	1314	1392	1469	1546	1701	1933	5502	5845	6192	6534	6877	7566	8598
		60.0	0.489	*12.42*	1384	1471	1557	1644	1730	1903	2163	6156	6543	6926	7313	7695	8465	9621
		65.0	0.534	*13.56*	1505	1599	1693	1788	1882	2070	2352	6695	7113	7531	7953	8372	9208	10462
		71.0	0.582	*14.78*	1634	1736	1838	1940	2042	2246	2553	7268	7722	8176	8630	9083	9991	11356
11.875	*301.62*	67.8	0.550	*13.97*	1565	1663	1761	1859	1957	2152	2446	6961	7397	7833	8269	8705	9573	10880
		71.8	0.582	*14.78*	1652	1755	1858	1962	2065	2271	2581	7348	7807	8265	8727	9186	10102	11481
13.375	*339.72*	61.0	0.430	*10.92*	1399	1486	1574	1661	1749	1924	2186	6223	6610	7001	7388	7780	8558	9724
		68.0	0.480	*12.19*	1556	1653	1750	1847	1945	2139	2431	6921	7353	7784	8216	8652	9515	10814
		72.0	0.514	*13.06*	1661	1765	1869	1973	2077	2284	2596	7388	7851	8314	8776	9239	10160	11548
		77.0	0.550	*13.97*	1773	1884	1994	2105	2216	2438	2770	7887	8380	8870	9364	9857	10845	12322
		80.7	0.580	*14.73*	1865	1982	2098	2215	2331	2565	2914	8296	8816	9332	9853	10369	11410	12962
		85.0	0.608	*15.44*	1951	2073	2195	2317	2439	2682	3048	8678	9221	9764	10307	10849	11930	13558
		86.0	0.625	*15.88*	2003	2128	2253	2378	2504	2754	3129	8910	9466	10022	10578	11138	12250	13918
13.625	*346.08*	88.2	0.625	*15.88*	2042	2170	2297	2425	2553	2808	3191	9083	9653	10218	10787	11356	12491	14194

Data provided by Vallourec & Mannesmann; September, 2005

Standard and Line Pipe Data Seamless, Electric Weld, Plain End

Size Nom	Size OD	Wall Thickness	Wt Plain End	Class	Schedule No.	Mill Test Pressure	
						Grade A	Grade B
in.	in.	in.	lb/ft			psi	psi
14	14.000	.188	27.76	-	-	600	700
		.203	29.94			650	760
		.210	30.96			670	790
		.219	32.26			700	820
		.250	36.75			800	940
		.281	41.21			900	1,050
		.312	45.65		20	1,000	1,170
		.344	50.22		-	1,110	1,290
		.375	54.62	Std.	30	1,210	1,410
		.406	59.00	-	-	1,300	1,520
		.438	63.50		40	1,410	1,640
		.469	67.84		-	1,510	1,760
		.500	72.16	XS		1,610	1,880
		.562	80.73	-		1,810	2,110
		.594	85.13		60	1,910	2,230
		.625	89.36		-	2,010	2,340
		.688	97.91			2,210	2,580
		.750	106.23		80	2,410	2,800
		.812	114.48		-	2,610	
		.938	130.98		100	2,800	
		1.094	150.93		120		
		1.250	170.37		140		
		1.406	189.29		160		
		1.500	200.44		-		
		2.000	256.56				
16	16.000	.188	31.78	-	-	530	620
		.203	34.28			570	670
		.219	36.95			620	720
		.250	42.09			700	820
		.281	47.22			790	920
		.312	52.32		20	880	1,020
		.344	57.57		-	970	1,130
		.375	62.64	Std.	30	1,050	1,230
		.406	67.68	-	-	1,140	1,330
		.438	72.86			1,230	1,440
		.469	77.87			1,320	1,540
		.500	82.85	XS	40	1,410	1,640
		.562	92.75	-	-	1,580	1,840
		.625	102.72			1,760	2,050
		.656	107.60		60	1,840	2,150
		.688	112.62		-	1,930	2,260
		.750	122.27			2,110	2,460
		.812	131.84			2,280	2,660
		.844	136.74	-	80	2,370	2,770
		1.031	164.98		100	2,800	2,800
		1.219	192.61		120		
		1.438	223.85		140		
		1.594	245.48		160	2,800	2,800
		1.618	248.76		-		
		2.000	299.32				
18	18.000	.219	41.63	-	-	550	640
		.250	47.44			630	730
		.281	53.23			700	820
		.312	58.99		20	780	910
		.344	64.93		-	860	1,000
		.375	70.65	Std.		940	1,090
		.406	76.36	-		1,010	1,180
		.438	82.23		30	1,090	1,280
		.469	87.89		-	1,170	1,370
		.500	93.54	XS		1,250	1,460

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Standard and Line Pipe Data Seamless, Electric Weld, Plain End (Continued)

Size Nom	Size OD	Wall Thickness	Wt Plain End	Class	Schedule No.	Mill Test Pressure	
						Grade A	Grade B
in.	in.	in.	lb/ft			psi	psi
18	18.000	.562	104.76	-	40	1,400	1,640
		.625	116.09		-	1,560	1,820
		.688	127.32			1,720	2,010
		.750	138.30		60	1,880	2,190
		.812	149.20		-	2,030	2,370
		.938	171.08		80	2,340	2,740
		1.156	208.15		100	2,800	2,800
		1.375	244.37		120		
		1.500	264.58		-		
		1.562	274.48		140		
		1.652	288.70		-		
20	20.000	.219	46.31	-	-	490	570
		.250	52.78			560	660
		.281	59.23			630	740
		.312	65.66			700	820
		.344	72.28			770	900
		.375	78.67	Std.	20	840	980
		.406	85.04	-	-	910	1,070
		.438	91.59			990	1,150
		.469	97.92			1,060	1,230
		.500	104.23	XS	30	1,130	1,310
		.562	116.78	-	-	1,260	1,480
		.594	123.23		40	1,340	1,560
		.625	129.45		-	1,410	1,640
		.688	142.03			1,550	1,810
		.750	154.34			1,690	1,970
		.812	166.56		60	1,830	2,130
		1.031	209.06		80	2,320	2,710
		1.281	256.34		100	2,750	2,750
		1.375	273.76		-	2,800	2,800
22	22.000	.375	86.69	Std.	20	770	890
		.406	93.72	-	-	830	970
		.438	100.96			900	1,050
		.469	107.95			960	1,120
		.500	114.92	XS	30	1,020	1,190
		.562	128.79	-	-	1,150	1,340
		.625	142.81			1,280	1,490
		.688	156.74			1,410	1,640
		.750	170.37			1,530	1,790
		.812	183.92			1,660	1,940
		.875	197.60		60	1,790	2,090
		1.125	251.05		80	2,300	2,500
		1.219	270.80		-	2,490	
24	24.000	.250	63.47	-	-	470	550
		.281	71.25			530	610
		.312	79.01			580	680
		.344	86.99			640	750
		.375	94.71	Std.	20	700	820
		.406	102.40	-	-	760	890
		.438	110.32			820	960
		.469	117.98			880	1,030
		.500	125.61	XS		940	1,090
		.562	140.81	-	30	1,050	1,230
		.625	156.17		-	1,170	1,370
		.688	171.45		40	1,290	1,500

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Standard and Line Pipe Data Seamless, Electric Weld, Plain End (Continued)

Size Nom	Size OD	Wall Thickness	Wt Plain End	Class	Schedule No.	Mill Test Pressure	
						Grade A	Grade B
in.	in.	in.	lb/ft			psi	psi
24	24.000	.750	186.41	-	-	1,410	1,640
		.812	201.28			1,520	1,780
		.875	216.31			1,640	1,910
		.938	231.25			1,760	2,050
		.969	238.57		60	1,820	2,120
		1.219	296.86		80	2,280	2,660
		1.312	318.21		-	2,340	2,340
26	26.000	.250	68.82	-	-	430	500
		.281	77.26			490	570
		.312	85.68			540	630
		.344	94.35			600	690
		.375	102.72	Std.		650	760
		.406	111.08	-		700	820
		.438	119.69			760	880
		.469	128.00			810	950
		.500	136.30	XS	20	870	1,010
		.562	152.83	-	-	970	1,130
		.625	169.54			1,080	1,260
		.656	177.73			1,140	1,320
		.688	186.16			1,190	1,390
		.750	202.44			1,300	1,510
		.875	235.01			1,510	1,770
		1.188	315.11			2,000	2,000

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Standard and Line Pipe Data Double Submerged Arc Weld and Plain End

Size Nom	Size OD	Wall Thickness	Wt Plain End	Mill Test Pressure	
				Grade A	Grade B
in.	in.	in.	lb/ft	psi	psi
30	30.000	.250	79.51	380	440
		.281	89.27	420	490
		.312	99.02	470	550
		.344	109.06	520	600
		.375	118.76	560	660
		.406	128.44	610	710
		.438	138.42	660	770
		.469	148.06	700	820
		.500	157.68	750	880
		.562	176.86	840	980
		.625	196.26	940	1,090
		.656	205.78	980	1,150
		.688	215.58	1,030	1,200
		.750	234.51	1,130	1,310
32	32.000	.250	84.85	350	410
		.281	95.28	400	460
		.312	105.69	440	510
		.344	116.41	480	560
		.375	126.78	530	620
		.406	137.12	570	670
		.438	147.78	620	720
		.469	158.08	660	770
		.500	168.37	700	820
		.562	188.87	790	920

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Some OD's, walls, and grades are Non-API. The weight per foot of pipe with threads and couplings is based on a length of 20 ft including the coupling

A-106 pipe furnished plain end only. A-53 and A-120 pipe furnished plain end or threaded and coupled, as ordered

Dimensions and plain end weights are based on ANSI Standard B36.10 - 1970

Standard and Line Pipe Data Double Submerged Arc Weld and Plain End (Continued)

Size Nom	Size OD	Wall Thickness	Wt Plain End	Mill Test Pressure	
				Grade A	Grade B
in.	in.	in.	lb/ft	psi	psi
32	32.000	.625	209.62	880	1,030
		.656	219.80	920	1,080
		.688	230.29	970	1,130
		.750	250.55	1,050	1,230
34	34.000	.250	90.20	330	390
		.281	101.29	370	430
		.312	112.36	410	480
		.344	123.77	460	530
		.375	134.79	500	580
		.406	145.80	540	630
		.438	157.14	580	680
		.469	168.11	620	720
		.500	179.06	660	770
		.562	200.89	740	870
		.625	222.99	830	970
		.656	233.83	870	1,010
		.688	245.00	910	1,060
		.750	266.58	990	1,160
36	36.000	.250	95.54	310	360
		.281	107.30	350	410
		.312	119.03	390	450
		.344	131.12	430	500
		.375	142.81	470	550
		.406	154.48	510	590
		.438	166.51	550	640
		.469	178.14	590	680
		.500	189.75	630	730
		.562	212.90	700	820
		.625	236.35	780	910
		.656	247.85	820	960
		.688	259.71	860	1,000
		.750	282.62	940	1,090
40	40.000	.312	132.37	350	410
		.344	145.83	390	450
		.375	158.85	420	490
		.406	171.84	460	530
		.438	185.24	490	570
		.469	198.19	530	620
		.500	211.13	560	660
		.562	236.93	630	740
		.625	263.07	700	820
		.688	289.13	770	900
		.750	314.69	840	980
42	42.000	.312	139.04	330	390
		.344	153.18	370	430
		.375	166.86	400	470
		.406	180.52	430	510
		.438	194.60	470	550
		.469	208.22	500	590
		.500	221.82	540	630
		.562	248.95	600	700
		.625	276.44	670	780
		.688	303.84	740	860
		.750	330.72	800	940

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A-106 pipe furnished plain end only. A-53 and A-120 pipe furnished plain end or threaded and coupled, as ordered

Dimensions and plain end weights are based on ANSI Standard B36.10 - 1970

Standard and Line Pipe Data Double Submerged Arc Weld and Plain End (Continued)

Size Nom	Size OD	Wall Thickness	Wt Plain End	Mill Test Pressure	
				Grade A	Grade B
in.	in.	in.	lb/ft	psi	psi
44	44.000	.344	160.54	280	330
		.375	174.88	310	360
		.406	189.20	330	390
		.438	203.97	360	420
		.469	218.25	380	450
		.500	232.51	410	480
		.562	260.97	460	540
		.625	289.80	510	600
		.688	318.55	560	660
		.750	346.76	610	720
46	46.000	.344	167.89	270	310
		.375	182.90	290	340
		.406	197.88	320	370
		.438	213.33	340	400
		.469	228.27	370	430
		.500	243.20	390	460
		.562	272.98	440	510
		.625	303.16	490	570
		.688	333.26	540	630
		.750	362.79	590	680
		.812	392.24	640	740
		.875	422.09	680	800
		.938	451.85	730	860
		1.000	481.05	780	910
48	48.000	.375	190.92	280	330
		.406	206.56	300	360
		.438	222.70	330	380
		.469	238.30	350	410
		.500	253.89	380	440
		.562	285.00	420	490
		.625	316.52	470	550
		.688	347.97	520	600
		.750	378.83	560	650
		.812	409.61	610	710
		.875	440.80	660	770
		.938	471.90	700	820
		1.000	502.43	750	880

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A-106 pipe furnished plain end only. A-53 and A-120 pipe furnished plain end or threaded and coupled, as ordered

Dimensions and plain end weights are based on ANSI Standard B36.10 - 1970

Cased Hole EXPatch™ System
Specifications for Solid Cone Expansions

Parent Casing				EXPatch™ Clad					
				Pre-Expansion		Post-Expansion		Clad Thickness	Clad Material
OD	Weight	ID	Drift	OD	ID	OD	ID	in.	
5-1/2	14.00	5.012	4.887	4.500	4.000	4.948	4.448	0.250	Carbon Steel
	15.50	4.950	4.825			4.881	4.381		
	17.00	4.892	4.767			4.819	4.319		
	20.00	4.778	4.653			4.696	4.196		
7	23.00	6.366	6.241	6.000	5.500	6.241	5.741	0.250	Carbon Steel
	26.00	6.276	6.151			6.151	5.651		
	29.00	6.184	6.059	5.750	5.250	6.059	5.559		
	32.00	6.094	5.969			5.969	5.469		
7-5/8	33.70	6.765	6.640	6.000	5.500	6.650	6.150	0.250	Carbon Steel
	39.00	6.625	6.500			6.500	6.000		
9-5/8	40.00	8.835	8.679	7.625	6.969	8.658	8.002	0.328	Carbon Steel
	43.50	8.755	8.599			8.571	7.915		
	47.00	8.681	8.525			8.491	7.835		
	53.50	8.535	8.379			8.334	7.678		

linEXX™ Monobore Casing Extension

	Pre-Expansion	Post-Expansion
Expansion%	-	18
Casing OD (in.)	8.000	9.390
Casing ID (in.)	7.310	8.625
Drift (in.)	7.185	8.500
Weight (lb/ft)	28.2#	
Connections	8" 28.2# linEXX	

NOTE: *The Expandable Screens EXPress® can be found in the Sand Control section of this manual.*

ACT Joining System

Threaded and Coupled



Integral Joint



API Threads (EUE 10rd, EUE 8rd, OD 8rd)

- Advanced composite thread (Patents Nos. 4,999,389 and 5,179, 140)
- Precision molded with epoxy, graphite and ceramic
- Tighter tolerances than steel
- Improved make and break properties
- Minimizes thread and wrench damage
- Provides higher thread shear than cut or ground threads
- Chemical resistant threads
- Compatible with steel API threads

API Threads

Pipe - Thread Size	Nominal Pipe Dimensions										IJ		T&C or Collar		Pressure				Tensile				Collapse			
	Inside Diameter		Drift Diameter		Outside Diameter		Wall Thickness		Pipe Weight		Connection Diameter		Connection Diameter ▲		Rating *		Ultimate ■ ASTM D-1599		Rating *		Star Ultimate ■		Rating *		Ultimate ■ ASTM D-2924	
in.	in.	mm	in.	mm	in.	mm	in.	mm	lb/ft	kg/m	in.	mm	in.	mm	psi	mpa	psi	mpa	lb	kg	lb	kg	psi	mpa	psi	mpa
Series 1000 - ACT																										
2 to 2-3/8	1.94	49.3	1.88	47.8	2.20	55.9	0.13	3.3	0.9	1.3	3.10	78.8	3.25	82.6	1,200	8.3	4,000	27.6	6,000	2.72	25,000	11.340	1,300	9.0	3,000	20.7
2-1/2 to 2-7/8	2.37	60.2	2.30	58.4	2.64	67.1	0.14	3.6	1.1	1.6	3.80	96.5	3.80	96.5	1,200	8.3	4,000	27.6	1,100	4.990	50,000	22.680	1,500	10.3	2,700	18.6
3 to 3-1/2	2.94	74.7	2.88	73.2	3.28	83.3	0.17	4.3	1.7	2.5	4.60	116.8	4.60	116.8	1,000	6.9	3,600	24.8	1,400	6.350	63,000	28.576	1,300	9.0	2,600	17.9
3-1/2 to 4	3.33	84.6	3.27	83.1	3.78	96.0	0.22	5.6	2.5	3.7	-	-	5.00	127.0	1,000	6.9	3,900	26.9	2,000	9.072	80,000	36.287	1,200	8.3	2,600	17.9
4 to 4-1/2	3.92	99.6	3.86	98.0	4.35	110.5	0.21	5.3	2.6	3.8	5.60	142.2	5.80	147.3	1,000	6.9	3,500	24.1	2,400	10.86	95,000	43.091	1,300	9.0	2,700	18.6
5 to 5-1/2	4.74	120.4	4.68	118.9	5.23	132.9	0.25	6.4	3.7	5.5	6.25	158.8	6.25	158.8	1,000	6.9	3,500	24.1	3,800	17.26	100,000	45.359	1,200	8.3	2,600	17.9
6 to 6-5/8	5.50	139.7	5.44	138.2	6.03	153.2	0.27	6.9	4.8	7.1	7.45	189.2	7.55	191.8	1,000	6.9	3,200	22.1	4,500	20.42	110,000	49.895	1,000	6.9	2,300	15.9
6 to 7	5.93	150.6	5.84	148.3	6.59	167.4	0.33	8.4	6.2	9.2	7.90	200.7	8.00	203.2	1,000	6.9	3,300	22.8	6,000	27.26	120,000	54.431	1,000	6.9	2,400	16.5
8 to 9-5/8	7.74	196.6	7.67	194.8	8.49	215.65	0.38	9.7	8.8	13.1	9.60	243.8	9.70	246.4	1,000	6.9	3,200	22.1	9,000	40.84	175,000	79.379	1,000	6.9	2,400	16.5
Series 1500 - ACT																										
1-1/2 to 1.90	1.44	36.6	1.38	35.1	1.71	43.4	0.14	3.6	0.7	1.0	2.60	66.0	2.80	71.1	1,500	10.3	5,500	37.9	5,000	2.268	20,000	9.072	1,500	10.3	4,500	31.0
2 to 2-3/8	1.94	49.3	1.88	47.8	2.31	58.7	0.19	4.8	1.2	1.8	3.20	81.3	3.25	82.6	1,500	10.3	6,000	41.4	11,500	5.216	42,000	19.051	2,400	16.5	4,800	33.1
2-1/2 to 2-7/8	2.37	60.2	2.30	58.4	2.72	69.1	0.18	4.6	1.4	2.1	3.80	96.5	3.80	96.5	1,500	10.3	5,300	36.5	14,000	6.350	55,000	24.948	2,000	13.8	4,200	29.0
3 to 3-1./2	2.94	74.7	2.88	73.2	3.35	85.1	0.21	5.3	2.0	3.0	4.45	113.0	4.60	116.8	1,500	10.3	4,700	32.4	18,500	8.391	71,000	32.205	1,600	11.0	3,300	22.8
3-1/2 to 4	3.33	84.6	3.27	83.1	3.78	96.0	0.23	5.8	2.5	3.7	-	-	5.00	127.0	1,500	10.3	4,700	32.4	25,000	11.340	85,000	38.555	1,800	12.4	3,600	24.8
4 to 4-1/2	3.92	99.6	3.86	98.0	4.48	113.8	0.28	7.1	3.5	5.2	5.80	147.3	5.80	147.3	1,500	10.3	4,700	32.4	34,000	15.422	95,000	43.091	1,800	12.4	3,700	25.5
5 to 5-1/2	4.74	120.4	4.68	118.9	5.39	136.9	0.33	8.4	4.8	7.1	-	-	6.60	167.6	1,500	10.3	4,600	31.7	48,000	21.772	120,000	54.431	1,800	12.4	3,600	24.8
6 to 6-5/8	5.50	139.7	5.44	138.2	6.20	157.5	0.35	8.9	6.1	9.1	7.60	193.0	7.90	200.7	1,500	10.3	4,200	29.0	60,000	27.216	125,000	56.699	1,800	12.4	3,600	24.8
6 to 7	5.93	150.6	5.84	148.3	6.72	170.7	0.39	9.9	7.4	11.0	8.40	213.4	8.40	213.4	1,500	10.3	4,500	31.0	75,000	34.019	140,000	63.503	1,800	12.4	3,600	24.8
8 to 9-5/8	7.74	196.6	7.67	194.8	8.79	223.3	0.53	13.5	13.6	20.2	11.40	289.6	11.50	292.1	1,500	10.3	4,700	32.4	125,000	56.699	200,000	90.718	1,800	12.4	3,700	25.5
Series 1750 - ACT																										
2 to 2-3/8	1.94	49.3	1.88	47.8	2.32	58.9	0.19	4.8	1.2	1.8	3.30	83.8	3.40	86.4	1,750	12.1	6,400	44.1	12,000	5.443	43,000	19.505	2,400	16.5	4,800	33.1
2-1/2 to 2-7/8	2.37	60.2	2.30	58.4	2.78	70.6	0.21	5.3	1.6	2.4	3.90	99.1	4.00	101.6	1,750	12.1	5,400	37.2	16,000	7.258	56,000	25.401	2,200	15.2	4,400	30.3
3 to 3-1/2	2.94	74.7	2.88	73.2	3.38	85.9	0.22	5.6	2.2	3.3	4.50	114.3	4.80	121.9	1,750	12.1	5,000	34.5	*21,000*	9.525	72,000	32.659	1,900	13.1	3,900	26.9
3-1/2 to 4	3.33	84.6	3.27	83.1	3.90	99.1	0.28	7.1	3.1	4.6	-	-	5.25	133.4	1,750	12.1	5,500	37.9	*30,000*	13.608	85,000	38.555	1,800	12.4	4,100	28.3
4 to 4-1/2	3.92	99.6	3.86	98.0	4.50	114.3	0.29	7.4	3.7	5.5	6.00	152.4	6.10	154.9	1,750	12.1	5,000	34.5	*38,000*	17.237	100,000	45.359	2,000	13.8	4,100	28.3
5 to 5-1/2	4.74	120.4	4.68	118.9	5.46	138.7	0.36	9.1	5.3	7.9	-	-	7.00	177.8	1,750	12.1	4,900	33.8	*53,000*	24.041	125,000	56.700	2,000	13.8	3,900	26.9
Series 2000 - ACT																										
1-1/2 to 1.90	1.44	36.6	1.38	35.1	1.72	43.7	0.14	3.6	0.8	1.2	2.70	68.6	2.80	71.1	2,000	13.8	7,200	49.6	7,500	3.402	25,000	11.340	2,800	19.3	5,700	39.3
2 to 2-3/8	1.94	49.3	1.88	47.8	2.36	59.9	0.21	5.3	1.4	2.1	3.40	86.4	3.40	86.4	2,000	13.8	7,000	48.3	14,500	6.557	46,000	20.865	2,800	19.3	5,600	38.6
2-1/2 to 2-7/8	2.37	60.2	2.30	58.4	2.79	70.9	0.21	5.3	1.7	2.5	4.00	101.6	4.00	101.6	2,000	13.8	6,200	42.7	18,000	8.165	58,000	26.308	2,400	16.5	4,900	33.8
3 to 3-1/2	2.94	74.7	2.88	73.2	3.47	88.1	0.27	6.9	2.6	3.9	4.70	119.4	4.80	121.9	2,000	13.8	5,900	40.7	25,000	11.340	74,000	33.566	2,300	15.9	4,700	32.4
3-1/2 to 4	3.33	84.6	3.27	83.1	3.93	99.8	0.30	7.6	3.3	4.9	-	-	5.25	133.4	2,000	13.8	5,800	40.0	34,000	15.422	90,000	40.823	2,300	15.9	4,600	31.7
4 to 4-1/2	3.92	99.6	3.86	98.0	4.64	117.9	0.36	9.1	4.5	6.7	6.20	157.5	6.10	154.9	2,000	13.8	5,900	40.7	45,000	20.412	100,000	45.359	2,300	15.9	4,600	31.7
5 to 5-1/2	4.74	120.4	4.68	118.9	5.52	140.2	0.39	9.9	5.7	8.5	-	-	7.00	177.8	2,000	13.8	5,500	37.9	58,000	26.308	130,000	58.967	2,200	15.2	4,300	29.6
6 to 6-5/8	5.50	139.7	5.44	138.2	6.38	162.1	0.44	11.2	7.6	11.3	8.00	203.2	8.25	209.6	2,000	13.8	5,200	35.9	70,000	31.751	140,000	63.503	2,200	15.9	4,100	28.3
6 to 7	5.93	150.6	5.84	148.3	6.94	176.3	0.50	12.7	9.2	13.7	8.70	221.0	8.75	222.3	2,000	13.8	5,400	37.2	90,000	40.823	150,000	68.039	2,200	15.9	4,400	30.3
8 to 9-5/8	7.74	196.6	7.67	194.8	9.09	230.9	0.68	17.3	16.3	24.3	11.75	298.5	11.90	302.3	2,000	13.8	4,800	33.1	160,000	72.575	210,000	95.254	2,200	15.9	4,400	30.3

* Ratings - all ratings are maximum operating limits. Exceeding these limits will void the warranty of all Star pipe

■ Ultimates - The typical mode of failure for pressure is weep and for tensile it is an across the joint pipe body shear

▲Collars - Smaller OD collars are available upon request, subject to application approval. Any order for integral joint products may include up to 15% threaded and coupled pipe

● Threads - All 1-1/2 EUE 10rd and 2_" - 4-1/2" EUE 8rd API threads conform to API 5B Table 14 (L4 is minimum), and all 5-1/2 - 9_" OD 8rd casing threads conform to API 5B, Table 7 (L4 is minimum).

◆ Elevators T&C - The 1,000 and 15,000 psi have a smaller OD, which may work with the same size elevators as the thread size

- Elevators IF - The setting plates must be removed so that the slips will properly set on the fiber glass pipe. Star IF tubing does not have an upset on the female end. Sizing slip type elevators requires use of the tubing OD instead of the upset OD on the male end. Rubber setting plates are available to minimize marking and to improve the fit. Shorter bolts are required to hold slips in place

⊗ Floor Slips - When running lighter weight (1,000 - 15,000 psi) products, it is good practice to replace the slip dies to make sure they will latch on the pipe body

API Threads (Continued)

Pipe - Thread Size	Nominal Pipe Dimensions										IJ		T&C or Collar		Pressure				Tensile				Collapse			
	Inside Diameter		Drift Diameter		Outside Diameter		Wall Thickness		Pipe Weight		Connection Diameter		Connection Diameter ▲		Rating *		Ultimate ■ ASTM D-1599		Rating *		Star Ultimate ■		Rating *		Ultimate ■ ASTM D-2924	
in.	in.	mm	in.	mm	in.	mm	in.	mm	lb/ft	kg/m	in.	mm	in.	mm	psi	mpa	psi	mpa	lb	kg	lb	kg	psi	mpa	psi	mpa
Series 2500 - ACT																										
1-1/2 to 1.90	1.44	36.6	1.38	35.1	1.84	46.7	0.20	5,1	1.0	1.5	2.80	71.1	2.90	73.7	2,500	17.2	8,600	59.3	10,000	4.536	25,000	11.340	3,300	22.8	6,700	46.2
2 to 2-3/8	1.94	49.3	1.88	47.8	2.47	62.7	0.27	6.9	1.7	2.5	3.50	88.9	3.60	91.4	2,500	17.2	8,600	59.3	17,000	7.711	47,000	21.319	3,300	22.8	6,800	46.9
2-1/2 to 2-7/8	2.37	60.2	2.30	58.4	2.92	74.2	0.28	7.1	2.2	3.3	4.20	106.7	4.20	106.7	2,500	17.2	7,600	52.4	22,000	9.979	60,000	27.216	3,000	20.7	6,100	42.1
3 to 3-1/2	2.94	74.7	2.88	73.2	3.58	90.9	0.32	8.1	3.0	4.5	4.90	124.5	5.10	129.5	2,500	17.2	6,600	45.5	30,000	13.608	80,000	36.287	2,600	17.9	5,200	35.9
3-1/2 to 4	3.33	84.6	3.27	83.1	4.07	103.4	0.37	9.4	4.0	6.0	-	-	5.55	141.0	2,500	17.2	7,000	48.3	40,000	18.144	90,000	40.823	2,700	18.6	5,600	38.6
4 to 4-1/2	3.92	99.6	3.86	98.0	4.77	121.2	0.42	10.7	5.3	7.9	6.50	165.1	6.40	162.6	2,500	17.2	6,800	46.9	55,000	24.948	110,000	49.895	2,700	18.6	5,400	37.2
6 to 6-5/8	5.50	139.7	5.44	138.2	6.56	166.6	0.53	13.5	9.0	13.4	8.00	203.2	8.25	209.6	2,500	17.2	5,000	34.5	70,000	31.751	150,000	68.039	2,700	18.6	4,800	33.1
Series 3000 - ACT																										
1-1/2 to 1.90	1.44	36.6	1.38	35.1	1.87	47.5	0.22	5.6	1.1	1.6	3.00	76.2	3.05	77.5	3,000	20.7	9,200	63.4	11,000	4.990	30,000	13.608	3,700	25.5	7,400	51.0
2 to 2-3/8	1.94	49.3	1.88	47.8	2.51	63.8	0.29	7.4	1.8	2.7	3.70	94.0	3.70	94.0	3,000	20.7	9,100	62.7	20,000	9.072	50,000	22.680	3,600	24.8	7,300	50.3
2-1/2 to 2-7/8	2.37	60.2	2.30	58.4	2.98	75.7	0.31	7.9	2.4	3.6	4.40	111.8	4.40	111.8	3,000	20.7	8,800	60.7	26,500	12.020	65,000	29.484	3,400	23.4	7,000	48.3
3 to 3-1/2	2.94	74.7	2.88	73.2	3.71	94.2	0.38	9.7	3.6	5.4	5.10	129.5	5.25	133.4	3,000	20.7	8,100	55.8	36,500	16.556	88,000	39.916	3,200	22.1	6,400	44.1
3-1/2 to 4	3.33	84.6	3.27	83.1	4.14	105.2	0.41	10.4	4.4	6.5	-	-	5.85	148.6	3,000	20.7	7,600	52.4	45,000	20.412	90,000	40.823	3,200	22.1	6,000	41.4
4-1/2 to 5-1/2	3.92	99.6	3.86	98.0	4.90	124.5	0.49	12.4	6.7	10.0	-	-	7.60	193.0	3,000	20.7	8,000	55.2	66,000	29.937	120,000	54.431	3,200	22.1	6,400	44.1
Series 3500 - ACT																										
1-1/2 to 1.90	1.44	36.6	1.38	35.1	1.94	49.3	0.25	6.4	1.3	1.9	3.20	81.3	3.15	80.0	3,500	24.1	11,000	75.8	13,000	5.897	35,000	15.876	4,400	30.3	8,800	60.7
2 to 2-3/8	1.94	49.3	1.88	47.8	2.56	65.0	0.31	7.9	2.0	3.0	3.85	97.8	3.90	99.1	3,500	24.1	9,900	68.3	21,500	9.752	53,000	24.040	3,900	26.9	7,900	54.5
2-1/2 to 2-7/8	2.37	60.2	2.30	58.4	3.07	78.0	0.35	8.9	2.8	4.2	4.60	116.8	4.60	116.8	3,500	24.1	9,300	64.1	30,000	13.608	68,000	30.844	3,700	25.5	7,400	51.0
3 to 4-1/2	2.94	74.7	2.88	73.2	3.84	97.5	0.45	11.4	5.0	7.4	-	-	7.00	177.8	3,500	24.1	9,300	64.1	44,000	19.958	115,000	52.163	3,700	25.5	7,400	51.0
3-1/2 to 4-1/2	3.33	84.6	3.27	83.1	4.29	109.0	0.48	12.2	5.7	8.5	-	-	7.00	177.8	3,500	24.1	8,300	57.2	50,000	22.680	110,000	49.895	3,600	24.8	6,700	46.2
4 to 5-1/2	3.92	99.6	3.86	98.0	5.11	129.8	0.59	15.0	8.1	12.1	-	-	7.90	200.7	3,500	24.1	9,100	62.7	78,000	35.380	125,000	56.699	3,600	24.8	7,200	49.6
Series 4000 - ACT																										
1-1/2 to 1.90	1.44	36.6	1.38	35.1	2.01	51.1	0.28	7.1	1.4	2.1	3.30	83.8	3.30	83.8	4,000	27.6	11,000	75.8	15,000	6.804	40,000	18.144	4,800	33.1	9,200	63.4
2 to 2-3/8	1.94	49.3	1.88	47.8	2.60	66.0	0.33	8.4	2.2	3.3	4.00	101.6	4.10	104.1	4,000	27.6	10,000	69.0	22,500	10.206	56,000	25.401	4,100	28.3	8,200	56.5
2-1/2 to 3-1/2	2.37	60.2	2.30	58.4	3.19	81.0	0.41	10.4	3.6	5.4	-	-	5.75	146.1	4,000	27.6	10,000	69.0	37,000	16.783	75,000	34.019	4,300	29.6	8,500	58.6
3 to 4-1/2	2.94	74.7	2.88	73.2	3.98	101.1	0.52	13.2	5.7	8.5	-	-	7.20	182.9	4,000	27.6	10,000	69.0	51,000	23.133	120,000	54.431	4,100	28.3	8,100	55.8
3-1/2 to 4-1/2	3.33	84.6	3.27	83.1	4.42	112.3	0.54	13.7	6.4	9.5	7.00	177.8	7.20	182.9	4,000	27.6	9,300	64.1	55,000	24.948	110,000	49.895	4,000	27.6	7,500	51.7
4-1/2 to 5-1/2	3.92	99.6	3.86	98.0	5.26	133.6	0.67	17.0	9.2	13.7	8.00	203.2	8.20	208.3	4,000	27.6	9,600	66.2	90,000	40.823	125,000	56.699	4,000	27.6	8,000	55.2

Reference page 5-259 for footnote reference

Dimensions, Specifications, And Physical Properties Of Centron® Epoxy Integral Joint Tubing Manufactured By Centron International Inc., Mineral Wells, Texas

Size	Nominal Inside Diameter		Nominal Wall Thickness		Nominal Outside Diameter		Nominal Box OD		Weight		Weight		Rated Operating Values: Static Internal Pressure 75°F *		Rated Operating Values: External Collapse		Rated Operating Values: Rated Axial Load x 10^3		Typical Ultimate Values: Short Term ■ Weep Pressure		Typical Ultimate Values: External Collapse Pressure		Typical Ultimate Values: Axial Thread Load		Typical Ultimate Values: Axial Wall Load x 10^3	
	in.	*mm*	in.	*mm*	in.	*mm*	in.	mm	lb/ft	*kg/m*	lb/joint	*kg/joint*	psi	*mpa*	psi	*mpa*	lb	*n*	psi	*mpa*	psi	*mpa*	lb	*kg*	lb	*n*
1-1/2																										
DH2000▲	1.60	*40.6*	.175	*4.45*	1.95	*47.0*	2.95	*74.9*	0.93	*1.38*	27.4	*12.4*	2,000	*13.8*	2,500	*17.2*	7.0	*32*	5,000	*34.5*	5,000	*34*	35,000	*15,875*	29	*129*
DH2500▲	1.60	*40.6*	.210	*5.33*	2.02	*51.3*	3.05	*77.5*	1.15	*1.74*	33.9	*15.3*	2,500	*17.2*	3,000	*21.0*	9.0	*40*	5,500	*37.0*	6,200	*42*	35,000	*15,875*	36	*160*
DH3000▲	1.60	*40.6*	.230	*5.84*	2.06	*52.3*	3.15	*80.0*	1.30	*1.94*	38.4	*17.5*	3,000	*20.7*	4,000	*28.0*	10.0	*44*	6,000	*41.4*	7,500	*52*	35,000	*15,875*	44	*195*
DH3500▲	1.60	*40.6*	.275	*6.99*	2.15	*54.6*	3.25	*82.6*	1.63	*2.43*	48.1	*21.8*	3,500	*24.1*	5,000	*34.0*	12.0	*53*	6,500	*44.8*	9,000	*62*	35,000	*15,875*	52	*240*
DH4000▲	1.60	*40.6*	.290	*7.37*	2.18	*55.4*	3.40	*86.4*	1.75	*2.61*	51.6	*23.5*	4,000	*27.6*	6,000	*41.0*	13.5	*60*	7,000	*48.3*	11,000	*76*	35,000	*15,875*	60	*266*
2-3/8																										
DH1500	1.95	*49.5*	.180	*4.57*	2.31	*58.7*	3.35	*85.1*	1.15	*1.72*	33.9	*15.4*	1,500	*10.3*	1,500	*10.3*	10.0	*44*	4,500	*31.0*	4,000	*28*	50,000	*22,680*	36	*160*
DH2000	1.95	*49.5*	.220	*5.59*	2.39	*60.7*	3.45	*87.6*	1.45	*2.16*	42.8	*19.5*	2,000	*13.8*	2,000	*13.8*	12.0	*53*	5,500	*34.5*	5,000	*34*	50,000	*22,680*	45	*200*
DH2500	1.95	*49.5*	.275	*6.99*	2.50	*63.5*	3.55	*90.2*	1.72	*2.56*	50.7	*23.0*	2,500	*17.2*	2,500	*17.2*	15.0	*62*	6,000	*37.9*	6,000	*43*	50,000	*22,680*	57	*253*
DH3000	1.95	*49.5*	.310	*7.87*	2.57	*65.3*	3.65	*92.7*	2.04	*3.03*	60.2	*27.3*	3,000	*20.7*	3,000	*20.7*	16.0	*71*	7,000	*41.4*	7,500	*52*	50,000	*22,680*	66	*293*
DH3500●	1.95	*49.5*	.330	*8.38*	2.61	*66.3*	3.70	*94.0*	2.18	*3.25*	64.2	*29.1*	3,500	*24.1*	3,500	*24.1*	17.0	*78*	7,500	*44.8*	9,000	*76*	50,000	*22,680*	70	*311*
2-7/8																										
DH1500	2.48	*63.0*	.190	*4.83*	2.86	*72.6*	4.00	*102*	1.55	*2.31*	45.7	*20.8*	1,500	*10.3*	1,500	*10.3*	12.0	*53*	4,500	*31.0*	3,600	*24*	60,000	*27,200*	55	*245*
DH2000	2.48	*63.0*	.230	*5.84*	2.94	*74.7*	4.20	*107*	1.85	*2.76*	81.4	*24.8*	2,000	*13.8*	2,000	*13.8*	17.0	*67*	5,500	*34.5*	5,000	*34*	60,000	*27,200*	71	*316*
DH2500●	2.48	*63.0*	.300	*7.62*	3.08	*78.2*	4.40	*112*	2.40	*3.58*	70.8	*32.2*	2,500	*17.2*	2,500	*17.2*	20.0	*89*	6,000	*37.9*	6,000	*41*	60,000	*27,200*	85	*378*
DH3000●	2.48	*63.0*	.350	*8.89*	3.18	*80.8*	4.50	*114*	2.80	*4.18*	82.6	*37.6*	3,000	*20.7*	3,000	*20.7*	22.0	*98*	6,500	*41.4*	8,000	*55*	60,000	*27,200*	96	*427*
3-1/2																										
DH1200	2.98	*75.7*	.190	*4.83*	3.36	*85.3*	4.50	*114*	1.75	*2.61*	51.6	*23.5*	1,200	*5.5*	1,200	*5.5*	14.0	*62*	3,000	*20.7*	1,500	*10*	70,000	*31,750*	60	*255*
DH1500	2.98	*75.7*	.230	*5.84*	3.44	*87.4*	4.70	*119*	1.90	*2.83*	58.3	*25.5*	1,500	*6.9*	1,500	*6.9*	16.9	*71*	4,500	*31.8*	1,800	*12*	70,000	*31,750*	76	*338*
DH2000	2.98	*75.7*	.280	*7.11*	3.54	*89.9*	4.85	*123*	2.65	*3.95*	78.1	*35.6*	2,000	*13.8*	2,000	*13.8*	21.0	*93*	5,000	*34.5*	4,500	*31*	70,000	*31,750*	92	*409*
DH2500	2.98	*75.7*	.310	*7.87*	3.60	*91.4*	4.90	*125*	2.90	*4.32*	85.6	*38.9*	2,500	*17.2*	2,500	*17.2*	26.0	*116*	5,500	*37.9*	6,800	*47*	70,000	*31,750*	109	*485*
4-1/2																										
DH1000	3.98	*101.0*	.200	*5.08*	4.38	*111*	5.55	*141*	2.50	*3.73*	73.8	*33.6*	1,000	*6.9*	400	*2.8*	20.0	*89*	3,000	*20.7*	700	*5*	90,000	*40,800*	80	*356*
DH1200	3.98	*101.0*	.230	*5.84*	4.44	*113*	5.60	*142*	2.70	*4.02*	79.7	*36.2*	1,200	*8.3*	700	*5.0*	22.0	*98*	3,600	*24.8*	1,000	*6.9*	90,000	*40,800*	99	*440*
DH1500	3.98	*101.0*	.290	*7.37*	4.56	*116*	5.75	*146*	3.50	*5.29*	103.0	*46.7*	1,500	*9.8*	1,100	*7.6*	28.0	*124*	4,500	*31.0*	2,200	*15*	90,000	*40,800*	120	*534*
DH2000●	3.98	*101.0*	.370	*9.40*	4.72	*120*	5.85	*149*	4.50	*6.71*	133.0	*60.4*	2,000	*13.8*	2,000	*3.8*	36.0	*160*	5,000	*34.5*	3,600	*25*	90,000	*40,800*	136	*605*
DH2500●	3.98	*101.0*	.430	*13.0*	4.84	*147*	6.00	*152*	5.40	*8.05*	159.3	*72.5*	2,500	*17.2*	3,000	*2.07*	42.0	*187*	5,500	*37.9*	5,000	*35*	90,000	*40,800*	150	*667*

Note: CENTRON® Tubing can be used in many applications to 180°F and in some cases above. In all applications, chemical compatibility must be established and physical capabilities of the tubing for the expected conditions must be determined. Contact Centron International Inc. for technical assistance. Ultimate properties listed are at 75°F.

***** Quasi-Steady
■ Unrestrained across the joint strength
▲ Not available in 10RD thread
● Not available in 8RD thread

Centron General Technical Data

Mill test Pressure: Operating Pressure x 1.25 Hazen-Williams Flow Factor: 150 Poissons Ratio (Hoop/Tensile): .30 Poissons Ratio (Axial Tensile): .21 Density 0.07 lb/in.^{3} 2 (Sp. Gr. = 1.95)	Axial Tensile Strength . . . 30,000 psi *(207 mpa)* Axial Modulus of Elasticity . . . 2.7 x 10^6 psi *(1.86 x 10^4 mpa)* Coefficient of Thermal Expansion . . . 1.0 x 10^{-5} in./in./°F. *(1.8 x 10^5 m/m°C)* Hoop Modulus of Elasticity:. . . 4.2 x 10^6 psi *(2.90 x 10^4 mpa)*

Data provided by Centron; August, 2005

Specifications of Centron Fiber Glass Epoxy Integral Joint Casing

Manufactured by Centron International Inc., Mineral Wells, Texas

Size		Nom Wall Thickness	OD	Max Box OD	Wt/Ft	Performance Properties at 75°F					
						Max Operating Conditions			Ultimate Physical Values		
						External Collapse	Internal Operating	Axial Load x 10^3	Internal Weep	External Collapse	Axial Wall Load x 10^3
		in.	in.	in.	lb	psi	psi	lb	psi	psi	lb
4-1/2	DHC150	.150	4.28	5.40	1.75	150	1,000	9.0	2,500	350	23
	DHC200	.200	4.38	5.50	2.40	300	1,250	12	3,100	750	30
	DHC250	.250	4.48	5.60	3.00	550	1,500	15	3,750	1,350	39
	DHC300	.300	4.58	5.70	3.60	900	1,800	18	4,300	2,200	48
	DHC350	.350	4.68	5.80	4.25	1,350	2,000	21	4,500	3,300	57
	DHC400	.400	4.78	5.90	4.90	1,850	2,500	25	5,000	4,600	65
5	DHC150	.150	4.63	5.25	1.90	110	900	9.5	2,250	275	25
	DHC175	.175	4.68	5.40	2.20	160	1,000	11	2,500	400	29
	DHC200	.200	4.73	5.50	2.53	240	1,200	13	3,000	600	34
	DHC250	.250	4.83	5.60	3.20	440	1,400	16	3,500	1,100	43
	DHC280	.280	4.89	5.75	3.61	600	1,600	18	4,000	1,500	48
5-1/2	DHC150	.150	5.15	6.30	2.10	80	800	10	2,000	200	28
	DHC175	.175	5.20	6.35	2.45	120	900	13	2,250	300	32
	DHC200	.200	5.25	6.40	2.85	180	1,000	14	2,500	440	38
	DHC250	.250	5.35	6.50	3.60	320	1,250	18	3,100	800	48
	DHC300	.300	5.45	6.60	4.40	520	1,500	22	3,750	1,300	58
	DHC350	.350	5.55	6.70	5.15	800	1,800	26	4,300	2,000	68
	DHC400	.400	5.65	6.80	5.90	1,150	2,000	30	4,500	2,800	78
6-5/8 *	DHC200	.200	6.500	8.10	3.52	90	800	18	2,000	225	47
	DHC250	.250	6.600	8.20	4.50	170	1,000	22	2,500	425	59
	DHC300	.300	6.700	8.35	5.40	290	1,250	27	3,100	725	72
	DHC350	.350	6.800	8.50	6.50	440	1,500	32	3,750	1,100	85
	DHC400	.400	6.900	8.65	7.35	620	1,650	37	4,125	1,550	95
	DHC450	.450	7.000	8.80	8.40	850	1,800	42	4,300	2,100	111
	DHC500	.500	7.100	8.95	9.30	1,150	2,000	48	4,500	2,800	120
7	DHC200	.200	6.800	8.10	3.75	80	800	19	2,000	200	49
	DHC250	.250	6.900	8.20	4.75	150	1,000	24	2,500	380	60
	DHC300	.300	7.000	8.35	5.70	250	1,200	29	3,000	625	74
	DHC350	.350	7.100	8.40	7.60	400	1,400	34	3,500	950	86
	DHC400	.400	7.200	8.45	7.70	550	1,600	39	4,000	1,350	100
	DHC450	.450	7.300	8.55	8.65	750	1,750	44	4,250	1,850	115
	DHC500	.500	7.400	8.65	9.65	1,000	2,000	50	4,500	2,400	128
9-5/8**	DHC250	.250	8.920	10.10	6.10	70	750	30	1,875	175	78
	DHC300	.300	9.020	10.25	7.45	120	900	37	2,250	300	95
	DHC350	.350	9.120	10.40	8.70	180	1,000	44	2,500	450	114
	DHC400	.400	9.220	10.55	9.95	260	1,200	50	3,000	650	130
	DHC450	.450	9.320	10.70	11.25	360	1,400	57	3,500	900	148
	DHC500	.500	9.420	10.90	12.60	480	1,500	64	3,750	1,200	165
10-3/4	DHC300	.300	10.320	12.20	7.80	65	750	35	1,875	160	87
	DHC350	.350	10.420	12.30	9.50	100	900	41	2,250	250	102
	DHC400	.400	10.520	12.50	11.0	150	1,000	48	2,500	380	120
	DHC450	.450	10.620	12.70	12.5	210	1,150	55	2,875	530	137
	DHC500	.500	10.720	12.90	14.0	280	1,250	61	3,100	720	152

Centron casing joints are 29.5' *(9.0 m)* overall, with a "make-up" length of 29.125' *(8.87 m)*, except for size 5", which is 30' *(9.14 m)* overall length with a "make-up" length of 20.67' *(9.04 m)* and 9-5/8" and 10-3/4" which is 29.17' *(8.89 m)* overall length with a "make-up" length of 28.67' *(8.74 m)*.

* 7 API LTC 8RD threads available

**9-5/8" API LTC 8RD threads available.

Data provided by Centron International Inc. literature 2000

STAR™ Aliphatic Amine Downhole Casing

Manufactured By Fiber Glass Systems, L.p.San Antonio, Texas

Size	ID	OD	Wall	Wt*	Connection Diameter		Pressure		Tensile		Collapse	
				lb/ft	IJ	T&C	Rating	ASTM D-1599	Rating	Ultimate	Rating	ASTM D-2924
5-1/2	4.75	5.23	0.25	3.70	N/A	6.25	1,000	3,400	38,000	100,000	1,200	2,700
6-5/8	5.50	6.02	0.26	4.70	7.45	7.55	1,000	3,200	45,000	110,000	1,000	2,500
7	5.93	6.57	0.32	6.00	7.90	8.00	1,000	3,500	60,000	120,000	1,000	2,800
8-5/8	7.74	8.48	0.37	8.50	9.60	9.70	1,000	3,200	90,000	175,000	1,000	2,500
5-1/2	4.75	5.41	0.34	4.90	N/A	6.60	1,500	4,600	48,000	120,000	1,800	3,600
6-5/8	5.50	6.20	0.35	5.70	7.65	7.90	1,500	4,200	60,000	125,000	1,800	3,300
7	5.93	6.71	0.39	6.90	8.40	8.40	1,500	4,300	75,000	140,000	1,800	3,400
9-5/8	7.74	8.78	0.52	12.60	11.40	11.50	1,500	4,400	25,000	200,000	1,800	3,500
5-1/2	4.75	5.45	0.36	5.20	N/A	7.00	1,750	4,900	53,000	125,000	2,000	3,800
5-1/2	4.74	5.48	0.37	5.40	N/A	7.00	2,000	5,100	53,000	130,000	2,000	4,000
6-5/8	5.50	6.38	0.44	7.20	8.00	8.25	2,000	5,200	70,000	140,000	2,200	4,100
7	5.93	6.93	0.50	9.10	8.70	8.75	2,000	5,400	90,000	150,000	2,200	4,200
9-5/8	7.74	9.07	0.67	15.40	11.75	11.90	2,000	4,900	60,000	210,000	2,200	4,400
5-1/2	3.85	4.83	0.49	6.70	N/A	7.60	3,000	7,800	66,000	120,000	3,200	6,200
5-1/2	3.85	5.04	0.60	8.10	N/A	7.90	3,500	9,200	78,000	125,000	3,600	7,400

* Pipe weight is based on Threaded and Coupled (T&C) Joining System

NOTES: Ratings - All ratings are maximum operating limits. Exceeding these limits will void the warranty on all Fiber Glass Systems pipe. Ultimates - The typical mode of failure for pressure is weep and for tensile it is an across the joint body sheer. Collars - Smaller OD collars are available upon request, subject to application approval. Any order for integral joint products may include up to 15% threaded and coupled pipe. Threads - All 5-1/2" - 9-5/8" OD 8rd casing threads conform to API 5B, table 7 (L4 is minimum). Thermal Properties - Coefficient of thermal conductivity 0.2 BTU/(ft hr ºF0 3,0 cal./*(cm hr ºC)*; Coefficient of thermal expansion 8.7 x 10-6 in./in./ºF *(15,7 x 10-6 mm/mm/ºC)* Flow Factors - Hasen Williams C-150; Effective Roughness = 0.00006 in. *(1524 x 10-6 mm)*
Physical Properties - Density (lb/cu ft) - 122; Density *(kgs/cu cm)* = 1,96 x 10-3; Specific gravity = 1.96

STAR™ Fiber Glass Downhole Tubing/Casing Product Data

Product Description

- Pressure - Up to 4,000 psi *(27.6 MPa)*
- Resin System - Aliphatic Amine Cured Epoxy
- Reinforcement - Premium Fiber Glass
- Joining System - API 8rd, Threaded and Coupled or Integral Joint
- Joint Length - 30 Feet *(9.1 Meters)* Nominal, API Range 2, 28 to 32 Feet *(8.5 to 9.8 Meters)*
- Fittings - A variety of filament wound API Threaded Nipples, Couplings and Swages
- Temperature - Up to 200ºF *(93.3ºC)* Maximum
- Sizes - 1-1/2 through 9-5/8 Inches

Tubing Design

- Non API
- Design Temperature - Up to 200ºF *(93.3ºC)*
- Wall Thickness – Nominal
- Design - Based on the Proportional Elastic Limit on both the Hoop and Axial direction
- 100% Factory Hydrotest - All sizes to 1.25 x Pressure Rating
- Tensile Test - since the hydrotest is across the joint and unsupported, tensile loads of a proportional amount are generated

Benefits

- Controls Corrosion Caused by CO_2, H_2S and Salt Water
- Improved Flow Efficiency
- Easily Drilled Up
- Excellent Logging Characteristics

Applications

- Disposal or Injection Tubing to Depths of 10,000 Feet
- Production Tubing - ESP, Gas Lift, or Rod Pump
- Casing Liners - Cemented and Perforated, Zone, or to Surface
- Chemical Waste Disposal
- Geothermal
- Slotted Production Liners and Prepacked Screens
- Observation Well Casing
- Openhole Casing, Zone, or To Surface

Physical Properties

- Density (lb/cu ft) = 122
- Density *(kgs/cu cm) = 1,96 x 10^{-3}*
- Specific Gravity = 1.96

Thermal Properties

- Coefficient of Thermal conductivity 0.2 BTU/(ft. hr. ºF) *3,0 cal. (cm.hrºC)*
- Coefficient of Thermal Expansion 8.7 x 10-6 in./in./ºF *(15, 7 x 10^{-6} mm/mm/ºC)*

Flow Factors

- Hazen Williams C = 150
- Effective roughness = 0.00006 inches *(1524 x 10^{-6} mm)*

Nominal Moduli

- Modules of Elasticity Hoop - 4.5 psi x 10^6 *(GPa 31.1)*, Axial - 3.0 psi x 10^6 *(GPa 20.7)*
- Poisson's Ratio (Minor) = 0.25

Specifications of STAR™ Aliphatic Tubing Manufactured by Fiber Glass Systems, L.P. San Antonio, Texas

Pipe-Thread Size		Pipe Dimensions (Nominal)				IJ Connection Diameter	T&C Connection Diameter	Pressure		Tensile		Collapse	
		Inside Diameter	Outside Diameter	Wall Thickness	Pipe Weight*			Rating (1)	Ultimate (2) ASTM D-1599	Rating (1)	STAR™ (2) Ultimate	Rating	Ultimate (2) ASTM D-2924
in.		in.	in.	in.	lb/ft	in.	in.	psi	psi	psi	psi	psi	psi
2-1/2	2-7/8	2.37	2.64	0.14	1.00	3.80	3.80	1,000	3,800	8,000	40,000	1,000	3,000
3	3-1/2	2.94	3.26	0.16	1.50	4.35	4.60	1,000	3,600	11,500	63,000	1,000	2,900
3-1/2	4	3.33	3.74	0.21	2.40	N/A	5.00	1,000	4,100	15,000	80,000	1,000	3,200
4	4-1/2	3.85	4.27	0.21	2.50	5.60	5.80	1,000	3,600	20,000	95,000	1,000	2,900
1-1/2	1.9	1.44	1.74	0.15	0.70	2.60	2.80	1,500	6,600	5,000	20,000	1,500	5,200
2	2-3/8	1.94	2.33	0.19	1.10	3.20	3.25	1,500	6,300	11,500	42,000	2,400	5,000
2-1/2	2-7/8	2.37	2.72	0.18	1.30	3.80	3.80	1,500	4,800	14,000	55,000	2,000	3,800
3	3-1/2	2.94	3.34	0.20	1.80	4.45	4.60	1,500	4,500	18,500	71,000	1,600	3,500
3-1/2	4	3.33	3.77	0.22	2.50	N/A	5.00	1,500	4,300	25,000	85,000	1,800	3,400
4	4-1/2	3.85	4.42	0.29	3.40	5.80	5.80	1,500	4,800	34,000	95,000	1,800	3,800
2	2-3/8	1.94	2.33	0.19	1.20	3.30	3.40	1,750	6,300	12,000	43,000	2,400	5,000
2-1/2	2-7/8	2.37	2.78	0.21	1.60	3.90	4.00	1,750	5,700	16,000	56,000	2,200	4,500
3	3-1/2	2.94	3.39	0.22	2.00	4.50	4.80	1,750	4,900	21,000	72,000	1,900	3,900
3-1/2	4	3.33	3.90	0.28	3.10	N/A	5.25	1,750	5,500	30,000	85,000	1,800	4,300
4	4-1/2	3.85	4.43	0.29	3.50	6.00	6.10	1,750	4,900	38,000	100,000	2,000	3,900
1-1/2	1.9	1.44	1.74	0.15	0.70	2.70	2.80	2,000	6,500	7,500	25,000	2,800	5,200
2	2-3/8	1.94	2.37	0.22	1.40	3.40	3.40	2,000	7,000	14,500	46,000	2,800	5,500
2-1/2	2-7/8	2.37	2.78	0.21	1.60	4.00	4.00	2,000	5,600	18,000	58,000	2,400	4,400
3	3-1/2	2.94	3.44	0.25	2.30	4.70	4.80	2,000	5,400	25,000	74,000	2,300	4,300
3-1/2	4	3.33	3.91	0.29	3.20	N/A	5.25	2,000	5,600	34,000	90,000	2,300	4,400
4	4-1/2	3.85	4.56	0.36	4.30	6.20	6.10	2,000	5,900	45,000	100,000	2,300	4,700
1-1/2	1.9	1.44	1.89	0.23	1.10	2.80	2.90	2,500	9,300	10,000	25,000	3,300	7,400
2	2-3/8	1.94	2.47	0.27	1.70	3.50	3.60	2,500	8,300	17,000	47,000	3,300	6,600
2-1/2	2-7/8	2.37	2.90	0.27	2.00	4.20	4.20	2,500	7,000	22,000	60,000	3,000	5,600
3	3-1/2	2.94	3.58	0.32	2.90	4.90	5.10	2,500	6,800	30,000	80,000	2,600	5,400
3-1/2	4	3.33	4.05	0.36	3.90	N/A	5.55	2,500	6,700	40,000	90,000	2,700	5,300
4	4-1/2	3.85	4.68	0.42	5.10	6.50	6.40	2,500	6,800	55,000	110,000	2,700	5,400
1-1/2	1.9	1.44	1.87	0.21	1.00	3.00	3.05	3,000	8,900	11,000	30,000	3,700	7,100
2	2-3/8	2.94	3.44	0.25	2.30	3.70	3.70	3,000	5,400	25,000	50,000	2,300	4,300
2-1/2	2-7/8	2.37	2.98	0.31	2.40	4.40	4.40	3,000	8,000	26,500	65,000	3,400	6,300
3	3-1/2	2.94	3.70	0.38	3.50	5.10	5.25	3,000	7,900	36,500	88,000	3,200	6,300
3-1/2	4	3.33	4.16	0.41	4.40	N/A	5.85	3,000	7,600	45,000	90,000	3,200	6,100
4	5-1/2	3.85	4.83	0.49	6.70	N/A	7.60	3,000	7,800	66,000	120,000	3,200	6,200
1-1/2	1.9	1.44	1.96	0.26	1.30	3.20	3.15	3,500	10,500	13,000	35,000	4,400	8,400
2	2-3/8	1.94	2.57	0.31	2.00	3.85	3.90	3,500	9,500	21,500	53,000	3,900	7,600
2-1/2	2-7/8	2.37	3.07	0.35	2.80	4.60	4.60	3,500	8,900	30,000	68,000	3,700	7,100
3	4-1/2	2.94	3.83	0.45	4.90	N/A	7.00	3,500	9,100	44,000	115,000	3,700	7,200
3-1/2	4-1/2	3.33	4.28	0.47	5.60	N/A	7.00	3,500	8,600	50,000	110,000	3,600	6,900
4	5-1/2	3.85	5.04	0.60	8.10	N/A	7.90	3,500	9,200	78,000	125,000	3,600	7,400
1-1/2	1.9	1.44	2.04	0.30	1.50	3.30	3.30	4,000	11,700	15,000	40,000	4,800	9,400
2	2 3/8	1.94	2.60	0.33	2.20	4.00	4.10	4,000	10,000	22,500	56,000	4,100	8,000
2-1/2	3-1/2	2.37	3.20	0.42	3.70	N/A	5.75	4,000	10,300	37,000	75,000	4,300	8,200
3	4-1/2	2.94	3.95	0.51	5.60	N/A	7.20	4,000	10,100	51,000	120,000	4,100	8,100
3-1/2	4-1/2	3.33	4.44	0.55	6.20	7.00	7.20	4,000	9,400	60,000	110,000	4,000	7,800
4-1/2	5-1/2	3.85	5.18	0.67	8.60	8.00	8.20	4,000	10,100	90,000	125,000	4,000	8,100

NOTE: Pipe weight is based on Threaded and Coupled (T&C) joining system

NOTES: 1. Ratings - All ratings are maximum operating limits. Exceeding these limits will void the warranty on all Fiber Glass Systems pipe.
2. Ultimates - The typical mode of failure for pressure is weep and for tensile it is an across the joint body shear.
3. Collars - Small OD collars are available upon request, subject to application approval. Any order for integral joint products may include up to 15% threaded and coupled pipe.
4. Threads - All 1 1/2" EUE 10rd and 2-3/8":-4 1/2" EUE 8rd API threads conform to API 5B, table 14 (L4 is minimum).

Data provided by STAR™ Aliphatic Tubing; Fiber Glass Systems L.P., Manufacturers - San Antonio, TX; September 2005

STAR™ Fiber Glass General Information

Packer Selection

- STAR™ tubing is designed to be set in tension (see stretch chart).
- Double Grip Packers are preferred with an on/off tool seal assembly, 1/4 turn release.
- Direct Tension Set Packers should be avoided due to the movement of fiber glass.
- Direct Set Packers are run < 3,500 feet deep *(1,067 m)*.
- Set Packers with a steel work string > 3,500 feet deep *(1,067 m)*.
- Hydraulic Set Packers are not recommended, due to uncontrollable forces.
- Polished Bore Receptacles are run with proper precautions to avoid compression.
  A complete STAR™ Well Evaluation must be run to determine the proper set-ups.

Perforation

- Use a Jet Perforating gun. Shoot a maximum of two shots at a time at 0° Phase or 180° Phase.
- Mechanically decentralized.
- Two (2) to four (4) shots per foot maximum.
- Steel, Hollow Carrier, ten (10) to sixteen (16) gram selected fire charges.
- Interval acidizing with 15% to 25% Hydrochloric Acid is common practice for up to four (4) hours maximum.
  Displace with five (5) times the tubing volume.

Cementing

- Standard float equipment, check thread compatibility.
- Thread lock all steel to FRP connections.
- When installing mixed strings, have one joint of FRP casing supplied without a coupling (pin x pin) for cross-overs.
- Cementing in two stages may help avoid exceeding collapse rating.
- Keep differential below external and internal rating at all times.
- Care must be given to avoid shock collapse pressure when setting cement plug.
- Fiber Glass centralizers are available; metal centralizers must be qualified to fit to FRP.
- Cement residue can be cleaned up with proper care using a rock bit.
- Landing joints are available, but must be sized for the well-head selected.
- Drilling-Up fiber glass tubing or casing is easy with a rock bit (not a mill).

Rod Pump Wells

- It is preferred that the tubing be anchored

Electrical Submersible Pumps

- Care must be given to direction and amount of start-up torque.
- Anchoring is good practice

Fishing

- Normal Procedures, Spear or Overshot

Cutting

- Mechanical Jet Cutter

NOTE: This literature is intended as a guide only. All values listed in this products specification are nominal. Unsatisfactory product results may occur due to environmental fluctuations, variations in operating procedures, or interpolation of data. We suggest that personnel using these data have specialized training and experience in the application of these products and their normal installation and operating conditions. Your intended applications of these products should be verified for propriety by your engineers. We expressly disclaim responsibility for any consequential or incidental damages resulting from the installation or use of these products, since we do not determine the degree of care utilized during the product installation or service. Fiber Glass Systems reserves the right to revise these data, as necessary, without notice.

Specifications of Fiber Glass Casing Manufactured by Future Pipe Industries, Inc.

Red Box 1000	4-1/2"	5-1/2"	6-5/8"	7"	7-5/8"	9-5/8"	10-3/4"
OD (in.)	4.30	4.78	5.87	6.71	6.71	8.46	9.55
ID (in.)	3.98	4.42	5.43	6.21	6.21	7.84	8.85
Wall Thickness (in.)	0.16	0.18	0.22	0.25	0.25	0.31	0.35
Coupling OD (in.)	5.67	6.78	8.00	8.50	9.23	11.60	13.00
Weight (lb/ft)	2.0	2.70	4.0	4.8	5.4	8.6	11.0
Burst Rating (psi)	1,000	1,000	1,000	1,000	1,000	1,000	1,000
Collapse Rating (psi)	400	300	300	300	300	300	300
Joint Tensile Rating (lb)	29,000	37,500	55,800	72,800	73,400	111,200	133,500
8rd Thread Form	4-1/2" EUE Long	5-1/2" LTC	6-5/8" LTC	7" LTC	7-5/8" LTC	9-5/8" LTC	10-3/4" STC

Red Box 1500	4-1/2"	5-1/2"	6-5/8"	7"	7-5/8"	9-5/8"	10-3/4"
OD (in.)	4.47	4.96	6.09	6.96	6.96	8.80	9.94
ID (in.)	3.98	4.42	5.43	6.21	6.21	7.84	8.85
Wall Thickness (in.)	0.24	0.27	0.33	0.38	0.38	0.48	0.54
Coupling OD (in.)	5.67	6.78	8.00	8.50	9.23	11.60	13.00
Weight (lb/ft)	2.9	3.8	5.7	6.9	7.5	12.1	15.4
Burst Rating (psi)	1,500	1,500	1,500	1,500	1,500	1,500	1,500
Collapse Rating (psi)	900	1,000	1,000	1,000	1,000	1,000	1,000
Joint Tensile Rating (lb)	44,400	55,900	79,200	86,400	94,200	119,400	133,500
8rd Thread Form	4-1/2" EUE Long	5-1/2" LTC	6-5/8" LTC	7" LTC	7-5/8" LTC	9-5/8" LTC	10-3/4" STC

Red Box 2000	4-1/2"	5-1/2"	6-5/8"	7"	7-5/8"	9-5/8"	10-3/4"
OD (in.)	4.65	5.16	6.32	use 7-5/8" size	7.23	9.15	10.32
ID (in.)	3.98	4.42	5.43		6.21	7.84	8.85
Wall Thickness (in.)	0.33	0.37	0.45		0.51	0.65	0.74
Coupling OD (in.)	5.67	6.78	8.00		9.23	11.60	13.00
Weight (lb/ft)	3.9	5.0	7.5		9.8	15.8	20.0
Burst Rating (psi)	2,000	2,000	2,000		2,000	2,000	2,000
Collapse Rating (psi)	2,200	2,200	2,100		2,100	2,200	2,200
Joint Tensile Rating (lb)	51,000	59,300	79,200		94,200	119,400	133,500
8rd Thread Form	4-1/2" EUE Long	5-1/2" LTC	6-5/8" LTC		7-5/8" LTC	9-5/8" LTC	10-3/4" STC

Red Box 2500	4-1/2"	5-1/2"	6-5/8"	7"	7-5/8"	9-5/8"	10-3/4"
OD (in.)	4.82	5.36	6.57	use 7-5/8" size	7.52	9.5	10.71
ID (in.)	3.98	4.42	5.43		6.21	7.84	8.85
Wall Thickness (in.)	0.42	0.47	0.57		0.66	0.83	0.93
Coupling OD (in.)	5.67	6.78	8.00		9.23	11.60	13.00
Weight (lb/ft)	4.9	6.3	9.4		12.4	19.7	24.8
Burst Rating (psi)	2,500	2,500	2,500		2,500	2,500	2,500
Collapse Rating (psi)	3,000	3,000	3,000		3,000	3,000	3,000
Joint Tensile Rating (lb)	51,000	59,300	79,200		94,200	119,400	133,500
8rd Thread Form	4-1/2" EUE Long	5-1/2" LTC	6-5/8" LTC		7-5/8" LTC	9-5/8" LTC	10-3/4" STC

Red Box 1250, 1750, 2250, and 2750 are also available. Data provided by Future Pipe Industries, Inc

Specifications of Fiber Glass Tubing, Manufactured By Future Pipe Industries Inc.

Red Box 1000	2-3/8	2-7/8	3-1/2	4-1/2	5-1/2	6-5/8	7	7-5/8	9-5/8	10-3/4	11-3/4	13-3/8	16
OD (in.)	2.18	2.67	3.24	4.3	4.78	5.87	6.71	6.71	8.46	9.55	11.49	12.83	15.53
ID (in.)	2	2.47	3	3.98	4.42	5.43	6.21	6.21	7.84	8.85	10.72	11.97	14.48
Wall Thickness (in.)	0.09	0.1	0.12	0.16	0.18	0.22	0.25	0.25	0.31	0.35	0.39	0.43	0.52
Box OD (in.) Max	3.35	3.88	4.66	5.67	6.78	8	8.5	9.23	11.6	13	14	15	18.1
Weight (lb/ft)	0.6	0.8	1.2	2	2.7	4	4.8	5.4	8.6	11	13.3	16.6	24.9
Internal Pressure Rating (psi)	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
Collapse Pressure Rating (psi)	310	350	310	340	310	330	330	330	310	310	240	240	240
Joint Tensile Ratubg (lb)	8000	12,200	17,500	31,000	39,500	59,000	77,500	77,500	121,000	154,000	135,500	169,000	247,000
8rd Thread Type	2-3/8 EUE	2-7/8 EUE	3-1/2 EUE	4-1/2 EUE	5-1/2 LTC	6-5/8 LTC	7 LTC	7-5/8 LTC	9-5/8 LTC	10-3/4 STC	11-3/4 T&C	13-3/8 T&C	16 T&C

Red Box 1500	2-3/8	2-7/8	3-1/2	4-1/2	5-1/2	6-5/8	7	7-5/8	9-5/8	10-3/4	11-3/4	13-3/8	16
OD (in.)	2.24	2.77	3.37	4.47	4.96	6.09	6.96	6.96	8.8	9.94	11.9	13.29	16.08
ID (in.)	2	2.47	3	3.98	4.42	5.43	6.21	6.21	7.84	8.85	10.72	11.97	14.48
Wall Thickness (in.)	0.12	0.15	0.19	0.24	0.27	0.33	0.38	0.38	0.48	0.54	0.59	0.66	0.8
Box OD (in.) Max	3.35	3.88	4.66	5.67	6.78	8	8.5	9.23	11.6	13	16.45	15.5	18.95
Weight (lb/ft)	0.8	1.2	1.7	2.9	3.8	5.7	6.9	7.5	12.1	15.4	23.1	23.7	35
Internal Pressure Rating (psi)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500
Collapse Pressure Rating (psi)	1200	1000	1100	1100	1000	1100	1000	1000	1000	1000	750	750	750
Joint Tensile Ratubg (lb)	13,000	19,000	28,000	48,000	57500	75,000	79,900	90,000	146,500	169,000	183,000	183,000	248,000
8rd Thread Type	2-3/8 EUE	2-7/8 EUE	3-1/2 EUE	4-1/2 EUE	5-1/2 LTC	6-5/8 LTC	7 LTC	7-5/8 LTC	9-5/8 LTC	10-3/4 STC	11-3/4 T&C	13-3/8 T&C	16 T&C

Red Box 2000	2-3/8	2-7/8	3-1/2	4-1/2	5-1/2	6-5/8	7	7-5/8	9-5/8	10-3/4	11-3/4	13-3/8	16
OD (in.)	2.33	2.97	3.5	4.65	5.16	6.32	7.23	7.23	9.15	10.32	-	-	-
ID (in.)	2	2.47	3	3.98	4.42	5.43	6.21	6.21	7.84	8.85	-	-	-
Wall Thickness (in.)	0.16	0.2	0.25	0.33	0.37	0.45	0.51	0.51	0.65	0.74	-	-	-
Box OD (in.) Max	3.35	3.88	4.66	5.67	6.78	8	9.23	9.23	11.6	13	-	-	-
Weight (lb/ft)	1	1.5	2.3	3.9	5	7.5	9.8	9.8	15.8	20	-	-	-
Internal Pressure Rating (psi)	2000	2000	2000	2000	2000	2000	2000	2000	2000	2000	-	-	-
Collapse Pressure Rating (psi)	2,100	2,100	2,300	2,200	2,200	2,100	2,100	2,100	2,200	2,200	-	-	-
Joint Tensile Ratubg (lb)	15,500	23,600	35,900	51,000	59,300	79,200	94,200	94,200	119,400	133,500	-	-	-
8rd Thread Type	2-3/8 EUE	2-7/8 EUE	3-1/2 EUE	4-1/2 EUE	5-1/2 EUE	6-5/8 EUE	7-5/8 LTC	7-5/8 LTC	9-5/8 LTC	10-3/4 STC	-	-	-

Red Box 2500	2-3/8	2-7/8	3-1/2	4-1/2	5-1/2	6-5/8	7	7-5/8	9-5/8	10-3/4	11-3/4	13-3/8	16
OD (in.)	2.43	2.99	3.63	4.82	5.36	6.57	7.52	7.52	9.5	10.71	-	-	-
ID (in.)	2	2.47	3	3.98	4.42	5.43	6.21	6.21	7.84	8.85	-	-	-
Wall Thickness (in.)	0.22	0.26	0.31	0.42	0.47	0.57	0.66	0.66	0.83	0.93	-	-	-
Box OD (in.) Max	3.35	3.88	4.68	5.67	6.78	8	9.23	9.23	11.6	13	-	-	-
Weight (lb/ft)	1.3	2	2.9	4.9	6.3	9.4	12.4	12.4	19.7	24.8	-	-	-
Internal Pressure Rating (psi)	2500	2500	2500	2500	2500	2500	2500	2500	2500	2500	-	-	-
Collapse Pressure Rating (psi)	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	2,900	-	-	-
Joint Tensile Ratubg (lb)	20,200	27,100	35,900	51,000	59,300	79,200	94,200	94,200	119,400	133,500	-	-	-
8rd Thread Type	2-3/8 EUE	2-7/8 EUE	3-1/2 EUE	4-1/2 EUE	5-1/2 EUE	6-5/8 LTC	7-5/8 LTC	7-5/8 LTC	9-5/8 LTC	10-3/4 STC	-	-	-

Red Box 3000	2-3/8	2-7/8	3-1/2	4-1/2	5-1/2	6-5/8	7	7-5/8	9-5/8	10-3/4	11-3/4	13-3/8	16
OD (in.)	2.52	3.1	3.77	5.03	-	-	-	-	-	-	-	-	-
ID (in.)	2	2.47	3	3.98	-	-	-	-	-	-	-	-	-
Wall Thickness (in.)	0.26	0.32	0.39	0.43	-	-	-	-	-	-	-	-	-
Box OD (in.) Max	3.35	3.88	4.66	5.46	-	-	-	-	-	-	-	-	-
Weight (lb/ft)	1.6	2.4	3.5	6.9	-	-	-	-	-	-	-	-	-
Internal Pressure Rating (psi)	3000	3000	3000	3000	-	-	-	-	-	-	-	-	-
Collapse Pressure Rating (psi)	3,500	3,500	3,400	3,500	-	-	-	-	-	-	-	-	-
Joint Tensile Ratubg (lb)	17,500	24,500	33,000	57,500	-	-	-	-	-	-	-	-	-
8rd Thread Type	2-3/8 EUE	2-7/8 EUE	3-1/2 EUE	4-1/2 EUE	-	-	-	-	-	-	-	-	-

Red Box 3500	2-3/8	2-7/8	3-1/2	4-1/2	5-1/2	6-5/8	7	7-5/8	9-5/8	10-3/4	11-3/4	13-3/8	16
OD (in.)	2.61	3.22	*	*	-	-	-	-	-	-	-	-	-
ID (in.)	2	2.47	-	-	-	-	-	-	-	-	-	-	-
Wall Thickness (in.)	0.31	0.38	-	-	-	-	-	-	-	-	-	-	-
Box OD (in.) Max	3.35	3.88	-	-	-	-	-	-	-	-	-	-	-
Weight (lb/ft)	1.9	2.9	-	-	-	-	-	-	-	-	-	-	-
Internal Pressure Rating (psi)	3500	3500	-	-	-	-	-	-	-	-	-	-	-
Collapse Pressure Rating (psi)	4000	4100	-	-	-	-	-	-	-	-	-	-	-
Joint Tensile Ratubg (lb)	17,500	27,100	-	-	-	-	-	-	-	-	-	-	-
8rd Thread Type	2-3/8 EUE	2-7/8 EUE	-	-	-	-	-	-	-	-	-	-	-

* Contact Don Anderson, Future Pipe Industries, Inc. d.anderson@us.future-pipe.com
Data provided by Future Pipe Industries Inc, Houston, Texas; August 2005

Section 6 - Dimensions and Capacities

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Equations for Calculating Volume and Height Between: Tubing/Casing and Hole; Tubing/Casing and Casing*

Cubic feet per lineal foot = $.005454 \times (D^2 - d^2)$

Lineal feet per cubic foot = $183.35 / (D^2 - d^2)$

Gallons per lineal foot = $.0408 \times (D^2 - d^2)$

Lineal feet per gallon = $24.51 / (D^2 - d^2)$

Barrels per lineal foot = $.0009714 \times (D^2 - d^2)$

Lineal feet per barrel = $1029.4 / (D^2 - d^2)$

D = inside diameter in inches for pipe; hole diameter in inches for holes

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The following notes apply to the tables within this section:

■ Ft/Cu Ft = $\frac{1}{\text{Cu Ft/Ft}}$

● $m/m^3 = \frac{1}{m^3/m}$

▲ Ft/Bbl = $\frac{1}{\text{Bbl/Ft}}$

◆ Ft/Gal = $\frac{1}{\text{Gal/Ft}}$

Capacities of Various Diameter Holes

ID	*ID (mm)*	cu ft/ft ■	*m^3 /m* ●	bbl/ft ▲	*L/m*	gal/ft ◆
1	*25*	0.0055	*0.000507*	0.0010	*0.507*	0.0408
1-1/8	*29*	0.0069	*0.000641*	0.0012	*0.641*	0.0516
1-1/4	*32*	0.0085	*0.000792*	0.0015	*0.792*	0.0637
1-3/8	*35*	0.0103	*0.000958*	0.0018	*0.958*	0.0771
1-1/2	*38*	0.0123	*0.001140*	0.0022	*1.140*	0.0918
1-5/8	*41*	0.0144	*0.001338*	0.0026	*1.338*	0.1077
1-3/4	*44*	0.0167	*0.001552*	0.0030	*1.552*	0.1249
1-7/8	*48*	0.0192	*0.001781*	0.0034	*1.781*	0.1434
2	*51*	0.0218	*0.002027*	0.0039	*2.027*	0.1632
2-1/8	*54*	0.0246	*0.002288*	0.0044	*2.288*	0.1842
2-1/4	*57*	0.0276	*0.002565*	0.0049	*2.565*	0.2065
2-3/8	*60*	0.0308	*0.002858*	0.0055	*2.858*	0.2301
2-1/2	*64*	0.0341	*0.003167*	0.0061	*3.167*	0.2550
2-5/8	*67*	0.0376	*0.003492*	0.0067	*3.492*	0.2811
2-3/4	*70*	0.0412	*0.003832*	0.0073	*3.832*	0.3085
2-7/8	*73*	0.0451	*0.004188*	0.0080	*4.188*	0.3372
3	*76*	0.0491	*0.004560*	0.0087	*4.560*	0.3672
3-1/8	*79*	0.0533	*0.004948*	0.0095	*4.948*	0.3984
3-1/4	*83*	0.0576	*0.005352*	0.0103	*5.352*	0.4309
3-3/8	*86*	0.0621	*0.005772*	0.0111	*5.772*	0.4647
3-1/2	*89*	0.0668	*0.006207*	0.0119	*6.207*	0.4998
3-5/8	*92*	0.0717	*0.006658*	0.0128	*6.658*	0.5361
3-3/4	*95*	0.0767	*0.007126*	0.0137	*7.126*	0.5737
3-7/8	*98*	0.0819	*0.007609*	0.0146	*7.609*	0.6126
4	*102*	0.0873	*0.008107*	0.0155	*8.107*	0.6528
4-1/8	*105*	0.0928	*0.008622*	0.0165	*8.622*	0.6942
4-1/4	*108*	0.0985	*0.009152*	0.0175	*9.152*	0.7369
4-3/8	*111*	0.1044	*0.009699*	0.0186	*9.699*	0.7809
4-1/2	*114*	0.1104	*0.010261*	0.0197	*10.261*	0.8262
4-5/8	*117*	0.1167	*0.010839*	0.0208	*10.839*	0.8727
4-3/4	*121*	0.1231	*0.011433*	0.0219	*11.433*	0.9205
4-7/8	*124*	0.1296	*0.012042*	0.0231	*12.042*	0.9696
5	*127*	0.1364	*0.012668*	0.0243	*12.668*	1.0200
5-1/8	*130*	0.1433	*0.013309*	0.0255	*13.309*	1.0716
5-1/4	*133*	0.1503	*0.013966*	0.0268	*13.966*	1.1245
5-3/8	*137*	0.1576	*0.014639*	0.0281	*14.639*	1.1787
5-1/2	*140*	0.1650	*0.015328*	0.0294	*15.328*	1.2342
5-5/8	*143*	0.1726	*0.016033*	0.0307	*16.033*	1.2909
5-3/4	*146*	0.1803	*0.016753*	0.0321	*16.753*	1.3489
5-7/8	*149*	0.1883	*0.017489*	0.0335	*17.489*	1.4082
6	*152*	0.1963	*0.018241*	0.0350	*18.241*	1.4688
6-1/8	*156*	0.2046	*0.019009*	0.0364	*19.009*	1.5306
6-1/4	*159*	0.2131	*0.019793*	0.0379	*19.793*	1.5937
6-3/8	*162*	0.2217	*0.020593*	0.0395	*20.593*	1.6581
6-1/2	*165*	0.2304	*0.021408*	0.0410	*21.408*	1.7238
6-5/8	*168*	0.2394	*0.022240*	0.0426	*22.240*	1.7907
6-3/4	*171*	0.2485	*0.023087*	0.0443	*23.087*	1.8589
6-7/8	*175*	0.2578	*0.023950*	0.0459	*23.950*	1.9284
7	*178*	0.2673	*0.024829*	0.0476	*24.829*	1.9992
7-1/8	*181*	0.2769	*0.025723*	0.0493	*25.723*	2.0712
7-1/4	*184*	0.2867	*0.026634*	0.0511	*26.634*	2.1445
7-3/8	*187*	0.2967	*0.027560*	0.0528	*27.560*	2.2191
7-1/2	*191*	0.3068	*0.028502*	0.0546	*28.502*	2.2950
7-5/8	*194*	0.3171	*0.029460*	0.0565	*29.460*	2.3721
7-3/4	*197*	0.3276	*0.030434*	0.0583	*30.434*	2.4505
7-7/8	*200*	0.3382	*0.031424*	0.0602	*31.424*	2.5302
8	*203*	0.3491	*0.032429*	0.0622	*32.429*	2.6112
8-1/8	*206*	0.3601	*0.033451*	0.0641	*33.451*	2.6934
8-1/4	*210*	0.3712	*0.034488*	0.0661	*34.488*	2.7769

Refer to back of section table of contents for footnote reference

Capacities of Various Diameter Holes (Continued)

ID	ID (mm)	cu ft/ft ■	m^3 /m ●	bbl/ft ▲	L/m	gal/ft ◆
8-3/8	213	0.3826	0.035541	0.0681	35.541	2.8617
8-1/2	216	0.3941	0.036610	0.0702	36.610	2.9478
8-5/8	219	0.4057	0.037694	0.0723	37.694	3.0351
8-3/4	222	0.4176	0.038795	0.0744	38.795	3.1237
8-7/8	225	0.4296	0.039911	0.0765	39.911	3.2136
9	229	0.4418	0.041043	0.0787	41.043	3.3048
9-1/8	232	0.4541	0.042191	0.0809	42.191	3.3972
9-1/4	235	0.4667	0.043355	0.0831	43.355	3.4909
9-3/8	238	0.4794	0.044535	0.0854	44.535	3.5859
9-1/2	241	0.4922	0.045730	0.0877	45.730	3.6822
9-5/8	244	0.5053	0.046942	0.0900	46.942	3.7797
9-3/4	248	0.5185	0.048169	0.0923	48.169	3.8785
9-7/8	251	0.5319	0.049412	0.0947	49.412	3.9786
10	254	0.5454	0.050671	0.0971	50.671	4.0800
10-1/8	257	0.5591	0.051945	0.0996	51.945	4.1826
10-1/4	260	0.5730	0.053236	0.1021	53.236	4.2865
10-3/8	264	0.5871	0.054542	0.1046	54.542	4.3917
10-1/2	267	0.6013	0.055864	0.1071	55.864	4.4982
10-5/8	270	0.6157	0.057203	0.1097	57.203	4.6059
10-3/4	273	0.6303	0.058556	0.1123	58.556	4.7149
10-7/8	276	0.6450	0.059926	0.1149	59.926	4.8252
11	279	0.6600	0.061312	0.1175	61.312	4.9368
11-1/8	283	0.6750	0.062713	0.1202	62.713	5.0496
11-1/4	286	0.6903	0.064130	0.1229	64.130	5.1637
11-3/8	289	0.7057	0.065563	0.1257	65.563	5.2791
11-1/2	292	0.7213	0.067012	0.1285	67.012	5.3958
11-5/8	295	0.7371	0.068477	0.1313	68.477	5.5137
11-3/4	298	0.7530	0.069957	0.1341	69.957	5.6329
11-7/8	302	0.7691	0.071454	0.1370	71.454	5.7534
12	305	0.7854	0.072966	0.1399	72.966	5.8752
12-1/8	308	0.8018	0.074494	0.1428	74.494	5.9982
12-1/4	311	0.8185	0.076038	0.1458	76.038	6.1225
12-3/8	314	0.8353	0.077598	0.1488	77.598	6.2481
12-1/2	318	0.8522	0.079173	0.1518	79.173	6.3750
12-5/8	321	0.8693	0.080764	0.1548	80.764	6.5031
12-3/4	324	0.8866	0.082372	0.1579	82.372	6.6325
12-7/8	327	0.9041	0.083995	0.1610	83.995	6.7632
13	330	0.9218	0.085634	0.1642	85.634	6.8952
13-1/8	333	0.9396	0.087288	0.1673	87.288	7.0284
13-1/4	337	0.9575	0.088959	0.1705	88.959	7.1629
13-3/8	340	0.9757	0.090645	0.1738	90.645	7.2987
13-1/2	343	0.9940	0.092347	0.1770	92.347	7.4358
13-5/8	346	1.0125	0.094065	0.1803	94.065	7.5741
13-3/4	349	1.0312	0.095799	0.1837	95.799	7.7137
13-7/8	352	1.0500	0.097549	0.1870	97.549	7.8546
14	356	1.0690	0.099315	0.1904	99.315	7.9968
14-1/8	359	1.0882	0.101096	0.1938	101.096	8.1402
14-1/4	362	1.1075	0.102893	0.1973	102.893	8.2849
14-3/8	365	1.1270	0.104706	0.2007	104.706	8.4309
14-1/2	368	1.1467	0.106535	0.2042	106.535	8.5782
14-5/8	371	1.1666	0.108380	0.2078	108.380	8.7267
14-3/4	375	1.1866	0.110241	0.2113	110.241	8.8765
14-7/8	378	1.2068	0.112117	0.2149	112.117	9.0276
15	381	1.2272	0.114009	0.2186	114.009	9.1800
15-1/8	384	1.2477	0.115917	0.2222	115.917	9.3336
15-1/4	387	1.2684	0.117841	0.2259	117.841	9.4885
15-3/8	391	1.2893	0.119781	0.2296	119.781	9.6447
15-1/2	394	1.3104	0.121736	0.2334	121.736	9.8022
15-5/8	397	1.3316	0.123708	0.2372	123.708	9.9609

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Capacities of Various Diameter Holes (Continued)

ID	ID (mm)	cu ft/ft ■	m^3/m ●	bbl/ft ▲	L/m	gal/ft ◆
15-3/4	400	1.3530	0.125695	0.2410	125.695	10.1209
15-7/8	403	1.3745	0.127698	0.2448	127.698	10.2822
16	406	1.3963	0.129717	0.2487	129.717	10.4448
16-1/4	413	1.4402	0.133802	0.2565	133.802	10.7737
16-1/2	419	1.4849	0.137951	0.2645	137.951	11.1078
16-3/4	425	1.5302	0.142163	0.2725	142.163	11.4469
17	432	1.5763	0.146438	0.2807	146.438	11.7912
17-1/4	438	1.6230	0.150777	0.2891	150.777	12.1405
17-1/2	445	1.6703	0.155179	0.2975	155.179	12.4950
17-3/4	451	1.7184	0.159645	0.3061	159.645	12.8545
18	457	1.7671	0.164173	0.3147	164.173	13.2192
18-1/4	464	1.8166	0.168765	0.3235	168.765	13.5889
18-1/2	470	1.8667	0.173421	0.3325	173.421	13.9638
18-3/4	476	1.9175	0.178139	0.3415	178.139	14.3437
19	483	1.9689	0.182921	0.3507	182.921	14.7288
19-1/4	489	2.0211	0.187767	0.3600	187.767	15.1189
19-1/2	495	2.0739	0.192676	0.3694	192.676	15.5142
19-3/4	502	2.1275	0.197648	0.3789	197.648	15.9145
20	508	2.1817	0.202683	0.3886	202.683	16.3200
20-1/4	514	2.2365	0.207782	0.3983	207.782	16.7305
20-1/2	521	2.2921	0.212944	0.4082	212.944	17.1462
20-3/4	527	2.3484	0.218169	0.4183	218.169	17.5669
21	533	2.4053	0.223458	0.4284	223.458	17.9928
21-1/4	540	2.4629	0.228810	0.4387	228.810	18.4237
21-1/2	546	2.5212	0.234226	0.4490	234.226	18.8598
21-3/4	552	2.5802	0.239704	0.4595	239.704	19.3009
22	559	2.6398	0.245246	0.4702	245.246	19.7472
22-1/4	565	2.7001	0.250852	0.4809	250.852	20.1985
22-1/2	572	2.7612	0.256521	0.4918	256.521	20.6550
22-3/4	578	2.8229	0.262253	0.5028	262.253	21.1165
23	584	2.8852	0.268048	0.5139	268.048	21.5831
23-1/4	591	2.9483	0.273907	0.5251	273.907	22.0549
23-1/2	597	3.0121	0.279829	0.5365	279.829	22.5317
23-3/4	603	3.0765	0.285815	0.5479	285.815	23.0137
24	610	3.1416	0.291864	0.5595	291.864	23.5007
24-1/4	616	3.2074	0.297976	0.5713	297.976	23.9929
24-1/2	622	3.2739	0.304151	0.5831	304.151	24.4901
24-3/4	629	3.3410	0.310390	0.5951	310.390	24.9925
25	635	3.4088	0.316692	0.6071	316.692	25.4999
25-1/4	641	3.4774	0.323058	0.6193	323.058	26.0125
25-1/2	648	3.5466	0.329487	0.6317	329.487	26.5301
25-3/4	654	3.6164	0.335979	0.6441	335.979	27.0529
26	660	3.6870	0.342534	0.6567	342.534	27.5807
26-1/4	667	3.7583	0.349153	0.6694	349.153	28.1137
26-1/2	673	3.8302	0.355835	0.6822	355.835	28.6517
26-3/4	679	3.9028	0.362581	0.6951	362.581	29.1949
27	686	3.9761	0.369390	0.7082	369.390	29.7431
27-1/4	692	4.0501	0.376262	0.7213	376.262	30.2965
27-1/2	699	4.1247	0.383198	0.7346	383.198	30.8549
27-3/4	705	4.2000	0.390196	0.7481	390.196	31.4185
28	711	4.2761	0.397259	0.7616	397.259	31.9871
28-1/4	718	4.3528	0.404384	0.7753	404.384	32.5609
28-1/2	724	4.4301	0.411573	0.7890	411.573	33.1397
28-3/4	730	4.5082	0.418825	0.8029	418.825	33.7237
29	737	4.5869	0.426141	0.8170	426.141	34.3127
29-1/4	743	4.6664	0.433520	0.8311	433.520	34.9069
29-1/2	749	4.7465	0.440962	0.8454	440.962	35.5061
29-3/4	756	4.8273	0.448468	0.8598	448.468	36.1105

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Capacities of Various Diameter Holes (Continued)

ID	ID (mm)	cu ft/ft ■	m^3 /m ●	bbl/ft ▲	L/m	gal/ft ◆
30	762	4.9087	0.456037	0.8743	456.037	36.7199
30-1/4	768	4.9909	0.463669	0.8889	463.669	37.3345
30-1/2	775	5.0737	0.471365	0.9037	471.365	37.9541
30-3/4	781	5.1572	0.479124	0.9185	479.124	38.5789
31	787	5.2414	0.486946	0.9335	486.946	39.2087
31-1/4	794	5.3263	0.494832	0.9487	494.832	39.8437
31-1/2	800	5.4119	0.50278	0.9639	502.780	40.4837
31-3/4	806	5.4981	0.510793	0.9793	510.793	41.1289
32	813	5.5851	0.518868	0.9947	518.868	41.7791
32-1/4	819	5.6727	0.527007	1.0103	527.007	42.4345
32-1/2	826	5.7610	0.535210	1.0261	535.210	43.0949
32-3/4	832	5.8499	0.543475	1.0419	543.475	43.7604
33	838	5.9396	0.551804	1.0579	551.804	44.4311
33-1/4	845	6.0299	0.560197	1.0740	560.197	45.1068
33-1/2	851	6.1209	0.568652	1.0902	568.652	45.7877
33-3/4	857	6.2126	0.577171	1.1065	577.171	46.4736
34	864	6.3050	0.585754	1.1230	585.754	47.1647
34-1/4	870	6.3981	0.594400	1.1395	594.400	47.8608
34-1/2	876	6.4918	0.603109	1.1562	603.109	48.5621
34-3/4	883	6.5862	0.611881	1.1731	611.881	49.2684
35	889	6.6813	0.620717	1.1900	620.717	49.9799
35-1/4	895	6.7771	0.629616	1.2071	629.616	50.6964
35-1/2	902	6.8736	0.638578	1.2242	638.578	51.4181
35-3/4	908	6.9707	0.647604	1.2415	647.604	52.1448
36	914	7.0686	0.656693	1.2590	656.693	52.8767
36-1/4	921	7.1671	0.665845	1.2765	665.845	53.6136
36-1/2	927	7.2663	0.675061	1.2942	675.061	54.3557
36-3/4	933	7.3662	0.684340	1.3120	684.340	55.1028
37	940	7.4667	0.693683	1.3299	693.683	55.8551
37-1/4	946	7.5680	0.703088	1.3479	703.088	56.6124
37-1/2	953	7.6699	0.712557	1.3661	712.557	57.3749
37-3/4	959	7.7725	0.722090	1.3843	722.090	58.1424
38	965	7.8758	0.731686	1.4027	731.686	58.9151
38-1/4	972	7.9798	0.741345	1.4213	741.345	59.6928
38-1/2	978	8.0844	0.751067	1.4399	751.067	60.4757
38-3/4	984	8.1898	0.760853	1.4587	760.853	61.2636
39	991	8.2958	0.770702	1.4775	770.702	62.0567
39-1/4	997	8.4025	0.780615	1.4965	780.615	62.8548
39-1/2	1003	8.5098	0.790590	1.5157	790.590	63.6581
39-3/4	1010	8.6179	0.800629	1.5349	800.629	64.4664
40	1016	8.7266	0.810732	1.5543	810.732	65.2798
40-1/4	1022	8.8361	0.820898	1.5738	820.898	66.0984
40-1/2	1029	8.9462	0.831127	1.5934	831.127	66.9220
40-3/4	1035	9.0570	0.841419	1.6131	841.419	67.7508
41	1041	9.1684	0.851775	1.6330	851.775	68.5846
41-1/4	1048	9.2806	0.862194	1.6529	862.194	69.4236
41-1/2	1054	9.3934	0.872677	1.6730	872.677	70.2676
41-3/4	1060	9.5069	0.883223	1.6933	883.223	71.1168
42	1067	9.6211	0.893832	1.7136	893.832	71.9710
42-1/4	1073	9.7360	0.904505	1.7341	904.505	72.8304
42-1/2	1080	9.8516	0.915240	1.7546	915.240	73.6948
42-3/4	1086	9.9678	0.926040	1.7753	926.040	74.5644
43	1092	10.0847	0.936902	1.7962	936.902	75.4390
44	1118	10.5592	0.980986	1.8807	980.986	78.9886
45	1143	11.0447	1.02608	1.9671	1026.080	82.6198
46	1168	11.5410	1.07219	2.0555	1072.190	86.3326
47	1194	12.0482	1.11932	2.1459	1119.320	90.1270
48	1219	12.5664	1.16745	2.2382	1167.450	94.0030

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Capacities of Various Diameter Holes (Continued)

ID	ID (mm)	cu ft/ft ■	m^3/m ●	bbl/ft ▲	L/m	gal/ft ◆
49	1245	13.0954	1.21660	2.3324	1216.600	97.9606
50	1270	13.6354	1.26677	2.4286	1266.770	101.9998
51	1295	14.1863	1.31795	2.5267	1317.950	106.1206
52	1321	14.7480	1.37014	2.6267	1370.140	110.3229
53	1346	15.3207	1.42334	2.7287	1423.340	114.6069
54	1372	15.9043	1.47756	2.8327	1477.560	118.9725
55	1397	16.4988	1.53279	2.9386	1532.790	123.4197
56	1422	17.1042	1.58903	3.0464	1589.030	127.9485
57	1448	17.7205	1.64629	3.1562	1646.290	132.5589
58	1473	18.3478	1.70456	3.2679	1704.560	137.2509
59	1499	18.9859	1.76385	3.3815	1763.850	142.0245
60	1524	19.6350	1.82415	3.4971	1824.150	146.8797
66	1676	23.7583	2.20722	4.2315	2207.220	177.7244
72	1829	28.2743	2.62677	5.0359	2626.770	211.5067
78	1981	33.1831	3.08281	5.9102	3082.810	248.2266
84	2134	38.4845	3.57533	6.8544	3575.330	287.8841
90	2286	44.1786	4.10433	7.8686	4104.330	330.4792
96	2438	50.2655	4.66982	8.9527	4669.820	376.0119
102	2591	56.7450	5.27178	10.1067	5271.780	424.4822
108	2743	63.6173	5.91024	11.3307	5910.240	475.8901
114	2896	70.8822	6.58517	12.6247	6585.170	530.2356
120	3048	78.5398	7.29659	13.9885	7296.590	587.5186
126	3200	86.5901	8.04449	15.4224	8044.490	647.7393
132	3353	95.0332	8.82887	16.9261	8828.870	710.8975
138	3505	103.8689	9.64974	18.4998	9649.740	776.9934
144	3658	113.0973	10.50709	20.1435	10507.090	846.0268
150	3810	122.7185	11.40092	21.8571	11400.920	917.9979
156	3962	132.7323	12.33123	23.6406	12331.230	992.9065
162	4115	143.1388	13.29803	25.4941	13298.030	1070.7527
168	4267	153.9380	14.30131	27.4175	14301.310	1151.5365
174	4420	165.1300	15.34108	29.4109	15341.080	1235.2579
180	4572	176.7146	16.41732	31.4742	16417.320	1321.9169
186	4724	188.6919	17.53005	33.6075	17530.050	1411.5135
192	4877	201.0619	18.67926	35.8107	18679.260	1504.0477
198	5029	213.8246	19.86496	38.0838	19864.960	1599.5195
204	5182	226.9801	21.08714	40.4269	21087.140	1697.9288

Refer to back of section table of contents for footnote reference

Dimensions and Capacities Of Tubing

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft ■	m^3/m ●	bbl/ft ▲	gal/ft ◆
1.050 Reg	27 Reg	1.14	1.70	0.824	20.93	0.00370	0.0003	0.00066	0.02770
1.050 EUE	27 EUE	1.20	1.79	0.824	20.93	0.00370	0.0003	0.00066	0.02770
1.050	27	1.20	1.79	0.824	20.93	0.00370	0.0003	0.00066	0.02770
		1.50	2.23	0.742	18.85	0.00300	0.0003	0.00053	0.02246
1.315 Reg	33 Reg	1.70	2.53	1.049	26.64	0.00600	0.0006	0.00107	0.04490
1.315 EUE	33 EUE	1.80	2.68	1.049	26.64	0.00600	0.0006	0.00107	0.04490
		2.25	3.35	0.957	24.31	0.00500	0.0005	0.00089	0.03737
1.660	42	2.10	3.13	1.410	35.81	0.01084	0.0010	0.00193	0.08111
1.660 Reg	42 Reg	2.30	3.42	1.380	35.05	0.01039	0.0010	0.00185	0.07770
1.660 EUE	42 EUE	2.40	3.57	1.380	35.05	0.01039	0.0010	0.00185	0.07770
1.660	42	3.02	4.49	1.278	32.46	0.00891	0.0008	0.00159	0.06664
1.900	48	2.40	3.57	1.650	41.91	0.01485	0.0014	0.00264	0.11108
1.900 Reg	48 Reg	2.75	4.09	1.610	40.89	0.01414	0.0013	0.00252	0.10576
1.900 EUE	48 EUE	2.90	4.32	1.610	40.89	0.01414	0.0013	0.00252	0.10576
1.900	48	3.64	5.42	1.500	38.10	0.01227	0.0011	0.00219	0.09180
2.063	52	3.25	4.84	1.751	44.48	0.01672	0.0016	0.00298	0.12509
2.375 Reg	60 Reg	4.00	5.95	2.041	51.84	0.02272	0.0021	0.00405	0.16996
2.375 EUE	60 EUE	4.10	6.10	2.041	51.84	0.02272	0.0021	0.00405	0.16996
2.375 Reg	60 Reg	4.60	6.85	1.995	50.67	0.02171	0.0020	0.00387	0.16238
2.375 EUE	60 EUE	4.70	6.99	1.995	50.67	0.02171	0.0020	0.00387	0.16238
2.375 Reg	60 Reg	5.00	7.44	1.947	49.45	0.02068	0.0019	0.00368	0.15466
2.375	60	5.30	7.89	1.939	49.25	0.02051	0.0019	0.00365	0.15340
2.375 Reg	60 Reg	5.80	8.63	1.867	47.42	0.01901	0.0018	0.00339	0.14222
2.375 EUE	60 EUE	5.95	8.86	1.867	47.42	0.01901	0.0018	0.00339	0.14222
2.375	60	6.20	9.23	1.853	47.07	0.01873	0.0017	0.00334	0.14009
		7.70	11.46	1.703	43.26	0.01582	0.0015	0.00282	0.11833
2.875 Reg	73 Reg	5.90	8.78	2.469	62.71	0.03325	0.0031	0.00592	0.24871
		6.40	9.52	2.441	62.00	0.03250	0.0030	0.00579	0.24311
2.875 EUE	73 EUE	6.50	9.67	2.441	62.00	0.03250	0.0030	0.00579	0.24311
2.875	73	7.9O	11.76	2.323	59.00	0.02943	0.0027	0.00524	0.22017
2.875 Reg	73 Reg	8.60	12.80	2.259	57.38	0.02783	0.0026	0.00496	0.20821
2.875 EUE	73 EUE	8.70	12.95	2.259	57.38	0.02783	0.0026	0.00496	0.20821
2.875	73	9.50	14.14	2.195	55.75	0.02628	0.0024	0.00468	0.19657
		10.70	15.92	2.091	53.11	0.02385	0.0022	0.00425	0.17839
		11.00	16.37	2.065	52.45	0.02326	0.0022	0.00414	0.17398
3.500 Reg	89 Reg	7.70	11.46	3.068	77.93	0.05134	0.0048	0.00914	0.38403
		8.50	12.65	3.068	77.93	0.05134	0.0048	0.00914	0.38403
3.500 EUE	89 EUE	8.50	12.65	3.018	76.66	0.04968	0.0046	0.00885	0.37162
3.500 Reg	89 Reg	9.20	13.69	2.992	76.00	0.04883	0.0045	0.00870	0.36524
3.500 EUE	89 EUE	9.30	13.84	2.992	76.00	0.04883	0.0045	0.00870	0.36524
3.500 Reg	89 Reg	10.20	15.18	2.797	71.04	0.04267	0.0040	0.00760	0.31919
		12.70	18.90	2.750	69.85	0.04125	0.0038	0.00735	0.30855
3.500	89 Reg	12.80	19.05	2.764	70.21	0.04167	0.0039	0.00742	0.31170
3.500 EUE	89 EUE	12.95	19.27	2.750	69.85	0.04125	0.0038	0.00735	0.30855
3.500	89	14.90	22.17	2.602	66.09	0.03693	0.0034	0.00658	0.27623
		15.80	23.51	2.548	64.72	0.03541	0.0033	0.00631	0.26489
		16.70	24.85	2.480	62.99	0.03355	0.0031	0.00597	0.25094
4.000 Reg	102 Reg	9.25	13.77	3.548	90.12	0.06866	0.0064	0.01223	0.51360
4.000 EUE	102 EUE	9.50	14.14	3.548	90.12	0.06866	0.0064	0.01223	0.51360
4.000	102	11.00	16.37	3.476	88.29	0.06590	0.0061	0.01174	0.49297
		11.60	17.26	3.428	87.07	0.06409	0.0060	0.01142	0.47945
		13.40	19.94	3.340	84.84	0.06084	0.0057	0.01084	0.45515
4.500 Reg	114 Reg	11.00	16.37	4.026	102.26	0.08840	0.0082	0.01575	0.66131
		11.80	17.56	3.990	101.35	0.08683	0.0081	0.01547	0.64954
		12.60	18.75	3.958	100.53	0.08544	0.0079	0.01522	0.63916
4.500 EUE	114 EUE	12.75	18.98	3.958	100.53	0.08544	0.0079	0.01522	0.63916
4.500	114	13.50	20.09	3.920	99.57	0.08381	0.0078	0.01493	0.62695
		15.50	23.07	3.826	97.18	0.07984	0.0074	0.01422	0.59724
		19.20	28.57	3.640	92.46	0.07227	0.0067	0.01287	0.54058
Coiled Tubing									
3/4	19.05	-	-	0.652	16.56	0.00232	0.000215	0.000410	0.01734
1	25.4	-	-	0.870	22.10	0.00413	0.000384	0.000736	0.03088

Dimensions and Capacities Of Drillpipe

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft ■	m^3 /m ●	bbl/ft ▲	gal/ft ◆
2-3/8	60	4.80	7.14	2.000	50.8	0.02182	0.0020	0.00389	0.16320
		4.85	7.22	1.995	50.7	0.02171	0.0020	0.00387	0.16238
		6.65	9.90	1.815	46.1	0.01797	0.0017	0.00320	0.13440
2-7/8	73	6.45	9.60	2.469	62.7	0.03325	0.0031	0.00592	0.24871
		6.85	10.19	2.441	62.0	0.03250	0.0030	0.00579	0.24311
		8.35	12.43	2.323	59.0	0.02943	0.0027	0.00524	0.22017
		10.40	15.48	2.151	54.6	0.02524	0.0023	0.00449	0.18877
3-1/2	89	8.50	12.65	3.063	77.8	0.05117	0.0048	0.00911	0.38278
		9.50	14.14	2.992	76.0	0.04883	0.0045	0.00870	0.36524
		11.20	16.67	2.900	73.7	0.04587	0.0043	0.00817	0.34313
		13.30	19.79	2.764	70.2	0.04167	0.0039	0.00742	0.31170
		15.50	23.07	2.602	66.1	0.03693	0.0034	0.00658	0.27623
4	102	10.40	15.48	3.500	88.9	0.06681	0.0062	0.01190	0.49980
		11.85	17.64	3.476	88.3	0.06590	0.0061	0.01174	0.49297
		12.50	18.60	3.382	85.9	0.06238	0.0058	0.01111	0.46667
		14.00	20.84	3.340	84.8	0.06084	0.0057	0.01084	0.45515
		15.70	23.37	3.240	82.3	0.05726	0.0053	0.01020	0.42830
4-1/2	114	12.75	18.98	4.000	101.6	0.08727	0.0081	0.01554	0.65280
		13.75	20.46	3.958	100.5	0.08544	0.0079	0.01522	0.63916
		16.60	24.70	3.826	97.2	0.07984	0.0074	0.01422	0.59724
		18.10	26.94	3.754	95.4	0.07686	0.0071	0.01369	0.57497
		20.00	29.77	3.640	92.5	0.07227	0.0067	0.01287	0.54058
5	127	16.25	24.18	4.408	112.0	0.10598	0.0098	0.01888	0.79276
		19.50	29.02	4.276	108.6	0.09972	0.0093	0.01776	0.74599
		25.60	38.1	4.000	101.6	0.08727	0.0081	0.01554	0.65280
5-1/2	140	21.90	32.59	4.778	121.4	0.12451	0.0116	0.02218	0.93143
		24.70	36.76	4.670	118.6	0.11895	0.0111	0.02119	0.88980
5-9/16	141	19.00	28.28	4.975	126.4	0.13499	0.0125	0.02404	1.00982
		22.20	33.04	4.859	123.4	0.12877	0.0120	0.02294	0.96328
		25.25	37.58	4.733	120.2	0.12218	0.0114	0.02176	0.91397
6-5/8	168	22.20	33.04	6.065	154.1	0.20063	0.0186	0.03573	1.50079
		25.20	37.50	5.965	151.5	0.19407	0.0180	0.03456	1.45171
		31.90	47.48	5.761	146.3	0.18102	0.0168	0.03224	1.35411
7-5/8	194	29.25	43.53	6.969	177.0	0.26489	0.0246	0.04718	1.98153
8-5/8	219	40.00	59.53	7.825	198.8	0.33396	0.0310	0.05948	2.4982

Refer to back of section table of contents for footnote reference

Dimensions and Capacities Of Casing

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft ■	m^3 /m ●	bbl/ft ▲	gal/ft ◆
4	102	5.65	8.41	3.607	91.62	0.0710	0.0066	0.0126	0.5308
		9.50	14.14	3.500	88.90	0.0668	0.0062	0.0119	0.4998
		11.60	17.26	3.428	87.07	0.0641	0.0060	0.0114	0.4794
4-1/2	114	6.75	10.05	4.216	107.09	0.0969	0.0090	0.0173	0.7252
		9.50	14.14	4.090	103.89	0.0912	0.0085	0.0163	0.6825
		10.50	15.63	4.052	102.92	0.0896	0.0083	0.0159	0.6699
		11.00	16.37	4.026	102.26	0.0884	0.0082	0.0157	0.6613
		11.60	17.26	4.000	101.60	0.0873	0.0081	0.0155	0.6528
		12.60	18.75	3.958	100.53	0.0854	0.0079	0.0152	0.6392
		13.50	20.09	3.920	99.57	0.0838	0.0078	0.0149	0.6269
		15.10	22.47	3.826	97.18	0.0798	0.0074	0.0142	0.5972
		16.60	24.70	3.754	95.35	0.0769	0.0071	0.0137	0.5750
		18.80	27.98	3.640	92.46	0.0723	0.0067	0.0129	0.5406
4-3/4	121	9.50	14.14	4.364	110.85	0.1039	0.0096	0.0185	0.7770
		16.00	23.81	4.082	103.68	0.0909	0.0084	0.0162	0.6798
		18.00	26.79	4.000	101.60	0.0873	0.0081	0.0155	0.6528
5	127	8.00	11.90	4.696	119.28	0.1203	0.0112	0.0214	0.8997
		11.50	17.11	4.560	115.82	0.1134	0.0105	0.0202	0.8484

Refer to back of section table of contents for footnote reference

Dimensions and Capacities Of Casing (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft ■	m^3/m ●	bbl/ft ▲	gal/ft ◆
5	127	13.00	19.35	4.494	114.15	0.1102	0.0102	0.0196	0.8240
		15.00	22.32	4.408	111.96	0.1060	0.0098	0.0189	0.7928
		18.00	26.79	4.276	108.61	0.0997	0.0093	0.0178	0.7460
		20.30	30.21	4.184	106.27	0.0955	0.0089	0.0170	0.7142
		20.80	30.96	4.156	105.56	0.0942	0.0088	0.0168	0.7047
		21.00	31.25	4.154	105.51	0.0941	0.0087		0.7040
		23.20	34.53	4.044	102.72	0.0892	0.0083	0.0159	0.6672
		24.10	36.02	4.000	101.60	0.0873	0.0081	0.0155	0.6528
5-1/4	133	8.50	12.65	4.944	125.58	0.1333	0.0124	0.0237	0.9973
		10.00	14.88	4.886	124.10	0.1302	0.0121	0.0232	0.9740
		13.00	19.35	4.768	121.11	0.1240	0.0115	0.0221	0.9275
		16.00	23.81	4.648	118.06	0.1178	0.0109	0.0210	0.8814
5-1/2	140	9.00	13.39	5.192	131.88	0.1470	0.0137	0.0262	1.0998
		13.00	19.35	5.044	128.12	0.1388	0.0129	0.0247	1.0380
		14.00	20.84	5.012	127.30	0.1370	0.0127	0.0244	1.0249
		15.00	22.32	4.974	126.34	0.1349	0.0125	0.0240	1.0094
		15.50	23.07	4.950	125.73	0.1336	0.0124	0.0238	0.9997
		17.00	25.30	4.892	124.26	0.1305	0.0121	0.0232	0.9764
		20.00	29.77	4.778	121.36	0.1245	0.0116	0.0222	0.9314
		23.00	34.23	4.670	118.62	0.1189	0.0111	0.0212	0.8898
		25.00	37.21	4.580	116.33	0.1144	0.0106	0.0204	0.8558
		26.00	38.69	4.548	115.52	0.1128	0.0105	0.0201	0.8439
5-3/4	146	14.00	20.84	5.290	134.37	0.1526	0.0142	0.0272	1.1417
		17.00	25.30	5.190	131.83	0.1469	0.0136	0.0262	1.0990
		19.50	29.02	5.090	129.29	0.1413	0.0131	0.0252	1.0571
		20.00	29.77						1.0570
		22.50	33.49	4.990	126.75	0.1358	0.0126	0.0242	1.0159
		25.20	37.50	4.890	124.21	0.1304	0.0121	0.0232	0.9756
6	152	10.50	15.63	5.672	144.07	0.1755	0.0163	0.0313	1.3126
		12.00	17.86	5.620	142.75	0.1723	0.0160	0.0307	1.2886
		15.00	22.32	5.524	140.31	0.1664	0.0155	0.0296	1.2450
		16.00	23.81	5.500	139.70	0.1650	0.0153	0.0294	1.2342
		17.00	25.30	5.450	138.43	0.1620	0.0151	0.0289	1.2119
		18.00	26.79	5.424	137.77	0.1605	0.0149	0.0286	1.2003
		20.00	29.77	5.352	135.94	0.1562	0.0145	0.0278	1.1687
		23.00	34.23	5.000	127.00	0.1364	0.0127	0.0243	1.0200
		26.00	38.69	5.140	130.56	0.1441	0.0134	0.0257	1.0779
6-5/8	168	12.00	17.86	6.287	159.69	0.2156	0.0200	0.0384	1.6127
		13.00	19.35	6.255	158.88	0.2134	0.0198	0.0380	1.5963
		17.00	25.30	6.135	155.83	0.2053	0.0191	0.0366	1.5356
		20.00	29.77	6.049	153.64	0.1996	0.0185	0.0355	1.4929
		22.00	32.74	5.989	152.12	0.1956	0.0182	0.0348	1.4634
		24.00	35.71	5.921	150.39	0.0912	0.0178	0.0341	1.4304
		26.00	38.69	5.855	148.72	0.1870	0.0174	0.0333	1.3987
		28.00	41.66	5.791	147.09	0.1829	0.0170	0.0326	1.3683
		29.00	43.16	5.761	146.33	0.1810	0.0168	0.0322	1.3541
		32.00	47.62	5.675	144.15	0.1757	0.0163	0.0313	1.3140
		34.00	50.60	5.595	142.11	0.1707	0.0159	0.0304	1.2772
7	178	13.00	19.35	6.520	165.61	0.2319	0.0215	0.0413	1.7344
		17.00	25.30	6.538	166.07	0.2331	0.0217	0.0415	1.7440
		20.00	29.77	6.456	163.98	0.2273	0.0211	0.0405	1.7005
		22.00	32.74	6.398	162.51	0.2233	0.0207	0.0398	1.6701
		23.00	34.23	6.366	161.70	0.2210	0.0205	0.0394	1.6535
		24.00	35.72	6.336	160.93	0.2190	0.0203	0.0390	1.6379
		26.00	38.69	6.276	159.41	0.2148	0.0200	0.0383	1.6070
		28.00	41.67	6.214	157.84	0.2106	0.0196	0.0375	1.5754
		29.00	43.16	6.184	157.07	0.2086	0.0194	0.0371	1.5603
		30.00	44.65	6.154	156.31	0.2066	0.0192	0.0368	1.5452

Refer to back of section table of contents for footnote reference

Dimensions and Capacities Of Casing (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft ■	m^3/m ●	bbl/ft ▲	gal/ft ◆
7	178	32.00	47.62	6.094	154.79	0.2026	0.0188	0.0361	1.5152
		33.70	50.15	6.048	153.62	0.1995	0.0185	0.0355	1.4924
		35.00	52.09	6.004	152.50	0.1966	0.0183	0.0350	1.4708
		38.00	56.55	5.920	150.37	0.1911	0.0178	0.0340	1.4299
		40.00	59.53	5.836	148.23	0.1858	0.0173	0.0331	1.3896
7-5/8	194	14.75	21.95	7.263	184.48	0.2877	0.0267	0.0512	2.1522
		20.00	29.77	7.125	180.98	0.2769	0.0257	0.0493	2.0712
		24.00	35.72	7.025	178.44	0.2692	0.0250	0.0479	2.0135
		26.40	39.29	6.969	177.01	0.2649	0.0246	0.0472	1.9815
		29.70	44.20	6.875	174.63	0.2578	0.0239	0.0459	1.9284
		33.70	50.15	6.765	171.83	0.2496	0.0232	0.0445	1.8672
		39.00	58.04	6.625	168.28	0.2394	0.0222	0.0426	1.7907
		45.00	66.97	6.445	163.70	0.2266	0.0210	0.0404	1.6947
		45.30	67.42	6.435	163.45	0.2259	0.0210	0.0402	1.6895
8	203	16.00	23.81	7.628	193.75	0.3174	0.0295	0.0565	2.3740
		20.00	29.77	7.528	191.21	0.3091	0.0287	0.0551	2.3122
		26.00	38.69	7.386	187.60	0.2975	0.0276	0.0530	2.2258
8-1/8	206	28.00	41.67	7.485	190.12	0.3056	0.0284	0.0544	2.2858
		32.00	47.62	7.385	187.58	0.2975	0.0276	0.0530	2.2252
		35.50	52.83	7.285	185.04	0.2895	0.0269	0.0516	2.1653
		39.50	58.79	7.185	182.50	0.2816	0.0262	0.0501	2.1063
		42.00	62.50	7.125	180.98	0.2769	0.0257	0.0493	2.0712
8-5/8	219	20.00	29.77	8.191	208.05	0.3659	0.0340	0.0652	2.7374
		24.00	35.72	8.097	205.66	0.3576	0.0332	0.0637	2.6749
		28.00	41.67	8.017	203.63	0.3506	0.0326	0.0624	2.6223
		32.00	47.62	7.921	201.19	0.3422	0.0318	0.0609	2.5599
		36.00	53.58	7.825	198.76	0.3340	0.0310	0.0595	2.4982
		38.00	56.55	7.775	197.49	0.3297	0.0306	0.0587	2.4664
		40.00	59.53	7.725	196.22	0.3255	0.0302	0.0580	2.4348
		43.00	63.99	7.651	194.34	0.3193	0.0297	0.0569	2.3883
		44.00	65.48	7.625	193.68	0.3171	0.0295	0.0565	2.3721
		48.00	71.44	7.537	191.44	0.3098	0.0288	0.0552	2.3177
		49.00	72.92	7.511	190.78	0.3077	0.0286	0.0548	2.3017
9	229	34.00	50.60	8.290	210.57	0.3748	0.0348	0.0668	2.8039
		38.00	56.55	8.196	208.18	0.3664	0.0340	0.0653	2.7407
		40.00	59.53	8.150	207.01	0.3623	0.0337	0.0645	2.7100
		45.00	66.97	8.032	204.01	0.3519	0.0327	0.0627	2.6321
		50.20	74.71	7.910	200.91	0.3413	0.0317	0.0608	2.5528
		55.00	81.85	7.812	198.42	0.3329	0.0309	0.0593	2.4899
9-5/8	244	29.30	43.61	9.063	230.20	0.4480	0.0416	0.0798	3.3512
		32.30	48.07	9.001	228.63	0.4419	0.0411	0.0787	3.3055
		36.00	53.58	8.921	226.59	0.4341	0.0403	0.0773	3.2470
		40.00	59.53	8.835	224.41	0.4257	0.0396	0.0758	3.1847
		43.60	64.89	8.775	222.89	0.4200	0.0390	0.0748	3.1416
		47.00	69.95	8.681	220.50	0.4110	0.0382	0.0732	3.0747
		53.50	79.62	8.535	216.79	0.3973	0.0369	0.0708	2.9721
		58.40	86.91	8.435	214.25	0.3881	0.0361	0.0691	2.9029
		61.10	90.93	8.375	212.73	0.3826	0.0355	0.0681	2.8617
		71.80	106.86	8.125	206.38	0.3601	0.0335	0.0641	2.6934
10	254	33.00	49.11	9.384	238.35	0.4803	0.0446	0.0855	3.5928
		41.50	61.76	9.200	233.68	0.4616	0.0429	0.0822	3.4533
		45.50	67.72	9.120	231.65	0.4536	0.0421	0.0808	3.3935
		50.50	75.16	9.016	229.01	0.4434	0.0412	0.0790	3.3166
		55.50	82.60	8.908	226.26	0.4328	0.0402	0.0771	3.2376
		61.20	91.08	8.690	220.73	0.4119	0.0383	0.0734	3.0810
10-3/4	273	32.75	48.74	10.192	258.88	0.5666	0.0526	0.1009	4.2382
		35.75	53.21	10.136	257.45	0.5604	0.0521	0.0998	4.1917
		40.50	60.27	10.050	255.27	0.5509	0.0512	0.0981	4.1209

Refer to back of section table of contents for footnote reference

Dimensions and Capacities Of Casing (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft ■	m^3/m ●	bbl/ft ▲	gal/ft ◆
10-3/4	273	45.50	67.72	9.950	252.73	0.5400	0.0502	0.0962	4.0393
		51.00	75.90	9.850	250.19	0.5292	0.0492	0.0942	3.9585
		54.00	80.37	9.784	248.51	0.5221	0.0485	0.0930	3.9056
		55.00	81.85	9.760	247.90	0.5195	0.0483	0.0925	3.8865
		60.70	90.34	9.660	245.36	0.5090	0.0473	0.0906	3.8073
		65.70	97.78	9.560	242.82	0.4985	0.0463	0.0888	3.7289
		71.10	105.81	9.450	240.03	0.4871	0.0453	0.0868	3.6435
11	279	26.75	39.81	10.552	268.02	0.6073	0.0564	0.1082	4.5429
11-3/4	298	38.00	56.55	11.150	283.21	0.6781	0.0630	0.1208	5.0723
		42.00	62.51	11.084	281.53	0.6701	0.0623	0.1193	5.0125
		47.00	69.95	11.000	279.40	0.6600	0.0613	0.1175	4.9368
		54.00	80.37	10.880	276.35	0.6456	0.0600	0.1150	4.8297
		60.00	89.30	10.772	273.61	0.6329	0.0588	0.1127	4.7343
		65.00	96.74	10.682	271.32	0.6223	0.0578	0.1108	4.6555
12	305	31.50	46.88	11.514	292.46	0.7231	0.0672	0.1288	5.4089
		40.00	59.53	11.384	289.15	0.7068	0.0657	0.1259	5.2875
12-3/4	324	43.00	63.99	12.130	308.10	0.8025	0.0746	0.1429	6.0032
		53.00	78.88	11.970	304.04	0.7815	0.0726	0.1392	5.8458
13	330	36.50	54.32	12.482	317.04	0.8497	0.0789	0.1513	6.3567
		40.00	59.53	12.438	315.93	0.8438	0.0784	0.1503	6.3119
		45.00	66.97	12.360	313.94	0.8332	0.0774	0.1484	6.2330
		50.00	74.41	12.282	311.96	0.8227	0.0764	0.1465	6.1546
		54.00	80.37	12.220	310.39	0.8145	0.0757	0.1451	6.0926
13-3/8	340	48.00	71.44	12.715	322.96	0.8818	0.0819	0.1571	6.5962
		54.50	81.11	12.615	320.42	0.8680	0.0806	0.1546	6.4928
		61.00	90.78	12.515	317.88	0.8543	0.0794	0.1521	6.3903
		68.00	101.20	12.415	315.34	0.8407	0.0781	0.1497	6.2866
		72.00	107.15	12.347	313.61	0.8315	0.0772	0.1481	6.2199
		77.00	114.60	12.275	311.79	0.8218	0.0763	0.1464	6.1476
		83.00	123.52	12.175	309.25	0.8085	0.0751	0.1440	6.0478
		85.00	126.50	12.159	308.84	0.8063	0.0749	0.1436	6.0319
		92.00	136.92	12.031	305.59	0.7895	0.0733	0.1406	5.9056
		98.00	145.85	11.937	303.20	0.7772	0.0722	0.1384	5.8137
14	356	42.00	62.51	13.488	342.60	0.9923	0.0922	0.1767	7.4226
		50.00	74.41	13.344	338.94	0.9712	0.0902	0.1730	7.2649
15	381	47.50	70.69	14.418	366.22	1.1338	0.1053	0.2019	8.4814
16	406	52.50	78.13	15.396	391.06	1.2928	0.1201	0.2303	9.6711
		55.00	81.85	15.375	390.53	1.2893	0.1198	0.2296	9.6447
		65.00	96.74	15.250	387.35	1.2684	0.1178	0.2259	9.4885
		70.00	104.18	15.198	386.03	1.2598	0.1170	0.2244	9.4239
		75.00	111.62	15.125	384.18	1.2477	0.1159	0.2222	9.3336
		84.00	125.01	15.010	381.25	1.2288	0.1142	0.2189	9.1922
		109.00	162.22	14.688	373.08	1.1767	0.1093	0.2096	8.8021
18-5/8	473	78.00	116.08	17.855	453.52	1.7388	0.1615	0.3097	13.0071
		87.50	130.22	17.755	450.98	1.7194	0.1597	0.3062	12.8618
		96.50	143.62	17.655	448.44	1.7001	0.1579	0.3028	12.7173
20	508	90.00	133.94	19.166	486.82	2.0035	0.1861	0.3568	14.9873
		94.00	139.90	19.124	485.75	1.9947	0.1853	0.3553	14.9216
		106.50	158.50	19.000	482.60	1.9689	0.1829	0.3507	14.7288
		133.00	197.94	18.730	475.74	1.9133	0.1778	0.3408	14.3132
21-1/2	546	92.50	137.66	20.710	526.03	2.3392	0.2173	0.4166	17.4993
		103.00	153.29	20.610	523.49	2.3168	0.2152	0.4126	17.3307
		114.00	169.66	20.510	520.95	2.2943	0.2132	0.4086	17.1630

Refer to back of section table of contents for footnote reference

Metal Displacement Only for Tubing and Drillpipe
(Run in Open Ended)

Tubing OD		Pipe Weight		Gal Per Lin ■	*L Per Lin* ●
in.	*mm*	lb/ft	*kg/m*	ft	*m*
2.062	*52.4*	3.4	*5.1*	0.0487	*0.604*
2-3/8	*60.3*	4.1	*6.1*	0.0606	*0.053*
		4.6 ; 4.7	*6.8; 7.0*	0.0681	*0.845*
		5.0	*7.4*	0.0756	*0.938*
2-7/8	*73.0*	5.9	*8.8*	0.0892	*1.106*
		6.4 ; 6.5	*9.5; 9.7*	0.0943	*1.171*
3-1/2	*88.9*	7.7	*11.5*	0.1159	*1.440*
		8.5 ; 8.8	*12.6; 13.2*	0.1279	*1.589*
		9.2 ; 9.3	*13.7; 13.8*	0.1346	*1.672*
		10.2	*15.2*	0.1511	*1.877*
		11.2	*16.7*	0.1563	*1.942*
4	*101.6*	9.25 ; 9.5	*13.377; 14.1*	0.1384	*1.719*
		11.0	*16.4*	0.1601	*1.988*
4-1/2	*114.3*	11.0	*16.4*	0.1646	*2.044*
		11.8	*17.6*	0.1765	*2.193*
		12.6 ; 12.75	*18.8; 18.97*	0.1870	*2.323*
Drillpipe					
2-3/8	*60.3*	4.8	*7.1*	0.0673	*0.836*
		6.35 ; 6.65	*9.45; 9.90*	0.0958	*1.189*
2-7/8	*73.0*	6.45	*9.60*	0.0891	*1.106*
		8.35	*12.43*	0.1174	*1.459*
		9.75 ; 10.4	*14.51; 15.5*	0.1489	*1.849*
3-1/2	*89*	8.5	*12.6*	0.1167	*1.440*
		11.2	*16.7*	0.1563	*1.942*
		12.4 ; 13.3	*18.5; 19.8*	0.1878	*2.332*
		15.25 ; 15.5	*22.69; 23.1*	0.2237	*2.778*
4	*102*	14.0	*20.8*	0.1982	*2.462*
		15.7	*23.4*	0.2244	*2.787*
4-1/2	*114*	12.75	*18.97*	0.1728	*2.462*
		13.75	*20.46*	0.1870	*2.323*
		15.35 ; 16.6	*22.84; 24.7*	0.2259	*2.806*
		18.1	*26.9*	0.2506	*3.112*
		19.75 ; 20.0	*29.39; 29.8*	0.2850	*3.540*
5	*127*	18.35 ; 19.5	*27.31; 29.0*	0.2745	*3.410*
5-1/2	*140*	20.35 ; 21.9	*30.28; 32.6*	0.3030	*3.763*
		23.25 ; 24.7	*34.60; 36.8*	0.3441	*4.274*
5-9/16	*141*	19.0	*28.3*	0.2528	*3.140*
6-5/8	*168*	22.2	*33.0*	0.2992	*3.716*
		23.3 ; 25.2	*37.58*	0.3389	*4.329*
		31.9	*33.0*	0.4369	*3.605*
7-5/8	*194*	28.75	*34.7; 37.5*	0.3927	*4.209*
		29.25	*47.5*	0.3905	*5.426*
8-5/8	*219*	40.0	*42.78*	0.5364	*4.887*
		46.5	*43.53*	0.6628	*4.850*

No allowance made for Couplings or Tool Joints

■ cu ft per lin ft = $\frac{\text{gal per lin ft}}{7.48}$

■ bbl per lin ft = $\frac{\text{gal per lin}}{\text{ft}}$

● m^3 per lin ft = $\frac{\text{L per lin ft}}{1{,}000}$

Section 7 - Annular Volume Tubing
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NOTE: The following annular tables contain some combinations of tubing and casing that will not go together with standard couplings. These combinations are for use with flush joint pipe being the inside pipe of the combination.

Equations for Calculating Volume and Height Between: Tubing/Casing and Hole; Tubing/Casing and Casing*

Cubic feet per lineal foot = $.005454 \times (D^2 - d^2)$

Lineal feet per cubic foot = $183.35 / (D^2 - d^2)$

Gallons per lineal foot = $.0408 \times (D^2 - d^2)$

Lineal feet per gallon = $24.51 / (D^2 - d^2)$

Barrels per lineal foot = $.0009714 \times (D^2 - d^2)$

Lineal feet per barrel = $1029.4 / (D^2 - d^2)$

Where:

For volume and height between tubing and hole:
- D = diameter of hole, inches
- d = outside diameter of tubing, inches

For volume and height between casing and hole:
- D = diameter of hole, inches
- d = outside diameter of casing, inches

For volume and height between tubing and casing:
- D = inside diameter of casing, inches
- d = outside diameter of tubing, inches

For volume and height between casings:
- D = inside diameter of outer casing, inches
- d = outside diameter of inner casing, inches

For volume and height between multiple tubing strings and hole (or casing):
- D = diameter of hole, inches (or ID of casing)
- d = outside diameter of tubing, inches

*For multiple strings of tubing/casing, multiply d by number of strings

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The following notes apply to the tables within this section:

■ Ft/Cu Ft = $\frac{1}{\text{Cu Ft/Ft}}$ ▲ Ft/Bbl = $\frac{1}{\text{Bbl/Ft}}$ ● $m/m^3 = \frac{1}{m^3/m}$

Gal/Ft = CuFt/Ft x 7.48

OH = Open Hole

Annular Volume Between Tubing and Casing or Open Hole

1.050 in. Tubing OD *(27 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
2-7/8	*73*	OH	*OH*	2.875	*73.03*	0.0391	*0.0036*	0.0070
2-7/8 Reg	*73*	5.90	*8.78*	2.469	*62.71*	0.0272	*0.0025*	0.0049
2-7/8 EUE	*73*	6.50	*9.67*	2.441	*62.00*	0.0265	*0.0025*	0.0047
3	*76*	OH	*OH*	3.000	*76.20*	0.0431	*0.0040*	0.0077
3-1/8	*79*	OH	*OH*	3.125	*79.38*	0.0472	*0.0044*	0.0084
3-1/4	*83*	OH	*OH*	3.250	*82.55*	0.0516	*0.0048*	0.0092
3-3/8	*84*	OH	*OH*	3.325	*84.46*	0.0543	*0.0050*	0.0097
3-1/2	*89*	OH	*OH*	3.500	*88.90*	0.0608	*0.0057*	0.0108
		7.70	*11.46*	3.068	*77.93*	0.0453	*0.0042*	0.0081
3-1/2 Reg	*89*	8.90	*13.24*	3.018	*76.66*	0.0437	*0.0041*	0.0078
		9.20	*13.69*	2.992	*76.00*	0.0428	*0.0040*	0.0076
3-1/2 EUE	*89*	9.30	*13.84*	2.992	*76.00*	0.0428	*0.0040*	0.0076
3-1/2 Reg	*89*	10.20	*15.18*	2.922	*74.22*	0.0405	*0.0038*	0.0072
		12.70	*18.90*	2.750	*69.85*	0.0352	*0.0033*	0.0063
3-1/2	*89*	12.80	*19.05*	2.764	*70.21*	0.0357	*0.0033*	0.0064
3-1/2 EUE	*89*	12.95	*19.27*	2.750	*69.85*	0.0352	*0.0033*	0.0063
3-1/2	*89*	14.90	*22.17*	2.602	*66.09*	0.0309	*0.0029*	0.0055
		15.80	*23.51*	2.548	*64.72*	0.0294	*0.0027*	0.0052
		16.70	*24.85*	2.480	*62.99*	0.0275	*0.0026*	0.0049
3-5/8	*92*	OH	*OH*	3.625	*92.08*	0.0657	*0.0061*	0.0117
3-3/4	*95*	OH	*OH*	3.750	*95.25*	0.0707	*0.0066*	0.0126
3-7/8	*98*	OH	*OH*	3.875	*98.43*	0.0759	*0.0071*	0.0135
4	*102*	OH	*OH*	4.000	*101.60*	0.0813	*0.0076*	0.0145
4 Reg Tbg	*102*	9.50	*14.14*	3.548	*90.12*	0.0626	*0.0058*	0.0112
4 EUE Tbg	*102*	11.00	*16.37*	3.476	*88.29*	0.0599	*0.0056*	0.0107
4 Tbg	*102*	11.60	*17.26*	3.428	*87.07*	0.0581	*0.0054*	0.0103
		13.40	*19.94*	3.340	*84.84*	0.0548	*0.0051*	0.0098
4 Csg	*102*	5.65	*8.41*	3.732	*94.79*	0.0699	*0.0065*	0.0125
4-1/8	*105*	OH	*OH*	4.125	*104.78*	0.0868	*0.0081*	0.0155
4-1/4	*108*	OH	*OH*	4.250	*107.95*	0.0925	*0.0086*	0.0165
4-3/8	*110*	OH	*OH*	4.325	*109.86*	0.0960	*0.0089*	0.0171
4-1/2	*114*	OH	*OH*	4.500	*114.30*	0.1044	*0.0097*	0.0186
4-1/2 EUE Tbg	*114*	12.75	*18.97*	3.958	*100.53*	0.0794	*0.0074*	0.0141
4-1/2 Tbg	*114*	15.50	*23.06*	3.826	*97.18*	0.0738	*0.0069*	0.0131
		19.20	*28.57*	3.640	*92.46*	0.0663	*0.0062*	0.0118
4-1/2 Csg	*114*	6.75	*10.04*	4.216	*107.09*	0.0909	*0.0085*	0.0162
		9.50	*14.14*	4.090	*103.89*	0.0852	*0.0079*	0.0152
		10.50	*14.62*	4.052	*102.92*	0.0835	*0.0078*	0.0149
		11.00	*16.27*	4.026	*102.26*	0.0824	*0.0077*	0.0147
		11.60	*17.26*	4.000	*101.60*	0.0813	*0.0076*	0.0145
		12.60	*18.75*	3.958	*100.53*	0.0794	*0.0074*	0.0141
		13.50	*20.09*	3.920	*99.57*	0.0778	*0.0072*	0.0139
		15.10	*22.47*	3.826	*97.18*	0.0738	*0.0069*	0.0131
		16.60	*24.70*	3.754	*95.35*	0.0708	*0.0066*	0.0126
		18.80	*27.97*	3.640	*92.46*	0.0663	*0.0062*	0.0118
4-5/8	*117*	OH	*OH*	4.625	*117.38*	0.1107	*0.0103*	0.0197
4-3/4	*121*	OH	*OH*	4.750	*120.65*	0.1170	*0.0109*	0.0208
		9.50	*14.14*	4.364	*110.85*	0.0979	*0.0091*	0.0174
		16.00	*23.81*	4.082	*103.68*	0.0849	*0.0079*	0.0151
		18.00	*26.78*	4.000	*101.60*	0.0813	*0.0076*	0.0145
4-7/8	*124*	OH	*OH*	4.875	*123.83*	0.1236	*0.0115*	0.0220
5	*127*	OH	*OH*	5.000	*127.00*	0.1303	*0.0121*	0.0232
		8.00	*11.90*	4.696	*119.28*	0.1143	*0.0106*	0.0204
		11.50	*17.11*	4.560	*115.82*	0.1074	*0.0100*	0.0191
		13.00	*19.34*	4.494	*114.15*	0.1041	*0.0097*	0.0185
		15.00	*22.32*	4.408	*111.96*	0.1000	*0.0093*	0.0178

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.050 in. Tubing OD *(27 mm)* (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m^3/m ●	bbl/ft ▲
5	127	18.00	26.78	4.276	108.61	0.0937	0.0087	0.0167
		20.30	30.21	4.184	106.27	0.0895	0.0083	0.0159
		20.80	30.95	4.156	105.56	0.0882	0.0082	0.0157
		21.00	31.25	4.154	105.51	0.0881	0.0082	0.0157
		23.20	34.52	4.044	102.72	0.0832	0.0077	0.0148
		24.20	36.01	4.000	101.60	0.0813	0.0076	0.0145
5-1/8	130	OH	OH	5.125	130.18	0.1372	0.0128	0.0244
5-1/4	133	OH	OH	5.250	133.35	0.1442	0.0134	0.0257
		8.50	12.65	4.944	125.58	0.1273	0.0118	0.0227
		10.00	14.88	4.886	124.10	0.1242	0.0115	0.0221
		13.00	19.34	4.768	121.11	0.1180	0.0110	0.0210
		16.00	23.81	4.648	118.06	0.1118	0.0104	0.0199
5-3/8	137	OH	OH	5.375	136.53	0.1516	0.0141	0.0270
5-1/2	140	OH	OH	5.500	139.70	0.1590	0.0148	0.0283
		9.00	13.39	5.192	131.88	0.1410	0.0131	0.0251
		13.00	19.34	5.044	128.12	0.1327	0.0123	0.0236
		14.00	20.83	5.012	127.30	0.1310	0.0122	0.0233
		15.00	22.32	4.974	126.34	0.1289	0.0120	0.0230
		15.50	23.06	4.950	125.73	0.1276	0.0119	0.0227
		17.00	25.30	4.892	124.26	0.1245	0.0116	0.0222
		20.00	29.76	4.778	121.36	0.1185	0.0110	0.0211
		23.00	34.22	4.670	118.62	0.1129	0.0105	0.0201
		25.00	37.20	4.580	116.33	0.1084	0.0101	0.0193
		26.00	38.69	4.548	115.42	0.1068	0.0099	0.0191
5-5/8	143	OH	OH	5.625	142.88	0.1666	0.0155	0.0297
5-3/4	146	OH	OH	5.750	146.05	0.1743	0.0162	0.0310
		14.00	20.83	5.290	134.37	0.1466	0.0136	0.0261
		17.00	25.30	5.190	131.83	0.1409	0.0131	0.0251
		19.50	29.02	5.090	129.29	0.1353	0.0126	0.0241
		22.50	33.48	4.990	126.75	0.1298	0.0121	0.0231
		25.20	37.50	4.890	124.21	0.1244	0.0116	0.0222
5-7/8	149	OH	OH	5.875	149.23	0.1822	0.0169	0.0325
6	152	OH	OH	6.000	152.40	0.1903	0.0177	0.0339
		10.50	15.62	5.672	144.07	0.1695	0.0157	0.0302
		12.00	17.86	5.620	142.75	0.1662	0.0154	0.0296
		15.00	22.32	5.524	140.31	0.1604	0.0149	0.0296
		16.00	23.81	5.500	139.70	0.1590	0.0148	0.0283
		17.00	25.30	5.450	138.43	0.1560	0.0145	0.0278
		18.00	26.78	5.424	137.77	0.1544	0.0144	0.0275
		20.00	29.76	5.352	135.94	0.1502	0.0140	0.0268
		23.00	34.22	5.000	127.00	0.1303	0.0121	0.0232
		26.00	38.69	5.140	130.56	0.1381	0.0128	0.0246
6-1/8	156	OH	OH	6.125	155.58	0.1986	0.0185	0.0354
6-1/4	159	OH	OH	6.250	158.75	0.2070	0.0192	0.0369
6-3/8	162	OH	OH	6.375	161.93	0.2156	0.0200	0.0384
6-1/2	165	OH	OH	6.500	165.10	0.2244	0.0209	0.0400
6-5/8	168	OH	OH	6.625	168.28	0.2334	0.0217	0.0416
		12.00	17.86	6.287	159.69	0.2096	0.0195	0.0373
		13.00	19.34	6.255	158.88	0.2074	0.0193	0.0369
		17.00	25.30	6.135	155.83	0.1993	0.0185	0.0355
		20.00	29.76	6.049	153.64	0.1936	0.0180	0.0345
		22.00	32.74	5.989	152.12	0.1896	0.0176	0.0338
		24.00	35.71	5.921	150.39	0.1852	0.0172	0.0330
		26.00	38.69	5.855	148.72	0.1810	0.0168	0.0322
		28.00	41.66	5.791	147.09	0.1769	0.0164	0.0316
		29.00	43.15	5.761	146.33	0.1750	0.0163	0.0312

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.050 in. Tubing OD *(27 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
6-5/8	*168*	32.00	*47.62*	5.675	*144.15*	0.1696	*0.0158*	0.0302
		34.00	*50.59*	5.595	*142.11*	0.1647	*0.0153*	0.0293
6-3/4	*171*	OH	*OH*	6.750	*171.45*	0.2425	*0.0225*	0.0432
6-7/8	*175*	OH	*OH*	6.875	*174.63*	0.2518	*0.0234*	0.0448
7	*178*	OH	*OH*	7.000	*177.80*	0.2612	*0.0243*	0.0465
		13.00	*19.34*	6.520	*165.61*	0.2258	*0.0210*	0.0402
		17.00	*25.30*	6.538	*166.07*	0.2271	*0.0211*	0.0405
		20.00	*29.76*	6.456	*163.98*	0.2213	*0.0206*	0.0394
		22.00	*32.74*	6.398	*162.51*	0.2172	*0.0202*	0.0387
		23.00	*34.22*	6.366	*161.70*	0.2150	*0.0200*	0.0383
		24.00	*35.71*	6.336	*160.93*	0.2129	*0.0198*	0.0379
		26.00	*38.69*	6.276	*159.41*	0.2088	*0.0194*	0.0372
		28.00	*41.66*	6.214	*157.84*	0.2046	*0.0190*	0.0364
		29.00	*43.15*	6.184	*157.07*	0.2026	*0.0188*	0.0361
		30.00	*44.64*	6.154	*156.31*	0.2005	*0.0186*	0.0357
		32.00	*47.62*	6.094	*154.79*	0.1965	*0.0183*	0.0350
		33.70	*50.15*	6.048	*153.62*	0.1935	*0.0180*	0.0345
		35.00	*52.08*	6.004	*152.50*	0.1906	*0.0177*	0.0339
		38.00	*56.54*	5.920	*150.37*	0.1851	*0.0172*	0.0330
		40.00	*59.52*	5.836	*148.23*	0.1797	*0.0167*	0.0320

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.315 in. Tubing OD *(33 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
2-7/8	*73*	OH	*OH*	2.875	*73.03*	0.0356	*0.0033*	0.0063
2-7/8 Reg	*73*	5.90	*8.78*	2.469	*62.71*	0.0238	*0.0022*	0.0042
2-7/8 EUE	*73*	6.50	*9.67*	2.441	*62.00*	0.0231	*0.0021*	0.0041
3	*76*	OH	*OH*	3.000	*76.20*	0.0397	*0.0037*	0.0071
3-1/8	*79*	OH	*OH*	3.125	*79.38*	0.0438	*0.0041*	0.0078
3-1/4	*83*	OH	*OH*	3.250	*82.55*	0.0482	*0.0045*	0.0086
3-3/8	*84*	OH	*OH*	3.325	*84.46*	0.0509	*0.0047*	0.0091
3-1/2	*89*	OH	*OH*	3.500	*88.90*	0.0574	*0.0053*	0.0102
		7.70	*11.46*	3.068	*77.93*	0.0419	*0.0039*	0.0075
3-1/2 Reg	*89*	8.90	*13.24*	3.018	*76.66*	0.0402	*0.0037*	0.0072
		9.20	*13.69*	2.992	*76.00*	0.0394	*0.0037*	0.0070
3-1/2 EUE	*89*	9.30	*13.84*	2.992	*76.00*	0.0394	*0.0037*	0.0070
3-1/2 Reg	*89*	10.20	*15.18*	2.992	*74.22*	0.0371	*0.0034*	0.0066
		12.70	*18.90*	2.750	*69.85*	0.0318	*0.0030*	0.0057
3-1/2	*89*	12.80	*19.05*	2.764	*70.21*	0.0322	*0.0030*	0.0057
3-1/2 EUE	*89*	12.95	*19.27*	2.750	*69.85*	0.0318	*0.0030*	0.0057
3-1/2	*89*	14.90	*22.17*	2.602	*66.09*	0.0275	*0.0026*	0.0049
		15.80	*23.51*	2.548	*64.72*	0.0260	*0.0024*	0.0046
		16.70	*24.85*	2.480	*62.99*	0.0241	*0.0022*	0.0043
3-5/8	*92*	OH	*OH*	3.625	*92.08*	0.0622	*0.0058*	0.0111
3-3/4	*95*	OH	*OH*	3.750	*95.25*	0.0673	*0.0063*	0.0120
3-7/8	*98*	OH	*OH*	3.875	*98.43*	0.0725	*0.0067*	0.0129
4	*102*	OH	*OH*	4.000	*101.60*	0.0778	*0.0072*	0.0139
4 Reg Tbg	*102*	9.50	*14.14*	3.548	*90.12*	0.0592	*0.0055*	0.0105
4 EUE Tbg	*102*	11.00	*16.37*	3.476	*88.29*	0.0565	*0.0053*	0.0101
4 Tbg	*102*	11.60	*17.26*	3.428	*87.07*	0.0547	*0.0051*	0.0097
		13.40	*19.94*	3.340	*84.84*	0.0514	*0.0048*	0.0092
4 Csg	*102*	5.65	*8.41*	3.732	*94.79*	0.0665	*0.0062*	0.0118
4-1/8	*105*	OH	*OH*	4.125	*104.78*	0.0834	*0.0078*	0.0148
4-1/4	*108*	OH	*OH*	4.250	*107.95*	0.0891	*0.0083*	0.0159
4-3/8	*110*	OH	*OH*	4.325	*109.86*	0.0926	*0.0086*	0.0165
4-1/2	*114*	OH	*OH*	4.500	*114.30*	0.1010	*0.0094*	0.0180
4-1/2 EUE Tbg	*114*	12.75	*18.97*	3.958	*100.53*	0.0760	*0.0071*	0.0135
4-1/2 Tbg	*114*	15.50	*23.06*	3.826	*97.18*	0.0704	*0.0065*	0.0125
		19.20	*28.57*	3.640	*92.46*	0.0628	*0.0058*	0.0112
4-1/2	*114*	6.75	*10.04*	4.216	*107.09*	0.0875	*0.0081*	0.0156
		9.50	*14.14*	4.090	*103.89*	0.0818	*0.0076*	0.0146
		10.50	*15.62*	4.052	*102.92*	0.0801	*0.0074*	0.0143
		11.00	*16.37*	4.026	*102.26*	0.0790	*0.0073*	0.0141
		11.60	*17.26*	4.000	*101.60*	0.0778	*0.0072*	0.0139
		12.60	*18.75*	3.958	*100.53*	0.0760	*0.0071*	0.0135
		13.50	*20.09*	3.920	*99.57*	0.0744	*0.0069*	0.0132
		15.10	*22.47*	3.826	*97.18*	0.0704	*0.0065*	0.0125
		16.60	*24.70*	3.754	*95.25*	0.0674	*0.0063*	0.0120
		18.80	*27.97*	3.640	*92.46*	0.0628	*0.0058*	0.0112
4-5/8	*117*	OH	*OH*	4.625	*117.48*	0.1072	*0.0100*	0.0191
4-3/4	*121*	OH	*OH*	4.750	*120.65*	0.1136	*0.0106*	0.0202
		9.50	*14.14*	4.364	*110.85*	0.0944	*0.0088*	0.0168
		16.00	*23.81*	4.082	*103.68*	0.0814	*0.0076*	0.0145
		18.00	*26.78*	4.000	*101.60*	0.0778	*0.0072*	0.0139
4-7/8	*124*	OH	*OH*	4.875	*123.83*	0.1202	*0.0112*	0.0214
5	*127*	OH	*OH*	5.000	*127.00*	0.1269	*0.0118*	0.0226
		8.00	*11.90*	4.696	*119.28*	0.1108	*0.0103*	0.0197
		11.50	*17.11*	4.560	*115.82*	0.1040	*0.0097*	0.0185
		13.00	*19.34*	4.494	*114.15*	0.1007	*0.0094*	0.0179

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.315 in. Tubing OD *(33 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
5	*127*	15.00	*22.32*	4.408	*111.96*	0.0965	*0.0090*	0.0172
		18.00	*26.78*	4.276	*108.61*	0.0903	*0.0084*	0.0161
		20.30	*30.21*	4.184	*106.27*	0.0860	*0.0080*	0.0153
		20.80	*30.95*	4.156	*105.56*	0.0848	*0.0079*	0.0151
		21.00	*31.25*	4.154	*105.51*	0.0847	*0.0079*	0.0151
		23.20	*34.52*	4.044	*102.72*	0.0798	*0.0074*	0.0142
		24.20	*36.01*	4.000	*101.60*	0.0778	*0.0072*	0.0139
5-1/8	*130*	OH	*OH*	5.125	*130.18*	0.1338	*0.0124*	0.0238
5-1/4	*133*	OH	*OH*	5.250	*133.35*	0.1409	*0.0131*	0.0251
		8.50	*12.65*	4.944	*125.58*	0.1239	*0.0115*	0.0221
		10.00	*14.88*	4.886	*124.10*	0.1208	*0.0112*	0.0215
		13.00	*19.34*	4.768	*121.11*	0.1146	*0.0106*	0.0204
		16.00	*23.81*	4.648	*118.06*	0.1084	*0.0101*	0.0193
5-3/8	*137*	OH	*OH*	5.375	*136.53*	0.1481	*0.0138*	0.0264
5-1/2	*140*	OH	*OH*	5.500	*139.70*	0.1556	*0.0145*	0.0277
		9.00	*13.39*	5.192	*131.88*	0.1376	*0.0128*	0.0245
		13.00	*19.34*	5.044	*128.12*	0.1293	*0.0120*	0.0230
		14.00	*20.83*	5.012	*127.30*	0.1276	*0.0119*	0.0227
		15.00	*22.32*	4.974	*126.34*	0.1255	*0.0117*	0.0224
		15.50	*23.06*	4.950	*125.73*	0.1242	*0.0115*	0.0221
		17.00	*25.30*	4.892	*124.26*	0.1211	*0.0113*	0.0216
		20.00	*29.76*	4.778	*121.36*	0.1151	*0.0107*	0.0205
		23.00	*34.22*	4.670	*118.62*	0.1095	*0.0102*	0.0195
		25.00	*37.20*	4.580	*116.33*	0.1050	*0.0098*	0.0187
		26.00	*28.69*	4.548	*115.52*	0.1034	*0.0096*	0.0184
5-5/8	*143*	OH	*OH*	5.625	*142.88*	0.1631	*0.0152*	0.0291
5-3/4	*146*	OH	*OH*	5.750	*146.05*	0.1709	*0.0159*	0.0304
		14.00	*20.83*	5.290	*134.37*	0.1432	*0.0133*	0.0255
		17.00	*25.30*	5.190	*131.83*	0.1375	*0.0128*	0.0245
		19.50	*29.02*	5.090	*129.29*	0.1319	*0.0123*	0.0235
		22.50	*33.48*	4.990	*126.75*	0.1264	*0.0117*	0.0225
		25.20	*37.50*	4.890	*124.21*	0.1210	*0.0112*	0.0215
5-7/8	*149*	OH	*OH*	5.875	*149.23*	0.1788	*0.0166*	0.0318
6	*152*	OH	*OH*	6.000	*152.40*	0.1869	*0.0174*	0.0333
		10.50	*15.62*	5.672	*144.07*	0.1660	*0.0154*	0.0296
		12.00	*17.86*	5.620	*142.75*	0.1628	*0.0151*	0.0290
		15.00	*22.32*	5.524	*140.31*	0.1570	*0.0146*	0.0280
		16.00	*23.81*	5.500	*139.70*	0.1556	*0.0145*	0.0277
		17.00	*25.30*	5.450	*138.43*	0.1526	*0.0142*	0.0272
		18.00	*26.78*	5.424	*137.77*	0.1510	*0.0140*	0.0269
		20.00	*29.76*	5.352	*135.94*	0.1468	*0.0136*	0.0261
		23.00	*34.22*	5.000	*127.00*	0.1269	*0.0118*	0.0226
		26.00	*38.69*	5.140	*130.56*	0.1347	*0.0125*	0.0240
6-1/8	*156*	OH	*OH*	6.125	*155.58*	0.1952	*0.0181*	0.0348
6-1/4	*159*	OH	*OH*	6.250	*158.75*	0.2036	*0.0189*	0.0363
6-3/8	*162*	OH	*OH*	6.375	*161.93*	0.2122	*0.0197*	0.0378
6-1/2	*165*	OH	*OH*	6.500	*165.10*	0.2210	*0.0205*	0.0394
6-5/8	*168*	OH	*OH*	6.625	*168.28*	0.2299	*0.0214*	0.0410
		12.00	*17.86*	6.387	*159.69*	0.2131	*0.0198*	0.0379
		13.00	*19.34*	6.255	*158.88*	0.2040	*0.0190*	0.0363
		17.00	*25.30*	6.135	*155.83*	0.1958	*0.0182*	0.0349
		20.00	*29.76*	6.049	*153.64*	0.1901	*0.0177*	0.0339
		22.00	*32.74*	5.989	*152.12*	0.1862	*0.0173*	0.0332
		24.00	*35.71*	5.921	*150.39*	0.1818	*0.0169*	0.0324
		26.00	*38.69*	5.855	*148.72*	0.1775	*0.0165*	0.0316
		28.00	*41.66*	5.791	*147.09*	0.1735	*0.0161*	0.0309

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.315 in. Tubing OD *(33 mm)* (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m^3/m ●	bbl/ft ▲
6-5/8	168	29.00	43.15	5.761	146.33	0.1716	0.0159	0.0306
		32.00	47.62	5.675	144.15	0.1662	0.0154	0.0296
		34.00	50.59	5.595	142.11	0.1613	0.0150	0.0287
6-3/4	171	OH	OH	6.750	171.45	0.2391	0.0222	0.0426
6-7/8	175	OH	OH	6.875	174.63	0.2484	0.0231	0.0442
7	178	OH	OH	7.000	177.80	0.2578	0.0240	0.0459
		13.00	19.34	6.520	165.61	0.2224	0.0207	0.0396
		17.00	25.30	6.538	166.07	0.2237	0.0208	0.0398
		20.00	29.76	6.456	163.98	0.2179	0.0202	0.0388
		22.00	32.74	6.398	162.51	0.2138	0.0199	0.0381
		23.00	34.22	6.366	161.70	0.2116	0.0197	0.0377
		24.00	35.71	6.336	160.93	0.2095	0.0195	0.0373
		26.00	38.69	6.276	159.41	0.2054	0.0191	0.0366
		28.00	41.66	6.214	157.84	0.2012	0.0187	0.0358
		29.00	43.15	6.184	157.07	0.1991	0.0185	0.0355
		30.00	44.64	6.154	156.31	0.1971	0.0183	0.0351
		32.00	47.62	6.094	154.79	0.1931	0.0179	0.0344
		33.70	50.15	6.048	153.62	0.1901	0.0177	0.0339
		35.00	52.08	6.004	152.50	0.1872	0.0174	0.0333
		38.00	56.54	5.920	150.37	0.1817	0.0169	0.0324
		40.00	59.52	5.836	148.23	0.1763	0.0164	0.0314
7-1/8	181	OH	OH	7.125	180.98	0.2674	0.0249	0.0476
7-1/4	184	OH	OH	7.250	184.15	0.2772	0.0258	0.0494
7-3/8	187	OH	OH	7.375	187.33	0.2872	0.0267	0.0512
7-1/2	191	OH	OH	7.500	190.50	0.2974	0.0276	0.0530
7-5/8	194	OH	OH	7.625	193.68	0.3077	0.0286	0.0548
		14.75	21.95	7.263	184.48	0.2783	0.0259	0.0496
		20.00	29.76	7.125	180.98	0.2674	0.0249	0.0476
		24.00	35.71	7.025	178.44	0.2597	0.0241	0.0463
		26.40	39.28	6.969	177.01	0.2555	0.0237	0.0455
		29.70	44.19	6.875	174.63	0.2484	0.0231	0.0442
		33.70	50.15	6.765	171.83	0.2402	0.0223	0.0428
		39.00	58.03	6.625	168.28	0.2299	0.0214	0.0410
		45.00	66.96	6.445	163.70	0.2171	0.0202	0.0387
		45.30	67.41	6.435	163.45	0.2164	0.0201	0.0385
7-3/4	197	OH	OH	7.750	196.85	0.3181	0.0296	0.0567
7-7/8	200	OH	OH	7.875	200.03	0.3288	0.0306	0.0586
8	203	OH	OH	8.000	203.20	0.3396	0.0316	0.0605
		16.00	23.81	7.628	193.75	0.3079	0.0286	0.0548
		20.00	29.76	7.528	191.21	0.2997	0.0278	0.0534
		26.00	38.69	7.386	187.60	0.2881	0.0268	0.0513
8-1/8	206	OH	OH	8.125	206.38	0.3506	0.0326	0.0624
		28.00	41.66	7.485	190.12	0.2961	0.0275	0.0527
		32.00	47.62	7.385	187.58	0.2880	0.0268	0.0513
		35.50	52.82	7.285	185.04	0.2800	0.0260	0.0499
		39.50	58.78	7.185	182.50	0.2721	0.0253	0.0485
		42.00	62.50	7.125	180.98	0.2674	0.0249	0.0476

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.660 in. Tubing OD *(42 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
2-7/8	*73*	OH	*OH*	2.875	*73.03*	0.0301	*0.0028*	0.0054
2-7/8 Reg	*73*	5.90	*8.78*	2.469	*62.71*	0.0182	*0.0017*	0.0032
2-7/8 EUE	*73*	6.50	*9.67*	2.441	*62.00*	0.0175	*0.0016*	00031
3	*76*	OH	*OH*	3.000	*76.20*	0.0341	*0.0032*	0.0061
3-1/8	*79*	OH	*OH*	3.125	*79.38*	0.0382	*0.0036*	0.0068
3-1/4	*83*	OH	*OH*	3.250	*82.55*	0.0426	*0.0040*	0.0076
3-3/8	*84*	OH	*OH*	3.325	*84.46*	0.0453	*0.0042*	0.0081
3-1/2	*89*	OH	*OH*	3.500	*88.90*	0.0518	*0.0048*	0.0092
		7.70	*11.46*	3.068	*77.93*	0.0363	*0.0034*	0.0065
3-1/2 Reg	*89*	8.90	*13.24*	3.018	*76.66*	0.0346	*0.0032*	0.0062
		9.20	*13.69*	2.992	*76.00*	0.0338	*0.0031*	0.0060
3-1/2 EUE	*89*	9.30	*13.84*	2.992	*76.00*	0.0338	*0.0031*	0.0060
3-1/2 Reg	*89*	10.20	*15.18*	2.922	*76.00*	0.0315	*0.0029*	0.0056
		12.70	*18.90*	2.750	*69.85*	0.0262	*0.0024*	0.0047
3-1/2	*89*	12.80	*19-05*	2.764	*70.21*	0.0266	*0.0025*	0.0047
3-1/2 EUE	*89*	12.95	*19.27*	2.750	*69.85*	0.0262	*0.0024*	0.0047
3-1/2	*89*	14.90	*22.17*	2.602	*66.09*	0.0219	*0.0020*	0.0039
		15.80	*23.51*	2.548	*64.72*	0.0204	*0.0019*	0.0036
		16.70	*24.85*	2.480	*62.99*	0.0185	*0.0017*	0.0033
3-5/8	*92*	OH	*OH*	3.625	*92.08*	0.0566	*0.0053*	0.0101
3-3/4	*95*	OH	*OH*	3.750	*95.25*	0.0617	*0.0057*	0.0110
3-7/8	*98*	OH	*OH*	3.875	*98.43*	0.0669	*0.0062*	0.0119
4	*102*	OH	*OH*	4.000	*101.60*	0.0722	*0.0067*	0.0129
4 Reg Tbg	*102*	9.50	*14.14*	3.548	*90.12*	0.0536	*0.0051*	0.0096
4 EUE Tbg	*102*	11.00	*16.37*	3.476	*88.29*	0.0509	*0.0047*	0.0091
4 Tbg	*102*	11.60	*17.26*	3.428	*87.07*	0.0491	*0.0046*	0.0087
		13.40	*19.94*	3.340	*84.84*	0.0458	*0.0043*	0.0082
4 Csg	*102*	5.65	*8.41*	3.732	*94.79*	0.0609	*0.0057*	0.0109
4-1/8	*105*	OH	*OH*	4.125	*104.78*	0.0778	*0.0072*	0.0139
4-1/4	*108*	OH	*OH*	4.250	*107.95*	0.0835	*0.0078*	0.0149
4-3/8	*110*	OH	*OH*	4.325	*109.86*	0.0870	*0.0081*	0.0155
4-1/2	*114*	OH	*OH*	4.500	*114.30*	0.0954	*0.0089*	0.0170
4-1/2 EUE Tbg	*114*	12.75	*18.97*	3.958	*100.53*	0.0704	*0.0065*	0.0125
4-1/2 EUE	*114*	15.50	*23.06*	3.826	*97.18*	0.0648	*0.0060*	0.0115
		19.20	*28.57*	3.640	*92.46*	0.0572	*0.0053*	0.0102
4-1/2 Csg	*114*	6.75	*10.04*	4.216	*107.09*	0.0819	*0.0076*	0.0146
		9.50	*14.14*	4.090	*103.89*	0.0762	*0.0071*	0.0136
		10.50	*15.62*	4.052	*102.92*	0.0745	*0.0069*	0.0133
		11.00	*16.37*	4.026	*102.26*	0.0734	*0.0068*	0.0131
		11.60	*17.26*	4.000	*101.60*	0.0722	*0.0067*	0.0129
		12.60	*18.75*	3.958	*100.53*	0.0704	*0.0065*	0.0125
		13.50	*20.09*	3.920	*99.57*	0.0688	*0.0064*	0.0123
		15.10	*22.47*	3.826	*97.18*	0.0648	*0.0060*	0.0115
		16.60	*24.70*	3.754	*95.35*	0.0618	*0.0057*	0.0110
		18.80	*27.97*	3.640	*92.46*	0.0572	*0.0053*	0.0102
4-5/8	*118*	OH	*OH*	4.625	*117.48*	0.1016	*0.0094*	0.0181
4-3/4	*121*	OH	*OH*	4.750	*120.65*	0.1080	*0.0100*	0.0192
		9.50	*14.14*	4.364	*110.85*	0.0888	*0.0083*	0.0158
		16.00	*23.81*	4.082	*103.68*	0.0758	*0.0071*	0.0135
		18.00	*26.78*	4.000	*101.60*	0.0722	*0.0067*	0.0129
4-7/8	*124*	OH	*OH*	4.875	*123.83*	0.1146	*0.0107*	0.0204
5	*127*	OH	*OH*	5.000	*127.00*	0.1213	*0.0113*	0.0216
		8.00	*11.90*	4.696	*119.28*	0.1052	*0.0098*	0.0187
		11.20	*17.11*	4.560	*115.82*	0.0984	*0.0091*	0.0175
		13.00	*19.34*	4.494	*114.15*	0.0951	*0.0088*	0.0169

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.660 in. Tubing OD *(42 mm)* (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m^3/m ●	bbl/ft ▲
		15.00	22.32	4.408	111.96	0.0909	0.0085	0.0152
		18.00	26.78	4.276	108.61	0.0847	0.0079	0.0151
		20.30	30.21	4.184	106.27	0.0804	0.0075	0.0143
5	127	20.80	30.95	4.156	105.56	0.0792	0.0074	0.0141
		21.00	31.25	4.154	105.51	0.0791	0.0074	0.0141
		23.20	34.52	4.044	102.72	0.0742	0.0069	0.0132
		24.20	36.01	4.000	101.60	0.0722	0.0067	0.0129
5-1/8	130	OH	OH	5.125	130.18	0.1282	0.0119	0.0228
		OH	OH	5.250	133.35	0.1353	0.0126	0.0241
		8.50	12.65	4.944	125.58	0.1183	0.0110	0.0211
5-1/4	133	10.00	14.88	4.886	124.10	0.1152	0.0107	0.0205
		13.00	19.34	4.768	121.11	0.1090	0.0101	0.0194
		16.00	23.81	4.648	118.06	0.1028	0.0096	0.0183
5-3/8	137	OH	OH	5.375	136.53	0.1425	0.0131	0.0254
		OH	OH	5.500	139.70	0.1500	0.0139	0.0267
		9.00	13.39	5.192	131.88	0.1320	0.0123	0.0235
		13.00	19.34	5.044	128.12	0.1237	0.0115	0.0220
		1400	20.83	5.012	127.30	0.1220	0.0113	0.0217
		15.00	22.32	4.974	126.34	0.1199	0.0111	0.0214
5-1/2	140	15.50	23.06	4.950	125.73	0.1186	0.0110	0.0211
		17.00	25.30	4.892	124.26	0.1155	0.0107	0.0206
		20.00	29.76	4.778	121.36	0.1095	0.0102	0.0195
		23.00	34.22	4.670	118.62	0.1039	0.0097	0.0185
		25.00	37.20	4.580	116.33	0.0994	0.0092	0.0177
		26.00	38.69	4.548	115.52	0.0978	0.0091	0.0174
5-5/8	143	OH	OH	5.625	142.88	0.1575	0.0146	0.0281
		OH	OH	5.750	146.05	0.1653	0.0154	0.0294
		14.00	20.83	5.290	134.37	0.1376	0.0128	0.0245
5-3/4	146	17.00	25.30	5.190	131.83	0.1319	0.0123	0.0235
		19.50	29.02	5.090	129.29	0.1263	0.0117	0.0225
		22.50	33.48	4.990	126.75	0.1208	0.0112	0.0215
		25.20	37.50	4.890	124.21	0.1154	0.0107	0.0206
5-7/8	149	OH	OH	5.875	149.23	0.1732	0.0161	0.0309
		OH	OH	6.000	152.40	0.1813	0.0168	0.0323
		10.50	15.62	5.672	144.07	0.1604	0.0149	0.0286
		12.00	17.86	5.620	142.75	0.1572	0.0146	0.0280
		15.00	22.32	5.524	140.31	0.1514	0.0141	0.0270
6	152	16.00	23.81	5.500	139.70	0.1500	0.0139	0.0267
		17.00	25.30	5.450	138.43	0.1470	0.0137	0.0262
		18.00	26.78	5.424	137.77	0.1454	0.0135	0.0259
		20.00	29.76	5.352	135.94	0.1412	0.0131	0.0251
		23.00	34.22	5.000	127.00	0.1213	0.0113	0.0216
		26.00	38.69	5.140	130.56	0.1291	0.0120	0.0230
6-1/8	156	OH	OH	6.125	155.58	0.1896	0.0176	0.0338
6-1/4	159	OH	OH	6.250	158.75	0.1980	0.0184	0.0353
6-3/8	162	OH	OH	6.375	161.93	0.2066	0.0192	0.0368
6-1/2	165	OH	OH	6.500	165.10	0.2154	0.0200	0.0384
		OH	OH	6.625	168.28	0.2244	0.0208	0.0400
		12.00	17.86	6.287	159.69	0.2005	0.0186	0.0357
		13.00	19.34	6.255	158.88	0.1984	0.0184	0.0353
		17.00	25.30	6.135	155.83	0.1902	0.0177	0.0339
6-5/8	168	20.00	29.76	6.049	153.64	0.1845	0.0171	0.0329
		22.00	32.74	5.989	152.12	0.1806	0.0168	0.0322
		24.00	35.71	5.921	150.29	0.1762	0.0164	0.0314
		26.00	38.69	5.855	148.72	0.1719	0.0160	0.0306
		28.00	41.66	5.791	147.09	0.1679	0.0156	0.0299

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.660 in. Tubing OD *(42 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
6-5/8	*168*	29.00	*43.15*	5.761	*146.33*	0.1660	*0.0154*	0.0296
		32.00	*47.62*	5.675	*144.15*	0.1606	*0.0149*	0.0286
		34.00	*50.59*	5.595	*142.11*	0.1557	*0.0145*	0.0277
6-3/4	*171*	OH	*OH*	6.750	*171.45*	0.2335	*0.0217*	0.0416
7-7/8	*175*	OH	*OH*	6.875	*174.63*	0.2428	*0.0226*	0.0432
7	*178*	OH	*OH*	7.000	*177.80*	0.2522	*0.0234*	0.0449
		13.00	*19.34*	6.520	*165.61*	0.2168	*0.0201*	0.0386
		17.00	*25.30*	6.538	*166.07*	0.2181	*0.0203*	0.0388
		20.00	*29.76*	6.456	*163.98*	0.2123	*0.0197*	0.0378
		22.00	*32.74*	6.398	*162.51*	0.2082	*0.0193*	0.0371
		23.00	*34.22*	6.366	*161.70*	0.2060	*0.0191*	0.0367
		24.00	*35.71*	6.336	*160.93*	0.2039	*0.0189*	0.0363
		26.00	*38.69*	6.276	*159.41*	0.1998	*0.0186*	0.0356
		28.00	*41.66*	6.214	*157.84*	0.1956	*0.0182*	0.0348
		29.00	*43.15*	6.184	*157.07*	0.1935	*0.0180*	0.0345
		30.00	*44.64*	6.154	*156.31*	0.1915	*0.0178*	0.0341
		32.00	*47.62*	6.094	*154.79*	0.1875	*0.0174*	0.0334
		33.70	*50.15*	6.048	*153.62*	0.1845	*0.0171*	0.0329
		35.00	*52.08*	6.004	*152.50*	0.1816	*0.0169*	0.0323
		38.00	*56.54*	5.920	*150.37*	0.1761	*0.0164*	0.0314
		40.00	*59.52*	5.836	*148.23*	0.1707	*0.0159*	0.0304
7-1/8	*181*	OH	*OH*	7.125	*180.98*	0.2618	*0.0243*	0.0466
7-1/4	*184*	OH	*OH*	7.250	*184.15*	0.2716	*0.0252*	0.0484
7-3/8	*187*	OH	*OH*	7.375	*187.33*	0.2816	*0.0262*	0.0502
7-1/2	*191*	OH	*OH*	7.500	*190.50*	0.2918	*0.0271*	0.0520
7-5/8	*194*	OH	*OH*	7.625	*193.68*	0.3021	*0.0281*	0.0538
		14.75	*21.95*	7.263	*184.48*	0.2727	*0.0253*	0.0486
		20.00	*29.76*	7.125	*180.98*	0.2618	*0.0243*	0.0466
		24.00	*35.71*	7.025	*178.44*	0.2541	*0.0236*	0.0453
		26.40	*39.28*	6.969	*177.01*	0.2499	*0.0232*	0.0445
		29.70	*44.19*	6.875	*174.63*	0.2428	*0.0226*	0.0432
		33.70	*50.15*	6.765	*171.83*	0.2346	*0.0218*	0.0418
		39.00	*58.03*	6.625	*168.28*	0.2244	*0.0208*	0.0400
		45.00	*66.96*	6.445	*163.70*	0.2115	*0.0197*	0.0377
		45.30	*67.41*	6.435	*163.45*	0.2108	*0.0196*	0.0375
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.3126	*0.0290*	0.0557
7-7/8	*200*	OH	*OH*	7.875	*200.03*	0.3232	*0.0300*	0.0576
8	*203*	OH	*OH*	8.000	*203.20*	0.3340	*0.0310*	0.0595
		16.00	*23.81*	7.628	*193.75*	0.3023	*0.0281*	0.0538
		20.00	*29.76*	7.528	*191.21*	0.2941	*0.0273*	0.0524
		26.00	*38.69*	7.386	*187.60*	0.2825	*0.0263*	0.0503
8-1/8	*206*	OH	*OH*	8.125	*206.38*	0.3450	*0.0321*	0.0615
		28.00	*41.66*	7.485	*190.12*	0.2905	*0.0270*	0.0517
		32.00	*47.62*	7.385	*187.58*	0.2824	*0.0262*	0.0503
		35.50	*52.82*	7.285	*185.04*	0.2744	*0.0255*	0.0489
		39.50	*58.78*	7.185	*182.50*	0.2665	*0.0248*	0.0475
		42.00	*62.50*	7.125	*180.98*	0.2618	*0.0243*	0.0466

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.900 in. Tubing OD *(48 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
2-7/8	*73*	OH	*OH*	2.875	*73.03*	0.0254	*0.0024*	0.0045
2-7/8 Reg	*73*	5.90	*8.78*	2.469	*62.71*	0.0136	*0.0013*	0.0024
2-7/8 EUE	*73*	6.50	*9.67*	2.441	*62.00*	0.0128	*0.0012*	0.0023
3	*76*	OH	*OH*	3.000	*76.20*	0.0294	*0.0027*	0.0052
3-1/8	*79*	OH	*OH*	3.125	*79.38*	0.0336	*0.0031*	0.0060
3-1/4	*83*	OH	*OH*	3.250	*82.55*	0.0379	*0.0035*	0.0068
3-3/8	*84*	OH	*OH*	3.325	*84.46*	0.0406	*0.0038*	0.0072
3-1/2	*89*	OH	*OH*	3.500	*88.90*	0.0471	*0.0044*	0.0084
		7.70	*11.46*	3.068	*77.93*	0.0316	*0.0029*	0.0056
3-1/2 Reg	*89*	8.90	*13.24*	3.018	*76.66*	0.0300	*0.0028*	0.0053
		9.20	*13.69*	2.992	*76.00*	0.0291	*0.0027*	0.0052
3-1/2 EUE	*89*	9.30	*13.84*	2.992	*76.00*	0.0291	*0.0027*	0.0052
3-1/2 Reg	*89*	10.20	*15.18*	2.992	*76.00*	0.0268	*0.0025*	0.0048
		12.70	*18.90*	2.750	*69.85*	0.0216	*0.0020*	0.0038
3-1/2	*89*	12.80	*19.05*	2.764	*70.21*	0.0220	*0.0020*	0.0039
3-1/2 EUE	*89*	12.95	*19.27*	2.750	*69.85*	0.0216	*0.0020*	0.0038
3-1/2	*89*	14.90	*22.17*	2.602	*66.09*	0.0172	*0.0016*	0.0031
		15.80	*23.51*	2.548	*64.72*	0.0157	*0.0015*	0.0028
		16.70	*24.85*	2.480	*62.99*	0.0139	*0.0013*	0.0025
3-5/8	*92*	OH	*OH*	3.625	*92.08*	0.0520	*0.0048*	0.0093
3-3/4	*95*	OH	*OH*	3.750	*95.25*	0.0570	*0.0053*	0.0102
3-7/8	*98*	OH	*OH*	3.875	*98.43*	0.0622	*0.0058*	0.0111
4	*102*	OH	*OH*	4.000	*101.60*	0.0676	*0.0063*	0.0120
4 Reg Tbg	*102*	9.50	*14.14*	3.548	*90.12*	0.0490	*0.0046*	0.0087
4 EUE Tbg	*102*	11.00	*16.37*	3.476	*88.29*	0.0462	*0.0043*	0.0082
4 Tbg	*102*	11.60	*17.26*	3.428	*87.07*	0.0444	*0.0041*	0.0079
		13.40	*19.94*	3.340	*84.84*	0.0412	*0.0038*	0.0073
4 Csg	*102*	5.65	*8.41*	3.732	*94.79*	0.0563	*0.0052*	0.0100
4-1/8	*105*	OH	*OH*	4.125	*104.78*	0.0731	*0.0068*	0.0130
4-1/4	*108*	OH	*OH*	4.250	*107.95*	0.0788	*0.0073*	0.0140
4-3/8	*110*	OH	*OH*	4.325	*109.86*	0.0823	*0.0077*	0.0147
4-1/2	*114*	OH	*OH*	4.500	*114.30*	0.0908	*0.0084*	0.0162
4-1/2 EUE Tbg	*114*	12.75	*18.97*	3.958	*100.53*	0.0658	*0.0061*	0.0117
4-1/2 Tbg	*114*	13.50	*20.09*	3.920	*99.57*	0.0641	*0.0060*	0.0114
		15.50	*23.06*	3.826	*97.18*	0.0601	*0.0056*	0.0107
		19.20	*28.57*	3.640	*92.46*	0.0526	*0.0049*	0.0094
4-1/2 Csg	*114*	6.75	*10.04*	4.216	*107.09*	0.0773	*0.0072*	0.0138
		9.50	*14.14*	4.090	*103.89*	0.0715	*0.0067*	0.0127
		10.50	*14.62*	4.052	*102.92*	0.0699	*0.0065*	0.0124
		11.00	*16.37*	4.026	*102.26*	0.0687	*0.0064*	0.0122
		11.60	*17.26*	4.000	*101.60*	0.0676	*0.0063*	0.0120
		12.60	*18.75*	3.958	*100.53*	0.0658	*0.0061*	0.0117
		13.50	*20.09*	3.920	*99.57*	0.0641	*0.0060*	0.0114
		15.10	*22.47*	3.826	*97.18*	0.0601	*0.0056*	0.0107
		16.60	*24.70*	3.754	*95.35*	0.0572	*0.0053*	0.0102
		18.80	*27.97*	3.640	*92.46*	0.0526	*0.0049*	0.0094
4-5/8	*117*	OH	*OH*	4.625	*117.48*	0.0970	*0.0090*	0.0173
4-3/4	*121*	OH	*OH*	4.750	*120.65*	0.1034	*0.0096*	0.0184
		9.50	*14.14*	4.364	*110.85*	0.0842	*0.0078*	0.0150
		16.00	*23.81*	4.082	*103.68*	0.0712	*0.0066*	0.0127
		18.00	*26.78*	4.000	*101.60*	0.0676	*0.0063*	0.0120
4-7/8	*124*	OH	*OH*	4.875	*123.83*	0.1099	*0.0102*	0.0196
5	*127*	OH	*OH*	5.000	*127.00*	0.1167	*0.0108*	0.0208
		8.00	*11.90*	4.696	*119.28*	0.1006	*0.0093*	0.0179
		11.50	*17.11*	4.560	*115.82*	0.0937	*0.0087*	0.0167
		13.00	*19.34*	4.494	*114.15*	0.0905	*0.0084*	0.0161

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.900 in. Tubing OD *(48 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
5	*127*	15.00	*22.32*	4.408	*111.96*	0.0863	*0.0080*	0.0154
		18.00	*26.78*	4.276	*108.61*	0.0800	*0.0074*	0.0143
		20.30	*30.21*	4.184	*106.27*	0.0758	*0.0070*	0.0135
		20.80	*30.95*	4.156	*105.56*	0.0745	*0.0069*	0.0133
		21.00	*31.25*	4.154	*105.51*	0.0744	*0.0069*	0.0133
		23.20	*34.52*	4.044	*102.72*	0.0695	*0.0065*	0.0124
		24.20	*36.01*	4.000	*101.60*	0,0676	*0.0063*	0.0120
5-1/8	*130*	OH	*OH*	5.125	*130.18*	0.1236	*0.0115*	0.0220
5-1/4	*133*	OH	*OH*	5.250	*133.35*	0.1306	*0.0121*	0.0233
		8.50	*12.65*	4.944	*125.58*	0.1136	*0.0106*	0.0202
		10.00	*14.88*	4.886	*124.10*	0.1105	*0.0103*	0.0197
		13.00	*19.34*	4.768	*121.11*	0.1043	*0.0097*	0.0186
		16.00	*23.81*	4.648	*118.06*	0.0981	*0.0091*	0.0175
5-3/8	*137*	OH	*OH*	5.375	*136.53*	0.1379	*0.0128*	0.0246
5-1/2	*140*	OH	*OH*	5.500	*139.70*	0.1453	*0.0135*	0.0259
		9.00	*13.39*	5.192	*131.88*	0.1273	*0.0118*	0.0227
		13.00	*19.34*	5.044	*128.12*	0.1191	*0.0111*	0.0212
		14.00	*20.83*	5.012	*127.30*	0.1173	*0.0109*	0.0209
		15.00	*22.32*	4.974	*126.34*	0.1152	*0.0107*	0.0205
		15.50	*23.06*	4.950	*125.73*	0.1139	*0.0106*	0.0203
		17.00	*25.30*	4.892	*124.26*	0.1108	*0.0103*	0.0197
		20.00	*29.76*	4.778	*121.36*	0.1048	*0.0097*	0.0187
		23.00	*34.22*	4.670	*118.62*	0.0993	*0.0092*	0.0177
		25.00	*37.20*	4.580	*116.33*	0.0947	*0.0088*	0.0169
		26.00	*38.69*	4.548	*115.52*	0.0931	*0.0087*	0.0166
5-5/8	*143*	OH	*OH*	5.625	*142.88*	0.1529	*0.0142*	0.0272
5-3/4	*146*	OH	*OH*	5.750	*146.05*	0.1606	*0.0149*	0.0286
		14.00	*20.83*	5.290	*134.37*	0.1329	*0.0124*	0.0237
		17.00	*25.30*	5.190	*131.83*	0.1272	*0.0118*	0.0227
		19.50	*29.02*	5.090	*129.29*	0.1216	*0.0113*	0.0217
		22.50	*33.48*	4.990	*126.75*	0.1161	*0.0108*	0.0207
		25.20	*37.50*	4.890	*124.21*	0.1107	*0.0103*	0.0197
5-7/8	*149*	OH	*OH*	5.875	*149.23*	0.1686	*0.0157*	0.0300
6	*152*	OH	*OH*	6.000	*152.40*	0.1767	*0.0164*	0.0315
		10.50	*15.62*	5.672	*144.07*	0.1558	*0.0145*	0.0277
		12.00	*17.86*	5.620	*142.75*	0.1526	*0.0142*	0.0272
		15.00	*22.32*	5.524	*140.31*	0.1467	*0.0136*	0.0261
		16.00	*23.81*	5.500	*139.70*	0.1453	*0.0135*	0.0259
		17.00	*25.30*	5.450	*138.43*	0.1423	*0.0132*	0.0253
		18.00	*26.78*	5.424	*137.77*	0.1408	*0.0131*	0.0251
		20.00	*29.76*	5.352	*135.94*	0.1365	*0.0127*	0.0243
		23.00	*34.22*	5.000	*127.00*	0.1167	*0.0108*	0.0208
		26.00	*38.69*	5.140	*130.56*	0.1244	*0.0116*	0.0222
6-1/8	*156*	OH	*OH*	6.125	*155.58*	0.1849	*0.0172*	0.0329
6-1/4	*159*	OH	*OH*	6.250	*158.75*	0.1934	*0.0180*	0.0344
6-3/8	*162*	OH	*OH*	6.375	*161.93*	0.2020	*0.0188*	0.0360
6-1/2	*165*	OH	*OH*	6.500	*165.10*	0.2107	*0.0196*	0.0375
6-5/8	*168*	OH	*OH*	6.625	*168.28*	0.2197	*0.0204*	0.0391
		12.00	*17.86*	6.287	*159.69*	0.1959	*0.0182*	0.0349
		13.00	*19.34*	6.255	*158.88*	0.1937	*0.0180*	0.0345
		17.00	*25.30*	6.135	*155.83*	0.1856	*0.0172*	0.0331
		20.00	*29.76*	6.049	*153.64*	0.1799	*0.0167*	0.0320
		22.00	*32.74*	5.989	*152.12*	0.1759	*0.0163*	0.0313
		24.00	*35.71*	5.921	*150.39*	0.1715	*0.0159*	0.0305
		26.00	*38.69*	5.855	*148.72*	0.1673	*0.0155*	0.0298
		28.00	*41.66*	5.791	*147.09*	0.1632	*0.0152*	0.0291

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.900 in. Tubing OD *(48 mm)* (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m^3/m ●	bbl/ft ▲
6-5/8	168	29.00	43.15	5.761	146.33	0.1613	0.0150	0.0287
		32.00	47.62	5.675	144.15	0.1560	0.0145	0.0278
		34.00	50.59	5.595	142.11	0.1510	0.0140	0.0269
6-3/4	171	OH	OH	6.750	171.45	0.2288	0.0213	0.0408
6-7/8	175	OH	OH	6.875	174.63	0.2381	0.0221	0.0424
7	178	OH	OH	7.000	177.80	0.2476	0.0230	0.0441
		13.00	19.34	6.520	165.61	0.2122	0.0197	0.0378
		17.00	25.30	6.538	166.07	0.2134	0.0198	0.0380
		20.00	29.76	6.456	163.98	0.2076	0.0193	0.0370
		22.00	32.74	6.398	162.51	0.2036	0.0189	0.0363
		23.00	34.22	6.366	161.70	0.2013	0.0187	0.0359
		24.00	35.71	6.336	160.93	0.1993	0.0185	0.0355
		26.00	38.69	6.276	159.41	0.1951	0.0181	0.0348
		28.00	41.66	6.214	157.84	0.1909	0.0177	0.0340
		29.00	43.15	6.184	157.07	0.1889	0.0176	0.0336
		30.00	44.64	6.154	156.31	0.1869	0.0174	0.0333
		32.00	47.62	6.094	154.79	0.1829	0.0171	0.0326
		33.70	50.15	6.048	153.62	0.1798	0.0167	0.0320
		35.00	52.08	6.004	152.50	0.1769	0.0164	0.0315
		38.00	56.54	5.920	150.37	0.1715	0.0159	0.0305
		40.00	59.52	5.836	148.23	0.1661	0.0154	0.0296
7-1/8	181	OH	OH	7.125	180.98	0.2572	0.0239	0.0458
7-1/4	184	OH	OH	7.250	184.15	0.2670	0.0248	0.0476
7-3/8	187	OH	OH	7.375	187.33	0.2770	0.0257	0.0493
7-1/2	191	OH	OH	7.500	190.50	0.2871	0.0267	0.0511
7-5/8	194	OH	OH	7.625	193.68	0.2974	0.0276	0.0530
		14.75	21.95	7.263	184.48	0.2680	0.0249	0.0477
		20.00	29.76	7.125	180.98	0.2572	0.0239	0.0458
		24.00	35.71	7.025	178.44	0.2495	0.0232	0.0444
		26.40	39.28	6.969	177.01	0.2452	0.0228	0.0437
		29.70	44.19	6.875	174.63	0.2381	0.0221	0.0424
		33.70	50.15	6.765	171.83	0.2299	0.0214	0.0409
		39.00	58.03	6.625	168.28	0.2197	0.0204	0.0391
		45.00	66.96	6.445	163.70	0.2069	0.0192	0.0368
		45.30	67.41	6.435	163.45	0.2062	0.0192	0.0367
7-3/4	197	OH	OH	7.750	196.85	0.3079	0.0286	0.0548
7-7/8	200	OH	OH	7.875	200.03	0.3185	0.0296	0.0567
8	203	OH	OH	8.000	203.20	0.3294	0.0306	0.0587
		16.00	23.81	7.628	193.75	0.2977	0.0277	0.0530
		20.00	29.76	7.528	191.21	0.2894	0.0269	0.0515
		26.00	38.69	7.386	187.60	0.2778	0.0258	0.0495
8-1/8	206	OH	OH	8.125	206.38	0.3404	0.0316	0.0606
		28.00	41.66	7.485	190.12	0.2859	0.0266	0.0509
		32.00	47.62	7.385	187.58	0.2778	0.0258	0.0495
		35.50	52.82	7.285	185.04	0.2698	0.0251	0.0480
		39.50	58.78	7.185	182.50	0.2619	0.0243	0.0466
		42.00	62.50	7.125	180.98	0.2572	0.0239	0.0458
8-1/4	210	OH	OH	8.250	209.55	0.3515	0.0327	0.0626
8-3/8	213	OH	OH	8.375	212.73	0.3629	0.0337	0.0646
8-1/2	216	OH	OH	8.500	215.90	0.3744	0.0348	0.0667
8-5/8	219	OH	OH	8.625	219.08	0.3860	0.0359	0.0688
		20.00	29.76	8.191	208.05	0.3462	0.0322	0.0617
		24.00	35.71	8.097	205.66	0.3379	0.0314	0.0602
		28.00	41.66	8.017	203.63	0.3309	0.0307	0.0589
		32.00	47.62	7.921	201.19	0.3225	0.0300	0.0574
		36.00	53.57	7.825	198.76	0.3143	0.0292	0.0560

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

1.900 in. Tubing OD *(48 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
8-5/8	*219*	38.00	*56.54*	7.775	*197.49*	0.3100	*0.0288*	0.0552
		40.00	*59.52*	7.725	*196.22*	0.3058	*0.0284*	0.0545
		43.00	*63.98*	7.651	*194.34*	0.2996	*0.0278*	0.0534
		44.00	*65.47*	7.625	*193.68*	0.2974	*0.0276*	0.0530
		48.00	*71.42*	7.537	*191.44*	0.2901	*0.0270*	0.0517
		49.00	*72.91*	7.511	*190.78*	0.2880	*0.0268*	0.0513
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.3979	*0.0370*	0.0709
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.4099	*0.0381*	0.0730
9	*229*	OH	*OH*	9.000	*228.60*	0.4221	*0.0392*	0.0752
		34.00	*50.59*	8.290	*210.57*	0.3551	*0.0330*	0.0633
		38.00	*56.54*	8.196	*208.18*	0.3467	*0.0322*	0.0617
		40.00	*59.52*	8.150	*207.01*	0.3426	*0.0318*	0.0610
		45.00	*66.96*	8.032	*204.01*	0.3322	*0.0309*	0.0592
		50.20	*74.70*	7.910	*200.91*	0.3216	*0.0299*	0.0573
		55.00	*81.84*	7.812	*198.42*	0.3132	*0.0291*	0.0558
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.4344	*0.0404*	0.0774
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.4470	*0.0415*	0.0796
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.4597	*0.0427*	0.0819
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.4725	*0.0439*	0.0842
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.4856	*0.0451*	0.0865
		29.30	*43.60*	9.063	*230.20*	0.4283	*0.0398*	0.0763
		32.30	*48.06*	9.001	*228.63*	0.4222	*0.0392*	0.0752
		36.00	*53.57*	8.921	*226.59*	0.4144	*0.0385*	0.0738
		40.00	*59.52*	8.835	*224.41*	0.4060	*0.0377*	0.0723
		43.50	*64.73*	8.755	*222.38*	0.3984	*0.0370*	0.0710
		47.00	*69.94*	8.681	*220.50*	0.3913	*0.0364*	0.0697
		53.30	*79.61*	8.535	*216.79*	0.3776	*0.0351*	0.0673
		58.40	*86.90*	8.435	*214.25*	0.3684	*0.0342*	0.0656
		61.10	*90.92*	8.375	*212.73*	0.3629	*0.0337*	0.0646
		71.80	*106.84*	8.125	*206.38*	0.3404	*0.0316*	0.0606
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.4988	*0.0463*	0.0888
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.5122	*0.0476*	0.0912
10	*254*	OH	*OH*	10.000	*254.00*	0.5257	*0.0488*	0.0936
		33.00	*49.10*	9.384	*238.35*	0.4606	*0.0428*	0.0820
		41.50	*61.75*	9.200	*233.68*	0.4419	*0.0411*	0.0787
		45.50	*67.70*	9.120	*231.65*	0.4339	*0.0403*	0.0773
		50.50	*75.14*	9.016	*229.01*	0.4237	*0.0394*	0.0755
		55.50	*82.58*	8.908	*226.26*	0.4131	*0.0384*	0.0736
		61.20	*91.07*	8.790	*223.27*	0.4017	*0.0373*	0.0715

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2.062 in. Tubing OD *(52 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
3	*76*	OH	*OH*	3.000	*76.20*	0.0259	*0.0024*	0.0046
3-1/8	*79*	OH	*OH*	3.125	*79.38*	0.0301	*0.0028*	0.0054
3-3/4	*83*	OH	*OH*	3.250	*82.55*	0.0344	*0.0032*	0.0061
3-3/8	*84*	OH	*OH*	3.325	*84.46*	0.0371	*0.0035*	0.0066
3-1/2	*89*	OH	*OH*	3.500	*88.90*	0.0436	*0.0041*	0.0078
		7.70	*11.46*	3.068	*77.93*	0.0281	*0.0026*	0.0050
3-1/2 Reg	*89*	8.90	*13.24*	3.018	*76.66*	0.0265	*0.0025*	0.0047
		9.20	*13.69*	2.992	*76.00*	0.0256	*0.0024*	0.0046
3-1/2 EUE	*89*	9.30	*13.84*	2.992	*76.00*	0.0256	*0.0024*	0.0046
3-1/2 Reg	*89*	10.20	*15.18*	2.922	*76.00*	0.0234	*0.0022*	0.0042
		12.70	*18.90*	2.750	*69.85*	0.0181	*0.0017*	0.0032
3-1/2	*89*	12.80	*19.05*	2.764	*70.21*	0.0185	*0.0017*	0.0033
3-1/2 EUE	*89*	12.95	*19.27*	2.750	*69.85*	0.0181	*0.0017*	0.0032
3-1/2	*89*	14.90	*22.17*	2.602	*66.09*	0.0137	*0.0013*	0.0024
		15.80	*23.51*	2.548	*64.72*	0.0122	*0.0011*	0.0022
		16.70	*24.85*	2.480	*62.99*	0.0104	*0.0010*	0.0018
3-5/8	*92*	OH	*OH*	3.625	*92.08*	0.0485	*0.0045*	0.0086
3-3/4	*95*	OH	*OH*	3.750	*95.25*	0.0535	*0.0050*	0.0095
3-7/8	*98*	OH	*OH*	3.875	*98.43*	0.0587	*0.0055*	0.0105
4	*102*	OH	*OH*	4.000	*101.60*	0.0641	*0.0060*	0.0114
4 Reg Tbg	*102*	9.50	*14.14*	3.548	*90.12*	0.0455	*0.0042*	0.0081
4 EUE Tbg	*102*	11.00	*16.37*	3.476	*88.29*	0.0427	*0.0040*	0.0760
4 Tbg	*102*	11.60	*17.26*	3.428	*87.07*	0.0409	*0.0038*	0.0730
		13.40	*19.94*	3.340	*84.84*	0.0377	*0.0035*	0.0067
4 Csg	*102*	5.65	*8.41*	3.732	*94.79*	0.0528	*0.0049*	0.0094
4-1/8 Csg	*105*	OH	*OH*	4.125	*104.78*	0.0696	*0.0065*	0.0124
4-1/4	*108*	OH	*OH*	4.250	*107.95*	0.0753	*0.0070*	0.0134
4-3/8	*110*	OH	*OH*	4.325	*109.86*	0.0788	*0.0073*	0.0140
4-1/2	*114*	OH	*OH*	4.500	*114.30*	0.0873	*0.0081*	0.0155
4-1/2 EUE	*114*	12.75	*18.97*	3.958	*100.53*	0.0623	*0.0058*	0.0111
4-1/2 Tbg	*114*	15.50	*23.06*	3.826	*97.18*	0.0566	*0.0053*	0.0101
		19.20	*28.57*	3.640	*92.46*	0.0491	*0.0046*	0.0087
4-1/2 Csg	*114*	6.75	*10.04*	4.216	*107.09*	0.0738	*0.0069*	0.0131
		9.50	*14.14*	4.090	*103.89*	0.0680	*0.0063*	0.0121
		10.50	*15.62*	4.052	*102.92*	0.0664	*0.0062*	0.0118
		11.00	*16.37*	4.026	*102.26*	0.0652	*0.0061*	0.0116
		11.60	*17.26*	4.000	*101.60*	0.0641	*0.0060*	0.0114
		12.60	*18.75*	3.958	*100.53*	0.0623	*0.0058*	0.0111
		13.50	*20.09*	3.920	*99.57*	0.0606	*0.0056*	0.0108
4-1/2	*114*	15.10	*22.47*	3.826	*97.18*	0.0566	*0.0053*	0.0101
4-1/2 Csg	*114*	16.60	*24.70*	3.754	*95.35*	0.0537	*0.0050*	0.0096
		18.80	*27.97*	3.640	*92.46*	0.0491	*0.0046*	0.0087
4-5/8	*117*	OH	*OH*	4.625	*117.48*	0.0935	*0.0087*	0.0166
4-3/4	*121*	OH	*OH*	4.750	*120.65*	0.0999	*0.0093*	0.0178
		9.50	*14.14*	4.364	*110.85*	0.0807	*0.0075*	0.0144
		16.00	*23.81*	4.082	*103.68*	0.0678	*0.0063*	0.0121
		18.00	*26.78*	4.000	*101.60*	0.0641	*0.0060*	0.0114
4-7/8	*124*	OH	*OH*	4.875	*123.83*	0.1064	*0.0099*	0.0190
5	*127*	OH	*OH*	5.000	*127.00*	0.1132	*0.0105*	0.0202
		8.00	*11.90*	4.696	*119.28*	0.0971	*0.0090*	0.0173
		11.50	*17.11*	4.560	*115.82*	0.0902	*0.0084*	0.0161
		13.00	*19.34*	4.494	*114.15*	0.0870	*0.0081*	0.0155
		15.00	*22.32*	4.408	*111.96*	0.0828	*0.0077*	0.0147
		18.00	*26.78*	4.276	*108.61*	0.0765	*0.0071*	0.0136
		20.30	*30.21*	4.184	*106.27*	0.0723	*0.0067*	0.0129

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2.062 in. Tubing OD *(52 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
5	*127*	20.80	*30.95*	4.156	*105.56*	0.0710	*0.0066*	0.0126
		21.00	*31.25*	4.154	*105.51*	0.0709	*0.0066*	0.0126
		23.20	*34.52*	4.044	*102.52*	0.0660	*0.0061*	0.0118
		24.20	*36.01*	4.000	*101.60*	0.0641	*0.0060*	0.0114
		OH	*OH*	5.125	*130.18*	0.1201	*0.0112*	0.0214
5-1/4	*133*	OH	*OH*	5.250	*133.35*	0.1271	*0.0118*	0.0226
		8.50	*12.65*	4.944	*125.58*	0.1101	*0.0102*	0.0196
		10.00	*14.88*	4.886	*124.10*	0.1070	*0.0099*	0.0191
		13.00	*19.34*	4.768	*121.11*	0.1008	*0.0094*	0.0180
		16.00	*23.81*	4.648	*118.06*	0.0946	*0.0088*	0.0169
5-3/8	*137*	OH	*OH*	5.375	*136.53*	0.1344	*0.0125*	0.0239
5-1/2	*140*	OH	*OH*	5.500	*139.70*	0.1418	*0.0132*	0.0253
		9.00	*13.39*	5.192	*131.88*	0.1238	*0.0115*	0.0221
		13.00	*19.34*	5.044	*128.12*	0.1156	*0.0107*	0.0206
		14.00	*20.83*	5.012	*127.30*	0.1138	*0.0106*	0.0203
		15.00	*22.32*	4.974	*126.34*	0.1117	*0.0104*	0.0199
		15.50	*23.06*	4.950	*125.73*	0.1104	*0.0103*	0.0197
		17.00	*25.30*	4.892	*124.26*	0.1073	*0.0100*	0.0191
		20.00	*29.76*	4.778	*121.36*	0.1013	*0.0094*	0.0180
		23.00	*34.22*	4.670	*118.62*	0.0958	*0.0089*	0.0171
		25.00	*37.20*	4.580	*116.33*	0.0912	*0.0085*	0.0162
		26.00	*38.59*	4.548	*115.52*	0.0896	*0.0083*	0.0160
5-5/8	*143*	OH	*OH*	5.625	*142.88*	0.1494	*0.0139*	0.0266
5-3/4	*146*	OH	*OH*	5.750	*146.05*	0.1571	*0.0146*	0.0280
		14.00	*20.83*	5.290	*134.37*	0.1294	*0.0120*	0.0231
		17.00	*25.30*	5.190	*131.83*	0.1237	*0.0115*	0.0220
		19.50	*29.02*	5.090	*129.29*	0.1181	*0.0110*	0.0210
		22.50	*33.48*	4.990	*126.75*	0.1126	*0.0105*	0.0201
		25.20	*37.50*	4.890	*124.21*	0.1072	*0.0100*	0.0191
5-7/8	*149*	OH	*OH*	5.875	*149.23*	0.1651	*0.0153*	0.0294
6	*152*	OH	*OH*	6.000	*152.40*	0.1732	*0.0161*	0.0308
		10.50	*15.62*	5.672	*144.07*	0.1523	*0.0142*	0.0271
		12.00	*17.86*	5.629	*142.75*	0.1497	*0.0139*	0.0266
		15.00	*22.32*	5.524	*140.31*	0.1432	*0.0133*	0.0255
		16.00	*23.81*	5.500	*139.70*	0.1418	*0.0132*	0.0253
		17.00	*25.30*	5.450	*138.43*	0.1388	*0.0129*	0.0247
		18.00	*26.78*	5.424	*137.77*	0.1373	*0.0128*	0.0244
		20.00	*29.76*	5.352	*135.94*	0.1330	*0.0124*	0.0237
		23.00	*34.22*	5.000	*127.00*	0.1132	*0.0105*	0.0202
		26.00	*38.69*	5.140	*130.56*	0.1209	*0.0112*	0.0215
6-1/8	*156*	OH	*OH*	6.125	*155.58*	0.1814	*0.0169*	0.0323
6-1/4	*159*	OH	*OH*	6.250	*158.75*	0.1899	*0.0176*	0.0338
6-3/8	*162*	OH	*OH*	6.375	*161.93*	0.1985	*0.0184*	0.0353
6-1/2	*165*	OH	*OH*	6.500	*165.10*	0.2072	*0.0193*	0.0369
6-5/8	*168*	OH	*OH*	6.625	*168.28*	0.2162	*0.0201*	0.0385
		12.00	*17.86*	6.287	*159.69*	0.1924	*0.0179*	0.0343
		13.00	*19.34*	6.255	*158.88*	0.1902	*0.0177*	0.0339
		17.00	*25.30*	6.135	*155.83*	0.1821	*0.0169*	0.0324
		20.00	*29.76*	6.049	*153.64*	0.1764	*0.0164*	0.0314
		22.00	*32.74*	5.989	*152.12*	0.1724	*0.0160*	0.0307
		24.00	*35.71*	5.921	*150.39*	0.1680	*0.0156*	0.0299
		26.00	*38.69*	5.855	*148.72*	0.1638	*0.0152*	0.0292
		28.00	*41.66*	5.791	*147.09*	0.1597	*0.0148*	0.0284
		29.00	*43.15*	5.761	*146.33*	0.1578	*0.0147*	0.0281
		32.00	*47.62*	5.675	*144.15*	0.1525	*0.0142*	0.0272
		34.00	*50.59*	5.595	*142.11*	0.1475	*0.0137*	0.0263

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2.062 in. Tubing OD *(52 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
6-3/4	*171*	OH	*OH*	6.750	*171.45*	0.2253	*0.0209*	0.0401
6-7/8	*175*	OH	*OH*	6.875	*174.63*	0.2346	*0.0218*	0.0418
7	*178*	OH	*OH*	7.000	*177.80*	0.2441	*0.0227*	0.0435
		13.00	*19.34*	6.520	*165.61*	0.2087	*0.0194*	0.0372
		17.00	*25.30*	6.538	*166.07*	0.2099	*0.0195*	0.0374
		20.00	*29.76*	6.456	*163.98*	0.2041	*0.0190*	0.0364
		22.00	*32.74*	6.398	*162.51*	0.2001	*0.0186*	0.0356
		23.00	*34.22*	6.366	*161.70*	0.1978	*0.0184*	0.0352
		24.00	*35.71*	6.336	*160.93*	0.1958	*0.0182*	0.0349
		26.00	*38.69*	6.276	*159.41*	0.1916	*0.0178*	0.0341
		28.00	*41.66*	6.214	*157.84*	0.1874	*0.0174*	0.0334
		29.00	*43.15*	6.184	*157.07*	0.1854	*0.0172*	0.0330
		30.00	*44.64*	6.154	*156.31*	0.1834	*0.0170*	0.0327
		32.00	*48.62*	6.094	*154.79*	0.1794	*0.0167*	0.0319
		33.70	*50.15*	6.048	*153.62*	0.1763	*0.0164*	0.0314
		35.00	*52.08*	6.004	*152.50*	0.1734	*0.0161*	0.0309
		38.00	*56.54*	5.920	*150.37*	0.1680	*0.0156*	0.0299
		40.00	*59.52*	5.836	*148.23*	0.1626	*0.0151*	0.0290
7-1/8	*181*	OH	*OH*	7.125	*180.98*	0.2537	*0.0236*	0.0452
7-1/4	*184*	OH	*OH*	7.250	*184.15*	0.2635	*0.0245*	0.0469
7-3/8	*187*	OH	*OH*	7.375	*187.33*	0.2735	*0.0254*	0.0487
7-1/2	*191*	OH	*OH*	7.500	*190.50*	0.2836	*0.0264*	0.0505
7-5/8	*194*	OH	*OH*	7.625	*193.68*	0.2939	*0.0273*	0.0523
		14.75	*21.95*	7.263	*184.48*	0.2645	*0.0246*	0.0471
		20.00	*29.76*	7.125	*180.98*	0.2537	*0.0236*	0.0452
		24.00	*35.71*	7.025	*178.44*	0.2460	*0.0229*	0.0438
		26.40	*39.28*	6.969	*177.01*	0.2417	*0.0225*	0.0430
		29.70	*44.19*	6.875	*174.63*	0.2346	*0.0218*	0.0418
		33.70	*50.15*	6.765	*171.83*	0.2264	*0.0210*	0.0403
		39.00	*58.03*	6.625	*168.28*	0.2162	*0.0201*	0.0385
		45.00	*66.96*	6.445	*163.70*	0.2034	*0.0189*	0.0362
		45.30	*67.41*	6.435	*163.45*	0.2027	*0.0188*	0.0361
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.3044	*0.0283*	0.0542
7-7/8	*200*	OH	*OH*	7.875	*200.03*	0.3150	*0.0293*	0.0561
8	*203*	OH	*OH*	8.000	*203.20*	0.3259	*0.0303*	0.0580
		16.00	*23.81*	7.628	*193.75*	0.2942	*0.0273*	0.0524
		20.00	*29.76*	7.528	*191.21*	0.2849	*0.0266*	0.0509
		26.00	*38.69*	7.386	*187.60*	0.2743	*0.0255*	0.0489
8-1/8	*206*	OH	*OH*	8.125	*206.38*	0.3369	*0.0313*	0.0600
		28.00	*41.66*	7.485	*190.12*	0.2824	*0.0262*	0.0503
		32.00	*47.62*	7.385	*187.58*	0.2743	*0.0255*	0.0488
		35.50	*52.82*	7.285	*185.04*	0.3663	*0.0247*	0.0474
		39.50	*58.78*	7.185	*182.50*	0.2584	*0.0240*	0.0460
		42.00	*62.50*	7.125	*180.98*	0.2537	*0.0236*	0.0452
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.3480	*0.0323*	0.0620
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.3594	*0.0334*	0.0640
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.3709	*0.0345*	0.0661
8-5/8	*219*	OH	*OH*	8.625	*219.08*	0.3825	*0.0355*	0.0681
		20.00	*29.76*	8.191	*208.05*	0.3427	*0.0318*	0.0610
		24.00	*35.71*	8.097	*205.66*	0.3344	*0.0311*	0.0596
		28.00	*41.66*	8.017	*203.63*	0.3274	*0.0304*	0.0583
		32.00	*47.62*	7.921	*201.19*	0.3190	*0.0296*	0.0568
		36.00	*53.57*	7.825	*198.76*	0.3108	*0.0289*	0.0553
		38.00	*56.54*	7.775	*197.49*	0.3065	*0.0285*	0.0546
		40.00	*59.52*	7.725	*196.22*	0.3023	*0.0281*	0.0538
		73.00	*63.98*	7.651	*194.34*	0.2961	*0.0275*	0.0527

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2.062 in. Tubing OD *(52 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
8-5/8	*219*	44.00	*65.47*	7.625	*193.68*	0.2939	*0.0273*	0.0523
		48.00	*71.42*	7.537	*191.44*	0.2866	*0.0266*	0.0511
		49.00	*72.91*	7.511	*190.78*	0.2845	*0.0264*	0.0507
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.3944	*0.0366*	0.0702
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.4064	*0.0378*	0.0724
9	*229*	OH	*OH*	9.000	*228.60*	0.4186	*0.0389*	0.0746
		34.00	*50.59*	8.290	*210.57*	0.3516	*0.0327*	0.0626
		38.00	*56.54*	8.196	*208.18*	0.3432	*0.0319*	0.0611
		40.00	*59.52*	8.150	*207.01*	0.3391	*0.0315*	0.0604
		45.00	*66.96*	8.032	*204.01*	0.3287	*0.0305*	0.0585
		50.20	*74.70*	7.910	*200.91*	0.3181	*0.0296*	0.0566
		55.00	*81.84*	7.812	*198.42*	0.3097	*0.0288*	0.0552
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.4309	*0.0400*	0.0768
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.4435	*0.0412*	0.0790
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.4562	*0.0424*	0.0812
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.4690	*0.0436*	0.0835
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.4821	*0.0448*	0.0859
		29.30	*43.60*	9.063	*230.20*	0.4248	*0.0395*	0.0757
		32.30	*48.06*	9.001	*228.63*	0.4187	*0.0389*	0.0746
		36.00	*53.57*	8.921	*226.59*	0.4109	*0.0382*	0.0732
		40.00	*59.52*	8.835	*224.41*	0.4025	*0.0374*	0.0717
		43.50	*64.73*	8.755	*222.38*	0.3949	*0.0367*	0.0703
		47.00	*69.94*	8.681	*220.50*	0.3878	*0.0360*	0.0691
		53.50	*79.61*	8.535	*216.79*	0.3741	*0.0348*	0.0666
		58.40	*86.90*	8.435	*214.25*	0.3649	*0.0339*	0.0650
		61.10	*90.92*	8.375	*212.73*	0.3594	*0.0334*	0.0640
		71.80	*106.84*	8.125	*206.38*	0.3369	*0.0313*	0.0600
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.4953	*0.0460*	0.0882
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.5087	*0.0473*	0.0906
10	*254*	OH	*OH*	10.000	*254.00*	0.5222	*0.0485*	0.0930
		33.00	*49.10*	9.384	*238.35*	0.4571	*0.0425*	0.0814
		41.50	*61.75*	9.200	*233.68*	0.4384	*0.0407*	0.0781
		45.50	*67.70*	9.120	*231.65*	0.4304	*0.0400*	0.0767
		50.50	*75.14*	9.016	*229.01*	0.4202	*0.0390*	0.0748
		55.50	*82.58*	8.908	*226.26*	0.4096	*0.0381*	0.0730
		61.20	*91.07*	8.790	*223.37*	0.3982	*0.0370*	0.0709

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2-3/8 in. Tubing OD *(60 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
4	*102*	OH	*OH*	4.000	*101.60*	0.0565	*0.0053*	0.0101
4 Reg Tbg	*102*	9.50	*14.14*	3.548	*90.12*	0.0379	*0.0035*	0.0067
4 EUE Tbg	*102*	11.00	*16.37*	3.476	*88.29*	0.0351	*0.0033*	0.0063
4 Tbg	*102*	11.60	*17.26*	3.428	*87.07*	0.0333	*0.0031*	0.0059
		13.40	*19.94*	3.340	*84.84*	0.0301	*0.0028*	0.0054
4 Csg	*102*	5.65	*8.41*	3.732	*94.79*	0.0452	*0.0042*	0.0081
		9.50	*14.14*	3.500	*88.90*	0.0360	*0.0034*	0.0064
		11.60	*17.26*	3.428	*87.07*	0.0333	*0.0031*	0.0059
4-1/8	*105*	OH	*OH*	4.125	*104.78*	0.0620	*0.0058*	0.0110
4-1/4	*108*	OH	*OH*	4.250	*107.95*	0.0677	*0.0063*	0.0121
4-3/8	*110*	OH	*OH*	4.325	*109.86*	0.0713	*0.0066*	0.0127
4-1/2	*114*	OH	*OH*	4.500	*114.30*	0.0797	*0.0074*	0.0142
4-1/2 EUE Tbg	*114*	12.75	*18.97*	3.958	*100.53*	0.0547	*0.0051*	0.0097
4-1/2 Tbg	*114*	15.50	*23.06*	3.826	*97.18*	0.0491	*0.0046*	0.0087
		19.20	*28.57*	3.640	*92.46*	0.0415	*0.0039*	0.0074
4-1/2	*114*	6.75	*10.04*	4.216	*107.09*	0.0662	*0.0062*	0.0118
		9.50	*14.14*	4.090	*103.89*	0.0605	*0.0056*	0.0108
		10.50	*15.62*	4.052	*102.92*	0.0588	*0.0055*	0.0105
		11.00	*16.37*	4.026	*102.26*	0.0576	*0.0054*	0.0103
		11.60	*17.26*	4.000	*101.60*	0.0565	*0.0053*	0.0101
		12.60	*18.75*	3.958	*100.53*	0.0547	*0.0051*	0.0097
		13.50	*20.09*	3.920	*99.57*	0.0530	*0.0049*	0.0094
		15.10	*22.47*	3.826	*97.18*	0.0491	*0.0046*	0.0087
		16.60	*24.70*	3.754	*95.35*	0.0461	*0.0043*	0.0082
		18.80	*27.97*	3.640	*92.46*	0.0415	*0.0039*	0.0074
4-5/8	*117*	OH	*OH*	4.625	*117.48*	0.0859	*0.0080*	0.0153
4-3/4	*121*	OH	*OH*	4.750	*120.65*	0.0923	*0.0086*	0.0164
		9.50	*14.14*	4.364	*110.85*	0.0731	*0.0068*	0.0130
		16.00	*23.81*	4.082	*103.68*	0.0601	*0.0056*	0.0107
		18.00	*26.78*	4.000	*101.60*	0.0565	*0.0053*	0.0101
4-7/8	*124*	OH	*OH*	4.875	*123.83*	0.0989	*0.0092*	0.0176
5	*127*	OH	*OH*	5.000	*127.00*	0.1056	*0.0098*	0.0188
		8.00	*11.90*	4.696	*119.28*	0.0895	*0.0083*	0.0159
		11.50	*17.11*	4.560	*115.82*	0.0826	*0.0077*	0.0147
		13.00	*19.34*	4.494	*114.15*	0.0794	*0.0074*	0.0141
		15.00	*22.32*	4.408	*111.96*	0.0752	*0.0070*	0.0134
		18.00	*26.78*	4.276	*108.61*	0.0690	*0.0064*	0.0123
		20.30	*30.21*	4.184	*106.27*	0.0647	*0.0060*	0.0115
		20.80	*30.95*	4.156	*105.56*	0.0634	*0.0059*	0.0113
		21.00	*31.25*	4.154	*105.51*	0.0633	*0.0059*	0.0113
		23.20	*34.52*	4.044	*102.72*	0.0584	*0.0054*	0.0104
		24.20	*36.01*	4.000	*101.60*	0.0565	*0.0053*	0.0101
5-1/8	*130*	OH	*OH*	5.125	*130.18*	0.1125	*0.0105*	0.0200
5-1/4	*133*	OH	*OH*	5.250	*133.35*	0.1196	*0.0111*	0.0213
		8.50	*12.65*	4.944	*125.58*	0.1025	*0.0095*	0.0183
		10.00	*14.88*	4.886	*124.10*	0.0994	*0.0092*	0.0177
		13.00	*19.34*	4.768	*121.11*	0.0932	*0.0087*	0.0166
		16.00	*23.81*	4.648	*118.06*	0.0871	*0.0081*	0.0155
5-3/8	*137*	OH	*OH*	5.375	*136.53*	0.1268	*0.0118*	0.0226
5-1/2	*140*	OH	*OH*	5.500	*139.70*	0.1342	*0.0125*	0.0239
		9.00	*13.39*	5.192	*131.88*	0.1163	*0.0108*	0.0207
		13.00	*19.34*	5.044	*128.12*	0.1080	*0.0100*	0.0192
		14.00	*20.83*	5.012	*127.30*	0.1062	*0.0099*	0.0189
		15.00	*22.32*	4.974	*126.34*	0.1042	*0.0097*	0.0186
		15.50	*23.06*	4.950	*125.73*	0.1029	*0.0096*	0.0183
		17.00	*25.30*	4.892	*124.26*	0.0998	*0.0093*	0.0178

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2-3/8 in. Tubing OD *(60 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
5-1/2	*140*	20.00	*29.76*	4.778	*121.36*	0.0937	*0.0087*	0.0167
		23.00	*34.22*	4.670	*118.62*	0.0882	*0.0082*	0.0157
		25.00	*37.20*	4.580	*116.33*	0.0836	*0.0078*	0.0149
		26.00	*38.69*	4.548	*115.52*	0.0820	*0.0076*	0.0146
5-5/8	*143*	OH	*OH*	5.625	*142.88*	0.1418	*0.0132*	0.0253
5-3/4	*146*	OH	*OH*	5.750	*146.05*	0.1496	*0.0139*	0.0266
		14.00	*20.83*	5.290	*134.37*	0.1219	*0.0113*	0.0217
		17.00	*25.30*	5.190	*131.83*	0.1161	*0.0108*	0.0207
		19.50	*29.02*	5.090	*129.29*	0.1105	*0.0103*	0.0197
		22.50	*29.76*	4.990	*129.29*	0.1050	*0.0103*	0.0187
		25.20	*33.48*	4.890	*126.75*	0.0997	*0.0098*	0.0177
5-7/8	*149*	OH	*OH*	5.875	*149.23*	0.1575	*0.0146*	0.0280
6	*152*	OH	*OH*	6.000	*152.40*	0.1656	*0.0154*	0.0295
		10.50	*15.62*	5.672	*144.07*	0.1447	*0.0134*	0.0258
		12.00	*17.86*	5.620	*142.75*	0.1415	*0.0132*	0.0252
		15.00	*22.32*	5.524	*140.31*	0.1357	*0.0126*	0.0242
		16.00	*23.81*	5.500	*139.70*	0.1342	*0.0125*	0.0239
		17.00	*25.30*	5.450	*138.43*	0.1312	*0.0122*	0.0234
		18.00	*26.78*	5.424	*137.77*	0.1297	*0.0121*	0.0231
		20.00	*29.76*	5.352	*135.94*	0.1255	*0.0117*	0.0223
		23.00	*34.22*	5.000	*127.00*	0.1056	*0.0098*	0.0188
		26.00	*38.69*	5.140	*130.56*	0.1133	*0.0105*	0.0202
6-1/8	*156*	OH	*OH*	6.125	*155.58*	0.1738	*0.0162*	0.0310
6-1/4	*159*	OH	*OH*	6.250	*158.75*	0.1823	*0.0169*	0.0325
6-3/8	*162*	OH	*OH*	6.375	*161.93*	0.1909	*0.0177*	0.0340
6-1/2	*165*	OH	*OH*	6.500	*165.10*	0.1997	*0.0186*	0.0356
6-5/8	*168*	OH	*OH*	6.625	*168.28*	0.2086	*0.0194*	0.0372
		12.00	*17.86*	6.287	*159.69*	0.1848	*0.0172*	0.0329
		13.00	*19.34*	6.255	*158.88*	0.1826	*0.0170*	0.0325
		17.00	*25.30*	6.135	*155.83*	0.1745	*0.0162*	0.0311
		20.00	*29.76*	6.049	*153.64*	0.1688	*0.0157*	0.0301
		22.00	*32.74*	5.989	*152.12*	0.1649	*0.0153*	0.0294
		24.00	*35.71*	5.921	*150.39*	0.1604	*0.0149*	0.0286
		26.00	*38.69*	5.855	*148.72*	0.1562	*0.0145*	0.0278
		28.00	*41.66*	5.791	*147.09*	0.1521	*0.0141*	0.0271
		29.00	*43.15*	5.761	*146.33*	0.1502	*0.0140*	0.0268
		32.00	*47.62*	5.675	*144.15*	0.1449	*0.0135*	0.0258
		34.00	*50.59*	5.595	*142.11*	0.1400	*0.0130*	0.0249
6-3/4	*171*	OH	*OH*	6.750	*171.45*	0.2177	*0.0202*	0.0388
6-7/8	*175*	OH	*OH*	6.875	*174.63*	0.2270	*0.0211*	0.0404
7	*178*	OH	*OH*	7.000	*177.80*	0.2365	*0.0220*	0.0421
		13.00	*19.34*	6.520	*165.61*	0.2011	*0.0187*	0.0358
		17.00	*25.30*	6.538	*166.07*	0.2024	*0.0188*	0.0360
		20.00	*29.76*	6.456	*163.98*	0.1966	*0.0183*	0.0350
		22.00	*32.74*	6.398	*162.51*	0.1925	*0.0179*	0.0343
		23.00	*34.22*	6.366	*161.70*	0.1903	*0.0177*	0.0339
		24.00	*35.71*	6.336	*160.93*	0.1882	*0.0175*	0.0335
		26.00	*38.69*	6.276	*159.41*	0.1841	*0.0171*	0.0328
		28.00	*41.66*	6.214	*157.84*	0.1798	*0.0167*	0.0320
		29.00	*43.15*	6.184	*157.07*	0.1778	*0.0165*	0.0317
		30.00	*44.64*	6.154	*156.31*	0.1758	*0.0163*	0.0313
		32.00	*47.62*	6.094	*154.79*	0.1718	*0.0160*	0.0306
		33.70	*50.15*	6.048	*153.62*	0.1687	*0.0157*	0.0301
		35.00	*52.08*	6.004	*152.50*	0.1658	*0.0154*	0.0295
		38.00	*56.54*	5.920	*150.37*	0.1604	*0.0149*	0.0286
		40.00	*59.52*	5.836	*148.23*	0.1550	*0.0144*	0.0276

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2-3/8 in. Tubing OD *(60 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
7-1/8	*181*	OH	*OH*	7.125	*180.98*	0.2461	*0.0229*	0.0438
7-1/4	*184*	OH	*OH*	7.250	*184.15*	0.2559	*0.0238*	0.0456
7-3/8	*187*	OH	*OH*	7.375	*187.33*	0.2659	*0.0247*	0.0474
7-1/2	*191*	OH	*OH*	7.500	*190.50*	0.2760	*0.0256*	0.0492
7-5/8	*194*	OH	*OH*	7.625	*193.68*	0.2863	*0.0266*	0.0510
		14.75	*21.95*	7.263	*184.48*	0.2569	*0.0239*	0.0458
		20.00	*29.76*	7.125	*180.98*	0.2461	*0.0229*	0.0438
		24.00	*35.71*	7.025	*178.44*	0.2384	*0.0222*	0.0425
		26.40	*39.28*	6.969	*177.01*	0.2341	*0.0218*	0.0417
		29.70	*44.19*	6.875	*174.63*	0.2270	*0.0211*	0.0404
		33.70	*50.15*	6.765	*171.83*	0.2188	*0.0203*	0.0390
		39.00	*58.03*	6.625	*168.28*	0.2086	*0.0194*	0.0372
		45.00	*66.96*	6.445	*163.70*	0.1958	*0.0182*	0.0349
		45.30	*67.41*	6.435	*163.45*	0.1951	*0.0181*	0.0347
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.2968	*0.0276*	0.0529
7-7/8	*200*	OH	*OH*	7.875	*200.03*	0.3075	*0.0286*	0.0548
8	*203*	OH	*OH*	8.000	*203.20*	0.3183	*0.0296*	0.0567
		16.00	*23.81*	7.628	*193.75*	0.2866	*0.0266*	0.0510
		20.00	*29.76*	7.528	*191.21*	0.2783	*0.0259*	0.0496
		26.00	*38.69*	7.386	*187.60*	0.2668	*0.0248*	0.0475
8-1/8	*206*	OH	*OH*	8.125	*206.38*	0.3293	*0.0306*	0.0586
		28.00	*41.66*	7.485	*190.12*	0.2748	*0.0255*	0.0489
		32.00	*47.62*	7.385	*187.58*	0.2667	*0.0248*	0.0475
		35.50	*52.82*	7.285	*185.04*	0.2587	*0.0240*	0.0461
		39.50	*58.78*	7.185	*182.50*	0.2508	*0.0233*	0.0447
		42.00	*62.50*	7.125	*180.98*	0.2461	*0.0229*	0.0438
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.3404	*0.0316*	0.0606
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.3518	*0.0327*	0.0627
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.3633	*0.0338*	0.0647
8-5/8	*219*	OH	*OH*	8.625	*219.08*	0.3750	*0.0348*	0.0668
		20.00	*29.76*	8.191	*208.05*	0.3352	*0.0311*	0.0597
		24.00	*35.71*	8.097	*205.66*	0.3268	*0.0304*	0.0582
		28.00	*41.66*	8.017	*203.63*	0.3198	*0.0297*	0.0570
		32.00	*47.62*	7.921	*201.19*	0.3114	*0.0289*	0.0555
		36.00	*53.57*	7.825	*198.76*	0.3032	*0.0282*	0.0540
		38.00	*56.54*	7.775	*197.49*	0.2989	*0.0278*	0.0532
		40.00	*59.52*	7.725	*196.22*	0.2947	*0.0274*	0.0525
		43.00	*63.98*	7.651	*194.34*	0.2885	*0.0268*	0.0514
		44.00	*65.47*	7.625	*193.68*	0.2863	*0.0266*	0.0510
		48.00	*71.42*	7.537	*191.44*	0.2791	*0.0259*	0.0497
		49.00	*72.91*	7.511	*190.78*	0.2769	*0.0257*	0.0493
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.3868	*0.0359*	0.0689
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.3988	*0.0371*	0.0710
9	*229*	OH	*OH*	9.000	*228.60*	0.4110	*0.0382*	0.0732
		34.00	*50.59*	8.290	*210.57*	0.3441	*0.0320*	0.0613
		38.00	*56.54*	8.196	*208.18*	0.3356	*0.0312*	0.0598
		40.00	*59.52*	8.150	*207.01*	0.3315	*0.0308*	0.0590
		45.00	*66.96*	8.032	*204.01*	0.3211	*0.0298*	0.0572
		50.20	*74.70*	7.910	*200.91*	0.3105	*0.0288*	0.0553
		55.00	*81.84*	7.812	*198.42*	0.3021	*0.0281*	0.0538
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.4234	*0.0393*	0.0754
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.4359	*0.0405*	0.0776
9-3/8	*239*	OH	*OH*	9.375	*238.13*	0.4486	*0.0417*	0.0799
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.4615	*0.0429*	0.0822

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2-3/8 in. Tubing OD *(60 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.4745	*0.0441*	0.0845
		29.30	*43.60*	9.063	*230.20*	0.4172	*0.0388*	0.0743
		32.30	*48.06*	9.001	*228.63*	0.4111	*0.0382*	0.0732
		36.00	*53.57*	8.921	*226.59*	0.4033	*0.0375*	0.0718
		40.00	*59.52*	8.835	*224.41*	0.3950	*0.0367*	0.0703
		43.50	*64.73*	8.755	*222.38*	0.3873	*0.0360*	0.0690
		47.00	*69.94*	8.681	*220.50*	0.3802	*0.0353*	0.0677
		53.50	*79.61*	8.535	*216.79*	0.3665	*0.0341*	0.0653
		58.40	*86.90*	8.435	*214.25*	0.3573	*0.0332*	0.0636
		61.10	*90.92*	8.375	*212.73*	0.3518	*0.0327*	0.0627
		71.80	*106.84*	8.125	*206.38*	0.3293	*0.0306*	0.0586
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.4877	*0.0453*	0.0869
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.5011	*0.0466*	0.0892
10	*254*	OH	*OH*	10.000	*254.00*	0.5146	*0.0478*	0.0917
		33.00	*49.10*	9.384	*238.35*	0.4495	*0.0418*	0.0801
		41.50	*61.75*	9.200	*233.68*	0.4309	*0.0400*	0.0767
		45.50	*67.70*	9.120	*231.65*	0.4229	*0.0393*	0.0753
		50.50	*75.14*	9.016	*229.01*	0.4126	*0.0383*	0.0735
		55.50	*82.58*	8.908	*226.26*	0.4020	*0.0374*	0.0716
		61.20	*91.07*	8.790	*223.27*	0.3906	*0.0363*	0.0696
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.5284	*0.0491*	0.0941
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.5422	*0.0504*	0.0966
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.5563	*0.0517*	0.0991
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.5705	*0.0530*	0.1016
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.5849	*0.0543*	0.1042
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.5995	*0.0557*	0.1068
		32.75	*48.73*	10.192	*258.88*	0.5358	*0.0498*	0.0954
		35.75	*53.20*	10.136	*257.45*	0.5296	*0.0492*	0.0943
		40.50	*60.26*	10.050	*255.27*	0.5201	*0.0483*	0.0926
		45.50	*67.70*	9.950	*252.73*	0.5092	*0.0473*	0.0907
		51.00	*75.89*	9.850	*250.19*	0.4984	*0.0463*	0.0888
		54.00	*80.35*	9.784	*248.51*	0.4913	*0.0457*	0.0875
		55.00	*81.84*	9.760	*247.90*	0.4888	*0.0454*	0.0871
		60.70	*90.32*	9.660	*245.36*	0.4782	*0.0444*	0.0852
		65.70	*97.76*	9.560	*242.82*	0.4677	*0.0435*	0.0833
		71.10	*105.80*	9.450	*240.03*	0.4563	*0.0424*	0.0813
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.6143	*0.0571*	0.1094
11	*279*	OH	*OH*	11.000	*279.40*	0.6292	*0.0585*	0.1121
		26.75	*39.80*	10.552	*268.02*	0.5765	*0.0536*	0.1027

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2-7/8 in. Tubing OD *(73 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
4	*102*	OH	*OH*	4.000	*101.60*	0.0422	*0.0039*	0.0075
4 Reg Tbg	*102*	9.50	*14.14*	3.548	*90.12*	0.0236	*0.0022*	0.0042
4 EUE Tbg	*102*	11.00	*16.37*	3.476	*88.19*	0.0208	*0.0019*	0.0037
4 Tbg	*102*	11.60	*17.26*	3.428	*87.07*	0.0190	*0.0018*	0.0034
		13.40	*19.94*	3.340	*84.84*	0.0158	*0.0015*	0.0028
4 Csg	*102*	5.65	*8.41*	3.732	*94.79*	0.0309	*0.0029*	0.0055
4-1/8	*105*	OH	*OH*	4.125	*104.78*	0.0477	*0.0044*	0.0085
4-1/4	*108*	OH	*OH*	4.250	*107.95*	0.0534	*0.0050*	0.0095
4-3/8	*110*	OH	*OH*	4.325	*109.86*	0.0569	*0.0053*	0.0101
4-1/2	*114*	OH	*OH*	4.500	*114.30*	0.0654	*0.0061*	0.0116
4-1/2 EUE Tbg	*114*	12.75	*18.97*	3.958	*100.53*	0.0404	*0.0038*	0.0072
4-1/2 Tbg	*114*	15.50	*20.09*	3.826	*99.57*	0.0348	*0.0036*	0.0062
		19.20	*28.57*	3.640	*92.46*	0.0272	*0.0025*	0.0048
4-1/2 Csg	*114*	6.75	*10.04*	4.216	*107.09*	0.0519	*0.0048*	0.0092
		9.50	*14.14*	4.090	*103.89*	0.0462	*0.0043*	0.0082
		10.50	*15.62*	4.052	*102.92*	0.0445	*0.0041*	0.0079
		11.00	*16.37*	4.026	*102.26*	0.0433	*0.0040*	0.0077
		11.60	*17.26*	4.000	*101.60*	0.0422	*0.0039*	0.0075
		12.60	*18.75*	3.958	*100.53*	0.0404	*0.0038*	0.0072
		13.50	*20.09*	3.920	*99.57*	0.0387	*0.0036*	0.0069
		15.10	*22.47*	3.826	*97.18*	0.0348	*0.0032*	0.0062
		16.60	*24.70*	3.754	*95.35*	0.0318	*0.0030*	0.0057
4-1/2	*114*	18.80	*27.97*	3.650	*92.46*	0.0272	*0.0025*	0.0048
4-5/8	*117*	OH	*OH*	4.625	*117.48*	0.0716	*0.0067*	0.0127
4-3/4	*121*	OH	*OH*	4.750	*120.65*	0.0780	*0.0072*	0.0139
		9.50	*14.14*	4.364	*110.85*	0.0588	*0.0055*	0.0105
		16.00	*23.81*	4.082	*103.68*	0.0458	*0.0043*	0.0082
		18.00	*26.78*	4.000	*101.60*	0.0422	*0.0039*	0.0075
4-7/8	*124*	OH	*OH*	4.875	*123.83*	0.0845	*0.0079*	0.0151
5	*127*	OH	*OH*	5.000	*127.00*	0.0913	*0.0085*	0.0163
		8.00	*11.90*	4.696	*119.28*	0.0752	*0.0070*	0.0134
		11.50	*17.11*	4.560	*115.82*	0.0683	*0.0064*	0.0122
		13.00	*19.34*	4.494	*114.15*	0.0651	*0.0061*	0.0116
		15.00	*22.32*	4.408	*111.96*	0.0609	*0.0057*	0.0108
		18.00	*26.78*	4.276	*108.61*	0.0546	*0.0051*	0.0097
		20.30	*30.21*	4.184	*106.27*	0.0504	*0.0047*	0.0090
		20.80	*30.95*	4.156	*105.56*	0.0491	*0.0046*	0.0087
		21.00	*31.25*	4.154	*105.51*	0.0490	*0.0046*	0.0087
		23.20	*34.52*	4.044	*102.72*	0.0441	*0.0041*	0.0079
		24.20	*36.01*	4.000	*101.60*	0.0422	*0.0039*	0.0075
5-1/8	*130*	OH	*OH*	5.125	*130.18*	0.0982	*0.0091*	0.0175
5-1/4	*133*	OH	*OH*	5.250	*133.35*	0.1052	*0.0098*	0.0187
		8.50	*12.65*	4.944	*125.58*	0.0882	*0.0082*	0.0157
		10.00	*14.88*	4.886	*124.10*	0.0851	*0.0079*	0.0152
		13.00	*19.34*	4.768	*121.11*	0.0789	*0.0073*	0.0141
		16.00	*23.81*	4.648	*118.06*	0.0727	*0.0068*	0.0130
5-3/8	*137*	OH	*OH*	5.375	*136.53*	0.1125	*0.0105*	0.0200
5-1/2	*140*	OH	*OH*	5.500	*139.70*	0.1199	*0.0111*	0.0214
		9.00	*13.39*	5.192	*131.88*	0.1019	*0.0095*	0.0182
		13.00	*19.34*	5.044	*128.12*	0.0937	*0.0087*	0.0167
		14.00	*20.83*	5.012	*127.30*	0.0919	*0.0085*	0.0165
		15.00	*22.32*	4.974	*126.34*	0.0899	*0.0084*	0.0160
		15.50	*23.06*	4.950	*125.73*	0.0886	*0.0082*	0.0158
		17.00	*25.30*	4.892	*125.26*	0.0854	*0.0079*	0.0152
		20.00	*29.76*	4.778	*121.36*	0.0794	*0.0074*	0.0141

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2-7/8 in. Tubing OD *(73 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
5-1/2	*140*	23.00	*34.22*	4.670	*118.62*	0.0739	*0.0069*	0.0132
		25.00	*37.20*	4.580	*116.33*	0.0693	*0.0064*	0.0123
		26.00	*38.69*	4.548	*115.52*	0.0677	*0.0063*	0.0121
5-5/8	*143*	OH	*OH*	5.625	*142.88*	0.1275	*0.0118*	0.0227
5-3/4	*146*	OH	*OH*	5.750	*146.05*	0.1352	*0.0126*	0.0241
		14.00	*20.83*	5.290	*134.37*	0.1075	*0.0100*	0.0192
		17.00	*25.30*	5.190	*131.83*	0.1018	*0.0095*	0.0181
		19.50	*29.02*	5.090	*129.29*	0.0962	*0.0089*	0.0171
		22.50	*33.48*	4.990	*126.75*	0.0907	*0.0084*	0.0162
		25.20	*37.50*	4.890	*124.21*	0.0853	*0.0079*	0.0152
5-7/8	*149*	OH	*OH*	5.875	*149.23*	0.1432	*0.0133*	0.0255
6	*152*	OH	*OH*	6.000	*152.40*	0.1513	*0.0141*	0.0269
		10.50	*15.62*	5.672	*144.07*	0.1304	*0.0121*	0.0232
		12.00	*17.86*	5.620	*142.75*	0.1272	*0.0118*	0.0227
		15.00	*22.32*	5.524	*140.31*	0.1213	*0.0113*	0.0216
		16.00	*23.81*	5.500	*139.70*	0.1199	*0.0111*	0.0214
		17.00	*25.30*	5.450	*138.43*	0.1169	*0.0109*	0.0208
		18.00	*26.78*	5.424	*137.77*	0.1154	*0.0107*	0.0205
		20.00	*29.76*	5.352	*135.94*	0.1111	*0.0103*	0.0198
		23.00	*34.22*	5.240	*133.10*	0.1046	*0.0097*	0.0186
		26.00	*38.69*	5.140	*130.56*	0.0990	*0.0092*	0.0176
6-1/8	*156*	OH	*OH*	6.125	*155.58*	0.1595	*0.0148*	0.0284
6-1/4	*159*	OH	*OH*	6.250	*158.75*	0.1680	*0.0156*	0.0299
6-3/8	*162*	OH	*OH*	6.375	*161.93*	0.1766	*0.0164*	0.0314
6-1/2	*165*	OH	*OH*	6.500	*165.10*	O.1854	*0.0172*	0.0330
6-5/8	*168*	OH	*OH*	6.625	*168.28*	0.1943	*0.0181*	0.0346
		12.00	*17.86*	6.287	*159.69*	0.1705	*0.0158*	0.0304
		13.00	*19.34*	6.255	*158.88*	0.1683	*0.0156*	0.0300
		17.00	*25.30*	6.135	*155.83*	0.1602	*0.0149*	0.0285
		20.00	*29.76*	6.049	*153.64*	0.1545	*0.0144*	0.0275
		22.00	*32.74*	5.989	*152.12*	0.1505	*0.0140*	0.0268
		24.00	*35.71*	5.921	*150.39*	0.1461	*0.0136*	0.0260
		26.00	*38.69*	5.855	*148.72*	0.1409	*0.0132*	0.0253
		28.00	*41.66*	5.791	*147.09*	0.1378	*0.0128*	0.0245
		29.00	*43.15*	5.761	*146.33*	0.1359	*0.0126*	0.0242
6-5/8	*168*	32.00	*47.62*	5.675	*144.15*	0.1306	*0.0121*	0.0233
		34.00	*50.59*	5.595	*142.11*	0.1257	*0.0117*	0.0224
6-3/8	*171*	OH	*OH*	6.750	*171.45*	0.2034	*0.0189*	0.0362
6-7/8	*175*	OH	*OH*	6.875	*174.63*	0.2127	*0.0198*	0.0379
7	*178*	OH	*OH*	7.000	*177.80*	0.2222	*0.0206*	0.0396
		13.00	*19.34*	6.520	*165.61*	0.1868	*0.0174*	0.0333
		17.00	*25.30*	6.538	*166.07*	0.1881	*0.0175*	0.0335
		20.00	*29.76*	6.456	*163.98*	0.1822	*0.0169*	0.0325
		22.00	*32.74*	6.398	*162.51*	0.1782	*0.0166*	0.0317
		23.00	*34.22*	6.366	*161.70*	0.1759	*0.0164*	0.0313
		24.00	*35.71*	6.336	*160.93*	0.1739	*0.0162*	0.0310
		26.00	*38.69*	6.276	*159.41*	0.1697	*0.0158*	0.0302
		28.00	*41.66*	6.214	*157.84*	0.1655	*0.0154*	0.0295
		29.00	*43.15*	6.184	*157.07*	0.1635	*0.0152*	0.0291
		30.00	*44.64*	6.154	*156.31*	0.1615	*0.0150*	0.0288
		32.00	*47.62*	6.094	*154.79*	0.1575	*0.0146*	0.0280
		33.70	*50.15*	6.048	*153.62*	0.1544	*0.0144*	0.0275
		35.00	*52.08*	6.005	*152.50*	0.1515	*0.0141*	0.0270
		38.00	*56.54*	5.920	*150.37*	0.1461	*0.0136*	0.0260
		40.00	*59.52*	5.836	*148.23*	0.1407	*0.0131*	0.0251
7-1/8	*181*	OH	*OH*	7.125	*180.98*	0.2318	*0.0215*	0.0413

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2-7/8 in. Tubing OD *(73 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
7-1/4	*184*	OH	*OH*	7.250	*184.15*	0.2416	*0.0224*	0.0430
7-3/8	*187*	OH	*OH*	7.375	*187.33*	0.2516	*0.0234*	0.0448
7-1/2	*191*	OH	*OH*	7.500	*190.50*	0.2617	*0.0243*	0.0466
7-5/8	*194*	OH	*OH*	7.625	*193.68*	0.2720	*0.0253*	0.0484
		14.75	*21.95*	7.263	*184.48*	0.2426	*0.0225*	0.0432
		20.00	*29.76*	7.125	*180.98*	0.2318	*0.0215*	0.0413
		24.00	*35.71*	7.025	*178.44*	0.2241	*0.0208*	0.0399
		26.40	*39.28*	6.969	*177.01*	0.2198	*0.0204*	0.0391
		29.70	*44.19*	6.875	*174.63*	0.2127	*0.0198*	0.0379
		33.70	*50.15*	6.765	*171.83*	0.2045	*0.0190*	0.0364
		39.00	*58.03*	6.625	*168.28*	0.1943	*0.0181*	0.0346
		45.00	*66.96*	6.445	*163.70*	0.1815	*0.0169*	0.0323
		45.30	*67.41*	6.435	*163.45*	0.1808	*0.0168*	0.0322
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.2825	*0.0263*	0.0503
7-7/8	*200*	OH	*OH*	7.875	*200.03*	0.2932	*0.0272*	0.0522
8	*203*	OH	*OH*	8.000	*203.20*	0.3040	*0.0282*	0.0541
		16.00	*23.81*	7.628	*193.75*	0.2723	*0.0253*	0.0485
		20.00	*29.76*	7.528	*191.21*	0.2640	*0.0245*	0.0470
		26.00	*38.69*	7.386	*187.60*	0.2525	*0.0235*	0.0450
8-1/8	*206*	OH	*OH*	8.125	*206.38*	0.3150	*0.0293*	0.0561
		28.00	*41.66*	7.485	*190.12*	0.2605	*0.0242*	0.0464
		32.00	*47.62*	7.385	*187.58*	0.2524	*0.0235*	0.0449
		35.50	*52.82*	7.285	*185.04*	0.2444	*0.0227*	0.0435
		39.50	*58.78*	7.185	*182.50*	0.2365	*0.0220*	0.0421
		42.00	*62.50*	7.125	*180.98*	0.2318	*0.0215*	0.0413
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.3261	*0.0303*	0.0581
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.3375	*0.0314*	0.0601
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.3490	*0.0324*	0.0622
8-5/8	*219*	OH	*OH*	8.625	*210.08*	0.3606	*0.0335*	0.0642
		20.00	*29.76*	8.191	*208.05*	0.3208	*0.0298*	0.0571
		24.00	*35.71*	8.097	*205.66*	0.3125	*0.0290*	0.0557
		28.00	*41.66*	8.017	*203.63*	0.3055	*0.0284*	0.0544
		32.00	*47.62*	7.921	*201.19*	0.2971	*0.0276*	0.0529
		36.00	*53.57*	7.825	*198.76*	0.2889	*0.0268*	0.0515
		38.00	*56.54*	7.775	*197.49*	0.2846	*0.0264*	0.0507
		40.00	*59.52*	7.725	*196.22*	0.2804	*0.0261*	0.0499
		43.00	*63.98*	7.651	*194.34*	0.2742	*0.0255*	0.0488
		44.00	*64.47*	7.625	*193.68*	0.2720	*0.0253*	0.0484
		48.00	*71.42*	7.537	*191.44*	0.2647	*0.0246*	0.0472
		49.40	*72.91*	7.511	*190.78*	0.2626	*0.0244*	0.0468
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.3725	*0.0346*	0.0663
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.3845	*0.0357*	0.0685
9	*229*	OH	*OH*	9.000	*228.60*	0.3967	*0.0369*	0.0707
		24.00	*50.59*	8.290	*210.57*	0.3297	*0.0306*	0.0587
		38.00	*56.54*	8.196	*208.18*	0.3213	*0.0299*	0.0572
		40.00	*59.52*	8.150	*207.01*	0.3172	*0.0295*	0.0565
		45.00	*66.96*	8.032	*204.01*	0.3068	*0.0285*	0.0546
		50.20	*74.70*	7.910	*200.91*	0.2962	*0.0275*	0.0527
		55.00	*81.84*	7.812	*198.42*	0.2878	*0.0267*	0.0513
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.4090	*0.0380*	0.0729
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.4216	*0.0392*	0.0751
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.4343	*0.0404*	0.0773
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.4471	*0.0415*	0.0796
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.4602	*0.0428*	0.0820
		29.30	*43.60*	9.063	*230.20*	0.4029	*0.0374*	0.0718
		32.30	*48.06*	9.001	*228.63*	0.3968	*0.0369*	0.0707

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

2-7/8 in. Tubing OD *(73 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
9-5/8	*244*	36.00	*53.57*	8.921	*226.59*	0.3890	*0.0361*	0.0693
		40.00	*59.52*	8.835	*224.41*	0.3806	*0.0354*	0.0678
		43.50	*64.73*	8.755	*222.38*	0.3730	*0.0346*	0.0664
		47.00	*69.94*	8.681	*220.50*	0.3659	*0.0340*	0.0652
		53.50	*79.61*	8.535	*216.79*	0.3522	*0.0327*	0.0627
		58.40	*86.90*	8.435	*214.25*	0.3430	*0.0319*	0.0611
		61.10	*90.92*	8.375	*212.73*	0.3375	*0.0314*	0.0601
		71.80	*106.84*	8.125	*205.38*	0.3150	*0.0293*	0.0561
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.4734	*0.0440*	0.0843
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.4868	*0.0452*	0.0867
10	*254*	OH	*OH*	10.000	*254.00*	0.5003	*0.0465*	0.0891
		33.00	*49.10*	9.384	*238.35*	0.4352	*0.0404*	0.0775
		41.50	*61.75*	9.200	*233.68*	0.4165	*0.0387*	0.0742
		45.50	*67.70*	9.120	*231.65*	0.4086	*0.0380*	0.0728
		50.50	*75.14*	9.016	*229.01*	0.3983	*0.0370*	0.0709
		55.50	*82.58*	8.908	*226.26*	0.3877	*0.0360*	0.0691
		61.20	*91.07*	8.790	*223.27*	0.3763	*0.0350*	0.0670
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.5140	*0.0478*	0.0916
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.5279	*0.0491*	0.0940
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.5420	*0.0504*	0.0965
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.5562	*0.0517*	0.0991
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.5706	*0.0530*	0.1016
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.5852	*0.0544*	0.1042
		32.65	*48.73*	10.192	*258.88*	0.5215	*0.0485*	0.0929
		35.75	*53.20*	10.136	*257.45*	0.5153	*0.0479*	0.0918
		40.50	*60.26*	10.050	*255.27*	0.5058	*0.0470*	0.0901
		45.50	*67.70*	9.950	*252.73*	0.4949	*0.0460*	0.0881
		51.00	*75.89*	9.850	*250.19*	0.4841	*0.0450*	0.0862
		54.00	*80.35*	9.784	*248.51*	0.4770	*0.0443*	0.0860
		55.00	*81.84*	9.760	*247.90*	0.4745	*0.0441*	0.0845
		60.70	*90.32*	9.660	*245.36*	0.4639	*0.0431*	0.0826
		65.70	*97.76*	9.560	*242.82*	0.4534	*0.0421*	0.0808
		71.10	*105.80*	9.450	*240.03*	0.4420	*0.0411*	0.0787
10-7/8	*276*	OH	*OH*	1.0.875	*276.23*	0.5999	*0.0557*	0.1069
11	*279*	OH	*OH*	11.000	*279.40*	0.6149	*0.0571*	0.1095
		26.75	*39.80*	10.552	*268.02*	0.5622	*0.0522*	0.1001
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.6299	*0.0585*	0.1122
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.6452	*0.0599*	0.1149
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.6606	*0.0614*	0.1177
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.6762	*0.0628*	0.1204
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.6920	*0.0643*	0.1232
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.7079	*0.0658*	0.1261
		28.00	*56.54*	11.150	*283.21*	0.6330	*0.0588*	0.1127
		42.00	*62.50*	11.084	*281.53*	0.6250	*0.0581*	0.1113
		47.00	*69.94*	11.000	*279.40*	0.6149	*0.0571*	0.1095
		54.00	*80.35*	10.880	*276.35*	0.6005	*0.0558*	0.1070
		60.00	*89.28*	10.772	*273.61*	0.5878	*0.0546*	0.1047
		65.00	*96.72*	10.682	*271.32*	0.5772	*0.0536*	0.1028
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.7240	*0.0673*	0.1290
12	*305*	OH	*OH*	12.000	*304.80*	0.7403	*0.0688*	0.1319
		31.50	*46.87*	11.514	*292.46*	0.6780	*0.0630*	0.1208
		40.00	*59.52*	11.384	*289.15*	0.6617	*0.0615*	0.1179
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.7567	*0.0703*	0.1348
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.7734	*0.0719*	0.1377
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.7901	*0.0734*	0.1407
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.8071	*0.0750*	0.1438

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

3-1/2 in. Tubing OD *(89 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
		OH	*OH*	5.000	*127.00*	0.0695	*0.0065*	0.0124
		8.00	*11.90*	4.696	*119.28*	0.0535	*0.0050*	0.0095
		11.50	*17.11*	4.560	*115.82*	0.0466	*0.0043*	0.0083
		13.00	*19.34*	4.494	*114.15*	0.0433	*0.0040*	0.0077
		15.00	*22.32*	4.408	*111.96*	0.0392	*0.0036*	0.0070
5	*127*	18.00	*26.78*	4.276	*108.61*	0.0329	*0.0031*	0.0059
		20.30	*30.21*	4.184	*106.27*	0.0287	*0.0027*	0.0051
		20.80	*30.95*	4.156	*105.56*	0.0274	*0.0025*	0.0049
		21.00	*31.25*	4.154	*105.51*	0.0273	*0.0025*	0.0049
		23.20	*34.52*	4.044	*102.72*	0.0224	*0.0021*	0.0040
		24.20	*36.01*	4.000	*101.60*	0.0205	*0.0019*	0.0036
5-1/8	*130*	OH	*OH*	5.125	*130.18*	0.0764	*0.0071*	0.0136
		OH	*OH*	5.250	*133.35*	0.0835	*0.0078*	0.0149
		8.50	*12.65*	4.944	*125.58*	0.0665	*0.0062*	0.0118
5-1/4	*133*	10.00	*14.88*	4.886	*124.10*	0.0634	*0.0059*	0.0113
		13.00	*19.34*	4.768	*121.11*	0.0572	*0.0053*	0.0102
		16.00	*23.81*	4.648	*118.06*	0.0510	*0.0047*	0.0091
5-3/8	*137*	OH	*OH*	5.375	*136.53*	0.0908	*0.0084*	0.0162
		OH	*OH*	5.500	*139.70*	0.0982	*0.0091*	0.0175
		9.00	*13.39*	5.192	*131.88*	0.0802	*0.0075*	0.0143
		13.00	*19.34*	5.044	*128.12*	0.0719	*0.0067*	0.0128
		14.00	*20.83*	5.012	*127.30*	0.0702	*0.0065*	0.0125
		15.00	*22.32*	4.974	*126.34*	0.0681	*0.0063*	0.0121
5-1/2	*140*	15.50	*23.06*	4.950	*125.73*	0.0668	*0.0062*	0.0119
		17.00	*25.30*	4.892	*124.26*	0.0637	*0.0059*	0.0113
		20.00	*29.76*	4.778	*121.36*	0.0577	*0.0054*	0.0103
		23.00	*34.22*	4.670	*118.62*	0.0521	*0.0048*	0.0093
		25.00	*37.20*	4.580	*116.33*	0.0476	*0.0044*	0.0085
		26.00	*38.69*	4.548	*115.52*	0.0460	*0.0043*	0.0082
5-5/8	*143*	OH	*OH*	5.625	*142.88*	0.1058	*0.0098*	0.0188
		OH	*OH*	5.750	*146.05*	0.1135	*0.0106*	0.0202
		14.00	*20.83*	5.290	*134.37*	0.0858	*0.0080*	0.0153
5-3/4	*146*	17.00	*25.30*	5.190	*131.83*	0.0801	*0.0074*	0.0143
		19.50	*29.76*	5.090	*129.29*	0.0745	*0.0069*	0.0133
		22.50	*33.48*	4.990	*126.75*	0.0690	*0.0064*	0.0123
		25.20	*37.50*	4.890	*124.21*	0.0636	*0.0059*	0.0113
5-7/8	*149*	OH	*OH*	5.875	*149.23*	0.1214	*0.0113*	0.0216
		OH	*OH*	6.000	*152.40*	0.1295	*0.0120*	0.0231
		10.50	*15.62*	5.672	*144.07*	0.1087	*0.0101*	0.0194
		12.00	*17.86*	5.620	*142.75*	0.1054	*0.0098*	0.0188
		15.00	*22.32*	5.524	*140.31*	0.0996	*0.0093*	0.0177
6	*152*	16.00	*23.81*	5.500	*139.70*	0.0982	*0.0091*	0.0175
		17.00	*25.30*	5.450	*138.43*	0.0952	*0.0088*	0.0170
		18.00	*26.78*	5.424	*137.77*	0.0936	*0.0087*	0.0167
		20.00	*29.76*	5.352	*135.94*	0.0894	*0.0083*	0.0159
		23.00	*34.22*	5.000	*127.00*	0.0695	*0.0065*	0.0124
		26.00	*38.69*	5.140	*130.56*	0.0773	*0.0072*	0.0138
6-1/8	*156*	OH	*OH*	6.125	*155.58*	0.1378	*0.0128*	0.0245
6-1/4	*159*	OH	*OH*	6.250	*158.75*	0.1462	*0.0136*	0.0260
6-3/8	*162*	OH	*OH*	6.375	*161.93*	0.1548	*0.0144*	0.0276
6-1/2	*165*	OH	*OH*	6.500	*165.10*	0.1636	*0.0152*	0.0291
		OH	*OH*	6.625	*168.28*	0.1726	*0.0160*	0.0307
6-5/8	*168*	12.00	*17.86*	6.287	*159.69*	0.1488	*0.0138*	0.0265
		13.00	*19.34*	6.255	*158.88*	0.1466	*0.0136*	0.0261
		17.00	*25.30*	6.135	*155.83*	0.1385	*0.0129*	0.0247

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

3-1/2 in. Tubing OD *(89 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
6-5/8	*168*	20.00	*29.76*	6.049	*153.64*	0.1328	*0.0123*	0.0236
		22.00	*32.74*	5.989	*152.12*	0.1288	*0.0120*	0.0229
		24.00	*35.71*	5.921	*150.39*	0.1244	*0.0116*	0.0222
		26.00	*38.69*	5.855	*148.72*	0.1202	*0.0112*	0.0214
		28.00	*41.66*	5.791	*147.09*	0.1161	*0.0108*	0.0207
		29.00	*43.15*	5.761	*146.33*	0.1142	*0.0106*	0.0203
		32.00	*47.62*	5.675	*144.15*	0.1088	*0.0101*	0.0194
		34.00	*50.59*	5.595	*142.11*	0.1039	*0.0097*	0.0185
6-3/4	*171*	OH	*OH*	6.750	*171.45*	0.1817	*0.0169*	0.0324
6-7/8	*175*	OH	*OH*	6.875	*174.63*	0.1910	*0.0177*	0.0340
7	*178*	OH	*OH*	7.000	*177.80*	0.2004	*0.0186*	0.0357
		13.00	*19.34*	6.520	*165.61*	0.1650	*0.0153*	0.0294
		17.00	*25.30*	6.538	*166.07*	0.1663	*0.0155*	0.0296
		20.00	*29.76*	6.456	*163.98*	0.1605	*0.0149*	0.0286
		22.00	*32.74*	6.398	*162.51*	0.1564	*0.0145*	0.0279
		23.00	*34.22*	6.366	*161.70*	0.1542	*0.0143*	0.0275
		24.00	*35.71*	6.336	*160.93*	0.1521	*0.0141*	0.0271
		26.00	*38.69*	6.276	*159.41*	0.1480	*0.0138*	0.0264
		28.00	*41.66*	6.214	*157.84*	0.1438	*0.0134*	0.0256
		29.00	*43.15*	6.184	*157.07*	0.1418	*0.0132*	0.0252
		30.00	*44.64*	6.154	*156.31*	0.1397	*0.0130*	0.0249
		32.00	*47.62*	6.094	*154.79*	0.1357	*0.0126*	0.0242
		33.70	*50.15*	6.048	*153.62*	0.1327	*0.0123*	0.0236
		35.00	*52.08*	6.004	*152.50*	0.1298	*0.0121*	0.0231
		38.00	*56.54*	5.920	*150.37*	0.1243	*0.0116*	0.0221
		40.00	*59.52*	5.836	*148.23*	0.1189	*0.0111*	0.0212
7-1/8	*181*	OH	*OH*	7.125	*180.98*	0.2101	*0.0195*	0.0374
7-1/4	*184*	OH	*OH*	7.250	*184.15*	0.2199	*0.0204*	0.0392
7-3/8	*187*	OH	*OH*	7.375	*187.33*	0.2298	*0.0214*	0.0409
7-1/2	*191*	OH	*OH*	7.500	*190.50*	0.2400	*0.0223*	0.0427
7-5/8	*194*	OH	*OH*	7.625	*193.68*	0.2503	*0.0233*	0.0446
		14.75	*21.95*	7.263	*184.48*	0.2209	*0.0205*	0.0393
		20.00	*29.76*	7.125	*180.98*	0.2101	*0.0195*	0.0374
		24.00	*35.71*	7.025	*178.44*	0.2023	*0.0188*	0.0360
		26.40	*39.28*	6.969	*177.01*	0.1981	*0.0184*	0.0353
		29.70	*44.19*	6.875	*174.63*	0.1910	*0.0177*	0.0340
		33.70	*50.15*	6.765	*171.83*	0.1828	*0.0170*	0.0326
		39.00	*58.03*	6.625	*168.28*	0.1726	*0.0160*	0.0307
		45.00	*66.96*	6.445	*163.70*	0.1597	*0.0148*	0.0285
		45.30	*67.41*	6.435	*163.45*	0.1590	*0.0148*	0.0283
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.2608	*0.0242*	0.0464
7-7/8	*200*	OH	*OH*	7.875	*200.03*	0.2714	*0.0252*	0.0483
8	*203*	OH	*OH*	8.000	*203.20*	0.2822	*0.0262*	0.0503
		16.00	*23.81*	7.628	*193.75*	0.2505	*0.0233*	0.0446
		20.00	*29.76*	7.528	*191.21*	0.2423	*0.0225*	0.0432
		26.00	*38.69*	7.386	*187.60*	0.2307	*0.0214*	0.0411
8-1/8	*206*	OH	*OH*	8.125	*206.38*	0.2932	*0.0272*	0.0522
		28.00	*41.66*	7.485	*190.12*	0.2388	*0.0222*	0.0425
		32.00	*47.62*	7.385	*187.58*	0.2306	*0.0214*	0.0411
		35.50	*52.82*	7.285	*185.04*	0.2226	*0.0207*	0.0397
		39.50	*58.78*	7.185	*182.50*	0.2147	*0.0200*	0.0382
		42.00	*62.50*	7.125	*180.98*	0.2101	*0.0195*	0.0374
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.3044	*0.0283*	0.0542
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.3157	*0.0293*	0.0562
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.3272	*0.0304*	0.0583

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

3-1/2 in. Tubing OD *(89 mm)* (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m^3/m ●	bbl/ft ▲
8-5/8	219	OH	OH	8.625	219.08	0.3389	0.0315	0.0604
		20.00	29.76	8.191	208.05	0.2991	0.0278	0.0533
		24.00	35.71	8.097	205.66	0.2908	0.0270	0.0518
		28.00	41.66	8.017	203.63	0.2837	0.0264	0.0505
		32.00	47.62	7.921	201.19	0.2754	0.0256	0.0490
		36.00	53.57	7.825	198.76	0.2671	0.0248	0.0476
		38.00	56.54	7.775	197.49	0.2629	0.0244	0.0468
		40.00	59.52	7.725	196.22	0.2587	0.0240	0.0461
		43.00	63.98	7.651	194.34	0.2525	0.0235	0.0450
		44.00	65.47	7.625	193.68	0.2503	0.0233	0.0446
		48.00	71.42	7.537	191.44	0.2430	0.0226	0.0433
		49.00	72.91	7.511	190.78	0.2409	0.0224	0.0429
8-3/4	222	OH	OH	8.750	222.25	0.3508	0.0326	0.0625
8-7/8	225	OH	OH	8.875	225.43	0.3628	0.0337	0.0646
9	229	OH	OH	9.000	228.60	0.3750	0.0348	0.0668
		34.00	50.59	8.290	210.57	0.3080	0.0286	0.0549
		38.00	56.54	8.196	208.18	0.2996	0.0278	0.0534
		40.00	59.52	8.150	207.01	0.2955	0.0275	0.0526
		45.00	66.96	8.032	204.01	0.2850	0.0265	0.0508
		50.20	74.70	7.910	200.91	0.2744	0.0255	0.0489
		55.00	81.84	7.812	198.42	0.2660	0.0247	0.0474
9-1/8	232	OH	OH	9.125	231.78	0.3873	0.0360	0.0690
9-1/4	235	OH	OH	9.250	234.95	0.3998	0.0372	0.0712
9-3/8	238	OH	OH	9.375	238.13	0.4125	0.0383	0.0735
9-1/2	241	OH	OH	9.500	241.30	0.4254	0.0395	0.0758
9-5/8	244	OH	OH	9.625	244.48	0.4385	0.0407	0.0781
		29.30	43.60	9.063	230.20	0.3812	0.0354	0.0679
		32.30	48.06	9.001	228.63	0.3751	0.0348	0.0668
		36.00	53.57	8.921	226.59	0.3672	0.0341	0.0654
		40.00	59.52	8.835	224.41	0.3589	0.0333	0.0639
		43.50	64.73	8.755	222.38	0.3512	0.0326	0.0626
		47.00	69.94	8.681	220.50	0.3442	0.0320	0.0613
		53.50	79.61	8.535	216.79	0.3305	0.0307	0.0589
		58.40	86.90	8.435	214.25	0.3212	0.0298	0.0572
		61.10	90.92	8.375	212.73	0.3157	0.0293	0.0562
		71.80	106.84	8.125	206.38	0.2932	0.0272	0.0522
9-3/4	248	OH	OH	9.750	247.65	0.4517	0.0420	0.0804
9-7/8	251	OH	OH	9.875	250.83	0.4650	0.0432	0.0828
10	254	OH	OH	10.000	254.00	0.4786	0.0445	0.0852
		33.00	49.10	9.384	238.35	0.4135	0.0384	0.0736
		41.50	61.75	9.200	233.68	0.3948	0.0367	0.0703
		45.50	67.70	9.120	231.65	0.3868	0.0359	0.0698
		50.50	75.14	9.016	229.01	0.3765	0.0350	0.0671
		55.50	82.58	8.908	266.26	0.3660	0.0340	0.0652
		61.20	91.07	8.790	223.27	0.3546	0.0329	0.0632
10-1/8	257	OH	OH	10.125	257.18	0.4923	0.0457	0.0877
10-1/4	260	OH	OH	10.250	260.35	0.5062	0.0470	0.0902
10-3/8	264	OH	OH	10.375	263.53	0.5203	0.0483	0.0927
10-1/2	267	OH	OH	10.500	266.70	0.5345	0.0497	0.0952
10-5/8	270	OH	OH	10.625	269.88	0.5489	0.0510	0.0978
10-3/4	273	OH	OH	10.750	273.05	0.5635	0.0524	0.1004
		32.75	48.73	10.192	258.88	0.4997	0.0464	0.0890
		35.75	53.20	10.136	257.45	0.4935	0.0459	0.0879
		40.50	60.26	10.050	255.27	0.4841	0.0450	0.0862
		45.50	67.70	9.950	252.73	0.4731	0.0440	0.0843
		51.00	75.89	9.850	250.19	0.4623	0.0430	0.0823

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

3-1/2 in. Tubing OD *(89 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
10-3/4	*273*	54.00	*80.35*	9.784	*248.51*	0.4553	*0.0423*	0.0811
		55.00	*81.84*	9.760	*247.90*	0.4527	*0.0421*	0.0806
		60.70	*90.32*	9.660	*245.36*	0.4421	*0.0411*	0.0787
		65.70	*97.76*	9.560	*242.82*	0.4316	*0.0401*	0.0769
		71.10	*105.80*	9.450	*240.03*	0.4202	*0.0390*	0.0748
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.5782	*0.0537*	0.1030
11	*279*	OH	*OH*	11.000	*279.40*	0.5931	*0.0551*	0.1056
		26.75	*39.80*	10.552	*268.02*	0.5405	*0.0502*	0.0963
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.6082	*0.0565*	0.1083
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.6235	*0.0579*	0.1110
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.6389	*0.0594*	0.1138
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.6545	*0.0608*	0.1166
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.6702	*0.0623*	0.1194
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.6862	*0.0638*	0.1222
		38.00	*56.54*	11.150	*283.21*	0.6112	*0.0568*	0.1089
		42.00	*62.50*	11.084	*281.53*	0.6032	*0.0560*	0.1074
		47.00	*69.94*	11.000	*279.40*	0.5931	*0.0551*	0.1056
		54.00	*80.35*	10.880	*276.35*	0.5788	*0.0538*	0.1031
		60.00	*89.28*	10.772	*273.61*	0.5660	*0.0526*	0.1008
		65.00	*96.72*	10.682	*271.32*	0.5555	*0.0516*	0.0989
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.7023	*0.0652*	0.1251
12	*305*	OH	*OH*	12.000	*304.80*	0.7186	*0.0668*	0.1280
		31.50	*46.87*	11.514	*292.46*	0.6562	*0.0610*	0.1169
		40.00	*59.52*	11.384	*289.15*	0.6400	*0.0595*	0.1140
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.7350	*0.0683*	0.1309
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.7516	*0.0698*	0.1339
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.7684	*0.0714*	0.1369
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.7854	*0.0730*	0.1399
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.8025	*0.0746*	0.1429
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.8198	*0.0762*	0.1460
		43.00	*63.98*	12.130	*308.10*	0.7357	*0.0684*	0.1310
		53.00	*78.86*	11.970	*304.04*	0.7146	*0.0664*	0.1273
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.8373	*0.0778*	0.1491
13	*330*	OH	*OH*	13.000	*330.20*	0.8549	*0.0794*	0.1523
		36.50	*54.31*	12.482	*317.04*	0.7829	*0.0727*	0.1394
		40.00	*59.52*	12.438	*315.93*	0.7769	*0.0722*	0.1384
		45.00	*66.96*	12.360	*313.94*	0.7664	*0.0712*	0.1365
		50.00	*74.40*	12.282	*311.96*	0.7559	*0.0702*	0.1346
		54.00	*80.35*	12.220	*310.39*	0.7476	*0.0695*	0.1332
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.8727	*0.0811*	0.1554
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.8907	*0.0828*	0.1586
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.9089	*0.0844*	0.1619
		48.00	*71.42*	12.715	*322.96*	0.8149	*0.0757*	0.1451
		54.50	*81.10*	12.615	*320.42*	0.8011	*0.0744*	0.1427
		61.00	*90.77*	12.515	*317.88*	0.7874	*0.0732*	0.1402
		68.00	*101.18*	12.415	*315.35*	0.7738	*0.0719*	0.1378
		72.00	*107.14*	12.347	*313.61*	0.7646	*0.0710*	0.1362
		77.00	*114.58*	12.275	*311.79*	0.7550	*0.0701*	0.1345
		83.00	*123.50*	12.175	*309.25*	0.7416	*0.0689*	0.1321
		85.00	*126.48*	12.159	*308.84*	0.7395	*0.0687*	0.1317
		92.00	*136.90*	12.031	*305.59*	0.7226	*0.0671*	0.1287
		98.00	*145.82*	11.937	*303.20*	0.7103	*0.0660*	0.1265
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.9272	*0.0861*	0.1651
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.9457	*0.0879*	0.1684
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.9643	*0.0896*	0.1718
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.9832	*0.0913*	0.1751

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

3-1/2 in. Tubing OD *(89 mm)* (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m^3/m ●	bbl/ft ▲
14	356	OH	OH	14.000	355.60	1.0022	0.0931	0.1785
		42.00	62.50	13.448	341.58	0.9195	0.0854	0.1638
		50.00	74.40	13.344	338.94	0.9043	0.0840	0.1611
14-1/8	359	OH	OH	14.125	358.78	1.0213	0.0949	0.1819
14-1/4	362	OH	OH	14.250	361.95	1.0407	0.0967	0.1854
14-3/8	365	OH	OH	14.375	365.13	1.0602	0.0985	0.1888
14-1/2	368	OH	OH	14.500	368.30	1.0799	0.1003	0.1923
14-5/8	371	OH	OH	14.625	371.48	1.0997	0.1022	0.1959
14-3/4	375	OH	OH	14.750	374.65	1.1198	0.1040	0.1994
14-7/8	378	OH	OH	14.875	377.83	1.1400	0.1059	0.2030
15	381	OH	OH	15.000	381.00	1.1603	0.1078	0.2067
		47.50	70.68	14.418	366.22	1.0670	0.0991	0.1900
15-1/8	384	OH	OH	15.125	384.18	1.1809	0.1097	0.2103
15-1/4	387	OH	OH	15.250	287.35	1.2016	0.1116	0.2140
15-3/8	391	OH	OH	15.375	390.53	1.2225	0.1136	0.2177
15-1/2	394	OH	OH	15.500	393.70	1.2435	0.1155	0.2215
15-5/8	397	OH	OH	15.625	396.88	1.2647	0.1175	0.2253
15-3/4	400	OH	OH	15.750	400.05	1.2861	0.1195	0.2291
15-7/8	403	OH	OH	15.875	403.23	1.3077	0.1215	0.2329
16	406	OH	OH	16.000	406.40	1.3294	0.1235	0.2368
		52.50	78.12	15.396	391.06	1.2260	0.1139	0.2184
		55.00	81.84	15.375	390.53	1.2225	0.1136	0.2177
		65.00	96.72	15.250	387.35	1.2016	0.1116	0.2140
		70.00	104.16	15.198	386.03	1.1929	0.1108	0.2125
		75.00	111.60	15.125	384.18	1.1809	0.1097	0.2103
		84.00	124.99	15.010	381.25	1.1620	0.1080	0.2070
		109.00	162.19	14.688	373.08	1.1098	0.1031	0.1977
16-1/8	410	OH	OH	16.125	409.58	1.3513	0.1255	0.2407
16-1/4	413	OH	OH	16.250	412.75	1.3734	0.1276	0.2446
16-3/8	416	OH	OH	16.375	415.93	1.3956	0.1297	0.2486
16-1/2	419	OH	OH	16.500	419.10	1.4180	0.1317	0.2526
16-5/8	422	OH	OH	16.625	422.28	1.4406	0.1338	0.2566
16-3/4	425	OH	OH	16.750	425.45	1.4634	0.1360	0.2606
16-7/8	429	OH	OH	16.875	428.63	1.4863	0.1381	0.2647
17	432	OH	OH	17.000	431.80	1.5094	0.1402	0.2688
17-1/8	435	OH	OH	17.125	434.98	1.5327	0.1424	0.2730
17-1/4	438	OH	OH	17.250	438.15	1.5561	0.1446	0.2772
17-3/8	441	OH	OH	17.375	441.33	1.5797	0.1468	0.2814
17-1/2	445	OH	OH	17.500	444.50	1.6035	0.1490	0.2856
17-5/8	448	OH	OH	17.625	447.68	1.6274	0.1512	0.2899
17-3/4	451	OH	OH	17.750	450.85	1.6515	0.1534	0.2942
17-7/8	444	OH	OH	17.875	454.03	1.6758	0.1557	0.2985
18	457	OH	OH	18.000	457.20	1.7003	0.1580	0.3028
18-1/8	460	OH	OH	18.125	460.38	1.7249	0.1603	0.3072
18-1/4	464	OH	OH	18.250	463.55	1.7497	0.1626	0.3116
18-3/8	467	OH	OH	18.375	466.73	1.7747	0.1649	0.3161
18-1/2	470	OH	OH	18.500	469.90	1.7998	0.1672	0.3206
18-5/8	473	OH	OH	18.625	473.08	1.8251	0.1696	0.3251
		78.00	116.06	17.855	453.52	1.6719	0.1553	0.2978
		87.50	130.20	17.755	450.98	1.6525	0.1535	0.2943
		96.50	143.59	17.655	448.44	1.6332	0.1517	0.2909
18-3/4	476	OH	OH	18.750	476.25	1.8506	0.1719	0.3296
18-7/8	479	OH	OH	18.875	479.43	1.8763	0.1743	0.3342
19	483	OH	OH	19.000	482.60	1.9021	0.1767	0.3388
19-1/8	486	OH	OH	19.125	485.78	1.9281	0.1791	0.3434
19-1/4	489	OH	OH	19.250	488.95	1.9542	0.1816	0.3481

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

3-1/2 in. Tubing OD *(89 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.9806	*0.1840*	0.3528
19-1/2	*495*	OH	*OH*	19.500	*495.30*	2.0071	*0.1865*	0.3575
19-5/8	*498*	OH	*OH*	19.625	*498.48*	2.0337	*0.1889*	0.3622
19-3/4	*502*	OH	*OH*	19.750	*501.65*	2.0606	*0.1914*	0.3670
19-7/8	*505*	OH	*OH*	19.875	*504.83*	2.0876	*0.1939*	0.3718
20	*508*	OH	*OH*	20.000	*508.00*	2.1148	*0.1965*	0.3767
		90.00	*133.92*	19.166	*486.82*	1.9366	*0.1799*	0.3449
		94.00	*139.87*	19.124	*485.75*	1.9279	*0.1791*	0.3434
		106.50	*158.47*	19.000	*482.60*	1.9021	*0.1767*	0.3388
		133.00	*197.90*	18.730	*475.74*	1.8465	*0.1716*	0.3289
20-1/8	*511*	OH	*OH*	20:125	*511.18*	2.1421	*0.1990*	0.3815
20-1/4	*514*	OH	*OH*	20.250	*514.35*	2.1697	*0.2016*	0.3864
20-3/8	*518*	OH	*OH*	20.375	*517.53*	2.1974	*0.2041*	0.3914
20-1/2	*521*	OH	*OH*	20.500	*520.70*	2.2252	*0.2067*	0.3963
20-5/8	*524*	OH	*OH*	20.625	*523.88*	2.2533	*0.2093*	0.4013
20-3/4	*527*	OH	*OH*	20.750	*527.05*	2.2815	*0.2120*	0.4063
20-7/8	*530*	OH	*OH*	20.875	*530.23*	2.3099	*0.2146*	0.4114
21	*533*	OH	*OH*	21.000	*533.40*	2.3384	*0.2172*	0.4165
21-1/8	*537*	OH	*OH*	21.125	*536.58*	2.3671	*0.2199*	0.4216
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.3960	*0.2226*	0.4267
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.4251	*0.2253*	0.4319
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.4543	*0.2280*	0.4371
		92.50	*137.64*	20.710	*526.03*	2.2724	*0.2111*	0.4047
		103.00	*153.26*	20.610	*523.49*	2.2499	*0.2090*	0.4007
		114.00	*169.63*	20.510	*520.95*	2.2275	*0.2069*	0.3967
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.4837	*0.2307*	0.4424
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.5133	*0.2335*	0.4476
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.5430	*0.2363*	0.4529
22	*559*	OH	*OH*	22.000	*558.80*	2.5729	*0.2390*	0.4583
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.6030	*0.2418*	0.4636
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.6333	*0.2446*	0.4690
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.6637	*0.2475*	0.4744
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.6943	*0.2503*	0.4799
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.7250	*0.2532*	0.4854
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.7560	*0.2560*	0.4909
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.7871	*0.2589*	0.4964
23	*584*	OH	*OH*	23.000	*584.20*	2.8184	*0.2618*	0.5020
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.8498	*0.2648*	0.5076
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.8814	*0.2677*	0.5132
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.9132	*0.2707*	0.5189
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.9452	*0.2736*	0.5246
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.9773	*0.2766*	0.5303
23-3/4	*603*	OH	*OH*	23.750	*603.25*	3.0096	*0.2796*	0.5360
23-7/8	*606*	OH	*OH*	23.875	*606.43*	3.0421	*0.2826*	0.5418
24	*610*	OH	*OH*	24.000	*609.60*	3.0747	*0.2857*	0.5476
24-1/8	*613*	OH	*OH*	24.125	*612.78*	3.1075	*0.2887*	0.5535
24-1/4	*616*	OH	*OH*	24.250	*615.95*	3.1405	*0.2918*	0.5593
24-3/8	*619*	OH	*OH*	24.375	*619.13*	3.1736	*0.2948*	0.5652
24-1/2	*622*	OH	*OH*	24.500	*622.30*	3.2070	*0.2979*	0.5712
		100.50	*149.54*	23.750	*603.25*	3.0096	*0.2796*	0.5360
		113.00	*168.14*	23.650	*600.71*	2.9837	*0.2772*	0.5314

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4 in. Tubing OD *(102 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
5-1/4	*133*	OH	*OH*	5.250	*133.35*	0.0631	*0.0058*	0.0112
		8.50	*27.52*	4.944	*125.58*	0.0461	*0.0043*	0.0082
		10.00	*14.88*	4.886	*124.10*	0.0429	*0.0040*	0.0076
		13.00	*19.34*	4.768	*121.11*	0.0367	*0.0034*	0.0065
5	*127*	16.00	*23.80*	4.648	*118.06*	0.0306	*0.0028*	0.0054
5-3/8	*137*	OH	*OH*	5.375	*136.53*	0.0703	*0.0065*	0.0125
5-1/2	*140*	OH	*OH*	5.500	*139.70*	0.0777	*0.0072*	0.0138
		9.00	*13.39*	5.192	*131.88*	0.0598	*0.0055*	0.0106
		13.00	*19.34*	5.044	*128.12*	0.0515	*0.0048*	0.0092
		14.00	*20.83*	5.012	*127.30*	0.0498	*0.0046*	0.0089
		15.00	*22.32*	4.974	*126.34*	0.0477	*0.0044*	0.0085
		15.50	*23.06*	4.950	*125.73*	0.0464	*0.0043*	0.0083
		17.00	*25.29*	4.892	*124.26*	0.0433	*0.0040*	0.0077
		20.00	*29.76*	4.778	*121.36*	0.0373	*0.0035*	0.0066
		23.00	*34.22*	4.670	*118.62*	0.0317	*0.0029*	0.0056
		25.00	*37.20*	4.580	*116.33*	0.0271	*0.0025*	0.0048
		26.00	*38.68*	4.548	*115.52*	0.0256	*0.0024*	0.0046
5-5/8	*143*	OH	*OH*	5.625	*142.88*	0.0853	*0.0079*	0.0152
5-3/4	*146*	OH	*OH*	5.750	*146.05*	0.0931	*0.0086*	0.0166
		14.00	*20.83*	5.290	*134.37*	0.0653	*0.0061*	0.0116
		17.00	*25.29*	5.190	*131.83*	0.0597	*0.0055*	0.0106
		19.50	*29.01*	5.090	*129.29*	0.0540	*0.0050*	0.0096
		22.50	*33.48*	4.990	*126.75*	0.0486	*0.0045*	0.0086
		25.20	*37.49*	4.890	*124.21*	0.0432	*0.0040*	0.0077
5-7/8	*149*	OH	*OH*	5.875	*149.23*	0.1010	*0.0094*	0.0180
6	*152*	OH	*OH*	6.000	*152.40*	0.1091	*0.0101*	0.0194
		10.50	*15.62*	5.672	*144.07*	0.0882	*0.0082*	0.0157
		12.00	*17.85*	5.620	*142.75*	0.0850	*0.0079*	0.0151
		15.00	*22.32*	5.524	*140.31*	0.0791	*0.0073*	0.0141
		16.00	*23.80*	5.500	*139.70*	0.0777	*0.0072*	0.0138
		17.00	*25.29*	5.450	*138.43*	0.0747	*0.0069*	0.0133
		18.00	*26.78*	5.424	*137.77*	0.0732	*0.0068*	0.0130
		20.00	*29.76*	5.352	*135.94*	0.0690	*0.0064*	0.0123
		23.00	*34.22*	5.000	*127.00*	0.0491	*0.0045*	0.0087
		26.00	*38.68*	5.140	*130.56*	0.0568	*0.0053*	0.0101
6-1/8	*156*	OH	*OH*	6.125	*155.58*	0.1174	*0.0109*	0.0209
6-1/4	*159*	OH	*OH*	6.250	*158.75*	0.1258	*0.0117*	0.0224
6-3/8	*162*	OH	*OH*	6.375	*161.93*	0.1344	*0.0124*	0.0239
6-1/2	*165*	OH	*OH*	6.500	*165.10*	0.1432	*0.0133*	0.0255
6-5/8	*168*	OH	*OH*	6.625	*168.28*	0.1521	*0.0141*	0.0271
		12.00	*17.86*	6.687	*159.69*	0.1283	*0.0119*	0.0229
		13.00	*19.34*	6.255	*158.88*	0.1261	*0.0117*	0.0225
		17.00	*25.30*	6.135	*155.83*	0.1180	*0.0110*	0.0210
		20.00	*29.76*	6.049	*153.64*	0.1123	*0.0104*	0.0200
		22.00	*32.74*	5.989	*152.12*	0.1084	*0.0101*	0.0193
		24.00	*35.71*	5.921	*150.39*	0.1039	*0.0097*	0.0185
		26.00	*38.69*	5.855	*148.72*	0.0997	*0.0093*	0.0178
		28.00	*41.66*	5.791	*147.09*	0.0956	*0.0089*	0.0170
		29.00	*43.15*	5.761	*146.33*	0.0937	*0.0087*	0.0167
		32.00	*47.62*	5.675	*144.15*	0.0884	*0.0082*	0.0157
		34.00	*50.59*	5.595	*142.11*	0.0835	*0.0078*	0.0149
6-3/4	*172*	OH	*OH*	6.750	*171.45*	0.1612	*0.0150*	0.0287
6-7/8	*175*	OH	*OH*	6.875	*174.63*	0.1705	*0.0158*	0.0304
7	*178*	OH	*OH*	7.000	*177.80*	0.1800	*0.0167*	0.0321
		13.00	*19.34*	6.520	*165.61*	0.1446	*0.0134*	0.0258

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4 in. Tubing OD *(102 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
7	*178*	17.00	*25.30*	6.538	*166.07*	0.1459	*0.0136*	0.0260
		20.00	*29.76*	6.456	*163.98*	0.1401	*0.0130*	0.0249
		22.00	*32.74*	6.398	*162.51*	0.1360	*0.0126*	0.0242
		23.00	*34.22*	6.366	*161.70*	0.1338	*0.0124*	0.0238
		24.00	*35.71*	6.336	*160.93*	0.1317	*0.0122*	0.0235
		26.00	*38.69*	6.276	*159.41*	0.1276	*0.0119*	0.0227
		28.00	*41.66*	6.214	*157.84*	0.1233	*0.0115*	0.0220
		29.00	*43.15*	6.184	*157.07*	0.1213	*0.0113*	0.0216
		30.00	*44.64*	6.154	*156.31*	0.1193	*0.0111*	0.0212
		32.00	*47.62*	6.094	*154.79*	0.1153	*0.0107*	0.0205
		33.70	*50.15*	6.048	*153.62*	0.1122	*0.0104*	0.0200
		35.00	*52.08*	6.004	*152.50*	0.1093	*0.0102*	0.0195
		38.00	*56.54*	5.920	*150.37*	0.1039	*0.0097*	0.0185
		40.00	*59.52*	5.836	*148.23*	0.0985	*0.0092*	0.0175
7-1/8	*181*	OH	*OH*	7.125	*180.98*	0.1896	*0.0176*	0.0338
7-1/4	*184*	OH	*OH*	7.250	*184.15*	0.1994	*0.0185*	0.0355
7-3/8	*187*	OH	*OH*	7.375	*187.33*	0.2094	*0.0195*	0.0373
7-1/2	*191*	OH	*OH*	7.500	*190.50*	0.2195	*0.0204*	0.0391
7-5/8	*194*	OH	*OH*	7.625	*193.68*	0.2298	*0.0214*	0.0409
		14.75	*21.95*	7.263	*184.48*	0.2004	*0.0186*	0.0357
		20.00	*29.76*	7.125	*180.98*	0.1896	*0.0176*	0.0338
		24.00	*35.71*	7.025	*178.44*	0.1819	*0.0169*	0.0324
		26.40	*39.28*	6.969	*177.01*	0.1776	*0.0165*	0.0316
		33.70	*50.15*	6.765	*171.83*	0.1623	*0.0151*	0.0289
		39.00	*58.03*	6.625	*168.28*	0.1521	*0.0141*	0.0271
		45.00	*66.96*	6.445	*163.70*	0.1393	*0.0129*	0.0248
		45.30	*67.41*	6.435	*163.45*	0.1386	*0.0129*	0.0247
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.2403	*0.0223*	0.0428
7-7/8	*200*	OH	*OH*	7.875	*200.03*	0.2510	*0.0233*	0.0447
8	*203*	OH	*OH*	8.000	*203.20*	0.2618	*0.0243*	0.0466
		16.00	*23.81*	7.628	*193.75*	0.2301	*0.0214*	0.0410
		20.00	*29.76*	7.528	*191.21*	0.2218	*0.0206*	0.0395
		26.00	*38.69*	7.386	*187.60*	0.2103	*0.0195*	0.0375
8-1/8	*206*	OH	*OH*	8.125	*206.38*	0.2728	*0.0253*	0.0486
		28.00	*41.66*	7.485	*190.12*	0.2183	*0.0203*	0.0389
		32.00	*47.62*	7.385	*187.58*	0.2102	*0.0195*	0.0374
		25.50	*52.82*	7.285	*185.04*	0.2022	*0.0188*	0.0360
		39.50	*58.78*	7.185	*182.50*	0.1943	*0.0181*	0.0346
		42.00	*62.50*	7.125	*180.98*	0.1896	*0.0176*	0.0338
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.2839	*0.0264*	0.0506
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.2953	*0.0274*	0.0526
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.3068	*0.0285*	0.0546
8-5/8	*219*	OH	*OH*	8.625	*219.08*	0.3185	*0.0296*	0.0567
		20.00	*29.76*	8.191	*208.05*	0.2787	*0.0259*	0.0496
		24.00	*35.71*	8.097	*205.66*	0.2703	*0.0251*	0.0481
		28.00	*41.66*	8.017	*203.63*	0.2633	*0.0245*	0.0469
		32.00	*47.62*	7.921	*201.19*	0.2549	*0.0237*	0.0454
		36.00	*53.57*	7.825	*198.76*	0.2467	*0.0229*	0.0439
		38.00	*56.54*	7.775	*197.49*	0.2424	*0.0225*	0.0432
		40.00	*59.52*	7.725	*196.22*	0.2382	*0.0221*	0.0424
		43.00	*63.98*	7.651	*194.34*	0.2320	*0.0216*	0.0413
		44.00	*65.47*	7.625	*193.68*	0.2298	*0.0214*	0.0409
		48.00	*71.42*	7.537	*191.44*	0.2226	*0.0207*	0.0396
		49.00	*72.91*	7.511	*190.78*	0.2204	*0.0205*	0.0393
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.3303	*0.0307*	0.0588
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.3423	*0.0318*	0.0610

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4 in. Tubing OD *(102 mm)* (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m^3/m ●	bbl/ft ▲
9	229	OH	OH	9.000	228.60	0.3545	0.0329	0.0631
		34.00	50.59	8.290	210.57	0.2876	0.0267	0.0512
		38.00	56.54	8.196	208.18	0.2791	0.0259	0.0497
		40.00	59.52	8.150	207.01	0.2750	0.0256	0.0490
		45.00	66.96	8.032	204.01	0.2646	0.0246	0.0471
		50.20	74.70	7.910	200.91	0.2540	0.0236	0.0452
		55.00	81.84	7.812	198.42	0.2456	0.0228	0.0437
9-1/8	232	OH	OH	9.125	231.78	0.3669	0.0341	0.0653
9-1/4	235	OH	OH	9.250	234.95	0.3794	0.0353	0.0676
9-3/8	238	OH	OH	9.375	238.13	0.3921	0.0364	0.0698
9-1/2	241	OH	OH	9.500	241.30	0.4050	0.0376	0.0721
9-5/8	244	OH	OH	9.625	244.48	0.4180	0.0388	0.0744
		29.30	43.60	9.063	230.20	0.3607	0.0335	0.0642
		32.30	48.06	9.001	228.63	0.3546	0.0329	0.0632
		36.00	53.57	8.921	226.59	0.3468	0.0322	0.0618
		40.00	59.52	8.835	224.41	0.3385	0.0314	0.0603
		43.50	64.73	8.755	222.38	0.3308	0.0307	0.0589
		47.00	69.94	8.681	220.50	0.3237	0.0301	0.0577
		53.50	79.61	8.535	216.79	0.3100	0.0288	0.0552
		58.40	86.90	8.435	214.25	0.3008	0.0279	0.0536
		61.10	90.92	8.375	212.73	0.2953	0.0274	0.0526
		71.80	106.84	8.125	206.38	0.2728	0.0253	0.0486
9-3/4	248	OH	OH	9.750	247.65	0.4312	0.0401	0.0768
9-7/8	251	OH	OH	9.875	250.83	0.4446	0.0413	0.0792
10	254	OH	OH	10.000	254.00	0.4581	0.0426	0.0816
		33.00	49.10	9.384	238.35	0.3930	0.0365	0.0700
		41.50	61.75	9.200	233.68	0.3744	0.0348	0.0667
		45.50	67.70	9.120	231.65	0.3664	0.0340	0.0653
		50.50	75.14	9.016	229.01	0.3561	0.0331	0.0634
		55.50	82.58	8.908	226.26	0.3455	0.0321	0.0615
		61.20	91.07	8.790	323.27	0.3341	0.0310	0.0595
10-1/8	257	OH	OH	10.125	257.18	0.4719	0.0438	0.0840
10-1/4	260	OH	OH	10.250	260.35	0.4857	0.0451	0.0865
10-3/8	264	OH	OH	10.375	263.53	0.4998	0.0464	0.0890
10-1/2	267	OH	OH	10.500	266.70	0.5140	0.0478	0.0916
10-5/8	270	OH	OH	10.625	269.88	0.5284	0.0491	0.0941
10-3/4	273	OH	OH	10.750	273.05	0.5430	0.0505	0.0967
		32.75	48.73	10.192	258.88	0.4793	0.0445	0.0854
		35.75	53.20	10.136	257.45	0.4731	0.0440	0.0843
		40.50	60.26	10.050	255.27	0.4636	0.0431	0.0826
		45.50	67.70	9.950	252.73	0.4527	0.0421	0.0806
		51.00	75.89	9.850	250.19	0.4419	0.0411	0.0787
		54.00	80.35	9.784	248.51	0.4348	0.0404	0.0774
		54.00	81.84	9.760	247.90	0.4323	0.0402	0.0770
		60.70	90.32	9.660	245.36	0.4217	0.0392	0.0751
		65.70	97.76	9.560	242.82	0.4112	0.0382	0.0732
		71.10	105.80	9.450	240.03	0.3998	0.0371	0.0712
10-7/8	276	OH	OH	10.875	276.23	0.5578	0.0518	0.0993
11	279	OH	OH	11.000	279.40	0.5727	0.0532	0.1020
		26.75	39.80	10.552	268.02	0.5200	0.0483	0.0926
11-1/8	283	OH	OH	11.125	282.58	0.5878	0.0546	0.1047
11-1/4	286	OH	OH	11.250	285.75	0.6030	0.0560	0.1074
11-3/8	289	OH	OH	11.375	288.93	0.6184	0.0575	0.1101
11-1/2	292	OH	OH	11.500	292.10	0.6340	0.0589	0.1129
11-5/8	295	OH	OH	11.625	295.28	0.6498	0.0604	0.1157

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4 in. Tubing OD *(102 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.6657	*0.0619*	0.1186
		38.00	*56.54*	11.150	*283.21*	0.5908	*0.0549*	0.1052
		42.00	*62.50*	11.084	*281.53*	0.5828	*0.0541*	0.1038
		47.00	*69.94*	11.000	*279.40*	0.5727	*0.0532*	0.1020
		54.00	*80.35*	10.880	*276.35*	0.5583	*0.0519*	0.0994
		60.00	*89.28*	10.772	*273.61*	0.5456	*0.0507*	0.0972
		65.00	*96.72*	10.682	*271.32*	0.5351	*0.0497*	0.0953
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.6818	*0.0633*	0.1214
12	*305*	OH	*OH*	12.000	*304.80*	0.6981	*0.0649*	0.1243
		31.50	*46.87*	11.514	*292.46*	0.6358	*0.0591*	0.1132
		40.00	*59.52*	11.384	*289.15*	0.6195	*0.0576*	0.1103
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.7146	*0.0664*	0.1273
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.7312	*0.0679*	0.1302
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.7480	*0.0695*	0.1332
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.7649	*0.0711*	0.1362
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.7821	*0.0727*	0.1393
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.7994	*0.0743*	0.1424
		43.00	*63.98*	12.130	*308.10*	0.7152	*0.0665*	0.1274
		53.00	*78.86*	11.970	*304.04*	0.6942	*0.0645*	0.1236
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.8168	*0.0759*	0.1455
13	*330*	OH	*OH*	13.000	*330.20*	0.8345	*0.0775*	0.1486
		36.50	*54.31*	12.482	*317.04*	0.7625	*0.0708*	0.1358
		40.00	*59.52*	12.438	*315.93*	0.7565	*0.0703*	0.1347
		45.00	*66.96*	12.360	*313.94*	0.7459	*0.0693*	0.1329
		50.00	*74.40*	12.282	*311.96*	0.7355	*0.0683*	0.1310
		54.00	*80.35*	12.220	*310.39*	0.7272	*0.0676*	0.1295
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.8523	*0.0792*	0.1518
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.8703	*0.0809*	0.1550
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.8884	*0.0825*	0.1582
		48.00	*71.42*	12.715	*322.96*	0.7945	*0.0738*	0.1415
		54.50	*81.10*	12.615	*320.42*	0.7807	*0.0725*	0.1390
		61.00	*90.77*	12.515	*317.88*	0.7670	*0.0713*	0.1366
		68.00	*101.18*	12.415	*315.34*	0.7534	*0.0700*	0.1342
		72.00	*107.14*	12.347	*313.61*	0.7442	*0.0691*	0.1325
		77.00	*114.58*	12.275	*311.79*	0.7345	*0.0682*	0.1308
		83.00	*123.50*	12.175	*309.25*	0.7212	*0.0670*	0.1284
		85.00	*126.48*	12.159	*308.84*	0.7191	*0.0668*	0.1281
		92.00	*136.90*	12.031	*305.59*	0.7022	*0.0652*	0.1251
		98.00	*145.82*	11.937	*303.20*	0.6899	*0.0641*	0.1229
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.9067	*0.0842*	0.1615
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.9252	*0.0860*	0.1648
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.9439	*0.0877*	0.1681
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.9627	*0.0894*	0.1715
14	*356*	OH	*OH*	14.000	*355.60*	0.9817	*0.0912*	0.1749
		42.00	*62.50*	13.448	*341.58*	0.8991	*0.0835*	0.1601
		50.00	*74.40*	13.344	*338.94*	0.8839	*0.0821*	0.1574
14-1/8	*359*	OH	*OH*	14.125	*358.78*	1.0009	*0.0930*	0.1783
14-1/4	*362*	OH	*OH*	14.250	*361.95*	1.0202	*0.0948*	0.1817
14-3/8	*365*	OH	*OH*	14.375	*365.13*	1.0398	*0.0966*	0.1852
14-1/2	*368*	OH	*OH*	14.500	*368.30*	1.0594	*0.0984*	0.1887
14-5/8	*371*	OH	*OH*	14.625	*371.48*	1.0793	*0.1003*	0.1922
14-3/4	*375*	OH	*OH*	14.750	*374.65*	1.0993	*0.1021*	0.1958
14-7/8	*378*	OH	*OH*	14.875	*377.83*	1.1195	*0.1040*	0.1994
15	*381*	OH	*OH*	15.000	*381.00*	1.1399	*0.1059*	0.2030
		47.50	*70.68*	14.418	*366.22*	1.0465	*0.0972*	0.1864
15-1/8	*384*	OH	*OH*	15.125	*384.18*	1.1604	*0.1078*	0.2067

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4 in. Tubing OD *(102 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
15-1/4	*387*	OH	*OH*	15.250	*387.35*	1.1811	*0.1097*	0.2104
15-3/8	*391*	OH	*OH*	15.375	*390.53*	1.2020	*0.1117*	0.2141
15-1/2	*394*	OH	*OH*	15.500	*393.70*	1.2231	*0.1136*	0.2178
15-5/8	*397*	OH	*OH*	15.625	*396.88*	1.2443	*0.1156*	0.2216
15-3/4	*400*	OH	*OH*	15.750	*400.05*	1.2657	*0.1176*	0.2254
15-7/8	*403*	OH	*OH*	15.875	*403.23*	1.2872	*0.1196*	0.2293
16	*406*	OH	*OH*	16.000	*406.40*	1.3090	*0.1216*	0.2331
		52.50	*78.12*	15.396	*391.06*	1.2055	*0.1120*	0.2147
		55.00	*81.84*	15.375	*390.53*	1.2020	*0.1117*	0.2141
		65.00	*96.12*	15.250	*387.35*	1.1811	*0.1097*	0.2104
		70.00	*104.16*	15.198	*386.03*	1.1725	*0.1089*	0.2088
		75.00	*111.60*	15.125	*384.18*	1.1604	*0.1078*	0.2067
		84.00	*124.99*	15.010	*381.25*	1.1415	*0.1061*	0.2033
		109.00	*162.19*	14.688	*373.08*	1.0894	*0.1012*	0.1940
16-1/8	*410*	OH	*OH*	16.125	*409.58*	1.3309	*0.1236*	0.2370
16-1/4	*413*	OH	*OH*	16.250	*412.75*	1.3529	*0.1257*	0.2410
16-3/8	*416*	OH	*OH*	16.375	*415.93*	1.3752	*0.1278*	0.2449
16-1/2	*419*	OH	*OH*	16.500	*419.10*	1.3976	*0.1298*	0.2489
16-5/8	*422*	OH	*OH*	16.625	*422.28*	1.4202	*0.1319*	0.2529
16-3/4	*425*	OH	*OH*	16.750	*425.45*	1.4429	*0.1341*	0.2570
16-7/8	*429*	OH	*OH*	16.875	*428.63*	1.4658	*0.1362*	0.2611
17	*432*	OH	*OH*	17.000	*431.80*	1.4889	*0.1383*	0.2652
17-1/8	*435*	OH	*OH*	17.125	*434.98*	1.5122	*0.1405*	0.2693
17-1/4	*438*	OH	*OH*	17.250	*438.15*	1.5356	*0.1427*	0.2735
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.5592	*0.1449*	0.2777
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.5830	*0.1471*	0.2819
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.6070	*0.1493*	0.2862
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.6311	*0.1515*	0.2905
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.6554	*0.1538*	0.2948
18	*457*	OH	*OH*	18.000	*457.20*	1.6798	*0.1561*	0.2992
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.7045	*0.1584*	0.3036
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.7293	*0.1607*	0.3080
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.7542	*0.1630*	0.3124
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.7794	*0.1653*	0.3169
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.8047	*0.1677*	0.3214
				17.855	*453.52*	1.6515	*0.1534*	0.2941
		87.50	*130.20*	17.755	*450.98*	1.6321	*0.1516*	0.2907
		96.50	*143.59*	17.655	*448.44*	1.6127	*0.1498*	0.2872
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.8302	*0.1700*	0.3260
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.8558	*0.1724*	0.3305
19	*483*	OH	*OH*	19.000	*482.60*	1.8816	*0.1748*	0.3351
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.9076	*0.1772*	0.3398
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.9338	*0.1797*	0.3444
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.9601	*0.1821*	0.3491
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.9866	*0.1846*	0.3538
19-5/8	*498*	OH	*OH*	19.625	*498.48*	2.0133	*0.1870*	0.3586
19-3/4	*502*	OH	*OH*	19.750	*501.65*	2.0401	*0.1895*	0.3634
197/8	*505*	OH	*OH*	19.875	*504.83*	2.0672	*0.1920*	0.3682
20	*508*	OH	*OH*	20.000	*508.00*	2.0943	*0.1946*	0.3730
		90.00	*133.92*	19.166	*486.82*	1.9162	*0.1780*	0.3413
		94.00	*139.87*	19.124	*485.75*	1.9074	*0.1772*	0.3397
		106.50	*158.47*	19.000	*482.60*	1.8816	*0.1748*	0.3351
		133.00	*197.90*	18.730	*475.74*	1.8261	*0.1697*	0.3252
20-1/8	*511*	OH	*OH*	20.125	*511.18*	2.1217	*0.1971*	0.3779
20-1/4	*514*	OH	*OH*	20.250	*514.35*	2.1492	*0.1997*	0.3828
20-3/8	*518*	OH	*OH*	20.375	*517.53*	2.1769	*0.2022*	0.3877

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4 in. Tubing OD *(102 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
20-1/2	*521*	OH	*OH*	20.500	*520.70*	2.2048	*0.2048*	0.3927
20-5/8	*524*	OH	*OH*	20.625	*523.88*	2.2328	*0.2074*	0.3977
20-3/4	*527*	OH	*OH*	20.750	*527.05*	2.2610	*0.2101*	0.4027
20-7/8	*530*	OH	*OH*	20.875	*530.23*	2.2894	*0.2127*	0.4078
21	*533*	OH	*OH*	21.000	*533.40*	2.3180	*0.2153*	0.4128
21-1/8	*537*	OH	*OH*	21.125	*536.58*	2.3467	*0.2180*	0.4180
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.3756	*0.2207*	0.4231
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.4046	*0.2234*	0.4283
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.4338	*0.2261*	0.4335
		92.50	*137.64*	20.710	*526.03*	2.2520	*0.2092*	0.4011
		103.00	*153.26*	20.610	*523.49*	2.2294	*0.2071*	0.3971
		114.00	*169.63*	20.510	*520.95*	2.2070	*0.2050*	0.3931
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.4632	*0.2288*	0.4387
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.4928	*0.2316*	0.4440
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.5226	*0.2344*	0.4493
22	*559*	OH	*OH*	22.000	*558.80*	2.5525	*0.2371*	0.4546
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.5826	*0.2399*	0.4600
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.6128	*0.2427*	0.4654
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.6432	*0.2456*	0.4708
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.6738	*0.2484*	0.4762
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.7046	*0.2513*	0.4817
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.7355	*0.2541*	0.4872
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.7666	*0.2570*	0.4928
23	*584*	OH	*OH*	23.000	*584.20*	2.7979	*0.2599*	0.4983
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.8293	*0.2629*	0.5039
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.8610	*0.2658*	0.5096
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.8928	*0.2688*	0.5152
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.9247	*0.2717*	0.5209
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.9568	*0.2747*	0.5266
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.9891	*0.2777*	0.5324
23-7/8	*606*	OH	*OH*	23.875	*606.43*	3.0216	*0.2807*	0.5382
24	*610*	OH	*OH*	24.000	*609.60*	3.0542	*0.2838*	0.5440
24-1/8	*613*	OH	*OH*	24.125	*612.78*	3.0870	*0.2868*	0.5498
24-1/4	*616*	OH	*OH*	24.250	*615.95*	3.1200	*0.2899*	0.5557
24-3/8	*619*	OH	*OH*	24.375	*619.13*	3.1532	*0.2929*	0.5616
24-1/2	*622*	OH	*OH*	24.500	*622.30*	3.1865	*0.2960*	0.5675
		100.50	*149.54*	23.750	*603.25*	2.9891	*0.2777*	0.5324
		113.00	*168.14*	23.650	*600.71*	2.9633	*0.2753*	0.5278

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4-1/2 in. Tubing OD *(114 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
		OH	*OH*	5.750	*146.05*	0.0699	*0.0065*	0.0124
		14.00	*20.83*	5.290	*134.37*	0.0422	*0.0039*	0.0075
		17.00	*25.30*	5.190	*131.83*	0.0365	*0.0034*	0.0065
5-3/4	*146*	19.50	*29.02*	5.090	*129.29*	0.0309	*0.0029*	0.0055
		20.00	*29.76*	5.090	*126.75*	0.0309	*0.0029*	0.0055
		22.50	*33.48*	4.990	*124.21*	0.0254	*0.0024*	0.0045
		25.20	*37.50*	4.890	*124.20*	0.0200	*0.0019*	0.0036
5-7/8	*149*	OH	*OH*	5.875	*149.23*	0.0778	*0.0072*	0.0139
		OH	*OH*	6.000	*152.40*	0.0859	*0.0080*	0.0153
		10.50	*15.62*	5.672	*144.07*	0.0650	*0.0060*	0.0116
		12.00	*17.86*	5.620	*142.75*	0.0618	*0.0057*	0.0110
		15.00	*22.32*	5.524	*140.31*	0.0560	*0.0052*	0.0100
6	*152*	16.00	*23.81*	5.500	*139.70*	0.0545	*0.0051*	0.0097
		17.00	*25.30*	5.450	*138.43*	0.0516	*0.0048*	0.0092
		18.00	*26.78*	5.424	*137.77*	0.0500	*0.0047*	0.0089
		20.00	*29.76*	5.352	*135.94*	0.0458	*0.0043*	0.0082
		23.00	*34.22*	5.000	*127.00*	0.0259	*0.0024*	0.0046
		26.00	*38.69*	5.140	*130.56*	0.0336	*0.0031*	0.0060
6-1/8	*156*	OH	*OH*	6.125	*155.58*	0.0942	*0.0088*	0.0168
6-1/4	*159*	OH	*OH*	6.250	*158.75*	0.1026	*0.0095*	0.0183
6-3/8	*162*	OH	*OH*	6.375	*161.93*	0.1112	*0.0103*	0.0198
6-1/2	*165*	OH	*OH*	6.500	*165.10*	0.1200	*0.0112*	0.0214
		OH	*OH*	6.625	*168.28*	0.1289	*0.0120*	0.0230
		12.00	*17.86*	6.287	*159.69*	0.1051	*0.0098*	0.0187
		13.00	*19.34*	6.255	*158.88*	0.1029	*0.0096*	0.0183
		17.00	*25.30*	6.135	*155.83*	0.0948	*0.0088*	0.0169
		20.00	*29.76*	6.049	*153.64*	0.0891	*0.0083*	0.0159
6-5/8	*168*	22.00	*32.74*	5.989	*152.12*	0.0852	*0.0079*	0.0152
		24.00	*35.71*	5.921	*150.39*	0.0808	*0.0075*	0.0144
		26.00	*38.69*	5.855	*148.72*	0.0765	*0.0071*	0.0136
		28.00	*41.66*	5.791	*147.09*	0.0725	*0.0067*	0.0129
		29.00	*43.15*	5.761	*146.33*	0.0706	*0.0066*	0.0126
		32.00	*47.62*	5.675	*144.15*	0.0652	*0.0061*	0.0116
		34.00	*50.59*	5.595	*142.11*	0.0603	*0.0056*	0.0107
6-3/4	*171*	OH	*OH*	6.750	*171.45*	0.1381	*0.0128*	0.0246
6-7/8	*175*	OH	*OH*	6.875	*174.63*	0.1473	*0.0137*	0.0262
		OH	*OH*	7.000	*177.80*	0.1568	*0.0146*	0.0279
		13.00	*19.34*	6.520	*165.61*	0.1214	*0.0113*	0.0216
		17.00	*25.30*	6.538	*166.07*	0.1227	*0.0114*	0.0219
		20.00	*29.76*	6.456	*163.98*	0.1169	*0.0109*	0.0208
		22.00	*32.74*	6.398	*162.51*	0.1128	*0.0105*	0.0201
		23.00	*34.22*	6.366	*161.70*	0.1106	*0.0103*	0.0197
		24.00	*35.71*	6.336	*160.93*	0.1085	*0.0101*	0.0193
7	*178*	26.00	*38.69*	6.276	*159.41*	0.1044	*0.0097*	0.0186
		28.00	*41.66*	6.214	*157.84*	0.1002	*0.0093*	0.0178
		29.00	*43.15*	6.184	*157.07*	0.0981	*0.0091*	0.0175
		30.00	*44.64*	6.154	*156.31*	0.0961	*0.0089*	0.0171
		32.00	*47.62*	6.094	*154.79*	0.0921	*0.0086*	0.0164
		33.70	*50.15*	6.048	*153.52*	0.0891	*0.0083*	0.0159
		35.00	*52.08*	6.004	*152.50*	0.0862	*0.0080*	0.0153
		38.00	*56.54*	5.920	*150.37*	0.0807	*0.0075*	0.0144
		40.00	*59.52*	5.836	*148.23*	0.0753	*0.0070*	0.0134
7-1/8	*181*	OH	*OH*	7.125	*180.98*	0.1664	*0.0155*	0.0296
7-1/4	*184*	OH	*OH*	7.250	*184.15*	0.1762	*0.0164*	0.0314
7-3/8	*187*	OH	*OH*	7.375	*137.33*	0.1862	*0.0173*	0.0332
7-1/2	*191*	OH	*OH*	7.500	*190.50*	0.1963	*0.0182*	0.0350

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4-1/2 in. Tubing OD *(114 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
7-5/8	*194*	OH	*OH*	7.625	*193.68*	0.2067	*0.0192*	0.0368
		14.75	*21.95*	7.263	*184.48*	0.1773	*0.0165*	0.0316
		20.00	*29.76*	7.125	*180.98*	0.1664	*0.0155*	0.0296
		24.00	*35.71*	7.025	*178.44*	0.1587	*0.0148*	0.0283
		26.40	*39.28*	6.969	*177.01*	0.1544	*0.0144*	0.0275
		29.70	*44.19*	6.875	*174.63*	0.1473	*0.0137*	0.0262
		33.70	*50.15*	6.765	*171.83*	0.1392	*0.0129*	0.0248
		39.00	*58.03*	6.625	*168.28*	0.1289	*0.0120*	0.0230
		45.00	*66.96*	6.445	*163.70*	0.1161	*0.0108*	0.0207
		45.30	*67.41*	6.435	*163.45*	0.1154	*0.0107*	0.0206
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.2171	*0.0202*	0.0387
7-7/8	*200*	OH	*OH*	7.875	*200.03*	0.2278	*0.0212*	0.0406
8	*203*	OH	*OH*	8.000	*203.20*	0.2386	*0.0222*	0.0425
		16.00	*23.81*	7.628	*193.75*	0.2069	*0.0192*	0.0369
		20.00	*29.76*	7.528	*191.21*	0.1986	*0.0185*	0.0354
		26.00	*38.69*	7.386	*187.60*	0.1871	*0.0174*	0.0333
8-1/8	*206*	OH	*OH*	8.125	*206.38*	0.2496	*0.0232*	0.0445
		28.00	*41.66*	7.485	*190.12*	0.1951	*0.0181*	0.0348
		32.00	*47.62*	7.385	*187.58*	0.1870	*0.0174*	0.0333
		35.50	*52.82*	7.285	*185.04*	0.1790	*0.0166*	0.0319
		39.50	*58.78*	7.185	*182.50*	0.1711	*0.0159*	0.0305
		42.00	*62.50*	7.125	*180.98*	0.1664	*0.0155*	0.0296
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.2608	*0.0242*	0.0464
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.2721	*0.0253*	0.0485
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.2836	*0.0264*	0.0505
8-5/8	*219*	OH	*OH*	8.625	*219.08*	0.2953	*0.0274*	0.0526
		20.00	*29.76*	8.191	*208.05*	0.2555	*0.0237*	0.0455
		24.00	*35.71*	8.097	*205.66*	0.2471	*0.0230*	0.0440
		28.00	*41.66*	8.017	*203.63*	0.2401	*0.0223*	0.0428
		32.00	*47.62*	7.921	*201.19*	0.2318	*0.0215*	0.0413
		36.00	*53.57*	7.825	*198.76*	0.2235	*0.0208*	0.0398
		38.00	*56.54*	7.775	*197.49*	0.2193	*0.0204*	0.0391
		40.00	*59.52*	7.725	*196.22*	0.2150	*0.0200*	0.0383
		43.00	*63.98*	7.651	*194.34*	0.2088	*0.0194*	0.0372
		44.00	*65.47*	7.625	*193.68*	0.2067	*0.0192*	0.0368
		48.00	*71.42*	7.537	*191.44*	0.1994	*0.0185*	0.0355
		49.00	*72.91*	7.511	*190.78*	0.1972	*0.0183*	0.0351
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.3071	*0.0285*	0.0547
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.3191	*0.0297*	0.0568
9	*229*	OH	*OH*	9.000	*228.60*	0.3313	*0.0308*	0.0590
		34.00	*50.59*	8.290	*210.57*	0.2644	*0.0246*	0.0471
		38.00	*56.54*	8.196	*208.18*	0.2559	*0.0238*	0.0456
		40.00	*59.52*	8.150	*207.01*	0.2518	*0.0234*	0.0449
		45.00	*66.96*	8.032	*204.01*	0.2414	*0.0224*	0.0430
		50.20	*74.70*	7.910	*200.91*	0.2308	*0.0214*	0.0411
		55.00	*81.84*	7.812	*198.42*	0.2224	*0.0207*	0.0396
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.3437	*0.0319*	0.0612
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.3562	*0.0331*	0.0634
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.3689	*0.0343*	0.0657
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.3818	*0.0355*	0.0680
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.3948	*0.0367*	0.0703
		29.30	*43.60*	9.063	*230.20*	0.3375	*0.0314*	0.0601
		32.30	*48.06*	9.001	*228.63*	0.3314	*0.0308*	0.0590
		36.00	*53.57*	8.921	*226.59*	0.3236	*0.0301*	0.0576
		40.00	*59.52*	8.835	*224.41*	0.3153	*0.0293*	0.0562
		43.50	*64.73*	8.755	*222.38*	0.3076	*0.0286*	0.0548

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4-1/2 in. Tubing OD *(114 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
9-5/8	*244*	47.00	*69.94*	8.681	*220.50*	0.3006	*0.0279*	0.0535
		53.50	*79.61*	8.535	*216.79*	0.2869	*0.0267*	0.0511
		58.40	*86.90*	8.435	*214.25*	0.2776	*0.0258*	0.0494
		61.10	*90.92*	9.375	*212.73*	0.2721	*0.0253*	0.0485
		71.80	*106.84*	8.125	*206.38*	0.2496	*0.0232*	0.0445
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.4080	*0.0379*	0.0727
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.4214	*0.0392*	0.0751
10	*254*	OH	*OH*	10.000	*254.00*	0.4350	*0.0404*	0.0775
		33.00	*49.10*	9.384	*238.35*	0.3698	*0.0344*	0.0659
		41.50	*61.75*	9.200	*233.68*	0.3512	*0.0326*	0.0625
		45.50	*67.70*	9.120	*231.65*	0.3432	*0.0319*	0.0611
		50.50	*75.14*	9.016	*229.01*	0.3329	*0.0309*	0.0593
		55.50	*82.58*	8.908	*226.26*	0.3223	*0.0300*	0.0574
		61.20	*91.07*	8.790	*223.27*	0.3110	*0.0289*	0.0554
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.4487	*0.0417*	0.0799
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.4626	*0.0430*	0.0824
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.4766	*0.0443*	0.0849
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.4909	*0.0456*	0.0874
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.5053	*0.0469*	0.0900
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.5198	*0.0483*	0.0926
		32.75	*48.73*	10.192	*258.88*	0.4561	*0.0424*	0.0812
		35.75	*53.20*	10.136	*257.45*	0.4499	*0.0418*	0.0801
		40.50	*60.26*	10.050	*255.27*	0.4404	*0.0409*	0.0784
		45.50	*67.70*	9.950	*252.73*	0.4295	*0.0399*	0.0765
		51.00	*75.89*	9.850	*250.19*	0.4187	*0.0389*	0.0746
		54.00	*80.35*	9.784	*248.51*	0.4116	*0.0382*	0.0733
		55.00	*81.84*	9.760	*247.90*	0.4091	*0.0380*	0.0729
		60.70	*90.32*	9.660	*245.36*	0.3985	*0.0370*	0.0710
		65.70	*97.76*	9.560	*242.82*	0.3880	*0.0361*	0.0691
		71.10	*105.80*	9.450	*240.03*	0.3766	*0.0350*	0.0671
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.5346	*0.0497*	0.0952
11	*279*	OH	*OH*	11.000	*279.40*	0.5495	*0.0511*	0.0979
		26.75	*39.80*	10.552	*268.02*	0.4968	*0.0462*	0.0885
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.5646	*0.0525*	0.1006
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.5798	*0.0539*	0.1033
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.5953	*0.0553*	0.1060
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.6108	*0.0568*	0.1088
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.6266	*0.0582*	0.1116
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.6425	*0.0597*	0.1144
		38.00	*56.54*	11.150	*283.21*	0.5676	*0.0527*	0.1011
		42.00	*62.50*	11.084	*281.53*	0.5596	*0.0520*	0.0997
		47.00	*69.94*	11.000	*279.40*	0.5495	*0.0511*	0.0979
		54.00	*80.35*	10.880	*276.35*	0.5352	*0.0497*	0.0953
		60.00	*89.28*	10.772	*273.61*	0.5224	*0.0485*	0.0930
		65.00	*96.72*	10.682	*271.32*	0.5119	*0.0476*	0.0912
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.6587	*0.0612*	0.1173
12	*305*	OH	*OH*	12.000	*304.80*	0.6749	*0.0627*	0.1202
		31.50	*46.87*	11.514	*292.46*	0.6126	*0.0569*	0.1091
		40.00	*59.52*	11.384	*289.15*	0.5964	*0.0554*	0.1062
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.6914	*0.0642*	0.1231
12-1/4	*311*	OH	*OH*	12.250	*31.1.15*	0.7080	*0.0658*	0.1261
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.7248	*0.0673*	0.1291
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.7417	*0.0689*	0.1321
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.7589	*0.0705*	0.1352

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4-1/2 in. Tubing OD *(114 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.7762	*0.0721*	0.1382
		43.00	*63.98*	12.130	*308.10*	0.6920	*0.0643*	0.1233
		53.00	*78.86*	11.970	*304.04*	0.6710	*0.0623*	0.1195
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.7936	*0.0737*	0.1414
13	*330*	OH	*OH*	13.000	*330.20*	0.8113	*0.0754*	0.1445
		36.50	*54.31*	12.482	*317.04*	0.7393	*0.0687*	0.1317
		40.00	*59.52*	12.438	*315.93*	0.7333	*0.0681*	0.1306
		45.00	*66.96*	12.360	*313.94*	0.7228	*0.0672*	0.1287
		50.00	*74.40*	12.282	*311.96*	0.7123	*0.0662*	0.1269
		54.00	*80.35*	12.220	*310.39*	0.7040	*0.0654*	0.1254
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.8291	*0.0770*	0.1477
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.8471	*0.0787*	0.1509
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.8652	*0.0804*	0.1541
		48.00	*71.42*	12.715	*322.96*	0.7713	*0.0717*	0.1374
		54.50	*81.10*	12.615	*320.42*	0.7575	*0.0704*	0.1349
		61.00	*90.77*	12.515	*317.88*	0.7438	*0.0691*	0.1325
		68.00	*101.18*	12.415	*315.34*	0.7302	*0.0678*	0.1301
		72.00	*107.14*	12.347	*313.61*	0.7210	*0.0670*	0.1284
		77.00	*114.58*	12.275	*311.79*	0.7113	*0.0661*	0.1267
		83.00	*123.50*	12.175	*309.25*	0.6980	*0.0649*	0.1243
		85.00	*126.48*	12.159	*308.84*	0.6959	*0.0647*	0.1239
		92.00	*136.90*	12.031	*305.59*	0.6790	*0.0631*	0.1209
		98.00	*145.82*	11.937	*303.20*	0.6667	*0.0619*	0.1187
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.8835	*0.0821*	0.1574
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.9020	*0.0838*	0.1607
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.9207	*0.0855*	0.1640
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.9395	*0.0873*	0.1673
14	*356*	OH	*OH*	14.000	*355.60*	0.9585	*0.0891*	0.1707
		42.00	*62.50*	13.448	*341.58*	0.8759	*0.0814*	0.1560
		50.00	*74.40*	13.344	*338.94*	0.8607	*0.0800*	0.1533
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.9777	*0.0908*	0.1741
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.9971	*0.0926*	0.1776
14-3/8	*365*	OH	*OH*	14.375	*365.13*	1.0166	*0.0944*	0.1811
14-1/2	*368*	OH	*OH*	14.500	*368.30*	1.0363	*0.0963*	0.1846
14-5/8	*371*	OH	*OH*	14.625	*371.48*	1.0561	*0.0981*	0.1881
14-3/4	*375*	OH	*OH*	14.750	*374.65*	1.0761	*0.1000*	0.1917
14-7/8	*378*	OH	*OH*	14.875	*377.83*	1.0963	*0.1019*	0.1953
15	*381*	OH	*OH*	15.000	*381.00*	1.1167	*0.1038*	0.1989
		47.50	*70.68*	14.418	*366.22*	1.0233	*0.0951*	0.1823
15-1/8	*384*	OH	*OH*	15.125	*384.18*	1.1372	*0.1057*	0.2026
15-1/4	*487*	OH	*OH*	15.250	*387.35*	1.1580	*0.1076*	0.2062
15-3/8	*391*	OH	*OH*	15.375	*390.53*	1.1788	*0.1095*	0.2100
15-1/2	*394*	OH	*OH*	15.500	*393.70*	1.1999	*0.1115*	0.2137
15-5/8	*397*	OH	*OH*	15.625	*396.88*	1.2211	*0.1134*	0.2175
15-3/4	*400*	OH	*OH*	15.750	*400.05*	1.2425	*0.1154*	0.2213
15-7/8	*403*	OH	*OH*	15.875	*403.23*	1.2640	*0.1174*	0.2251
16	*406*	OH	*OH*	16.000	*406.40*	1.2858	*0.1195*	0.2290
		52.50	*78.12*	15.396	*391.06*	1.1824	*0.1098*	0.2106
		55.00	*81.84*	15.375	*390.53*	1.1788	*0.1095*	0.2100
		65.00	*96.72*	15.250	*387.35*	1.1580	*0.1076*	0.2062
		70.00	*104.16*	15.198	*386.03*	1.1493	*0.1068*	0.2047
		75.00	*111.60*	15.125	*384.18*	1.1372	*0.1057*	0.2026
		84.00	*124.99*	15.010	*381.25*	1.1183	*0.1039*	0.1992
		109.00	*162.19*	14.688	*373.08*	1.0662	*0.0991*	0.1899
16-1/8	*410*	OH	*OH*	16.125	*409.58*	1.3077	*0.1215*	0.2329
16-1/4	*413*	OH	*OH*	16.250	*412.75*	1.3298	*0.1235*	0.2368

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4-1/2 in. Tubing OD *(114 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
16-3/8	*416*	OH	*OH*	16.375	*415.93*	1.3520	*0.1256*	0.2408
16-1/2	*419*	OH	*OH*	16.500	*419.10*	1.3744	*0.1277*	0.2448
16-5/8	*422*	OH	*OH*	16.625	*422.28*	1.3970	*0.1298*	0.2488
16-3/4	*425*	OH	*OH*	16.750	*425.45*	1.4197	*0.1319*	0.2529
16-7/8	*429*	OH	*OH*	16.875	*428.63*	1.4427	*0.1340*	0.2570
17	*432*	OH	*OH*	17.000	*431.80*	1.4658	*0.1362*	0.2611
17-1/8	*435*	OH	*OH*	17.125	*434.98*	1.4890	*0.1383*	0.2652
17-1/4	*438*	OH	*OH*	17.250	*438.15*	1.5125	*0.1405*	0.2694
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.5361	*0.1427*	0.2736
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.5598	*0.1449*	0.2778
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.5838	*0.1471*	0.2821
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.6079	*0.1494*	0.2864
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.6322	*0.1516*	0.2907
18	*457*	OH	*OH*	18.000	*457.20*	1.6567	*0.1539*	0.2951
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.6813	*0.1562*	0.2994
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.7061	*0.1585*	0.3039
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.7310	*0.1608*	0.3083
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.7562	*0.1632*	0.3128
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.7815	*0.1655*	0.3173
		78.00	*116.06*	17.855	*453.52*	1.6283	*0.1513*	0.2900
		87.50	*130.20*	17.755	*450.98*	1.6089	*0.1495*	0.2866
		96.50	*143.59*	17.655	*448.44*	1.5896	*0.1477*	0.2831
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.8070	*0.1679*	0.3218
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.8326	*0.1703*	0.3264
19	*483*	OH	*OH*	19.000	*482.60*	1.8585	*0.1727*	0.3310
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.8844	*0.1751*	0.3356
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.9106	*0.1775*	0.3403
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.9369	*0.1800*	0.3450
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.9634	*0.1824*	0.3497
19-5/8	*499*	OH	*OH*	19.625	*498.48*	1.9901	*0.1849*	0.3545
19-3/4	*502*	OH	*OH*	19.750	*501.65*	2.0170	*0.1874*	0.3592
19-7/8	*505*	OH	*OH*	19.875	*504.83*	2.0440	*0.1899*	0.3640
20	*508*	OH	*OH*	20.000	*508.00*	2.0712	*0.1924*	0.3689
		90.00	*133.92*	19.166	*486.82*	1.8930	*0.1759*	0.3372
		94.00	*139.87*	19.124	*485.75*	1.8842	*0.1751*	0.3356
		106.50	*158.47*	19.000	*482.60*	1.8585	*0.1727*	0.3310
		133.00	*197.90*	18.730	*475.74*	1.8029	*0.1675*	0.3211
20-1/8	*511*	OH	*OH*	20.125	*511.18*	2.0985	*0.1950*	0.3738
20-1/4	*514*	OH	*OH*	20.250	*514.35*	2.1260	*0.1975*	0.3787
20-3/8	*518*	OH	*OH*	20.375	*517.53*	2.1537	*0.2001*	0.3836
20-1/2	*521*	OH	*OH*	20.500	*520.70*	2.1816	*0.2027*	0.3886
20-5/8	*524*	OH	*OH*	20.625	*523.88*	2.2096	*0.2053*	0.3936
20-3/4	*527*	OH	*OH*	20.750	*527.05*	2.2378	*0.2079*	0.3986
20-7/8	*530*	OH	*OH*	20.875	*530.23*	2.2662	*0.2105*	0.4036
21	*533*	OH	*OH*	21.000	*533.40*	2.2948	*0.2132*	0.4087
21-1/8	*537*	OH	*OH*	21.125	*536.58*	2.3235	*0.2159*	0.4138
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.3524	*0.2185*	0.4190
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.3814	*0.2212*	0.4242
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.4107	*0.2240*	0.4294
		92.50	*137.64*	20.710	*526.03*	2.2288	*0.2071*	0.3970
		103.00	*153.26*	20.610	*523.49*	2.2063	*0.2050*	0.3930
		114.00	*169.63*	20.510	*520.95*	2.1838	*0.2029*	0.3890
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.4401	*0.2267*	0.4346
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.4696	*0.2294*	0.4399
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.4994	*0.2322*	0.4452
22	*559*	OH	*OH*	22.000	*558.80*	2.5293	*0.2350*	0.4505

Refer to back of section table of contents for footnote reference

Annular Volume Between Tubing and Casing or Open Hole

4-1/2 in. Tubing OD *(114 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.5594	*0.2378*	0.4558
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.5896	*0.2406*	0.4612
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.6201	*0.2434*	0.4667
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.6506	*0.2463*	0.4721
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.6814	*0.2491*	0.4776
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.7123	*0.2520*	0.4831
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.7434	*0.2549*	0.4886
23	*584*	OH	*OH*	23.000	*584.20*	2.7747	*0.2578*	0.4942
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.8062	*0.2607*	0.4998
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.8378	*0.2636*	0.5054
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.8696	*0.2666*	0.5111
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.9015	*0.2696*	0.5168
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.9337	*0.2726*	0.5225
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.9660	*0.2756*	0.5283
23-7/8	*606*	OH	*OH*	23.875	*606.43*	2.9984	*0.2786*	0.5340
24	*610*	OH	*OH*	24.000	*609.60*	3.0311	*0.2816*	0.5399
24-1/8	*613*	OH	*OH*	24.125	*612.78*	3.0639	*0.2846*	0.5457
24-1/4	*616*	OH	*OH*	24.250	*615.95*	3.0968	*0.2877*	0.5516
24-3/8	*619*	OH	*OH*	24.375	*619.13*	3.1300	*0.2908*	0.5575
24-1/2	*622*	OH	*OH*	24.500	*622.30*	3.1633	*0.2939*	0.5634
		100.50	*149.54*	23.750	*603.25*	2.9660	*0.2756*	0.5283
		113.00	*168.14*	23.650	*600.71*	2.9401	*0.2731*	0.5237

Refer to back of section table of contents for footnote reference

Annular Volume Between Drill Pipe and Casing or Open Hole

5-9/16 in. Tubing OD *(141 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
5-3/4	*146*	OH	*OH*	5.750	*146.05*	0.0116	*0.0011*	0.0021
6	*152*	OH	*OH*	6.000	*152.40*	0.0276	*0.0026*	0.0049
6-1/4	*159*	OH	*OH*	6.250	*158.75*	0.0443	*0.0041*	0.0079
6-1/2	*165*	OH	*OH*	6.500	*165.10*	0.0617	*0.0057*	0.0110
6-5/8	*168*	13.00	*19.34*	6.255	*158.88*	0.0446	*0.0041*	0.0079
		17.00	*25.30*	6.135	*155.83*	0.0365	*0.0034*	0.0065
		20.00	*29.76*	6.049	*153.64*	0.0308	*0.0029*	0.0055
		24.00	*35.71*	5.921	*150.39*	0.0224	*0.0021*	0.0040
		32.00	*47.62*	5.675	*144.15*	0.0069	*0.0018*	0.0012
6-3/4	*171*	OH	*OH*	6.750	*171.45*	0.0797	*0.0074*	0.0142
7	*178*	OH	*OH*	7.000	*177.80*	0.0985	*0.0092*	0.0175
		17.00	*25.30*	6.538	*166.07*	0.0644	*0.0060*	0.0115
		20.00	*29.76*	6.456	*163.98*	0.0586	*0.0054*	0.0104
		22.00	*32.74*	6.398	*162.51*	0.0545	*0.0051*	0.0097
		23.00	*34.22*	6.366	*161.70*	0.0523	*0.0049*	0.0093
		24.00	*35.71*	6.336	*160.93*	0.0502	*0.0047*	0.0089
		26.00	*38.69*	6.276	*159.41*	0.0461	*0.0043*	0.0082
		28.00	*41.66*	6.214	*157.84*	0.0418	*0.0039*	0.0074
		29.00	*43.15*	6.184	*157.07*	0.0398	*0.0037*	0.0071
		30.00	*44.64*	6.154	*156.31*	0.0378	*0.0035*	0.0067
		32.00	*47.62*	6.094	*154.79*	0.0338	*0.0031*	0.0060
		35.00	*52.08*	6.004	*152.50*	0.0278	*0.0026*	0.0050
		38.00	*56.54*	5.920	*150.37*	0.0224	*0.0021*	0.0040
7-1/4	*184*	OH	*OH*	7.250	*184.15*	0.1179	*0.0110*	0.0210
7-1/2	*191*	OH	*OH*	7.500	*190.50*	0.1380	*0.0128*	0.0246
7-5/8	*194*	OH	*OH*	7.625	*193.68*	0.1484	*0.0138*	0.0264
		20.00	*29.76*	7.125	*180.98*	0.1004	*0.0100*	0.0193
		24.00	*35.71*	7.025	*178.44*	0.1004	*0.0093*	0.0179
		26.40	*39.28*	6.969	*177.01*	0.0961	*0.0092*	0.0171
		29.70	*44.19*	6.875	*174.63*	0.0890	*0.0083*	0.0159
		33.70	*50.15*	6.765	*171.83*	0.0808	*0.0075*	0.0144
		39.00	*58.03*	6.625	*168.28*	0.0706	*0.0066*	0.0126
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.1588	*0.0148*	0.0283
8	*203*	OH	*OH*	8.000	*203.20*	0.1803	*0.0167*	0.0321
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.2025	*0.0188*	0.0361
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.2138	*0.0198*	0.0381
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.2253	*0.0209*	0.0401
8-5/8	*219*	OH	*OH*	8.625	*219.08*	0.2370	*0.0220*	0.0422
		20.00	*29.76*	8.191	*208.05*	0.1971	*0.0183*	0.0351
		24.00	*35.71*	8.097	*205.66*	0.1889	*0.0167*	0.0336
		28.00	*41.66*	8.018	*203.63*	0.1818	*0.0169*	0.0324
		32.00	*47.62*	7.921	*201.19*	0.1735	*0.0161*	0.0309
		36.00	*52.57*	7.825	*198.76*	0.1652	*0.0154*	0.0294
		38.00	*56.54*	7.775	*197.49*	0.1610	*0.0150*	0.0287
		40.00	*59.52*	7.725	*196.22*	0.1567	*0.0146*	0.0279
		43.00	*63.98*	7.651	*194.34*	0.1505	*0.0140*	0.0268
		44.00	*65.47*	7.625	*193.98*	0.1483	*0.0138*	0.0264
		49.00	*72.91*	7.511	*190.78*	0.1389	*0.0129*	0.0247
8-3/4	*222*	OH	*OH*	7.511	*222.25*	0.2488	*0.0227*	0.0443
9	*229*	OH	*OH*	9.000	*228.60*	0.2730	*0.0254*	0.0486
		34.00	*50.59*	8.290	*210.57*	0.2060	*0.0191*	0.0367
		38.00	*56.54*	8.196	*208.18*	0.1976	*0.0184*	0.0352
		40.00	*59.52*	8.150	*207.01*	0.1935	*0.0180*	0.0345
		45.00	*66.96*	8.032	*204.01*	0.1831	*0.0170*	0.0362

Refer to back of section table of contents for footnote reference

Annular Volume Between Drill Pipe and Casing or Open Hole

5-9/16 in. Tubing OD *(141 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
9	*229*	50.20	*74.70*	7.910	*200.91*	0.1725	*0.0160*	0.0307
		55.00	*81.84*	7.812	*198.42*	0.1641	*0.0152*	0.0292
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.2979	*0.0277*	0.0531
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.3235	*0.0300*	0.0576
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.3366	*0.0313*	0.0600
		29.30	*43.60*	9.063	*230.20*	0.2792	*0.0260*	0.0497
		32.30	*48.06*	9.001	*228.63*	0.2731	*0.0258*	0.0486
		36.00	*53.57*	8.921	*226.59*	0.2653	*0.0247*	0.0472
		40.00	*59.52*	8.835	*224.41*	0.2570	*0.0239*	0.0458
		43.50	*64.73*	8.755	*222.38*	0.2493	*0.0232*	0.0444
		47.00	*69.94*	8.681	*220.50*	0.2422	*0.0225*	0.0431
		53.50	*79.61*	8.535	*216.79*	0.2235	*0.0212*	0.0407
		58.40	*86.90*	8.435	*214.25*	0.2193	*0.0204*	0.0391
		61.10	*90.92*	8.375	*212.73*	0.2138	*0.0199*	0.0381
		71.80	*106.84*	8.125	*206.38*	0.1913	*0.0178*	0.0341
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.3497	*0.0325*	0.0623
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.3632	*0.0337*	0.0647
10	*254*	OH	*OH*	10.000	*254.00*	0.3766	*0.0350*	0.0671
		41.50	*61.75*	9.200	*233.68*	0.2929	*0.0272*	0.0522
		45.50	*67.70*	9.120	*231.65*	0.2849	*0.0266*	0.0507
		50.50	*75.14*	9.016	*229.01*	0.2746	*0.0255*	0.0489
		55.50	*82.58*	8.908	*226.26*	0.2640	*0.0246*	0.0470
		61.20	*91.07*	8.790	*223.27*	0.2526	*0.0235*	0.0450
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.4043	*0.0376*	0.0720
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.4325	*0.0404*	0.0770
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.4470	*0.0439*	0.0796
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.4615	*0.0453*	0.0822
		32.75	*48.73*	10.192	*258.88*	0.3978	*0.0390*	0.0708
		40.50	*60.26*	10.050	*255.27*	0.3821	*0.0375*	0.0681
		45.50	*67.70*	9.950	*252.73*	0.3712	*0.0364*	0.0661
		51.00	*75.89*	9.850	*250.19*	0.3604	*0.0354*	0.0642
		54.00	*80.35*	9.784	*248.51*	0.3533	*0.0347*	0.0629
		55.00	*81.84*	9.760	*247.90*	0.3508	*0.0344*	0.0625
		60.70	*90.32*	9.660	*245.36*	0.3402	*0.0334*	0.0606
		65.70	*97.76*	9.560	*242.82*	0.3297	*3.0323*	0.0587
		71.10	*105.80*	9.450	*240.03*	0.3183	*0.0312*	0.0567
11	*279*	OH	*OH*	11.000	*279.40*	0.4912	*0.0482*	0.0875
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.5215	*0.0512*	0.0929
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.5525	*0.0542*	0.0984
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.5842	*0.0573*	0.1040
		38.00	*56.54*	11.150	*283.21*	0.5093	*0.0500*	0.0907
		42.00	*62.50*	11.084	*281.53*	0.5013	*0.0492*	0.0893
		47.00	*69.94*	11.000	*279.40*	0.4912	*0.0482*	0.0875
		54.00	*80.35*	10.880	*276.35*	0.4768	*0.0468*	0.0849
		60.00	*89.28*	10.772	*273.61*	0.4641	*0.0456*	0.0827
		65.00	*96.72*	10.682	*271.32*	0.4536	*0.0445*	0.0808
12	*305*	OH	*OH*	12.000	*304.80*	0.6166	*0.0605*	0.1098
		31.50	*46.87*	11.514	*292.46*	0.5543	*0.0544*	0.0987
		40.00	*59.52*	11.384	*289.15*	0.5380	*0.0528*	0.0958
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.6497	*0.0638*	0.1157
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.6834	*0.0671*	0.1217
12-3/4	*324*	43.00	*63.98*	12.130	*308.10*	0.6337	*0.0700*	0.1129
		53.00	*78.86*	11.970	*304.04*	0.6127	*0.0602*	0.1091
13	*330*	OH	*OH*	13.000	*330.20*	0.7530	*0.0740*	0.1341
		50.00	*74.40*	12.282	*311.96*	0.6540	*0.0642*	0.1165
		54.00	*80.35*	12.220	*310.39*	0.6457	*0.0634*	0.1150

Refer to back of section table of contents for footnote reference

Annular Volume Between Drill Pipe and Casing or Open Hole

5-9/16 in. Tubing OD *(141 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
13-3/8	*340*	48.00	*71.42*	12.715	*322.96*	0.7130	*0.0700*	0.1270
		54.50	*81.10*	12.615	*320.42*	0.6992	*0.0687*	0.1245
		61.00	*90.77*	12.515	*317.88*	0.6855	*0.0673*	0.1221
		68.00	*101.18*	12.415	*315.34*	0.6719	*0.0660*	0.1197
		72.00	*107.14*	12.347	*313.61*	0.6627	*0.0651*	0.1180
		83.00	*123.50*	12.175	*309.25*	0.6397	*0.0628*	0.1139
		92.00	*136.90*	12.031	*305.59*	0.6207	*0.0609*	0.1105
		98.00	*145.82*	11.937	*303.20*	0.6083	*0.0597*	0.1084
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.8624	*0.0847*	0.1536
14	*356*	OH	*OH*	14.000	*355.60*	0.9003	*0.0884*	0.1604
		50.00	*74.40*	13.344	*338.94*	0.8024	*0.0788*	0.1430
15	*381*	OH	*OH*	15.000	*381.00*	1.0590	*0.1040*	0.1885
		47.50	*70.68*	14.418	*366.22*	0.9650	*0.0948*	0.1719
16	*406*	OH	*OH*	16.000	*406.40*	1.2280	*0.1206*	0.2186
		70.00	*104.16*	15.198	*386.03*	1.0910	*0.1071*	0.1943
		109.00	*162.19*	14.688	*373.08*	1.0079	*0.0990*	0.1796
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.5020	*0.1476*	0.2674
18-5/8	*473*	87.50	*130.20*	17.755	*450.98*	1.5506	*0.1523*	0.2762
		96.50	*143.59*	17.655	*448.44*	1.5313	*0.1503*	0.2727
20	*508*	133.00	*197.90*	18.730	*475.74*	1.7446	*0.1714*	0.3107
21-1/2	*546*	114.00	*169.63*	20.510	*520.95*	2.1256	*0.2088*	0.3786
22	*559*	OH	*OH*	22.000	*558.80*	2.4710	*0.2428*	0.4401
23	*584*	OH	*OH*	23.000	*584.20*	2.7170	*0.2669*	0.4838
24-1/2	*622*	100.50	*149.54*	23.750	*603.25*	2.9077	*0.2857*	0.5179
		113.00	*168.14*	23.650	*600.71*	2.8818	*0.2831*	0.5133

Refer to back of section table of contents for footnote reference

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Equations for Calculating Volume and Height Between: Tubing/Casing and Hole; Tubing/Casing and Casing*

Cubic feet per lineal foot = $.005454 \times (D^2 - d^2)$

Lineal feet per cubic foot = $183.35 / (D^2 - d^2)$

Gallons per lineal foot = $.0408 \times (D^2 - d^2)$

Lineal feet per gallon = $24.51 / (D^2 - d^2)$

Barrels per lineal foot = $.0009714 \times (D^2 - d^2)$

Lineal feet per barrel = $1029.4 / (D^2 - d^2)$

Where:

For volume and height between tubing and hole:
- D = diameter of hole, inches
- d = outside diameter of tubing, inches

For volume and height between casing and hole:
- D = diameter of hole, inches
- d = outside diameter of casing, inches

For volume and height between tubing and casing:
- D = inside diameter of casing, inches
- d = outside diameter of tubing, inches

For volume and height between casings:
- D = inside diameter of outer casing, inches
- d = outside diameter of inner casing, inches

For volume and height between multiple tubing strings and hole (or casing):
- D = diameter of hole, inches (or ID of casing)
- d = outside diameter of tubing, inches

*For multiple strings of tubing/casing, multiply d by number of strings

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The following notes apply to the tables within this section:

■ Ft/Cu Ft = $\frac{1}{\text{Cu Ft/Ft}}$ ▲ Ft/Bbl = $\frac{1}{\text{Bbl/Ft}}$ ● $m/m^3 = \frac{1}{m^3/m}$

Gal/Ft = CuFt/Ft x 7.48

OH = Open Hole

Annular Volume Between Casing and Casing or Openhole

5 in. OD Casing *(127 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
6-1/2	*165*	OH	*OH*	6.500	*165.10*	0.0941	*0.0087*	0.0168
6-5/8	*168*	OH	*OH*	6.625	*168.28*	0.1030	*0.0096*	0.0184
				6.287	*159.69*	0.0792	*0.0074*	0.0141
		13.00	*19.34*	6.255	*158.88*	0.0770	*0.0072*	0.0137
		17.00	*25.10*	6.135	*155.83*	0.0689	*0.0064*	0.0123
		20.00	*29.76*	6.049	*153.64*	0.0632	*0.0059*	0.0113
		22.00	*32.74*	5.989	*152.12*	0.0593	*0.0055*	0.0106
		24.00	*35.71*	5.921	*150.39*	0.0549	*0.0051*	0.0098
		26.00	*38.69*	5.855	*148.72*	0.0506	*0.0047*	0.0090
		28.00	*41.66*	5.791	*147.09*	0.0466	*0.0043*	0.0083
		29.00	*43.15*	5.761	*146.33*	0.0447	*0.0042*	0.0080
		32.00	*47.62*	5.675	*144.15*	0.0393	*0.0037*	0.0070
		34.00	*50.59*	5.595	*142.11*	0.0344	*0.0032*	0.0061
6-3/4	*171*	OH	*OH*	6.750	*171.45*	0.1121	*0.0104*	0.0200
6-7/8	*175*	OH	*OH*	6.875	*174.63*	0.1214	*0.0113*	0.0216
7	*178*	OH	*OH*	7.000	*177.80*	0.1309	*0.0122*	0.0233
		13.00	*19.34*	6.520	*165.61*	0.0955	*0.0089*	0.0170
		17.00	*25.30*	6.538	*166.07*	0.0968	*0.0090*	0.0172
		20.00	*29.76*	6.456	*163.98*	0.0910	*0.0085*	0.0162
		22.00	*32.74*	6.398	*162.51*	0.0869	*0.0081*	0.0155
		23.00	*34.22*	6.366	*161.70*	0.0847	*0.0079*	0.0151
		24.00	*35.71*	6.336	*160.93*	0.0826	*0.0077*	0.0147
		26.00	*38.69*	6.276	*159.41*	0.0785	*0.0073*	0.0140
		28.00	*41.66*	6.214	*157.84*	0.0742	*0.0069*	0.0132
		29.00	*43.15*	6.184	*157.07*	0.0722	*0.0067*	0.0129
		30.00	*44.64*	6.154	*156.31*	0.0702	*0.0065*	0.0125
		32.00	*47.62*	6.094	*154.79*	0.0662	*0.0062*	0.0118
		33.70	*50.15*	6.048	*153.62*	0.0631	*0.0059*	0.0112
		35.00	*52.08*	6.004	*152.50*	0.0603	*0.0056*	0.0107
		38.00	*56.54*	5.920	*150.37*	0.0548	*0.0051*	0.0098
		40.00	*59.52*	5.836	*148.23*	0.0494	*0.0046*	0.0088
7-1/8	*181*	OH	*OH*	7.125	*180.98*	0.1405	*0.0131*	0.0250
7-1/4	*184*	OH	*OH*	7.250	*184.15*	0.1503	*0.0140*	0.0268
7-3/8	*187*	OH	*OH*	7.375	*187.33*	0.1603	*0.0149*	0.0286
7-1/2	*191*	OH	*OH*	7.500	*190.50*	0.1704	*0.0158*	0.0304
7-5/8	*194*	OH	*OH*	7.625	*193.68*	0.1807	*0.0168*	0.0322
		14.75	*21.95*	7.263	*184.48*	0.1514	*0.0141*	0.0270
		20.00	*29.76*	7.125	*180.98*	0.1405	*0.0131*	0.0250
		24.00	*35.71*	7.025	*178.44*	0.1328	*0.0123*	0.0237
		26.40	*39.28*	6.969	*177.01*	0.1285	*0.0119*	0.0229
		29.70	*44.19*	6.875	*174.63*	0.1214	*0.0113*	0.0216
		33.70	*50.15*	6.765	*171.83*	0.1133	*0.0105*	0.0202
		39.00	*58.03*	6.625	*168.28*	0.1030	*0.0096*	0.0184
		45.00	*66.96*	6.445	*163.70*	0.0902	*0.0084*	0.0161
		45.30	*67.41*	6.435	*163.45*	0.0895	*0.0083*	0.0159
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.1912	*0.0178*	0.0341
7-7/8	*200*	OH	*OH*	7.875	*200.03*	0.2019	*0.0188*	0.0360
8	*203*	OH	*OH*	8.000	*203.20*	0.2127	*0.0198*	0.0379
		16.00	*23.81*	7.628	*193.75*	0.1810	*0.0168*	0.0322
		20.00	*29.76*	7.528	*191.21*	0.1727	*0.0161*	0.0308
		26.00	*38.69*	7.386	*187.60*	0.1612	*0.0150*	0.0287
8-1/8	*206*	OH	*OH*	8.125	*206.38*	0.2237	*0.0208*	0.0398
		28.00	*41.66*	7.485	*190.12*	0.1692	*0.0157*	0.0301
		32.00	*47.62*	7.385	*187.58*	0.1611	*0.0150*	0.0287
		35.50	*52.82*	7.285	*185.04*	0.1531	*0.0142*	0.0273

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

5 in. OD Casing *(127 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
8-1/8	*206*	39.50	*58.78*	7.185	*182.50*	0.1452	*0.0135*	0.0259
		42.00	*62.50*	7.125	*180.98*	0.1405	*0.0131*	0.0250
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.2349	*0.0218*	0.0418
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.2462	*0.0229*	0.0438
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.2577	*0.0239*	0.0459
8-5/8	*219*	OH	*OH*	8.625	*219.08*	0.2694	*0.0250*	0.0480
		20.00	*29.76*	8.191	*208.05*	0.2296	*0.0213*	0.0409
		24.00	*35.71*	8.097	*205.66*	0.2212	*0.0206*	0.0394
		28.00	*41.66*	8.017	*203.63*	0.2142	*0.0199*	0.0381
		32.00	*47.62*	7.921	*201.19*	0.2058	*0.0191*	0.0367
		36.00	*53.57*	7.825	*198.76*	0.1976	*0.0184*	0.0352
		38.00	*56.54*	7.775	*197.49*	0.1933	*0.0180*	0.0344
		40.00	*59.52*	7.725	*196.22*	0.1891	*0.0176*	0.0337
		43.00	*63.98*	7.651	*194.34*	0.1829	*0.0170*	0.0326
		44.00	*65.47*	7.625	*193.68*	0.1807	*0.0168*	0.0322
		48.00	*71.42*	7.537	*191.44*	0.1735	*0.0161*	0.0309
		49.00	*72.91*	7.511	*190.78*	0.1713	*0.0159*	0.0305
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.2812	*0.0261*	0.0501
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.2932	*0.0272*	0.0522
9	*229*	OH	*OH*	9.000	*228.60*	0.3054	*0.0284*	0.0544
		34.00	*50.59*	8.290	*210.57*	0.2385	*0.0222*	0.0425
		38.00	*56.54*	8.196	*208.18*	0.2300	*0.0214*	0.0410
		40.00	*59.52*	8.150	*207.01*	0.2259	*0.0210*	0.0402
		45.00	*66.96*	8.032	*204.01*	0.2155	*0.0200*	0.0384
		50.20	*74.70*	7.910	*200.91*	0.2049	*0.0190*	0.0365
		55.00	*81.84*	7.812	*198.42*	0.1965	*0.0183*	0.0350
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.3178	*0.0295*	0.0566
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.3303	*0.0307*	0.0588
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.3430	*0.0319*	0.0611
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.3559	*0.0331*	0.0634
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.3689	*0.0343*	0.0657
		29.30	*43.60*	9.063	*230.20*	0.3116	*0.0290*	0.0555
		32.30	*48.06*	9.001	*228.63*	0.3055	*0.0284*	0.0544
		36.00	*53.57*	8.921	*226.59*	0.2977	*0.0277*	0.0530
		40.00	*59.52*	8.835	*224.41*	0.2894	*0.0269*	0.0515
		43.50	*64.73*	8.755	*222.38*	0.2817	*0.0262*	0.0502
		47.00	*69.94*	8.681	*220.50*	0.2747	*0.0255*	0.0489
		53.50	*79.61*	8.535	*216.79*	0.2610	*0.0242*	0.0465
		58.40	*86.90*	8.435	*214.25*	0.2517	*0.0234*	0.0448
		61.10	*90.92*	8.375	*212.73*	0.2462	*0.0229*	0.0438
		71.80	*106.84*	8.125	*206.38*	0.2237	*0.0208*	0.0398
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.3821	*0.0355*	0.0681
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.3955	*0.0367*	0.0704
10	*254*	OH	*OH*	10.000	*254.00*	0.4090	*0.0380*	0.0729
		33.00	*49.10*	9.384	*238.35*	0.3439	*0.0320*	0.0613
		41.50	*61.75*	9.200	*233.68*	0.3253	*0.0302*	0.0579
		45.50	*67.70*	9.120	*231.65*	0.3173	*0.0295*	0.0565
		50.50	*75.14*	9.016	*229.01*	0.3070	*0.0285*	0.0547
		55.50	*82.58*	8.908	*226.26*	0.2964	*0.0275*	0.0528
		61.20	*91.07*	8.790	*223.27*	0.2850	*0.0265*	0.0508
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.4228	*0.0393*	0.0753
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.4367	*0.0406*	0.0778
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.4507	*0.0419*	0.0803
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.4650	*0.0432*	0.0828
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.4794	*0.0445*	0.0854

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

5 in. OD Casing *(127 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m³/m* ●	bbl/ft ▲
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.4939	*0.0459*	0.0880
		32.75	*48.73*	10.192	*258.88*	0.4302	*0.0400*	0.0766
		35.75	*53.20*	10.136	*257.45*	0.4240	*0.0394*	0.0755
		40.50	*60.26*	10.050	*255.27*	0.4145	*0.0385*	0.0738
		45.50	*67.70*	9.950	*252.73*	0.4036	*0.0375*	0.0719
		51.00	*75.89*	9.850	*250.19*	0.3928	*0.0365*	0.0700
		54.00	*80.35*	9.784	*248.51*	0.3857	*0.0358*	0.0687
		55.00	*81.84*	9.760	*247.90*	0.3832	*0.0356*	0.0682
		60.70	*90.32*	9.660	*245.36*	0.3726	*0.0346*	0.0664
		65.70	*97.76*	9.560	*242.82*	0.3621	*0.0336*	0.0645
		71.10	*105.80*	9.450	*240.03*	0.3507	*0.0326*	0.0625
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.5087	*0.0473*	0.0906
11	*279*	OH	*OH*	11.000	*279.40*	0.5236	*0.0486*	0.0933
		26.75	*39.80*	10.552	*268.02*	0.4709	*0.0438*	0.0839
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.5387	*0.0500*	0.0959
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.5539	*0.0515*	0.0987
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.5693	*0.0529*	0.1014
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.5849	*0.0543*	0.1042
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.6007	*0.0558*	0.1070
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.6166	*0.0573*	0.1098
		38.00	*56.54*	11.150	*283.21*	0.5417	*0.0503*	0.0965
		42.00	*62.50*	11.084	*281.53*	0.5337	*0.0496*	0.0951
		47.00	*69.94*	11.000	*279.40*	0.5236	*0.0486*	0.0933
		54.00	*80.35*	10.880	*276.35*	0.5093	*0.0473*	0.0907
		60.00	*89.28*	10.772	*273.61*	0.4965	*0.0461*	0.0884
		65.00	*96.72*	10.682	*271.32*	0.4860	*0.0452*	0.0866
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.6327	*0.0588*	0.1127
12	*305*	OH	*OH*	12.000	*304.80*	0.6490	*0.0603*	0.1156
		31.50	*46.87*	11.514	*292.46*	0.5867	*0.0545*	0.1045
		40.00	*59.52*	11.384	*289.15*	0.5705	*0.0530*	0.1016
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.6655	*0.0618*	0.1185
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.6821	*0.0634*	0.1215
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.6989	*0.0649*	0.1245
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.7158	*0.0665*	0.1275
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.7330	*0.0681*	0.1305
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.7503	*0.0697*	0.1336
		43.00	*63.98*	12.130	*308.10*	0.6661	*0.0619*	0.1186
		53.00	*78.86*	11.970	*304.04*	0.6451	*0.0599*	0.1149
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.7677	*0.0713*	0.1367
13	*330*	OH	*OH*	13.000	*330.20*	0.7854	*0.0730*	0.1399
		36.50	*54.31*	12.482	*317.04*	0.7134	*0.0663*	0.1271
		40.00	*59.52*	12.438	*315.93*	0.7074	*0.0657*	0.1260
		45.00	*66.96*	12.360	*313.94*	0.6969	*0.0647*	0.1241
		50.00	*74.40*	12.282	*311.96*	0.6864	*0.0638*	0.1222
		54.00	*80.35*	12.220	*310.39*	0.6781	*0.0630*	0.1208
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.8032	*0.0746*	0.1431
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.8212	*0.0763*	0.1463
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.8393	*0.0780*	0.1495
		48.00	*71.42*	12.715	*322.96*	0.7454	*0.0693*	0.1328
		54.50	*81.10*	12.615	*320.42*	0.7316	*0.0680*	0.1303
		61.00	*90.77*	12.515	*317.88*	0.7179	*0.0667*	0.1279
		68.00	*101.18*	12.415	*315.34*	0.7043	*0.0654*	0.1254
		72.00	*107.14*	12.347	*313.61*	0.6951	*0.0646*	0.1238
		77.00	*114.58*	12.275	*311.19*	0.6854	*0.0637*	0.1221
		83.00	*123.50*	12.175	*309.25*	0.6721	*0.0624*	0.1197
		85.00	*126.48*	12.159	*308.84*	0.6700	*0.0622*	0.1193

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

5 in. OD Casing *(127 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
13-3/8	*340*	92.00	*136.90*	12.031	*305.59*	0.6531	*0.0607*	0.1163
		98.00	*145.82*	11.937	*303.20*	0.6408	*0.0595*	0.1141
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.8576	*0.0797*	0.1528
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.8761	*0.0814*	0.1560
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.8948	*0.0831*	0.1594
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.9136	*0.0849*	0.1627
14	*356*	OH	*OH*	14.000	*355.60*	0.9326	*0.0866*	0.1661
		42.00	*62.50*	13.448	*341.58*	0.8500	*0.0790*	0.1514
		50.00	*74.40*	13.344	*338.94*	0.8348	*0.0776*	0.1487
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.9518	*0.0884*	0.1695
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.9712	*0.0902*	0.1730
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.9907	*0.0920*	0.1764
14-1/2	*368*	OH	*OH*	14.500	*368.30*	1.0104	*0.0939*	0.1800
14-5/8	*371*	OH	*OH*	14.625	*371.48*	1.0302	*0.0957*	0.1835
14-3/4	*375*	OH	*OH*	14.750	*374.65*	1.0502	*0.0976*	0.1871
14-7/8	*378*	OH	*OH*	14.875	*377.83*	1.0704	*0.0995*	0.1907
15	*381*	OH	*OH*	15.000	*381.00*	1.0908	*0.1013*	0.1943
		47.50	*70.68*	14.418	*366.22*	0.9974	*0.0927*	0.1776
15-1/8	*384*	OH	*OH*	15.125	*384.18*	1.1113	*0.1033*	0.1979
15-1/4	*387*	OH	*OH*	15.250	*387.35*	1.1320	*0.1052*	0.2016
15-3/8	*391*	OH	*OH*	15.375	*390.53*	1.1529	*0.1071*	0.2053
15-1/2	*394*	OH	*OH*	15.500	*393.70*	1.1740	*0.1091*	0.2091
15-5/8	*397*	OH	*OH*	15.625	*396.88*	1.1952	*0.1110*	0.2129
15-3/4	*400*	OH	*OH*	15.750	*400.05*	1.2166	*0.1130*	0.2167
15-7/8	*403*	OH	*OH*	15.875	*403.23*	1.2381	*0.1150*	0.2205
16	*406*	OH	*OH*	16.000	*406.40*	1.2599	*0.1171*	0.2244
		52.50	*78.12*	15.396	*391.06*	1.1564	*0.1074*	0.2060
		55.00	*81.84*	15.375	*390.53*	1.1529	*0.1071*	0.2053
		65.00	*96.72*	15.250	*387.35*	1.1320	*0.1052*	0.2016
		70.00	*104.16*	15.198	*386.03*	1.1234	*0.1044*	0.2001
		75.00	*111.60*	15.125	*384.18*	1.1113	*0.1033*	0.1979
		84.00	*124.99*	15.010	*381.25*	1.0924	*0.1015*	0.1946
		109.00	*162.19*	14.688	*373.08*	1.0403	*0.0967*	0.1853
16-1/8	*410*	OH	*OH*	16.125	*409.58*	1.2818	*0.1191*	0.2283
16-1/4	*413*	OH	*OH*	16.250	*412.75*	1.3038	*0.1211*	0.2322
16-3/8	*416*	OH	*OH*	16.375	*415.93*	1.3261	*0.1232*	0.2362
16-1/2	*419*	OH	*OH*	16.500	*419.10*	1.3485	*0.1253*	0.2402
16-5/8	*422*	OH	*OH*	16.625	*422.28*	1.3711	*0.1274*	0.2442
16-3/4	*425*	OH	*OH*	16.750	*425.45*	1.3938	*0.1295*	0.2483
16-7/8	*429*	OH	*OH*	16.875	*428.63*	1.4168	*0.1316*	0.2523
17	*432*	OH	*OH*	17.000	*431.80*	1.4399	*0.1338*	0.2564
17-1/8	*435*	OH	*OH*	17.125	*434.98*	1.4631	*0.1359*	0.2606
17-1/4	*438*	OH	*OH*	17.250	*438.15*	1.4866	*0.1381*	0.2648
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.5102	*0.1403*	0.2690
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.5339	*0.1425*	0.2732
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.5579	*0.1447*	0.2775
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.5820	*0.1470*	0.2818
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.6063	*0.1492*	0.2861
18	*457*	OH	*OH*	18.000	*457.20*	1.6307	*0.1515*	0.2904
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.6554	*0.1538*	0.2948
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.6802	*0.1561*	0.2993
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.7051	*0.1584*	0.3037
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.7303	*0.1608*	0.3082
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.7556	*0.1631*	0.3127
		78.00	*116.06*	17.855	*453.52*	1.6024	*0.1489*	0.2854

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

5 in. OD Casing *(127 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m³/m* ●	bbl/ft ▲
18-5/8	*473*	87.50	*130.20*	17.755	*450.98*	1.5830	*0.1471*	0.2819
		96.50	*143.59*	17.655	*448.44*	1.5637	*0.1453*	0.2785
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.7811	*0.1655*	0.3172
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.8067	*0.1679*	0.3218
19	*483*	OH	*OH*	19.000	*482.60*	1.8325	*0.1703*	0.3264
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.8585	*0.1727*	0.3310
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.8847	*0.1751*	0.3357
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.9110	*0.1775*	0.3404
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.9375	*0.1800*	0.3451
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.9642	*0.1825*	0.3498
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.9911	*0.1850*	0.3546
19-7/8	*505*	OH	*OH*	19.875	*504.83*	2.0181	*0.1875*	0.3594
20	*508*	OH	*OH*	20.000	*508.00*	2.0453	*0.1900*	0.3643
		90.00	*133.92*	19.166	*486.82*	1.8671	*0.1735*	0.3325
		94.00	*139.87*	19.124	*485.75*	1.8583	*0.1726*	0.3310
		106.50	*158.47*	19.000	*482.60*	1.8325	*0.1703*	0.3264
		133.00	*197.90*	18.730	*475.74*	1.7770	*0.1651*	0.3165
20-1/8	*511*	OH	*OH*	20.125	*511.18*	2.0726	*0.1926*	0.3691
20-1/4	*514*	OH	*OH*	20.250	*514.35*	2.1001	*0.1951*	0.3740
20-3/8	*518*	OH	*OH*	20.375	*517.53*	2.1278	*0.1977*	0.3790
20-1/2	*521*	OH	*OH*	20.500	*520.70*	2.1557	*0.2003*	0.3839
20-5/8	*524*	OH	*OH*	20.625	*523.88*	2.1837	*0.2029*	0.3889
20-3/4	*527*	OH	*OH*	20.750	*527.05*	2.2119	*0.2055*	0.3940
20-7/8	*530*	OH	*OH*	20.875	*530.23*	2.2403	*0.2081*	0.3990
21	*533*	OH	*OH*	21.000	*533.40*	2.2689	*0.2108*	0.4041
21-1/8	*537*	OH	*OH*	21.125	*536.58*	2.2976	*0.2135*	0.4092
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.3265	*0.2161*	0.4144
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.3555	*0.2188*	0.4195
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.3848	*0.2216*	0.4247
		92.50	*137.64*	20.710	*526.03*	2.2029	*0.2047*	0.3924
		103.00	*153.26*	20.610	*523.49*	2.1804	*0.2026*	0.3883
		114.00	*169.63*	20.510	*520.95*	2.1579	*0.2005*	0.3843
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.4142	*0.2243*	0.4300
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.4437	*0.2770*	0.4352
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.4735	*0.2298*	0.4405
22	*559*	OH	*OH*	22.000	*558.80*	2.5034	*0.2326*	0.4459
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.5335	*0.2354*	0.4512
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.5637	*0.2382*	0.4566
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.5941	*0.2410*	0.4620
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.6247	*0.2439*	0.4675
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.6555	*0.2467*	0.4730
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.6864	*0.2496*	0.4785
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.7175	*0.2525*	0.4840
23	*584*	OH	*OH*	23.000	*584.20*	2.7488	*0.2554*	0.4896

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

5-1/2 in. OD Casing *(140 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
6	*152*	OH	*OH*	6.000	*152.40*	0.0314	*0.0029*	0.0056
6-1/8	*156*	OH	*OH*	6.125	*155.58*	0.0396	*0.0037*	0.0071
6-1/4	*159*	OH	*OH*	6.250	*158.75*	0.0482	*0.0045*	0.0086
6-3/8	*162*	OH	*OH*	6.375	*161.93*	0.0567	*0.0052*	0.0101
6-1/2	*165*	OH	*OH*	6.500	*165.10*	0.0655	*0.0061*	0.0117
6-5/8	*168*	OH	*OH*	6.625	*168.28*	0.0744	*0.0069*	0.0133
6-3/4	*171*	OH	*OH*	6.750	*171.45*	0.0835	*0.0077*	0.0149
6-7/8	*175*	OH	*OH*	6.875	*174.63*	0.0928	*0.0086*	0.0165
7	*178*	OH	*OH*	7.000	*177.80*	0.1023	*0.0095*	0.0182
		13.00	*19.34*	6.520	*165.61*	0.0669	*0.0062*	0.0119
		17.00	*25.25*	6.538	*166.06*	0.0682	*0.0067*	0.0121
		20.00	*29.70*	6.456	*163.98*	0.0624	*0.0061*	0.0111
		22.00	*32.67*	6.398	*162.51*	0.0583	*0.0057*	0.0104
		23.00	*34.16*	6.366	*161.69*	0.0561	*0.0055*	0.0100
		24.00	*35.64*	6.336	*160.93*	0.0540	*0.0053*	0.0096
		26.00	*38.61*	6.276	*159.41*	0.0498	*0.0049*	0.0089
		28.00	*41.58*	6.214	*157.84*	0.0456	*0.0045*	0.0081
		29.00	*43.06*	6.184	*157.07*	0.0436	*0.0043*	0.0078
		30.00	*44.55*	6.154	*156.31*	0.0416	*0.0041*	0.0074
7-1/8	*181*	OH	*OH*	7.125	*180.97*	0.1119	*0.0110*	0.0199
7-1/4	*184*	OH	*OH*	7.250	*184.15*	0.1217	*0.0112*	0.0217
7-3/8	*187*	OH	*OH*	7.375	*187.32*	0.1317	*0.0129*	0.0235
7-1/2	*191*	OH	*OH*	7.500	*190.50*	0.1418	*0.0139*	0.0253
7-5/8	*194*	OH	*OH*	7.625	*193.67*	0.1521	*0.0149*	0.0271
		14.75	*21.90*	7.263	*184.48*	0.1227	*0.0121*	0.0219
		20.00	*29.70*	7.125	*180.97*	0.1119	*0.0110*	0.0199
		24.00	*35.64*	7.025	*178.43*	0.1042	*0.0102*	0.0186
		26.40	*38.61*	6.969	*177.01*	0.0999	*0.0098*	0.0178
		29.70	*44.10*	6.875	*174.62*	0.0928	*0.0091*	0.0165
		33.20	*49.30*	6.765	*171.83*	0.0846	*0.0083*	0.0151
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.1626	*0.0160*	0.0290
7-7/8	*200*	OH	*OH*	7.875	*200.02*	0.1733	*0.0170*	0.0309
8	*203*	OH	*OH*	8.000	*203.20*	0.1841	*0.0181*	0.0328
		16.00	*23.76*	7.628	*193.75*	0.1524	*0.0150*	0.0271
		20.00	*29.70*	7.528	*191.21*	0.1441	*0.0142*	0.0257
		26.00	*38.68*	7.368	*187.15*	0.1311	*0.0129*	0.0234
8-1/8	*207*	OH	*OH*	8.125	*206.38*	0.1951	*0.0192*	0.0347
		28.00	*41.66*	7.485	*190.12*	0.1406	*0.0138*	0.0250
		32.00	*47.61*	7.385	*187.58*	0.1325	*0.0130*	0.0236
		35.50	*52.82*	7.285	*185.04*	0.1245	*0.0122*	0.0222
		39.50	*58.78*	7.185	*182.50*	0.1166	*0.0108*	0.0208
		42.00	*62.50*	7.125	*180.98*	0.1119	*0.0104*	0.0199
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.2062	*0.0192*	0.0367
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.2176	*0.0202*	0.0387
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.2291	*0.0213*	0.0408
8-5/8	*219*	OH	*OH*	8.625	*219.08*	0.2407	*0.0224*	0.0429
		20.00	*29.76*	8.191	*208.05*	0.2009	*0.0187*	0.0358
		24.00	*35.71*	8.097	*205.66*	0.1926	*0.0179*	0.0343
		28.00	*41.66*	8.017	*203.63*	0.1856	*0.0172*	0.0330
		32.00	*47.62*	7.921	*201.19*	0.1772	*0.0165*	0.0316
		36.00	*53.57*	7.825	*198.76*	0.1690	*0.0157*	0.0301
		38.00	*56.54*	7.775	*197.49*	0.1647	*0.0153*	0.0293
		40.00	*59.52*	7.725	*196.22*	0.1605	*0.0149*	0.0286
		43.00	*63.98*	7.651	*194.34*	0.1543	*0.0143*	0.0275
		44.00	*65.47*	7.625	*193.68*	0.1521	*0.0141*	0.0271
		48.00	*71.42*	7.537	*191.44*	0.1448	*0.0135*	0.0258

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

5-1/2 in. OD Casing *(140 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
8-5/8	*219*	49.00	*72.91*	7.511	*190.78*	0.1427	*0.0133*	0.0254
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.2526	*0.0235*	0.0450
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.2646	*0.0246*	0.0471
9	*229*	OH	*OH*	9.000	*228.60*	0.2768	*0.0257*	0.0493
		34.00	*50.59*	8.290	*210.57*	0.2098	*0.0195*	0.0374
		38.00	*56.54*	8.196	*208.18*	0.2014	*0.0187*	0.0359
		40.00	*59.52*	8.150	*207.01*	0.1973	*0.0183*	0.0351
		45.00	*66.96*	8.032	*204.01*	0.1869	*0.0174*	0.0333
		50.20	*74.70*	7.910	*200.91*	0.1763	*0.0164*	0.0314
		55.00	*81.84*	7.812	*198.42*	0.1679	*0.0156*	0.0299
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.2891	*0.0269*	0.0515
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.3017	*0.0280*	0.0537
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.3144	*0.0292*	0.0560
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.3272	*0.0304*	0.0583
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.3403	*0.0316*	0.0606
		29.30	*43.60*	9.063	*230.20*	0.2830	*0.0263*	0.0504
		32.30	*48.06*	9.001	*228.63*	0.2769	*0.0257*	0.0493
		36.00	*53.57*	8.921	*226.59*	0.2691	*0.0250*	0.0479
		40.00	*59.52*	8.835	*224.41*	0.2607	*0.0242*	0.0464
		43.50	*64.73*	8.755	*222.38*	0.2531	*0.0235*	0.0451
		47.00	*69.94*	8.681	*220.50*	0.2460	*0.0229*	0.0438
		53.50	*79.61*	8.535	*216.79*	0.2323	*0.0216*	0.0414
		58.40	*86.90*	8.435	*214.25*	0.2231	*0.0207*	0.0397
		61.10	*90.92*	8.375	*212.73*	0.2176	*0.0202*	0.0387
		71.80	*106.84*	8.125	*206.38*	0.1951	*0.0181*	0.0347
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.3535	*0.0328*	0.0630
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.3669	*0.0341*	0.0653
10	*254*	OH	*OH*	10.000	*254.00*	0.3804	*0.0353*	0.0678
		33.00	*49.10*	9.384	*238.35*	0.3153	*0.0293*	0.0562
		41.50	*61.75*	9.200	*233.68*	0.2966	*0.0275*	0.0528
		45.50	*67.70*	9.120	*231.65*	0.2886	*0.0268*	0.0514
		50.50	*75.14*	9.016	*229.01*	0.2784	*0.0259*	0.0496
		55.50	*82.58*	8.908	*226.26*	0.2678	*0.0249*	0.0477
		61.20	*91.07*	8.790	*223.27*	0.2564	*0.0238*	0.0457
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.3941	*0.0366*	0.0702
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.4080	*0.0379*	0.0727
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.4221	*0.0392*	0.0752
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.4363	*0.0405*	0.0777
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.4507	*0.0419*	0.0803
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.4653	*0.0432*	0.0829
		32.75	*48.73*	10.192	*258.88*	0.4016	*0.0373*	0.0715
		35.75	*53.20*	10.136	*257.45*	0.3954	*0.0367*	0.0704
		40.50	*60.26*	10.050	*255.27*	0.3859	*0.0359*	0.0687
		45.50	*67.70*	9.950	*252.73*	0.3750	*0.0348*	0.0668
		51.00	*75.89*	9.850	*250.19*	0.3642	*0.0338*	0.0649
		54.00	*80.35*	9.784	*248.51*	0.3571	*0.0332*	0.0636
		55.00	*81.84*	9.760	*247.90*	0.3546	*0.0329*	0.0631
		60.70	*90.32*	9.660	*245.36*	0.3440	*0.0320*	0.0613
		65.70	*97.76*	9.560	*242.82*	0.3335	*0.0310*	0.0594
		71.10	*105.80*	9.450	*240.03*	0.3221	*0.0299*	0.0574
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.4800	*0.0446*	0.0855
11	*279*	OH	*OH*	11.000	*279.40*	0.4950	*0.0460*	0.0882
		26.75	*39.80*	10.552	*268.02*	0.4423	*0.0411*	0.0788
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.5100	*0.0474*	0.0908
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.5253	*0.0488*	0.0936
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.5407	*0.0502*	0.0963

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

5-1/2 in. OD Casing *(140 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.5563	*0.0517*	0.0991
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.5721	*0.0532*	0.1019
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.5880	*0.0546*	0.1047
		38.00	*56.54*	11.150	*283.21*	0.5131	*0.0477*	0.0914
		42.00	*62.50*	11.084	*281.53*	0.5051	*0.0469*	0.0900
		47.00	*69.94*	11.000	*279.40*	0.4950	*0.0460*	0.0882
		54.00	*80.35*	10.880	*276.35*	0.4806	*0.0447*	0.0856
		60.00	*89.28*	10.772	*273.61*	0.4679	*0.0435*	0.0833
		65.00	*96.72*	10.682	*271.32*	0.4573	*0.0425*	0.0815
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.6041	*0.0561*	0.1076
12	*305*	OH	*OH*	12.000	*304.80*	0.6204	*0.0576*	0.1105
		31.50	*46.87*	11.514	*292.46*	0.5581	*0.0519*	0.0994
		40.00	*59.52*	11.384	*289.15*	0.5418	*0.0503*	0.0965
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.6368	*0.0592*	0.1134
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.6535	*0.0607*	0.1164
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.6702	*0.0623*	0.1194
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.6872	*0.0638*	0.1224
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.7043	*0.0654*	0.1254
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.7216	*0.0670*	0.1285
		43.00	*63.98*	12.130	*308.10*	0.6375	*0.0592*	0.1135
		53.00	*78.86*	11.970	*304.04*	0.6165	*0.0573*	0.1098
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.7391	*0.0687*	0.1316
13	*330*	OH	*OH*	13.000	*330.20*	0.7567	*0.0703*	0.1348
		36.50	*54.31*	12.482	*317.04*	0.6848	*0.0636*	0.1220
		40.00	*59.52*	12.438	*315.93*	0.6788	*0.0631*	0.1209
		45.00	*66.96*	12.360	*313.94*	0.6682	*0.0621*	0.1190
		50.00	*74.40*	12.282	*311.96*	0.6577	*0.0611*	0.1171
		54.00	*80.35*	12.220	*310.39*	0.6495	*0.0603*	0.1157
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.7746	*0.0720*	0.1380
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.7925	*0.0736*	0.1412
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.8107	*0.0753*	0.1444
		48.00	*71.42*	12.715	*322.96*	0.7168	*0.0666*	0.1277
		54.50	*81.10*	12.615	*320.42*	0.7030	*0.0653*	0.1252
		61.00	*90.77*	12.515	*317.88*	0.6893	*0.0640*	0.1228
		68.00	*101.18*	12.415	*315.34*	0.6757	*0.0628*	0.1203
		72.00	*107.14*	12.347	*313.61*	0.6665	*0.0619*	0.1187
		77.00	*114.58*	12.275	*311.79*	0.6568	*0.0610*	0.1170
		83.00	*123.50*	12.175	*309.25*	0.6435	*0.0598*	0.1146
		85.00	*126.48*	12.159	*308.84*	0.6413	*0.0596*	0.1142
		92.00	*136.90*	12.031	*305.59*	0.6245	*0.0580*	0.1112
		98.00	*145.82*	11.937	*303.20*	0.6122	*0.0569*	0.1090
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.8290	*0.0770*	0.1477
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.8475	*0.0787*	0.1509
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.8662	*0.0805*	0.1543
13-5/8	*352*	OH	*OH*	13.875	*352.43*	0.8850	*0.0822*	0.1576
14	*356*	OH	*OH*	14.000	*355.60*	0.9040	*0.0840*	0.1610
		42.00	*62.50*	13.448	*341.58*	0.8214	*0.0763*	0.1463
		50.00	*74.40*	13.344	*338.94*	0.8062	*0.0749*	0.1436
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.9232	*0.0858*	0.1644
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.9425	*0.0876*	0.1679
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.9620	*0.0894*	0.1713
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.9817	*0.0912*	0.1749
14-5/8	*371*	OH	*OH*	14.625	*371.48*	1.0016	*0.0931*	0.1784
14-3/4	*375*	OH	*OH*	14.750	*374.65*	1.0216	*0.0949*	0.1820
14-7/8	*378*	OH	*OH*	14.875	*377.83*	1.0418	*0.0968*	0.1856

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

5-1/2 in. OD Casing *(140 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
15	*381*	OH	*OH*	15.000	*381.00*	1.0622	*0.0987*	0.1892
		47.50	*70.68*	14.418	*366.22*	0.9688	*0.0900*	0.1725
15-1/8	*384*	OH	*OH*	15.125	*384.18*	1.0827	*0.1006*	0.1928
15-1/4	*387*	OH	*OH*	15.250	*387.35*	1.1034	*0.1025*	0.1965
15-3/8	*391*	OH	*OH*	15.375	*390.53*	1.1243	*0.1045*	0.2002
15-1/2	*394*	OH	*OH*	15.500	*393.70*	1.1453	*0.1064*	0.2040
15-5/8	*397*	OH	*OH*	15.625	*396.88*	1.1666	*0.1084*	0.2078
15-3/4	*400*	OH	*OH*	15.750	*400.05*	1.1879	*0.1104*	0.2116
15-7/8	*403*	OH	*OH*	15.875	*403.23*	1.2095	*0.1124*	0.2154
16	*406*	OH	*OH*	16.000	*406.40*	1.2312	*0.1144*	0.2193
		52.50	*78.12*	15.396	*391.06*	1.1278	*0.1048*	0.2009
		55.00	*81.84*	15.375	*390.53*	1.1243	*0.1045*	0.2002
		65.00	*96.72*	15.250	*387.35*	1.1034	*0.1025*	0.1965
		70.00	*104.16*	15.198	*386.03*	1.0948	*0.1017*	0.1950
		75.00	*111.60*	15.125	*384.18*	1.0827	*0.1006*	0.1928
		84.00	*124.99*	15.010	*381.25*	1.0638	*0.0988*	0.1895
		109.00	*162.19*	14.688	*373.08*	1.0116	*0.0940*	0.1802
16-1/8	*410*	OH	*OH*	16.125	*409.58*	1.2531	*0.1164*	0.2232
16-1/4	*413*	OH	*OH*	16.250	*412.75*	1.2752	*0.1185*	0.2271
16-3/8	*416*	OH	*OH*	16.375	*415.93*	1.2975	*0.1205*	0.2311
16-1/2	*419*	OH	*OH*	16.500	*419.10*	1.3199	*0.1226*	0.2351
16-5/8	*422*	OH	*OH*	16.625	*422.28*	1.3425	*0.1247*	0.2391
16-3/4	*425*	OH	*OH*	16.750	*425.45*	1.3652	*0.1268*	0.2432
16-7/8	*429*	OH	*OH*	16.875	*428.63*	1.3881	*0.1290*	0.2472
17	*432*	OH	*OH*	17.000	*431.80*	1.4112	*0.1311*	0.2513
17-1/8	*435*	OH	*OH*	17.125	*434.98*	1.4345	*0.1333*	0.2555
17-1/4	*438*	OH	*OH*	17.250	*438.15*	1.4579	*0.1355*	0.2597
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.4815	*0.1376*	0.2639
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.5053	*0.1399*	0.2681
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.5293	*0.1421*	0.2724
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.5534	*0.1443*	0.2767
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.5777	*0.1466*	0.2810
18	*457*	OH	*OH*	18.000	*457.20*	1.6021	*0.1488*	0.2853
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.6267	*0.1511*	0.2897
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.6515	*0.1534*	0.2942
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.6765	*0.1558*	0.2986
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.7016	*0.1581*	0.3031
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.7270	*0.1604*	0.3076
		78.00	*116.06*	17.855	*453.52*	1.5738	*0.1462*	0.2803
		87.50	*130.20*	17.755	*450.98*	1.5543	*0.1444*	0.2768
		96.50	*143.59*	17.655	*448.44*	1.5350	*0.1426*	0.2734
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.7524	*0.1628*	0.3121
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.7781	*0.1652*	0.3167
19	*483*	OH	*OH*	19.000	*482.60*	1.8039	*0.1676*	0.3213
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.8299	*0.1700*	0.3259
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.8561	*0.1724*	0.3306
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.8824	*0.1749*	0.3353
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.9089	*0.1773*	0.3400
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.9356	*0.1798*	0.3447
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.9624	*0.1823*	0.3495
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.9894	*0.1848*	0.3543

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

5-1/2 in. OD Casing *(140 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
20	*508*	OH	*OH*	20.000	*508.00*	2.0166	*0.1874*	0.3592
		90.00	*133.92*	19.166	*486.82*	1.8385	*0.1708*	0.3274
		94.00	*139.87*	19.124	*485.75*	1.8297	*0.1700*	0.3259
		106.50	*158.47*	19.000	*482.60*	1.8039	*0.1676*	0.3213
		133.50	*197.90*	18.730	*475.74*	1.7484	*0.1624*	0.3114
20-1/8	*511*	OH	*OH*	20.125	*511.18*	2.0440	*0.1899*	0.3640
20-1/4	*514*	OH	*OH*	20.250	*514.35*	2.0715	*0.1925*	0.3689
20-3/8	*518*	OH	*OH*	20.375	*517.53*	2.0992	*0.1950*	0.3739
20-1/2	*521*	OH	*OH*	20.500	*520.70*	2.1271	*0.1976*	0.3788
20-5/8	*524*	OH	*OH*	20.625	*523.88*	2.1551	*0.2002*	0.3838
20-3/4	*527*	OH	*OH*	20.750	*527.05*	2.1833	*0.2028*	0.3889
20-7/8	*530*	OH	*OH*	20.875	*530.23*	2.2117	*0.2055*	0.3939
21	*533*	OH	*OH*	21.000	*533.40*	2.2402	*0.2081*	0.3990
21-1/8	*537*	OH	*OH*	21.125	*536.58*	2.2689	*0.2108*	0.4041
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.2978	*0.2135*	0.4093
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.3269	*0.2162*	0.4144
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.3561	*0.2189*	0.4196
		92.50	*137.64*	20.710	*526.03*	2.1743	*0.2020*	0.3873
		103.00	*153.26*	20.610	*523.49*	2.1517	*0.1999*	0.3832
		114.00	*169.63*	20.510	*520.95*	2.1293	*0.1978*	0.3792
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.3855	*0.2216*	0.4249
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.4151	*0.2244*	0.4301
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.4448	*0.2271*	0.4354
22	*559*	OH	*OH*	22.000	*558.80*	2.4748	*0.2299*	0.4408
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.5048	*0.2327*	0.4461
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.5351	*0.2355*	0.4515
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.5655	*0.2383*	0.4569
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.5961	*0.2412*	0.4624
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.6269	*0.2440*	0.4679
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.6578	*0.2469*	0.4734
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.6889	*0.2498*	0.4789
23	*584*	OH	*OH*	23.000	*584.20*	2.7202	*0.2527*	0.4845

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

6 in. OD Casing *(152 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
7	*178*	OH	*OH*	7.000	*177.80*	0.0709	*0.0066*	0.0126
		13.00	*19.34*	6.520	*165.61*	0.0355	*0.0033*	0.0063
		17.00	*25.29*	6.538	*166.07*	0.0368	*0.0034*	0.0066
		20.00	*29.76*	6.456	*163.98*	0.0310	*0.0029*	0.0055
		22.00	*32.73*	6.398	*162.51*	0.0269	*0.0025*	0.0048
		23.00	*34.22*	6.366	*161.70*	0.0247	*0.0023*	0.0044
		24.00	*35.71*	6.336	*160.93*	0.0226	*0.0021*	0.0040
		26.00	*38.68*	6.276	*159.41*	0.0185	*0.0017*	0.0033
		28.00	*41.66*	6.214	*157.84*	0.0143	*0.0013*	0.0025
		29.00	*43.15*	6.184	*157.07*	0.0122	*0.0011*	0.0022
		30.00	*44.63*	6.154	*156.31*	0.0102	*0.0009*	0.0018
7-1/8	*181*	OH	*OH*	7.125	*180.98*	0.0805	*0.0075*	0.0143
7-1/4	*184*	OH	*OH*	7.250	*184.15*	0.0903	*0.0084*	0.0161
7-3/8	*187*	OH	*OH*	7.375	*187.33*	0.1003	*0.0093*	0.0179
7-1/2	*191*	OH	*OH*	7.500	*190.50*	0.1105	*0.0102*	0.0197
7-5/8	*194*	OH	*OH*	7.625	*193.68*	0.1208	*0.0112*	0.0215
		14.75	*21.95*	7.263	*184.48*	0.0914	*0.0085*	0.0163
		20.00	*29.76*	7.125	*180.98*	0.0805	*0.0075*	0.0143
		24.00	*35.71*	7.025	*178.44*	0.0728	*0.0067*	0.0130
		26.40	*39.28*	6.969	*177.01*	0.0686	*0.0063*	0.0122
		29.70	*44.49*	6.875	*174.63*	0.0615	*0.0057*	0.0109
		33.70	*50.14*	6.765	*171.83*	0.0532	*0.0049*	0.0095
		39.00	*58.02*	6.625	*168.28*	0.0430	*0.0040*	0.0077
		45.00	*66.95*	6.445	*163.70*	0.0302	*0.0028*	0.0054
		45.30	*67.40*	6.435	*163.45*	0.0295	*0.0027*	0.0053
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.1313	*0.0122*	0.0234
7-7/8	*200*	OH	*OH*	7.875	*200.03*	0.1419	*0.0131*	0.0253
8	*203*	OH	*OH*	8.000	*203.20*	0.1527	*0.0141*	0.0272
		16.00	*23.80*	7.628	*193.75*	0.1210	*0.0112*	0.0216
		20.00	*29.76*	7.528	*191.21*	0.1128	*0.0104*	0.0201
		26.00	*38.68*	7.386	*187.60*	0.1012	*0.0094*	0.0180
8-1/8	*206*	OH	*OH*	8.125	*206.38*	0.1637	*0.0152*	0.0292
		28.00	*41.66*	7.485	*190.12*	0.1092	*0.0101*	0.0195
		32.00	*47.61*	7.385	*187.58*	0.1011	*0.0094*	0.0180
		35.50	*52.82*	7.285	*185.04*	0.0931	*0.0086*	0.0166
		39.50	*58.77*	7.185	*182.50*	0.0852	*0.0079*	0.0152
		42.00	*62.49*	7.125	*180.98*	0.0805	*0.0075*	0.0143
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.1749	*0.0162*	0.0311
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.1862	*0.0172*	0.0332
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.1977	*0.0183*	0.0352
8-5/8	*219*	OH	*OH*	8.625	*219.08*	0.2094	*0.0195*	0.0373
		20.00	*29.76*	8.191	*208.05*	0.1696	*0.0158*	0.0302
		24.00	*35.71*	8.097	*205.66*	0.1612	*0.0150*	0.0287
		28.00	*41.66*	8.017	*203.63*	0.1542	*0.0143*	0.0275
		32.00	*47.62*	7.921	*201.19*	0.1459	*0.0136*	0.0260
		36.00	*53.57*	7.825	*198.76*	0.1376	*0.0128*	0.0245
		38.00	*56.54*	7.775	*197.49*	0.1334	*0.0124*	0.0238
		40.00	*59.52*	7.725	*196.22*	0.1291	*0.0120*	0.0230
		43.00	*63.98*	7.651	*194.34*	0.1229	*0.0114*	0.0219
		44.00	*65.47*	7.625	*193.68*	0.1208	*0.0112*	0.0215
		48.00	*71.42*	7.537	*191.44*	0.1135	*0.0105*	0.0202
		49.00	*72.91*	7.511	*190.78*	0.1113	*0.0103*	0.0198
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.2212	*0.0206*	0.0394
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.2332	*0.0217*	0.0415

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

6 in. OD Casing *(152 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
		OH	*OH*	9.000	*228.60*	0.2454	*0.0228*	0.0437
		34.00	*50.59*	8.290	*210.57*	0.1785	*0.0166*	0.0318
		38.00	*56.54*	8.196	*208.18*	0.1700	*0.0158*	0.0303
9	*229*	40.00	*59.52*	8.150	*207.01*	0.1659	*0.0154*	0.0296
		45.00	*66.96*	8.032	*204.01*	0.1555	*0.0145*	0.0277
		50.20	*74.70*	7.910	*200.91*	0.1449	*0.0135*	0.0258
		55.00	*81.84*	7.812	*198.42*	0.1365	*0.0127*	0.0243
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.2578	*0.0240*	0.0459
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.2703	*0.0251*	0.0481
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.2830	*0.0263*	0.0504
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.2959	*0.0275*	0.0527
		OH	*OH*	9.625	*244.48*	0.3089	*0.0287*	0.0550
		29.30	*43.60*	9.063	*230.20*	0.2516	*0.0234*	0.0448
		32.30	*48.06*	9.001	*228.63*	0.2455	*0.0228*	0.0437
		36.00	*53.57*	8.921	*226.59*	0.2377	*0.0221*	0.0423
		40.00	*59.52*	8.835	*224.41*	0.2294	*0.0213*	0.0409
9-5/8	*244*	43.50	*64.73*	8.755	*222.38*	0.2217	*0.0206*	0.0395
		47.00	*69.94*	8.681	*220.50*	0.2147	*0.0199*	0.0382
		53.50	*79.61*	8.535	*216.79*	0.2010	*0.0187*	0.0358
		58.40	*86.90*	8.435	*214.25*	0.1917	*0.0178*	0.0341
		61.10	*90.92*	8.375	*212.73*	0.1862	*0.0173*	0.0332
		71.80	*106.84*	8.125	*206.38*	0.1637	*0.0152*	0.0292
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.3221	*0.0299*	0.0574
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.3355	*0.0312*	0.0598
		OH	*OH*	10.000	*254.00*	0.3491	*0.0324*	0.0622
		33.00	*49.10*	9.384	*238.35*	0.2839	*0.0264*	0.0506
		41.50	*61.75*	9.200	*233.68*	0.2653	*0.0247*	0.0472
10	*254*	45.50	*67.70*	9.120	*231.65*	0.2573	*0.0239*	0.0458
		50.50	*75.14*	9.016	*229.01*	0.2470	*0.0230*	0.0440
		55.50	*82.58*	8.908	*226.26*	0.2364	*0.0220*	0.0421
		61.20	*91.07*	8.790	*223.27*	0.2251	*0.0209*	0.0401
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.3628	*0.0337*	0.0646
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.3767	*0.0350*	0.0671
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.3907	*0.0363*	0.0696
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.4050	*0.0376*	0.0721
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.4194	*0.0390*	0.0747
		OH	*OH*	10.750	*273.05*	0.4339	*0.0403*	0.0773
		32.75	*48.73*	10.192	*258.88*	0.3702	*0.0344*	0.0659
		35.75	*53.20*	10.136	*257.45*	0.3640	*0.0338*	0.0648
		40.50	*60.26*	10.050	*255.27*	0.3545	*0.0329*	0.0631
		45.50	*67.70*	9.950	*252.73*	0.3436	*0.0319*	0.0612
10-3/4	*273*	51.00	*75.89*	9.850	*250.19*	0.3328	*0.0309*	0.0593
		54.00	*80.35*	9.784	*248.51*	0.3257	*0.0303*	0.0580
		55.00	*81.84*	9.760	*247.90*	0.3232	*0.0300*	0.0576
		60.70	*90.32*	9.660	*245.36*	0.3126	*0.0290*	0.0557
		65.70	*97.76*	9.560	*242.82*	0.3021	*0.0281*	0.0538
		71.10	*105.80*	9.450	*240.03*	0.2907	*0.0270*	0.0518
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.4487	*0.0417*	0.0799
11	*279*	OH	*OH*	11.000	*279.40*	0.4636	*0.0431*	0.0826
		26.75	*39.80*	10.552	*268.02*	0.4109	*0.0382*	0.0732
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.4787	*0.0445*	0.0853
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.4939	*0.0459*	0.0880
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.5094	*0.0473*	0.0907
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.5249	*0.0488*	0.0935
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.5407	*0.0502*	0.0963

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

6 in. OD Casing *(152 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.5566	*0.0517*	0.0991
		38.00	*56.54*	11.150	*283.21*	0.4817	*0.0448*	0.0858
		42.00	*62.50*	11.084	*281.53*	0.4737	*0.0440*	0.0844
		47.00	*69.94*	11.000	*279.40*	0.4636	*0.0431*	0.0826
		54.00	*80.35*	10.880	*276.35*	0.4493	*0.0417*	0.0800
		60.00	*89.28*	10.772	*273.61*	0.4365	*0.0406*	0.0777
		65.00	*96.72*	10.682	*271.32*	0.4260	*0.0396*	0.0759
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.5728	*0.0532*	0.1020
12	*305*	OH	*OH*	12.000	*304.80*	0.5890	*0.0547*	0.1049
		31.50	*46.87*	11.514	*292.46*	0.5267	*0.0489*	0.0938
		40.00	*59.52*	11.384	*289.15*	0.5105	*0.0474*	0.0909
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.6055	*0.0563*	0.1078
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.6221	*0.0578*	0.1108
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.6389	*0.0594*	0.1138
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.6558	*0.0609*	0.1168
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.6730	*0.0625*	0.1199
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.6903	*0.0641*	0.1229
		43.00	*63.98*	12.130	*308.10*	0.6061	*0.0563*	0.1080
		53.00	*78.86*	11.970	*304.04*	0.5851	*0.0544*	0.1042
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.7077	*0.0658*	0.1261
13	*330*	OH	*OH*	13.000	*330.20*	0.7254	*0.0674*	0.1292
		36.50	*54.31*	12.482	*317.04*	0.6534	*0.0607*	0.1164
		40.00	*59.52*	12.438	*315.93*	0.6474	*0.0602*	0.1153
		45.00	*66.96*	12.360	*313.94*	0.6369	*0.0592*	0.1134
		50.00	*74.40*	12.282	*311.96*	0.6264	*0.0582*	0.1116
		54.00	*80.35*	12.220	*310.39*	0.6181	*0.0574*	0.1101
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.7432	*0.0690*	0.1324
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.7612	*0.0707*	0.1356
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.7793	*0.0724*	0.1388
		48.00	*71.42*	12.715	*322.96*	0.6854	*0.0637*	0.1221
		54.50	*81.10*	12.615	*320.42*	0.6716	*0.0624*	0.1196
		61.00	*90.77*	12.515	*317.88*	0.6579	*0.0611*	0.1172
		68.00	*101.18*	12.415	*315.34*	0.6443	*0.0599*	0.1148
		72.00	*107.14*	12.347	*313.61*	0.6351	*0.0590*	0.1131
		77.00	*114.58*	12.275	*311.79*	0.6254	*0.0581*	0.1114
		83.00	*123.50*	12.175	*309.25*	0.6121	*0.0529*	0.1090
		85.00	*126.48*	12.159	*308.84*	0.6100	*0.0567*	0.1086
		92.00	*136.90*	12.031	*305.59*	0.5931	*0.0551*	0.1056
		98.00	*145.82*	11.937	*303.20*	0.5808	*0.0540*	0.1034
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.7976	*0.0741*	0.1421
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.8161	*0.0758*	0.1454
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.8348	*0.0776*	0.1487
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.8536	*0.0793*	0.1520
14	*356*	OH	*OH*	14.000	*355.60*	0.8726	*0.0811*	0.1554
		42.00	*62.50*	13.448	*341.58*	0.7900	*0.0734*	0.1407
		50.00	*74.40*	13.344	*338.94*	0.7748	*0.0720*	0.1380
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.8918	*0.0829*	0.1588
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.9112	*0.0847*	0.1623
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.9307	*0.0865*	0.1658
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.9504	*0.0883*	0.1693
14-5/8	*371*	OH	*OH*	14.625	*371.48*	0.9702	*0.0901*	0.1728
14-3/4	*375*	OH	*OH*	14.750	*374.65*	0.9902	*0.0920*	0.1764
14-7/8	*378*	OH	*OH*	14.875	*377.83*	1.0104	*0.0939*	0.1880
15	*381*	OH	*OH*	15.000	*381.00*	1.0308	*0.0958*	0.1836
		47.50	*70.68*	14.418	*366.22*	0.9374	*0.0871*	0.1670
15-1/8	*384*	OH	*OH*	15.125	*384.18*	1.0513	*0.0977*	0.1873

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

6 in. OD Casing *(152 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
15-1/4	*387*	OH	*OH*	15.250	*387.35*	1.0721	*0.0996*	0.1909
15-3/8	*391*	OH	*OH*	15.375	*390.53*	1.0929	*0.1015*	0.1947
15-1/2	*394*	OH	*OH*	15.500	*393.70*	1.1140	*0.1035*	0.1984
15-5/8	*397*	OH	*OH*	15.625	*396.88*	1.1352	*0.1055*	0.2022
15-3/4	*400*	OH	*OH*	15.750	*400.05*	1.1566	*0.1075*	0.2060
15-7/8	*403*	OH	*OH*	15.875	*403.23*	1.1781	*0.1095*	0.2098
16	*406*	OH	*OH*	16.000	*406.40*	1.1999	*0.1115*	0.2137
		52.50	*78.12*	15.396	*391.06*	1.0965	*0.1019*	0.1953
		55.00	*81.84*	15.375	*390.53*	1.0929	*0.1015*	0.1947
		65.00	*96.72*	15.250	*387.35*	1.0721	*0.0996*	0.1909
		70.00	*104.16*	15.198	*386.03*	1.0634	*0.0988*	0.1894
		75.00	*111.60*	15.125	*384.18*	1.0513	*0.0977*	0.1873
		84.00	*124.99*	15.010	*381.25*	1.0324	*0.0959*	0.1839
		109.00	*162.19*	14.688	*373.08*	0.9803	*0.0911*	0.1746

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

6-5/8 in. OD Casing *(168 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
7-3/4	*197*	OH	*OH*	7.750	*196.85*	0.0882	*0.0082*	0.0157
7-7/8	*200*	OH	*OH*	7.875	*200.03*	0.0989	*0.0092*	0.0176
8	*203*	OH	*OH*	8.000	*203.20*	0.1097	*0.0102*	0.0195
		16.00	*23.80*	7.628	*193.75*	0.0780	*0.0072*	0.0139
		20.00	*29.76*	7.528	*191.21*	0.0697	*0.0065*	0.0124
		26.00	*38.68*	7.386	*187.60*	0.0582	*0.0054*	0.0104
8-1/8	*206*	OH	*OH*	8.125	*206.38*	0.1207	*0.0112*	0.0215
		28.00	*41.66*	7.485	*190.12*	0.0662	*0.0061*	0.0118
		32.00	*47.61*	7.385	*187.58*	0.0581	*0.0054*	0.0103
		35.50	*52.82*	7.285	*185.04*	0.0501	*0.0046*	0.0089
		39.50	*58.77*	7.185	*182.50*	0.0422	*0.0039*	0.0075
		42.00	*62.49*	7.125	*180.98*	0.0375	*0.0035*	0.0067
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.1319	*0.0122*	0.0235
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.1432	*0.0133*	0.0255
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.1547	*0.0143*	0.0276
8-5/8	*219*	OH	*OH*	8.625	*219.08*	0.1664	*0.0154*	0.0296
		20.00	*29.76*	8.191	*208.05*	0.1266	*0.0117*	0.0225
		24.00	*35.71*	8.097	*205.66*	0.1182	*0.0109*	0.0211
		28.00	*41.66*	8.017	*203.63*	0.1112	*0.0103*	0.0198
		32.00	*47.61*	7.921	*201.19*	0.1028	*0.0095*	0.0183
		36.00	*53.56*	7.825	*198.76*	0.0946	*0.0088*	0.0168
		38.00	*56.54*	7.775	*197.49*	0.0903	*0.0084*	0.0161
		40.00	*59.51*	7.725	*196.22*	0.0861	*0.0080*	0.0153
		43.00	*63.98*	7.651	*194.34*	0.0799	*0.0074*	0.0142
		44.00	*65.46*	7.625	*193.68*	0.0777	*0.0072*	0.0138
		48.00	*71.41*	7.537	*191.44*	0.0705	*0.0065*	0.0125
		49.00	*72.90*	7.511	*190.78*	0.0683	*0.0063*	0.0122
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.1782	*0.0165*	0.0317
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.1902	*0.0176*	0.0339
9	*229*	OH	*OH*	9.000	*228.60*	0.2024	*0.0187*	0.0361
		34.00	*50.59*	8.290	*210.57*	0.1355	*0.0125*	0.0241
		38.00	*56.54*	8.196	*207.92*	0.1261	*0.0117*	0.0225
		40.00	*59.51*	8.150	*207.01*	0.1229	*0.0114*	0.0219
		45.00	*66.95*	8.032	*204.01*	0.1125	*0.0104*	0.0200
		50.20	*74.71*	7.910	*200.91*	0.1019	*0.0094*	0.0181
		55.00	*81.83*	7.812	*198.42*	0.0935	*0.0087*	0.0166
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.2148	*0.0199*	0.0383
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.2273	*0.0211*	0.0405
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.2400	*0.0222*	0.0427
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.2529	*0.0234*	0.0450
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.2659	*0.0247*	0.0474
		29.30	*43.60*	9.063	*230.20*	0.2086	*0.0194*	0.0372
		32.30	*48.06*	9.001	*228.63*	0.2025	*0.0188*	0.0361
		36.00	*53.57*	8.921	*226.59*	0.1947	*0.0181*	0.0347
		40.00	*59.52*	8.835	*224.41*	0.1863	*0.0173*	0.0332
		43.50	*64.73*	8.755	*222.38*	0.1787	*0.0166*	0.0318
		47.00	*69.94*	8.681	*220.50*	0.1716	*0.0160*	0.0306
		53.50	*79.61*	8.535	*216.79*	0.1579	*0.0147*	0.0281
		58.40	*86.90*	8.435	*214.25*	0.1487	*0.0138*	0.0265
		61.10	*90.92*	8.375	*212.73*	0.1432	*0.0133*	0.0255
		71.80	*106.84*	8.125	*206.38*	0.1207	*0.0112*	0.0215
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.2791	*0.0259*	0.0497
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.2925	*0.0272*	0.0521

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

6-5/8 in. OD Casing *(168 mm)* (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m 3/m ●	bbl/ft ▲
10	254	OH	OH	10.000	254.00	0.3060	0.0284	0.0545
		33.00	49.10	9.384	238.35	0.2409	0.0224	0.0429
		41.50	61.75	9.200	233.68	0.2222	0.0207	0.0396
		45.50	67.70	9.120	231/65	0.2143	0.0199	0.0382
		50.50	75.14	9.016	229.01	0.2040	0.0190	0.0363
		55.50	82.58	8.908	226.26	0.1934	0.0180	0.0344
		61.20	91.07	8.790	223.27	0.1820	0.0169	0.0324
10-1/8	257	OH	OH	10.125	257.18	0.3197	0.0297	0.0569
10-1/4	260	OH	OH	10.250	260.35	0.3336	0.0310	0.0594
10-3/8	264	OH	OH	10.375	263.53	0.3477	0.0323	0.0619
10-1/2	267	OH	OH	10.500	266.70	0.3619	0.0336	0.0645
10-5/8	270	OH	OH	10.625	269.88	0.3763	0.0350	0.0670
10-3/4	273	OH	OH	10.750	273.05	0.3909	0.0363	0.0696
		32.75	48.73	10.192	258.88	0.3272	0.0304	0.0583
		35.75	53.20	10.136	257.45	0.3210	0.0298	0.0572
		40.50	60.26	10.050	255.27	0.3115	0.0289	0.0555
		45.50	67.70	9.950	252.73	0.3006	0.0279	0.0535
		51.00	75.89	9.850	250.19	0.2898	0.0269	0.0516
		54.00	80.35	9.784	248.51	0.2827	0.0263	0.0504
		55.00	81.84	9.760	247.90	0.2802	0.0260	0.0499
		60.70	90.32	9.660	245.36	0.2696	0.0250	0.0480
		65.70	97.76	9.560	242.82	0.2591	0.0241	0.0461
		71.10	105.80	9.450	240.03	0.2477	0.0230	0.0441
10-7/8	276	OH	OH	10.875	276.23	0.4056	0.0377	0.0722
11	279	OH	OH	11.000	279.40	0.4206	0.0391	0.0749
		26.75	39.80	10.552	268.02	0.3679	0.0342	0.0655
11-1/8	283	OH	OH	11.125	282.58	0.4356	0.0405	0.0776
11-1/4	286	OH	OH	11.250	285.75	0.4509	0.0419	0.0803
11-3/8	289	OH	OH	11.375	288.93	0.4663	0.0433	0.0831
11-1/2	292	OH	OH	11.500	292.10	0.4819	0.0488	0.0858
11-5/8	295	OH	OH	11.625	295.28	0.4977	0.0462	0.0886
11-3/4	298	OH	OH	11.750	298.45	0.5136	0.0477	0.0915
		38.00	56.54	11.150	283.21	0.4387	0.0408	0.0781
		42.00	62.50	11.084	281.53	0.4307	0.0400	0.0767
		47.00	69.94	11.000	279.40	0.4206	0.0391	0.0749
		54.00	80.35	10.880	276.35	0.4062	0.0377	0.0724
		60.00	89.28	10.772	273.61	0.3935	0.0366	0.0701
11-3/8	298	65.00	96.72	10.682	271.32	0.3829	0.0356	0.0682
11-7/8	302	OH	OH	11.875	301.63	0.5297	0.0492	0.0943
12	305	OH	OH	12.000	304.80	0.5460	0.0507	0.0972
		31.50	46.87	11.514	292.46	0.4837	0.0449	0.0861
		40.00	59.52	11.384	289.15	0.4674	0.0434	0.0833
12-1/8	308	OH	OH	12.125	307.98	0.5624	0.0523	0.1002
12-1/4	311	OH	OH	12.250	311.15	0.5791	0.0538	0.1031
12-3/8	314	OH	OH	12.375	314.33	0.5958	0.0554	0.1061
12-1/2	318	OH	OH	12.500	317.50	0.6128	0.0569	0.1091
12-5/8	321	OH	OH	12.625	320.68	0.6299	0.0585	0.1122
12-3/4	324	OH	OH	12.750	323.85	0.6472	0.0601	0.1153
		43.00	63.98	12.130	308.10	0.5631	0.0523	0.1003
		53.00	78.86	11.970	304.04	0.5421	0.0504	0.0965
12-7/8	327	OH	OH	12.875	327.03	0.6647	0.0618	0.1184
13	330	OH	OH	13.000	330.20	0.6823	0.0634	0.1215
		36.50	54.31	12.482	317.04	0.6104	0.0567	0.1087
		40.00	59.52	12.438	315.93	0.6044	0.0562	0.1076
		45.00	66.96	12.360	313.94	0.5938	0.0552	0.1058
		50.00	74.40	12.282	311.96	0.5833	0.0542	0.1039

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

6-5/8 in. OD Casing *(168 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
13	*330*	54.00	*80.35*	12.220	*310.39*	0.5751	*0.0534*	0.1024
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.7002	*0.0651*	0.1247
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.7181	*0.0667*	0.1279
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.7363	*0.0684*	0.1311
		48.00	*71.42*	12.715	*322.96*	0.6424	*0.0597*	0.1144
		54.50	*81.10*	12.615	*320.42*	0.6286	*0.0584*	0.1120
		61.00	*90.77*	12.515	*317.88*	0.6149	*0.0571*	0.1095
		68.00	*101.18*	12.415	*315.34*	0.6013	*0.0559*	0.1071
		72.00	*107.14*	12.347	*313.61*	0.5921	*0.0550*	0.1055
		77.00	*114.58*	12.275	*311.79*	0.5824	*0.0541*	0.1037
		83.00	*123.50*	12.175	*309.25*	0.5691	*0.0529*	0.1014
		85.00	*126.48*	12.159	*308.84*	0.5669	*0.0527*	0.1010
		92.00	*136.90*	12.031	*305.59*	0.5501	*0.0511*	0.0980
		98.00	*145.82*	11.937	*303.20*	0.5378	*0.0500*	0.0958
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.7546	*0.0701*	0.1344
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.7731	*0.0718*	0.1377
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.7918	*0.0736*	0.1410
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.8106	*0.0753*	0.1444
14	*356*	OH	*OH*	14.000	*355.60*	0.8296	*0.0771*	0.1478
		42.00	*62.50*	13.448	*341.58*	0.7470	*0.0694*	0.1330
		50.00	*74.40*	13.344	*338.94*	0.7318	*0.0680*	0.1303
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.8488	*0.0789*	0.1515
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.8681	*0.0807*	0.1546
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.8876	*0.0825*	0.1581
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.9073	*0.0843*	0.1616
14-5/8	*371*	OH	*OH*	14.625	*371.48*	0.9272	*0.0861*	0.1651
14-3/4	*375*	OH	*OH*	14.750	*374.65*	0.9472	*0.0880*	0.1687
14-7/8	*378*	OH	*OH*	14.875	*377.83*	0.9674	*0.0899*	0.1723
15	*381*	OH	*OH*	15.000	*381.00*	0.9878	*0.0918*	0.1759
		47.50	*70.68*	14.418	*366.22*	0.8944	*0.0831*	0.1593
15-1/8	*384*	OH	*OH*	15.125	*384.18*	1.0083	*0.0937*	0.1796
15-1/4	*387*	OH	*OH*	15.250	*387.35*	1.0290	*0.0956*	0.1833
15-3/8	*391*	OH	*OH*	15.375	*390.53*	1.0499	*0.0975*	0.1870
15-1/2	*394*	OH	*OH*	15.500	*393.70*	1.0709	*0.0995*	0.1907
15-5/8	*397*	OH	*OH*	15.625	*396.88*	1.0922	*0.1015*	0.1945
15-3/4	*400*	OH	*OH*	15.750	*400.05*	1.1136	*0.1035*	0.1983
15-7/8	*403*	OH	*OH*	15.875	*403.23*	1.1351	*0.1055*	0.2022
16	*406*	OH	*OH*	16.000	*406.40*	1.1568	*0.1075*	0.2060
		52.50	*78.12*	15.396	*391.06*	1.0534	*0.0979*	0.1876
		55.00	*81.84*	15.375	*390.53*	1.0499	*0.0975*	0.1870
		65.00	*96.72*	15.250	*387.35*	1.0290	*0.0956*	0.1833
		70.00	*104.16*	15.198	*386.03*	1.0204	*0.0948*	0.1817
		75.00	*111.60*	15.125	*384.18*	1.0083	*0.0937*	0.1796
		84.00	*124.99*	15.010	*381.25*	0.9894	*0.0919*	0.1762
		109.00	*162.19*	14.688	*373.08*	0.9373	*0.0871*	0.1669
16-1/8	*410*	OH	*OH*	16.125	*409.58*	1.1787	*0.1095*	0.2099
16-1/4	*413*	OH	*OH*	16.250	*412.75*	1.2008	*0.1116*	0.2139
16-3/8	*416*	OH	*OH*	16.375	*415.93*	1.2231	*0.1136*	0.2178
16-1/2	*419*	OH	*OH*	16.500	*419.10*	1.2455	*0.1157*	0.2218
16-5/8	*422*	OH	*OH*	16.625	*422.28*	1.2681	*0.1178*	0.2259
16-3/4	*425*	OH	*OH*	16.750	*425.45*	1.2908	*0.1199*	0.2299
16-7/8	*429*	OH	*OH*	16.875	*428.63*	1.3137	*0.1221*	0.2340
17	*432*	OH	*OH*	17.000	*431.80*	1.3368	*0.1242*	0.2381
17-1/8	*435*	OH	*OH*	17.125	*434.98*	1.3601	*0.1264*	0.2422
17-1/4	*438*	OH	*OH*	17.250	*438.15*	1.3835	*0.1285*	0.2464
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.4071	*0.1307*	0.2506

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

6-5/8 in. OD Casing *(168 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.4309	*0.1329*	0.2549
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.4549	*0.1352*	0.2591
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.4790	*0.1374*	0.2634
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.5033	*0.1397*	0.2677
18	*457*	OH	*OH*	18.000	*457.20*	1.5277	*0.1419*	0.2721
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.5523	*0.1442*	0.2765
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.5771	*0.1465*	0.2809
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.6021	*0.1488*	0.2853
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.6273	*0.1512*	0.2898
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.6526	*0.1535*	0.2943
		78.00	*116.06*	17.855	*453.52*	1.4994	*0.1393*	0.2670
		87.50	*130.20*	17.755	*450.98*	1.4799	*0.1375*	0.2636
		96.50	*143.59*	17.655	*448.44*	1.4606	*0.1357*	0.2601
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.6780	*0.1559*	0.2989
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.7037	*0.1583*	0.3034
19	*483*	OH	*OH*	19.000	*482.60*	1.7295	*0.1607*	0.3080
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.7555	*0.1631*	0.3127
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.7817	*0.1655*	0.3173
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.8080	*0.1680*	0.3220
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.8345	*0.1704*	0.3267
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.8612	*0.1729*	0.3315
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.8880	*0.1754*	0.3363
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.9150	*0.1779*	0.3411
20	*508*	OH	*OH*	20.000	*508.00*	1.9422	*0.1804*	0.3459
		90.00	*133.22*	19.166	*486.82*	1.7641	*0.1639*	0.3142
		94.00	*139.87*	19.124	*485.75*	1.7553	*0.1631*	0.3126
		106.50	*158.47*	19.000	*482.60*	1.7295	*0.1607*	0.3080
		133.00	*197.90*	18.730	*475.74*	1.6740	*0.1555*	0.2981
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.9696	*0.1830*	0.3508
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.9971	*0.1855*	0.3557
20-3/8	*518*	OH	*OH*	20.375	*517.53*	2.0248	*0.1881*	0.3606
20-1/2	*521*	OH	*OH*	20.500	*520.70*	2.0527	*0.1907*	0.3656
20-5/8	*524*	OH	*OH*	20.625	*523.88*	2.0807	*0.1933*	0.3706
20-3/4	*527*	OH	*OH*	20.750	*527.05*	2.1089	*0.1959*	0.3756
20-7/8	*530*	OH	*OH*	20.875	*530.23*	2.1373	*0.1986*	0.3807
21	*533*	OH	*OH*	21.000	*533.40*	2.1658	*0.2012*	0.3858
21-1/8	*537*	OH	*OH*	21.125	*536.58*	2.1946	*0.2039*	0.3909
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.2234	*0.2066*	0.3960
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.2525	*0.2093*	0.4012
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.2817	*0.2120*	0.4064
		92.50	*137.64*	20.710	*526.03*	2.0999	*0.1951*	0.3740
		103.00	*153.26*	20.610	*523.49*	2.0773	*0.1930*	0.3700
		114.00	*169.63*	20.510	*520.95*	2.0549	*0.1909*	0.3660
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.3111	*0.2147*	0.4116
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.3407	*0.2175*	0.4169
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.3704	*0.2202*	0.4222
22	*559*	OH	*OH*	22.000	*558.80*	2.4004	*0.2230*	0.4275
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.4304	*0.2258*	0.4329
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.4607	*0.2286*	0.4383
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.4911	*0.2314*	0.4437
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.5217	*0.2343*	0.4491
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.5525	*0.2371*	0.4546
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.5834	*0.2400*	0.4601
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.6145	*0.2429*	0.4657
23	*584*	OH	*OH*	23.000	*584.20*	2.6458	*0.2458*	0.4712

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7 in. OD Casing *(178 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
8	*203*	OH	*OH*	8.000	*203.20*	0.0818	*0.0076*	0.0146
		16.00	*23.81*	7.628	*193.75*	0.0501	*0.0047*	0.0089
		20.00	*29.76*	7.528	*191.21*	0.0418	*0.0039*	0.0075
		26.00	*38.69*	7.386	*187.60*	0.0303	*0.0028*	0.0054
8-1/8	*206*	OH	*OH*	8.125	*206.38*	0.0928	*0.0086*	0.0165
		28.00	*41.66*	7.485	*190.12*	0.0383	*0.0036*	0.0068
		32.00	*47.62*	7.385	*187.58*	0.0302	*0.0028*	0.0054
		35.50	*52.82*	7.285	*185.04*	0.0222	*0.0021*	0.0040
		39.50	*58.78*	7.185	*182.50*	0.0143	*0.0013*	0.0025
		42.00	*62.50*	7.125	*180.98*	0.0096	*0.0009*	0.0017
8-1/4	*210*	OH	*OH*	8.250	*209.55*	0.1040	*0.0097*	0.0185
8-3/8	*213*	OH	*OH*	8.375	*212.73*	0.1153	*0.0107*	0.0205
8-1/2	*216*	OH	*OH*	8.500	*215.90*	0.1268	*0.0118*	0.0226
8-5/8	*219*	OH	*OH*	8.625	*219.08*	0.1385	*0.0129*	0.0247
		20.00	*29.76*	8.191	*208.05*	0.0987	*0.0092*	0.0176
		24.00	*35.71*	8.097	*205.66*	0.0903	*0.0084*	0.0161
		28.00	*41.66*	8.017	*203.63*	0.0833	*0.0077*	0.0148
		32.00	*47.62*	7.921	*201.19*	0.0750	*0.0070*	0.0133
		36.00	*53.57*	7.825	*198.76*	0.0667	*0.0062*	0.0119
		38.00	*56.54*	7.775	*197.49*	0.0625	*0.0058*	0.0111
		40.00	*59.52*	7.725	*196.22*	0.0582	*0.0054*	0.0104
		43.00	*63.98*	7.651	*194.34*	0.0520	*0.0048*	0.0093
		44.00	*65.47*	7.625	*193.68*	0.0499	*0.0046*	0.0089
		48.00	*71.42*	7.537	*191.44*	0.0426	*0.0040*	0.0076
		49.00	*72.91*	7.511	*190.78*	0.0404	*0.0038*	0.0072
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.1503	*0.0140*	0.0268
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.1623	*0.0151*	0.0289
9	*229*	OH	*OH*	9.000	*228.60*	0.1745	*0.0162*	0.0311
		34.00	*50.59*	8.290	*210.57*	0.1076	*0.0100*	0.0192
		38.00	*56.54*	8.196	*208.18*	0.0991	*0.0092*	0.0177
		40.00	*59.52*	8.150	*207.01*	0.0950	*0.0088*	0.0169
		45.00	*66.96*	8.032	*204.01*	0.0846	*0.0079*	0.0151
		50.20	*74.70*	7.910	*200.91*	0.0740	*0.0069*	0.0132
		55.00	*81.84*	7.812	*198.42*	0.0656	*0.0061*	0.0117
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.1869	*0.0174*	0.0333
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.1994	*0.0185*	0.0355
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.2121	*0.0197*	0.0378
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.2250	*0.0209*	0.0401
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.2380	*0.0221*	0.0424
		29.30	*43.60*	9.063	*230.20*	0.1807	*0.0168*	0.0322
		32.30	*48.06*	9.001	*228.63*	0.1746	*0.0162*	0.0311
		36.00	*53.57*	8.921	*226.59*	0.1668	*0.0155*	0.0297
		40.00	*59.52*	8.835	*224.41*	0.1585	*0.0147*	0.0282
		43.50	*64.73*	8.755	*222.38*	0.1508	*0.0140*	0.0269
		47.00	*69.94*	8.681	*220.50*	0.1438	*0.0134*	0.0256
		53.50	*79.61*	8.535	*216.79*	0.1301	*0.0121*	0.0232
		58.40	*86.90*	8.435	*214.25*	0.1208	*0.0112*	0.0215
		61.10	*90.92*	8.375	*212.73*	0.1153	*0.0107*	0.0205
		71.80	*106.84*	8.125	*206.38*	0.0928	*0.0086*	0.0165
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.2512	*0.0233*	0.0447
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.2646	*0.0246*	0.0471
10	*254*	OH	*OH*	10.000	*254.00*	0.2782	*0.0258*	0.0495
		33.00	*49.10*	9.384	*238.35*	0.2130	*0.0198*	0.0379
		41.50	*61.75*	9.200	*233.68*	0.1944	*0.0181*	0.0346
		45.50	*67.70*	9.120	*231.65*	0.1864	*0.0173*	0.0332

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7 in. OD Casing *(178 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
10	*254*	50.50	*75.14*	9.016	*229.01*	0.1761	*0.0164*	0.0314
		55.50	*82.58*	8.908	*226.26*	0.1655	*0.0154*	0.0295
		61.20	*91.07*	8.790	*223.27*	0.1542	*0.0143*	0.0275
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.2919	*0.0271*	0.0520
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.3058	*0.0284*	0.0545
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.3198	*0.0297*	0.0570
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.3341	*0.0310*	0.0595
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.3485	*0.0324*	0.0621
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.3630	*0.0337*	0.0647
		32.75	*48.73*	10.192	*258.88*	0.2993	*0.0278*	0.0533
		35.75	*53.20*	10.136	*257.45*	0.2931	*0.0272*	0.0522
		40.50	*60.26*	10.050	*255.27*	0.2836	*0.0264*	0.0505
		45.50	*67.70*	9.950	*252.73*	0.2727	*0.0253*	0.0486
		51.00	*75.89*	9.850	*250.19*	0.2619	*0.0243*	0.0466
		54.00	*80.35*	9.784	*248.51*	0.2548	*0.0237*	0.0454
		55.00	*81.84*	9.760	*247.90*	0.2523	*0.0234*	0.0449
		60.70	*90.32*	9.660	*245.36*	0.2417	*0.0225*	0.0430
		65.70	*97.76*	9.560	*242.82*	0.2312	*0.0215*	0.0412
		71.10	*105.80*	9.450	*240.03*	0.2198	*0.0204*	0.0391
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.3778	*0.0351*	0.0673
11	*279*	OH	*OH*	11.000	*279.40*	0.3927	*0.0365*	0.0699
		26.75	*39.80*	10.552	*268.02*	0.3400	*0.0316*	0.0606
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.4078	*0.0379*	0.0726
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.4230	*0.0393*	0.0753
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.4385	*0.0407*	0.0781
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.4540	*0.0422*	0.0809
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.4698	*0.0437*	0.0837
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.4857	*0.0451*	0.0865
		38.00	*56.54*	11.150	*283.21*	0.4108	*0.0382*	0.0732
		42.00	*62.50*	11.084	*281.53*	0.4028	*0.0374*	0.0717
		47.00	*69.94*	11.000	*279.40*	0.3927	*0.0365*	0.0699
		54.00	*80.35*	10.880	*276.35*	0.3784	*0.0352*	0.0674
		60.00	*89.28*	10.772	*273.61*	0.3656	*0.0340*	0.0651
		65.00	*96.72*	10.682	*271.32*	0.3551	*0.0330*	0.0632
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.5019	*0.0466*	0.0894
12	*305*	OH	*OH*	12.000	*304.80*	0.5181	*0.0481*	0.0923
		31.50	*46.87*	11.514	*292.46*	0.4558	*0.0424*	0.0812
		40.00	*59.52*	11.384	*289.15*	0.4396	*0.0408*	0.0783
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.5346	*0.0497*	0.0952
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.5512	*0.0512*	0.0982
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.5680	*0.0528*	0.1012
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.5849	*0.0543*	0.1042
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.6021	*0.0559*	0.1072
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.6194	*0.0575*	0.1103
		43.00	*63.98*	12.130	*308.10*	0.5352	*0.0497*	0.0953
		53.00	*78.86*	11.970	*304.04*	0.5142	*0.0478*	0.0916
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.6368	*0.0592*	0.1134
13	*330*	OH	*OH*	13.000	*330.20*	0.6545	*0.0608*	0.1166
		36.50	*54.31*	12.482	*317.04*	0.5825	*0.0541*	0.1037
		40.00	*59.52*	12.438	*315.93*	0.5765	*0.0536*	0.1027
		45.00	*66.96*	12.360	*313.94*	0.5660	*0.0526*	0.1008
		50.00	*74.40*	12.282	*311.96*	0.5555	*0.0516*	0.0989
		54.00	*80.35*	12.220	*310.39*	0.5472	*0.0508*	0.0975
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.6723	*0.0625*	0.1197
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.6903	*0.0641*	0.1229

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7 in. OD Casing *(178 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.7084	*0.0658*	0.1262
		48.00	*71.42*	12.715	*322.96*	0.6145	*0.0571*	0.1094
		54.50	*81.10*	12.615	*320.42*	0.6007	*0.0558*	0.1070
		61.00	*90.77*	12.515	*317.88*	0.5870	*0.0545*	0.1045
		68.00	*101.18*	12.415	*315.34*	0.5734	*0.0533*	0.1021
		72.00	*107.14*	12.347	*313.61*	0.5642	*0.0524*	0.1005
		77.00	*114.58*	12.275	*311.79*	0.5545	*0.0515*	0.0988
		83.00	*123.50*	12.175	*309.25*	0.5412	*0.0503*	0.0964
		85.00	*126.48*	12.159	*308.84*	0.5391	*0.0501*	0.0960
		92.00	*136.90*	12.031	*305.59*	0.5222	*0.0485*	0.0930
		98.00	*145.82*	11.937	*303.20*	0.5099	*0.0474*	0.0908
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.7267	*0.0675*	0.1294
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.7452	*0.0692*	0.1327
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.7639	*0.0710*	0.1361
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.7827	*0.0727*	0.1394
14	*356*	OH	*OH*	14.000	*355.60*	0.8017	*0.0745*	0.1428
		42.00	*62.50*	13.448	*341.58*	0.7191	*0.0668*	0.1281
		50.00	*74.40*	13.344	*338.94*	0.7039	*0.0654*	0.1254
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.8209	*0.0763*	0.1462
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.8403	*0.0781*	0.1497
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.8598	*0.0799*	0.1531
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.8795	*0.0817*	0.1566
14-5/8	*371*	OH	*OH*	14.625	*371.48*	0.8993	*0.0836*	0.1602
14-3/4	*375*	OH	*OH*	14.750	*374.65*	0.9193	*0.0854*	0.1637
14-7/8	*378*	OH	*OH*	14.875	*377.83*	0.9395	*0.0873*	0.1673
15	*381*	OH	*OH*	15.000	*381.00*	0.9599	*0.0892*	0.1710
		47.50	*70.68*	14.418	*366.22*	0.8665	*0.0805*	0.1543
15-1/8	*384*	OH	*OH*	15.125	*384.18*	0.9804	*0.0911*	0.1746
15-1/4	*387*	OH	*OH*	15.250	*387.35*	1.0011	*0.0930*	0.1783
15-3/8	*391*	OH	*OH*	15.375	*390.53*	1.0220	*0.0950*	0.1820
15-1/2	*394*	OH	*OH*	15.500	*393.70*	1.0431	*0.0969*	0.1858
15-5/8	*397*	OH	*OH*	15.625	*396.88*	1.0643	*0.0989*	0.1896
15-3/4	*400*	OH	*OH*	15.750	*400.05*	1.0857	*0.1009*	0.1934
15-7/8	*403*	OH	*OH*	15.875	*403.23*	1.1072	*0.1029*	0.1972
16	*406*	OH	*OH*	16.000	*406.40*	1.1290	*0.1049*	0.2011
		52.50	*78.12*	15.396	*391.06*	1.0256	*0.0953*	0.1827
		55.00	*81.84*	15.375	*390.53*	1.0220	*0.0950*	0.1820
		65.00	*96.72*	15.250	*387.35*	1.0011	*0.0930*	0.1783
		70.00	*104.16*	15.198	*386.03*	0.9925	*0.0922*	0.1768
		75.00	*111.60*	15.125	*384.18*	0.9804	*0.0911*	0.1746
		84.00	*124.99*	15.010	*381.25*	0.9615	*0.0893*	0.1713
		109.00	*162.19*	14.688	*373.08*	0.9094	*0.0845*	0.1620
16-1/8	*410*	OH	*OH*	16.125	*409.58*	1.1509	*0.1069*	0.2050
16-1/4	*413*	OH	*OH*	16.250	*412.75*	1.1730	*0.1090*	0.2089
16-3/8	*416*	OH	*OH*	16.375	*415.93*	1.1952	*0.1110*	0.2129
16-1/2	*419*	OH	*OH*	16.500	*419.10*	1.2176	*0.1131*	0.2169
16-5/8	*422*	OH	*OH*	16.625	*422.28*	1.2402	*0.1152*	0.2209
16-3/4	*425*	OH	*OH*	16.750	*425.45*	1.2629	*0.1173*	0.2249
16-7/8	*429*	OH	*OH*	16.875	*428.63*	1.2859	*0.1195*	0.2290
17	*432*	OH	*OH*	17.000	*431.80*	1.3090	*0.1216*	0.2331
17-1/8	*435*	OH	*OH*	17.125	*434.98*	1.3322	*0.1238*	0.2373
17-1/4	*438*	OH	*OH*	17.250	*438.15*	1.3557	*0.1259*	0.2415
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.3793	*0.1281*	0.2457
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.4030	*0.1304*	0.2499
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.4270	*0.1326*	0.2542
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.4511	*0.1348*	0.2585

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7 in. OD Casing *(178 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.4754	*0.1371*	0.2628
18	*457*	OH	*OH*	18.000	*457.20*	1.4999	*0.1393*	0.2671
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.5245	*0.1416*	0.2715
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.5493	*0.1439*	0.2759
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.5742	*0.1463*	0.2804
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.5994	*0.1486*	0.2849
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.6247	*0.1509*	0.2894
		78.00	*116.06*	17.855	*453.52*	1.4715	*0.1367*	0.2621
		87.50	*130.20*	17.755	*450.98*	1.4521	*0.1349*	0.2586
		96.50	*143.59*	17.655	*448.44*	1.4328	*0.1331*	0.2552
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.6502	*0.1533*	0.2939
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.6758	*0.1557*	0.2985
19	*483*	OH	*OH*	19.000	*482.60*	1.7016	*0.1581*	0.3031
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.7276	*0.1605*	0.3077
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.7538	*0.1629*	0.3124
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.7801	*0.1654*	0.3171
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.8066	*0.1678*	0.3218
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.8333	*0.1703*	0.3265
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.8602	*0.1728*	0.3313
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.8872	*0.1753*	0.3361
20	*508*	OH	*OH*	20.000	*508.00*	1.9144	*0.1779*	0.3410
		90.00	*133.92*	19.166	*486.82*	1.7362	*0.1613*	0.3092
		94.00	*139.87*	19.124	*485.75*	1.7274	*0.1605*	0.3077
		106.50	*158.47*	19.000	*482.60*	1.7016	*0.1581*	0.3031
		133.00	*197.90*	18.730	*475.74*	1.6461	*0.1529*	0.2932
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.9417	*0.1804*	0.3458
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.9692	*0.1830*	0.3507
20-3/8	*518*	OH	*OH*	20.375	*517.53*	1.9969	*0.1855*	0.3557
20-1/2	*521*	OH	*OH*	20.500	*520.70*	2.0248	*0.1881*	0.3606
20-5/8	*524*	OH	*OH*	20.625	*523.88*	2.0528	*0.1907*	0.3656
20-3/4	*527*	OH	*OH*	20.750	*527.05*	2.0810	*0.1933*	0.3706
20-7/8	*530*	OH	*OH*	20.875	*530.23*	2.1094	*0.1960*	0.3757
21	*533*	OH	*OH*	21.000	*533.40*	2.1380	*0.1986*	0.3808
21-1/8	*537*	OH	*OH*	21.125	*536.58*	2.1667	*0.2013*	0.3859
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.1956	*0.2040*	0.3910
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.2246	*0.2067*	0.3962
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.2539	*0.2094*	0.4014
		92.50	*137.64*	20.710	*526.03*	2.0720	*0.1925*	0.3690
		103.00	*153.26*	20.610	*523.49*	2.0495	*0.1904*	0.3650
		114.00	*169.63*	20.510	*520.95*	2.0270	*0.1883*	0.3610
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.2833	*0.2121*	0.4067
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.3128	*0.2149*	0.4119
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.3426	*0.2176*	0.4172
22	*559*	OH	*OH*	22.000	*558.80*	2.3725	*0.2204*	0.4226

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7-5/8 in. OD Casing *(194 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
8-5/8	*219*	OH	*OH*	8.625	*219.08*	0.0886	*0.0082*	0.0158
8-3/4	*222*	OH	*OH*	8.750	*222.25*	0.1005	*0.0093*	0.0179
8-7/8	*225*	OH	*OH*	8.875	*225.43*	0.1125	*0.0104*	0.0200
9	*229*	OH	*OH*	9.000	*228.60*	0.1247	*0.0115*	0.0222
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.1371	*0.0127*	0.0244
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.1496	*0.0139*	0.0266
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.1623	*0.0150*	0.0289
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.1752	*0.0162*	0.0312
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.1882	*0.0174*	0.0335
		29.30	*43.59*	9.063	*230.20*	0.1309	*0.0121*	0.0233
		32.30	*48.06*	9.001	*228.63*	0.1248	*0.0116*	0.0222
		36.00	*53.56*	8.921	*226.59*	0.1170	*0.0108*	0.0208
		40.00	*59.51*	8.835	*224.41*	0.1086	*0.0101*	0.0193
		43.50	*64.72*	8.755	*222.38*	0.1010	*0.0094*	0.0180
		47.00	*69.93*	8.681	*220.50*	0.0939	*0.0087*	0.0167
		53.50	*79.60*	8.535	*216.79*	0.0802	*0.0074*	0.0143
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.2014	*0.0187*	0.0359
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.2148	*0.0199*	0.0383
10	*254*	OH	*OH*	10.000	*254.00*	0.2283	*0.0211*	0.0407
		33.00	*49.10*	9.384	*238.35*	0.1632	*0.0151*	0.0291
		41.50	*61.74*	9.200	*233.68*	0.1446	*0.0134*	0.0257
		45.50	*67.69*	9.120	*231.65*	0.1366	*0.0126*	0.0243
		50.50	*75.13*	9.016	*229.01*	0.1263	*0.0117*	0.0225
		55.50	*82.58*	8.908	*226.26*	0.1157	*0.0107*	0.0206
		61.20	*91.05*	8.790	*223.27*	0.1043	*0.0097*	0.0186
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.2421	*0.0224*	0.0431
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.2560	*0.0237*	0.0456
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.2700	*0.0250*	0.0481
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.2843	*0.0263*	0.0506
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.2987	*0.0277*	0.0532
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.3132	*0.0290*	0.0558
		32.75	*48.73*	10.192	*258.88*	0.2495	*0.0231*	0.0444
		35.75	*53.19*	10.136	*257.45*	0.2433	*0.0225*	0.0433
		40.50	*60.26*	10;050	*255.27*	0.2338	*0.0217*	0.0416
		45.50	*67.69*	9.950	*227.33*	0.2229	*0.0111*	0.0397
		51.00	*75.88*	9.850	*250.19*	0.2121	*0.0196*	0.0378
		54.00	*80.34*	9.284	*235.81*	0.1530	*0.0142*	0.0273
		55.00	*81.83*	9.760	*247.90*	0.2025	*0.0188*	0.0361
		60.70	*90.31*	9.660	*245.36*	0.1919	*0.0178*	0.0342
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.3280	*0.0304*	0.0584
11	*279*	OH	*OH*	11.000	*279.40*	0.3428	*0.0319*	0.0611
		26.75	*39.80*	10.552	*268.02*	0.2902	*0.0270*	0.0517
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.3579	*0.0333*	0.0637
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.3732	*0.0347*	0.0665
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.3886	*0.0361*	0.0692
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.4042	*0.0376*	0.0720
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.4200	*0.0390*	0.0748
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.4359	*0.0405*	0.0776
		38.00	*56.54*	11.150	*283.21*	0.3610	*0.0335*	0.0643
		42.00	*62.50*	11.084	*281.53*	0.3530	*0.0328*	0.0629
		47.00	*69.94*	11.000	*279.40*	0.3428	*0.0319*	0.0611
		54.00	*80.35*	10.880	*276.35*	0.3285	*0.0305*	0.0585
		60.00	*89.28*	10.772	*273.61*	0.3158	*0.0293*	0.0562
		65.00	*96.72*	10.682	*271.32*	0.3052	*0.0284*	0.0544
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.4520	*0.0420*	0.0805

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7-5/8 in. OD Casing *(194 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
12	*305*	OH	*OH*	12.000	*304.80*	0.4683	*0.0435*	0.0834
		31.50	*46.87*	11.514	*292.46*	0.4059	*0.0377*	0.0723
		40.00	*59.52*	11.384	*289.15*	0.3897	*0.0362*	0.0694
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.4847	*0.0450*	0.0863
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.5013	*0.0466*	0.0893
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.5181	*0.0481*	0.0923
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.5351	*0.0497*	0.0953
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.5522	*0.0513*	0.0984
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.5695	*0.0529*	0.1014
		43.00	*63.98*	12.130	*308.10*	0.4854	*0.0451*	0.0865
		53.00	*78.86*	11.970	*304.04*	0.4644	*0.0431*	0.0827
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.5870	*0.0545*	0.1045
13	*330*	OH	*OH*	13.000	*330.20*	0.6046	*0.0562*	0.1077
		36.50	*54.31*	12.482	*317.04*	0.5326	*0.0495*	0.0949
		40.00	*59.52*	12.438	*315.93*	0.5267	*0.0489*	0.0938
		45.00	*66.96*	12.360	*313.94*	0.5161	*0.0480*	0.0919
		50.00	*74.40*	12.282	*311.96*	0.5056	*0.0470*	0.0901
		54.00	*80.35*	12.220	*310.39*	0.4973	*0.0462*	0.0886
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.6224	*0.0578*	0.1109
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.6404	*0.0595*	0.1141
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.6586	*0.0612*	0.1173
		48.00	*71.42*	12.715	*322.96*	0.5647	*0.0525*	0.1006
		54.50	*81.10*	12.615	*320.42*	0.5508	*0.0512*	0.0981
		61.00	*90.77*	12.515	*317.88*	0.5371	*0.0499*	0.0957
		68.00	*101.18*	12.415	*315.34*	0.5235	*0.0486*	0.0932
		72.00	*107.14*	12.347	*313.61*	0.5144	*0.0478*	0.0916
		77.00	*114.58*	12.275	*311.79*	0.5047	*0.0469*	0.0899
		83.00	*123.50*	12.175	*309.25*	0.4914	*0.0457*	0.0875
		85.00	*126.48*	12.159	*308.84*	0.4892	*0.0455*	0.0871
		92.00	*136.90*	12.031	*305.59*	0.4723	*0.0439*	0.0841
		98.00	*145.82*	11.937	*303.20*	0.4601	*0.0427*	0.0819
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.6769	*0.0629*	0.1206
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.6954	*0.0646*	0.1239
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.7140	*0.0663*	0.1272
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.7329	*0.0681*	0.1305
14	*356*	OH	*OH*	14.000	*355.60*	0.7519	*0.0699*	0.1339
		42.00	*62.50*	13.448	*341.58*	0.6692	*0.0622*	0.1192
		50.00	*74.40*	13.344	*338.94*	0.6541	*0.0608*	0.1165
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.7711	*0.0716*	0.1373
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.7904	*0.0734*	0.1408
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.8099	*0.0752*	0.1443
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.8296	*0.0771*	0.1478
14-5/8	*371*	OH	*OH*	14.625	*371.48*	0.8495	*0.0789*	0.1513
14-3/4	*375*	OH	*OH*	14.750	*374.65*	0.8695	*0.0808*	0.1549
14-7/8	*378*	OH	*OH*	14.875	*377.83*	0.8897	*0.0827*	0.1585
15	*381*	OH	*OH*	15.000	*381.00*	0.9101	*0.0846*	0.1621
		47.50	*70.68*	14.418	*366.22*	0.8167	*0.0759*	0.1455
15-1/8	*384*	OH	*OH*	15.125	*384.18*	0.9306	*0.0865*	0.1657
15-1/4	*387*	OH	*OH*	15.250	*387.35*	0.9513	*0.0884*	0.1694
15-3/8	*391*	OH	*OH*	15.375	*390.53*	0.9722	*0.0903*	0.1732
15-1/2	*394*	OH	*OH*	15.500	*393.70*	0.9932	*0.0923*	0.1769
15-5/8	*397*	OH	*OH*	15.625	*396.88*	1.0144	*0.0942*	0.1807
15-3/4	*400*	OH	*OH*	15.750	*400.05*	1.0358	*0.0962*	0.1845
15-7/8	*403*	OH	*OH*	15.875	*403.23*	1.0574	*0.0982*	0.1883

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7-5/8 in. OD Casing *(194 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
16	*406*	OH	*OH*	16.000	*406.40*	1.0791	*0.1003*	0.1922
		52.50	*78.12*	15.396	*391.06*	0.9757	*0.0907*	0.1738
		55.00	*81.84*	15.375	*390.53*	0.9722	*0.0903*	0.1732
		65.00	*96.72*	15.250	*387.35*	0.9513	*0.0884*	0.1694
		70.00	*104.1.6*	15.198	*386.03*	0.9427	*0.0876*	0.1679
		75.00	*111.60*	15.125	*384.18*	0.9306	*0.0865*	0.1657
		84.00	*124.99*	15.010	*381.25*	0.9117	*0.0847*	0.1624
		109.00	*162.19*	14.688	*373.08*	0.8595	*0.0799*	0.1531
16-1/8	*410*	OH	*OH*	16.125	*409.58*	1.1010	*0.1023*	0.1961
16-1/4	*413*	OH	*OH*	16.250	*412.75*	1.1231	*0.1043*	0.2000
16-3/8	*416*	OH	*OH*	16.375	*415.93*	1.1453	*0.1064*	0.2040
16-1/2	*419*	OH	*OH*	16.500	*419.10*	1.1678	*0.1085*	0.2080
16-5/8	*422*	OH	*OH*	16.625	*422.28*	1.1903	*0.1106*	0.2120
16-3/4	*425*	OH	*OH*	16.750	*425.45*	1.2131	*0.1127*	0.2161
16-7/8	*429*	OH	*OH*	16.875	*428.63*	1.2360	*0.1148*	0.2201
17	*432*	OH	*OH*	17.000	*431.80*	1.2591	*0.1170*	0.2243
17-1/8	*435*	OH	*OH*	17.125	*434.98*	1.2824	*0.1191*	0.2284
17-1/4	*438*	OH	*OH*	17.250	*438.15*	1.3058	*0.1213*	0.2326
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.3294	*0.1235*	0.2368
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.3532	*0.1257*	0.2410
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.3771	*0.1279*	0.2453
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.4013	*0.1302*	0.2496
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.4255	*0.1324*	0.2539
18	*457*	OH	*OH*	18.000	*457.20*	1.4500	*0.1347*	0.2583
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.4746	*0.1370*	0.2626
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.4994	*0.1393*	0.2671
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.5244	*0.1416*	0.2715
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.5495	*0.1440*	0.2760
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.5748	*0.1463*	0.2805
		78.00	*116.06*	17.855	*453.52*	1.4216	*0.1321*	0.2532
		87.50	*130.20*	17.755	*450.98*	1.4022	*0.1303*	0.2497
		96.50	*143.59*	17.655	*448.44*	1.3829	*0.1285*	0.2463
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.6003	*0.1487*	0.2850
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.6260	*0.1511*	0.2896
19	*483*	OH	*OH*	19.000	*482.60*	1.6518	*0.1535*	0.2942
19-1/8	*386*	OH	*OH*	19.125	*485.78*	1.6778	*0.1559*	0.2988
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.7039	*0.1583*	0.3035
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.7303	*0.1608*	0.3082
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.7568	*0.1632*	0.3129
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.7835	*0.1657*	0.3176
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.8103	*0.1682*	0.3224
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.8373	*0.1707*	0.3272
20	*508*	OH	*OH*	20.000	*508.00*	1.8645	*0.1732*	0.3321
		90.00	*133.92*	19.166	*486.82*	1.6863	*0.1567*	0.3004
		94.00	*139.87*	19.124	*485.75*	1.6776	*0.1559*	0.2988
		106.50	*158.47*	19.000	*482.60*	1.6518	*0.1535*	0.2942
		133.00	*197.90*	18.730	*475.74*	1.5962	*0.1483*	0.2843
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.8919	*0.1758*	0.3370
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.9194	*0.1783*	0.3419
20-3/8	*518*	OH	*OH*	20.375	*517.53*	1.9471	*0.1809*	0.3468
20-1/2	*521*	OH	*OH*	20.500	*520.70*	1.9749	*0.1835*	0.3518
20-5/8	*524*	OH	*OH*	20.625	*523.88*	2.0030	*0.1861*	0.3567
20-3/4	*527*	OH	*OH*	20.750	*527.05*	2.0312	*0.1887*	0.3618
20-7/8	*530*	OH	*OH*	20.875	*530.23*	2.0596	*0.1913*	0.3668
21	*533*	OH	*OH*	21.000	*533.40*	2.0881	*0.1940*	0.3719
21-1/8	*537*	OH	*OH*	21.125	*536.58*	2.1168	*0.1967*	0.3770

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7-5/8 in. OD Casing *(194 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.1457	*0.1993*	0.3822
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.1748	*0.2020*	0.3873
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.2040	*0.2048*	0.3926
		92.50	*137.64*	20.710	*526.03*	2.0221	*0.1879*	0.3602
		103.00	*153.26*	20.610	*523.49*	1.9996	*0.1858*	0.3561
		114.00	*169.63*	20.510	*520.95*	1.9772	*0.1837*	0.3522
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.2334	*0.2075*	0.3978
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.2630	*0.2102*	0.4031
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.2927	*0.2130*	0.4084
22	*559*	OH	*OH*	22.000	*558.80*	2.3226	*0.2158*	0.4137
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.3527	*0.2186*	0.4190
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.3830	*0.2214*	0.4244
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.4134	*0.2242*	0.4298
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.4440	*0.2271*	0.4353
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.4748	*0.2299*	0.4408
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.5057	*0.2328*	0.4463
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.5368	*0.2357*	0.4518
23	*584*	OH	*OH*	23.000	*584.20*	2.5681	*0.2386*	0.4574
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.5995	*0.2415*	0.4630
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.6311	*0.2444*	0.4686
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.6629	*0.2474*	0.4743
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.6949	*0.2504*	0.4800
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.7270	*0.2534*	0.4857
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.7593	*0.2564*	0.4915
23-7/8	*606*	OH	*OH*	23.875	*606.43*	2.7918	*0.2594*	0.4972
24	*610*	OH	*OH*	24.000	*609.60*	2.8244	*0.2624*	0.5030

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7-3/4 in. OD Casing *(197 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
9	*229*	OH	*OH*	9.000	*228.60*	0.1142	*0.0106*	0.0203
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.1265	*0.0118*	0.0225
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.1391	*0.0129*	0.0248
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.1518	*0.0141*	0.0270
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.1646	*0.0153*	0.0293
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.1777	*0.0165*	0.0316
		29.30	*43.59*	9.063	*230.20*	0.1204	*0.0112*	0.0214
		32.30	*48.05*	9.001	*228.63*	0.1143	*0.0106*	0.0204
		36.00	*53.56*	8.921	*226.59*	0.1065	*0.0099*	0.0190
		40.00	*59.51*	8.835	*224.41*	0.0981	*0.0091*	0.0175
		43.50	*64.72*	8.755	*222.38*	0.0905	*0.0084*	0.0161
		47.00	*69.93*	8.681	*220.50*	0.0834	*0.0078*	0.0149
		53.50	*79.60*	8.535	*216.79*	0.0697	*0.0065*	0.0124
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.1909	*0.0177*	0.0340
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.2043	*0.0190*	0.0364
10	*254*	OH	*OH*	10.000	*254.00*	0.2178	*0.0202*	0.0388
		33.00	*49.10*	9.384	*238.35*	0.1527	*0.0142*	0.0272
		41.50	*61.74*	9.200	*233.68*	0.1340	*0.0125*	0.0239
		45.50	*67.69*	9.120	*231.65*	0.1261	*0.0117*	0.0224
		50.50	*75.13*	9.016	*229.01*	0.1158	*0.0108*	0.0206
		55.50	*82.57*	8.908	*226.26*	0.1052	*0.0098*	0.0187
		61.20	*91.05*	8.790	*223.27*	0.0938	*0.0087*	0.0167
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.2315	*0.0215*	0.0412
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.2454	*0.0228*	0.0437
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.2595	*0.0241*	0.0462
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.2737	*0.0254*	0.0487
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.2881	*0.0268*	0.0513
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.3027	*0.0281*	0.0539
		32.75	*48.73*	10.192	*258.88*	0.2390	*0.0222*	0.0426
		35.75	*53.19*	10.136	*257.45*	0.2328	*0.0216*	0.0415
		40.50	*60.26*	10.050	*255.27*	0.2233	*0.0207*	0.0398
		45.50	*67.69*	8.950	*227.33*	0.1093	*0.0102*	0.0195
		51.00	*75.88*	9.850	*250.19*	0.2016	*0.0187*	0.0359
		54.00	*80.34*	9.284	*235.81*	0.1425	*0.0132*	0.0254
		55.00	*81.83*	9.760	*247.90*	0.1920	*0.0178*	0.0342
		60.70	*90.31*	9.660	*245.36*	0.1814	*0.0168*	0.0323
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.3174	*0.0295*	0.0565
11	*279*	OH	*OH*	11.000	*279.40*	0.3324	*0.0309*	0.0592
		26.75	*39.80*	10.552	*268.02*	0.2797	*0.0260*	0.0498
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.3474	*0.0323*	0.0619
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.3627	*0.0337*	0.0646
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.3781	*0.0351*	0.0673
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.3937	*0.0366*	0.0701
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.4095	*0.0380*	0.0729
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.4254	*0.0395*	0.0758
		38.00	*56.54*	11.150	*283.21*	0.3505	*0.0326*	0.0624
		42.00	*62.49*	11.084	*281.53*	0.3425	*0.0318*	0.0610
		47.00	*69.93*	11.000	*279.40*	0.3324	*0.0309*	0.0592
		54.00	*80.34*	10.880	*276.35*	0.3180	*0.0295*	0.0566
		60.00	*89.27*	10.772	*273.61*	0.3053	*0.0284*	0.0544
		65.00	*96.71*	10.682	*271.32*	0.2947	*0.0274*	0.0525
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.4415	*0.0410*	0.0786
12	*305*	OH	*OH*	12.000	*304.80*	0.4578	*0.0425*	0.0815
		31.50	*46.87*	11.514	*292.46*	0.3955	*0.0367*	0.0704
		40.00	*59.51*	11.384	*289.15*	0.3792	*0.0352*	0.0675

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7-3/4 in. OD Casing *(197 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.4742	*0.0441*	0.0845
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.4909	*0.0456*	0.0874
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.5076	*0.0472*	0.0904
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.5246	*0.0487*	0.0934
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.5417	*0.0503*	0.0965
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.5590	*0.0519*	0.0996
		43.00	*63.98*	12.130	*308.10*	0.4749	*0.0441*	0.0845
		53.00	*78.85*	11.970	*304.04*	0.4539	*0.0422*	0.0808
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.5765	*0.0536*	0.1027
13	*330*	OH	*OH*	13.000	*330.20*	0.5941	*0.0552*	0.1058
		36.50	*54.30*	12.482	*317.04*	0.5222	*0.0485*	0.0930
		40.00	*59.51*	12.438	*315.93*	0.5162	*0.0480*	0.0919
		45.00	*66.95*	12.360	*313.94*	0.5056	*0.0470*	0.0901
		50.00	*74.39*	12.282	*311.96*	0.4951	*0.0460*	0.0882
		54.00	*80.34*	12.220	*310.39*	0.4869	*0.0452*	0.0867
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.6120	*0.0569*	0.1090
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.6299	*0.0585*	0.1122
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.6481	*0.0602*	0.1154
		48.00	*71.41*	12.715	*322.96*	0.5542	*0.0515*	0.0987
		54.50	*81.09*	12.615	*320.42*	0.5404	*0.0502*	0.0962
		61.00	*90.76*	12.515	*317.88*	0.5267	*0.0489*	0.0938
		68.00	*101.17*	12.415	*315.34*	0.5131	*0.0477*	0.0914
		72.00	*107.12*	12.347	*313.61*	0.5039	*0.0468*	0.0897
		77.00	*114.56*	12.275	*311.79*	0.4942	*0.0459*	0.0880
		83.00	*123.49*	12.175	*309.25*	0.4809	*0.0447*	0.0856
		85.00	*126.46*	12.159	*308.84*	0.4787	*0.0445*	0.0853
		92.00	*136.88*	12.031	*305.59*	0.4619	*0.0429*	0.0823
		98.00	*145.80*	11.937	*303.20*	0.4496	*0.0418*	0.0801
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.6664	*0.0619*	0.1187
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.6849	*0.0636*	0.1220
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.7036	*0.0654*	0.1253
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.7224	*0.0671*	0.1287
14	*356*	OH	*OH*	14.000	*355.60*	0.7414	*0.0689*	0.1320
		42.00	*62.49*	13.448	*341.58*	0.6588	*0.0612*	0.1173
		50.00	*74.39*	13.344	*338.94*	0.6436	*0.0598*	0.1146
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.7606	*0.0707*	0.1355
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.7799	*0.0725*	0.1389
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.7994	*0.0743*	0.1424
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.8191	*0.0761*	0.1459
14-5/8	*371*	OH	*OH*	14.625	*371.48*	0.8390	*0.0779*	0.1494
14-3/4	*375*	OH	*OH*	14.750	*374.65*	0.8590	*0.0798*	0.1530
14-7/8	*378*	OH	*OH*	14.875	*377.83*	0.8792	*0.0817*	0.1566
15	*381*	OH	*OH*	15.000	*381.00*	0.8996	*0.0836*	0.1602
		47.50	*70.67*	14.418	*366.22*	0.8062	*0.0749*	0.1436
15-1/8	*384*	OH	*OH*	15.125	*384.18*	0.9201	*0.0855*	0.1639
15-1/4	*387*	OH	*OH*	15.250	*387.35*	0.9408	*0.0874*	0.1676
15-3/8	*391*	OH	*OH*	15.375	*390.53*	0.9617	*0.0893*	0.1713
15-1/2	*394*	OH	*OH*	15.500	*393.70*	0.9827	*0.0913*	0.1750
15-5/8	*397*	OH	*OH*	15.625	*396.88*	1.0040	*0.0933*	0.1788
15-3/4	*400*	OH	*OH*	15.750	*400.05*	1.0254	*0.0953*	0.1826
15-7/8	*403*	OH	*OH*	15.875	*403.23*	1.0469	*0.0973*	0.1865
16	*406*	OH	*OH*	16.000	*406.40*	1.0686	*0.0993*	0.1903
		52.50	*78.11*	15.396	*391.06*	0.9652	*0.0897*	0.1719
		55.00	*81.83*	15.375	*390.53*	0.9617	*0.0893*	0.1713
		65.00	*96.71*	15.250	*387.35*	0.9408	*0.0874*	0.1676
		70.00	*104.15*	15.198	*386.03*	0.9322	*0.0866*	0.1660

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7-3/4 in. OD Casing *(197 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
16	*406*	75.00	*111.59*	15.125	*384.18*	0.9201	*0.0855*	0.1639
		84.00	*124.98*	15.010	*381.25*	0.9012	*0.0837*	0.1605
		109.00	*162.17*	14.688	*373.08*	0.8491	*0.0789*	0.1512
16-1/8	*410*	OH	*OH*	16.125	*409.58*	1.0905	*0.1013*	0.1942
16-1/4	*413*	OH	*OH*	16.250	*412.75*	1.1126	*0.1034*	0.1982
16-3/8	*416*	OH	*OH*	16.375	*415.93*	1.1349	*0.1054*	0.2021
16-1/2	*419*	OH	*OH*	16.500	*419.10*	1.1573	*0.1075*	0.2061
16-5/8	*422*	OH	*OH*	16.625	*422.28*	1.1799	*0.1096*	0.2101
16-3/4	*425*	OH	*OH*	16.750	*425.45*	1.2026	*0.1117*	0.2142
16-7/8	*429*	OH	*OH*	16.875	*428.63*	1.2255	*0.1139*	0.2183
17	*432*	OH	*OH*	17.000	*431.80*	1.2486	*0.1160*	0.2224
17-1/8	*435*	OH	*OH*	17.125	*434.98*	1.2719	*0.1182*	0.2265
17-1/4	*438*	OH	*OH*	17.250	*438.15*	1.2953	*0.1203*	0.2307
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.3189	*0.1225*	0.2349
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.3427	*0.1247*	0.2391
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.3667	*0.1270*	0.2434
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.3908	*0.1292*	0.2477
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.4151	*0.1315*	0.2520
18	*457*	OH	*OH*	18.000	*457.20*	1.4395	*0.1337*	0.2564
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.4641	*0.1360*	0.2608
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.4889	*0.1383*	0.2652
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.5139	*0.1407*	0.2696
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.5391	*0.1430*	0.2741
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.5644	*0.1453*	0.2786
		78.00	*116.05*	17.855	*453.52*	1.4112	*0.1311*	0.2513
		87.50	*130.18*	17.755	*450.98*	1.3917	*0.1293*	0.2479
		96.50	*143.57*	17.655	*448.44*	1.3724	*0.1275*	0.2444
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.5898	*0.1477*	0.2832
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.6155	*0.1501*	0.2877
19	*483*	OH	*OH*	19.000	*482.60*	1.6413	*0.1525*	0.2923
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.6673	*0.1549*	0.2969
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.6935	*0.1573*	0.3016
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.7198	*0.1598*	0.3063
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.7463	*0.1622*	0.3110
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.7730	*0.1647*	0.3158
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.7998	*0.1672*	0.3205
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.8268	*0.1697*	0.3254
20	*508*	OH	*OH*	20.000	*508.00*	1.8540	*0.1722*	0.3302
		90.00	*133.90*	19.166	*486.82*	1.6759	*0.1557*	0.2985
		94.00	*139.85*	19.124	*485.75*	1.6671	*0.1549*	0.2969
		106.50	*158.45*	19.000	*482.60*	1.6413	*0.1525*	0.2923
		133.00	*197.88*	18.730	*475.74*	1.5858	*0.1473*	0.2824
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.8814	*0.1748*	0.3351
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.9089	*0.1773*	0.3400
20-3/8	*518*	OH	*OH*	20.375	*517.53*	1.9366	*0.1799*	0.3449
20-1/2	*521*	OH	*OH*	20.500	*520.70*	1.9645	*0.1825*	0.3499
20-5/8	*524*	OH	*OH*	20.625	*523.88*	1.9925	*0.1851*	0.3549
20-3/4	*527*	OH	*OH*	20.750	*527.05*	2.0207	*0.1877*	0.3599
20-7/8	*530*	OH	*OH*	20.875	*530.23*	2.0491	*0.1904*	0.3649
21	*533*	OH	*OH*	21.000	*533.40*	2.0776	*0.1930*	0.3700
21-1/8	*537*	OH	*OH*	21.125	*536.58*	2.1064	*0.1957*	0.3751
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.1352	*0.1984*	0.3803
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.1643	*0.2011*	0.3855

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

7-3/4 in. OD Casing *(197 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.1935	*0.2038*	0.3907
		92.50	*137.62*	20.710	*526.03*	2.0117	*0.1869*	0.3583
		103.00	*153.24*	20.610	*523.49*	1.9891	*0.1848*	0.3543
		114.00	*169.61*	20.510	*520.95*	1.9667	*0.1827*	0.3503
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.2229	*0.2065*	0.3959
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.2525	*0.2093*	0.4012
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.2822	*0.2120*	0.4065
22	*559*	OH	*OH*	22.000	*558.80*	2.3122	*0.2148*	0.4118
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.3422	*0.2176*	0.4172
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.3725	*0.2204*	0.4225
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.4029	*0.2232*	0.4280
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.4335	*0.2261*	0.4334
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.4643	*0.2289*	0.4389
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.4952	*0.2318*	0.4444
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.5263	*0.2347*	0.4499
23	*584*	OH	*OH*	23.000	*584.20*	2.5576	*0.2376*	0.4555
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.5890	*0.2405*	0.4611
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.6206	*0.2435*	0.4667
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.6524	*0.2464*	0.4724
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.6844	*0.2494*	0.4781
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.7165	*0.2524*	0.4838
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.7488	*0.2554*	0.4896
23-7/8	*606*	OH	*OH*	23.875	*606.43*	2.7813	*0.2584*	0.4953
24	*610*	OH	*OH*	24.000	*609.60*	2.8139	*0.2614*	0.5012
24-1/8	*613*	OH	*OH*	24.125	*612.78*	2.8467	*0.2645*	0.5070
24-1/4	*616*	OH	*OH*	24.250	*615.95*	2.8797	*0.2675*	0.5129
24-3/8	*619*	OH	*OH*	24.375	*619.13*	2.9129	*0.2706*	0.5188
24-1/2	*622*	OH	*OH*	24.500	*622.30*	2.9462	*0.2737*	0.5247
		100.50	*149.52*	23.750	*603.25*	2.7488	*0.2554*	0.4896
		113.00	*168.12*	23.650	*600.71*	2.7230	*0.2530*	0.4850

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

8 in. OD Casing *(203 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
9	*229*	OH	*OH*	9.000	*228.60*	0.0927	*0.0086*	0.0165
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.1051	*0.0098*	0.0187
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.1176	*0.0109*	0.0209
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.1303	*0.0121*	0.0232
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.1432	*0.0133*	0.0255
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.1562	*0.0145*	0.0278
		29.30	*43.59*	9.063	*230.20*	0.0989	*0.0092*	0.0176
		32.30	*48.06*	9.001	*228.63*	0.0928	*0.0086*	0.0165
		36.00	*53.56*	8.921	*226.59*	0.0850	*0.0079*	0.0151
		40.00	*59.51*	8.835	*224.41*	0.0767	*0.0071*	0.0137
		43.50	*64.72*	8.755	*222.38*	0.0690	*0.0064*	0.0123
		47.00	*69.93*	8.681	*220.50*	0.0620	*0.0058*	0.0110
		53.50	*79.60*	8.535	*216.79*	0.0482	*0.0045*	0.0086
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.1694	*0.0157*	0.0302
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.1828	*0.0170*	0.0326
10	*254*	OH	*OH*	10.000	*254.00*	0.1963	*0.0182*	0.0350
		33.00	*49.10*	9.384	*238.35*	0.1312	*0.0122*	0.0234
		41.50	*61.74*	9.200	*233.68*	0.1126	*0.0105*	0.0200
		45.50	*67.69*	9.120	*231.65*	0.1046	*0.0097*	0.0186
		50.50	*75.13*	9.016	*229.01*	0.0943	*0.0088*	0.0168
		55.50	*82.57*	8.908	*226.26*	0.0837	*0.0078*	0.0149
		61.20	*91.05*	8.790	*223.27*	0.0723	*0.0067*	0.0129
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.2101	*0.0195*	0.0374
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.2240	*0.0208*	0.0399
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.2380	*0.0221*	0.0424
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.2522	*0.0234*	0.0449
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.2666	*0.0248*	0.0475
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.2812	*0.0261*	0.0501
		32.75	*48.73*	10.192	*258.88*	0.2175	*0.0202*	0.0387
		35.75	*53.19*	10.136	*257.45*	0.2113	*0.0196*	0.0376
		40.50	*60.26*	10.050	*255.27*	0.2018	*0.0187*	0.0359
		45.50	*67.69*	8.950	*227.33*	0.0878	*0.0082*	0.0156
		51.00	*75.88*	9.850	*250.19*	0.1801	*0.0167*	0.0321
		54.00	*80.34*	9.284	*235.81*	0.1210	*0.0112*	0.0216
		55.00	*81.83*	9.760	*247.90*	0.1705	*0.0158*	0.0304
		60.70	*90.31*	9.660	*245.36*	0.1599	*0.0149*	0.0285
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.2960	*0.0275*	0.0527
11	*279*	OH	*OH*	11.000	*279.40*	0.3109	*0.0289*	0.0554
		26.75	*39.80*	10.552	*268.02*	0.2582	*0.0240*	0.0460
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.3260	*0.0303*	0.0581
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.3412	*0.0317*	0.0608
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.3566	*0.0331*	0.0635
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.3722	*0.0346*	0.0663
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.3880	*0.0360*	0.0691
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.4039	*0.0375*	0.0719
		38.00	*56.54*	11.150	*283.21*	0.3290	*0.0306*	0.0586
		42.00	*62.49*	11.084	*281.53*	0.3210	*0.0298*	0.0572
		47.00	*69.93*	11.000	*279.40*	0.3109	*0.0289*	0.0554
		54.00	*80.34*	10.880	*276.35*	0.2966	*0.0276*	0.0528
		60.00	*89.27*	10.772	*273.61*	0.2838	*0.0264*	0.0505
		66.00	*96.71*	10.682	*271.32*	0.2733	*0.0254*	0.0487
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.4200	*0.0390*	0.0748
12	*305*	OH	*OH*	12.000	*304.80*	0.4363	*0.0405*	0.0777
		31.50	*46.87*	11.514	*292.46*	0.3740	*0.0347*	0.0666
		40.00	*59.51*	11.384	*289.15*	0.3578	*0.0332*	0.0637

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

8 in. OD Casing *(203 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.4528	*0.0421*	0.0806
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.4694	*0.0436*	0.0836
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.4862	*0.0452*	0.0866
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.5031	*0.0467*	0.0896
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.5203	*0.0483*	0.0927
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.5376	*0.0499*	0.0957
		43.00	*63.98*	12.130	*308.10*	0.4534	*0.0421*	0.0808
		53.00	*78.85*	11.970	*304.04*	0.4324	*0.0402*	0.0770
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.5550	*0.0516*	0.0989
13	*330*	OH	*OH*	13.000	*330.20*	0.5727	*0.0532*	0.1020
		36.50	*54.30*	12.482	*317.04*	0.5007	*0.0465*	0.0892
		40.00	*59.51*	12.438	*315.93*	0.4947	*0.0460*	0.0881
		45.00	*66.95*	12.360	*313.94*	0.4841	*0.0450*	0.0862
		50.00	*74.39*	12.282	*311.96*	0.4737	*0.0440*	0.0844
		54.00	*80.34*	12.220	*310.39*	0.4654	*0.0432*	0.0829
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.5905	*0.0549*	0.1052
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.6085	*0.0565*	0.1084
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.6266	*0.0582*	0.1116
		48.00	*71.41*	12.715	*322.96*	0.5327	*0.0495*	0.0949
		54.50	*81.09*	12.615	*320.42*	0.5189	*0.0482*	0.0924
		61.00	*90.76*	12.515	*317.88*	0.5052	*0.0469*	0.0900
		68.00	*101.17*	12.415	*315.34*	0.4916	*0.0457*	0.0876
		72.00	*107.12*	12.347	*313.61*	0.4824	*0.0448*	0.0859
		77.00	*114.56*	12.275	*311.79*	0.4727	*0.0439*	0.0842
		83.00	*123.49*	12.175	*309.25*	0.4594	*0.0427*	0.0818
		85.00	*126.46*	12.159	*308.84*	0.4573	*0.0425*	0.0814
		92.00	*136.88*	12.031	*305.59*	0.4404	*0.0409*	0.0784
		98.00	*145.80*	11.937	*303.20*	0.4281	*0.0398*	0.0762
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.6449	*0.0599*	0.1149
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.6634	*0.0616*	0.1182
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.6821	*0.0634*	0.1215
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.7009	*0.0651*	0.1248
14	*356*	OH	*OH*	14.000	*355.60*	0.7199	*0.0669*	0.1282
		42.00	*62.49*	13.448	*341.58*	0.6373	*0.0592*	0.1135
		50.00	*74.39*	13.344	*338.94*	0.6221	*0.0578*	0.1108
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.7391	*0.0687*	0.1316
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.7584	*0.0705*	0.1351
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.7780	*0.0723*	0.1386
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.7976	*0.0741*	0.1421
14-5/8	*371*	OH	*OH*	14.625	*371.48*	0.8175	*0.0760*	0.1456
14-3/4	*375*	OH	*OH*	14.750	*374.65*	0.8375	*0.0778*	0.1492
14-7/8	*378*	OH	*OH*	14.875	*377.83*	0.8577	*0.0797*	0.1528
15	*381*	OH	*OH*	15.000	*381.00*	0.8781	*0.0816*	0.1564
		47.50	*70.67*	14.418	*366.22*	0.7847	*0.0729*	0.1398
15-1/8	*384*	OH	*OH*	15.125	*384.18*	0.8986	*0.0835*	0.1600
15-1/4	*387*	OH	*OH*	15.250	*387.35*	0.9193	*0.0854*	0.1637
15-3/8	*391*	OH	*OH*	15.375	*390.53*	0.9402	*0.0874*	0.1675
15-1/2	*394*	OH	*OH*	15.500	*393.70*	0.9613	*0.0893*	0.1712
15-5/8	*397*	OH	*OH*	15.625	*396.88*	0.9825	*0.0913*	0.1750
15-3/4	*400*	OH	*OH*	15.750	*400.05*	1.0039	*0.0933*	0.1788
15-7/8	*403*	OH	*OH*	15.875	*403.23*	1.0254	*0.0953*	0.1826
16	*406*	OH	*OH*	16.000	*406.40*	1.0472	*0.0973*	0.1865
		52.50	*78.11*	15.396	*391.06*	0.9437	*0.0877*	0.1681
		55.00	*81.83*	15.375	*390.53*	0.9402	*0.0874*	0.1675
		65.00	*96.71*	15.250	*387.35*	0.9193	*0.0854*	0.1637
		70.00	*104.15*	15.198	*386.03*	0.9107	*0.0846*	0.1622

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

8 in. OD Casing *(203 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
16	*406*	75.00	*111.59*	15.125	*384.18*	0.8986	*0.0835*	0.1600
		84.00	*124.98*	15.010	*381.25*	0.8797	*0.0817*	0.1567
		109.00	*162.17*	14.688	*373.08*	0.8276	*0.0769*	0.1474
16-1/8	*410*	OH	*OH*	16.125	*409.58*	1.0691	*0.0993*	0.1904
16-1/4	*413*	OH	*OH*	16.250	*412.75*	1.0911	*0.1014*	0.1943
16-3/8	*416*	OH	*OH*	16.375	*415.93*	1.1134	*0.1034*	0.1983
16-1/2	*419*	OH	*OH*	16.500	*419.10*	1.1358	*0.1055*	0.2023
16-5/8	*422*	OH	*OH*	16.625	*422.28*	1.1584	*0.1076*	0.2063
16-3/4	*425*	OH	*OH*	16.750	*425.45*	1.1811	*0.1097*	0.2104
16-7/8	*429*	OH	*OH*	16.875	*428.63*	1.2041	*0.1119*	0.2144
17	*432*	OH	*OH*	17.000	*431.80*	1.2272	*0.1140*	0.2186
17-1/8	*435*	OH	*OH*	17.125	*434.98*	1.2504	*0.1162*	0.2227
17-1/4	*438*	OH	*OH*	17.250	*438.15*	1.2739	*0.1183*	0.2269
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.2975	*0.1205*	0.2311
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.3212	*0.1228*	0.2353
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.3452	*0.1250*	0.2396
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.3693	*0.1272*	0.2439
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.3936	*0.1295*	0.2482
18	*457*	OH	*OH*	18.000	*457.20*	1.4180	*0.1317*	0.2526
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.4427	*0.1340*	0.2569
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.4675	*0.1363*	0.2614
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.4924	*0.1387*	0.2658
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.5176	*0.1410*	0.2703
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.5429	*0.1433*	0.2748
		78.00	*116.05*	17.855	*453.52*	1.3897	*0.1291*	0.2475
		87.50	*130.18*	17.755	*450.98*	1.3703	*0.1273*	0.2440
		96.50	*143.57*	17.655	*448.44*	1.3510	*0.1255*	0.2406
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.5684	*0.1457*	0.2793
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.5940	*0.1481*	0.2839
19	*483*	OH	*OH*	19.000	*482.60*	1.6198	*0.1505*	0.2885
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.6458	*0.1529*	0.2931
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.6720	*0.1553*	0.2978
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.6983	*0.1578*	0.3025
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.7248	*0.1602*	0.3072
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.7515	*0.1627*	0.3119
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.7783	*0.1652*	0.3167
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.8054	*0.1677*	0.3215
20	*508*	OH	*OH*	20.000	*508.00*	1.8325	*0.1703*	0.3264
		90.00	*133.90*	19.166	*486.82*	1.6544	*0.1537*	0.2946
		94.00	*139.85*	19.124	*485.75*	1.6456	*0.1529*	0.2931
		106.50	*158.45*	19.000	*482.60*	1.6198	*0.1505*	0.2885
		133.00	*197.88*	18.730	*475.74*	1.5643	*0.1453*	0.2786
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.8599	*0.1728*	0.3312
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.8874	*0.1754*	0.3362
20-3/8	*518*	OH	*OH*	20.375	*517.53*	1.9151	*0.1779*	0.3411
20-1/2	*521*	OH	*OH*	20.500	*520.70*	1.9430	*0.1805*	0.3460
20-5/8	*524*	OH	*OH*	20.625	*523.88*	1.9710	*0.1831*	0.3510
20-3/4	*527*	OH	*OH*	20.750	*527.05*	1.9992	*0.1857*	0.3561
20-7/8	*530*	OH	*OH*	20.875	*530.23*	2.0276	*0.1884*	0.3611
21	*533*	OH	*OH*	21.000	*533.40*	2.0562	*0.1910*	0.3662
21-1/8	*537*	OH	*OH*	21.125	*536.58*	2.0849	*0.1937*	0.3713
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.1138	*0.1964*	0.3765
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.1428	*0.1991*	0.3816
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.1721	*0.2018*	0.3868
		92.50	*137.62*	20.710	*526.03*	1.9902	*0.1849*	0.3545

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

8 in. OD Casing *(203 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
21-1/2	*546*	103.00	*153.24*	20.610	*523.49*	1.9677	*0.1828*	0.3504
		114.00	*169.61*	20.510	*520.95*	1.9452	*0.1807*	0.3464
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.2015	*0.2045*	0.3921
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.2310	*0.2073*	0.3973
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.2608	*0.2100*	0.4026
22	*559*	OH	*OH*	22.000	*558.80*	2.2907	*0.2128*	0.4080
21-1/8	*562*	OH	*OH*	22.125	*561.98*	2.3208	*0.2156*	0.4133
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.3510	*0.2184*	0.4187
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.3814	*0.2212*	0.4241
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.4120	*0.2241*	0.4296
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.4428	*0.2270*	0.4351
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.4737	*0.2298*	0.4406
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.5048	*0.2327*	0.4461
23	*584*	OH	*OH*	23.000	*584.20*	2.5361	*0.2356*	0.4517
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.5676	*0.2385*	0.4573
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.5992	*0.2415*	0.4629
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.6310	*0.2444*	0.4686
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.6629	*0.2474*	0.4743
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.6950	*0.2504*	0.4800
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.7273	*0.2534*	0.4857
23-7/8	*606*	OH	*OH*	23.875	*606.43*	2.7598	*0.2564*	0.4915
24	*610*	OH	*OH*	24.000	*609.60*	2.7924	*0.2594*	0.4973
24-1/8	*613*	OH	*OH*	24.125	*612.78*	2.8253	*0.2625*	0.5032
24-1/4	*616*	OH	*OH*	24.250	*615.95*	2.8582	*0.2655*	0.5091
24-3/8	*619*	OH	*OH*	24.375	*619.13*	2.8914	*0.2686*	0.5150
24-1/2	*622*	OH	*OH*	24.500	*622.30*	2.9247	*0.2717*	0.5209
		100.50	*149.52*	23.750	*603.25*	2.7273	*0.2534*	0.4857
		113.00	*168.12*	23.650	*600.71*	2.7015	*0.2510*	0.4811

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

8-5/8 in. OD Casing *(219 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
9-1/8	*232*	OH	*OH*	9.125	*231.78*	0.0484	*0.0045*	0.0086
9-1/4	*235*	OH	*OH*	9.250	*234.95*	0.0609	*0.0056*	0.0109
9-3/8	*238*	OH	*OH*	9.375	*238.13*	0.0736	*0.0068*	0.0131
9-1/2	*241*	OH	*OH*	9.500	*241.30*	0.0865	*0.0080*	0.0154
9-5/8	*244*	OH	*OH*	9.625	*244.48*	0.0996	*0.0092*	0.0177
9-3/4	*248*	OH	*OH*	9.750	*247.65*	0.1128	*0.0104*	0.0201
9-7/8	*251*	OH	*OH*	9.875	*250.83*	0.1261	*0.0117*	0.0225
10	*254*	OH	*OH*	10.000	*254.00*	0.1397	*0.0129*	0.0249
		41.50	*61.74*	9.200	*233.68*	0.0559	*0.0052*	0.0100
		45.50	*67.69*	9.120	*231.65*	0.0479	*0.0044*	0.0085
		50.50	*75.13*	9.016	*229.01*	0.0376	*0.0035*	0.0067
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.1534	*0.0142*	0.0273
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.1673	*0.0155*	0.0298
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.1814	*0.0168*	0.0323
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.1956	*0.0181*	0.0348
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.2100	*0.0195*	0.0374
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.2246	*0.0208*	0.0400
		35.75	*53.19*	10.136	*257.45*	0.1546	*0.0143*	0.0275
		40.50	*60.26*	10.050	*255.27*	0.1452	*0.0134*	0.0259
		45.50	*67.69*	9.950	*252.73*	0.1343	*0.0124*	0.0239
		51.00	*75.88*	9.850	*250.19*	0.1235	*0.0114*	0.0220
		54.00	*80.34*	9.784	*248.51*	0.1164	*0.0108*	0.0207
		55.00	*81.83*	9.760	*247.90*	0.1138	*0.0105*	0.0203
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.2393	*0.0222*	0.0426
11	*279*	OH	*OH*	11.000	*279.40*	0.2543	*0.0235*	0.0453
		26.75	*39.80*	10.552	*268.02*	0.2016	*0.0187*	0.0359
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.2693	*0.0249*	0.0480
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.2846	*0.0264*	0.0507
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.3000	*0.0278*	0.0534
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.3156	*0.0292*	0.0562
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.3314	*0.0307*	0.0590
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.3473	*0.0322*	0.0619
		38.00	*56.54*	11.150	*283.21*	0.2724	*0.0252*	0.0485
		42.00	*62.49*	11.084	*281.53*	0.2644	*0.0245*	0.0471
		47.00	*69.93*	11.000	*279.40*	0.2543	*0.0235*	0.0453
		54.00	*80.34*	10.880	*276.35*	0.2399	*0.0222*	0.0427
		60.00	*89.27*	10.772	*273.61*	0.2272	*0.0210*	0.0405
		65.00	*96.71*	10.682	*271.32*	0.2166	*0.0201*	0.0386
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.3634	*0.0337*	0.0647
12	*305*	OH	*OH*	12.000	*304.80*	0.3797	*0.0352*	0.0676
		31.50	*46.87*	11.514	*292.46*	0.3173	*0.0295*	0.0565
		40.00	*59.52*	11.384	*289.15*	0.3011	*0.0280*	0.0536
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.3961	*0.0368*	0.0705
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.4127	*0.0383*	0.0735
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.4295	*0.0399*	0.0765
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.4465	*0.0415*	0.0795
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.4636	*0.0431*	0.0826
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.4809	*0.0447*	0.0857
		43.00	*63.98*	12.130	*308.10*	0.3968	*0.0369*	0.0707
		53.00	*78.86*	11.970	*304.04*	0.3757	*0.0349*	0.0669
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.4984	*0.0463*	0.0888
13	*330*	OH	*OH*	13.000	*330.20*	0.5160	*0.0479*	0.0919
		36.50	*54.31*	12.482	*317.04*	0.4440	*0.0413*	0.0791
		40.00	*59.52*	12.438	*315.93*	0.4380	*0.0407*	0.0780
		45.00	*66.96*	12.360	*313.94*	0.4275	*0.0397*	0.0761

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

8-5/8 in. OD Casing *(219 mm)* (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m 3/m ●	bbl/ft ▲
13	330	50.00	74.40	12.282	311.96	0.4170	0.0387	0.0743
		54.00	80.35	12.220	310.39	0.4087	0.0380	0.0728
13-1/8	333	OH	OH	13.125	333.38	0.5338	0.0496	0.0951
13-1/4	337	OH	OH	13.250	336.55	0.5518	0.0513	0.0983
13-3/8	340	OH	OH	13.375	339.73	0.5699	0.0530	0.1015
		48.00	71.42	12.715	322.96	0.4760	0.0442	0.0848
		54.50	81.10	12.165	320.42	0.4622	0.0429	0.0823
		61.00	90.77	12.515	317.88	0.4485	0.0417	0.0799
		68.00	101.18	12.415	315.34	0.4349	0.0404	0.0775
		72.00	107.14	12.347	313.61	0.4257	0.0396	0.0758
		77.00	114.58	12.275	311.79	0.4161	0.0387	0.0741
		83.00	123.50	12.175	309.25	0.4027	0.0374	0.0717
		85.00	126.48	12.159	308.84	0.4006	0.0372	0.0713
		92.00	136.90	12.031	305.59	0.3837	0.0357	0.0683
		98.00	145.82	11.937	303.20	0.3714	0.0345	0.0662
13-1/2	343	OH	OH	13.500	342.90	0.5883	0.0547	0.1048
13-5/8	346	OH	OH	13.625	346.08	0.6068	0.0564	0.1081
13-3/4	349	OH	OH	13.750	349.25	0.6254	0.0581	0.1114
13-7/8	352	OH	OH	13.875	352.43	0.6443	0.0599	0.1147
14	356	OH	OH	14.000	355.60	0.6633	0.0616	0.1181
		42.00	62.50	13.448	341.58	0.5806	0.0539	0.1034
		50.00	74.40	13.344	338.94	0.5654	0.0525	0.1007
14-1/8	359	OH	OH	14.125	358.78	0.6824	0.0634	0.1215
14-1/4	362	OH	OH	14.250	361.95	0.7018	0.0652	0.1250
14-3/8	365	OH	OH	14.375	365.13	0.7213	0.0670	0.1285
14-1/2	368	OH	OH	14.500	368.30	0.7410	0.0688	0.1320
14-5/8	371	OH	OH	14.625	371.48	0.7608	0.0707	0.1355
14-3/4	375	OH	OH	14.750	374.65	0.7809	0.0725	0.1391
14-7/8	378	OH	OH	14.875	377.83	0.8011	0.0744	0.1427
15	381	OH	OH	15.000	381.00	0.8214	0.0763	0.1463
		47.50	70.68	14.418	366.22	0.7280	0.0676	0.1297
15-1/8	384	OH	OH	15.125	384.18	0.8420	0.0782	0.1500
15-1/4	387	OH	OH	15.250	387.35	0.8627	0.0801	0.1536
15-3/8	391	OH	OH	15.375	390.53	0.8835	0.0821	0.1574
15-1/2	394	OH	OH	15.500	393.70	0.9046	0.0840	0.1611
15-5/8	397	OH	OH	15.625	396.88	0.9258	0.0860	0.1649
15-3/4	400	OH	OH	15.750	400.05	0.9472	0.0880	0.1687
15-7/8	403	OH	OH	15.875	403.23	0.9688	0.0900	0.1725
16	406	OH	OH	16.000	406.40	0.9905	0.0920	0.1764
		52.50	78.12	15.396	391.06	0.8871	0.0824	0.1580
		55.00	81.84	15.375	390.53	0.8835	0.0821	0.1574
		65.00	96.72	15.250	387.35	0.8627	0.0801	0.1536
		70.00	104.16	15.198	386.03	0.8540	0.0793	0.1521
		75.00	111.60	15.125	384.18	0.8420	0.0782	0.1500
		84.00	124.99	15.010	381.25	0.8231	0.0765	0.1466
		109.00	162.19	14.688	373.08	0.7709	0.0716	0.1373
16-1/8	410	OH	OH	16.125	409.58	1.0124	0.0941	0.1803
16-1/4	413	OH	OH	16.250	412.75	1.0345	0.0961	0.1842
16-3/8	416	OH	OH	16.375	415.93	1.0567	0.0982	0.1882
16-1/2	419	OH	OH	16.500	419.10	1.0791	0.1003	0.1922
16-5/8	422	OH	OH	16.625	422.28	1.1017	0.1024	0.1962
16-3/4	425	OH	OH	16.750	425.45	1.1245	0.1045	0.2003
16-7/8	429	OH	OH	16.875	428.63	1.1474	0.1066	0.2044
17	432	OH	OH	17.000	431.80	1.1705	0.1087	0.2085
17-1/8	435	OH	OH	17.125	434.98	1.1937	0.1109	0.2126
17-1/4	438	OH	OH	17.250	438.15	1.2172	0.1131	0.2168

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

8-5/8 in. OD Casing *(219 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.2408	*0.1153*	0.2210
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.2646	*0.1175*	0.2252
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.2885	*0.1197*	0.2295
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.3126	*0.1220*	0.2338
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.3369	*0.1242*	0.2381
18	*457*	OH	*OH*	18.000	*457.20*	1.3614	*0.1265*	0.2425
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.3860	*0.1288*	0.2469
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.4108	*0.1311*	0.2513
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.4358	*0.1334*	0.2557
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.4609	*0.1357*	0.2602
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.4862	*0.1381*	0.2647
		78.00	*116.06*	17.855	*453.52*	1.3330	*0.1238*	0.2374
		87.50	*130.20*	17.755	*450.98*	1.3136	*0.1220*	0.2340
		96.50	*143.59*	17.655	*448.44*	1.2943	*0.1202*	0.2305
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.5117	*0.1404*	0.2692
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.5373	*0.1428*	0.2738
19	*483*	OH	*OH*	19.000	*482.60*	1.5632	*0.1452*	0.2784
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.5892	*0.1476*	0.2830
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.6153	*0.1501*	0.2877
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.6417	*0.1525*	0.2924
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.6682	*0.1550*	0.2971
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.6948	*0.1575*	0.3019
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.7217	*0.1600*	0.3066
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.7487	*0.1625*	0.3115
20	*508*	OH	*OH*	20.000	*508.00*	1.7759	*0.1650*	0.3163
		90.00	*133.92*	19.166	*486.82*	1.5977	*0.1484*	0.2846
		94.00	*139.87*	19.124	*485.75*	1.5890	*0.1476*	0.2830
		106.50	*158.47*	19.000	*482.60*	1.5632	*0.1452*	0.2784
		133.00	*197.90*	18.730	*475.74*	1.5076	*0.1401*	0.2685
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.8032	*0.1675*	0.3212
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.8308	*0.1701*	0.3261
20-3/8	*518*	OH	*OH*	20.375	*517.53*	1.8585	*0.1727*	0.3310
20-1/2	*521*	OH	*OH*	20.500	*520.70*	1.8863	*0.1752*	0.3360
20-5/8	*524*	OH	*OH*	20.625	*523.88*	1.9144	*0.1779*	0.3410
20-3/4	*527*	OH	*OH*	20.750	*527.05*	1.9426	*0.1805*	0.3460
20-7/8	*530*	OH	*OH*	20.875	*530.23*	1.9709	*0.1831*	0.3510
21	*533*	OH	*OH*	21.000	*533.40*	1.9995	*0.1858*	0.3561
21-1/8	*537*	OH	*OH*	21.125	*536.58*	2.0282	*0.1884*	0.3612
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.0571	*0.1911*	0.3664
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.0862	*0.1938*	0.3716
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.1154	*0.1965*	0.3768
		92.50	*137.64*	20.710	*526.03*	1.9335	*0.1796*	0.3444
		103.00	*153.26*	20.610	*523.49*	1.9110	*0.1775*	0.3404
		114.00	*169.63*	20.510	*520.95*	1.8886	*0.1755*	0.3364
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.1448	*0.1933*	0.3820
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.1744	*0.2020*	0.3873
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.2041	*0.2048*	0.3926
22	*559*	OH	*OH*	22.000	*558.80*	2.2340	*0.2076*	0.3979
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.2641	*0.2103*	0.4033
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.2943	*0.2132*	0.4086
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.3248	*0.2160*	0.4141
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.3554	*0.2188*	0.4195
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.3861	*0.2217*	0.4250
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.4171	*0.2246*	0.4305
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.4482	*0.2274*	0.4360
23	*584*	OH	*OH*	23.000	*584.20*	2.4794	*0.2304*	0.4416

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

8-5/8 in. OD Casing *(219 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.5109	*0.2333*	0.4472
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.5425	*0.2362*	0.4528
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.5743	*0.2392*	0.4585
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.6062	*0.2421*	0.4642
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.6384	*0.2451*	0.4699
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.6707	*0.2481*	0.4757
23-7/8	*606*	OH	*OH*	23.875	*606.43*	2.7031	*0.2511*	0.4815
24	*610*	OH	*OH*	24.000	*609.60*	2.7358	*0.2542*	0.4873
24-1/8	*613*	OH	*OH*	24.125	*612.78*	2.7686	*0.2572*	0.4931
24-1/4	*616*	OH	*OH*	24.250	*615.95*	2.8016	*0.2603*	0.4990
24-3/8	*619*	OH	*OH*	24.375	*619.13*	2.8347	*0.2634*	0.5049
24-1/2	*622*	OH	*OH*	24.500	*622.30*	2.8680	*0.2665*	0.5108
		100.50	*149.54*	23.750	*603.25*	2.6707	*0.2481*	0.4757
		113.00	*168.14*	23.650	*600.71*	2.6448	*0.2457*	0.4711

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

9 in. OD Casing *(229 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
10-1/8	*257*	OH	*OH*	10.125	*257.18*	0.1174	*0.0109*	0.0209
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.1313	*0.0122*	0.0234
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.1453	*0.0135*	0.0259
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.1596	*0.0148*	0.0284
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.1740	*0.0161*	0.0310
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.1885	*0.0175*	0.0336
		32.75	*48.73*	10.192	*258.88*	0.1248	*0.0116*	0.0222
		35.75	*53.19*	10.136	*257.45*	0.1186	*0.0110*	0.0211
		40.50	*60.26*	10.050	*255.27*	0.1091	*0.0101*	0.0194
		45.50	*67.69*	9.950	*252.73*	0.0982	*0.0091*	0.0175
		51.00	*75.88*	9.850	*250.19*	0.0874	*0.0081*	0.0156
		54.00	*80.34*	9.784	*248.51*	0.0803	*0.0074*	0.0143
		55.00	*81.83*	9.760	*247.90*	0.0778	*0.0072*	0.0139
		60.70	*90.31*	9.660	*245.36*	0.0672	*0.0062*	0.0120
		65.70	*97.75*	9.560	*242.82*	0.0567	*0.0053*	0.0101
		71.10	*105.78*	9.450	*240.03*	0.0453	*0.0042*	0.0081
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.2033	*0.0188*	0.0362
11	*279*	OH	*OH*	11.000	*279.40*	0.2182	*0.0202*	0.0389
		26.75	*39.80*	10.552	*268.02*	0.1655	*0.0153*	0.0295
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.2333	*0.0216*	0.0415
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.2485	*0.0230*	0.0443
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.2640	*0.0244*	0.0470
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.2796	*0.0259*	0.0498
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.2953	*0.0274*	0.0526
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.3113	*0.0288*	0.0554
		38.00	*56.54*	11.150	*283.21*	0.2363	*0.0219*	0.0421
		42.00	*62.49*	11.084	*281.53*	0.2283	*0.0211*	0.0407
		47.00	*69.93*	11.000	*279.40*	0.2182	*0.0202*	0.0389
		54.00	*80.34*	10.880	*276.35*	0.2039	*0.0189*	0.0363
		60.00	*89.27*	10.772	*273.61*	0.1911	*0.0177*	0.0340
		65.00	*96.71*	10.682	*271.32*	0.1806	*0.0167*	0.0322
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.3274	*0.0303*	0.0583
12	*305*	OH	*OH*	12.000	*304.80*	0.3437	*0.0318*	0.0612
		31.50	*46.87*	11.514	*292.46*	0.2813	*0.0261*	0.0501
		40.00	*59.51*	11.384	*289.15*	0.2651	*0.0246*	0.0472
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.3601	*0.0334*	0.0641
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.3767	*0.0349*	0.0671
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.3935	*0.0364*	0.0701
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.4105	*0.0380*	0.0731
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.4276	*0.0396*	0.0762
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.4448	*0.0413*	0.0792
		43.00	*63.98*	12.130	*308.10*	0.3607	*0.0335*	0.0642
		53.00	*78.86*	11.970	*304.04*	0.3397	*0.0316*	0.0605
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.4623	*0.0430*	0.0823
13	*330*	OH	*OH*	13.000	*330.20*	0.4800	*0.0446*	0.0855
		36.50	*54.31*	12.482	*317.04*	0.4080	*0.0379*	0.0727
		40.00	*59.52*	12.438	*315.93*	0.4020	*0.0374*	0.0716
		45.00	*66.96*	12.360	*313.94*	0.3914	*0.0364*	0.0697
		50.00	*74.40*	12.282	*311.96*	0.3809	*0.0354*	0.0678
		54.00	*80.35*	12.220	*310.39*	0.3727	*0.0346*	0.0664
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.4978	*0.0462*	0.0887
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.5157	*0.0479*	0.0919
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.5339	*0.0496*	0.0951
		48.00	*71.42*	12.715	*322.96*	0.4400	*0.0409*	0.0784
		54.50	*81.10*	12.615	*320.42*	0.4262	*0.0396*	0.0759
		61.00	*90.77*	12.515	*317.88*	0.4125	*0.0383*	0.0735

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

9 in. OD Casing *(229 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
13-3/8	*340*	68.00	*101.18*	12.415	*315.34*	0.3989	*0.0371*	0.0710
		72.00	*107.14*	12.347	*313.61*	0.3897	*0.0362*	0.0694
		77.00	*114.58*	12.275	*311.79*	0.3800	*0.0353*	0.0677
		83.00	*123.50*	12.175	*309.25*	0.3667	*0.0341*	0.0653
		85.00	*126.48*	12.159	*308.84*	0.3646	*0.0339*	0.0649
		92.00	*136.90*	12.031	*305.59*	0.3477	*0.0323*	0.0619
		98.00	*145.82*	11.937	*303.20*	0.3354	*0.0312*	0.0597
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.5522	*0.0513*	0.0984
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.5707	*0.0530*	0.1016
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.5894	*0.0548*	0.1050
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.6082	*0.0565*	0.1083
14	*356*	OH	*OH*	14.000	*355.60*	0.6272	*0.0583*	0.1117
		42.00	*62.50*	13.448	*341.58*	0.5446	*0.0506*	0.0970
		50.00	*74.40*	13.344	*338.94*	0.5294	*0.0492*	0.0943
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.6464	*0.0601*	0.1151
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.6657	*0.0619*	0.1186
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.6852	*0.0637*	0.1220
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.7049	*0.0655*	0.1256
14-5/8	*371*	OH	*OH*	14.625	*371.48*	0.7248	*0.0673*	0.1291
14-3/4	*375*	OH	*OH*	14.750	*374.65*	0.7448	*0.0692*	0.1327
14-7/8	*378*	OH	*OH*	14.875	*377.83*	0.7650	*0.0711*	0.1363
15	*381*	OH	*OH*	15.000	*381.00*	0.7854	*0.0730*	0.1399
		47.50	*70.68*	14.418	*366.22*	0.6920	*0.0643*	0.1232
15-1/8	*384*	OH	*OH*	15.125	*384.18*	0.8059	*0.0749*	0.1435
15-1/4	*387*	OH	*OH*	15.250	*387.35*	0.8266	*0.0768*	0.1472
15-3/8	*391*	OH	*OH*	15.375	*390.53*	0.8475	*0.0787*	0.1509
15-1/2	*394*	OH	*OH*	15.500	*393.70*	0.8685	*0.0807*	0.1547
15-5/8	*397*	OH	*OH*	15.625	*396.88*	0.8898	*0.0827*	0.1585
15-3/4	*400*	OH	*OH*	15.750	*400.05*	0.9112	*0.0847*	0.1623
15-7/8	*403*	OH	*OH*	15.875	*403.23*	0.9327	*0.0867*	0.1661
16	*406*	OH	*OH*	16.000	*406.40*	0.9545	*0.0887*	0.1700
		52.50	*78.12*	15.396	*391.06*	0.8510	*0.0791*	0.1516
		55.00	*81.84*	15.375	*390.53*	0.8475	*0.0787*	0.1509
		65.00	*96.72*	15.250	*387.35*	0.8266	*0.0768*	0.1472
		70.00	*104.16*	15.198	*386.03*	0.8180	*0.0760*	0.1457
		75.00	*111.60*	15.125	*384.18*	0.8059	*0.0749*	0.1435
		84.00	*124.99*	15.010	*381.25*	0.7870	*0.0731*	0.1402
		109.00	*162.19*	14.688	*373.08*	0.7349	*0.0683*	0.1309
16-1/8	*410*	OH	*OH*	16.125	*409.58*	0.9764	*0.0907*	0.1739
16-1/4	*413*	OH	*OH*	16.250	*412.75*	0.9984	*0.0928*	0.1778
16-3/8	*416*	OH	*OH*	16.375	*415.93*	1.0207	*0.0948*	0.1818
16-1/2	*419*	OH	*OH*	16.500	*419.10*	1.0431	*0.0969*	0.1858
16-5/8	*422*	OH	*OH*	16.625	*422.28*	1.0657	*0.0990*	0.1898
16-3/4	*425*	OH	*OH*	16.750	*425.45*	1.0884	*0.1011*	0.1939
16-7/8	*429*	OH	*OH*	16.875	*428.63*	1.1113	*0.1033*	0.1979
17	*432*	OH	*OH*	17.000	*431.80*	1.1344	*0.1054*	0.2021
17-1/8	*435*	OH	*OH*	17.125	*434.98*	1.1577	*0.1076*	0.2062
17-1/4	*438*	OH	*OH*	17.250	*438.15*	1.1811	*0.1097*	0.2104
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.2047	*0.1119*	0.2146
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.2285	*0.1141*	0.2188
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.2525	*0.1164*	0.2231
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.2766	*0.1186*	0.2274
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.3009	*0.1209*	0.2317
18	*457*	OH	*OH*	18.000	*457.20*	1.3253	*0.1231*	0.2361
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.3500	*0.1254*	0.2404
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.3747	*0.1277*	0.2449

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

9 in. OD Casing *(229 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.3997	*0.1300*	0.2493
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.4249	*0.1324*	0.2538
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.4502	*0.1347*	0.2583
		78.00	*116.06*	17.855	*453.52*	1.2970	*0.1205*	0.2310
		87.50	*130.20*	17.755	*450.98*	1.2775	*0.1187*	0.2275
		96.50	*143.59*	17.655	*448.44*	1.2582	*0.1169*	0.2241
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.4756	*0.1371*	0.2628
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.5013	*0.1395*	0.2674
19	*483*	OH	*OH*	19.000	*482.60*	1.5271	*0.1419*	0.2720
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.5531	*0.1443*	0.2766
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.5793	*0.1467*	0.2813
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.6056	*0.1492*	0.2860
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.6321	*0.1516*	0.2907
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.6588	*0.1541*	0.2954
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.6856	*0.1566*	0.3002
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.7126	*0.1591*	0.3050
20	*508*	OH	*OH*	20.000	*508.00*	1.7398	*0.1616*	0.3099
		90.00	*133.92*	19.166	*486.82*	1.5617	*0.1451*	0.2781
		94.00	*139.87*	19.124	*485.75*	1.5529	*0.1443*	0.2766
		106.50	*158.47*	19.000	*482.60*	1.5271	*0.1419*	0.2720
		133.00	*197.90*	18.730	*475.74*	1.4716	*0.1367*	0.2621
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.7672	*0.1642*	0.3147
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.7947	*0.1667*	0.3197
20-3/8	*518*	OH	*OH*	20.375	*517.53*	1.8224	*0.1693*	0.3246
20-1/2	*521*	OH	*OH*	20.500	*520.70*	1.8503	*0.1719*	0.3295
20-5/8	*524*	OH	*OH*	20.625	*523.88*	1.8783	*0.1745*	0.3345
20-3/4	*527*	OH	*OH*	20.750	*527.05*	1.9065	*0.1771*	0.3396
20-7/8	*530*	OH	*OH*	20.875	*530.23*	1.9349	*0.1798*	0.3446
21	*533*	OH	*OH*	21.000	*533.40*	1.9634	*0.1824*	0.3497
21-1/8	*537*	OH	*OH*	21.125	*536.58*	1.9922	*0.1851*	0.3548
21-1/4	*540*	OH	*OH*	21.250	*539.75*	2.0210	*0.1878*	0.3600
21-3/8	*543*	OH	*OH*	21.375	*542.93*	2.0501	*0.1905*	0.3651
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.0793	*0.1932*	0.3703
		92.50	*137.64*	20.710	*526.03*	1.8975	*0.1763*	0.3380
		103.00	*153.26*	20.610	*523.49*	1.8749	*0.1742*	0.3339
		114.00	*169.63*	20.510	*520.95*	1.8525	*0.1721*	0.3299
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.1087	*0.1959*	0.3756
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.1383	*0.1987*	0.3808
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.1681	*0.2014*	0.3861
22	*559*	OH	*OH*	22.000	*558.80*	2.1980	*0.2042*	0.3915
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.2280	*0.2070*	0.3968
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.2583	*0.2098*	0.4022
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.2887	*0.2126*	0.4076
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.3193	*0.2155*	0.4131
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.3501	*0.2183*	0.4186
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.3810	*0.2212*	0.4241
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.4121	*0.2241*	0.4296
23	*584*	OH	*OH*	23.000	*584.20*	2.4434	*0.2270*	0.4352
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.4748	*0.2299*	0.4408
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.5065	*0.2329*	0.4464
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.5382	*0.2358*	0.4521
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.5702	*0.2388*	0.4578
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.6023	*0.2418*	0.4635
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.6346	*0.2448*	0.4692
23-7/8	*606*	OH	*OH*	23.875	*606.43*	2.6671	*0.2478*	0.4750

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

9 in. OD Casing *(229 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
24	*610*	OH	*OH*	24.000	*609.60*	2.6997	*0.2508*	0.4808
24-1/8	*613*	OH	*OH*	24.125	*612.78*	2.7325	*0.2539*	0.4867
24-1/4	*616*	OH	*OH*	24.250	*615.95*	2.7655	*0.2569*	0.4926
24-3/8	*619*	OH	*OH*	24.375	*619.13*	2.7987	*0.2600*	0.4985
24-1/2	*622*	OH	*OH*	24.500	*622.30*	2.8320	*0.2631*	0.5044
		100.50	*149.54*	23.750	*603.25*	2.6346	*0.2448*	0.4692
		113.00	*168.14*	23.650	*600.71*	2.6088	*0.2424*	0.4646

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

9-5/8 in. OD Casing *(244 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
10-1/4	*260*	OH	*OH*	10.250	*260.35*	0.0678	*0.0063*	0.0121
10-3/8	*264*	OH	*OH*	10.375	*263.53*	0.0818	*0.0076*	0.0146
10-1/2	*267*	OH	*OH*	10.500	*266.70*	0.0961	*0.0089*	0.0171
10-5/8	*270*	OH	*OH*	10.625	*269.88*	0.1105	*0.0102*	0.0197
10-3/4	*273*	OH	*OH*	10.750	*273.05*	0.1250	*0.0116*	0.0223
10-7/8	*276*	OH	*OH*	10.875	*276.23*	0.1398	*0.0129*	0.0249
11	*279*	OH	*OH*	11.000	*279.40*	0.1547	*0.0143*	0.0276
11-1/8	*283*	OH	*OH*	11.125	*282.58*	0.1698	*0.0157*	0.0302
11-1/4	*286*	OH	*OH*	11.250	*285.75*	0.1850	*0.0171*	0.0330
11-3/8	*289*	OH	*OH*	11.375	*288.93*	0.2005	*0.0186*	0.0357
11-1/2	*292*	OH	*OH*	11.500	*292.10*	0.2161	*0.0200*	0.0385
11-5/8	*295*	OH	*OH*	11.625	*295.28*	0.2318	*0.0215*	0.0413
11-3/4	*298*	OH	*OH*	11.750	*298.45*	0.2478	*0.0229*	0.0441
		42.00	*62.49*	11.084	*281.53*	0.1648	*0.0153*	0.0294
		47.00	*69.93*	11.000	*279.40*	0.1547	*0.0143*	0.0276
		54.00	*80.34*	10.880	*276.35*	0.1404	*0.0130*	0.0250
		60.00	*89.27*	10.772	*273.61*	0.1276	*0.0118*	0.0227
11-7/8	*302*	OH	*OH*	11.875	*301.63*	0.2639	*0.0244*	0.0470
12	*305*	OH	*OH*	12.000	*304.80*	0.2802	*0.0259*	0.0499
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.2966	*0.0275*	0.0528
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.3132	*0.0290*	0.0558
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.3300	*0.0306*	0.0588
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.3470	*0.0321*	0.0618
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.3641	*0.0337*	0.0648
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.3814	*0.0353*	0.0679
		43.00	*63.98*	12.130	*308.10*	0.2973	*0.0275*	0.0529
		53.00	*78.85*	11.970	*304.04*	0.2762	*0.0256*	0.0492
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.3989	*0.0369*	0.0710
13	*330*	OH	*OH*	13.000	*330.20*	0.4165	*0.0386*	0.0742
		36.50	*54.30*	12.482	*317.04*	0.3445	*0.0319*	0.0614
		40.00	*59.51*	12.438	*315.93*	0.3386	*0.0314*	0.0603
		45.00	*66.95*	12.360	*313.94*	0.3280	*0.0304*	0.0584
		50.00	*74.41*	12.282	*311.96*	0.3175	*0.0294*	0.0566
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.4344	*0.0402*	0.0774
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.4523	*0.0419*	0.0806
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.4705	*0.0436*	0.0838
		48.00	*71.41*	12.715	*322.96*	0.3766	*0.0349*	0.0671
		54.50	*81.09*	12.615	*320.42*	0.3627	*0.0336*	0.0646
		61.00	*90.76*	12.515	*317.88*	0.3490	*0.0323*	0.0622
		68.00	*101.20*	12.415	*315.34*	0.3354	*0.0311*	0.0597
		72.00	*107.14*	12.347	*313.61*	0.3262	*0.0303*	0.0581
		77.00	*114.58*	12.275	*311.79*	0.3165	*0.0294*	0.0564
		83.00	*123.50*	12.175	*309.25*	0.3032	*0.0282*	0.0540
		85.00	*126.48*	12.159	*308.84*	0.3011	*0.0280*	0.0536
		92.00	*136.90*	12.031	*305.59*	0.2842	*0.0264*	0.0506
		98.00	*145.82*	11.937	*303.20*	0.2719	*0.0253*	0.0484
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.4887	*0.0454*	0.0870
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.5072	*0.0471*	0.0903
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.5259	*0.0489*	0.0937
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.5447	*0.0506*	0.0970
14	*356*	OH	*OH*	14.000	*355.60*	0.5637	*0.0524*	0.1004
		42.00	*62.50*	13.448	*341.58*	0.4811	*0.0447*	0.0857
		50.00	*74.40*	13.344	*338.94*	0.4659	*0.0433*	0.0830
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.5829	*0.0542*	0.1038
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.6022	*0.0560*	0.1073
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.6218	*0.0578*	0.1107

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

9-5/8 in. OD Casing *(244 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.6414	*0.0596*	0.1142
14-5/8	*371*	OH	*OH*	14.625	*371.48*	0.6613	*0.0614*	0.1178
14-3/4	*375*	OH	*OH*	14.750	*374.65*	0.6813	*0.0633*	0.1213
14-7/8	*378*	OH	*OH*	14.875	*377.83*	0.7015	*0.0652*	0.1249
15	*381*	OH	*OH*	15.000	*381.00*	0.7219	*0.0671*	0.1286
		47.50	*70.68*	14.418	*366.22*	0.6285	*0.0584*	0.1119
15-1/8	*384*	OH	*OH*	15.125	*384.18*	0.7424	*0.0690*	0.1322
15-1/4	*387*	OH	*OH*	15.250	*387.35*	0.7631	*0.0709*	0.1359
15-3/8	*391*	OH	*OH*	15.375	*390.53*	0.7840	*0.0728*	0.1396
15-1/2	*394*	OH	*OH*	15.500	*393.70*	0.8051	*0.0748*	0.1434
15-5/8	*397*	OH	*OH*	15.625	*396.88*	0.8263	*0.0768*	0.1472
15-3/4	*400*	OH	*OH*	15.750	*400.05*	0.8477	*0.0788*	0.1510
15-7/8	*403*	OH	*OH*	15.875	*403.23*	0.8692	*0.0808*	0.1548
16	*406*	OH	*OH*	16.000	*406.40*	0.8910	*0.0828*	0.1587
		52.50	*78.12*	15.396	*391.06*	0.7875	*0.0732*	0.1403
		55.00	*81.84*	15.375	*390.53*	0.7840	*0.0728*	0.1396
		65.00	*96.72*	15.250	*387.35*	0.7631	*0.0709*	0.1359
		70.00	*104.16*	15.198	*386.03*	0.7545	*0.0701*	0.1344
		75.00	*111.60*	15.125	*384.18*	0.7424	*0.0690*	0.1322
		84.00	*124.99*	15.010	*381.25*	0.7235	*0.0672*	0.1289
		109.00	*162.19*	14.688	*373.08*	0.6714	*0.0624*	0.1196
16-1/8	*410*	OH	*OH*	16.125	*409.58*	0.9129	*0.0848*	0.1626
16-1/4	*413*	OH	*OH*	16.250	*412.75*	0.9349	*0.0869*	0.1665
16-3/8	*416*	OH	*OH*	16.375	*415.93*	0.9572	*0.0889*	0.1705
16-1/2	*419*	OH	*OH*	16.500	*419.10*	0.9796	*0.0910*	0.1745
16-5/8	*422*	OH	*OH*	16.625	*422.28*	1.0022	*0.0931*	0.1785
16-3/4	*425*	OH	*OH*	16.750	*425.45*	1.0249	*0.0952*	0.1825
16-7/8	*429*	OH	*OH*	16.875	*428.63*	1.0478	*0.0974*	0.1866
17	*432*	OH	*OH*	17.000	*431.80*	1.0709	*0.0995*	0.1907
17-1/8	*435*	OH	*OH*	17.125	*434.98*	1.0942	*0.1017*	0.1949
17-1/4	*438*	OH	*OH*	17.250	*438.15*	1.1176	*0.1038*	0.1991
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.1412	*0.1050*	0.2033
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.1650	*0.1082*	0.2075
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.1890	*0.1105*	0.2118
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.2131	*0.1127*	0.2161
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.2374	*0.1150*	0.2204
18	*457*	OH	*OH*	18.000	*457.20*	1.2618	*0.1172*	0.2247
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.2865	*0.1195*	0.2291
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.3113	*0.1218*	0.2335
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.3362	*0.1241*	0.2380
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.3614	*0.1265*	0.2425
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.3867	*0.1288*	0.2470
		78.00	*116.06*	17.855	*453.52*	1.2335	*0.1146*	0.2197
		87.50	*130.20*	17.755	*450.98*	1.2141	*0.1128*	0.2162
		96.50	*143.59*	17.655	*448.44*	1.1947	*0.1110*	0.2128
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.4122	*0.1312*	0.2515
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.4378	*0.1336*	0.2561
19	*483*	OH	*OH*	19.000	*482.60*	1.4636	*0.1360*	0.2607
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.4896	*0.1384*	0.2653
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.5158	*0.1408*	0.2700
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.5421	*0.1433*	0.2747
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.5686	*0.1457*	0.2794
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.5953	*0.1482*	0.2841
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.6221	*0.1507*	0.2889
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.6492	*0.1532*	0.2937

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

9-5/8 in. OD Casing *(244 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
20	*508*	OH	*OH*	20.000	*508.00*	1.6763	*0.1557*	0.2986
		90.00	*133.92*	19.166	*486.82*	1.4982	*0.1392*	0.2668
		94.00	*139.87*	19.124	*485.75*	1.4894	*0.1384*	0.2653
		106.50	*158.47*	19.000	*482.60*	1.4636	*0.1360*	0.2607
		133.00	*197.90*	18.730	*475.74*	1.4081	*0.1308*	0.2508
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.7037	*0.1583*	0.3034
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.7312	*0.1608*	0.3083
20-3/8	*518*	OH	*OH*	20.375	*517.53*	1.7589	*0.1634*	0.3133
20-1/2	*521*	OH	*OH*	20.500	*520.70*	1.7868	*0.1660*	0.3182
20-5/8	*524*	OH	*OH*	20.625	*523 88*	1.8148	*0.1686*	0.3232
20-3/4	*527*	OH	*OH*	20.750	*527.05*	1.8430	*0.1712*	0.3283
20-7/8	*530*	OH	*OH*	20.875	*530.23*	1.8714	*0.1739*	0.3333
21	*533*	OH	*OH*	21.000	*533.40*	1.9000	*0.1765*	0.3384
21-1/8	*537*	OH	*OH*	21.125	*536.58*	1.9287	*0.1792*	0.3435
21-1/4	*540*	OH	*OH*	21.250	*539.75*	1.9576	*0.1819*	0.3487
21-3/8	*543*	OH	*OH*	21.375	*542.93*	1.9866	*0.1846*	0.3538
21-1/2	*546*	OH	*OH*	21.500	*546.10*	2.0158	*0.1873*	0.3590
		92.50	*137.64*	20.710	*526.03*	1.8340	*0.1704*	0.3266
		103.00	*153.26*	20.610	*523.49*	1.8114	*0.1683*	0.3226
		114.00	*169.63*	20.510	*520.95*	1.7890	*0.1662*	0.3186
21-5/8	*549*	OH	*OH*	21.625	*549.28*	2.0453	*0.1900*	0.3643
21-3/4	*552*	OH	*OH*	21.750	*552.45*	2.0748	*0.1928*	0.3695
21-7/8	*556*	OH	*OH*	21.875	*555.63*	2.1046	*0.1955*	0.3748
22	*559*	OH	*OH*	22.000	*558.80*	2.1345	*0.1983*	0.3802
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.1646	*0.2011*	0.3855
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.1948	*0.2039*	0.3909
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.2252	*0.2067*	0.3963
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.2558	*0.2096*	0.4018
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.2866	*0.2124*	0.4073
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.3175	*0.2153*	0.4128
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.3486	*0.2182*	0.4183
23	*584*	OH	*OH*	23.000	*584.20*	2.3799	*0.2211*	0.4239
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.4113	*0.2240*	0.4295
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.4430	*0.2270*	0.4351
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.4748	*0.2299*	0.4408
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.5067	*0.2329*	0.4465
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.5388	*0.2359*	0.4522
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.5711	*0.2389*	0.4579
23-7/8	*606*	OH	*OH*	23.875	*606.43*	2.6036	*0.2419*	0.4637
24	*610*	OH	*OH*	24.000	*609.60*	2.6362	*0.2449*	0.4695
24-1/8	*613*	OH	*OH*	24.125	*612.78*	2.6691	*0.2480*	0.4754
24-1/4	*616*	OH	*OH*	24.250	*615.95*	2.7020	*0.2510*	0.4813
24-3/8	*619*	OH	*OH*	24.375	*619.13*	2.7352	*0.2541*	0.4872
24-1/2	*622*	OH	*OH*	24.500	*622.30*	2.7685	*0.2572*	0.4931
		100.50	*149.54*	23.750	*603.25*	2.5711	*0.2389*	0.4579
		113.00	*168.14*	23.650	*600.71*	2.5453	*0.2365*	0.4533

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

10-3/4 in. OD Casing *(273 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
12	*305*	OH	*OH*	12.000	*304.80*	0.1551	*0.0144*	0.0276
		31.50	*46.87*	11.514	*292.46*	0.0928	*0.0086*	0.0165
		40.00	*59.52*	11.384	*289.15*	0.0765	*0.0071*	0.0136
12-1/8	*308*	OH	*OH*	12.125	*307.98*	0.1715	*0.0159*	0.0306
12-1/4	*311*	OH	*OH*	12.250	*311.15*	0.1882	*0.0175*	0.0335
12-3/8	*314*	OH	*OH*	12.375	*314.33*	0.2050	*0.0190*	0.0365
12-1/2	*318*	OH	*OH*	12.500	*317.50*	0.2219	*0.0206*	0.0395
12-5/8	*321*	OH	*OH*	12.625	*320.68*	0.2390	*0.0222*	0.0426
12-3/4	*324*	OH	*OH*	12.750	*323.85*	0.2563	*0.0238*	0.0457
		43.00	*63.98*	12.130	*308.10*	0.1722	*0.0160*	0.0307
		53.00	*78.86*	11.970	*304.04*	0.1512	*0.0140*	0.0269
12-7/8	*327*	OH	*OH*	12.875	*327.03*	0.2738	*0.0254*	0.0488
13	*330*	OH	*OH*	13.000	*330.20*	0.2914	*0.0271*	0.0519
		36.50	*54.31*	12.482	*317.04*	0.2195	*0.0204*	0.0391
		40.00	*59.52*	12.438	*315.93*	0.2135	*0.0198*	0.0380
		45.00	*66.96*	12.360	*313.94*	0.2029	*0.0189*	0.0361
		50.00	*74.40*	12.282	*311.96*	0.1924	*0.0179*	0.0343
		54.00	*80.35*	12.220	*310.39*	0.1842	*0.0171*	0.0328
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.3093	*0.0287*	0.0551
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.3272	*0.0304*	0.0583
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.3454	*0.0321*	0.0615
		48.00	*71.42*	12.715	*322.96*	0.2515	*0.0234*	0.0448
		54.50	*81.10*	12.615	*320.42*	0.2377	*0.0221*	0.0423
		61.00	*90.77*	12.515	*317.88*	0.2240	*0.0208*	0.0399
		68.00	*101.18*	12.415	*315.34*	0.2104	*0.0195*	0.0375
		72.00	*107.14*	12.347	*313.61*	0.2012	*0.0187*	0.0358
		77.00	*114.58*	12.275	*311.79*	0.1915	*0.0178*	0.0341
		83.00	*123.50*	12.175	*309.25*	0.1782	*0.0166*	0.0317
		85.00	*126.48*	12.159	*308.84*	0.1760	*0.0164*	0.0314
		92.00	*136.90*	12.031	*305.59*	0.1592	*0.0148*	0.0283
		98.00	*145.82*	11.937	*303.20*	0.1469	*0.0136*	0.0262
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.3637	*0.0338*	0.0648
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.3822	*0.0355*	0.0681
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.4009	*0.0372*	0.0714
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.4197	*0.0390*	0.0748
14	*356*	OH	*OH*	14.000	*355.60*	0.4387	*0.0408*	0.0781
		42.00	*62.50*	13.448	*341.58*	0.3561	*0.0331*	0.0634
		50.00	*74.40*	13.344	*338.94*	0.3409	*0.0317*	0.0607
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.4579	*0.0425*	0.0816
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.4772	*0.0443*	0.0850
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.4967	*0.0462*	0.0885
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.5164	*0.0480*	0.0920
14-5/8	*371*	OH	*OH*	14.625	*371.48*	0.5363	*0.0498*	0.0955
14-3/4	*375*	OH	*OH*	14.750	*374.65*	0.5563	*0.0517*	0.0991
14-7/8	*378*	OH	*OH*	14.875	*377.83*	0.5765	*0.0536*	0.1027
15	*381*	OH	*OH*	15.000	*381.00*	0.5969	*0.0555*	0.1063
		47.50	*70.68*	14.418	*366.22*	0.5035	*0.0468*	0.0897
15-1/8	*384*	OH	*OH*	15.125	*384.18*	0.6174	*0.0574*	0.1100
15-1/4	*387*	OH	*OH*	15.250	*387.35*	0.6381	*0.0593*	0.1137
15-3/8	*391*	OH	*OH*	15.375	*390.53*	0.6590	*0.0612*	0.1174
15-1/2	*394*	OH	*OH*	15.500	*393.70*	0.6800	*0.0632*	0.1211
15-5/8	*397*	OH	*OH*	15.625	*396.88*	0.7013	*0.0652*	0.1249
15-3/4	*400*	OH	*OH*	15.750	*400.05*	0.7227	*0.0671*	0.1287
15-7/8	*403*	OH	*OH*	15.875	*403.23*	0.7442	*0.0691*	0.1326

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

10-3/4 in. OD Casing *(273 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
16	*406*	OH	*OH*	16.000	*406.40*	0.7659	*0.0712*	0.1364
		52.50	*78.12*	15.396	*391.06*	0.6625	*0.0616*	0.1180
		55.00	*81.84*	15.375	*390.53*	0.6590	*0.0612*	0.1174
		65.00	*96.72*	15.250	*387.35*	0.6381	*0.0593*	0.1137
		70.00	*104.16*	15.198	*386.03*	0.6295	*0.0585*	0.1121
		75.00	*111.60*	15.125	*384.18*	0.6174	*0.0574*	0.1100
		84.00	*124.99*	15.010	*381.25*	0.5985	*0.0556*	0.1066
		109.00	*162.19*	14.688	*373.08*	0.5464	*0.0508*	0.0973
16-1/8	*410*	OH	*OH*	16.125	*409.58*	0.7878	*0.0732*	0.1403
16-1/4	*413*	OH	*OH*	16.250	*412.75*	0.8099	*0.0752*	0.1443
16-3/8	*416*	OH	*OH*	16.375	*415.93*	0.8322	*0.0773*	0.1482
16-1/2	*419*	OH	*OH*	16.500	*419.10*	0.8546	*0.0794*	0.1522
16-5/8	*422*	OH	*OH*	16.625	*422.28*	0.8772	*0.0815*	0.1562
16-3/4	*425*	OH	*OH*	16.750	*425.45*	0.8999	*0.0836*	0.1603
16-7/8	*429*	OH	*OH*	16.875	*428.63*	0.9228	*0.0857*	0.1644
17	*432*	OH	*OH*	17.000	*431.80*	0.9459	*0.0879*	0.1685
17-1/8	*435*	OH	*OH*	17.125	*434.98*	0.9692	*0.0900*	0.1726
17-1/4	*438*	OH	*OH*	17.250	*438.15*	0.9926	*0.0922*	0.1768
17-3/8	*441*	OH	*OH*	17.375	*441.33*	1.0162	*0.0944*	0.1810
17-1/2	*445*	OH	*OH*	17.500	*444.50*	1.0400	*0.0966*	0.1852
17-5/8	*448*	OH	*OH*	17.625	*447.68*	1.0640	*0.0988*	0.1895
17-3/4	*451*	OH	*OH*	17.750	*450.85*	1.0881	*0.1011*	0.1938
17-7/8	*454*	OH	*OH*	17.875	*454.03*	1.1124	*0.1033*	0.1981
18	*457*	OH	*OH*	18.000	*457.20*	1.1368	*0.1056*	0.2025
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.1614	*0.1079*	0.2069
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.1862	*0.1102*	0.2113
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.2112	*0.1125*	0.2157
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.2364	*0.1149*	0.2202
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.2617	*0.1172*	0.2247
		78.00	*116.06*	17.855	*453.52*	1.1085	*0.1030*	0.1974
		87.50	*130.20*	17.755	*450.98*	1.0890	*0.1012*	0.1940
		96.50	*143.59*	17.655	*448.44*	1.0697	*0.0994*	0.1905
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.2871	*0.1196*	0.2293
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.3128	*0.1220*	0.2338
19	*483*	OH	*OH*	19.000	*482.60*	1.3386	*0.1244*	0.2384
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.3646	*0.1268*	0.2430
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.3908	*0.1292*	0.2477
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.4171	*0.1317*	0.2524
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.4436	*0.1341*	0.2571
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.4703	*0.1366*	0.2619
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.4971	*0.1391*	0.2666
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.5241	*0.1416*	0.2715
20	*508*	OH	*OH*	20.000	*508.00*	1.5513	*0.1441*	0.2763
		90.00	*133.92*	19.166	*486.82*	1.3732	*0.1276*	0.2446
		94.00	*139.87*	19.124	*485.75*	1.3644	*0.1268*	0.2430
		106.50	*158.47*	19.000	*482.60*	1.3386	*0.1244*	0.2384
		133.00	*197.90*	18.730	*475.74*	1.2831	*0.1192*	0.2285
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.5787	*0.1467*	0.2812
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.6062	*0.1492*	0.2861
20-3/8	*518*	OH	*OH*	20.375	*517.53*	1.6339	*0.1518*	0.2910
20-1/2	*521*	OH	*OH*	20.500	*520.70*	1.6618	*0.1544*	0.2960
20-5/8	*524*	OH	*OH*	20.625	*523.88*	1.6898	*0.1570*	0.3010
20-3/4	*527*	OH	*OH*	20.750	*527.05*	1.7180	*0.1596*	0.3060
20-7/8	*530*	OH	*OH*	20.875	*530.23*	1.7464	*0.1622*	0.3110
21	*533*	OH	*OH*	21.000	*533.40*	1.7749	*0.1649*	0.3161
21-1/8	*537*	OH	*OH*	21.125	*536.58*	1.8037	*0.1676*	0.3212

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

10-3/4 in. OD Casing *(273 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
21-1/4	*540*	OH	*OH*	21.250	*539.75*	1.8325	*0.1703*	0.3264
21-3/8	*543*	OH	*OH*	21.375	*542.93*	1.8616	*0.1730*	0.3316
21-1/2	*546*	OH	*OH*	21.500	*546.10*	1.8908	*0.1757*	0.3368
		92.50	*137.64*	20.710	*526.03*	1.7090	*0.1588*	0.3044
		103.00	*153.26*	20.610	*523.49*	1.6864	*0.1567*	0.3004
		114.00	*169.63*	20.510	*520.95*	1.6640	*0.1546*	0.2964
21-5/8	*549*	OH	*OH*	21.625	*549.28*	1.9202	*0.1784*	0.3420
21-3/4	*552*	OH	*OH*	21.750	*552.45*	1.9498	*0.1811*	0.3473
21-7/8	*556*	OH	*OH*	21.875	*555.63*	1.9795	*0.1839*	0.3526
22	*559*	OH	*OH*	22.000	*558.80*	2.0095	*0.1867*	0.3579
22-1/8	*562*	OH	*OH*	22.125	*561.98*	2.0395	*0.1895*	0.3633
22-1/4	*565*	OH	*OH*	22.250	*565.15*	2.0698	*0.1923*	0.3686
22-3/8	*568*	OH	*OH*	22.375	*568.33*	2.1002	*0.1951*	0.3741
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.1308	*0.1980*	0.3795
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.1616	*0.2008*	0.3850
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.1925	*0.2037*	0.3905
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.2236	*0.2066*	0.3960
23	*584*	OH	*OH*	23.000	*584.20*	2.2549	*0.2095*	0.4016
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.2863	*0.2124*	0.4072
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.3180	*0.2153*	0.4128
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.3497	*0.2138*	0.4185
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.3817	*0.2213*	0.4242
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.4138	*0.2243*	0.4299
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.4461	*0.2273*	0.4357
23-7/8	*606*	OH	*OH*	23.875	*606.43*	2.4786	*0.2303*	0.4415
24	*610*	OH	*OH*	24.000	*609.60*	2.5112	*0.2333*	0.4473
24-1/8	*613*	OH	*OH*	24.125	*612.78*	2.5440	*0.2364*	0.4531
24-1/4	*616*	OH	*OH*	24.250	*615.95*	2.5770	*0.2394*	0.4590
24-3/8	*619*	OH	*OH*	24.375	*619.13*	2.6102	*0.2425*	0.4649
24-1/2	*622*	OH	*OH*	24.500	*622.30*	2.6435	*0.2456*	0.4708
		100.50	*149.54*	23.750	*603.25*	2.4461	*0.2273*	0.4357
		113.00	*168.14*	23.650	*600.71*	2.4203	*0.2249*	0.4311

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

11-3/4 in. OD Casing *(298 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
13	*330*	OH	*OH*	13.000	*330.20*	0.1687	*0.0157*	0.0301
		36.50	*54.31*	12.482	*317.04*	0.0967	*0.0090*	0.0172
		40.00	*59.52*	12.438	*315.93*	0.0908	*0.0084*	0.0162
		45.00	*66.96*	12.360	*313.94*	0.0802	*0.0075*	0.0143
		50.00	*74.40*	12.282	*311.96*	0.0697	*0.0065*	0.0124
		54.00	*80.35*	12.220	*310.39*	0.0614	*0.0057*	0.0109
13-1/8	*333*	OH	*OH*	13.125	*333.38*	0.1865	*0.0173*	0.0332
13-1/4	*337*	OH	*OH*	13.250	*336.55*	0.2045	*0.0190*	0.0364
13-3/8	*340*	OH	*OH*	13.375	*339.73*	0.2227	*0.0207*	0.0397
		48.00	*71.42*	12.715	*322.96*	0.1288	*0.0120*	0.0229
		54.50	*81.10*	12.615	*320.42*	0.1149	*0.0107*	0.0205
		61.00	*90.77*	12.515	*317.88*	0.1012	*0.0094*	0.0180
		68.00	*101.18*	12.415	*315.34*	0.0876	*0.0081*	0.0156
		72.00	*107.14*	12.347	*313.61*	0.0785	*0.0073*	0.0140
		77.00	*114.58*	12.275	*311.79*	0.0688	*0.0064*	0.0123
		83.00	*123.50*	12.175	*309.25*	0.0555	*0.0052*	0.0099
		85.00	*126.48*	12.159	*308.84*	0.0533	*0.0050*	0.0095
		92.00	*136.90*	12.031	*305.59*	0.0364	*0.0034*	0.0065
		98.00	*145.82*	11.937	*303.20*	0.0242	*0.0022*	0.0043
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.2410	*0.0224*	0.0429
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.2595	*0.0241*	0.0462
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.2782	*0.0258*	0.0495
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.2970	*0.0276*	0.0529
14	*356*	OH	*OH*	14.000	*355.60*	0.3160	*0.0294*	0.0563
		42.00	*62.50*	13.448	*341.58*	0.2334	*0.0217*	0.0416
		50.00	*74.40*	13.344	*338.94*	0.2182	*0.0203*	0.0389
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.3352	*0.0311*	0.0597
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.3545	*0.0329*	0.0631
14-3/8	*365*	OH	*OH*	14.375	*365.13*	0.3740	*0.0348*	0.0666
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.3937	*0.0366*	0.0701
14-5/8	*371*	OH	*OH*	14.625	*371.48*	0.4136	*0.0384*	0.0737
14-3/4	*375*	OH	*OH*	14.750	*374.65*	0.4336	*0.0403*	0.0772
14-7/8	*378*	OH	*OH*	14.875	*377.83*	0.4538	*0.0422*	0.0808
15	*381*	OH	*OH*	15.000	*381.00*	0.4742	*0.0441*	0.0845
		47.50	*70.68*	14.418	*366.22*	0.3808	*0.0354*	0.0678
15-1/8	*384*	OH	*OH*	15.125	*384.18*	0.4947	*0.0460*	0.0881
15-1/4	*387*	OH	*OH*	15.250	*387.35*	0.5154	*0.0479*	0.0918
15-3/8	*391*	OH	*OH*	15.375	*390.53*	0.5363	*0.0498*	0.0955
15-1/2	*394*	OH	*OH*	15.500	*393.70*	0.5573	*0.0518*	0.0993
15-5/8	*397*	OH	*OH*	15.625	*395.88*	0.5786	*0.0538*	0.1030
15-3/4	*400*	OH	*OH*	15.750	*400.05*	0.5999	*0.0557*	0.1069
15-7/8	*403*	OH	*OH*	15.875	*403:23*	0.6215	*0.0577*	0.1107
16	*406*	OH	*OH*	16.000	*406.40*	0.6432	*0.0598*	0.1146
		52.50	*78.12*	15.396	*391.06*	0.5398	*0.0502*	0.0961
		55.00	*81.84*	15.375	*390.53*	0.5363	*0.0498*	0.0955
		65.00	*96.72*	15.250	*387.35*	0.5154	*0.0479*	0.0918
		70.00	*104.16*	15.198	*386.03*	0.5068	*0.0471*	0.0903
		75.00	*111.60*	15.125	*384.18*	0.4947	*0.0460*	0.0881
		84.00	*124.99*	15.010	*381.25*	0.4758	*0.0442*	0.0847
		109.00	*162.19*	14.688	*373.08*	0.4236	*0.0394*	0.0755
16-1/8	*410*	OH	*OH*	16.125	*409.58*	0.6651	*0.0618*	0.1185
16-1/4	*413*	OH	*OH*	16.250	*412.75*	0.6872	*0.0638*	0.1224
16-3/8	*416*	OH	*OH*	16.375	*415.93*	0.7094	*0.0659*	0.1264
16-1/2	*419*	OH	*OH*	16.500	*419.10*	0.7319	*0.0680*	0.1303
16-5/8	*422*	OH	*OH*	16.625	*422.28*	0.7544	*0.0701*	0.1344

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

11-3/4 in. OD Casing *(298 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
16-3/4	*425*	OH	*OH*	16.750	*425.45*	0.7772	*0.0722*	0.1384
16-7/8	*429*	OH	*OH*	16.875	*428.63*	0.8001	*0.0743*	0.1425
17	*432*	OH	*OH*	17.000	*431.80*	0.8232	*0.0765*	0.1466
17-1/8	*435*	OH	*OH*	17.125	*434.98*	0.8465	*0.0786*	0.1508
17-1/4	*438*	OH	*OH*	17.250	*438.15*	0.8699	*0.0808*	0.1549
17-3/8	*441*	OH	*OH*	17.375	*441.33*	0.8935	*0.0830*	0.1591
17-1/2	*445*	OH	*OH*	17.500	*444.50*	0.9173	*0.0852*	0.1634
17-5/8	*448*	OH	*OH*	17.625	*447.68*	0.9412	*0.0874*	0.1676
17-3/4	*451*	OH	*OH*	17.750	*450.85*	0.9654	*0.0897*	0.1719
17-7/8	*454*	OH	*OH*	17.875	*454.03*	0.9896	*0.0919*	0.1763
18	*457*	OH	*OH*	18.000	*457.20*	1.0141	*0.0942*	0.1806
18-1/8	*460*	OH	*OH*	18.125	*460.38*	1.0387	*0.0965*	0.1850
18-1/4	*464*	OH	*OH*	18.250	*463.55*	1.0635	*0.0988*	0.1894
18-3/8	*467*	OH	*OH*	18.375	*466.73*	1.0885	*0.1011*	0.1939
18-1/2	*470*	OH	*OH*	18.500	*469.90*	1.1136	*0.1035*	0.1983
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.1389	*0.1058*	0.2029
		78.00	*116.06*	17.855	*453.52*	0.9857	*0.0916*	0.1756
		87.50	*130.20*	17.755	*450.98*	0.9663	*0.0898*	0.1721
		96.50	*143.59*	17.655	*448.44*	0.9470	*0.0880*	0.1687
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.1644	*0.1082*	0.2074
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.1901	*0.1106*	0.2120
19	*483*	OH	*OH*	19.000	*482.60*	1.2159	*0.1130*	0.2166
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.2419	*0.1154*	0.2212
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.2681	*0.1178*	0.2259
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.2944	*0.1203*	0.2305
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.3209	*0.1227*	0.2353
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.3476	*0.1252*	0.2400
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.3744	*0.1277*	0.2488
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.4014	*0.1302*	0.2496
20	*508*	OH	*OH*	20.000	*508.00*	1.4286	*0.1327*	0.2544
		90.00	*133.92*	19.166	*486.82*	1.2505	*0.1162*	0.2227
		94.00	*139.87*	19.124	*485.75*	1.2417	*0.1154*	0.2212
		106.50	*158.47*	19.000	*482.60*	1.2159	*0.1130*	0.2166
		133.00	*197.90*	18.730	*475.74*	1.1603	*0.1078*	0.2067
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.4560	*0.1353*	0.2593
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.4835	*0.1378*	0.2642
20-3/8	*518*	OH	*OH*	20.375	*517.53*	1.5112	*0.1404*	0.2692
20-1/2	*521*	OH	*OH*	20.500	*520.70*	1.5391	*0.1430*	0.2741
20-5/8	*524*	OH	*OH*	20.625	*523.88*	1.5671	*0.1456*	0.2791
20-3/4	*527*	OH	*OH*	20.750	*527.05*	1.5953	*0.1482*	0.2841
20-7/8	*530*	OH	*OH*	20.875	*530.23*	1.6237	*0.1508*	0.2892
21	*533*	OH	*OH*	21.000	*533.40*	1.6522	*0.1535*	0.2943
21-1/8	*537*	OH	*OH*	21.125	*536.58*	1.6809	*0.1562*	0.2994
21-1/4	*540*	OH	*OH*	21.250	*539.75*	1.7098	*0.1589*	0.3045
21-3/8	*543*	OH	*OH*	21.375	*542.93*	1.7389	*0.1616*	0.3097
21-1/2	*546*	OH	*OH*	21.500	*546.10*	1.7681	*0.1643*	0.3149
		92.50	*137.64*	20.710	*526.03*	1.5863	*0.1474*	0.2825
		103.00	*153.26*	20.610	*523.49*	1.5637	*0.1453*	0.2785
		114.00	*169.63*	20.510	*520.95*	1.5413	*0.1432*	0.2745
21-5/8	*549*	OH	*OH*	21.625	*549.28*	1.7975	*0.1670*	0.3202
21-3/4	*552*	OH	*OH*	21.750	*552.45*	1.8271	*0.1697*	0.3254
21-7/8	*556*	OH	*OH*	21.875	*555.63*	1.8568	*0.1725*	0.3307
22	*559*	OH	*OH*	22.000	*558.80*	1.8867	*0.1753*	0.3360
22-1/8	*562*	OH	*OH*	22.125	*561.98*	1.9168	*0.1781*	0.3414
22-1/4	*565*	OH	*OH*	22.250	*565.15*	1.9471	*0.1809*	0.3468
22-3/8	*568*	OH	*OH*	22.375	*568.33*	1.9775	*0.1837*	0.3522

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

11-3/4 in. OD Casing *(298 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
22-1/2	*572*	OH	*OH*	22.500	*571.50*	2.0081	*0.1866*	0.3577
22-5/8	*575*	OH	*OH*	22.625	*574.68*	2.0389	*0.1894*	0.3631
22-3/4	*578*	OH	*OH*	22.750	*577.85*	2.0698	*0.1923*	0.3686
22-7/8	*581*	OH	*OH*	22.875	*581.03*	2.1009	*0.1952*	0.3742
23	*584*	OH	*OH*	23.000	*584.20*	2.1322	*0.1981*	0.3798
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.1636	*0.2010*	0.3854
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.1952	*0.2039*	0.3910
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.2270	*0.2069*	0.3966
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.2590	*0.2099*	0.4023
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.2911	*0.2129*	0.4081
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.3234	*0.2159*	0.4138
23-7/8	*606*	OH	*OH*	23.875	*606.43*	2.3559	*0.2189*	0.4196
24	*610*	OH	*OH*	24.000	*609.60*	2.3885	*0.2219*	0.4254
24-1/8	*613*	OH	*OH*	24.125	*612.78*	2.4213	*0.2250*	0.4313
24-1/4	*616*	OH	*OH*	24.250	*615.95*	2.4543	*0.2280*	0.4371
24-3/8	*619*	OH	*OH*	24.375	*619.13*	2.4875	*0.2311*	0.4430
24-1/2	*622*	OH	*OH*	24.500	*622.30*	2.5208	*0.2342*	0.4490
		100.50	*149.54*	23.750	*603.25*	2.3234	*0.2159*	0.4138
		113.00	*168.14*	23.650	*600.71*	2.2976	*0.2135*	0.4092

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

12-3/4 in. OD Casing *(324 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
13-1/2	*343*	OH	*OH*	13.500	*342.90*	0.1074	*0.0100*	0.0191
13-5/8	*346*	OH	*OH*	13.625	*346.08*	0.1259	*0.0117*	0.0224
13-3/4	*349*	OH	*OH*	13.750	*349.25*	0.1445	*0.0134*	0.0257
13-7/8	*352*	OH	*OH*	13.875	*352.43*	0.1634	*0.0152*	0.0291
14	*356*	OH	*OH*	14.000	*355.60*	0.1824	*0.0169*	0.0325
		42.00	*62.49*	13.448	*341.58*	0.0997	*0.0093*	0.0178
		50.00	*74.39*	13.344	*338.94*	0.0845	*0.0079*	0.0151
14-1/8	*359*	OH	*OH*	14.125	*358.78*	0.2015	*0.0187*	0.0359
14-1/4	*362*	OH	*OH*	14.250	*361.95*	0.2209	*0.0205*	0.0393
14-3/8	*365*	OH	*OH*	14;375	*365.13*	0.2404	*0.0223*	0.0428
14-1/2	*368*	OH	*OH*	14.500	*368.30*	0.2601	*0.0242*	0.0463
14-5/8	*371*	OH	*OH*	14.625	*371.48*	0.2799	*0.0260*	0.0499
14-3/4	*375*	OH	*OH*	14.750	*374.65*	0.3000	*0.0279*	0.0534
14-7/8	*378*	OH	*OH*	14.875	*377.83*	0.3202	*0.0297*	0.0570
15	*381*	OH	*OH*	15.000	*381.00*	0.3405	*0.0316*	0.0606
		47.50	*70.67*	14.418	*366.22*	0.2472	*0.0230*	0.0440
15-1/8	*384*	OH	*OH*	15.125	*384.18*	0.3611	*0.0335*	0.0643
15-1/4	*387*	OH	*OH*	15.250	*387.35*	0.3818	*0.0355*	0.0680
15-3/8	*391*	OH	*OH*	15.375	*390.53*	0.4027	*0.0374*	0.0717
15-1/2	*394*	OH	*OH*	15.500	*393.70*	0.4237	*0.0394*	0.0755
15-5/8	*397*	OH	*OH*	15.625	*396.88*	0.4449	*0.0413*	0.0792
15-3/4	*400*	OH	*OH*	15.750	*400.05*	0.4663	*0.0433*	0.0831
15-7/8	*403*	OH	*OH*	15.875	*403.23*	0.4879	*0.0453*	0.0869
16	*406*	OH	*OH*	16.000	*406.40*	0.5096	*0.0473*	0.0908
		52.50	*78.11*	15.396	*391.06*	0.4062	*0.0377*	0.0723
		55.00	*81.83*	15.375	*390.53*	0.4027	*0.0374*	0.0717
		65.00	*96.71*	15.250	*387.35*	0.3818	*0.0355*	0.0680
		70.00	*104.15*	15.198	*386.03*	0.3731	*0.0347*	0.0665
		75.00	*111.59*	15.125	*384.18*	0.3611	*0.0335*	0.0643
		84.00	*124.98*	15.010	*381.25*	0.3422	*0.0318*	0.0609
		109.00	*162.17*	14.688	*373.08*	0.2900	*0.0269*	0.0517
16-1/8	*410*	OH	*OH*	16.125	*409.58*	0.5315	*0.0494*	0.0947
16-1/4	*413*	OH	*OH*	16.250	*412.75*	0.5536	*0.0514*	0.0986
16-3/8	*416*	OH	*OH*	16.375	*415.93*	0.5758	*0.0535*	0.1026
16-1/2	*419*	OH	*OH*	16.500	*419.10*	0.5982	*0.0556*	0.1065
16-5/8	*422*	OH	*OH*	16.625	*422.28*	0.6208	*0.0577*	0.1106
16-3/4	*425*	OH	*OH*	16.750	*425.45*	0.5436	*0.0598*	0.1146
16-7/8	*429*	OH	*OH*	16.875	*428.63*	0.6665	*0.0619*	0.1187
17	*432*	OH	*OH*	17.000	*431.80*	0.6896	*0.0641*	0.1228
17-1/8	*435*	OH	*OH*	17.125	*434.98*	0.7129	*0.0662*	0.1270
17-1/4	*438*	OH	*OH*	17.250	*438.15*	0.7363	*0.0684*	0.1311
17-3/8	*441*	OH	*OH*	17.375	*441.33*	0.7599	*0.0706*	0.1353
17-1/2	*445*	OH	*OH*	17.500	*444.50*	0.7837	*0.0728*	0.1396
17-5/8	*448*	OH	*OH*	17.625	*447.68*	0.8076	*0.0750*	0.1438
17-3/4	*451*	OH	*OH*	17.750	*450.85*	0.8317	*0.0773*	0.1481
17-7/8	*454*	OH	*OH*	17.875	*454.03*	0.8560	*0.0795*	0.1525
18	*457*	OH	*OH*	18.000	*457.20*	0.8805	*0.0818*	0.1568
18-1/8	*460*	OH	*OH*	18.125	*460.38*	0.9051	*0.0841*	0.1612
18-1/4	*464*	OH	*OH*	18.250	*463.55*	0.9299	*0.0864*	0.1656
18-3/8	*467*	OH	*OH*	18.375	*466.73*	0.9549	*0.0887*	0.1701
18-1/2	*470*	OH	*OH*	18.500	*469.90*	0.9800	*0.0910*	0.1745
18-5/8	*473*	OH	*OH*	18.625	*473.08*	1.0053	*0.0934*	0.1790
		78.00	*116.05*	17.855	*453.52*	0.8521	*0.0792*	0.1518
		87.50	*130.18*	17.755	*450.98*	0.8327	*0.0774*	0.1483
		96.50	*143.57*	17.655	*448.44*	0.8134	*0.0756*	0.1449

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

12-3/4 in. OD Casing *(324 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
18-3/4	*476*	OH	*OH*	18.750	*476.25*	1.0308	*0.0958*	0.1836
18-7/8	*479*	OH	*OH*	18.875	*479.43*	1.0565	*0.0982*	0.1882
19	*483*	OH	*OH*	19.000	*482.60*	1.0823	*0.1006*	0.1928
19-1/8	*486*	OH	*OH*	19.125	*485.78*	1.1083	*0.1030*	0.1974
19-1/4	*489*	OH	*OH*	19.250	*488.95*	1.1344	*0.1054*	0.2020
19-3/8	*492*	OH	*OH*	19.375	*492.13*	1.1608	*0.1078*	0.2067
19-1/2	*495*	OH	*OH*	19.500	*495.30*	1.1873	*0.1103*	0.2115
19-5/8	*498*	OH	*OH*	19.625	*498.48*	1.2139	*0.1128*	0.2162
19-3/4	*502*	OH	*OH*	19.750	*501.65*	1.2408	*0.1153*	0.2210
19-7/8	*505*	OH	*OH*	19.875	*504.83*	1.2678	*0.1178*	0.2258
20	*508*	OH	*OH*	20.000	*508.00*	1.2950	*0.1203*	0.2306
		90.00	*133.90*	19.166	*486.82*	1.1168	*0.1038*	0.1989
		94.00	*139.85*	19.124	*485.75*	1.1081	*0.1029*	0.1973
		106.50	*158.45*	19.000	*482.60*	1.0823	*0.1006*	0.1928
		133.00	*197.88*	18.730	*475.74*	1.0267	*0.0954*	0.1829
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.3223	*0.1229*	0.2355
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.3499	*0.1254*	0.2404
20-3/8	*518*	OH	*OH*	20.375	*517.53*	1.3776	*0.1280*	0.2453
20-1/2	*521*	OH	*OH*	20.500	*520.70*	1.4054	*0.1306*	0.2503
20-5/8	*524*	OH	*OH*	20.625	*523.88*	1.4335	*0.1332*	0.2553
20-3/4	*527*	OH	*OH*	20.750	*527.05*	1.4617	*0.1358*	0.2603
20-7/8	*530*	OH	*OH*	20.875	*530.23*	1.4900	*0.1384*	0.2654
21	*533*	OH	*OH*	21.000	*533.40*	1.5186	*0.1411*	0.2705
21-1/8	*537*	OH	*OH*	21.125	*536.58*	1.5473	*0.1438*	0.2756
21-1/4	*540*	OH	*OH*	21.250	*539.75*	1.5762	*0.1464*	0.2807
21-3/8	*543*	OH	*OH*	21.375	*542.93*	1.6053	*0.1491*	0.2859
21-1/2	*546*	OH	*OH*	21.500	*546.10*	1.6345	*0.1519*	0.2911
		92.50	*137.62*	20.710	*526.03*	1.4526	*0.1350*	0.2587
		103.00	*153.24*	20.610	*523.49*	1.4301	*0.1329*	0.2547
		114.00	*169.61*	20.510	*520.95*	1.4077	*0.1308*	0.2507
21-5/8	*549*	OH	*OH*	21.625	*549.28*	1.6639	*0.1546*	0.2963
21-3/4	*552*	OH	*OH*	21.750	*552.45*	1.6935	*0.1573*	0.3016
21-7/8	*556*	OH	*OH*	21.875	*555.63*	1.7232	*0.1601*	0.3069
22	*559*	OH	*OH*	22.000	*558.80*	1.7531	*0.1629*	0.3122
22-1/8	*562*	OH	*OH*	22.125	*561.98*	1.7832	*0.1657*	0.3176
22-1/4	*565*	OH	*OH*	22.250	*565.15*	1.8135	*0.1685*	0.3230
22-3/8	*568*	OH	*OH*	22.375	*568.33*	1.8439	*0.1713*	0.3284
22-1/2	*572*	OH	*OH*	22.500	*571.50*	1.8745	*0.1741*	0.3338
22-5/8	*575*	OH	*OH*	22.625	*574.68*	1.9052	*0.1770*	0.3393
22-3/4	*578*	OH	*OH*	22.750	*577.85*	1.9362	*0.1799*	0.3448
22-7/8	*581*	OH	*OH*	22.875	*581.03*	1.9673	*0.1828*	0.3504
23	*584*	OH	*OH*	23.000	*584.20*	1.9986	*0.1857*	0.3559
23-1/8	*587*	OH	*OH*	23.125	*587.38*	2.0300	*0.1886*	0.3615
23-1/4	*591*	OH	*OH*	23.250	*590.55*	2.0616	*0.1915*	0.3672
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.0934	*0.1945*	0.3728
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.1254	*0.1975*	0.3785
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.1575	*0.2004*	0.3842
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.1898	*0.2034*	0.3900
23-7/8	*606*	OH	*OH*	23.875	*606.43*	2.2223	*0.2065*	0.3958
24	*610*	OH	*OH*	24.000	*609.60*	2.2549	*0.2095*	0.4016
24-1/8	*613*	OH	*OH*	24.125	*612.78*	2.2877	*0.2125*	0.4074
24-1/4	*616*	OH	*OH*	24.250	*615.95*	2.3207	*0.2156*	0.4133
24-3/8	*619*	OH	*OH*	24.375	*619.13*	2.3538	*0.2187*	0.4192
24-1/2	*622*	OH	*OH*	24.500	*622.30*	2.3871	*0.2218*	0.4252
		100.50	*149.52*	23.750	*603.25*	2.1898	*0.2034*	0.3900
		113.00	*168.12*	23.650	*600.71*	2.1639	*0.2010*	0.3854

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

13-3/8 in. OD Casing *(340 mm)*

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m 3/m ●	bbl/ft ▲
15	381	OH	OH	15.000	381.00	0.2515	0.0234	0.0448
		47.50	70.68	14.418	366.22	0.1581	0.0147	0.0282
15-1/8	384	OH	OH	15.125	384.18	0.2720	0.0253	0.0484
15-1/4	387	OH	OH	15.250	387.35	0.2927	0.0272	0.0751
15-3/8	391	OH	OH	15.375	390.53	0.3136	0.0291	0.0559
15-1/2	394	OH	OH	15.500	393.70	0.3347	0.0311	0.0596
15-5/8	397	OH	OH	15.625	396.88	0.3559	0.0331	0.0634
15-3/4	400	OH	OH	15.750	400.05	0.3773	0.0351	0.0672
15-7/8	403	OH	OH	15.875	403.23	0.3988	0.0371	0.0710
16	406	OH	OH	16.000	406.40	0.4206	0.0391	0.0749
		52.50	78.12	15.396	391.06	0.3171	0.0295	0.0565
		55.00	81.84	15.375	390.53	0.3136	0.0291	0.0559
		65.00	96.72	15.250	387.35	0.2927	0.0272	0.0521
		70.00	104.16	15.198	386.03	0.2841	0.0264	0.0506
		75.00	111.60	15.125	384.18	0.2720	0.0253	0.0484
		84.00	124.99	15.010	381.25	0.2531	0.0235	0.0451
		109.00	162.19	14.688	373.08	0.2010	0.0187	0.0358
16-1/8	410	OH	OH	16.125	409.58	0.4425	0.0411	0.0788
16-1/4	413	OH	OH	16.250	412.75	0.4645	0.0432	0.0827
16-3/8	416	OH	OH	16.375	415.93	0.4868	0.0452	0.0867
16-1/2	419	OH	OH	16.500	419.10	0.5092	0.0473	0.0907
16-5/8	422	OH	OH	16.625	422.28	0.5318	0.0494	0.0947
16-3/4	425	OH	OH	16.750	425.45	0.5545	0.0515	0.0988
16-7/8	429	OH	OH	16.875	428.63	0.5774	0.0537	0.1028
17	432	OH	OH	17.000	431.80	0.6005	0.0558	0.1070
17-1/8	435	OH	OH	17.125	434.98	0.6238	0.0580	0.1111
17-1/4	438	OH	OH	17.250	438.15	0.6472	0.0601	0.1153
17-3/8	441	OH	OH	17.375	441.33	0.6708	0.0623	0.1195
17-1/2	445	OH	OH	17.500	444.50	0.6946	0.0645	0.1237
17-5/8	448	OH	OH	17.625	447.68	0.7186	0.0668	0.1280
17-3/4	451	OH	OH	17.750	450.85	0.7427	0.0690	0.1323
17-7/8	454	OH	OH	17.875	454.03	0.7670	0.0713	0.1366
18	457	OH	OH	18.000	457.20	0.7914	0.0735	0.1410
18-1/8	460	OH	OH	18.125	460.38	0.8161	0.0758	0.1453
18-1/4	464	OH	OH	18.250	463.55	0.8409	0.0781	0.1498
18-3/8	467	OH	OH	18.375	466.73	0.8658	0.0804	0.1542
18-1/2	470	OH	OH	18.500	469.90	0.8910	0.0828	0.1587
18-5/8	473	OH	OH	18.625	473.09	0.9163	0.0851	0.1632
		78.00	116.06	17.855	453.52	0.7631	0.0709	0.1359
		87.50	130.20	17.755	450.98	0.7436	0.0691	0.1324
		96.50	143.59	17.655	448.44	0.7243	0.0673	0.1290
18-3/4	476	OH	OH	18.750	476.25	0.9418	0.0875	0.1677
18-7/8	479	OH	OH	18.875	479.43	0.9674	0.0899	0.1723
19	483	OH	OH	19.000	482.60	0.9932	0.0923	0.1769
19-1/8	486	OH	OH	19.125	485.78	1.0192	0.0947	0.1815
19-1/4	489	OH	OH	19.250	488.95	1.0454	0.0971	0.1862
19-3/8	492	OH	OH	19.375	492.13	1.0717	0.0995	0.1909
19-1/2	495	OH	OH	19.500	495.30	1.0982	0.1020	0.1956
19-5/8	498	OH	OH	19.625	498.48	1.1249	0.1045	0.2004
19-3/4	502	OH	OH	19.750	501.65	1.1517	0.1070	0.2051
19-7/8	505	OH	OH	19.875	504.83	1.1787	0.1095	0.2099
20	508	OH	OH	20.000	508.00	1.2059	0.1120	0.2148
		90.00	133.92	19.166	486.82	1.0278	0.0955	0.1831
		94.00	139.87	19.124	485.75	1.0190	0.0947	0.1815

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

13-3/8 in. OD Casing *(340 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
20	*508*	106.50	*158.47*	19.000	*482.60*	0.9932	*0.0923*	0.1769
		133.00	*197.90*	18.730	*475.74*	0.9377	*0.0871*	0.1670
20-1/8	*511*	OH	*OH*	20.125	*511.18*	1.2333	*0.1146*	0.2197
20-1/4	*514*	OH	*OH*	20.250	*514.35*	1.2608	*0.1171*	0.2246
20-3/8	*518*	OH	*OH*	20.375	*517.53*	1.2885	*0.1197*	0.2295
20-1/2	*521*	OH	*OH*	20.500	*520.70*	1.3164	*0.1223*	0.2345
20-5/8	*524*	OH	*OH*	20.625	*523.88*	1.3444	*0.1249*	0.2395
20-3/4	*527*	OH	*OH*	20.750	*527.05*	1.3726	*0.1275*	0.2445
20-7/8	*530*	OH	*OH*	20.875	*530.23*	1.4010	*0.1302*	0.2495
21	*533*	OH	*OH*	21.000	*533.40*	1.4295	*0.1328*	0.2546
21-1/8	*537*	OH	*OH*	21.125	*536.58*	1.4583	*0.1355*	0.2597
21-1/4	*540*	OH	*OH*	21.250	*539.75*	1.4872	*0.1382*	0.2649
21-3/8	*543*	OH	*OH*	21.375	*542.93*	1.5162	*0.1409*	0.2700
21-1/2	*548*	OH	*OH*	21.500	*546.10*	1.5454	*0.1436*	0.2753
		92.50	*137.64*	20.710	*526.03*	1.3636	*0.1267*	0.2429
		103.00	*153.26*	20.610	*523.49*	1.3410	*0.1246*	0.2388
		114.00	*169.63*	20.510	*520.95*	1.3186	*0.1225*	0.2349
21-5/8	*549*	OH	*OH*	21.625	*549.28*	1.5748	*0.1463*	0.2805
21-3/4	*552*	OH	*OH*	21.750	*552.45*	1.6044	*0.1491*	0.2858
21-7/8	*556*	OH	*OH*	21.875	*555.63*	1.6342	*0.1518*	0.2911
22	*559*	OH	*OH*	22.000	*558.80*	1.6641	*0.1546*	0.2964
22-1/8	*562*	OH	*OH*	22.125	*561.98*	1.6941	*0.1574*	0.3017
22-1/4	*565*	OH	*OH*	22.250	*565.15*	1.7244	*0.1602*	0.3071
22-3/8	*568*	OH	*OH*	22.375	*568.33*	1.7548	*0.1630*	0.3125
22-1/2	*572*	OH	*OH*	22.500	*571.50*	1.7854	*0.1659*	0.3180
22-5/8	*575*	OH	*OH*	22.625	*574.68*	1.8162	*0.1687*	0.3235
22-3/4	*578*	OH	*OH*	22.750	*577.85*	1.8471	*0.1716*	0.3290
22-7/8	*581*	OH	*OH*	22.875	*581.03*	1.8782	*0.1745*	0.3345
23	*584*	OH	*OH*	23.000	*584.20*	1.9095	*0.1774*	0.3401
23-1/8	*587*	OH	*OH*	23.125	*587.38*	1.9409	*0.1803*	0.3457
23-1/4	*591*	OH	*OH*	23.250	*550.55*	1.9726	*0.1833*	0.3513
23-3/8	*594*	OH	*OH*	23.375	*593.73*	2.0043	*0.1863*	0.3570
23-1/2	*597*	OH	*OH*	23.500	*596.90*	2.0363	*0.1892*	0.3627
23-5/8	*600*	OH	*OH*	23.625	*600.08*	2.0684	*0.1922*	0.3684
23-3/4	*603*	OH	*OH*	23.750	*603.25*	2.1007	*0.1925*	0.3742
23-7/8	*606*	OH	*OH*	23.875	*606.43*	2.1332	*0.1982*	0.3799
24	*610*	OH	*OH*	24.000	*609.60*	2.1658	*0.2012*	0.3858
24-1/8	*613*	OH	*OH*	24.125	*612.78*	2.1986	*0.2043*	0.3916
24-1/4	*616*	OH	*OH*	24.250	*615.95*	2.2316	*0.2073*	0.3975
24-3/8	*619*	OH	*OH*	24.375	*619.13*	2.2648	*0.2104*	0.4034
24-1/2	*622*	OH	*OH*	24.500	*622.30*	2.2981	*0.2135*	0.4093
		100.50	*149.54*	23.750	*603.25*	2.1007	*0.1952*	0.3742
		113.00	*168.14*	23.650	*600.71*	2.0749	*0.1928*	0.3696

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

16 in. OD Casing *(406 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
17	*432*	OH	*OH*	17.000	*431.80*	0.1800	*0.0167*	0.0321
17-1/8	*435*	OH	*OH*	17.125	*434.98*	0.2032	*0.0189*	0.0362
17-1/4	*438*	OH	*OH*	17.250	*438.15*	0.2267	*0.0211*	0.0404
17-3/8	*441*	OH	*OH*	17.375	*441.33*	0.2503	*0.0233*	0.0446
17-1/2	*445*	OH	*OH*	17.500	*444.50*	0.2741	*0.0255*	0.0488
17-5/8	*448*	OH	*OH*	17.625	*447.68*	0.2980	*0.0277*	0.0531
17-3/4	*451*	OH	*OH*	17.750	*450.85*	0.3221	*0.0299*	0.0574
17-7/8	*454*	OH	*OH*	17.875	*454.03*	0.3464	*0.0322*	0.0617
18	*457*	OH	*OH*	18.000	*457.20*	0.3709	*0.0345*	0.0661
18-1/8	*460*	OH	*OH*	18.125	*460.38*	0.3955	*0.0367*	0.0704
18-1/4	*464*	OH	*OH*	18.250	*463.55*	0.4203	*0.0391*	0.0749
18-3/8	*467*	OH	*OH*	18.375	*466.73*	0.4453	*0.0414*	0.0793
18-1/2	*470*	OH	*OH*	18.500	*469.90*	0.4704	*0.0437*	0.0838
18-5/8	*473*	OH	*OH*	18.625	*473.08*	0.4957	*0.0461*	0.0883
		78.00	*116.06*	17.855	*453.52*	0.3425	*0.0318*	0.0610
		87.50	*130.20*	17.755	*450.98*	0.3231	*0.0300*	0.0575
		96.50	*143.59*	17.655	*448.44*	0.3038	*0.0282*	0.0541
18-3/4	*476*	OH	*OH*	18.750	*476.25*	0.5212	*0.0484*	0.0928
18-7/8	*479*	OH	*OH*	18.875	*479.43*	0.5468	*0.0508*	0.0974
19	*483*	OH	*OH*	19.000	*482.60*	0.5727	*0.0532*	0.1020
19-1/8	*486*	OH	*OH*	19.125	*485.78*	0.5987	*0.0556*	0.1066
19-1/4	*489*	OH	*OH*	19.250	*488.95*	0.6248	*0.0581*	0.1113
19-3/8	*492*	OH	*OH*	19.375	*492.13*	0.6512	*0.0605*	0.1160
19-1/2	*495*	OH	*OH*	19.500	*495.30*	0.6777	*0.0630*	0.1207
19-5/8	*498*	OH	*OH*	19.625	*498.48*	0.7043	*0.0654*	0.1254
19-3/4	*502*	OH	*OH*	19.750	*501.65*	0.7312	*0.0679*	0.1302
19-7/8	*505*	OH	*OH*	19.875	*504.83*	0.7582	*0.0704*	0.1350
20	*508*	OH	*OH*	20.000	*508.00*	0.7854	*0.0730*	0.1399
		90.00	*133.92*	19.166	*486.82*	0.6072	*0.0564*	0.1082
		94.00	*139.87*	19.124	*485.75*	0.5985	*0.0556*	0.1066
		106.50	*158.47*	19.000	*482.60*	0.5727	*0.0532*	0.1020
		133.00	*197.90*	18.730	*475.74*	0.5171	*0.0480*	0.0921
20-1/8	*511*	OH	*OH*	20.125	*511.18*	0.8127	*0.0755*	0.1448
20-1/4	*514*	OH	*OH*	20.250	*514.35*	0.8403	*0.0781*	0.1497
20-3/8	*518*	OH	*OH*	20.375	*517.53*	0.8680	*0.0806*	0.1546
20-1/2	*521*	OH	*OH*	20.500	*520.70*	0.8958	*0.0832*	0.1596
20-5/8	*524*	OH	*OH*	20.625	*523.88*	0.9239	*0.0858*	0.1645
20-3/4	*527*	OH	*OH*	20.750	*527.05*	0.9521	*0.0885*	0.1696
20-7/8	*530*	OH	*OH*	20.875	*530.23*	0.9804	*0.0911*	0.1746
21	*533*	OH	*OH*	21.000	*533.40*	1.0090	*0.0937*	0.1797
21-1/8	*537*	OH	*OH*	21.125	*536.58*	1.0377	*0.0964*	0.1848
21-1/4	*540*	OH	*OH*	21.250	*539.75*	1.0666	*0.0991*	0.1900
21-3/8	*543*	OH	*OH*	21.375	*542.93*	1.0957	*0.1018*	0.1951
21-1/2	*546*	OH	*OH*	21.500	*546.10*	1.1249	*0.1045*	0.2004
		92.50	*137.64*	20.710	*526.03*	0.9430	*0.0876*	0.1680
		103.00	*153.26*	20.610	*523.49*	0.9205	*0.0855*	0.1639
		114.00	*169.63*	20.510	*520.95*	0.8981	*0.0834*	0.1600
21-5/8	*549*	OH	*OH*	21.625	*549.28*	1.1543	*0.1072*	0.2056
21-3/4	*552*	OH	*OH*	21.750	*552.45*	1.1839	*0.1100*	0.2109
21-7/8	*556*	OH	*OH*	21.875	*555.63*	1.2136	*0.1128*	0.2162
22	*559*	OH	*OH*	22.000	*558.80*	1.2435	*0.1155*	0.2215
22-1/8	*562*	OH	*OH*	22.125	*561.98*	1.2736	*0.1183*	0.2268
22-1/4	*565*	OH	*OH*	22.250	*565.15*	1.3038	*0.1211*	0.2322
22-3/8	*568*	OH	*OH*	22.375	*568.33*	1.3343	*0.1240*	0.2376
22-1/2	*572*	OH	*OH*	22.500	*571.50*	1.3649	*0.1268*	0.2431

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

16 in. OD Casing *(406 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
22-5/8	*575*	OH	*OH*	22.625	*574.68*	1.3956	*0.1297*	0.2486
22-3/4	*578*	OH	*OH*	22.750	*577.85*	1.4266	*0.1325*	0.2541
22-7/8	*581*	OH	*OH*	22.875	*581.03*	1.4577	*0.1354*	0.2596
23	*584*	OH	*OH*	23.000	*584.20*	1.4889	*0.1383*	0.2652
23-1/8	*587*	OH	*OH*	23.125	*587.38*	1.5204	*0.1413*	0.2708
23-1/4	*591*	OH	*OH*	23.250	*590.55*	1.5520	*0.1442*	0.2764
23-3/8	*594*	OH	*OH*	23.375	*593.73*	1.5838	*0.1471*	0.2821
23-1/2	*597*	OH	*OH*	23.500	*596.90*	1.6157	*0.1501*	0.2878
23-5/8	*600*	OH	*OH*	23.625	*600.08*	1.6479	*0.1531*	0.2935
23-3/4	*603*	OH	*OH*	23.750	*603.25*	1.6802	*0.1561*	0.2993
23-7/8	*606*	OH	*OH*	23.875	*606.43*	1.7126	*0.1591*	0.3050
24	*610*	OH	*OH*	24.000	*609.60*	1.7453	*0.1621*	0.3108
24-1/8	*613*	OH	*OH*	24.125	*612.78*	1.7781	*0.1652*	0.3167
24-1/4	*616*	OH	*OH*	24.250	*615.95*	1.8111	*0.1683*	0.3226
24-3/8	*619*	OH	*OH*	24.375	*619.13*	1.8442	*0.1713*	0.3285
24-1/2	*622*	OH	*OH*	24.500	*622.30*	1.8775	*0.1744*	0.3344
		100.50	*149.54*	23.750	*603.25*	1.6802	*0.1561*	0.0993
		113.00	*168.14*	23.650	*600.71*	1.6543	*0.1537*	0.2946
24-5/8	*625*	OH	*OH*	24.625	*625.48*	1.9110	*0.1775*	0.3404
24-3/4	*629*	OH	*OH*	24.750	*628.65*	1.9447	*0.1807*	0.3464
24-7/8	*632*	OH	*OH*	24.875	*631.83*	1.9785	*0.1838*	0.3524
25	*635*	OH	*OH*	25.000	*635.00*	2.0125	*0.1870*	0.3584
25-1/8	*638*	OH	*OH*	25.125	*638.18*	2.0467	*0.1901*	0.3645
25-1/4	*647*	OH	*OH*	25.250	*641.35*	2.0810	*0.1933*	0.3706
25-3/8	*645*	OH	*OH*	25.375	*644.53*	2.1156	*0.1965*	0.3768
25-1/2	*648*	OH	*OH*	25.500	*647.70*	2.1502	*0.1998*	0.3830
25-5/8	*651*	OH	*OH*	25.625	*650.88*	2.1851	*0.2030*	0.3892
25-3/4	*654*	OH	*OH*	25.750	*654.05*	2.2201	*0.2063*	0.3954
25-7/8	*657*	OH	*OH*	25.875	*657.23*	2.2553	*0.2095*	0.4017
26	*660*	OH	*OH*	26.000	*660.40*	2.2907	*0.2128*	0.4080
26-1/8	*664*	OH	*OH*	26.125	*663.58*	2.3262	*0.2161*	0.4143
26-1/4	*667*	OH	*OH*	26.250	*666.75*	2.3619	*0.2194*	0.4207
26-3/8	*670*	OH	*OH*	26.375	*669.93*	2.3978	*0.2228*	0.4271
26-1/2	*673*	OH	*OH*	26.500	*673.10*	2.4338	*0.2261*	0.4335
26-5/8	*676*	OH	*OH*	26.625	*676.28*	2.4701	*0.2295*	0.4399
26-3/4	*679*	OH	*OH*	26.750	*679.45*	2.5056	*0.2329*	0.4464
26-7/8	*683*	OH	*OH*	26.875	*682.63*	2.5430	*0.2363*	0.4529
27	*686*	OH	*OH*	27.000	*685.80*	2.5797	*0.2397*	0.4595
27-1/8	*689*	OH	*OH*	27.125	*688.98*	2.6166	*0.2431*	0.4660
27-1/4	*692*	OH	*OH*	27.250	*692.15*	2.6537	*0.2465*	0.4726
27-3/8	*695*	OH	*OH*	27.375	*695.33*	2.6910	*0.2500*	0.4793
27-1/2	*699*	OH	*OH*	27.500	*698.50*	2.7284	*0.2535*	0.4859
27-5/8	*702*	OH	*OH*	27.625	*701.68*	2.7659	*0.2570*	0.4926
27-3/4	*705*	OH	*OH*	27.750	*704.85*	2.8037	*0.2605*	0.4994
27-7/8	*708*	OH	*OH*	27.875	*708.03*	2.8416	*0.2640*	0.5061
28	*711*	OH	*OH*	28.000	*711.20*	2.8797	*0.2675*	0.5129
28-1/4	*718*	OH	*OH*	28.250	*717.55*	2.9564	*0.2747*	0.5266
28-1/2	*724*	OH	*OH*	28.500	*723.90*	3.0338	*0.2819*	0.5403
28-3/4	*730*	OH	*OH*	28.750	*730.25*	3.1118	*0.2891*	0.5542
29	*737*	OH	*OH*	29.000	*736.60*	3.1906	*0.2964*	0.5683
29-1/8	*740*	OH	*OH*	29.125	*739.78*	3.2302	*0.3001*	0.5753
29-1/4	*743*	OH	*OH*	29.250	*742.95*	3.2700	*0.3038*	0.5824
29-3/8	*746*	OH	*OH*	29.375	*746.13*	3.3100	*0.3075*	0.5895
29-1/2	*749*	OH	*OH*	29.500	*749.30*	3.3501	*0.3112*	0.5967
29-5/8	*752*	OH	*OH*	29.625	*752.48*	3.3904	*0.3150*	0.6039
29-3/4	*756*	OH	*OH*	29.750	*755.65*	3.4309	*0.3187*	0.6111

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole
16 in. OD Casing *(406 mm)* (Continued)

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m 3/m ●	bbl/ft ▲
29-7/8	759	OH	OH	29.875	758.83	3.4716	0.3225	0.6183
30	762	OH	OH	30.000	762.00	3.5124	0.3263	0.6256
30-1/8	765	OH	OH	30.125	765.18	3.5534	0.3301	0.6329
30-1/4	768	OH	OH	30.250	768.35	3.5945	0.3339	0.6402
30-3/8	772	OH	OH	30.375	771.53	3.6359	0.3378	0.6476
30-1/2	775	OH	OH	30.500	774.70	3.6774	0.3416	0.6550

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole
20 in. OD Casing *(508 mm)*

OD	OD (mm)	lb/ft	kg/m	ID	ID (mm)	cu ft/ft * ■	m 3/m ●	bbl/ft ▲
21	533	OH	OH	21.000	533.40	0.2236	0.0208	0.0398
21-1/8	537	OH	OH	21.125	536.58	0.2523	0.0234	0.0449
21-1/4	540	OH	OH	21.250	539.75	0.2812	0.0261	0.0501
21-3/8	543	OH	OH	21.375	542.93	0.3103	0.0288	0.0553
21-1/2	546	OH	OH	21.500	546.10	0.3395	0.0315	0.0605
		92.50	137.64	20.710	526.03	0.1576	0.0147	0.0281
		103.00	153.26	20.610	523.49	0.1351	0.0126	0.0241
		114.00	169.63	20.510	520.95	0.1127	0.0105	0.0201
21-5/8	549	OH	OH	21.625	549.28	0.3689	0.0343	0.0657
21-3/4	552	OH	OH	21.750	552.45	0.3985	0.0370	0.0710
21-7/8	556	OH	OH	21.875	555.63	0.4282	0.0398	0.0763
22	559	OH	OH	22.000	558.80	0.4581	0.0426	0.0816
22-1/8	562	OH	OH	22.125	561.98	0.4882	0.0454	0.0870
22-1/4	565	OH	OH	22.250	565.15	0.5185	0.0482	0.0923
22-3/8	568	OH	OH	22.375	568.33	0.5489	0.0510	0.0978
22-1/2	572	OH	OH	22.500	571.50	0.5795	0.0538	0.1032
22-5/8	575	OH	OH	22.625	574.68	0.6103	0.0567	0.1087
22-3/4	578	OH	OH	22.750	577.85	0.6412	0.0596	0.1142
22-7/8	581	OH	OH	22.875	581.03	0.6723	0.0625	0.1197
23	584	OH	OH	23.000	584.20	0.7036	0.0654	0.1253
23-1/8	587	OH	OH	23.125	587.38	0.7350	0.0683	0.1309
23-1/4	591	OH	OH	23.250	590.55	0.7666	0.0712	0.1365
23-3/8	594	OH	OH	23.375	593.73	0.7984	0.0742	0.1422
23-1/2	597	OH	OH	23.500	596.90	0.8304	0.0771	0.1479
23-5/8	600	OH	OH	23.625	600.08	0.8625	0.0801	0.1536
23-3/4	603	OH	OH	23.750	603.25	0.8948	0.0831	0.1594
23-7/8	606	OH	OH	23.875	606.43	0.9273	0.0862	0.1652
24	610	OH	OH	24.000	609.60	0.9599	0.0892	0.1710
24-1/8	613	OH	OH	24.125	612.78	0.9927	0.0922	0.1768
24-1/4	616	OH	OH	24.250	615.95	1.0257	0.0953	0.1827
24-3/8	619	OH	OH	24.375	619.13	1.0588	0.0984	0.1886
24-1/2	622	OH	OH	24.500	622.30	1.0922	0.1015	0.1945
		100.50	149.54	23.750	603.25	0.8948	0.0831	0.1594
		113.00	168.14	23.650	600.71	0.8689	0.0807	0.1548
24-5/8	625	OH	OH	24.625	625.48	1.1257	0.1046	0.2005
24-3/4	629	OH	OH	24.750	628.65	1.1593	0.1077	0.2065
24-7/8	632	OH	OH	24.875	631.83	1.1931	0.1109	0.2125
25	635	OH	OH	25.000	635.00	1.2272	0.1140	0.2186
25-1/8	638	OH	OH	25.125	638.18	1.2613	0.1172	0.2247
25-1/4	647	OH	OH	25.250	641.35	1.2957	0.1204	0.2308
25-3/8	645	OH	OH	25.375	644 53	1.3302	0.1236	0.2369
25-1/2	648	OH	OH	25.500	647.70	1.3649	0.1268	0.2431

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

20 in. OD Casing *(508 mm)* (Continued)

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
25-5/8	*651*	OH	*OH*	25.625	*650.88*	1.3997	*0.1300*	0.2493
25-3/4	*654*	OH	*OH*	25.750	*654.05*	1.4347	*0.1333*	0.2555
25-7/8	*657*	OH	*OH*	25.875	*657.23*	1.4699	*0.1366*	0.2618
26	*660*	OH	*OH*	26.000	*660.40*	1.5053	*0.1399*	0.2681
26-1/8	*664*	OH	*OH*	26.125	*663.58*	1.5408	*0.1432*	0.2744
26-1/4	*667*	OH	*OH*	26.250	*666.75*	1.5765	*0.1465*	0.2808
26-3/8	*670*	OH	*OH*	26.375	*669.93*	1.6124	*0.1498*	0.2872
26-1/2	*673*	OH	*OH*	26.500	*673.10*	1.6485	*0.1532*	0.2936
26-5/8	*676*	OH	*OH*	26.625	*676.28*	1.6847	*0.1565*	0.3001
26-3/4	*679*	OH	*OH*	26.750	*679.45*	1.7211	*0.1599*	0.3065
26-7/8	*683*	OH	*OH*	26.875	*682.63*	1.7576	*0.1633*	0.3130
27	*686*	OH	*OH*	27.000	*685.80*	1.7944	*0.1667*	0.3196
27-1/8	*689*	OH	*OH*	27.125	*688.98*	1.8313	*0.1701*	0.3262
27-1/4	*692*	OH	*OH*	27.250	*692.15*	1.8683	*0.1736*	0.3328
27-3/4	*695*	OH	*OH*	27.375	*695.33*	1.9056	*0.1770*	0.3394
27-1/2	*699*	OH	*OH*	27.500	*698.50*	1.9430	*0.1805*	0.3461
27-3/8	*702*	OH	*OH*	27.625	*701.68*	1.9806	*0.1840*	0.3528
27-3/4	*705*	OH	*OH*	27.750	*704.85*	2.0183	*0.1875*	0.3595
27-7/8	*708*	OH	*OH*	27.875	*708.03*	2.0562	*0.1910*	0.3662
28	*711*	OH	*OH*	28.000	*711.20*	2.0943	*0.1946*	0.3730
28-1/4	*718*	OH	*OH*	28.250	*717.55*	2.1710	*0.2017*	0.3867
28-1/2	*724*	OH	*OH*	28.500	*723.90*	2.2484	*0.2089*	0.4005
28-3/4	*730*	OH	*OH*	28.750	*730.25*	2.3265	*0.2161*	0.4144
29	*737*	OH	*OH*	29.000	*736.60*	2.4052	*0.2235*	0.4284
29-1/8	*740*	OH	*OH*	29.125	*739.78*	2.4448	*0.2271*	0.4354
29-1/4	*743*	OH	*OH*	29.250	*742.95*	2.4846	*0.2308*	0.4425
29-3/8	*746*	OH	*OH*	29.375	*746.13*	2.5246	*0.2345*	0.4497
29-1/2	*749*	OH	*OH*	29.500	*749.30*	2.5647	*0.2383*	0.4568
29-5/8	*752*	OH	*OH*	29.625	*752.48*	2.6051	*0.2420*	0.4640
29-3/4	*756*	OH	*OH*	29.750	*755.65*	2.6455	*0.2458*	0.4712
29-7/8	*759*	OH	*OH*	29.875	*758.83*	2.6862	*0.2496*	0.4784
30	*762*	OH	*OH*	30.000	*762.00*	2.7270	*0.2534*	0.4857
30-1/8	*765*	OH	*OH*	30.125	*765.18*	2.7680	*0.2572*	0.4930
30-1/4	*768*	OH	*OH*	30.250	*768.35*	2.8092	*0.2610*	0.5003
30-3/8	*772*	OH	*OH*	30.375	*771.53*	2.8505	*0.2648*	0.5077
30-1/2	*775*	OH	*OH*	30.500	*774.70*	2.8920	*0.2687*	0.5151

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

21-1/2 in. OD Casing *(546 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m 3/m* ●	bbl/ft ▲
24	*610*	OH	*OH*	24.000	*609.60*	0.6204	*0.0576*	0.1105
24-1/8	*613*	OH	*OH*	24.125	*612.78*	0.6532	*0.0607*	0.1163
24-1/4	*616*	OH	*OH*	24.250	*615.95*	0.6862	*0.0638*	0.1222
24-3/8	*619*	OH	*OH*	24.375	*619.13*	0.7193	*0.0668*	0.1281
24-1/2	*622*	OH	*OH*	24.500	*622.30*	0.7527	*0.0699*	0.1341
		100.50	*149.54*	23.750	*603.25*	0.5553	*0.0516*	0.0989
		113.00	*168.14*	23.650	*600.71*	0.5294	*0.0492*	0.0943
24-5/8	*625*	OH	*OH*	24.625	*625.48*	0.7861	*0.0730*	0.1400
24-3/4	*629*	OH	*OH*	24.750	*628.65*	0.8198	*0.0762*	0.1460
24-7/8	*632*	OH	*OH*	24.875	*631.83*	0.8536	*0.0793*	0.1520
25	*635*	OH	*OH*	25.000	*635.00*	0.8876	*0.0825*	0.1581
25-1/8	*638*	OH	*OH*	25.125	*638.18*	0.9218	*0.0856*	0.1642
25-1/4	*647*	OH	*OH*	25.250	*641.35*	0.9562	*0.0888*	0.1703
25-3/8	*645*	OH	*OH*	25.375	*644.53*	0.9907	*0.0920*	0.1764
25-1/2	*648*	OH	*OH*	25.500	*647.70*	1.0254	*0.0953*	0.1826
25-5/8	*651*	OH	*OH*	25.625	*650.88*	1.0602	*0.0985*	0.1888
25-3/4	*654*	OH	*OH*	25.750	*654.05*	1.0952	*0.1018*	0.1951
25-7/8	*657*	OH	*OH*	25.875	*657.23*	1.1304	*0.1050*	0.2013
26	*660*	OH	*OH*	26.000	*660.40*	1.1658	*0.1083*	0.2076
26-1/8	*664*	OH	*OH*	26.125	*663.58*	1.2013	*0.1116*	0.2140
26-1/4	*667*	OH	*OH*	26.250	*666.75*	1.2370	*0.1149*	0.2203
26-3/8	*670*	OH	*OH*	26.375	*669.63*	1.2729	*0.1183*	0.2267
26-1/2	*673*	OH	*OH*	26.500	*673.10*	1.3090	*0.1216*	0.2331
26-5/8	*676*	OH	*OH*	26.625	*676.28*	1.3452	*0.1250*	0.2396
26-3/4	*679*	OH	*OH*	26.750	*679.45*	1.3816	*0.1284*	0.2461
26-7/8	*683*	OH	*OH*	26.875	*682.63*	1.4181	*0.1318*	0.2526
27	*686*	OH	*OH*	27.000	*685.80*	1.4549	*0.1352*	0.2591
27-1/8	*689*	OH	*OH*	27.125	*688.98*	1.4918	*0.1386*	0.2657
27-1/4	*692*	OH	*OH*	27.250	*692.15*	1.5288	*0.1420*	0.2723
27-3/8	*695*	27.38	*40.73*	27.375	*695.33*	1.5661	*0.1455*	0.2789
27-1/2	*699*	OH	*OH*	27.500	*698.50*	1.6035	*0.1490*	0.2856
27-5/8	*702*	OH	*OH*	27.625	*701.68*	1.6411	*0.1525*	0.2923
27-3/4	*702*	OH	*OH*	27.750	*704.85*	1.6788	*0.1560*	0.2990
27-7/8	*708*	OH	*OH*	27.875	*708.03*	1.7167	*0.1595*	0.3058
28	*711*	OH	*OH*	28.000	*711.20*	1.7548	*0.1630*	0.3125
28-1/4	*718*	OH	*OH*	28.250	*717.55*	1.8315	*0.1702*	0.3262
28-1/2	*724*	OH	*OH*	28.500	*723.90*	1.9089	*0.1773*	0.3400
28-3/4	*730*	OH	*OH*	28.750	*730.25*	1.9870	*0.1846*	0.3539
29	*737*	OH	*OH*	29.000	*736.60*	2.0657	*0.1919*	0.3679
29-1/8	*740*	OH	*OH*	29.125	*739.78*	2.1053	*0.1956*	0.3750
29-1/4	*743*	OH	*OH*	29.250	*742.95*	2.1451	*0.1993*	0.3821
29-3/8	*746*	OH	*OH*	29.375	*746.13*	2.1851	*0.2030*	0.3892
29-1/2	*749*	OH	*OH*	29.500	*749.30*	2.2252	*0.2067*	0.3963
29-5/8	*752*	OH	*OH*	29.625	*752.48*	2.2655	*0.2105*	0.4035
29-3/4	*756*	OH	*OH*	29.750	*755.65*	2.3060	*0.2142*	0.4107
29-7/8	*759*	OH	*OH*	29.875	*758.83*	2.3467	*0.2180*	0.4180
30	*762*	OH	*OH*	30.000	*762.00*	2.3875	*0.2218*	0.4252
30-1/8	*765*	OH	*OH*	30.125	*765.18*	2.4285	*0.2256*	0.4325
30-1/4	*768*	OH	*OH*	30.250	*768.35*	2.4696	*0.2294*	0.4399
30-3/8	*772*	OH	*OH*	30.375	*771.53*	2.5110	*0.2333*	0.4472
30-1/2	*775*	OH	*OH*	30.500	*774.70*	2.5525	*0.2371*	0.4546
30-5/8	*778*	OH	*OH*	30.625	*777.88*	2.5941	*0.2410*	0.4620
30-3/4	*781*	OH	*OH*	30.750	*781.05*	2.6360	*0.2449*	0.4695
30-7/8	*784*	OH	*OH*	30.875	*784.23*	2.6780	*0.2488*	0.4770
31	*787*	OH	*OH*	31.000	*787.40*	2.7202	*0.2527*	0.4845
31-1/8	*791*	OH	*OH*	31.125	*790.58*	2.7625	*0.2567*	0.4920
31-1/4	*794*	OH	*OH*	31.250	*793.75*	2.8051	*0.2606*	0.4996
31-3/8	*797*	OH	*OH*	31.375	*796.93*	2.8478	*0.2646*	0.5072
31-1/2	*800*	OH	*OH*	31.500	*800.10*	2.8906	*0.2686*	0.5148
31-5/8	*803*	OH	*OH*	31.625	*803.28*	2.9337	*0.2726*	0.5225

Refer to back of section table of contents for footnote reference

Annular Volume Between Casing and Casing or Openhole

24-1/2 in. OD Casing *(622 mm)*

OD	*OD (mm)*	lb/ft	*kg/m*	ID	*ID (mm)*	cu ft/ft * ■	*m^3/m* ●	bbl/ft ▲
25	*635*	OH	*OH*	25.000	*635.00*	0.1350	*0.0125*	0.0240
25-1/8	*638*	OH	*OH*	25.125	*638.18*	0.1692	*0.0157*	0.0301
25-1/4	*647*	OH	*OH*	25.250	*641.35*	0.2035	*0.0189*	0.0362
25-3/8	*645*	OH	*OH*	25.375	*644.53*	0.2380	*0.0221*	0.0424
25-1/2	*648*	OH	*OH*	25.500	*647.70*	0.2727	*0.0253*	0.0486
25-5/8	*651*	OH	*OH*	25.625	*650.88*	0.3076	*0.0286*	0.0548
25-3/4	*654*	OH	*OH*	25.750	*654.05*	0.3426	*0.0318*	0.0610
25-7/8	*657*	OH	*OH*	25.875	*657.23*	0.3778	*0.0351*	0.0673
26	*660*	OH	*OH*	26.000	*660.40*	0.4131	*0.0384*	0.0736
26-1/8	*664*	OH	*OH*	26.125	*663.58*	0.4487	*0.0417*	0.0799
26-1/4	*667*	OH	*OH*	26.250	*666.75*	0.4844	*0.0450*	0.0863
26-3/8	*670*	OH	*OH*	26.375	*669.73*	0.5203	*0.0483*	0.0927
26-1/2	*673*	OH	*OH*	26.500	*673.10*	0.5563	*0.0517*	0.0991
26-5/8	*676*	OH	*OH*	26.625	*676.28*	0.5925	*0.0551*	0.1055
26-3/4	*679*	OH	*OH*	26.750	*679.45*	0.6289	*0.0584*	0.1120
26-7/8	*683*	OH	*OH*	26.875	*682.63*	0.6655	*0.0618*	0.1185
27	*686*	OH	*OH*	27.000	*685.80*	0.7022	*0.0652*	0.1251
27-1/8	*689*	OH	*OH*	27.125	*688.98*	0.7391	*0.0687*	0.1316
27-1/4	*692*	OH	*OH*	27.250	*692.15*	0.7762	*0.0721*	0.1382
27-3/8	*695*	OH	*OH*	27.375	*695.33*	0.8134	*0.0756*	0.1449
27-1/2	*699*	OH	*OH*	27.500	*698.50*	0.8508	*0.0790*	0.1515
27-5/8	*702*	OH	*OH*	27.625	*701.68*	0.8884	*0.0825*	0.1582
27-3/4	*705*	OH	*OH*	27.750	*704.85*	0.9262	*0.0860*	0.1650
27-7/8	*708*	OH	*OH*	27.875	*708.03*	0.9641	*0.0896*	0.1717
28	*711*	OH	*OH*	28.000	*711.20*	1.0022	*0.0931*	0.1785
28-1/4	*718*	OH	*OH*	28.250	*717.55*	1.0789	*0.1002*	0.1922
28-1/2	*724*	OH	*OH*	28.500	*723.90*	1.1562	*0.1074*	0.2059
28-3/4	*730*	OH	*OH*	28.750	*730.25*	1.2343	*0.1147*	0.2198
29	*737*	OH	*OH*	29.000	*736.60*	1.3131	*0.1220*	0.2339
29-1/8	*740*	OH	*OH*	29.125	*739.78*	1.3527	*0.1257*	0.2409
29-1/4	*743*	OH	*OH*	29.250	*742.95*	1.3925	*0.1294*	0.2480
29-3/8	*746*	OH	*OH*	29.375	*746.13*	1.4324	*0.1331*	0.2551
29-1/2	*749*	OH	*OH*	29.500	*749.30*	1.4726	*0.1368*	0.2623
29-5/8	*752*	OH	*OH*	29.625	*752.48*	1.5129	*0.1406*	0.2695
29-3/4	*756*	OH	*OH*	29.750	*755.65*	1.5534	*0.1443*	0.2767
29-7/8	*759*	OH	*OH*	29.875	*758.83*	1.5940	*0.1481*	0.2839
30	*762*	OH	*OH*	30.000	*762.00*	1.6348	*0.1519*	0.2912
30-1/8	*765*	OH	*OH*	30.125	*765.18*	1.6758	*0.1557*	0.2985
30-1/4	*768*	OH	*OH*	30.250	*768.35*	1.7170	*0.1595*	0.3058
30-3/8	*772*	OH	*OH*	30.375	*771.53*	1.7583	*0.1634*	0.3132
30-1/2	*775*	OH	*OH*	30.500	*774.70*	1.7998	*0.1672*	0.3206
30-5/8	*778*	OH	*OH*	30.625	*777.88*	1.8415	*0.1711*	0.3280
30-3/4	*781*	OH	*OH*	30.750	*781.05*	1.8833	*0.1750*	0.3354
30-7/8	*784*	OH	*OH*	30.875	*784.23*	1.9253	*0.1789*	0.3429
31	*787*	OH	*OH*	31.000	*787.40*	1.9675	*0.1828*	0.3504
31-1/4	*797*	OH	*OH*	31.125	*796.93*	2.0951	*0.1946*	0.3732
31-1/2	*800*	OH	*OH*	31.500	*800.10*	2.1380	*0.1986*	0.3808
31-5/8	*803*	OH	*OH*	31.625	*803.28*	2.1810	*0.2026*	0.3885

Refer to back of section table of contents for footnote reference

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Technical Data on Gravel Pack Sand

Standard Sieve Openings

U.S. Mesh Size	Sieve Opening			Equivalent ϕ Units*
	in.	microns	*mm*	
2.5	0.315	8000	*8.000*	-3.0
3	0.265	6730	*6.730*	-2.75
3.5	0.223	5660	*5.660*	-2.5
4	0.187	4760	*4.760*	-2.25
5	0.157	4000	*4.000*	-2.0
6	0.132	3360	*3.360*	-1.75
7	0.111	2830	*2.830*	-1.5
8	0.0937	2380	*2.380*	-1.25
10	0.0787	2000	*2.000*	-1.0
12	0.0661	1680	*1.680*	-.75
14	0.0555	1410	*1.410*	-.5
16	0.0469	1190	*1.190*	-.25
18	0.0394	1000	*1.000*	0
20	0.0331	840	*0.840*	.25
25	0.0280	710	*0.710*	.50
30	0.0232	589	*0.589*	.76
35	0.0197	500	*0.500*	1
40	0.0165	420	*0.420*	1.25
45	0.0138	351	*0.351*	1.5
50	0.0117	297	*0.297*	1.75
60	0.0098	250	*0.250*	2.0
70	0.0083	210	*0.210*	2.25
80	0.0070	177	*0.177*	2.5
100	0.0059	149	*0.149*	2.75
120	0.0049	124	*0.124*	3.0
140	0.0041	104	*0.104*	3.25
170	0.0035	88	*0.088*	3.5
200	0.0029	74	*0.074*	3.75
230	0.0024	62	*0.062*	4.00
270	0.0021	53	*0.053*	4.25
325	0.0017	44	*0.044*	4.5
400	0.0015	37	*0.037*	4.75

* $\phi = \log_2 1/D$ *(mm)*

Permeability of Gravel

U.S. Mesh Size Range	Permeability (Darcies)*
6-10	2,703
8-12	1,969
10-20	652
12-20	518
16-25	391
16-30	398

U.S. Mesh Size Range	Permeability (Darcies)*
20-40	136
30-40	138
30-50	100
40-60	61
50-70	32

***** Based on average porosity of 40 percent. Baker Hughes standard gravel permeability as per Fair and Hatch procedure from Bear, J. “Dynamics of Fluids in a Porous Media” 1988, Dover Publications Inc. NY pp 133-135

Geological Definition of Sand, Silt, and Clay Grains

Grain Diameter	Sand	Silt	Clay
Inches	.00246 - .08	.00015 - .00246	< .00015
Millimeters	.0625 - 2.0	.00391 - .0625	< .00391
Microns	62.5 - 2000	3.91 - 62.5	< 3.9

Sieve Data

Micron*	Inches	Micron*	Inches
50	0.001968498	300	0.011810988
100	0.003936996	350	0.013779486
150	0.005905494	400	0.015747984
200	0.007873992	450	0.017716482
250	0.009842490	500	0.019684980

* 1 micron = 0.00003937 inches

Specific Volume of Common Gravels and Proppants

	Specific Volume (Dsv) (gal/lb)
Natural Sand	0.0452
Econoprop®	0.0444
CarboLite®	0.0443
CarboProp®	0.0367
Bauxite	0.0336

Density of Gravel

Absolute Density = *2.65 g/cc*
= 22.1 lb/gal = 165.4 lb/cu ft

Bulk Density (assuming $\phi = \pm 38\,\%$)
= *1.60 g/cc* = 13.4 lb/gal = 100 lb/cu ft

Common Gravel Pack Sand Sizes and Recommended Screen Gauge

U.S. Mesh Size Range	Grain Diameter Range	Median Grain Diameter	Median Grain Diameter	Recommended Screen Gauge
	in.	in.	microns	
8-12	.0937-.0661	.0799	2,029	40
10-20	.0787-.0331	.0559	1,420	20
12-20	.0661-.0331	.0496	1,260	20
16-25	.0469-.0280	.0388	986	20
16-30	.0469-.0232	.0351	892	18
20-40	.0331-.0165	.0248	630	12
30-40	.0232-.0165	.0199	505	12
30-50	.0232-.0117	.0175	445	8
40-60	.0165-.0098	.0132	335	6
50-70	.0117-.0083	.0100	254	6

API Specifications for Gravel Pack Sand

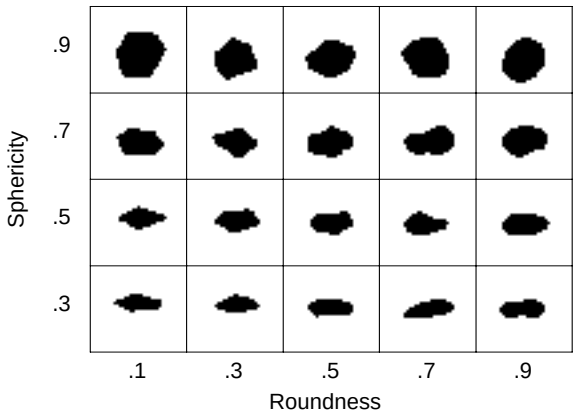
Sieve Analysis	A minimum of 96 percent by weight of the tested sand sample should pass the course designated sieve and be retained on the fine designated sieve (with the course and fine designated sieves defined in the table below). Not over 0.1 percent of the total tested sample should be retained by the course designated sieve and not over 2 percent of the total tested sample pass through the fine designated sieve.
Sphericity and Roundness	Gravel pack sand should have an average sphericity of 0.6 or greater and an average roundness of 0.6 or greater as determined by visual analysis using the chart developed by Krumbein and Sloss.
Acid Solubility	A 5 gram sand sample is added to *100 ml* of 12 percent -3 percent HCl-HF acid and allowed to sit for one hour at 72°F to allow dissolution of contaminates (carbonates, feldspars, iron oxides, clays, etc.). The sand is then removed and dried. The before and after weights are compared to determine acid solubility. The acid soluble material in gravel pack sand should not exceed 1.0 percent by weight.
Silt and Clay Content	A *20 ml* sample of dry sand is mixed with *100 ml* of demineralized water and allowed to sit for thirty minutes. The sample is then shaken vigorously for 30 seconds and allowed to sit for 5 minutes. A *25 ml* sample of the water-silt suspension is removed and the turbidity is measured. The resulting turbidity of tested gravel pack sand should be 250 NTU's or less.
Crush Resistance	A sample is sieved to remove all fines and weighed. The sample is then exposed to 2,000 psi confining stress for two minutes. The sample is sieved again to determine the weight of fines generated. Gravel pack sand subjected to this test should not produce more than 2 percent by weight fines. For large sand sizes, 12-20 U.S. Mesh and 8-16 U.S. Mesh, the amount of fines produced should not exceed 4 percent and 8 percent respectively.

Data provided by API, from Recommended Practice 58 (RP58), "Recommended Practices for the Testing of Sand Used in Gravel Pack Operations," First Edition; March 31, 1986

Designated Coarse and Fine Sieves for API Gravel Testing

U.S. Mesh Size Range	Coarse Sieve Size	Fine Sieve Size
8-12	6	12
12-20	8	20
16-30	12	30
20-40	16	40
30-50	20	50
40-60	30	60
50-70	40	70

Krumbian Chart for Visual Estimates of Sand Grain Sphericity and Roundness



Permeability of Baker Bond and Gravel Substitutes

U.S. Mesh Size Range	Baker Bond	Sintered Bauxite	Carbolite®	Econoprop®
12-18	-	-	-	-
12-20	-	559	2003	-
16-20	178	448	1288	-
16-25	-	-	-	-
16-30	105*	-	-	-
20-40	87	226	570	340
30-40	-	-	-	-
30-50	-	-	-	230
30-60	53	82	-	-
40-60	-	-	-	78
50-70	-	-	-	-

* Estimated Permeability

Gravel and Screen Sizing Guidelines

Sorting Coefficient

- $C_\mu = d_{40}/d_{90}$
- $C_\mu < 3$, uniform
- $3 \leq C_\mu \leq 5$, non-uniform
- $C_\mu > 5$, highly non-uniform

Gravel Pack Sand Sizing

- Use $D_{50} \leq 6 \times d_{50}$
- If highly non-uniform ($C_\mu > 5$) consider using next smaller size

Wire Wrapped Screen Gauge

- When used with a gravel pack, screen opening should be ±70 percent of the smallest grain diameter of selected gravel pack sand.
- When used in a standalone application, screen opening should be sized to the d10 of the formation sand size, if possible.

EXCLUDER™ Screen Sizing

- $d_{10} < 100$ microns, use prepacked screen
- 100 microns $< d_{10} <$ 200 microns, use Fine EXCLUDER2000™
- $200 < d_{10} < 250$, use Medium EXCLUDER2000™
- $d_{10} > 250$, use EXCLUDER2000™ Coarse
- d_{10} equals the dimension of the grain size at the largest 10^{th} percentile by weight (diameter d_{10} > diameter d_{50})

Alternately, use the following criteria:

- $d_{50} < 75$ microns, use prepacked screen
- 75 microns $< d_{50} <$ 150 microns, use 110 EXCLUDER™
- $d_{50} > 150$ microns, use 230 EXCLUDER™

Technical Data on Baker Hughes Screens - Screen Dimensions

Base Pipe				Hole Size / Number per Foot			BAKERWELD®	BAKERWELD® 140	BAKERWELD® 250	SLIM-PAK®	EXCLUDER2000™	EXCLUDER2000™	EQUALIZER™	EQUALIZER™ CF	DIRECT PAK™
OD	ID	Weight	Coupling OD	Size	Standard	High Flow	OD	OD	OD	OD	OD*	OD**	OD	OD	OD
in.	in.	lb/ft	in.				in.	in.	in.	in.	in.	in.	in.	in.	in.
1.050	0.824	1.14	1.31	3/8	30	60	1.50	1.64	-	1.50	-	-	-	-	-
1.315	1.049	1.70	1.66	3/8	30	60	1.76	1.90	-	1.76	-	-	-	-	-
1.660	1.380	2.30	2.05	3/8	36	72	2.11	2.25	-	2.11	-	-	-	-	-
1.900	1.610	2.75	2.20	3/8	42	84	2.35	2.49	-	2.35	-	-	-	-	-
2.063	1.751	3.25	2.50	3/8	42	84	2.51	2.65	-	2.51	-	-	-	-	-
2.375	1.995	4.60	2.88	3/8	48	96	2.82	2.96	-	2.82	3.17	3.22	-	-	-
2.875	2.441	6.40	3.50	3/8	54	108	3.32	3.46	-	3.32	3.67	3.72	-	-	-
3.250	2.750	8.00	3.56	3/8	60	120	3.70	3.83	-	-	-	-	-	-	-
3.500	2.992	9.20	4.25	3/8	66	132	3.95	4.09	-	3.95	4.30	4.35	4.52	-	5.48
4.000	3.548	9.50	4.50	3/8	72	144	4.45	4.59	4.78	4.45	4.80	4.85	-	-	-
4.500	4.000	11.60	5.00	3/8	78	156	4.96	5.10	5.28	4.96	5.31	5.36	5.53	5.53	6.57
5.000	4.408	15.00	5.56	3/8	84	168	5.47	5.61	5.78	5.47	-	-	-	-	-
5.500	4.950	15.50	6.05	3/8	90	180	5.97	6.11	6.28	5.97	6.32	6.37	6.54	-	7.57
6.625	5.920	24.00	7.39*	3/8	108	216	7.11	7.25	7.40	7.11	7.46	7.51	7.68	-	-
7.000	6.366	23.00	7.66*	3/8	114	228	7.49	7.63	7.78	7.49	-	-	-	-	-
7.625	6.875	29.70	8.50*	3/8	114	228	8.12	8.26	8.40	8.12	-	-	-	-	-
8.625	7.921	32.00	9.63*	3/8	156	312	-	9.27	-	9.13	-	-	-	-	-
9.625	8.921	36.00	10.63*	3/8	180	360	-	10.28	-	10.14	10.48	10.53	-	-	-

* Indicates OD for EXLUDER2000™ with fine and medium Vector Weave

** Indicates OD for EXCLUDER2000™ with coarse Vector Weave

EXPress® Expandable Screens

System / Expansion %	4.75 (17-22%)		6.875 (20-25%)		7.625 (18-22%)	
Expansion	**pre**	**post**	**pre**	**post**	**pre**	**post**
Base Pipe ID (in.)	4.19	4.90-5.11	6.235	7.48-7.80	6.985	8.26-8.56
Base Pipe OD (in.)	4.75	5.44-5.63	6.875	7.99-8.39	7.625	8.83-9.10
Screen OD (in.)	5.16	5.74-5.93	7.286	8.37-8.65	8.045	9.16-9.40
Approximate screen Assembly Weight (lb/ft)	18.5		28.5		30.5	
Connections	4.75 EXPress®		6.875 EXPress®		7.625 EXPress® Buttress	

Metallurgy; Base Pipe and Weave - 316L, Shroud - 304 SS

EXPress® 28 Expandable Screens

System / Expansion %	4.75 (17-22%)		6.875 (18-28%)	
Expansion	**pre**	**post**	**pre**	**post**
Base Pipe ID (in.)	4.19	4.90 - 5.11	6.235	7.36 - 8.00
Base Pipe OD (in.)	4.75	5.44 - 5.63	6.875	8.00 - 8.52
Screen OD (in.)	5.33	5.80 - 6.00	7.48	8.40 - 8.92
Approximate Screen Assembly Weight (lb/ft)	20.5		31.5	
Connections	4.75 EXPress® Buttress		6.875 EXPress® Buttress	

Solids cones also available as options:
4-3/4" - 18 and 20% solid cones
6-7/8" - 18 and 20% solid cones
Metallurgy; Base Pipe and Weave - 316L, Shroud - 304 SS

EXCLUDER2000™ and EQUALIZER™ Screen Weights

Base Pipe OD	EXCLUDER2000™		EQUALIZER™	
	19.5 ft Joint	**39 ft Joint**	**19.5 ft Joint**	**39 ft Joint**
in.	**Total Weight per Joint (lb)**			
2.875	238.23	476.46	N/A	
3.500	313.90	627.80	328.90	657.80
4.000	335.94	671.87	N/A	
4.500	396.48	792.96	N/A	
5.000	N/A		N/A	
5.500	504.43	1008.85	524.43	1048.85
6.625	708.41	1416.81	738.41	1476.81
7.000▲	717.00✷	1434.00✷	N/A	
9.625▲	1121.25●	2242.50●	N/A	

✷Pipe Base 26#
●Pipe Base 43.5#
▲Based on EXCLUDER™ coarse only

BAKERWELD® and SLIM-PAK® Screen Weights

Base Pipe OD	BAKERWELD® Screens Total Weight per Joint (lb)						SLIM-PAK®Screen Weight Per Joint (lb)	
	105W x 105R		105W x 140R		140W x 140R			
in.	19.5 ft Joint	39 ft Joint	19.5 ft Joint	39 ft Joint	19.5 ft Joint	39 ft Joint	19.5 ft Joint	39 ft Joint
1.050	47.58	95.16	52.46	104.91	60.26	120.51	64.16	128.31
1.315	62.40	124.80	67.67	135.33	76.44	152.88	81.71	163.41
1.660	78.98	157.95	84.63	169.26	95.16	190.32	102.18	204.36
1.900	91.85	183.69	98.09	196.17	109.40	218.79	117.39	234.78
2.063	104.52	209.04	111.35	222.69	123.24	246.48	132.21	264.42
2.375	135.72	271.44	142.94	285.87	156.39	312.78	166.34	332.67
2.875	178.04	356.07	186.23	372.45	201.63	403.26	214.50	429.00
3.500	241.80	483.60	250.77	501.54	268.91	537.81	285.48	570.96
4.000	254.87	509.73	264.81	529.62	284.90	569.79	304.01	608.01
4.500	304.20	608.40	315.12	630.24	337.55	675.09	359.00	717.99
5.000	377.91	755.82	389.61	779.22	414.18	828.36	439.92	879.84
5.500	395.85	791.70	408.72	817.44	435.44	870.87	463.71	927.42
6.625	578.96	1157.91	593.97	1187.94	625.37	1250.73	660.27	1320.54
7.000	565.31	1130.61	580.91	1161.81	613.86	1227.72	651.50	1302.99
7.625	705.71	1411.41	722.67	1445.34	758.36	1516.71	800.87	1601.73
8.625	765.96	1531.92	784.49	1568.97	824.46	1648.92	874.19	1748.37
9.625	859.17	1718.34	879.65	1759.29	923.72	1847.43	981.05	1962.09

Pore Size Selection Criteria

Size	Formation	Description
Fine	100 p.m.<d_{10}<200 p.m.	High sand retention efficiency
Medium	200 p.m.<d_{10}<300 p.m.	Allows for conditioned mud flow back
Coarse	d_{10}>300 p.m.	Minimum fines plugging and maximum mud flow back capacity

Slurry Calculations

Clean Fluid Volume Required

$$V_f = \frac{G_w}{W_g}$$

Where:

V_f = clean fluid volume required (gal)
G_w = weight of gravel required (lb)
W_g = gravel mix ratio (ppg)

Slurry Volume

$$V_s = V_f(1 + D_{sv}W_g)$$

Where:

V_s = slurry volume (bbl)
V_f = clean fluid volume (bbl)
W_g = gravel mix ratio (ppg)
D_{sv} = specific volume of gravel (gal/lb)

Slurry Density

$$D_s = \frac{D_b + W_g}{1 + D_{sv}W_g}$$

Where:

D_s = slurry density (ppg)
D_b = base fluid density (ppg)
W_g = gravel mix ratio (ppg)
D_{sv} = specific volume of gravel (gal/lb)

Sand Feed Rate

$$Q_g = \frac{42Q_s}{\left(\frac{1}{W_g} + D_{sv}\right)}$$

Where:

Q_s = slurry rate (bbl/min)
Q_g = sand rate (lb/min)
W_g = gravel mix ratio (ppg)
D_{sv} = specific volume of gravel (gal/lb)

Gravel Mix Ratio

$$W_g = \frac{Q_g}{42Q_s - D_{sv}Q_g}$$

Where:

Q_s = slurry rate (bbl/min)
Q_g = sand rate (lb/min)
W_g = gravel mix ratio (ppg)
D_{sv} = specific volume of gravel (gal/lb)

Settling Factor

$$SF = \frac{W_g(D_{bv})}{1 + D_{sv}(W_g)} \times 100$$

Where:

SF = settling factor (%)
W_g = gravel mix ratio (ppg)
D_{bv} = bulk volume (gal/lb) = 7.48/bulk density (lb/cu ft)
D_{sv} = specific volume of gravel (gal/lb) = 1/particle density

Sand Feed Rate < 1 - 10 > (lb/min)

Sand Mix Ratio (ppga)	Slurry Rate (bpm)																		
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
0.25	10	16	21	26	31	36	42	47	52	57	62	67	73	78	83	88	93	99	104
0.50	21	31	41	51	62	72	82	92	103	113	123	133	144	154	164	175	185	195	205
0.75	30	46	61	76	91	107	122	137	152	168	183	198	213	228	244	259	274	289	305
1.00	40	60	80	100	121	141	161	181	201	221	241	261	281	301	321	341	362	382	402
1.25	50	75	99	124	149	174	199	224	248	273	298	323	348	373	397	422	447	472	497
1.50	59	88	118	147	177	206	236	265	295	324	354	383	413	442	472	501	531	560	590
1.75	68	102	136	170	204	238	272	306	340	374	408	442	476	511	545	579	613	647	681
2.00	77	115	154	192	231	269	308	346	385	423	462	500	539	577	616	654	693	731	770
2.25	86	129	171	214	257	300	343	386	429	471	514	557	600	643	686	729	771	814	857
2.50	94	141	189	236	283	330	377	424	471	518	566	613	660	707	754	801	848	895	943
2.75	103	154	205	257	308	359	411	462	513	564	616	667	718	770	821	872	924	975	1026
3.00	111	166	222	277	333	388	443	499	554	610	665	720	776	831	887	942	998	1,053	1,108
3.25	119	178	238	297	357	416	476	535	594	654	713	773	832	892	951	1,010	1,070	1,129	1,189
3.50	127	190	254	317	380	444	507	570	634	697	761	824	887	951	1,014	1,078	1,141	1,204	1,268
3.75	135	202	269	336	404	471	538	605	673	740	807	874	942	1,009	1,076	1,143	1,211	1,278	1,345
4.00	142	213	284	355	426	497	568	639	710	781	853	924	995	1,066	1,137	1,208	1,279	1,350	1,421
4.25	150	224	299	374	449	523	598	673	748	822	897	972	1,047	1,121	1,196	1,271	1,346	1,420	1,495
4.50	157	235	314	392	470	549	627	706	784	863	941	1,019	1,098	1,176	1,255	1,333	1,411	1,490	1,568
4.75	164	246	328	410	492	574	656	738	820	902	984	1,066	1,148	1,230	1,312	1,394	1,476	1,558	1,640
5.00	171	257	342	428	513	599	684	770	855	941	1,026	1,112	1,197	1,283	1,368	1,454	1,539	1,625	1,710
5.25	178	267	356	445	534	623	712	801	890	978	1,067	1,156	1,245	1,334	1,423	1,512	1,601	1,690	1,779
5.5	185	277	369	462	554	646	739	831	923	1,016	1,108	1,200	1,293	1,385	1,477	1,570	1,662	1,754	1,847
5.75	191	287	383	478	574	670	765	861	957	1,052	1,148	1,244	1,339	1,435	1,531	1,626	1,722	1,818	1,913
6.00	198	297	396	495	594	693	791	890	989	1,088	1,187	1,286	1,385	1,484	1,583	1,682	1,781	1,880	1,979
6.25	204	306	409	511	613	715	817	919	1,021	1,124	1,226	1,328	1,430	1,532	1,634	1,736	1,839	1,941	2,043
6.50	211	316	421	526	632	737	842	948	1,053	1,158	1,263	1,369	1,474	1,579	1,685	1,790	1,895	2,001	2,106
6.75	217	325	434	542	650	759	867	975	1,084	1,192	1,301	1,409	1,517	1,626	1,734	1,843	1,951	2,059	2,168
7.00	223	334	446	557	669	780	891	1,003	1,114	1,226	1,337	1,449	1,560	1,671	1,783	1,894	2,006	2,117	2,229
7.25	229	343	458	572	687	801	915	1,030	1,144	1,259	1,373	1,487	1,602	1,716	1,831	1,945	2,060	2,174	2,288
7.50	235	352	469	587	704	822	939	1,056	1,174	1,291	1,408	1,526	1,643	1,760	1,878	1,995	2,113	2,230	2,347
7.75	241	361	481	601	722	842	962	1,082	1,203	1,323	1,443	1,563	1,684	1,804	1,924	2,044	2,165	2,285	2,405
8.00	246	369	492	615	739	862	985	1,108	1,231	1,354	1,477	1,600	1,723	1,846	1,970	2,093	2,216	2,339	2,462
8.25	252	378	504	629	755	881	1,007	1,133	1,259	1,385	1,511	1,637	1,762	1,888	2,014	2,140	2,266	2,392	2,518
8.50	257	386	515	643	772	900	1,029	1,158	1,286	1,415	1,544	1,672	1,801	1,930	2,058	2,187	2,316	2,444	2,573
8.75	263	394	525	657	788	919	1,051	1,182	1,313	1,445	1,576	1,707	1,839	1,970	2,102	2,233	2,364	2,496	2,627
9.00	268	402	536	670	804	938	1,072	1,206	1,340	1,474	1,608	1,742	1,876	2,010	2,144	2,278	2,412	2,546	2,680
9.25	273	410	546	683	820	956	1,093	1,230	1,366	1,503	1,639	1,776	1,913	2,049	2,186	2,323	2,459	2,596	2,732
9.50	278	418	557	696	835	974	1,114	1,253	1,392	1,531	1,670	1,810	1,949	2,088	2,227	2,366	2,506	2,645	2,784
9.75	283	425	567	709	850	992	1,134	1,276	1,417	1,559	1,701	1,843	1,984	2,126	2,268	2,409	2,551	2,693	2,835
10.00	288	433	577	721	865	1,010	1,154	1,298	1,442	1,587	1,731	1,875	2,019	2,163	2,308	2,452	2,595	2,740	2,885

Sand Feed Rate < 11 - 40 > (lb/min)

Sand Mix Ratio (ppga)	Slurry Rate (bpm)																	
	11.0	12.0	13.0	14.0	15.0	16.0	17.0	18.0	19.0	20.0	22.0	23.0	24.0	25.0	27.5	30.0	35.0	40.0
0.25	114	125	135	145	156	166	176	187	197	208	228	239	249	260	285	311	363	415
0.50	226	246	267	287	308	329	349	370	390	411	452	472	493	513	565	616	719	821
0.75	335	365	396	426	457	487	518	548	579	609	670	701	731	761	838	914	1,066	1,218
1.00	442	482	522	562	603	643	683	723	763	803	884	924	964	1,004	1105	1205	1,406	1,607
1.25	546	596	646	695	745	795	844	894	944	993	1,093	1,142	1,192	1,242	1,366	1,490	1,738	1,987
1.50	649	708	767	826	885	943	1,002	1,061	1,120	1,179	1,297	1,356	1,415	1,474	1,622	1,769	2,064	2,359
1.75	749	817	885	953	1,021	1,089	1,157	1,225	1,293	1361	1,497	1566	1,634	1,702	1,872	2,042	2,382	2,723
2.00	847	924	1,001	1,078	1,155	1,232	1,309	1,386	1,463	1540	1,694	1,771	1,848	1,924	2,117	2,309	2,694	3,079
2.25	943	1,028	1,114	1,200	1,286	1,371	1,457	1,543	1,628	1,714	1,886	1,971	2,057	2,143	2,357	2,571	3,000	3,428
2.50	1,037	1,131	1,225	1,320	1,414	1,508	1,602	1,697	1,791	1,885	2,074	2,168	2,262	2,356	2,592	2,828	3,299	3,770
2.75	1,129	1,232	1,334	1,437	1,539	1,642	1,745	1,847	1,950	2,053	2,258	2,360	2463	2,566	2,822	3,079	3,592	4,105
3.00	1,219	1,330	1,441	1,552	1,663	1,773	1,884	1,995	2,106	2,217	2,438	2,549	2,660	2,771	3,048	3,325	3,879	4,433
3.25	1,308	1,427	1,545	1,664	1,783	1,902	2,021	2,140	2,259	2,378	2,615	2,734	2,853	2,972	3,269	3,566	4,161	4,755
3.50	1,394	1,521	1,648	1,775	1,902	2,028	2,155	2,282	2,409	2,535	2,789	2,916	3,042	3,169	3,486	3,803	4,437	5,071
3.75	1,480	1,614	1,749	1,883	2,018	2,152	2,287	2,421	2,556	2,690	2,959	3,094	3,228	3,363	3,699	4,035	4,708	5,380
4.00	1,563	1,705	1,847	1,989	2,131	2,273	2,415	2,558	2,700	2,842	3,126	3,268	3,410	3,552	3,907	4,263	4,973	5,683
4.25	1,645	1,794	1,944	2,093	2,243	2,392	2,542	2,691	2,841	2,990	3,289	3,439	3,589	3,738	4,112	4,486	5,233	5,981
4.50	1,725	1,882	2,039	2,195	2,352	2,509	2,666	2,823	2,980	3,136	3,450	3,607	3,764	3,921	4,313	4,705	5,489	6,273
4.75	1,804	1,968	2,132	2,296	2,460	2,624	2,788	2,952	3,116	3,280	3,608	3,772	3,936	4,100	4,509	4,919	5,739	6,559
5.00	1,881	2,052	2,223	2,394	2,565	2,736	2,907	3,078	3,249	3,420	3,762	3,933	4,104	4,275	4,703	5,130	5,985	6,840
5.25	1,957	2,135	2,313	2,491	2,669	2,847	3,024	3,202	3,380	3,558	3,914	4,092	4,270	4,448	4,892	5,337	6,227	7,116
5.50	2,031	2,216	2,401	2,586	2,770	2,955	3,140	3,324	3,509	3,694	4,063	4,248	4,432	4,617	5,079	5,540	6,464	7,387
5.75	2,105	2,296	2,487	2,679	2,870	3,061	3,253	3,444	3,635	3,827	4,209	4,401	4,592	4,783	5,262	5,740	6,697	7,653
6.00	2,177	2,374	2,572	2,770	2,968	3,166	3,364	3,562	3,759	3,957	4,353	4,551	4,749	4,947	5,441	5,936	6,925	7,915
6.25	2,247	2,451	2,656	2,860	3,064	3,268	3,473	3,677	3,881	4,086	4,494	4,698	4,903	5,107	5,618	6,128	7,150	8,171
6.50	2,316	2,527	2,738	2,948	3,159	3,369	3,580	3,790	4,001	4,212	4,633	4,843	5,054	5,265	5,791	6,317	7,370	8,423
6.75	2,385	2,601	2,818	3,035	3,252	3,468	3,685	3,902	4,119	4,336	4,769	4,986	5,203	5,419	5,961	6,503	7,587	8,671
7.00	2,451	2,674	2,897	3,120	3,343	3,566	3,789	4,012	4,234	4,457	4,903	5,126	5,349	5,572	6,129	6,686	7,800	8,914
7.25	2,517	2,746	2,975	3,204	3,433	3,662	3,890	4,119	4,348	4,577	5,035	5,263	5,492	5,721	6,293	6,865	8,010	9,154
7.50	2,582	2,817	3,051	3,286	3,521	3,756	3,990	4,225	4,460	4,694	5,164	5,399	5,633	5,868	6,455	7,042	8,215	9,389
7.75	2,646	2,886	3,127	3,367	3,608	3,848	4,089	4,329	4,570	4,810	5,291	5,532	5,772	6,013	6,614	7,215	8,418	9,620
8.00	2,708	2,954	3,200	3,447	3,693	3,939	4,185	4,431	4,678	4,924	5,416	5,662	5,909	6,155	6,770	7,386	8,617	9,848
8.25	2,770	3,021	3,273	3,525	3,777	4,028	4,280	4,532	4,784	5,036	5,539	5,791	6,043	6,295	6,924	7,553	8,812	10,071
8.50	2,830	3,087	3,345	3,602	3,859	4,116	4,374	4,631	4,888	5,146	5,660	5,917	6,175	6,432	7,075	7,718	9,005	10,291
8.75	2,890	3,152	3,415	3,678	3,940	4,203	4,466	4,728	4,991	5,254	5,779	6,042	6,305	6,567	7,224	7,881	9,194	10,508
9.00	2,948	3,216	3,484	3,752	4,020	4,288	4,556	4,824	5,092	5,360	5,896	6,164	6,432	6,700	7,370	8,040	9,380	10,720
9.25	3,006	3,279	3,552	3,825	4,099	4,372	4,645	4,918	5,192	5,465	6,011	6,285	6,558	6,831	7,514	8,197	9,564	10,930
9.50	3,062	3,341	3,619	3,898	4,176	4,454	4,733	5,011	5,290	5,568	6,125	6,403	6,682	6,960	7,656	8,352	9,744	11,136
9.75	3,118	3,402	3,685	3,969	4,252	4,536	4,819	5,102	5,386	5,669	6,236	6,520	6,803	7,087	7,795	8,504	9,921	11,339
10.00	3,173	3,462	3,750	4,038	4,327	4,615	4,904	5,192	5,481	5,769	6,346	6,635	6,923	7,212	7,933	8,654	10,096	11,538

Darcy's Law Equations For Water Pack

Linear Flow (Velocity < 0.7 ft/sec)

$$h = \frac{0.00078\, kA(p_s - p_i)}{\mu q}$$

Where:
- h = gravel height above top of screen (ft)
- k = permeability of gravel (darcies)
- A = flow area in casing/blank annulus (ft^2)
- p_s = sandout pressure (psi)
- p_i = initial circulating pressure (psi)
- μ = completion fluid viscosity (cp)
- q = pump rate (bpm)

Linear Flow (Velocity > 0.7 ft/sec)

$$h = \frac{kA^2(p_s - p_i)}{1279.0\mu qA + 0.0000144\left(\frac{21(1-\phi)}{d_{50}\phi^3}\right)\rho k q^2}$$

Where:
- h = gravel height above top of screen (ft)
- k = permeability of gravel (darcies)
- A = flow area in casing/blank annulus (ft^2)
- p_s = sandout pressure (psi)
- p_i = initial circulating pressure (psi)
- μ = completion fluid viscosity (cp)
- q = pump rate (bpm)
- ϕ = porosity (fraction)
- d_{50} = average grain size (in.)
- ρ = completion fluid density (ppg)

Flow Velocity

$$V = \frac{5.615q}{A}$$

Where:
- V = flow velocity (ft/min)
- A = flow area (ft^2)
- q = pump rate (bpm)

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QT-700 Coiled Tubing Technical Data - US Customary Units

Specified		Calculated	Plain End	Pipe Metal	Pipe Body	Tensile	Internal	Hydro Test	Torsional	Flow	Internal		External		Displacement	
Outside Diameter	Wall Thickness	Inside Diameter	Weight	Cross-sectional Area	Yield Load	Load	Yield Pressure	Pressure	Yield Strength	Area	Capacity per 1,000 ft		Displacement per 1,000 ft		Ext - Int per 1,000 ft	
in.	in.	in.	lb/ft	in.^{2}	lb	lb	psi	psi	lb/ft	in.^{2}	gal	bbl	gal	bbl	gal	bbl
0.625	0.087	0.451	0.500	0.147	10290	11760	18370	14700	120	0.160	8.299	0.1976	15.938	0.3795	7.639	0.1819
	0.095	0.435	0.538	0.158	11070	12650	20160	15000	120	0.149	7.720	0.1838			8.217	0.1956
	0.102	0.421	0.570	0.168	11730	13410	21730		130	0.139	7.231	0.1722			8.706	0.2073
0.750	0.087	0.576	0.617	0.181	12680	14500	15310	12200	180	0.261	13.536	0.3223	22.950	0.5464	9.414	0.2241
	0.095	0.560	0.665	0.195	13680	15640	16800	13400	190	0.246	12.795	0.3046			10.155	0.2418
	0.102	0.546	0.707	0.208	14540	16610	18110	14500	200	0.234	12.163	0.2896			10.787	0.2568
1.000	0.087	0.826	0.849	0.250	17470	19960	11480	9200	350	0.536	27.837	0.6628	40.800	0.9714	12.963	0.3086
	0.095	0.810	0.919	0.270	18910	21610	12600	10100	380	0.515	26.769	0.6374			14.031	0.3341
	0.102	0.796	0.979	0.288	20140	23020	13580	10900	400	0.498	25.852	0.6155			14.948	0.3559
	0.109	0.782	1.038	0.305	21360	24410	14560	11600	410	0.480	24.950	0.5941			15.850	0.3774
1.250	0.087	1.076	1.082	0.318	22250	25430	9180	7300	580	0.909	47.237	1.1247	63.750	1.5179	16.513	0.3932
	0.095	1.060	1.173	0.345	24130	27580	10080	8100	620	0.882	45.843	1.0915			17.907	0.4264
	0.102	1.046	1.252	0.368	25750	29430	10860	8700	660	0.859	44.640	1.0629			19.110	0.4550
	0.109	1.032	1.330	0.391	27350	31260	11650	9300	690	0.836	43.453	1.0346			20.297	0.4833
	0.118	1.014	1.428	0.420	29370	33570	12660	10100	730	0.808	41.950	0.9988			21.800	0.5190
	0.125	1.000	1.503	0.442	30930	35340	13440	10800	760	0.785	40.800	0.9714			22.950	0.5464
	0.134	0.982	1.599	0.470	32890	37580	14450	11600	800	0.757	39.344	0.9368			24.406	0.5811
	0.156	0.938	1.824	0.536	37530	42890	16910	13500	880	0.691	35.898	0.8547			27.852	0.6632
	0.175	0.900	2.011	0.591	41370	47280	19040	15000	940	0.636	33.048	0.7869			30.702	0.7310
1.500	0.095	1.310	1.427	0.419	29350	33550	8400	6700	930	1.348	70.017	1.6671	91.800	2.1857	21.783	0.5186
	0.102	1.296	1.524	0.448	31360	35840	9050	7200	990	1.319	68.528	1.6316			23.272	0.5541
	0.109	1.282	1.621	0.476	33340	38110	9710	7800	1040	1.291	67.056	1.5966			24.744	0.5891
	0.118	1.264	1.743	0.512	35860	40990	10550	8400	1110	1.255	65.186	1.5520			26.614	0.6337
	0.125	1.250	1.837	0.540	37800	43200	11200	9000	1160	1.227	63.750	1.5179			28.050	0.6679
	0.134	1.232	1.957	0.575	40250	46000	12040	9600	1220	1.192	61.927	1.4745			29.873	0.7113
	0.156	1.188	2.241	0.659	46110	52690	14090	11300	1350	1.108	57.583	1.3710			34.217	0.8147
	0.175	1.150	2.479	0.728	50990	58280	15870	12700	1460	1.039	53.958	1.2847			37.842	0.9010
	0.188	1.124	2.637	0.775	54240	61990	17080	13700	1530	0.992	51.546	1.2273			40.254	0.9584
1.750	0.109	1.532	1.912	0.562	39340	44950	8320	6700	1460	1.843	95.759	2.2800	124.950	2.9750	29.191	0.6950
	0.118	1.514	2.059	0.605	42350	48400	9040	7200	1560	1.800	93.522	2.2267			31.428	0.7483
	0.125	1.500	2.171	0.638	44670	51050	9600	7700	1630	1.767	91.800	2.1857			33.150	0.7893
	0.134	1.482	2.315	0.680	47620	54420	10320	8300	1720	1.725	89.610	2.1336			35.340	0.8414

Note:

1. Minimum wall thickness is 0.005" less than specified wall thickness
2. Pressures calculated based on (t-0.005) in
3. Maximum hydrostatic test pressure is 15,000 psi

Data provided by Quality Tubing; October, 2005

QT-700 Coiled Tubing Technical Data - US Customary Units (Continued)

Specified		Calculated	Plain End	Pipe Metal	Pipe Body	Tensile	Internal	Hydro Test	Torsional	Flow	Internal		External		Displacement	
Outside Diameter	Wall Thickness	Inside Diameter	Weight	Cross-sectional Area	Yield Load	Load	Yield Pressure	Pressure	Yield Strength	Area	Capacity per 1,000 ft		Displacement per 1,000 ft		Ext - Int per 1,000 ft	
in.	in.	in.	lb/ft	in.^{2}	lb	lb	psi	psi	lb/ft	in.^{2}	gal	bbl	gal	bbl	gal	bbl
1.750	0.145	1.460	2.488	0.731	51180	58490	11200	9000	1830	1.674	86.969	2.0707	124.950	2.9750	37.981	0.9043
	0.156	1.438	2.658	0.781	54680	62500	12080	9700	1930	1.624	84.368	2.0088			40.582	0.9662
	0.175	1.400	2.946	0.866	60610	69270	13600	10900	2090	1.539	79.968	1.9040			44.982	1.0710
	0.188	1.374	3.139	0.923	64580	73800	14640	11700	2200	1.483	77.025	1.8339			47.925	1.1411
	0.203	1.344	3.357	0.987	69060	78930	15840	12700	2310	1.419	73.699	1.7547			51.251	1.2203
2.000	0.125	1.750	2.505	0.736	51540	58910	8400	6700	2190	2.405	124.950	2.9750	163.200	3.8857	38.250	0.9107
	0.134	1.732	2.673	0.786	54990	62840	9030	7200	2310	2.356	122.393	2.9141			40.807	0.9716
	0.156	1.688	3.075	0.904	63260	72300	10570	8500	2610	2.238	116.253	2.7679			46.947	1.1178
	0.175	1.650	3.414	1.003	70230	80270	11900	9500	2840	2.138	111.078	2.6447			52.122	1.2410
	0.188	1.624	3.642	1.070	74910	85620	12810	10200	2990	2.071	107.605	2.5620			55.595	1.3237
	0.203	1.594	3.900	1.146	80220	91680	13860	11100	3160	1.996	103.666	2.4682			59.534	1.4175
2.375	0.134	2.107	3.210	0.943	66040	75470	7600	6100	3370	3.487	181.130	4.3126	230.138	5.4795	49.008	1.1669
	0.145	2.085	3.457	1.016	71110	81270	8250	6600	3600	3.414	177.367	4.2230			52.771	1.2564
	0.156	2.063	3.700	1.088	76130	87000	8900	7100	3820	3.343	173.644	4.1344			56.494	1.3451
	0.175	2.025	4.116	1.210	84670	96760	10020	8000	4180	3.221	167.306	3.9835			62.832	1.4960
	0.188	1.999	4.395	1.292	90420	103340	10790	8600	4410	3.138	163.037	3.8818			67.101	1.5976
	0.203	1.969	4.713	1.385	96960	110810	11670	9300	4670	3.045	158.180	3.7662			71.957	1.7133
2.625	0.156	2.313	4.117	1.210	84700	96800	8050	6400	4750	4.202	218.279	5.1971	281.138	6.6938	62.859	1.4966
	0.175	2.275	4.583	1.347	94290	107760	9070	7300	5210	4.065	211.166	5.0278			69.972	1.6660
	0.188	2.249	4.898	1.439	100750	115150	9760	7800	5520	3.973	206.366	4.9135			74.771	1.7803
	0.203	2.219	5.256	1.545	108120	123570	10560	8400	5850	3.867	200.898	4.7833			80.240	1.9105
2.875	0.156	2.563	4.534	1.333	93280	106600	7350	5900	5790	5.159	268.014	6.3813	337.238	8.0295	69.224	1.6482
	0.175	2.525	5.051	1.484	103910	118750	8280	6600	6360	5.007	260.126	6.1935			77.112	1.8360
	0.188	2.499	5.400	1.587	111090	126960	8910	7100	6740	4.905	254.796	6.0666			82.441	1.9629
	0.203	2.469	5.798	1.704	119280	136320	9640	7700	7170	4.788	248.715	5.9218			88.522	2.1077
3.500	0.175	3.150	6.220	1.828	127960	146240	6800	5400	9750	7.793	404.838	9.6390	499.800	11.9000	94.962	2.2610
	0.188	3.124	6.656	1.956	136930	156490	7320	5900	10360	7.665	398.183	9.4805			101.617	2.4195
	0.203	3.094	7.155	2.103	147190	168210	7920	6300	11040	7.519	390.572	9.2993			109.228	2.6007

Refer to page 10-1 for footnote reference

QT-800 Coiled Tubing Technical Data - US Customary Units

Specified		Calculated	Plain End	Pipe Metal	Pipe Body	Tensile	Internal	Hydro Test	Torsional	Flow	Internal Capacity		External Displacement		Displacement Ext - Int	
Outside Diameter	Wall Thickness	Inside Diameter	Weight	Cross-sectional Area	Yield Load	Load	Yield Pressure	Pressure	Yield Strength	Area	per 1,000 ft.		per 1,000 ft.		per 1,000 ft	
in.	in.	in.	lb/ft	in.²	lb	lb	psi	psi	lb/ft	in.²	gal	bbl	gal	bbl	gal	bbl
0.625	0.087	0.451	0.500	0.147	11760	13230	20990	15000	130	0.160	8.299	0.1976	15.938	0.3795	7.639	0.1819
	0.095	0.435	0.538	0.158	12650	14240	23040		140	0.149	7.720	0.1838			8.217	0.1956
	0.102	0.421	0.570	0.168	13410	15080	24830		150	0.139	7.231	0.1722			8.706	0.2073
0.750	0.087	0.576	0.617	0.181	14500	16310	17490	14000	210	0.261	13.536	0.3223	22.950	0.5464	9.414	0.2241
	0.095	0.560	0.665	0.195	15640	17590	19200	15000	220	0.246	12.795	0.3046			10.155	0.2418
	0.102	0.546	0.707	0.208	16610	18690	20690		230	0.234	12.163	0.2896			10.787	0.2568
1.000	0.087	0.826	0.849	0.250	19960	22460	13120	10500	400	0.536	27.837	0.6628	40.800	0.9714	12.963	0.3086
	0.095	0.810	0.919	0.270	21610	24310	14400	11500	430	0.515	26.769	0.6374			14.031	0.3341
	0.102	0.796	0.979	0.288	23020	25900	15520	12400	450	0.498	25.852	0.6155			14.948	0.3559
	0.109	0.782	1.038	0.305	24410	27460	16640	13300	470	0.480	24.950	0.5941			15.850	0.3774
	0.118	0.764	1.113	0.327	26160	29430	18080	14500	500	0.458	23.815	0.5670			16.985	0.4044
	0.125	0.750	1.169	0.344	27490	30930	19200	15000	520	0.442	22.950	0.5464			17.850	0.4250
1.250	0.087	1.076	1.082	0.318	25430	28610	10500	8400	670	0.909	47.237	1.1247	63.750	1.5179	16.513	0.3932
	0.095	1.060	1.173	0.345	27580	31020	11520	9200	710	0.882	45.843	1.0915			17.907	0.4264
	0.102	1.046	1.252	0.368	29430	33110	12420	9900	750	0.859	44.640	1.0629			19.110	0.4550
	0.109	1.032	1.330	0.391	31260	35160	13310	10600	790	0.836	43.453	1.0346			20.297	0.4833
	0.118	1.014	1.428	0.420	33570	37770	14460	11600	840	0.808	41.950	0.9988			21.800	0.5190
	0.125	1.000	1.503	0.442	35340	39760	15360	12300	870	0.785	40.800	0.9714			22.950	0.5464
	0.134	0.982	1.599	0.470	37580	42280	16510	13200	910	0.757	39.344	0.9368			24.406	0.5811
	0.145	0.960	1.713	0.503	40270	45300	17920	14300	960	0.724	37.601	0.8953			26.149	0.6226
	0.156	0.938	1.824	0.536	42890	48250	19330	15000	1010	0.691	35.898	0.8547			27.852	0.6632
	0.175	0.900	2.011	0.591	47280	53190	21760		1080	0.636	33.048	0.7869			30.702	0.7310
	0.188	0.874	2.134	0.627	50180	56450	23420		1120	0.600	31.166	0.7420			32.584	0.7759
1.500	0.095	1.310	1.427	0.419	33550	37740	9600	7700	1070	1.348	70.017	1.6671	91.800	2.1857	21.783	0.5186
	0.102	1.296	1.524	0.448	35840	40320	10350	8300	1130	1.319	68.528	1.6316			23.272	0.5541
	0.109	1.282	1.621	0.476	38110	42870	11090	8900	1190	1.291	67.056	1.5966			24.744	0.5891
	0.118	1.264	1.743	0.512	40990	46110	12050	9600	1260	1.255	65.186	1.5520			26.614	0.6337
	0.125	1.250	1.837	0.540	43200	48600	12800	10200	1320	1.227	63.750	1.5179			28.050	0.6679
	0.134	1.232	1.957	0.575	46000	51750	13760	11000	1390	1.192	61.927	1.4745			29.873	0.7113
	0.145	1.210	2.100	0.617	49380	55550	14930	11900	1470	1.150	59.735	1.4223			32.065	0.7634
	0.156	1.188	2.241	0.659	52690	59280	16110	12900	1550	1.108	57.583	1.3710			34.217	0.8147
	0.175	1.150	2.479	0.728	58280	65560	18130	14500	1670	1.039	53.958	1.2847			37.842	0.9010
	0.188	1.124	2.637	0.775	61990	69740	19520	15600	1750	0.992	51.546	1.2273			40.254	0.9584
	0.203	1.094	2.815	0.827	66170	74440	21120	15000	1830	0.940	48.831	1.1626			42.969	1.0231

Note:

1. Minimum wall thickness is 0.005" less than specified wall thickness
2. Pressures calculated based on (t-0.005) in
3. Maximum hydrostatic test pressure is 15,000 psi

True Taper® product available

Data provided by Quality Tubing; October, 2005

QT-800 Coiled Tubing Technical Data - US Customary Units (Continued)

Specified		Calculated	Plain End	Pipe Metal	Pipe Body	Tensile	Internal	Hydro Test	Torsional	Flow	Internal		External		Displacement	
Outside Diameter	Wall Thickness	Inside Diameter	Weight	Cross-sectional Area	Yield Load	Load	Yield Pressure	Pressure	Yield Strength	Area	Capacity per 1,000 ft.		Displacement per 1,000 ft.		Ext - Int per 1,000 ft	
in.	in.	in.	lb/ft	in.^{2}	lb	lb	psi	psi	lb/ft	in.^{2}	gal	bbl	gal	bbl	gal	bbl
1.750	0.109	1.532	1.912	0.562	44950	50570	9510	7600	1670	1.843	95.759	2.2800	124.950	2.9750	29.191	0.6950
	0.118	1.514	2.059	0.605	48400	54450	10330	8300	1780	1.800	93.522	2.2267			31.428	0.7483
	0.125	1.500	2.171	0.638	51050	57430	10970	8800	1860	1.767	91.800	2.1857			33.150	0.7893
	0.134	1.482	2.315	0.680	54420	61230	11790	9400	1970	1.725	89.610	2.1336			35.340	0.8414
	0.145	1.460	2.488	0.731	58490	65800	12800	10200	2090	1.674	86.969	2.0707			37.981	0.9043
	0.156	1.438	2.658	0.781	62500	70310	13810	11000	2200	1.624	84.368	2.0088			40.582	0.9662
	0.175	1.400	2.946	0.866	69270	77930	15540	12400	2390	1.539	79.968	1.9040			44.982	1.0710
	0.188	1.374	3.139	0.923	73800	83030	16730	13400	2510	1.483	77.025	1.8339			47.925	1.1411
	0.203	1.344	3.357	0.987	78930	88790	18100	14500	2640	1.419	73.699	1.7547			51.251	1.2203
	0.236	1.278	3.820	1.123	89800	101030	21120	15000	2900	1.283	66.638	1.5866			58.312	1.3884
2.000	0.125	1.750	2.505	0.736	58910	66270	9600	7700	2500	2.405	124.950	2.9750	163.200	3.8857	38.250	0.9107
	0.134	1.732	2.673	0.786	62840	70700	10320	8300	2650	2.356	122.393	2.9141			40.807	0.9716
	0.145	1.710	2.875	0.845	67600	76050	11200	9000	2810	2.297	119.303	2.8406			43.897	1.0452
	0.156	1.688	3.075	0.904	72300	81340	12080	9700	2980	2.238	116.253	2.7679			46.947	1.1178
	0.175	1.650	3.414	1.003	80270	90300	13600	10900	3250	2.138	111.078	2.6447			52.122	1.2410
	0.188	1.624	3.642	1.070	85620	96320	14640	11700	3420	2.071	107.605	2.5620			55.595	1.3237
	0.203	1.594	3.900	1.146	91680	103140	15840	12700	3610	1.996	103.666	2.4682			59.534	1.4175
	0.236	1.528	4.450	1.308	104630	117710	18480	14800	3990	1.834	95.259	2.2681			67.941	1.6176
2.375	0.125	2.125	3.007	0.884	70690	79520	8080	6500	3640	3.547	184.238	4.3866	230.138	5.4795	45.900	1.0929
	0.134	2.107	3.210	0.943	75470	84910	8690	7000	3850	3.487	181.130	4.3126			49.008	1.1669
	0.145	2.085	3.457	1.016	81270	91430	9430	7500	4110	3.414	177.367	4.2230			52.771	1.2564
	0.156	2.063	3.700	1.088	87000	97880	10170	8100	4360	3.343	173.644	4.1344			56.494	1.3451
	0.175	2.025	4.116	1.210	96760	108860	11450	9200	4770	3.221	167.306	3.9835			62.832	1.4960
	0.188	1.999	4.395	1.292	103340	116250	12330	9900	5040	3.138	163.037	3.8818			67.101	1.5976
	0.203	1.969	4.713	1.385	110810	124670	13340	10700	5340	3.045	158.180	3.7662			71.957	1.7133
	0.236	1.903	5.396	1.586	126870	142730	15560	12400	5950	2.838	147.443	3.5105			82.694	1.9689
2.675	0.156	2.363	4.201	1.235	98760	111110	9030	7200	5660	4.202	218.279	5.1971	281.138	6.6938	62.859	1.4966
	0.175	2.325	4.677	1.374	109960	123700	10170	8100	6210	4.065	211.166	5.0278			69.972	1.6660
	0.188	2.299	4.998	1.469	117510	132200	10950	8800	6570	3.973	206.366	4.9135			74.771	1.7803
	0.203	2.269	5.364	1.577	126120	141890	11840	9500	6980	3.867	200.898	4.7833			80.240	1.9105
	0.236	2.201	6.177	1.815	145220	163370	13880	11100	7840	3.634	188.773	4.4946			92.364	2.1991
2.875	0.156	2.563	4.534	1.333	106600	119930	8400	6700	6620	5.159	268.014	6.3813	337.238	8.0295	69.224	1.6482
	0.175	2.525	5.051	1.484	118750	133600	9460	7600	7270	5.007	260.126	6.1935			77.112	1.8360
	0.188	2.499	5.400	1.587	126960	142830	10180	8100	7710	4.905	254.796	6.0666			82.441	1.9629
	0.203	2.469	5.798	1.704	136320	153360	11020	8800	8190	4.788	248.715	5.9218			88.522	2.1077
	0.236	2.403	6.658	1.957	156530	176090	12860	10300	9190	4.528	235.204	5.6001			102.034	2.4294
3.500	0.175	3.150	6.220	1.828	146240	164520	7770	6200	11140	7.793	404.838	9.6390	499.800	11.9000	94.962	2.2610
	0.188	3.124	6.656	1.956	156490	176050	8370	6700	11840	7.665	398.183	9.4805			101.617	2.4195
	0.203	3.094	7.155	2.103	168210	189240	9050	7200	12610	7.519	390.572	9.2993			109.228	2.6007
	0.236	3.028	8.235	2.420	193600	217800	10560	8400	14250	7.192	373.592	8.8951			126.208	3.0049

Refer to page 10-3 for footnote reference

QT-900 Coiled Tubing Technical Data - US Customary Units

Specified		Calculated	Plain End	Pipe Metal	Pipe Body	Tensile	Internal	Hydro Test	Torsional	Flow	Internal Capacity per 1,000 ft		External Displacement per 1,000 ft		Displacement Ext - Int per 1,000 ft	
Outside Diameter	Wall Thickness	Inside Diameter	Weight	Cross-sectional Area	Yield Load	Load	Yield Pressure	Pressure	Yield Strength	Area						
in.	in.	in.	lb/ft	in.^{2}	lb	lb	psi	psi	lb/ft	in.^{2}	gal	bbl	gal	bbl	gal	bbl
0.625	0.087	0.451	0.500	0.147	13230	14410	23620	15000	150	0.160	8.299	0.1976	15.938	0.3795	7.639	0.1819
	0.095	0.435	0.538	0.158	14240	15500	25920		160	0.149	7.720	0.1838			8.217	0.1956
	0.102	0.421	0.570	0.168	15080	16420	27940			0.139	7.231	0.1722			8.706	0.2073
0.750	0.087	0.576	0.617	0.181	16310	17760	19680	15000	230	0.261	13.536	0.3223	22.950	0.5464	9.414	0.2241
	0.095	0.560	0.665	0.195	17590	19160	21600		250	0.246	12.795	0.3046			10.155	0.2418
	0.102	0.546	0.707	0.208	18690	20350	23280		260	0.234	12.163	0.2896			10.787	0.2568
	0.109	0.532	0.747	0.220	19760	21510	24960		270	0.222	11.547	0.2749			11.403	0.2715
1.000	0.087	0.826	0.849	0.250	22460	24450	14760	11800	450	0.536	27.837	0.6628	40.800	0.9714	12.963	0.3086
	0.095	0.810	0.919	0.270	24310	26470	16200	13000	480	0.515	26.769	0.6374			14.031	0.3341
	0.102	0.796	0.979	0.288	25900	28200	17460	14000	510	0.498	25.852	0.6155			14.948	0.3559
	0.109	0.782	1.038	0.305	27460	29900	18720	15000	530	0.480	24.950	0.5941			15.850	0.3774
	0.118	0.764	1.113	0.327	29430	32040	20340		560	0.458	23.815	0.5670			16.985	0.4044
	0.125	0.750	1.169	0.344	30930	33670	21600		580	0.442	22.950	0.5464			17.850	0.4250
1.250	0.087	1.076	1.082	0.318	28610	31150	11810	9400	750	0.909	47.237	1.1247	63.750	1.5179	16.513	0.3932
	0.095	1.060	1.173	0.345	31020	33780	12960	10400	800	0.882	45.843	1.0915			17.907	0.4264
	0.102	1.046	1.252	0.368	33110	36050	13970	11200	850	0.859	44.640	1.0629			19.110	0.4550
	0.109	1.032	1.330	0.391	35160	38290	14980	12000	890	0.836	43.453	1.0346			20.297	0.4833
	0.118	1.014	1.428	0.420	37770	41120	16270	13000	940	0.808	41.950	0.9988			21.800	0.5190
	0.125	1.000	1.503	0.442	39760	43300	17280	13800	980	0.785	40.800	0.9714			22.950	0.5464
	0.134	0.982	1.599	0.470	42280	46040	18580	14900	1030	0.757	39.344	0.9368			24.406	0.5811
	0.145	0.960	1.713	0.503	45300	49330	20160	15000	1080	0.724	37.601	0.8953			26.149	0.6226
	0.156	0.938	1.824	0.536	48250	52540	21740		1130	0.691	35.898	0.8547			27.852	0.6632
	0.175	0.900	2.011	0.591	53190	57920	24480		1210	0.636	33.048	0.7869			30.702	0.7310
	0.188	0.874	2.134	0.627	56450	61470	26350		1260	0.600	31.166	0.7420			32.584	0.7759
1.500	0.095	1.310	1.427	0.419	37740	41090	10800	8600	1200	1.348	70.017	1.6671	91.800	2.1857	21.783	0.5186
	0.102	1.296	1.524	0.448	40320	43900	11640	9300	1270	1.319	68.528	1.6316			23.272	0.5541
	0.109	1.282	1.621	0.476	42870	46680	12480	10000	1340	1.291	67.056	1.5966			24.744	0.5891
	0.118	1.264	1.743	0.512	46110	50210	13560	10800	1420	1.255	65.186	1.5520			26.614	0.6337
	0.125	1.250	1.837	0.540	48600	52920	14400	11500	1490	1.227	63.750	1.5179			28.050	0.6679
	0.134	1.232	1.957	0.575	51750	56360	15480	12400	1560	1.192	61.927	1.4745			29.873	0.7113
	0.145	1.210	2.100	0.617	55550	60490	16800	13400	1650	1.150	59.735	1.4223			32.065	0.7634
	0.156	1.188	2.241	0.659	59280	64550	18120	14500	1740	1.108	57.583	1.3710			34.217	0.8147

Note:
1. Minimum wall thickness is 0.005” less than specified wall thickness
2. Pressures calculated based on (t-0.005) in
3. Maximum hydrostatic test pressure is 15,000 psi

True Taper® product available

Data provided by Quality Tubing; October, 2005

QT-900 Coiled Tubing Technical Data - US Customary Units (Continued)

Specified		Calculated	Plain End	Pipe Metal	Pipe Body	Tensile	Internal	Hydro Test	Torsional	Flow	Internal Capacity per 1,000 ft		External Displacement per 1,000 ft		Displacement Ext - Int per 1,000 ft	
Outside Diameter	Wall Thickness	Inside Diameter	Weight	Cross-sectional Area	Yield Load	Load	Yield Pressure	Pressure	Yield Strength	Area						
in.	in.	in.	lb/ft	in.^{2}	lb	lb	psi	psi	lb/ft	in.^{2}	gal	bbl	gal	bbl	gal	bbl
1.500	0.175	1.150	2.479	0.728	65560	71390	20400	15000	1880	1.039	53.958	1.2847	91.800	2.1857	37.842	0.9010
	0.188	1.124	2.637	0.775	69740	75940	21960		1960	0.992	51.546	1.2273			40.254	0.9584
	0.224	1.052	3.055	0.898	80820	88000	26280		2180	0.869	45.153	1.0751			46.647	1.1106
	0.236	1.028	3.189	0.937	84340	91840	27720		2240	0.830	43.117	1.0266			48.683	1.1591
1.750	0.109	1.532	1.912	0.562	50570	55070	10700	8600	1880	1.843	95.759	2.2800	124.950	2.9750	29.191	0.6950
	0.118	1.514	2.059	0.605	54450	59290	11620	9300	2000	1.800	93.522	2.2267			31.428	0.7483
	0.125	1.500	2.171	0.638	57430	62540	12340	9900	2100	1.767	91.800	2.1857			33.150	0.7893
	0.134	1.482	2.315	0.680	61230	66670	13270	10600	2210	1.725	89.610	2.1336			35.340	0.8414
	0.145	1.460	2.488	0.731	65800	71650	14400	11500	2350	1.674	86.969	2.0707			37.981	0.9043
	0.156	1.438	2.658	0.781	70310	76560	15530	12400	2480	1.624	84.368	2.0088			40.582	0.9662
	0.175	1.400	2.946	0.866	77930	84860	17490	14000	2690	1.539	79.968	1.9040			44.982	1.0710
	0.188	1.374	3.139	0.923	83030	90410	18820	15000	2820	1.483	77.025	1.8339			47.925	1.1411
	0.203	1.344	3.357	0.987	88790	96690	20370		2970	1.419	73.699	1.7547			51.251	1.2203
	0.224	1.302	3.654	1.074	96650	105240	22530		3160	1.331	69.164	1.6468			55.786	1.3282
	0.236	1.278	3.820	1.123	101030	110010	23760		3260	1.283	66.638	1.5866			58.312	1.3884
2.000	0.125	1.750	2.505	0.736	66270	72160	10800	8600	2810	2.405	124.950	2.9750	163.200	3.8857	38.250	0.9107
	0.134	1.732	2.673	0.786	70700	76980	11610	9300	2980	2.356	122.393	2.9141			40.807	0.9716
	0.145	1.710	2.875	0.845	76050	82810	12600	10100	3170	2.297	119.303	2.8406			43.897	1.0452
	0.156	1.688	3.075	0.904	81340	88570	13590	10900	3350	2.238	116.253	2.7679			46.947	1.1178
	0.175	1.650	3.414	1.003	90300	98330	15300	12200	3650	2.138	111.078	2.6447			52.122	1.2410
	0.188	1.624	3.642	1.070	96320	104880	16470	13200	3840	2.071	107.605	2.5620			55.595	1.3237
	0.203	1.594	3.900	1.146	103140	112310	17820	14300	4060	1.996	103.666	2.4682			59.534	1.4175
	0.224	1.552	4.253	1.250	112480	122480	19710	15000	4340	1.892	98.275	2.3399			64.925	1.5458
	0.236	1.528	4.450	1.308	117710	128170	20790		4480	1.834	95.259	2.2681			67.941	1.6176
2.375	0.125	2.125	3.007	0.884	79520	86590	9090	7300	4090	3.547	184.238	4.3866	230.138	5.4795	45.900	1.0929
	0.134	2.107	3.210	0.943	84910	92450	9780	7800	4330	3.487	181.130	4.3126			49.008	1.1669
	0.145	2.085	3.457	1.016	91430	99550	10610	8500	4620	3.414	177.367	4.2230			52.771	1.2564
	0.156	2.063	3.700	1.088	97880	106580	11440	9200	4910	3.343	173.644	4.1344			56.494	1.3451
	0.175	2.025	4.116	1.210	108860	118530	12880	10300	5370	3.221	167.306	3.9835			62.832	1.4960
	0.188	1.999	4.395	1.292	116250	126590	13870	11100	5670	3.138	163.037	3.8818			67.101	1.5976
	0.203	1.969	4.713	1.385	124670	135750	15010	12000	6010	3.045	158.180	3.7662			71.957	1.7133
	0.224	1.927	5.151	1.514	136230	148340	16600	13300	6450	2.916	151.504	3.6072			78.634	1.8722
	0.236	1.903	5.396	1.586	142730	155420	17510	14000	6690	2.838	147.443	3.5105			82.694	1.9689
2.625	0.156	2.313	4.117	1.210	108900	118580	10350	8300	6110	4.202	218.279	5.1971	281.138	6.6938	62.859	1.4966
	0.175	2.275	4.583	1.347	121230	132000	11660	9300	6700	4.065	211.166	5.0278			69.972	1.6660
	0.188	2.249	4.898	1.439	129540	141060	12550	10000	7090	3.973	206.366	4.9135			74.771	1.7803
	0.203	2.219	5.256	1.545	139020	151370	13580	10900	7530	3.867	200.898	4.7833			80.240	1.9105

Refer to page 10-5 for footnote reference

QT-900 Coiled Tubing Technical Data - US Customary Units (Continued)

Specified		Calculated	Plain End	Pipe Metal	Pipe Body	Tensile	Internal	Hydro Test	Torsional	Flow	Internal		External		Displacement	
Outside Diameter	Wall Thickness	Inside Diameter	Weight	Cross-sectional Area	Yield Load	Load	Yield Pressure	Pressure	Yield Strength	Area	Capacity per 1,000 ft		Displacement per 1,000 ft		Ext - Int per 1,000 ft	
in.	in.	in.	lb/ft	in.^{2}	lb	lb	psi	psi	lb/ft	in.^{2}	gal	bbl	gal	bbl	gal	bbl
2.625	0.224	2.177	5.749	1.690	152070	165580	15020	12000	8100	3.722	193.365	4.6039	281.138	6.6938	87.773	2.0898
	0.236	2.153	6.027	1.771	159410	173580	15840	12700	8420	3.634	188.773	4.4946			92.364	2.1991
2.875	0.156	2.563	4.534	1.333	119930	130590	9450	7600	7440	5.159	268.014	6.3813	337.238	8.0295	69.224	1.6482
	0.175	2.525	5.051	1.484	133600	145470	10640	8500	8180	5.007	260.126	6.1935			77.112	1.8360
	0.188	2.499	5.400	1.587	142830	155530	11460	9200	8670	4.905	254.796	6.0666			82.441	1.9629
	0.203	2.469	5.798	1.704	153360	167000	12400	9900	9210	4.788	248.715	5.9218			88.522	2.1077
	0.224	2.427	6.348	1.866	167900	182820	13710	11000	9940	4.626	240.325	5.7220			96.912	2.3074
	0.236	2.403	6.658	1.957	176090	191750	14460	11600	10340	4.528	235.204	5.6001			102.034	2.4294
3.500	0.175	3.150	6.220	1.828	164520	179150	8740	7000	12540	7.793	404.838	9.6390	499.800	11.9000	94.962	2.2610
	0.188	3.124	6.656	1.956	176050	191700	9410	7500	13320	7.665	398.183	9.4805			101.617	2.4195
	0.204	3.092	7.188	2.112	190110	207010	10230	8200	14250	7.519	390.572	9.2993			109.228	2.6007
	0.224	3.052	7.845	2.305	207480	225930	11260	9000	15380	7.316	380.040	9.0486			119.760	2.8514
	0.237	3.026	8.267	2.429	218650	238090	11930	9500	16080	7.192	373.592	8.8951			126.208	3.0049

Refer to page 10-5 for footnote reference

QT-1000 Coiled Tubing Technical Data - US Customary Units

Specified		Calculated	Plain End	Pipe Metal	Pipe Body	Tensile	Internal	Hydro Test	Torsional	Flow	Internal Capacity per 1,000 ft		External Displacement per 1,000 ft		Displacement Ext - Int per 1,000 ft	
Outside Diameter	Wall Thickness	Inside Diameter	Weight	Cross-sectional Area	Yield Load	Load	Yield Pressure	Pressure	Yield Strength	Area						
in.	in.	in.	lb/ft	in.^{2}	lb	lb	psi	psi	lb/ft	in.^{2}	gal	bbl	gal	bbl	gal	bbl
1.000	0.102	0.796	0.979	0.288	28780	31650	19400	15000	570	0.498	25.852	0.6155	40.800	0.9714	14.948	0.3559
	0.109	0.782	1.038	0.305	30510	33560	20800		590	0.480	24.950	0.5941			15.850	0.3774
1.250	0.102	1.046	1.252	0.368	36790	40470	15520	12400	940	0.859	44.640	1.0629	63.750	1.5179	19.110	0.4550
	0.109	1.032	1.330	0.391	39070	42980	16640	13300	990	0.836	43.453	1.0346			20.297	0.4833
	0.118	1.014	1.428	0.420	41960	46160	18080	14500	1050	0.808	41.950	0.9988			21.800	0.5190
	0.125	1.000	1.503	0.442	44180	48600	19200	15000	1090	0.785	40.800	0.9714			22.950	0.5464
	0.134	0.982	1.599	0.470	46980	51680	20640		1140	0.757	39.344	0.9368			24.406	0.5811
	0.145	0.960	1.713	0.503	50340	55370	22400		1200	0.724	37.601	0.8953			26.149	0.6226
	0.156	0.938	1.824	0.536	53620	58980	24160		1260	0.691	35.898	0.8547			27.852	0.6632
	0.175	0.900	2.011	0.591	59100	65010	27200		1350	0.636	33.048	0.7869			30.702	0.7310
1.500	0.102	1.296	1.524	0.448	44800	49280	12930	10300	1410	1.319	68.528	1.6316	91.800	2.1857	23.272	0.5541
	0.109	1.282	1.621	0.476	47630	52400	13870	11100	1490	1.291	67.056	1.5966			24.744	0.5891
	0.118	1.264	1.743	0.512	51230	56360	15070	12100	1580	1.255	65.186	1.5520			26.614	0.6337
	0.125	1.250	1.837	0.540	54000	59400	16000	12800	1650	1.227	63.750	1.5179			28.050	0.6679
	0.134	1.232	1.957	0.575	57510	63260	17200	13800	1740	1.192	61.927	1.4745			29.873	0.7113
	0.145	1.210	2.100	0.617	61720	67900	18670	14900	1840	1.150	59.735	1.4223			32.065	0.7634
	0.156	1.188	2.241	0.659	65870	72450	20130	15000	1930	1.108	57.583	1.3710			34.217	0.8147
	0.175	1.150	2.479	0.728	72850	80130	22670		2090	1.039	53.958	1.2847			37.842	0.9010
	0.188	1.124	2.637	0.775	77490	85240	24400		2180	0.992	51.546	1.2273			40.254	0.9584
	0.203	1.094	2.815	0.827	82720	90990	26400		2290	0.940	48.831	1.1626			42.969	1.0231
1.750	0.109	1.532	1.912	0.562	56190	61810	11890	9500	2090	1.843	95.759	2.2800	124.950	2.9750	29.191	0.6950
	0.118	1.514	2.059	0.605	60500	66550	12910	10300	2230	1.800	93.522	2.2267			31.428	0.7483
	0.125	1.500	2.171	0.638	63810	70200	13710	11000	2330	1.767	91.800	2.1857			33.150	0.7893
	0.134	1.482	2.315	0.680	68030	74830	14740	11800	2460	1.725	89.610	2.1336			35.340	0.8414
	0.145	1.460	2.488	0.731	73110	80420	16000	12800	2610	1.674	86.969	2.0707			37.981	0.9043
	0.156	1.438	2.658	0.781	78120	85930	17260	13800	2750	1.624	84.368	2.0088			40.582	0.9662
	0.175	1.400	2.946	0.866	86590	95250	19430	15000	2990	1.539	79.968	1.9040			44.982	1.0710
	0.188	1.374	3.139	0.923	92250	101480	20910		3140	1.483	77.025	1.8339			47.925	1.1411
	0.203	1.344	3.357	0.987	98660	108530	22630		3300	1.419	73.699	1.7547			51.251	1.2203
	0.236	1.278	3.820	1.123	112250	123480	26400		3620	1.283	66.638	1.5866			58.312	1.3884
2.000	0.125	1.750	2.505	0.736	73630	80990	12000	9600	3130	2.405	124.950	2.9750	163.200	3.8857	38.250	0.9107
	0.134	1.732	2.673	0.786	78550	86410	12900	10300	3310	2.356	122.393	2.9141			40.807	0.9716
	0.145	1.710	2.875	0.845	84500	92950	14000	11200	3520	2.297	119.303	2.8406			43.897	1.0452

Note:
1. Minimum wall thickness is 0.005" less than specified wall thickness
2. Pressures calculated based on (t-0.005) in
3. Maximum hydrostatic test pressure is 15,000 psi

True Taper® product available

Data provided by Quality Tubing; October, 2005

QT-1000 Coiled Tubing Technical Data - US Customary Units (Continued)

Specified		Calculated	Plain End	Pipe Metal	Pipe Body	Tensile	Internal	Hydro Test	Torsional	Flow	Internal		External		Displacement	
Outside Diameter	Wall Thickness	Inside Diameter	Weight	Cross-sectional Area	Yield Load	Load	Yield Pressure	Pressure	Yield Strength	Area	Capacity per 1,000 ft		Displacement per 1,000 ft		Ext - Int per 1,000 ft	
in.	in.	in.	lb/ft	in.^{2}	lb	lb	psi	psi	lb/ft	in.^{2}	gal	bbl	gal	bbl	gal	bbl
2.000	0.156	1.688	3.075	0.904	90370	99410	15100	12100	3720	2.238	116.253	2.7679	163.200	3.8857	46.947	1.1178
	0.175	1.650	3.414	1.003	100330	110370	17000	13600	4060	2.138	111.078	2.6447			52.122	1.2410
	0.188	1.627	3.642	1.070	107020	117720	18300	14600	4270	2.071	107.605	2.5620			55.595	1.3237
	0.203	1.594	3.900	1.146	114600	126060	19800	15000	4510	1.996	103.666	2.4682			59.534	1.4175
	0.224	1.552	4.253	1.250	124980	137480	21900		4820	1.892	98.275	2.3399			64.925	1.5458
	0.236	1.528	4.450	1.308	130790	143860	23100		4980	1.834	95.259	2.2681			67.941	1.6176
2.375	0.134	2.107	3.210	0.943	94340	103770	10860	8700	4820	3.487	181.130	4.3126	230.138	5.4795	49.008	1.1669
	0.145	2.085	3.457	1.016	101580	111740	11790	9400	5140	3.414	177.367	4.2230			52.771	1.2564
	0.156	2.063	3.700	1.088	108750	119630	12720	10200	5450	3.343	173.644	4.1344			56.494	1.3451
	0.175	2.025	4.116	1.210	120950	133050	14320	11500	5970	3.221	167.306	3.9835			62.832	1.4960
	0.188	1.999	4.395	1.292	129170	142090	15410	12300	6300	3.138	163.037	3.8818			67.101	1.5976
	0.203	1.969	4.713	1.385	138520	152370	16670	13300	6680	3.045	158.180	3.7662			71.957	1.7133
	0.224	1.927	5.151	1.514	151370	166510	18440	14800	7170	2.916	151.504	3.6072			78.634	1.8722
	0.236	1.903	5.396	1.586	158590	174450	19450	15000	7440	2.838	147.443	3.5105			82.694	1.9689
2.625	0.134	2.357	3.568	1.049	104860	115350	9830	7900	5980	4.363	226.662	5.3967	281.138	6.6938	54.476	1.2971
	0.145	2.335	3.844	1.130	112970	124270	10670	8500	6390	4.282	222.450	5.2964			58.688	1.3974
	0.156	2.313	4.117	1.210	121000	133100	11500	9200	6790	4.202	218.279	5.1971			62.859	1.4966
	0.175	2.275	4.583	1.347	134700	148170	12950	10400	7450	4.065	211.166	5.0278			69.972	1.6660
	0.188	2.249	4.898	1.439	143930	158330	13940	11200	7880	3.973	206.366	4.9135			74.771	1.7803
	0.203	2.219	5.256	1.545	154460	169910	15090	12100	8360	3.867	200.898	4.7833			80.240	1.9105
	0.224	2.177	5.749	1.690	168960	185860	16690	13300	9000	3.722	193.365	4.6039			87.773	2.0898
	0.236	2.153	6.027	1.771	177120	194840	17600	14100	9350	3.634	188.773	4.4946			92.364	2.1991
2.875	0.134	2.607	3.926	1.154	115390	126930	8970	7200	7270	5.338	277.295	6.6023	337.238	8.0295	59.942	1.4272
	0.145	2.585	4.232	1.244	124360	136800	9740	7800	7780	5.248	272.635	6.4913			64.603	1.5382
	0.156	2.563	4.534	1.333	133260	146580	10500	8400	8270	5.159	268.014	6.3813			69.224	1.6482
	0.175	2.525	5.051	1.484	148440	163280	11830	9500	9090	5.007	260.126	6.1935			77.112	1.8360
	0.188	2.499	5.400	1.587	158700	174570	12730	10200	9630	4.905	254.796	6.0666			82.441	1.9629
	0.203	2.469	5.798	1.704	170410	187450	13770	11000	10240	4.788	248.715	5.9218			88.522	2.1077
	0.224	2.427	6.348	1.866	186560	205210	15230	12200	11050	4.626	240.325	5.7220			96.912	2.3074
	0.236	2.403	6.658	1.957	195660	215230	16070	12900	11490	4.528	235.204	5.6001			102.034	2.4294
3.500	0.175	3.150	6.220	1.828	182800	201080	9710	7800	13930	7.793	404.838	9.6390	499.800	11.9000	94.962	2.2610
	0.188	3.124	6.656	1.956	195610	215170	10460	8400	14800	7.665	398.183	9.4805			101.617	2.4195
	0.203	3.094	7.155	2.103	210260	231290	11310	9100	15770	7.519	390.572	9.2993			109.228	2.6007
	0.224	3.052	7.845	2.305	230540	253590	12510	10000	17080	7.316	380.040	9.0486			119.760	2.8514
	0.236	3.028	8.235	2.420	242000	266200	13200	10600	17810	7.192	373.592	8.8951			126.208	3.0049

Refer to page 10-8 for footnote reference

Navi-Drill® X-treme® Workover Motor Specifications

OD		Power Section	Standard Connection	Length		Flow		Speed	Op ΔP ■		Op Torque ■		Temperature	
in.	*mm*			ft	*m*	GPM	*LPM*	RPM	psi	*bar*	ft-lb	*Nm*	°F	*°C*
1.69	*42.9*	XS	1” AMMT	5.51	*1.68*	50	*190*	640	435	*30*	75	*105*	392	*200*
		X		7.64	*2.33*				870	*60*	150	*205*		
		AD		8.33	*2.54*			445	725	*50*	180	*245*		
2.13	*54.1*	XS	1-1/2” AMMT	5.94	*1.81*	65	*250*	660	435	*30*	105	*145*	392	*200*
		X		8.17	*2.49*				1,015	*70*	250	*340*		
		AD		9.55	*2.91*			475			350	*475*		
2.88	*73.2*	XS	2-3/8” API Reg or 2-3/8” PAC DSI	7.80	*2.38*	120	*450*	490	580	*40*	310	*420*	392	*200*
		X		10.63	*3.24*				1,160	*80*	620	*845*		
		AD		12.60	*3.84*			345			885	*1 200*		

Note: XS = “Short” X = Std. Length (Mud) AD = Air Motor

■ Operating pressure and operating torque are the maximum values the motor should be run at for continuous operation

Navi-Drill® X-treme® Workover Motor Peak Performance Specifications

Tool OD		Power Section	Max Torque ■		Max ΔP ■		Stall Torque		Stall ΔP	
in.	*mm*		ft-lb	*Nm*	psi	*bar*	ft-lb	*Nm*	psi	*bar*
1.69	*42.9*	XS	95	*130*	545	*37.5*	115	*155*	655	*45*
		X	190	*260*	1,090	*75*	230	*310*	1,305	*90*
		AD	225	*305*	905	*62.5*	270	*365*	1,090	*75*
2.13	*54.1*	XS	135	*180*	545	*37.5*	160	*220*	655	*45*
		X	315	*425*	1,270	*87.5*	375	*510*	1,525	*105*
		AD	440	*595*			525	*710*		
2.88	*73.2*	XS	390	*530*	725	*50*	470	*635*	870	*60*
		X	830	*1,125*	1,450	*100*	935	*1,270*	1,740	*120*
		AD	1,105	*1,500*			1,330	*1,800*		

■ Maximum pressure and maximum torque are the maximum values the motor can be operated at for a short period of time, taking increased wear rates into account

Navi-Drill® V.I.P. ™ Workover Motor Specifications

OD		Power Section	Standard Connection	Length		Flow Rate		Speed	Op ΔP ■		Op Torque■		Temperature	
in.	*mm*			ft	*m*	GPM	*LPM*	RPM	psi	*bar*	ft-lb	*Nm*	°F	*°C*
1.69	*42.9*	M1V	1" AMMT Box x Box	9.37	*2.86*	50	*190*	640	400	*28*	66	*90*	338	*170*
		M1ADV						410	230	*16*	59	*80*		
2.13	*54.1*	M1V	1-1/2" AMMT Box x Box	11.38	*3.47*	74	*280*	700	640	*44*	140	*190*	338	*170*
		M1ADV						300	230	*16*	120	*160*		
2.88	*73.2*	M1V	2-3/8" PAC DSI Box x Box	11.98	*3.65*	120	*450*	440	800	*55*	420	*570*	338	*170*
		M1ADV						185	290	*20*	360	*490*		
3.38	*85.8*	M1W1	2-7/8" PAC DSI Box x 2-3/8" API Reg Box	16.78	*5.11*	160	*600*	365	870	*60*	720	*975*	338	*170*
		M1ADM						125	290	*20*	710	*960*		

■ Maximum pressure and maximum torque are the maximum values the motor can be operated at for a short period of time, taking increased wear rates into account

Smith Services: TT Jar Specifications

Double Acting TT® Jar Specifications

Tool OD (in.)	1-11/16	2-1/16	2-7/8
Tool ID (in.)	9/16	11/16	31/32
Tool Joint Connections	1 AM MT	1-1/2 AM MT	2-3/8 PAC
Overall Length “Extended”	7' - 10"	7' - 9"	8' - 3"
Maximum Detent Working Load (lbf)	8,000	11,000	20,000
Tensile Yield Strength (lbf)	56,000	86,000	200,000
Torsional Yield Strength (lbf-ft)	850	1,600	5,300
Free Stroke Up (in.)	4		
Free Stroke Down (in.)	4		
Total Stroke (in.)	12		
Tool Weight (lb)	38	56	140

Data provided by Smith Services; February, 2006

Double Acting TT® Accelerator Specification

Tool OD (in.)	1-11/16	2-1/16	2-7/8
Tool ID (in.)	9/16	11/16	31/32
Tool Joint Connection	1 AM MT	1-1/2 AM MT	2-3/8 PAC
Overall Length “Extended”	8' - 6"	8' - 9"	9' - 1"
Maximum Detent Working Load (lbf)	8,000	11,000	20,000
Tensile Yield Strength (lbf)	56,000	86,000	200,000
Torsional Yield Strength (lbf-ft)	850	1,600	5,300
Free Stroke Up (in.)	6		
Free Stroke Down (in.)	6		
Tool Weight (lb)	43	66	156

Data provided by Smith Services; February, 2006

Bowen Specification for Up/Down Coiled Tubing Jars

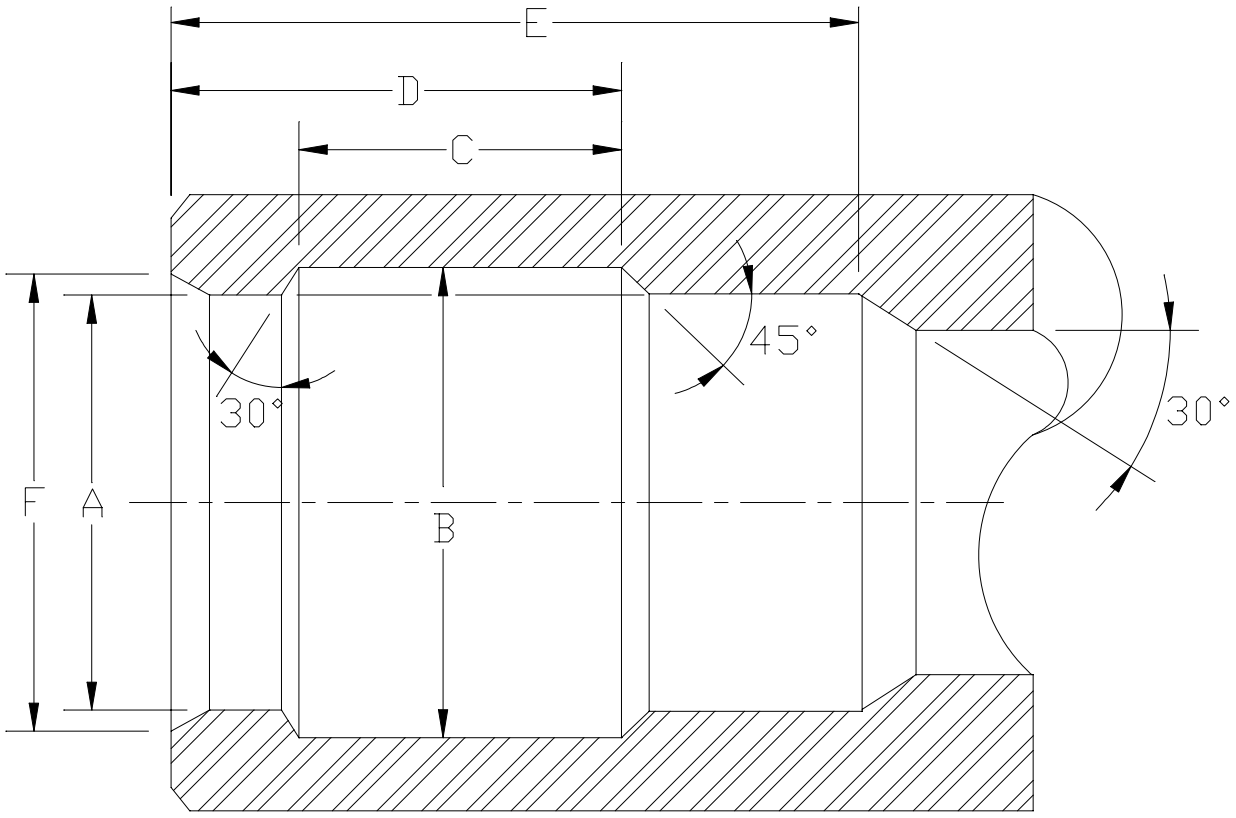
Size	1-11/16 x 9/16	1-13/16 x 9/16	2-1/8 x 3/4	2-1/4 x 3/4	2-7/8 x 1	3-1/8 x 1-1/4
Assembly No.	155876	153844	155235		156231	155267
Outside Diameter (in.)	1-11/16	1-13/16	2-1/8	2-1/4	2-7/8	3-1/8
Inside Diameter (in.)	9/16		3/4		1	1-1/4
Maximum Up Jar Load (lb)	10,000	12,000	18,000	22,000	32,000	40,000
Maximum Down Jar Load (lb)	10,000	12,000	18,000	22,000	32,000	40,000
Lift after Jarring at Yield (lb)	50,000	69,000	95,000		195,000	233,000
Torsional Yield (ft-lb)	330	150	700		2,700	3,000
Approximate Length Closed Position (in.)	69	67	68		84	
Testing Pull Load (lb)	8,000	10,000	16,000		30,000	
Testing Push Load (lb)	4,000	6,000	10,000		20,000	
Pump Open Area (sq in.)	0.69	0.783	1.22		2.4	3.13

Data provided by National Oilwell; September, 2005

Bowen Specification for Up/Down Coiled Tubing Intensifiers

Size	1-11/16 x 9/16	1-13/16 x 9/16	2-1/8 x 3/4	2-1/4 x 3/4	2-7/8 x 1	3-1/8 x 1-1/4
Assembly No.	155969	153965	154412		156341	154440
Outside Diameter (in.)	1-11/16	1-13/16	2-1/8	2-1/4	2-7/8	3-1/8
Inside Diameter (in.)	9/16		3/4		1	1-1/4
Maximum Up Jar Load (lb)	10,000	12,000	18,000	22,000	32,000	40,000
Maximum Down Jar Load (lb)	10,000	12,000	18,000	22,000	32,000	40,000
Lift after Jarring at Yield (lb)	50,000	69,000	95,000		195,000	214,000
Torsional Yield (ft-lb)	330	150	700		2,700	3,000
Approximate Length Neutral Position (in.)	76	73	87		104	104
“A” Total Stroke (in.)	6		7		8	
Testing Pull Load (lb)	8,000 - 10,000	9,000 - 11,000	11,000 - 14,000		25,000 -30,000	28,000 -36,000
Testing Push Load (lb)	6,000 - 8,000	7,000 - 9,000	7,000 - 10,000		16,000 -20,000	18,000 - 22,000

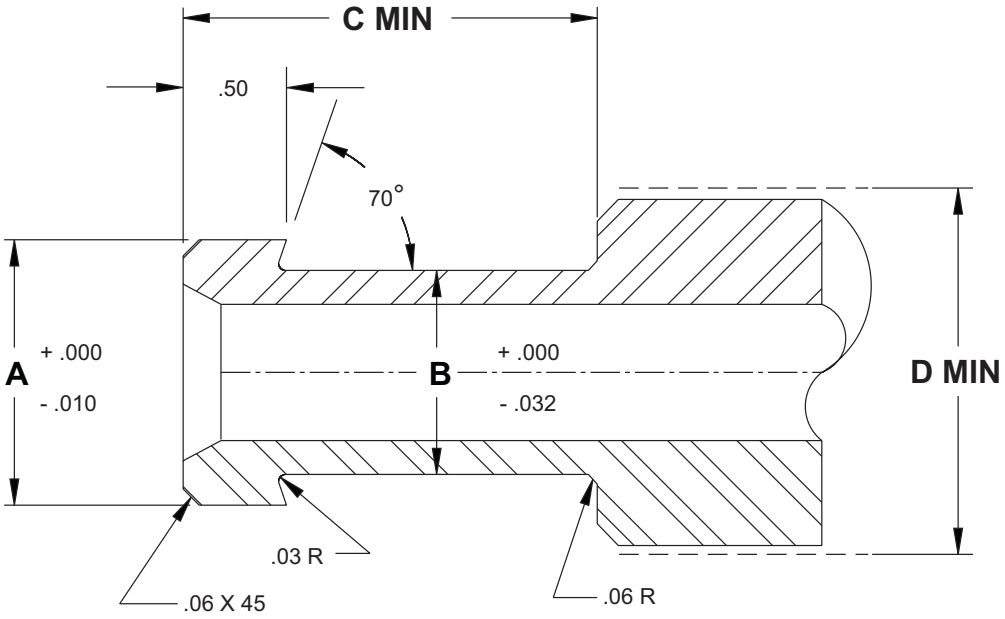
Data provided by National Oilwell; September, 2005



Internal Fishing Necks

Size	A		B		C	D	E	F	
	Max	Min	Max	Min				Max	Min
	in.		in.		in.	in.	in.	in.	
1-1/4	.90	.88	1.05	1.03	1	1.38	2	1.03	1.00
1-1/2	1.08	1.06	1.24	1.22	1-1/2	2	3	1.19	1.16
2	1.40	1.38	1.58	1.56	1-1/2	2	3	1.62	1.59
2-1/2	1.83	1.81	1.99	1.97	1-1/2	2	3	1.94	1.91
3	2.33	2.31	2.52	2.50	1-1/2	2	3	2.50	2.47
3-1/2	2.64	2.62	2.83	2.81	1-1/2	2	3	2.81	2.78
4	3.14	3.12	3.33	3.31	1-1/2	2	3	3.38	3.35
5	4.02	4.00	4.21	4.19	1-1/2	2	3	4.19	4.16
7*	5.38	5.40	5.62	5.64	1-1/2	2	3	5.60	5.64

*Note: Fishing Neck for inside 7" OD Tubing



External Fishing Necks

Min Tubing Size in Which Neck May Be Run	A ▲	B	C ■	D ●	Pulling Tool	
					Otis®	Schlumberger
in.	in.	in.	in.	in.		
1.660	.875	.688	2-3/4	1-5/16	1-3/16 RB	1-1/4 JDC*
					1-5/16 SM*	1-5/16 JDC
	1.000	.813	2-3/4	1-7/16	1-1/4 RB	1-3/8 JDC*
					1-1/4" SB	
1.900	1.188	1.000	2-1/4	1-1/2	1-1/2 RB*	1-1/2 JUC
					1-1/2 SB	1-1/2 JDC*
2-3/8	1.375	1.188	2-3/8	1-15/16	2 RB*	2 JUC
					2 SB	2 JDC*
2-7/8	1.750	1.500	2-1/4	2-3/8	2-1/2 RB*	2-1/2 JUC
					2-1/2 SB	2-1/2 JDC*
3-1/2	2.313	2.063	2-1/4	2-7/8	3 RB*	3 JUC
					3 SB	3 JDC*

* These dimensions are based on using the pulling tools (overshots) most commonly found on wire line service trucks. They are the Otis® RB, RS, SB, and SS, and the Schlumberger JDC, JUC, JDS, and JUS. The RB, RS, JUC, and JUS are all jar-up release tools, and the others are jar-down release

■ The minimum recommended distance to allow an Otis® SB or Schlumberger JDC pulling tool to release

▲ Fishing Neck Type Size sometimes referred to by “A” dimension

● The least recommended diameter immediately surrounding the fishing neck to allow the overshot dogs room to latch and unlatch

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Specification Guide for Sur-Set

OD	Weight	Drift	Nipple Size Seal Bore Min ID		Nipple Size Bottom No-Go Min ID			Lock Top No-Go Max OD		
in.	lb/ft	in.	in.	A	AR	in.	HR	AF	in.	HF
2.375	4.60	1.901	1.875	●	●	1.822	-	-	*	-
	5.30	1.845	1.781	-	-	1.728	●		1.835	●
	5.95	1.773	1.710	●		1.640			1.765	
	7.70	1.609	1.562	-		1.492			N/A	-
2.875	6.40	2.347	2.312	-	●	2.257	-	-	*	-
			2.250			2.197		●	2.305	
	7.90	2.229	2.188	●	-	2.098	●	-	2.225	●
	8.60	2.165	2.125			2.035			2.160	
			2.062			2.005			2.115	
	11.00	1.972	1.875	-		1.822		●	1.935	
			1.812			1.760		-	1.865	
3.500	9.30	2.867	2.812	-	●	2.760	-	-	2.865	-
			2.750	●		2.660		●	2.805	
	12.70	2.625	2.562		-	2.472	●		2.615	●
	15.80	2.423	2.312			2.230			2.390	
4.000	11.00	3.351	2.937	-	-	N/A	-	●	2.995	-
			3.312	●	-	3.256		-	N/A	
	11.60	3.303	3.250	-	●	3.160		-	3.305	
	13.40	3.215	3.125			3.072		●	3.200	
			3.000		-	N/A			3.145	
4.500	11.60	3.875	3.812	-	-	3.759	-	-	3.870	-
	12.95	3.833	3.750		●	3.695			3.805	
	13.50	3.795	3.688	●		3.625		●	3.740	
	16.90	3.679	3.625		-	N/A			3.678	
	18.80	3.515	3.437		●	3.347			3.500	
	21.60	3.375	3.312	-		3.256			3.375	
5.000	11.50	4.435	4.312	●	-	4.255	-	-	4.390	-
			4.250	-	●	4.135			4.305	
	15.00	4.283	4.125			4.035		●	4.200	
	18.00	4.151	4.000			3.900	●		4.090	
	20.80	4.031	3.875		-	N/A	-		3.950	
	23.60	3.919	3.812		●	3.759	●		3.870	
5.500	15.50	4.825	4.750	●	●	4.660	-	●	4.820	-
	17.00	4.676	4.562	-		4.470			4.650	
7.000	26.00	6.151	6.000	-	-	N/A	-	-	6.058	-
	29.00	6.059	5.873			N/A		●	5.960	
			5.950		-	5.850			6.020	
	38.00	5.795	5.810			5.690		-	N/A	
			5.625		●	5.500		●	5.705	
	41.00	5.695	5.750			5.625			5.840	
	43.00	5.626	5.312			5.187		-	N/A	

* Have “AF” Locks in this size with Turn Down No-Go. Special for Safety Systems

Thru-Tubing Inflatable Element Ratings

Pressure differentials for inflatable devices are slightly more complex than standard mechanical tools. In the mechanical arena the calculation of allowable differential pressures, both in terms of pressure reductions (such as drawdown) or applied pressure (such as testing) is a relatively simple process. The mechanical solution supplies us with a very two dimensional platform on which we have to base our calculations, i.e the difference in pressure from above to below the packing element or the pressure from below to above. When a high expansion fluid filled inflatable type of packing element is introduced into the equation the same thinking in terms of simple hydraulics calculations does not apply. A new third dimension is introduced whereby not only must pressure differentials across the device itself be considered, but also differences in pressure from the inside of the inflatable element to the outside of the element.

Some quick formulas for calculating maximum inflation pressures and maximum available drawdown:

Maximum Element Inflation Pressure =

Element Pressure Rating - (minus) Maximum Required Drawdown

Maximum Allowable Drawdown =

Element Pressure Rating - (minus) Element Inflation Pressure

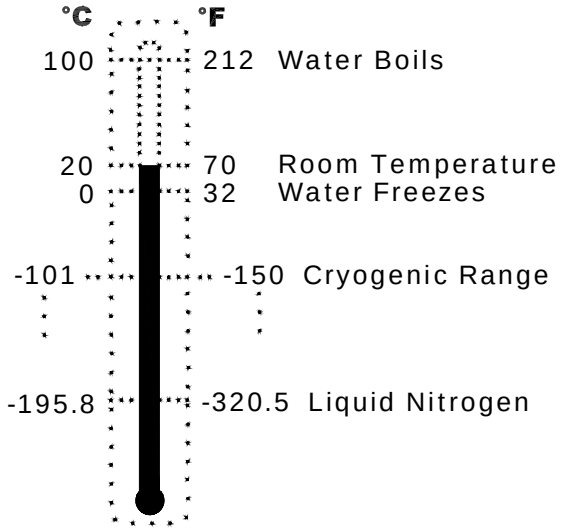
Thru-Tubing Inflatable Element Ratings

Element OD (in./*mm*)	Size Element is to be Set in (inches/*mm*)															
	OD	**2.375** *60.3*	**2.875** *73.0*	**3.500** *88.9*	**4.000** *101.6*	**4.500** *114.3*	**5.000** *127.0*	**5.500** *139.7*	**6.625** *168.3*	**7.000** *177.8*	**7.625** *193.7*	**8.625** *219.1*	**9.625** *244.5*	**10.750** *273.1*	**11.750** *298.5*	**13.375** *339.7*
	ID	**1.995** *50.7*	**2.441** *62.0*	**2.992** *76.0*	**3.548** *90.1*	**3.958** *100.5*	**4.276** *108.6*	**4.892** *124.3*	**5.921** *150.4*	**6.094** *154.8*	**6.765** *171.8*	**7.511** *190.8*	**8.681** *220.5*	**9.760** *247.9*	**10.772** *273.6*	**12.415** *315.3*
	Maximum Applied Differential Pressure (psi/*bar*) Maximum Temperature (°F/*°C*)															
1.69 *42.9*		5,500 *379*	5,500 *379*	4,600 *317*	3,200 *221*	2,600 *179*	2,200 *152*	1,700 *117*								
		300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	250 *121*	250 *121*								
2.13 *54.1*			6,000 *414*	6,000 *414*	5,500 *379*	4,300 *297*	3,600 *248*	2,600 *179*	1,600 *110*	1,500 *103*	1,000 *69*					
			300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	280 *138*	280 *138*	280 *138*					
2.50 *63.5*				6,500 *448*	6,500 *448*	6,300 *434*	5,500 *379*	4,200 *290*	2,500 *172*	2,300 *159*	1,800 *124*	1,550 *107*	1,300 *90*			
				300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	280 *138*	280 *138*	260 *127*	240 *116*			
3.00 *76.2*					8,000 *552*	8,000 *552*	8,000 *552*	8,000 *552*	4,900 *338*	4,550 *314*	3,400 *234*	2,500 *172*	1,600 *110*			
					300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	280 *138*	260 *127*	240 *116*			
3.38 *85.9*					8,500 *586*	8,500 *586*	8,500 *586*	8,500 *586*	6,500 *448*	6,200 *428*	4,900 *338*	3,700 *255*	2,450 *169*	1,700 *117*		
					300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	280 *138*	280 *138*	275 *135*		
4.25 *108.0*								8,500 *586*	8,500 *586*	8,500 *586*	6,550 *452*	4,900 *338*	3,300 *228*	2,350 *162*		
								300 *149*	300 *149*	300 *149*	300 *149*	280 *138*	280 *138*	280 *138*		
5.38 *136.7*									8,500 *586*	8,500 *586*	8,500 *586*	8,100 *559*	5,950 *410*	4,700 *324*	3,800 *262*	2,850 *197*
									300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	280 *138*	280 *138*	260 *127*
5.75 *146.1*									8,500 *586*	8,500 *586*	8,500 *586*	8,500 *586*	6,850 *472*	5,350 *369*	4,350 *300*	3,200 *221*
									300 *149*	300 *149*	300 *149*	300 *149*	300 *149*	280 *138*	280 *138*	260 *127*

Reduce pressure ratings by 10% for acid service elements and by 20% for H_2S service elements. Standard service elements use high strength alloys but are susceptible to stress corrosion cracking (SCC) in H_2S and other highly corrosive environments. Acid service elements use nickel alloy materials, but the material does not meet requirements of NACE MR0175. H_2S service elements use nickel alloy materials that meet the requirements of NACE MR0175. For element ratings in different ID's from above please contact your local Baker Hughes representative.

Nitrogen Properties and Uses

Nitrogen makes up approximately 78% of the earth's atmosphere. Nitrogen gas is an inert gas that is both colorless and odorless, with a density of 0.0724 pounds/scf (at 14.7 psia and 60°F). In 1959, when techniques for using liquid nitrogen were developed, nitrogen made its introduction into the oilfield. Nitrogen is converted into a liquid (along with oxygen) through a gas separation and liquification plant. The liquid nitrogen (LN_2) is considered a cryogenic material. Cryogenics is a term used for material at -150°F or colder.



Temperature Characteristics

At atmospheric pressure (14.7 psia), liquid nitrogen will boil at -320.5°F.
In other words, it begins to vaporize to a gas above -320.5°F.

LN_2 boiling point = -320.5°F at 14.7 psia.

The critical temperature (where all properties of the coexisting vapor and liquid phases become identical) = -232.8°F.

Volume Characteristics

If you had one gallon of liquid nitrogen (at atmospheric pressure) and allowed it to vaporize entirely into gas, you would then have 93.11 scf (standard cubic feet) of nitrogen gas. Standard conditions are considered to be at 14.7 psi (1 atmosphere) pressure and 70°F.

Conversion tables tell us that one gallon is equal to 0.1337 cubic feet. One gallon of liquid nitrogen is also 0.1337 cubic feet of liquid nitrogen. If it is allowed to entirely vaporize to a gas (at 14.7 psi and 70°F), you would still end up with 93.11 scf of gas. This is equivalent to 696.5 gallons of gas. Remember, 93.11 cf / 0.1337 cf/gallon = 696.5 gallon.

Conversion Data

	1 Lb	1 Kg	1 SCF Gas	1 Nm^3 Gas	1 Gal Liquid	1 L Liquid
lb	1.0000	2.205	0.07245	2.757	6.745	1.782
Kg	0.4536	1.0	0.03286	1.2506	3.060	0.8083
scf gas	13.803	30.42	1.0	38.04	93.11	24.60
Nm^3	0.3627	0.7996	0.02628	1.0	2.447	0.6464
Gal Liquid	0.1481	0.3262	0.01074	0.4080	1.0	0.2642
L Liquid	0.5606	1.2349	0.04065	1.5443	3.785	1.0

* Nm^3 (Normal cubic meter) gas measured at 1 atmosphere and 0°C. All values rounded to nearest 4/5 significant numbers. SCF (standard cubic foot) gas measured at 1 atmosphere and 70°F. Liquid measured at 1 atmosphere and boiling temperature. All values are consistent with standards adopted by the Compressed Gas Association on June 6, 1962

Nitrogen Characteristics

- Chemical Symbol = N_2
- Molecular Weight = 28.016
- Triple Point = -345.9°F at 1.82 psig
- Specific Gravity of Liquid Nitrogen (water = 1.0) = 0.809
- Normal Boiling Point = -320.45°F
- Latent Heat of Evaporation = 85.67 BTU/lb
- Critical Temperature = -232.87°F
- Critical Pressure = 492.3 psia
- Critical Pressure Atmospheres abs. = 33.54
- Triple Point Pressure Atmospheres abs. = 0.1238
- Triple Point Pressure psia = 1.819
- Specific Heat (cp) @77°F = 0.4471 BTU / (lb) (°F)
- Ratio of Specific Heat = 1.4014 @ 70°F
- Coeff Viscosity, Micropoises @ 77°F = 117.96
- Thermal Conductivity @ 60°F = 0.01462 BTU / ft^2/hour
- Density of Saturated Vapor @ 14.7 psia - 0.03635 lb/ft^3
- Density lb/ft^3 70°F 1 ATM = 0.07245
- Specific Gravity of Saturated Vapor @ 14.7 psia (air = 1.0) = 0.967
- Specific Volume cu ft per lb 70°F 1 ATM = 13.803
- Density of Liquid Nitrogen @ Normal Boiling Point 0 = 50.443 lb/ft^3
- Weighs approximately 3% less than air (at atmospheric temperature)
- Odorless, colorless, tasteless
- Nontoxic and nonflammable

Nitrogen Calculations

The density of nitrogen at a given temperature and pressure is:

$$\rho = \frac{MP}{ZRT}$$

Once the constants and unit conversions are included, this equation can be written for standard units as:

$$\rho(scf/bbl) = \frac{198.6P(psia)}{Z(460 + °F)}$$

In metric units, it can be written as:

$$\rho(sm^3/m^3) = \frac{2.8416P(kPa)}{Z(273 + °C)}$$

These densities are the “volume factors” in the following tables. Note that both of these densities express the weight or mass as a “standard” volume. Standard conditions are defined as atmospheric pressure (14.7 psia or 1 atm) and 60°F or *(15°C)*. SCF stands for standard cubic feet and scm or sm^3 stands for standard cubic meters.

The pressure vs depth for a well filled with Nitrogen graphs were based upon a surface temperature of 70°F *(21°C)* and a gradient of 1.6°F per 100 ft *(2.92°C per 100 meters)*. Variations in the well temperature from these values make relatively small changes in the pressures.

The following examples show how the graphs in this section can be used to solve nitrogen problems.

Standard Units - Example 1

How much nitrogen is required to fill a 12,500 ft reel of 2" OD x 0.156" wall CT to 3,500 psia at an average temperature of 75°F?

1. From the Coiled Tubing technical data table earlier in this section, read the internal volume for this size 2.7679 bbl/1,000 ft.
2. Multiply this value by 12.5 thousand feet to obtain a total volume of 34.6 bbls.
3. Using the Volume Factor - Medium pressure graph, read the volume factor as 1,200 SCF/bbl.
4. Multiply the volume of the reel by the volume factor to obtain 41,520 SCF. This is the amount of nitrogen needed.

Metric Units - Example 1

How much nitrogen is required to fill a 3,810 m reel of 50.8 mm OD x 3.962 mm wall CT to 24,100 kPa at an average temperature of 24°C?

1. *From the Coiled Tubing technical data table earlier in this section read the internal volume for this size and convert to metric 1.4438 liters/m, which is the same as 1.4438 m^3/1,000 m.*
2. *Multiply this value by 3.81 thousand meters to obtain a total volume of 5.5 m^3.*
3. *Using the Volume Factor - Medium pressure graph, read the volume factor as 221 scm/m^3.*
4. *Multiply the volume of the reel by the volume factor to obtain 1,215 scm. This is the amount of nitrogen needed.*

Standard Units - Example 2

The same reel of CT as Example 1 (standard) is being used to place nitrogen in a well. The CT will be run to 7,500 ft Nitrogen will be pumped until the pressure at the end of the CT reaches 3,500 psia, filling both the well tubular, which is 3.5" 12.95 lb/ft EU tubing and the CT.

1. From the dimensions and capacities section 6 of this tech facts book, read the internal volume for this size tubing as 7.35 bbls/1,000 ft.
2. Multiply this value by the depth of 7.5 thousand feet to obtain a well volume of 55.125 bbls.
3. From the technical data table earlier in this section, read the internal volume for this coiled tubing size as 2.7679 bbls/ 1,000 ft and the external displacements as 3.8857 bbls/1,000 ft.
4. Multiply these values by 7.5 thousand feet to obtain a internal volume of 20.76 bbls and the external displacement as 29.143 bbls.
5. The total volume in the well to be filled with nitrogen is 55.125 - 29.143 + 20.76 = 46.74 bbls.
6. From the pressure vs depth for a well filled with Nitrogen graph, find the point where the pressure is 3,500 psia at 7,500 ft of depth. Follow the curves upward to read an approximate surface pressure of 2,750 psia.
7. The average pressure is (3,500 + 2,750)/2 = 3,125 psia.
8. The estimated bottom hole temperature is 70°F + 1.6 * 75 hundred feet = 190°F.
   The average temperature is (190 + 70)/2 = 130°F.
9. The Volume Factor for this average temperature and pressure is approximately 950 SCF/bbl.
10. Multiplying this volume factor by the well volume from Step 5 yields a nitrogen requirement of 44,400 SCF.
11. For the remaining 5,000 ft of CT on the reel, assume the pressure will be the same as the wellhead pressure, which is 2,750 psia, and the temperature is 75°F. Using the Volume Factor - Medium Pressure Graph, read the volume factor as 990 SCF/bbl. The volume of this section of the coiled tubing is 2.7679 * 5 thousand feet - 13.84 bbls.
12. Multiply the volume of this section by the volume factor to obtain 13,700 SCF.
13. The total nitrogen required is 13,700 + 44,400 = 58,100 SCF.

Metric Units - Example 2

The same reel of CT as Example 1 (metric) is being used to place nitrogen in a well. The CT will be run to 2,285 m. Nitrogen will be pumped until the pressure at the end of the CT reaches 24,100 kPa, filling both the well tubular, which is 88.9 mm 19.27 kg/m EU tubing and the CT.

1. *From the dimensions and capacities in section 6 of this tech facts book, read the internal volume for this size tubing as 0.0038 m^3/m, which is the same as 3.800 m^3 per 1,000 meters.*
2. *Multiply this value by the depth of 2.285 thousand meters to obtain a well volume of 8.683 m^3.*
3. *From the technical data table earlier in this section read the internal volume for this size and convert to metric 1.4438 liters/m and the external displacement as 2.0268 liters/m.*
4. *Multiply these values by 2.285 thousand meters to obtain a internal volume of 3.3 m^3 and the external displacement as 4.631 m^3.*
5. *The total volume in the well to be filled with nitrogen is 8.683 - 4.631 + 3.3 = 7.352 m^3.*
6. *From the Pressure vs Depth for a Well Filled with Nitrogen graph, find the point where the pressure is 24,100 kPa at 2,285 m of depth. Follow the curves upward to read an approximate surface pressure of approximately 19,000 kPa.*
7. *The average pressure is (24,100 + 19,000)/2 = 21,550 kPa.*
8. *The estimated bottom hole temperature is 21°C + 2.92 * 22.85 hundred meters = 88°C. The average temperature is (88 + 21)/2 = 55°C.*
9. *The Volume Factor for this average temperature and pressure is approximately 170 sm^3/m^3.*
10. *Multiplying this volume factor by the well volume from Step 5 yields a nitrogen requirement of 1,250 sm^3.*
11. *For the remaining 1,525 m of CT on the reel, assume the pressure will be the same as the wellhead pressure, which is 1,900 kPa, and the temperature is 24°C. Using the Volume Factor - Medium Pressure graph, read the volume factor as 175 sm^3/m^3. The volume of this section of the coiled tubing is 1.4438 * 1.525 thousand meters = 2.2 sm^3/m^3.*
12. *Multiply the volume of this section by the volume factor to obtain 385 sm^3.*
13. *The total nitrogen required is 385 + 1,250 = 1,635 sm^3.*

Nomenclature

M = molecular weight of Nitrogen = 28.0134

P = absolute pressure (psi for English units, *kPa* for metric units)

R = gas constant (1545 ft-lb/lb mole °R - for English units, 0.08206 atm-liters/gm mole °K)

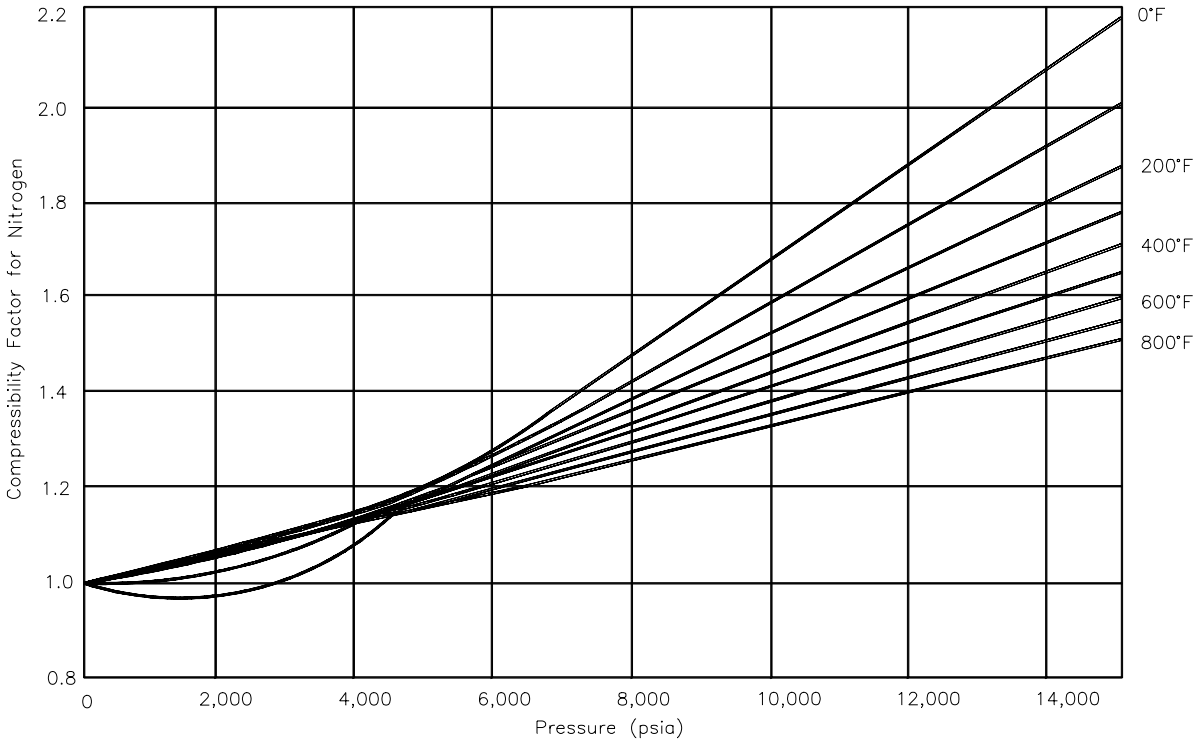
T = absolute temperature (°F + 460 for English units, °C + 273 for metric units)

Z = compressibility factor for the following Nitrogen Compressibility Factor curves

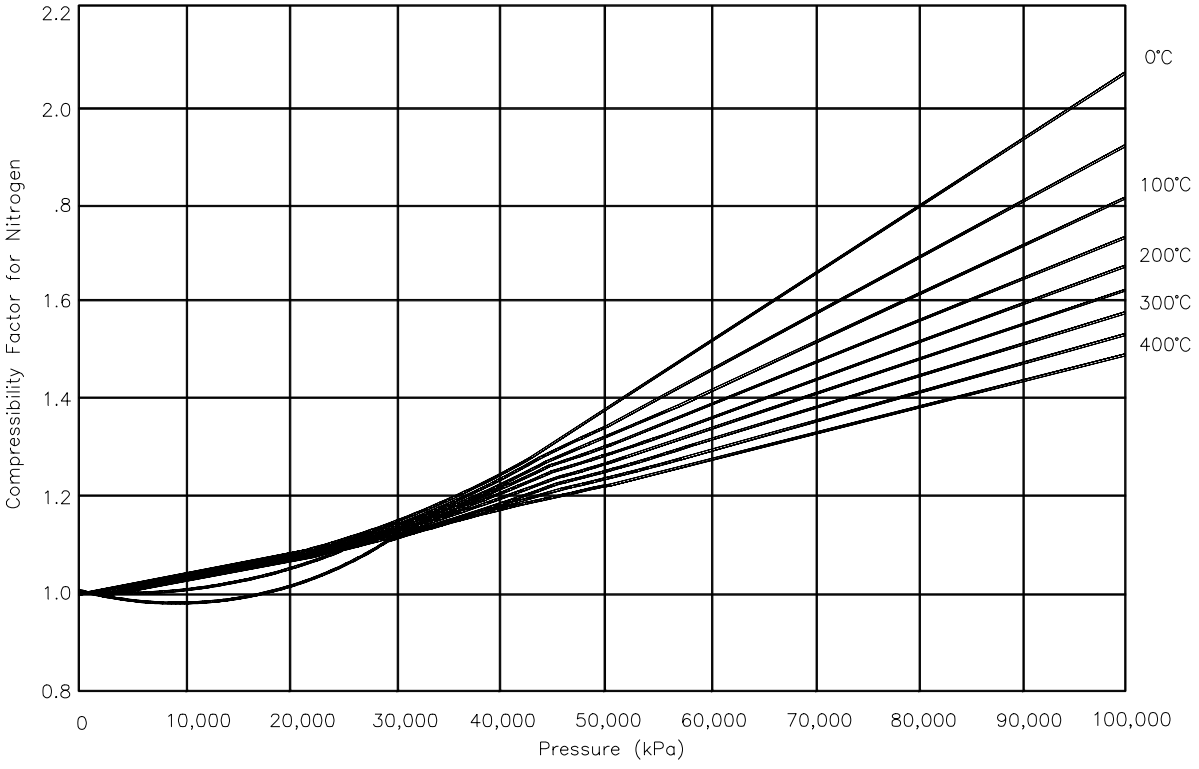
ρ = density in weight or standard volume per unit volume

Nitrogen Compressibility Factor

Standard

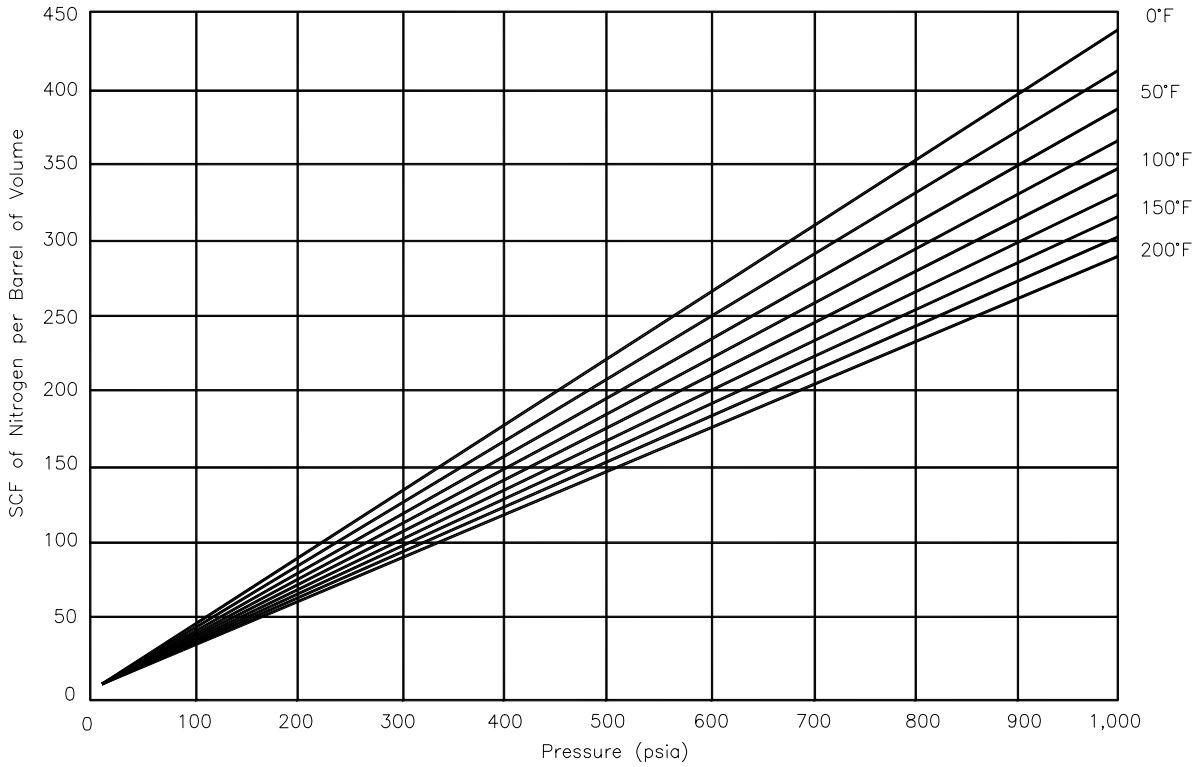


Metric

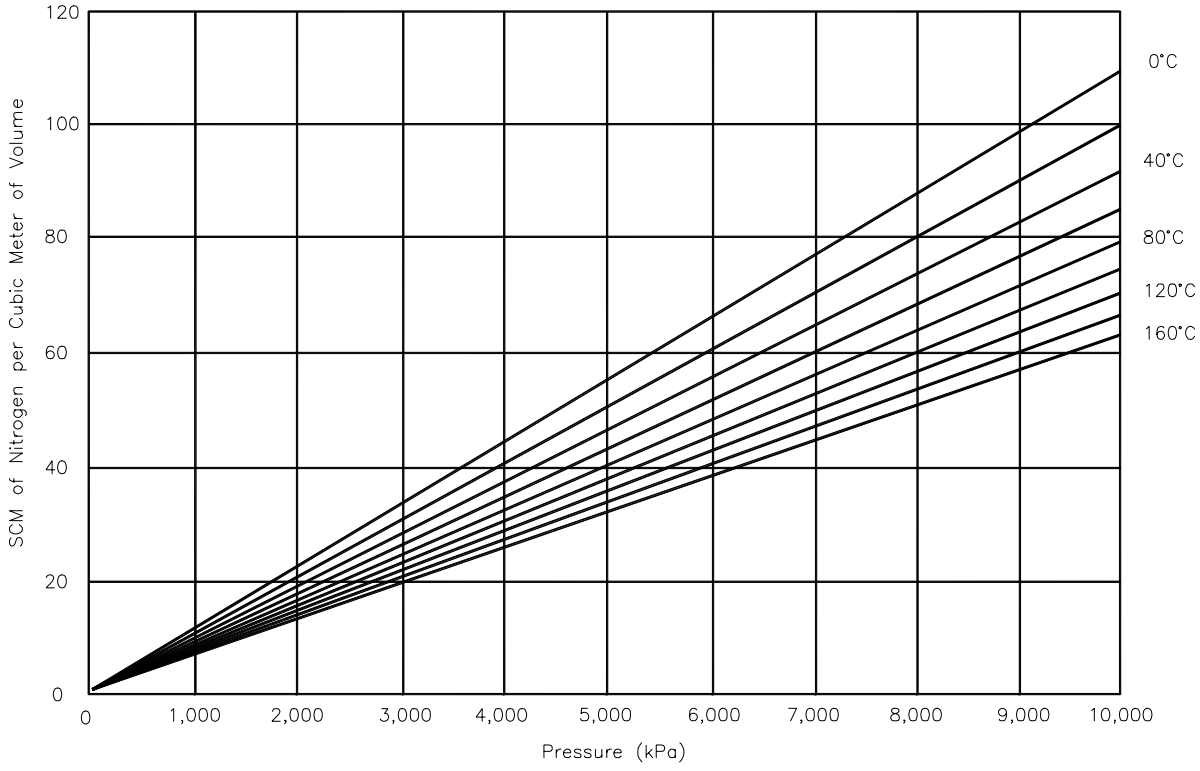


Volume Factor - Low Pressure

Standard

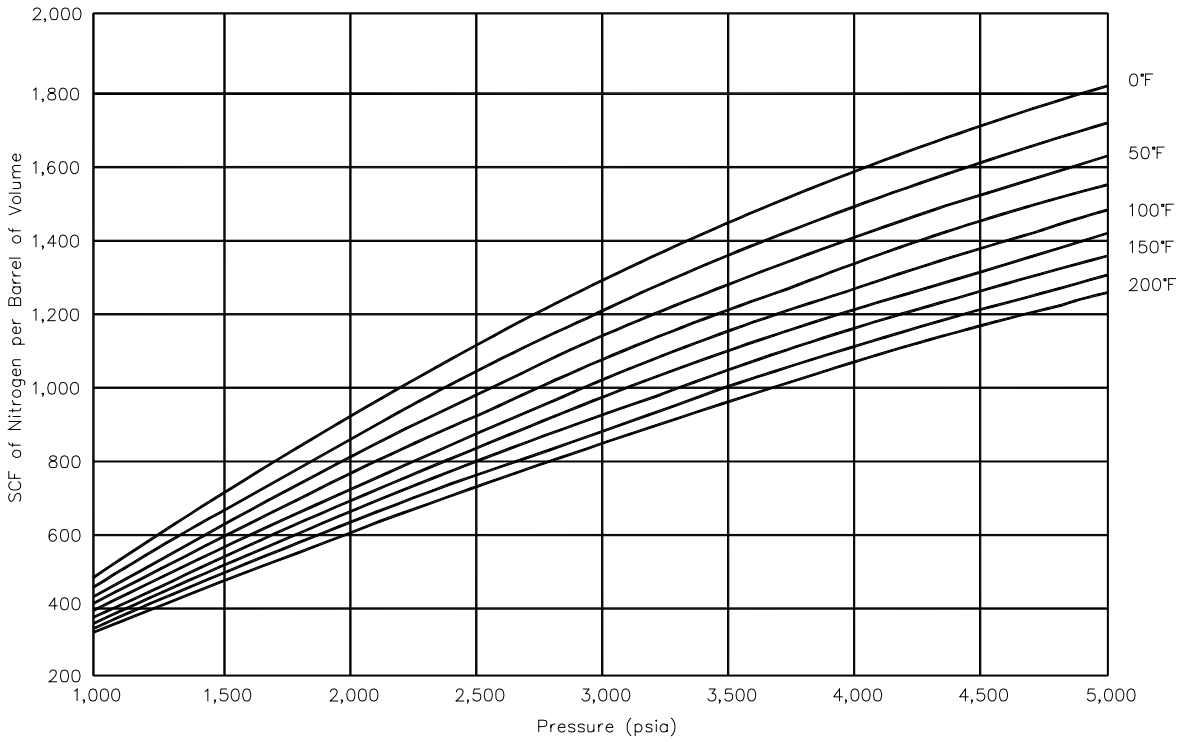


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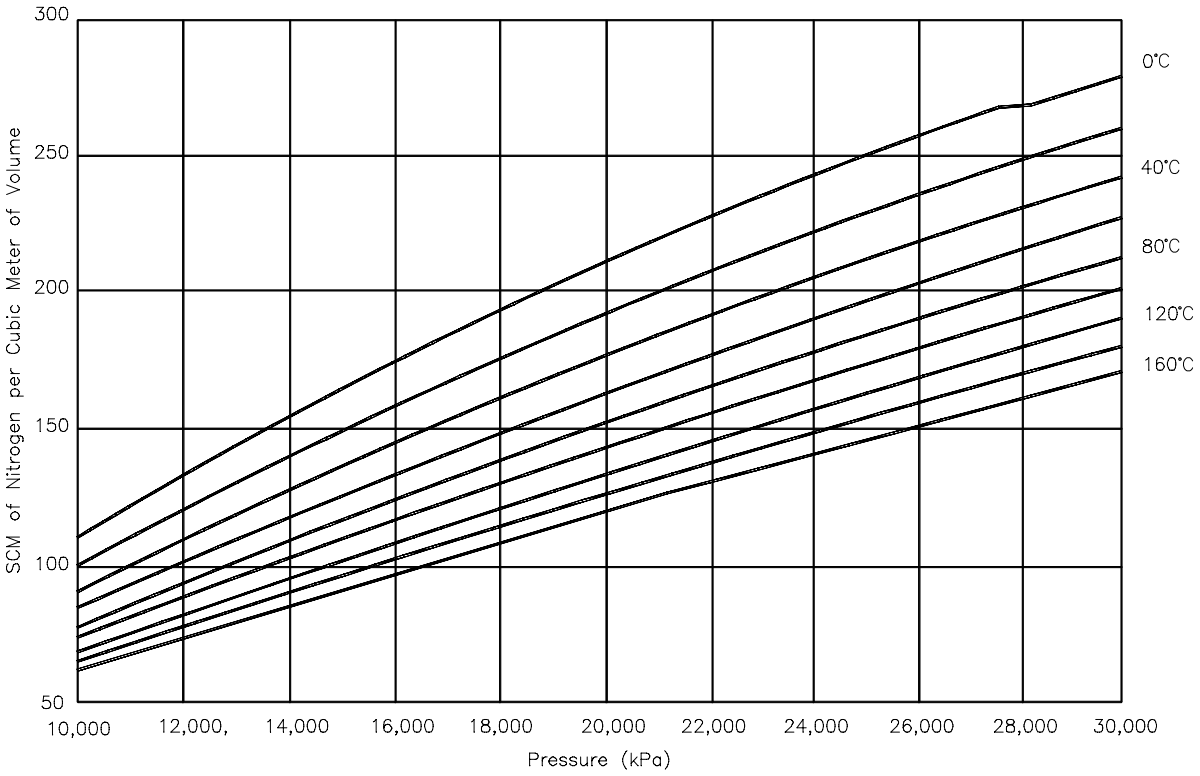


Volume Factor - Medium Pressure

Standard

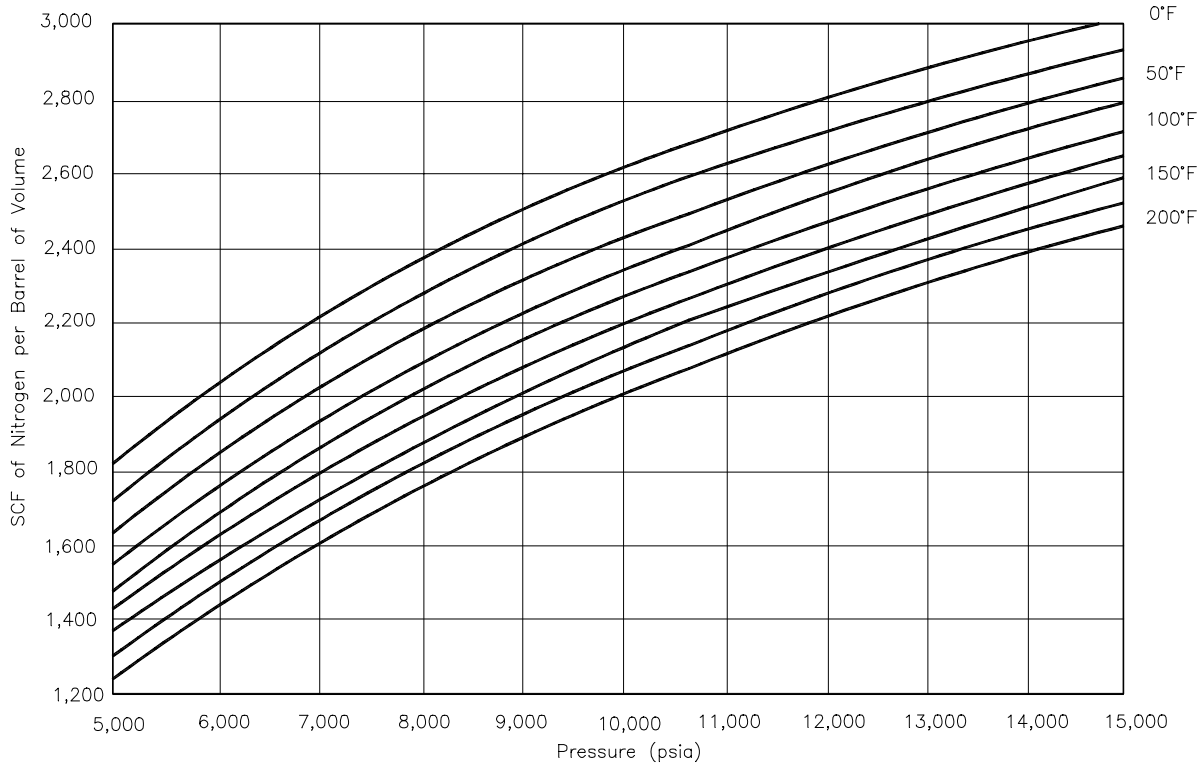


Metric

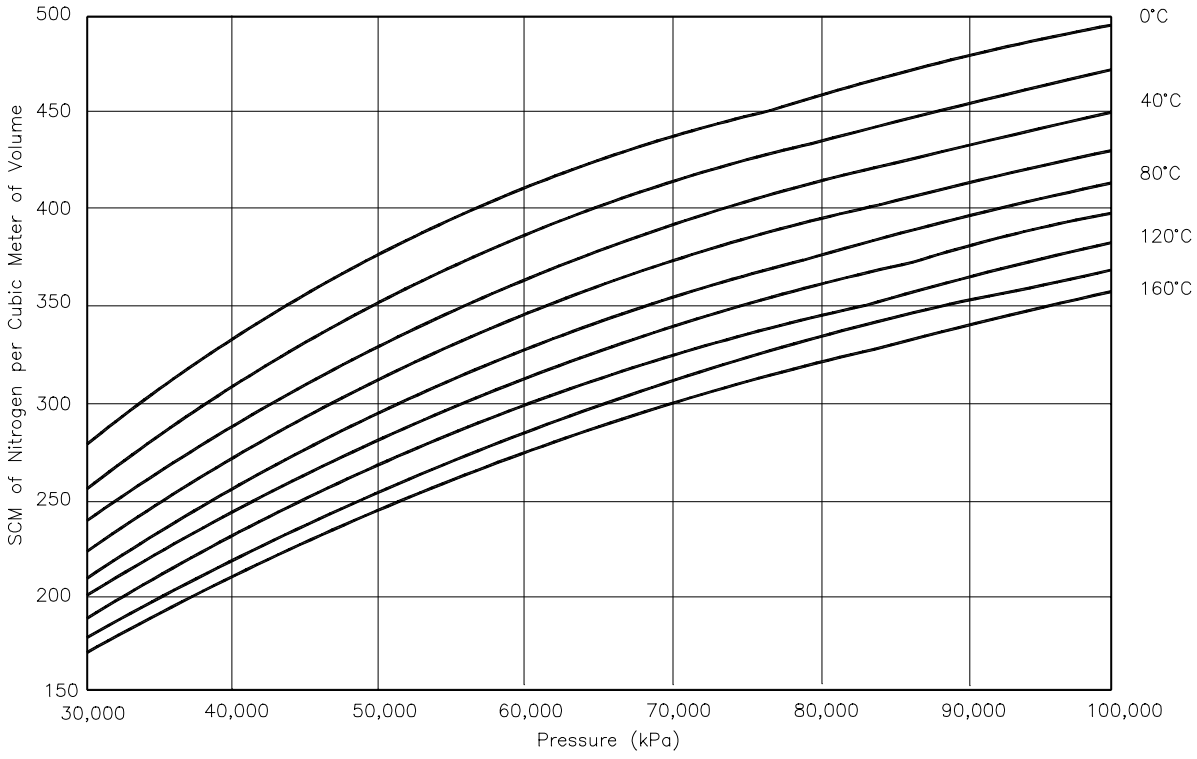


Volume Factor - High Pressure

Standard

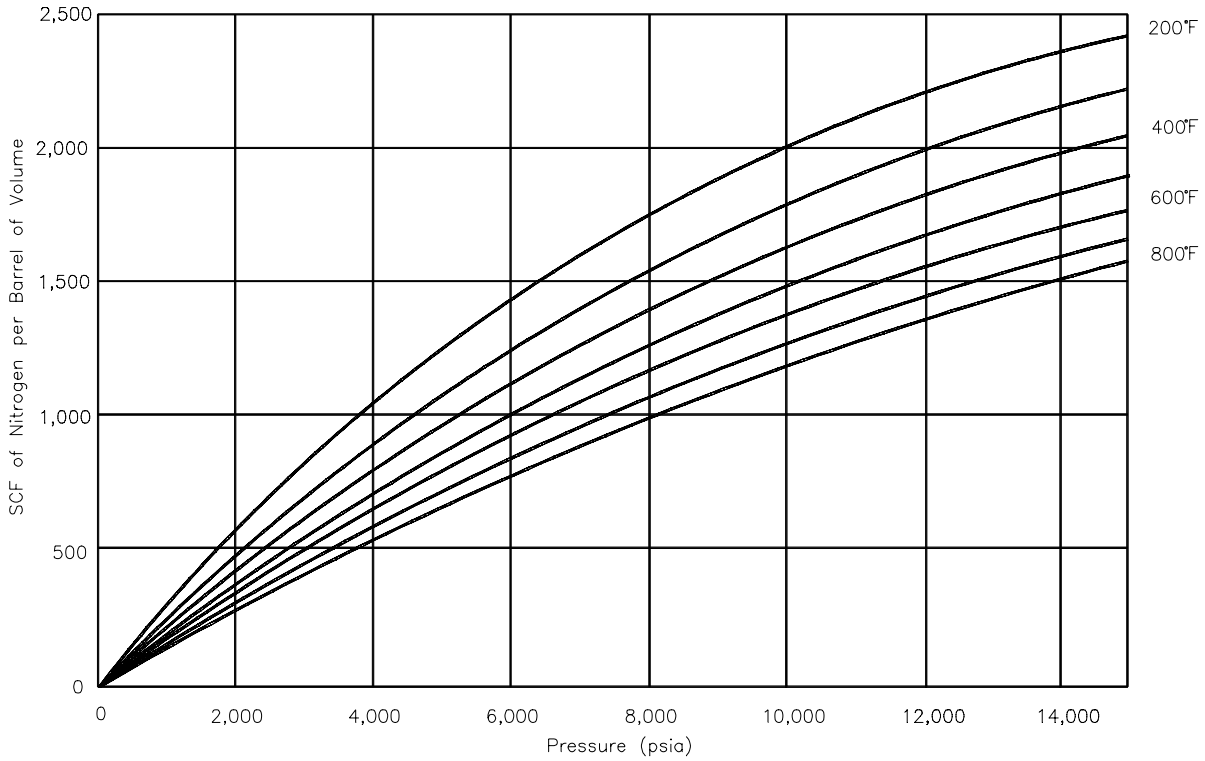


Metric

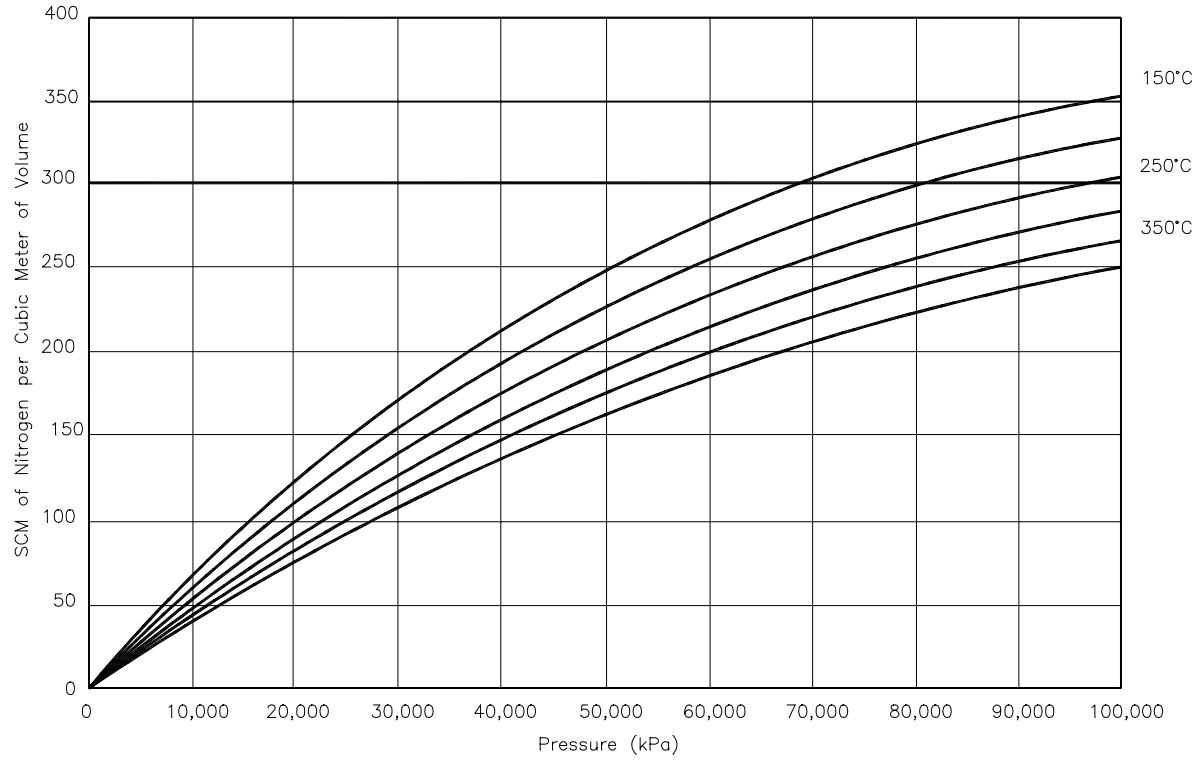


Volume Factor - High Temperature

Standard

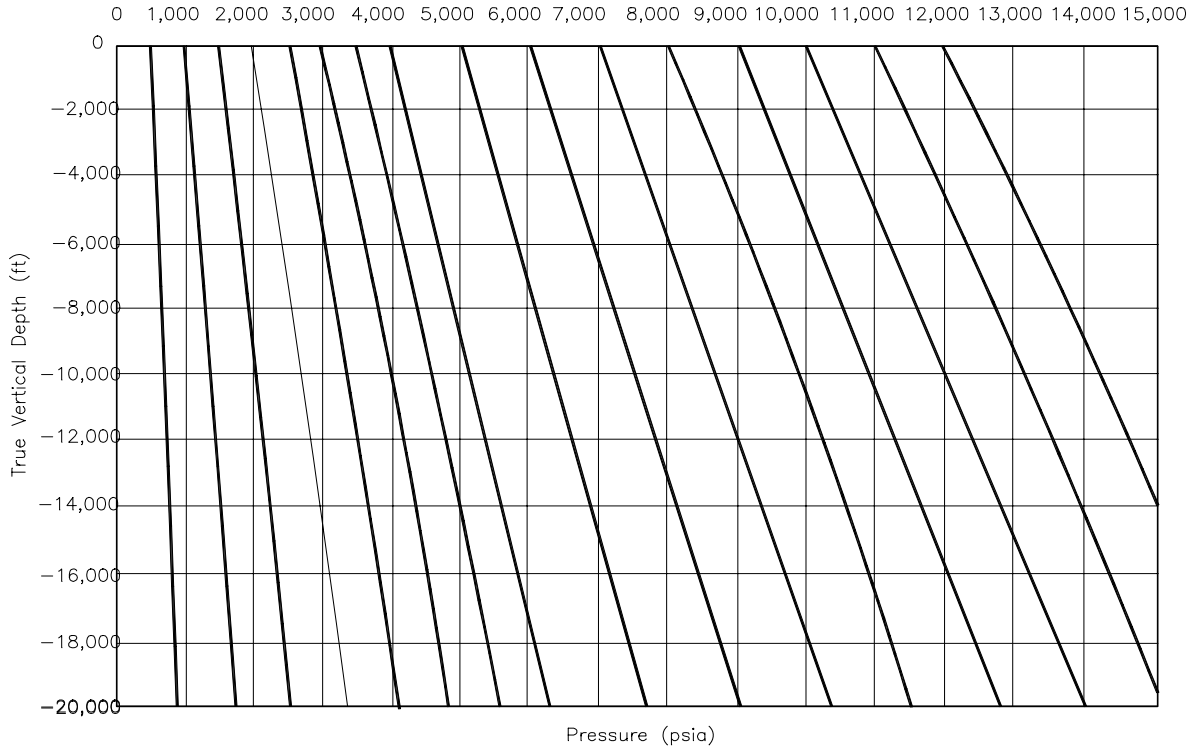


Metric

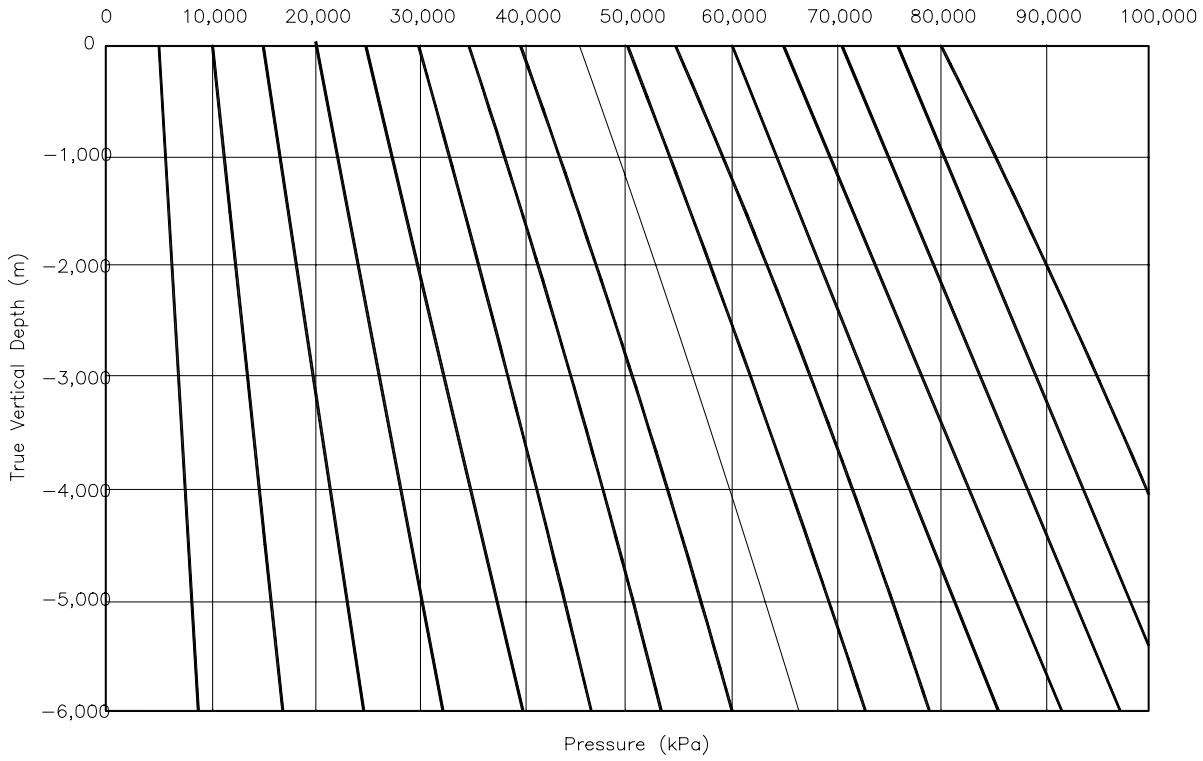


Pressure vs Depth for Well Full of Nitrogen

Standard



Metric



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Multilateral Systems

Baker Hughes Multilateral Systems

- Mechanical support at the junction for TAML levels 3 to 6
- Selective mainbore and lateral access capability
- Compatible with conventional or intelligent well systems
- Flexible production options utilizing:
  - Selective re-entry tool
  - Dual completion module
  - Dual seal module
  - Lateral entry module
  - Lateral entry nipple

FORMation Junction™

- Reformable drilling junction allows for larger production casing downhole
- Extended length of casing below leg #1 provides for greater lateral separation
- Well control maintained during installation
- Lateral open-hole completions include:
  - Perforated or slotted liners
  - Sand screens
  - Gravel pack systems
  - Expandable screens and liners
- New well applications

HOOK Hanger™-L5

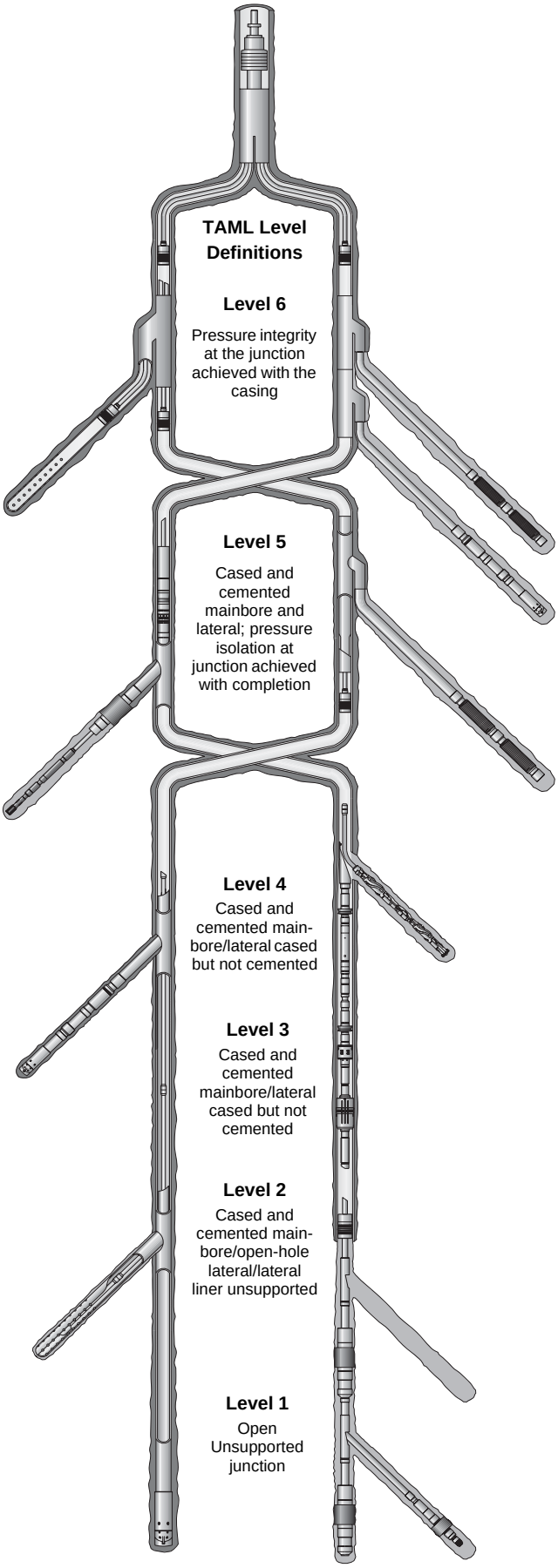
- All the features of a Level 3 and 4 plus:
  - Hydraulic isolation provided with a tubing straddle assembly at the junction

HOOK Hanger™-L4

- All the features of a level 3 HOOK Hanger™, plus HOOK Hanger is cemented back into the mainbore providing additional mechanical support
- Liner wash over is not required at the junction, eliminating debris

HOOK Hanger™-L3

- Lateral liner, screens, expandable systems installed with system in a single trip
- Multiple HOOK Hangers can be stacked in the wellbore for maximum reservoir contact
- Selective access to all laterals in a single or stacked application
- Extended reach drilling capability
- Fracturing applications compatible
- New or re-entry well applications



DeepSet Splitter™

- High burst and collapse ratings
- Junction enables the drilling of two wellbores
- Riser/diverter system for conventional drilling, liner installation, and cementing operations
- New well applications

Stackable Splitter™

- Junction system for high pressure applications
- Single or multiple splitters are installed and cemented with a single casing string
- Pressure isolating diverter system for selective fracturing or other high pressure applications
- New well applications

FORM 5™ Junction™

- Reformable completion system provides maximum lateral production
- Lateral open-hole completions include:
  - Perforated or slotted liners
  - Sand screens
  - Gravel pack systems
- CRA material option
- New or re-entry well applications

SLOPE™ System

- Permanent datum point and orientation point for:
  - Casing exit
  - Selective lateral access
- Multiple nipples can be installed in a single casing string
- Casing orientation not required prior to cementing
- Casing pressure integrity and full bore ID maintained
- New well applications

Open-Hole Multilateral System

- Construct accurate open-hole sidetracks
- Positive through tubing re-entry access to all laterals
- Lateral production control and isolation

Well Bore Construction

sealEXX™		EXPatch™		EXPress®		linEXX™		EXXdrill™	
Open-Hole Completions Zonal Isolation System 6 in. to 6-1/8 in. Open Hole 8-1/2 in. Open Hole		Cased-Hole Clad System 5-1/2 in. Casing 7 in. Casing 7-5/8 in. Casing 9-5/8 in Casing		Open- or Cased-Hole Screens 6 in. to 6-1/8 in. Open Hole 7 in. Casing 8-1/2 in. Open Hole 9-5/8 in. Casing 9-1/2 in. Open Hole 10-3/4 in. Casing		Open-Hole Casing Extension Systems 9-5/8 in. Casing Extension 8-1/2 in. Drift Post Extension		Open-Hole Drilling Clad 9-1/2 in. to 9-7/8 in. Open Hole 8-1/2 in. Post Expanded ID	
Consumables	Running Tool	Consumables	Running Tool	Consumables	Running Tool	Consumables	Running Tool	Consumables	Running Tool
Shear Sleeve Shear Sleeve Retainer Setting Sleeve(s) Contingency Release Crossover Sub Liner Sub *(4-3/4 in. only)* Crossover Sub *(4-3/4 in. only)* Carry-In Hanger FORMpac™ Open-Hole Packer sealEXX™ Blank Pipe FORMpac™ Open-Hole Packer RNX™ Retrievable Shoe	Pump-Out Sub Sealing Sub Hyflo™ Valve *(4-3/4 in. only)* Hyflo™ Sub *(4-3/4 in. only)* **Anchor** Stroker One-Trip Tool and Expansion Cone RNX™ Retrievable Shoe	Top Seal Hanger EXPatch™ Blank Pipe Bottom Seal	Stroker and Expansion Cone Running Tool Anchor	Setting Sleeve(s) Contingency Release Crossover Sub FORMlock™ EXPress® Hanger Saver Sub EXPress® Blank Pipe FORMpac™ Open-Hole Packer Screen FORMpac™ Open-Hole Packer Screen Bull Plug	Pump-Out Sub Hyflo™ Valve *(4-3/4 in. only)* Hyflo™ Sub *(4-3/4 in. only)* Anchor Stroker One-Trip Tool and Expansion Cone	RC9™/RC9-R™ Contingency Shoe *(Made up, run and cemented with 9-5/8 in. casing)* FORMlock™ linEXX™ Hanger linEXX™ Blank Pipe FORMpac™ Open-Hole Packer *(optional)* RNX™ Retrievable Shoe	Pup Joint Pump-Out Sub Anchor Stroker and Expansion Cone Running Tool RNX™ Retrievable Tool	Carry-In Hanger/ FORMpac™ EXXdrill™ Blank Pipe FORMpac™ Open-Hole Packer RNX™ Retrievable Shoe	Pup Joint Pump-Out Sub Anchor Expansion Cone and Running Tool Stroker RNX™ Retrievable Tool

Conversion Factors

Multiply	By	To Obtain
Atmospheres	76.00	Cms of Mercury
	760.00	Millimeters of Mercury
	29.92	Inches of Mercury
	33.90	Feet of Water
	1.0333	Kgs/Sq Cm
	14.70	lb/Sq In.
	1.0580	Tons/Sq Ft
Barrel	5.6146	Cubic Feet
	0.15897	Cubic Meters
Barrels-Oil	42.00	Gallons-Oil
Barrel of Water	0.1588	Metric Ton
Barrel (36° API)	0.1342	Metric Ton
Barrel per Hour	0.0936	Cu Ft per Minute
	0.700	Gallon per Minute
	2.695	Cu In. per Second
Barrel per Day	0.02917	Gallon per Minule
Bars	0.9869	Atmospheres
	2,089.00	lb/Sq Ft
	14.50	lb/Sq In.
British Thermal Units	0.2520	Kilogram-Calories
	0.2928	Watt Hour
	777.50	ft-lb
	0.0003927	Horsepower-Hours
	107.50	Kilogram-Meters
	0.0002928	Kilowatt-Hours
BTU/Min	12.96	ft-lb/sec
	0.02356	Horsepower
	0.01757	Kilowatts
	17.57	Watts
Centares (Centaires)	1.00	Square Meters
Centigrams	0.01	Grams
Centiliters	0.01	Liters
Centimeters	0.3937	Inches
	0.01	Meters
	10.00	Millimeters
Centimeters of Mercury	0.01316	Atmospheres
	0.4461	Feet of Water
Centimeters of Mercury	136.00	Kgs/Sq Meter
	27.85	lb/Sq Ft
	0.1934	lb/Sq In.
Centimeters/Second	1.969	Feet/Min
	0.03281	Feet/Sec
	0.036	Kilometers/Hrs
	0.60	Meters/Min
	0.02237	Miles/Hrs
	0.0003728	Miles/Min
Centimeters/Second/Second	0.03281	Feet/Sec/Sec
Cubic Centimeters	0.00003531	Cubic Feet
	0.06102	Cubic Inches
	0.0000010	Cubic Meters
	0.000001308	Cubic Yards
	0.0002642	Gallons
	0.001	Liters
	0.002113	Pints (Liq)
	0.001057	Quarts (Liq)
Cubic Feet	0.1781	Barrels
	28,320.00	Cubic Cms
	1,728.00	Cubic Inches
	0.02832	Cubic Meters

Conversion Factors (Continued)

Multiply	By	To Obtain
Cubic Feet	0.03704	Cubic Yards
	7.48052	Gallons
	28.32	Liters
	59.84	Pints (Liq)
	29.92	Quarts (Liq)
Cubic Feet/Minute	472.00	Cubic Cm/Sec
	0.1247	Gallons/Sec
	0.4720	Liters/Sec
	62.43	lb of Water/Min
	10.686	Barrels per Hour
	28.800	Cubic In. per Sec
Cubic Feet/Second	0.646317	Million Gals/Day
	448.831	Gallons/Minute
Cubic Inches	16.39	Cubic Centimeters
	0.0005787	Cubic Feet
	0.00001639	Cubic Meters
	0.00002143	Cubic Yards
	0.004329	Gallons
	0.01639	Liters
Cubic Inches	0.03463	Pints (Liq)
	0.01732	Quarts (Liq)
Cubic Meters	6.2905	Barrels
	1,000,000.00	Cubic Centimeters
	35.31	Cubic Feet
	61,023.00	Cubic Inches
	1.308	Cubic Yards
	264.20	Gallons
	1,000.00	Liters
	2,113.00	Pints (Liq)
	1,057.00	Quarts (Liq)
Cubic Yards	4.8089	Barrels
	764,600.00	Cubic Centimeters
	27.00	Cubic Feet
	46,656.00	Cubic Inches
	0.7646	Cubic Meters
Cubic Yards	202.00	Gallons
	764.60	Liters
	1,616.00	Pints (Liq)
	807.90	Quarts (Liq)
Cubic Yards/Min	0.45	Cubic Feet/Sec
	3.367	Gallon/Sec
	12.74	Liters/Sec
Decigrams	0.10	Grams
Deciliters	0.10	Liters
Decimeters	0.10	Meters
Degrees (Angle)	60.00	Minutes
	0.01745	Radians
	3,600.00	Seconds
Degrees/Sec	0.01745	Radians/Sec
	0.1667	Revolutions/Min
	0.002778	Revolutions/Sec
Dekagrams	10.00	Gram
Dekaliters	10.00	Liters
Dekameters	10.00	Meters
Drams	27.34375	Grains
	0.0625	Ounces
	1.771845	Grams

Conversion Factors (Continued)

Multiply	By	To Obtain
Feet	30.48	Centimeters
	12.00	Inches
	0.3048	Meters
	0.3600	Varas (Texas)
Feet	0.3333	Yards
Feet of Water	0.02950	Atmospheres
	0.8826	Inches of Mercury
	0.03048	Kgs/Sq Cm
	62.43	lb/Sq Ft
	0.4335	lb/Sq In.
Feet/Min	0.5080	Centimeters/Sec
	0.01667	Feet/Sec
	0.01829	Kilometers/Hr
	0.3048	Meters/Min
	0.01136	Miles/Hr
Feet/Sec	0.68182	Miles per Hour
Feet/Sec/Sec	30.48	Centimeters/Sec/Sec
	0.3048	Meters/Sec/Sec
Ft-Lb	0.001286	British Thermal Units
	0.0000005050	Horsepower-Hrs
	0.0003241	Kilogram-Calories
	0.1383	Kilogram-Meters
	0.0000003766	Kilowatt-Hrs
Ft-Lb/Min	0.001286	British Thermal Units/Min
	0.01667	ft-lb/sec
Ft-Lb/Min	0.00003030	Horsepower
	0.0003241	Kg-Calories/Min
	0.00002260	Kilowatts
Ft-Lb/Sec	0.07717	BTU/Min
	0.001818	Horsepower
	0.01945	Kg-Calories/Min
	0.001356	Kilowatts
Gallons (U.S.)	0.02381	Barrel
	0.83267	Gallons (Imperial)
Gallons (U.S.)	3,785.00	Cubic Centimeters
	0.1337	Cubic Feet
	231.00	Cubic Inches
	0.003785	Cubic Meters
	0.00495	Cubic Yards
	3.785	Liters
	8.00	Pints (Liq)
	4.00	Quarts (Liq)
Gallons (Imperial)	1.20095	Gallons (U.S.)
	277.419	Cubic Inches
Gallons (U.S.) Water	8.3453	Pounds of Water
Gallons (U.S.)/Min	1.429	Barrels per Hour
	0.1337	Cu Ft per Minute
Gallons (U.S.)/Min	34.286	Barrels per Day
	0.06308	Liters/Sec
	8.0208	Cu Ft/Hr
	0.002228	Cu Ft/Sec
Gallons (U.S.) of Water/Min	6.0086	Tons Water/24 Hrs
Grains (Troy)	1.00	Grains (Avoir)
	0.06480	Grams
	0.04167	Pennyweights (Troy)
	0.0020833	Ounces (Troy)
Grains/U.S. Gal	17.118	Parts/Million
	142.86	lb/Million Gal
Grains/Imperial Gal	14.286	Parts/Million

Conversion Factors (Continued)

Multiply	By	To Obtain
Grams	980.70	Dynes
	15.43	Grains
	0.001	Kilograms
	1,000.00	Milligrams
Grams	0.03527	Ounces (Avoir)
	0.03215	Ounces (Troy)
Grams/Cm	0.0056	Pounds/Inch
Grams/Cu Cm	62.43	Pounds/Cubic Foot
	0.03613	Pounds/Cubic Inch
Grams/Liter	58.417	Grains/Gal
	8.345	Pounds/1,000 Gals
	0.062427	Pounds/Cubic Foot
	1,000.00	Parts/Million
Hectograms	100.00	Grams
Hectoliters	100.00	Liters
Hectowatts	100.00	Watts
Horsepower	42.44	BTU/Min
	33,000.00	ft-lb/min
	550.00	ft-lb/sec
	1.014	Horsepower (Metric)
	10.70	Kg-Calories/Min
	0.7457	Kilowatts
	745.70	Watts
Horsepower (Boiler)	33,479.00	BTU/Hr
	9.803	Kilowatts
Horsepower-Hours	2,547.00	British Thermal Units
	1,980.000	ft-lb
	641.70	Kilogram-Calorie
	273,700.00	Kilogram-Meters
Horsepower-Hours	0.7457	Kilowatt-Hours
Inches	2.540	Centimeters
	25.40	Millimeters
Inches of Mercury	0.03342	Atmospheres
	1.133	Feet of Water
	0.03453	Kgs/Sq Cm
	70.73	lb/Sq Ft
	0.4912	lb/Sq In.
Inches of Water	0.002458	Atmospheres
	0.07355	Inches of Mercury
	0.002540	Kgs/Sq Cm
	0.5781	Ounces/Sq In.
	5.202	lb/Sq Ft
	0.03613	lb/Sq In.
Kilograms	980,665.00	Dynes
	2.205	lb
	0.001102	Tons (Short)
	1,000.00	Grams
Kilograms-Meter	7.233	ft-lb
	0.6720	lb/Ft
Kgs/Sq Centimeter	0.9678	Atmospheres
	32.81	Feet of Water
	28.96	Inches of Mercury
	2,048.00	lb/Sq Ft
	14.22	lb/Sq In.
Kgs/Sq Millimeter	1,000,000.00	Kgs/Sq Meter
Kiloliters	1,000.00	Liters
Kms	100,000.00	Centimeters
	3,281.00	Feet

Conversion Factors (Continued)

Multiply	By	To Obtain
Kms	1,000.00	Meters
	0.6214	Miles
Kms	0.5396	Miles (Nautical)
	1,094.00	Yards
Kms/Hr	27.78	Centimeters/Sec
	54.68	Feet/Min
	0.9113	Feet/Sec
	0.5396	Knots
	16.67	Meters/Min
	0.6214	Miles/Hr
Kilopascal	0.145	psi
Kms/Hr/Sec	27.78	Cms/Sec/Sec
	0.9113	Ft/Sec/Sec
	0.2778	Meters/Sec/Sec
Kilowatts	56.92	British Thermal Units/Min
	44,250.00	ft-lb/min
	737.60	ft-lb/sec
	1.341	Horsepower
	14.34	Kg-Calories/Min
	1,000.00	Watts
Kilowatt-Hours	3,415.00	British Thermal Units
	2,655,000.00	ft-lb
	1.341	Horsepower-Hrs
	860.50	Kg-Calories
	367,100.00	Kg-Meters
Link (Surveyor's)	7.92	Inches
Liters	1,000.00	Cubic Cm
	0.03531	Cubic Feet
	61.02	Cubic In.
	0.001	Cubic Meters
	0.001308	Cubic Yards
	0.2642	Gallons
	2.113	Pints (Liq)
	1.057	Quarts (Liq)
Liters/Min	0.0005886	Cubic Ft/Sec
Meters	100.00	Centimeters
	3.281	Feet
	39.37	Inches
	0.001	Kilometers
	1,000.00	Millimeters
	1.094	Yards
Meters/Min	1.667	Centimeters/Sec
	3.281	Feet/Min
	0.05468	Feet/Sec
	0.06	Kilometers/Hr
	0.03728	Miles/Hr
Meters/Sec	196.80	Feet/Min
	3.281	Feet/Sec
	3.60	Kilometers/Hr
Meters/Sec	0.06	Kilometers/Min
	2.237	Miles/Hr
	0.03728	Miles/Min
Microns	0.0000010	Meters
Miles	160,900.00	Centimeters
	5,280.00	Feet
Miles	1.609	Kilometers
	1,760.00	Yards
	1,900.80	Varas (Texas)

Conversion Factors (Continued)

Multiply	By	To Obtain
Miles/Hr	44.70	Centimeters/Sec
	88.00	Feet/Min
	1.467	Feet/Sec
	1.609	Kilometers/Hrs
	0.8684	Knots
	26.82	Meters/Min
Miles/Min	2,682.00	Centimeters/Sec
	88.00	Feet/Sec
	1.609	Kilometers/Min
	60.00	Miles/Hr
Milliers	1,000.00	Kilograms
Milligrams	0.0010	Grams
Milliliters	0.0010	Liters
Millimeters	0.10	Centimeters
	0.03937	Inches
Milligrams/Liter	1.00	Parts/Million
Million Gals/Day	1.54723	Cubic Feet/Sec
Mills	0.000254	Centimeters
	0.001	Inches
Miner's Inches	1.50	Cubic Ft/Min
Minutes (Angle)	0.0002909	Radians
Ounces	16.00	Drams
	437.50	Grains
	0.0625	lb
	28.349527	Grams
	0.9115	Ounces (Troy)
	0.0000279	Tons (Long)
	0.00002835	Tons (Metric)
Ounces (Troy)	480.00	Grains
	20.00	Pennyweights (Troy)
	0.08333	lb (Troy)
	31.103481	Grams
	1.09714	Ounces (Avoir)
Ounces (Fluid)	1.805	Cubic In.
	0.02957	Liters
Ounces/Sq Inch	0.0625	lb/Sq In.
Parts/Million	0.0584	Grains/U.S. Gal
	0.07016	Grains/Imperial Gal
Parts/Million	8.345	lb/Million Gal
Pennyweights (Troy)	24.00	Grains
	1.55517	Grams
	0.05	Ounces (Troy)
	0.0041667	Pounds (Troy)
lb	16.00	Ounces
	256.00	Drams
	7,000.00	Grains
	0.0005	Tons (Short)
	453.5924	Grams
	1.21528	lb (Troy)
	14.5833	Ounces (Troy)
lb (Troy)	5760.00	Grains
	240.00	Pennyweights (Troy)
	12.00	Ounces (Troy)
	373.24177	Grams
	0.822857	lb (Avoir)
	13.1657	Ounces (Avoir)
	0.00036735	Tons (Long)
	0.00041143	Tons (Short)
	0.00037324	Tons (Metric)

Conversion Factors (Continued)

Multiply	By	To Obtain
lb of Water	0.01602	Cubic Feet
	27.68	Cubic In.
	0.1198	Gallons
lb/Cubic Ft	0.01602	Grams/Cubic Cm
	16.02	Kgs/Cubic Meter
	0.0005787	lb/Cubic In.
lb/Cubic In.	27.68	Grams/Cubic Cm
	27,680.00	Kgs/Cubic Meter
	1,728.00	lb/Cubic Ft
lb of Water/Min	0.000267	Cubic/Sec
lb/Ft	1.488	Kgs/Meter
lb/Gallon	0.1199	Grams/Cubic Cm
lb/In.	178.60	Grams/Cm
lb/Sq Ft	0.01602	Feet of Water
	0.0004883	Kgs/Sq Cm
	0.006945	lb/Sq In.
lb/Sq In.	0.06804	Atmospheres
	2.307	Feet of Water
	2.36	Inches of Mercury
	0.07031	Kgs/Sq Cm
	6.894757	Kilopascal
Quarts (Dry)	67.20	Cubic In.
Quarts (Liquid)	57.75	Cubic In.
	0.946	Liter
Quintal	0.50802	CWT (Hundred Weight)
Quintal (Argentine)	101.28	lb
Quintal (Brazil)	129.54	lb
Quintal (Castile, Peru)	101.43	lb
Quintal (Chile)	101.41	lb
Quintal (Mexico)	101.47	lb
Quintal (metric)	220.46	lb
Square Centimeter	0.1550	Square Inch
Square Foot	0.0929	Square Meter
	0.1296	Square Vara (Texas)
Square Inch	6.452	Square Centimeters
Square Kilometer	0.3861	Square Mile
Square Meter	10.76	Square Feet
Square Mile	2.590	Square Kilometers
Square Vara (Texas)	7.716	Square Feet
Square Mile	640.00	Acre
Temp (°C) + 273.15	1.00	Abs Temp (°C), Kelvin
Temp (°C) + 17.78	1.80	Temp (°F)
Temp (°F) + 460	1.00	Abs Temp (°F)
Temp (°F) - 32	0.5555	Temp (°C)
Tons (Long)	1,016.00	Kilograms
	2,240.00	lb
	1.12000	Tons (Short)
Tons (Metric)	1,000.00	Kilograms
	2,205.00	lb

PSI per Barrel

Mud Wt API Gr lb/gal	psi/ft	2-3/8 EU Tubing 4.7 lb/ft	2-7/8 EU Tubing 6.5 lb/ft	2-7/8 IU Drillpipe 10.4 lb/ft	3-1/2 IU Drillpipe 13.3 lb/ft
API Gr					
60	.320	82.70	55.20	72.20	43.50
55	.329	85.00	56.80	74.20	44.70
50	.338	87.30	58.30	76.20	46.00
48	.341	88.10	58.90	76.90	46.40
46	.345	89.10	59.50	77.80	47.00
44	.349	90.20	60.20	78.70	47.50
43	.351	90.70	60.60	79.20	47.70
Diesel					
42	.354	95.10	61.10	79.80	48.10
API Gr					
41	.355	91.70	61.30	80.10	48.30
40	.357	92.20	61.60	80.50	48.60
39	.359	92.80	62.00	81.00	48.80
38	.362	93.50	62.50	81.60	49.20
37	.364	94.10	62.80	82.10	49.50
36	.366	94.60	63.20	82.50	49.80
35	.368	95.10	63.50	83.00	50.00
34	.370	95.60	63.90	83.40	50.30
33	.373	96.40	64.40	84.10	50.70
32	.375	96.90	64.70	84.60	51.00
31	.377	97.40	65.10	85.0	51.30
30	.379	97.90	65.40	85.50	51.50
28	.384	99.20	66.30	86.60	52.20
26	.389	100.50	67.10	87.70	52.90
24	.394	101.80	68.00	88.90	53.60
22	.399	103.10	68.90	90.00	54.30
20	.405	104.70	69.90	91.30	55.10
18	.410	105.90	70.80	92.50	55.80
15	.418	108.00	72.10	94.30	56.90
12	.427	110.30	73.70	96.30	58.10
10	.433	111.90	74.80	97.60	58.90
lb/gal					
8.34	.433	111.90	74.80	97.60	58.90
9.00	.468	120.80	80.70	105.40	63.60
9.20	.478	123.50	82.50	107.80	65.00
9.40	.488	126.10	84.30	110.10	66.40
9.60	.499	128.80	86.10	112.40	67.80
9.80	.509	131.50	87.90	114.80	69.20
10.00	.519	134.20	89.70	117.10	70.70
10.20	.530	136.90	91.40	119.50	72.10
10.40	.540	139.60	93.20	121.80	73.50
10.60	.551	142.20	95.00	124.20	74.90
10.80	.561	144.90	96.80	126.50	76.30
11.00	.571	147.60	98.60	128.80	77.70
11.20	.582	150.30	100.40	131.20	79.10
11.40	.592	153.00	102.20	133.50	80.50
11.60	.603	155.70	104.00	135.90	82.00
11.80	.613	158.30	105,80	138.20	83.40
12.00	.623	161.00	107.60	140.60	84.80
12.20	.634	163.70	109.40	142.90	86.20
12.40	.644	166.40	111.20	145.20	87.60
12.60	.655	169.10	113.00	147.60	89.00
12.80	.665	171.80	114.80	149.90	90.40
13.00	.675	174.50	116.50	152.30	91.80
13.20	.686	177.10	118.30	154.60	93.30
13.40	.696	179.80	120.10	157.00	94.70

PSI per Barrel (Continued)

Mud Wt API Gr lb/gal	psi/ft	2-3/8 EU Tubing 4.7 lb/ft	2-7/8 EU Tubing 6.5 lb/ft	2-7/8 IU Drillpipe 10.4 lb/ft	3-1/2 IU Drillpipe 13.3 lb/ft
13.60	.706	182.50	121.90	159.30	96.10
13.80	.717	185.20	123.70	161.60	97.50
14.00	.727	187.90	125.50	164.00	98.90
14.50	.753	194.60	130.00	169.80	102.40
15.00	.779	201.30	134.50	175.70	106.00
15.50	.805	208.00	139.00	181.60	109.50
16.00	.831	214.70	143.40	187.40	113.00
16.50	.857	221.40	147.90	193.30	116.60
17.00	.883	228.10	152.40	199.10	120.10
17.50	.909	234.80	156.90	205.00	123.60
18.00	.935	241.50	161.40	210.80	127.20
18.50	.961	248.30	165,80	216.70	130.70
19.00	.987	255.00	170.30	222.60	134.20
19.50	1.01	261.70	174.80	228.40	137.80
20.00	1.04	268.40	179.30	234.30	141.30

Fluid Density, Buoyancy Factor and Pressure (at 60°F)

Degrees API	Specific Gravity	Density			Fluid Head		Buoyancy Factor ■
		lb/gal	lb/cu ft	*g/cc*	psi/ft	*kg/sq cm/m*	
60	0.738	6.160	46.08	*0.738*	0.320	*.0738*	0.905
55	0.758	6.325	47.31	*0.758*	0.328	*.0758*	0.903
50	0.779	6.499	48.62	*0.779*	0.336	*.0779*	0.900
45	0.801	6.683	49.99	*0.801*	0.347	*.0801*	0.897
40	0.825	6.878	51.45	*0.825*	0.357	*.0825*	0.894
35	0.849	7.085	53.00	*0.849*	0.368	*.0849*	0.891
30	0.876	7.304	54.64	*0.876*	0.379	*.0876*	0.888
25	0.904	7.537	56.38	*0.904*	0.391	*.0904*	0.884
20	0.933	7.786	58.24	*0.933*	0.404	*.0933*	0.880
15	0.965	8.052	60.23	*0.965*	0.418	*.0965*	0.876
10	1.000	8.337	62.36	*1.000*	0.433	*.1000*	0.872
-	1.007	8.400	62.83	*1.007*	0.436	*.1007*	0.871
-	1.031	8.600	64.33	*1.031*	0.446	*.1031*	0.868
-	1.055	8.800	65.82	*1.055*	0.457	*.1055*	0.865
-	1.079	9.000	67.32	*1.079*	0.467	*.1079*	0.862
-	1.103	9.200	68.82	*1.103*	0.477	*.1103*	0.859
-	1.127	9.400	70.31	*1.127*	0.488	*.1127*	0.856
-	1.151	9.600	71.81	*1.151*	0.498	*.1151*	0.852
-	1.175	9.800	73.30	*1.175*	0.509	*.1175*	0.849
-	1.199	10.000	74.80	*1.199*	0.519	*.1199*	0.846
-	1.223	10.200	76.30	*1.223*	0.529	*.1223*	0.843
-	1.247	10.400	77.79	*1.247*	0.540	*.1247*	0.840
-	1.271	10.600	79.29	*1.271*	0.550	*.1271*	0.837
-	1.295	10.800	80.78	*1.295*	0.561	*.1295*	0.834
-	1.319	11.000	82.28	*1.319*	0.571	*.1319*	0.831
-	1.343	11.200	83.78	*1.343*	0.581	*.1343*	0.828
-	1.367	11.400	85.27	*1.367*	0.592	*.1367*	0.825
-	1.391	11.600	86.77	*1.391*	0.602	*.1391*	0.822
-	1.415	11.800	88.27	*1.415*	0.612	*.1415*	0.819
-	1.439	12.000	89.76	*1.439*	0.623	*.1439*	0.816
-	1.463	12.200	91.26	*1.463*	0.633	*.1463*	0.813
-	1.487	12.400	92.75	*1.487*	0.644	*.1487*	0.810
-	1.511	12.600	94.25	*1.511*	0.654	*.1511*	0.806
-	1.535	12.800	95.75	*1.535*	0.664	*.1535*	0.803
-	1.569	13.000	97.24	*1.559*	0.675	*.1559*	0.800

Fluid Density, Buoyancy Factor and Pressure (at 60°F) (Continued)

Degrees API	Specific Gravity	Density			Fluid Head		Buoyancy Factor ■
		lb/gal	lb/cu ft	*g/cc*	psi/ft	*kg/sq cm/m*	
-	1.583	13.200	98.74	*1.583*	0.685	*.1583*	0.797
-	1.607	13.400	100.23	*1.607*	0.696	*.1607*	0.794
-	1.631	13.600	101.73	*1.631*	0.706	*.1631*	0.791
-	1.655	13.800	103.23	*1.655*	0.716	*.1655*	0.788
-	1.679	14.000	104.72	*1.679*	0.727	*.1679*	0.785
-	1.703	14.200	106.22	*1.703*	0.737	*.1703*	0.782
-	1.727	14.399	107.71	*1.727*	0.748	*.1727*	0.779
-	1.751	14.600	109.21	*1.751*	0.758	*.1751*	0.776
-	1.775	14.800	110.71	*1.775*	0.768	*.1775*	0.773
-	1.799	15.000	112.20	*1.799*	0.779	*.1799*	0.770
-	1.823	15.200	113.70	*1.823*	0.789	*.1823*	0.767
-	1.847	15.400	115.20	*1.847*	0.799	*.1847*	0.764
-	1.871	15.600	116.69	*1.871*	0.810	*.1871*	0.761
-	1.895	15.800	118.19	*1.895*	0.820	*.1895*	0.757
-	1.919	16.000	119.68	*1.919*	0.831	*.1919*	0.754
-	1.943	16.200	121.18	*1.943*	0.841	*.1943*	0.751
-	1.967	16.400	122.68	*1.967*	0.851	*.1967*	0.748
-	1.991	16.600	124.17	*1.991*	0.862	*.1991*	0.745
-	2.015	16.800	125.67	*2.015*	0.872	*.2015*	0.742
-	2.039	17.000	127.16	*2.039*	0.883	*.2039*	0.739
-	2.063	17.200	128.66	*2.063*	0.893	*.2063*	0.736
-	2.087	17.400	130.16	*2.087*	0.903	*.2087*	0.733
-	2.111	17.600	131.65	*2.111*	0.914	*.2111*	0.730
-	2.135	17.800	133.15	*2.135*	0.924	*.2135*	0.727
-	2.159	18.000	134.64	*2.159*	0.935	*.2159*	0.724
-	2.183	18.200	136.14	*2.183*	0.945	*.2183*	0.721
-	2.207	18.400	137.64	*2.207*	0.955	*.2207*	0.718
-	2.231	18.600	139.13	*2.231*	0.966	*.2231*	0.715
-	2.255	18.800	140.63	*2.255*	0.976	*.2255*	0.712
-	2.278	19.000	142.12	*2.278*	0.987	*.2278*	0.708
-	2.302	19.200	143.62	*2.302*	0.997	*.2302*	0.705
-	2.326	19.400	145.12	*2.326*	1.007	*.2326*	0.702
-	2.350	19.600	146.61	*2.350*	1.018	*.2350*	0.699
-	2.374	19.800	148.11	*2.374*	1.028	*.2374*	0.696
-	2.398	20.000	149.61	*2.398*	1.038	*.2398*	0.693

■ Buoyancy factor is used to compensate for loss of weight when steel tubulars are immersed in fluid

Applicable only when tubing or casing is completely filled with fluid

Actual hook load = length of string (ft) x weight of string (lb/ft) x Buoyancy Factor

Tubing Movement Formulas

Changes in temperature and pressure cause contraction or expansion of a tubing string as covered in detail within Baker's "Packer Calculation Handbook". For ready reference, the formulas for calculating the forces developed by this contraction/expansion are given below:

F_1 (piston effect) = $(A_p - A_i)\,\Delta P_i - (A_p - A_o)\,\Delta P_o$
F_2 (buckling effect) = usually negligible
F_3 (ballooning effect) = $.6\,(\Delta P_{ia} A_i - \Delta P_{oa} A_o)$
F_4 (temperature effect) = $207\, A_s\, \Delta t$

The above forces are in pounds and the equivalent tubing movement can be obtained from the stretch charts in another section of this handbook or can be calculated using the formula:

$$\Delta L \text{ (stretch or contraction in feet)} = \frac{F \times L}{E \times A_s}$$

Where: F = force in pounds
L = tubing length in feet
E = elasticity factor of steel = 30,000,000
A_s = cross section area of tubing in square inches

Terms used in the force formulas are defined below:

A_s = cross section area of tubing in square inches = $A_o - A_i$
A_p = area of packer bore in square inches
A_o = area of tubing OD in square inches
A_i = area of tubing ID in square inches
ΔP_i = change in tubing pressure at packer in pounds per square inch
ΔP_o = change in annulus pressure at packer in pounds per square inch
ΔP_{ia} = change in average tubing pressure in pounds per square inch
ΔP_{oa} = change in average annulus pressure in pounds per square inch
Δt = change in average tubing temperature in degrees Fahrenheit

For more detailed information regarding tubing movement refer to the Baker "Packer Calculation Handbook."

Gas Flow Through Choke

A calculation of the volume of gas flowing through a choke may be made using the formula:

$$Q = \frac{C\,P}{\sqrt{GT}}$$

Where: Q = gas flow rate in MCF per day at 60°F and atmospheric pressure
C = choke coefficient, listed in table below for various size chokes
P = absolute flowline pressure upstream of choke, gage reading plus 15 psi
G = gas specific gravity
T = absolute gas temperature upstream of choke, °F plus 460

If neither temperature nor specific gravity are known, an approximation can be made by assuming a temperature of 80°F (540°F absolute) and a specific gravity of 0.6 for the gas. In this case the formula will be:

$$Q = \frac{C\,P}{\sqrt{540 \times 0.6}} = \frac{C\,P}{18} = .0555\,CP$$

Coefficient Table			
Choke Size	**Coefficient**	**Choke Size**	**Coefficient**
in.	**C**	**in.**	**C**
1/8	6.25	7/16	85.13
3/16	14.44	1/2	112.72
1/4	26.51	5/8	179.74
5/16	43.64	3/4	260.99
3/8	61.21		

Class A Cement Slurry

Slurry Weight	Mixing Water	Yield	Factor
lb/gal	gal/sack	cu ft/sack	sack/cu ft
14.00	7.72	1.512	0.661
14.10	7.53	1.487	0.673
14.20	7.34	1.461	0.684
14.30	7.15	1.436	0.697
14.40	6.98	1.413	0.708
14.50	6.80	1.389	0.720
14.60	6.64	1.368	0.731
14.70	6.48	1.346	0.743
14.80	6.32	1.325	0.755
14.90	6.17	1.305	0.766
15.00	6.02	1.285	0.778
15.10	5.90	1.267	0.789
15.20	5.74	1.247	0.802
15.30	5.61	1.230	0.813
15.40	5.48	1.212	0.825
15.50	5.35	1.195	0.837
15.60	5.23	1.179	0.848
15.70	5.11	1.163	0.860
15.80	4.99	1.147	0.872
15.90	4.88	1.132	0.883
16.00	4.77	1.118	0.895
16.10	4.66	1.103	0.907
16.20	4.56	1.089	0.918
16.30	4.46	1.076	0.929
16.40	4.36	1.063	0.941
16.50	4.26	1.049	0.953
16.60	4.16	1.036	0.965
16.70	4.07	1.024	0.977
16.80	3.98	1.012	0.988
16.90	3.89	1.000	1.000

Bit and Casing Combinations

Casing OD	Weight lb/ft	Casing ID	Casing Drift	Bit Size	Standard Bit Pin Thread
4-1/2	9.50	4.090	3.965	3-7/8	2-3/8 API Regular
	10.50	4.052	3.927		
	11.60	4.000	3.875		
	13.50	3.920	3.795	3-3/4	
5	11.50	4.560	4.435	4-1/4	2-3/8 API Regular
	13.00	4.494	4.369		
	15.00	4.408	4.283		
	18.00	4.276	4.151	4-1/8	
5-1/2	13.00	5.044	4.919	4-3/4	2-7/8 API Regular
	14.00	5.012	4.887		
	15.50	4.950	4.825		
	17.00	4.892	4.767		
	20.00	4.778	4.653	4-5/8	
	23.00	4.670	4.545	4-1/2	2-3/8 API Regular
	26.00	4.548	4.423	4-3/8	
5-1/8	15.00	5.524	5.399	5-3/8	3-1/2 API Regular
	18.00	5.424	5.299	5-1/8	
	20.00	5.352	5.227		
	23.00	5.240	5.115		
6-5/8	17.00	6.135	6.010	6	3-1/2 API Regular
	20.00	6.049	5.924	5-7/8	
	24.00	5.921	5.796	5-5/8	
	28.00	5.791	5.666		
	32.00	5.675	5.550	5-3/8	
7	17.00	6.538	6.413	6-1/4	3-1/2 API Regular
	20.00	6.456	6.331		
	23.00	6.366	6.241		
	26.00	6.276	6.151	6-1/8	
	29.00	6.184	6.059	6	
	32.00	6.094	5.969		
	35.00	6.004	5.879	5-7/8	
	38.00	5.920	5.795	5-3/4	
7-5/8	20.00	7.125	7.000	6-3/4	3-1/2 API Regular
	24.00	7.025	6.900		
	26.40	6.969	6.844		
	29.70	6.875	6.750		
	33.70	6.765	6.640	6-5/8	
	39.00	6.625	6.500	6-1/2	
8-5/8	24.00	8.097	7.972	7-7/8	4-1/2 API Regular
	28.00	8.017	7.892		
	32.00	7.921	7.796	7-5/8	
	36.00	7.825	7.700		
	40.00	7.725	7.600		
	44.00	7.625	7.500	7-3/8	3-1/2 API Regular
	49.00	7.511	7.386		
9-5/8	29.30	9.063	8.907	8-3/4	4-1/2 API Regular
	32.30	9.001	8.845		
	36.00	8.921	8.765		
	40.00	8.835	8.679	8-5/8	
	43.50	8.755	8.599		
	47.00	8.681	8.525	8-1/2	
	53.50	8.535	8.379	8-3/8	
10-3/4	32.70	10.192	10.036	9-7/8	6-5/8 API Regular
	40.50	10.050	9.894		
	45.50	9.950	9.794	9-3/4■	
	51.00	9.850	9.694	9-5/8■	
	55.50	9.760	9.604		

■5-1/2 API Regular Thread optional

Bit and Casing Combinations (Continued)

Casing OD	Weight lb/ft	Casing ID	Casing Drift	Bit Size	Standard Bit Pin Thread
11-3/4	38.00	11.150	10.994	11	6-5/8 API Regular
	42.00	11.084	10.928	10-3/4	
	47.00	11.000	10.844	10-3/4■	
	54.00	10.880	10.724	10-5/8■	
	60.00	10.772	10.616		
13-3/8	48.00	12.715	12.559	12-1/4	6-5/8 API Regular
	54.50	12.615	12.459		
	61.00	12.515	12.359		
	68.00	12.415	12.259		
	72.00	12.347	12.191	12	
16	55.00	15.375	15.188	15	6-5/8 API Regular
	65.00	15.250	15.062		
	75.00	15.125	14.938	14-3/4	
	84.00	15.010	14.822		
20	94.00	19.124	18.936	17-1/2	6-5/8 API Regular

■5-1/2 API Regular Thread optional

Temperature Conversion of Fahrenheit to Centigrade

Fahrenheit	*Centigrade*
+300°	*+148.89°*
+295°	*+146.11°*
+290°	*+143.33°*
+285°	*+140.55°*
+280°	*+137.78°*
+275°	*+135.00°*
+270°	*+132.22°*
+265°	*+129.44°*
+260°	*+126.67°*
+255°	*+123.89°*
+250°	*+121.11°*
+245°	*+118.33°*
+240°	*+115.55°*
+235°	*+112.78°*
+ 230°	*+110.00°*
+225°	*+107.22°*
+220°	*+104.44°*
+215°	*+101.67°*
+210°	*+98.89°*
+205°	*+96.11°*
+200°	*+93.33°*
+195°	*+90.55°*
+190°	*+87.78°*
+185°	*+85.00°*

Fahrenheit	*Centigrade*
+180°	*+82.22°*
+175°	*+79.44°*
+170°	*+76.67°*
+165°	*+73.89°*
+160°	*+71.11°*
+155°	*+68.33°*
+150°	*+65.55°*
+145°	*+62.78°*
+140°	*+60.00°*
+135°	*+57.22°*
+130°	*+54.44°*
+125°	*+51.67°*
+120°	*+48.89°*
+115°	*+46.11°*
+110°	*+43.33°*
+105°	*+40.56°*
+100°	*+37.78°*
+95°	*+35.00°*
+90°	*+32.22°*
+85°	*+29.44°*
+80°	*+26.67°*
+75°	*+23.89°*
+70°	*+21.11°*
+65°	*+18.33°*

Fahrenheit	*Centigrade*
+60°	*+15.56°*
+55°	*+12.78°*
+50°	*+10.00°*
+45°	*+7.22°*
+40°	*+4.44°*
+35°	*+1.67°*
+30°	*-1.11°*
+25°	*-3.89°*
+20°	*-6.67°*
+15°	*-9.44°*
+10°	*-12.22°*
+5°	*-15.00°*
0°	*-17.78°*
-5°	*-20.56°*
-10°	*-23.33°*
-15°	*-26.11°*
-20°	*-28.89°*
-25°	*-31.67°*
-30°	*-34.44°*
-35°	*-37.22°*
-40°	*-40.00°*
-45°	*-42.78°*
-50°	*-45.56°*

Formulas for Conversion of Fahrenheit and Centigrade Temperature Readings

$°F = \frac{[°C \times 9]}{5} + 32$	$°C = \frac{[°F - 32]}{9} \times 5$

Capacity of Vertical Cylindrical Tanks

Inside Diameter		bbl/in.	gal/in.	cu ft/in.
ft	in.			
4	0	.186	7.83	1.05
	3	.210	8.84	1.18
	6	.236	9.91	1.33
	9	.263	11.05	1.48
5	0	.291	12.24	1.64
	3	.321	13.50	1.80
	6	.352	14.81	1.98
	9	.385	16.19	2.16
6	0	.419	17.63	2.36
	3	.455	19.13	2.56
	6	.492	20.69	2.77
	9	.531	22.31	2.98
7	0	.571	23.99	3.21
	3	.612	25.74	3.44
	6	.655	27.54	3.68
	9	.700	29.41	3.93
8	0	.746	31.33	4.19
	3	.793	33.32	4.46
	6	.842	35.37	4.73
	9	.892	37.49	5.01
9	0	.944	39.66	5.30
	3	.997	41.89	5.60
	6	1.05	44.19	5.91
	9	1.11	46.54	6.22
10	0	1.17	48.96	6.54
	3	1.22	51.44	6.88
	6	1.28	53.98	7.22
	9	1.35	56.58	7.56
11	0	1.41	59.24	7.92
	3	1.47	61.97	8.28
	6	1.54	64.75	8.66
	9	1.61	67.60	9.04
12	0	1.68	70.50	9.43
	3	1.75	73.47	9.82
	6	1.82	76.50	10.23
	9	1.89	79.59	10.64
13	0	1.97	82.74	11.06
	3	2.05	85.96	11.49
	6	2.12	89.23	11.93
	9	2.20	92.57	12.37
14	0	2.28	95.96	12.83
	3	2.37	99.42	13.29
	6	2.45	102.94	13.76
	9	2.54	106.52	14.24
15	0	2.62	110.16	14.73
	3	2.71	113.86	15.22
	6	2.80	117.63	15.72
	9	2.89	121.45	16.24
16	0	2.98	125.34	16.76
	3	3.08	129.29	17.28
	6	3.17	133.29	17.82
	9	3.27	137.36	18.36
17	0	3.37	141.49	18.92
	3	3.47	145.69	19.48
	6	3.57	149.95	20.04
	9	3.67	154.26	20.62
18	0	3.78	158.66	21.21
	3	3.88	163.07	21.80
	6	3.99	167.57	22.40
	9	4.10	172.13	23.01
19	0	4.21	176.75	23.63
	3	4.32	181.43	24.25
	6	4.43	186.17	24.89
	9	4.54	190.98	25.53
20	0	4.66	195.84	26.18
	3	4.78	200.77	26.84
	6	4.90	205.75	27.51
	9	5.02	210.80	28.18
21	0	5.14	215.91	28.86
	3	5.26	221.09	29.56
	6	5.39	226.32	30.25
	9	5.51	231.61	30.96
22	0	5.64	236.97	31.68
	3	5.77	242.38	32.40
	6	5.90	247.86	33.13
	9	6.03	253.40	33.87
23	0	6.16	259.00	34.62
	3	6.30	264.66	35.38
	6	6.43	270.38	36.15
	9	6.57	276.17	36.92
24	0	6.71	282.01	37.70
	3	6.85	287.92	38.49
	6	6.99	293.88	39.29
	9	7.15	300.40	40.16
25	0	7.28	306.00	40.91
	3	7.43	312.15	41.73
	6	7.58	318.36	42.56
	9	7.72	324.64	43.40
26	0	7.88	330.97	44.24
	3	8.03	337.37	45.10
	6	8.18	343.82	45.96
	9	8.34	350.34	46.83
27	0	8.49	356.92	47.71
	3	8.65	363.56	48.60
	6	8.81	370.26	49.50
	9	8.97	377.02	50.40
28	0	9.13	83.85	51.31
	3	9.30	390.73	52.23
	6	9.46	397.68	53.16
	9	9.63	404.69	54.10
29	0	9.80	411.75	55.04
	3	9.97	418.88	56.00
	6	10.14	426.07	56.96
	9	10.31	433.33	57.93
30	0	10.49	40.64	58.91

Formulas for Capacity of Vertical Cylindrical Tanks with Flat Ends

Bbl per ft of depth of fluid = $.1400 \times D^2$ (ft)

Bbl per in. of depth of fluid = $.01165 \times D^2$ (ft)

Formulas for Capacity of Vertical Cylindrical Tanks with Flat Ends

Gal per ft of depth of fluid	=	$5.8752 \times D^2$ (ft)
Gal per in. of depth of fluid	=	$.4896 \times D^2$ (ft)
Cu ft per ft of depth of fluid	=	$.7854 \times D^2$ (ft)
Cu ft per in. of depth of fluid	=	$.06545 \times D^2$ (ft)
D	=	Diameter in feet

Formulas for Capacity of Rectangular Tanks with Flat Ends

For small or medium size rectangular tanks or pits measure the length and width in inches.

Bbl per in. of depth of fluid	=	.0001031 x L (in.) x W (in.)
Gal per in. of depth of fluid	=	.004329 x L (in.) x W (in.)
Cu ft per in. of depth of fluid	=	.005787 x L (in.) x W (in.)

L = Length in inches W = Width in inches

For large tanks or pits measure length and width in feet.

Bbl per in. of depth of fluid	=	.01484 x L (ft) x W (ft)
Gal per in. of depth of fluid	=	.6234 x L (ft) x W (ft)
Cu ft per in. of depth of fluid	=	.08333 x L (ft) x W (ft)

Formulas for Contents of Pipe Lines

Barrels per lin ft	=	$.0009714 \times D^2$
Lin ft per barrel	=	$\frac{1029.4}{D^2}$
Gallons per lineal ft	=	$.0408 \times D^2$
Lineal ft per gallon	=	$\frac{24.51}{D^2}$
Cu ft per lineal ft	=	$.005454 \times D^2$
Lineal ft per cu ft	=	$\frac{183.35}{D^2}$
D	=	Diameter in inches

Formulas for Velocity and Horsepower

Feet per second	=	$\frac{\text{BPH} \times .2859}{(\text{Diameter in inches})^2}$
Feet per second	=	$\frac{\text{BPD} \times .0119}{(\text{Diameter in inches})^2}$
Feet per min	=	$\frac{\text{GPM} \times .24.513}{D_1^2 - D_2^2}$

(D_1 = ID of outer string. D_2 = OD of pipe)

Hydraulic Horsepower	=	$\frac{\text{BPH} \times \text{Pressure (psi)}}{2447}$
Hydraulic Horsepower	=	BPH x Pressure (psi) x .000409
Hydraulic Horsepower	=	BPD x Pressure (psi) x .000017
Hydraulic Horsepower	=	BPM x Pressure (psi) x .0245
Hydraulic Horsepower	=	GPM x Pressure (psi) x .000584
Brake Horsepower	=	$\frac{\text{BPH} \times \text{Pressure (psi)} \times .000409}{\text{Efficiency}}$
Brake Horsepower	=	$\frac{\text{BPD} \times \text{Pressure (psi)} \times .000017}{\text{Efficiency}}$
Brake Horsepower	=	$\frac{\text{GPM} \times \text{Pressure (psi)} \times .000584}{\text{Efficiency}}$

Note: BPM = Barrels per minute BPD = Barrels per day
BPH = Barrels per hour psi = Pounds per square inch

Formulas for Jet Velocity

$$V_\eta = \frac{0.32086\ Q}{A_\eta}$$

Where: V_η = Jet velocity (ft/sec)
Q = Circulation rate (gpm)
A_η = Area of nozzle ($in.^2$)

Formulas for Jet Impact Force

$$I_f = 0.000518\ W\ Q\ V_\eta$$

Where: I_f = Jet impact force (lb_f)
W = Mud weight (lb/gal)
Q = Circulations rate (gpm)
V_η = Jet velocity (ft/sec)

Formulas for Annular Velocity

$$V_a = \frac{24.51\ Q}{D_h^2 - D_p^2}$$

Where: V_a = Annular velocity (ft/min)
Q = Flow rate (gpm)
D_h = Hole diameter (in.)
D_p = Drillstring outside diameter (in.)

Formulas for Mechanical Horsepower

$$H_m = \frac{T\ S}{5252}$$

Where: H_m = Mechanical horsepower (hp)
T = Torque (ft-lb)
S = Speed (rpm)

Formulas for Hydrostatic Pressure

$P_s = 0.052 \times (TVD) \times Mw$

Where: P_s = Static pressure (psi)
TVD = True Vertical Depth (ft)
Mw = Mud weight (lb/gal)

$P_s = 0.0098 \times (TVD) \times Mw$

Where: P_s = Static pressure (kPa)
TVD = True Vertical Depth (M)
Mw = Mud weight (kg/m^3)

Formulas for Volume and Height Between Multiple Tubing Strings and Hole (or Casing)

Cu ft per lin ft	=	$(D^2 - d^2)\ 0.005454$
Lin ft per cu ft	=	$\frac{183.35}{D^2 - d^2}$
Gallons per lin ft	=	$(D^2 - d^2)\ 0.0408$
Lin ft per gallon	=	$\frac{24.51}{D^2 - d^2}$
Barrels per lin ft	=	$(D^2 - d^2)\ 0.0009714$
Lin ft per barrel	=	$\frac{1029.4}{D^2 - d^2}$

Formulas for Volume and Height Between Multiple Tubing Strings and Hole (or Casing)

Where: For Volume and Height between Tubing and Hole
D = Diameter of hole, inches
d = Outside diameter of tubing, inches
For Volume and Height between Casing and Hole
D = Diameter of hole, inches
d = Outside diameter of casing, inches
For Volume and Height between Tubing and Casing
D = Inside diameter of casing, inches
d = Outside diameter of tubing, inches
For Volume and Height between Casings
D = Inside diameter of outer casing, inches
d = Outside diameter of inner casing, inches

Maximum Recommended Rotary Speed for Milling Casing

Cu ft per lin ft	=	$(D^2 - d^2)\ 0.005454$
Lin ft per cu ft	=	$\frac{183.35}{D^2 - d^2}$
Gallons per lin ft	=	$(D^2 - d^2)\ 0.0408$
Lin ft per gallon	=	$\frac{24.51}{D^2 - d^2}$
Barrels per lin ft	=	$(D^2 - d^2)\ 0.0009714$
Lin ft per barrel	=	$\frac{1029.4}{D^2 - d^2}$

Where: D = Diameter of hole, inches (or ID of casing)
d = Outside diameter of tubing, inches

Formulas for Manual Tong
(Torque in Foot Pounds)

Line Pull (ft) x Tong Length (lb) = Torque in (ft-lb)
Example: Using 42 in. Tongs and applying 4,000 lb Line Pull will give 14,000 ft-lb of Torque

Decimal Equivalents of Fractions of an Inch in Inches and Millimeters

Fraction	Dec Equiv	*Millimeters*	Fraction	Dec Equiv	*Millimeters*
1/64	.015625	*0.397*	33/64	.515625	*13.097*
1/32	.031250	*0.794*	17/32	.531250	*13.494*
3/64	.046875	*1.191*	35/64	.546875	*13.891*
1/16	.062500	*1.588*	9/16	.562500	*14.288*
5/64	.078125	*1.984*	37/64	.578125	*14.684*
3/32	.093750	*2.381*	19/32	.593750	*15.081*
7/64	.109375	*2.778*	39/64	.609375	*15.478*
1/8	.125000	*3.175*	5/8	.625000	*15.875*
9/64	.140625	*3.572*	41/64	.640625	*16.272*
5/32	.156250	*3.969*	21/32	.656250	*16.669*
11/64	.171875	*4.366*	43/64	.671875	*17.066*
3/16	.187500	*4.763*	11/16	.687500	*17.463*
13/64	.203125	*5.159*	45/64	.703125	*17.859*
7/32	.218750	*5.556*	23/32	.718750	*18.256*
15/64	.234375	*5.953*	47/64	.734375	*18.653*
1/4	.250000	*6.350*	3/4	.750000	*19.050*
17/64	.265625	*6.747*	49/64	.765625	*19.447*
9/32	.281250	*7.144*	25/32	.781250	*19.844*
19/64	.296875	*7.541*	51/64	.796875	*20.241*
5/16	.312500	*7.938*	13/16	.812500	*20.638*
21/64	.328125	*8.334*	53/64	.828125	*21.034*
11/32	.343750	*8.731*	27/32	.843750	*21.431*
23/64	.359375	*9.128*	55/64	.859375	*21.828*
3/8	.375000	*9.525*	7/8	.875000	*22.225*
25/64	.390625	*9.922*	57/64	.890625	*22.622*
13/32	.406250	*10.319*	29/32	.906250	*23.019*
27/64	.421875	*10.716*	59/64	.921875	*23.416*
7/16	.437500	*11.113*	15/16	.937500	*23.813*
29/64	.453125	*11.509*	61/64	.953125	*24.209*
15/32	.468750	*11.906*	31/32	.968750	*24.606*
31/64	.484375	*12.303*	63/64	.984375	*25.003*
1/2	.500000	*12.700*	1.000	1.00000	*25.400*

O-ring Dimensions

Size			ASA Part No.
OD	ID	Cross Section	
in.	in.	in.	
7/16	5/16	1/16	568-011
3/4	5/8	1/16	568-016
15/16	13/16	1/16	568-019
1-1/16	15/16	1/16	568-021
1-1/4	1-1/8	1/16	568-024
1-7/8	1-3/4	1/16	568-031
2-1/2	2-3/8	1/16	568-036
3-3/8	3-1/4	1/16	568-042
9/16	3/8	3/32	568-110
11/16	1/2	3/32	568-112
3/4	9/16	3/32	568-113
13/16	5/8	3/32	568-114
7/8	11/16	3/32	568-115
15/16	3/4	3/32	568-116
2-7/16	2-1/4	3/32	568-140
2-11/16	2-1/2	3/32	568-144
2-3/4	2-9/16	3/32	568-145
3-7/16	3-1/4	3/32	568-152
1	3/4	1/8	568-210
1-1/16	13/16	1/8	568-211
1-1/8	7/8	1/8	568-212
1-3/16	15/16	1/8	568-213
1-1/4	1	1/8	568-214
1-5/16	1-1/16	1/8	568-215
1-3/8	1-1/8	1/8	568-216
1-7/16	1-3/16	1/8	568-217
1-1/2	1-1/4	1/8	568-218
1-9/16	1-5/16	1/8	568-219
1-5/8	1-3/8	1/8	568-220
1-11/16	1-7/16	1/8	568-221
1-3/4	1-1/2	1/8	568-222
1-7/8	1-5/8	1/8	568-223
2	1-3/4	1/8	568-224
2-1/8	1-7/8	1/8	568-225
2-1/4	2	1/8	568-226
2-3/8	2-1/8	1/8	568-227
2-1/2	2-1/4	1/8	568-228
2-5/8	2-3/8	1/8	568-229
2-3/4	2-1/2	1/8	568-230
2-7/8	2-5/8	1/8	568-231
3	2-3/4	1/8	568-232
3-1/8	2-7/8	1/8	568-233
3-1/4	3	1/8	568-234
3-3/8	3-1/8	1/8	568-235
3-1/2	3-1/4	1/8	568-236
3-5/8	3-3/8	1/8	568-237
3-3/4	3-1/2	1/8	568-238
3-7/8	3-5/8	1/8	568-239
4	3-3/4	1/8	568-240
4-1/8	3-7/8	1/8	568-241
4-1/4	4	1/8	568-242
4-3/8	4-1/8	1/8	568-243
4-1/2	4-1/4	1/8	568-244
4-5/8	4-3/8	1/8	568-245
4-3/4	4-1/2	1/8	568-246
4-7/8	4-5/8	1/8	568-247
5	4-3/4	1/8	568-248
5-1/8	4-7/8	1/8	568-249
5-1/4	5	1/8	568-250
5-3/8	5-1/8	1/8	568-251
5-1/2	5-1/4	1/8	568-252
5-5/8	5-3/8	1/8	568-253
5-3/4	5-1/2	1/8	568-254
5-7/8	5-5/8	1/8	568-255
6	5-3/4	1/8	568-256
6-1/8	5-7/8	1/8	568-257
6-1/4	6	1/8	568-258
6-1/2	6-1/4	1/8	568-259
6-3/4	6-1/2	1/8	568-260
7	6-3/4	1/8	568-261
7-1/4	7	1/8	568-262
7-1/2	7-1/4	1/8	568-263
7-3/4	7-1/2	1/8	568-264
8	7-3/4	1/8	568-265
8-1/4	8	1/8	568-266
8-1/2	8-1/4	1/8	568-267
8-3/4	8-1/2	1/8	568-268
9	8-3/4	1/8	568-269
9-1/4	9	1/8	568-270
9-1/2	9-1/4	1/8	568-271
9-3/4	9-1/2	1/8	568-272
10	9-3/4	1/8	568-273
10-1/4	10	1/8	568-274
11-1/4	11	1/8	568-276
1-7/8	1-1/2	3/16	568-325
2	1-5/8	3/16	568-326
2-1/8	1-3/4	3/16	568-327
2-1/4	1-7/8	3/16	568-328
2-3/8	2	3/16	568-329
2-1/2	2-1/8	3/16	568-330

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O-ring Dimensions (Continued)

Size			ASA Part No.
OD	ID	Cross Section	
in.	in.	in.	
1-7/8	1-1/2	3/16	568-325
2	1-5/8	3/16	568-326
2-1/8	1-3/4	3/16	568-327
2-1/4	1-7/8	3/16	568-328
2-3/8	2	3/16	568-329
2-1/2	2-1/8	3/16	568-330
2-5/8	2-1/4	3/16	568-331
2-3/4	2-3/8	3/16	568-332
2-7/8	2-1/2	3/16	568-333
3	2-5/8	3/16	568-334
3-1/8	2-3/4	3/16	568-335
3-1/4	2-7/8	3/16	568-336
3-3/8	3	3/16	568-337
3-1/2	3-1/8	3/16	568-338
3-5/8	3-1/4	3/16	568-339
3-3/4	3-3/8	3/16	568-340
3-7/8	3-1/2	3/16	568-341
4	3-5/8	3/16	568-342
4-1/8	3-3/4	3/16	568-343
4-1/4	3-7/8	3/16	568-344
4-3/8	4	3/16	568-345
4-1/2	4-1/8	3/16	568-346
4-5/8	4-1/4	3/16	568-347
4-3/4	4-3/8	3/16	568-348
4-7/8	4-1/2	3/16	568-349
7-5/8	7-1/4	3/16	568-366
5	4-1/2	1/4	568-425
5-1/8	4-5/8	1/4	568-426

Size			ASA Part No.
OD	ID	Cross Section	
in.	in.	in.	
5-1/4	4-3/4	1/4	568-427
5-3/8	4-7/8	1/4	568-428
5-1/2	5	1/4	568-429
5-5/8	5-1/8	1/4	568-430
5-3/4	5-1/4	1/4	568-431
5-7/8	5-3/8	1/4	568-432
6	5-1/2	1/4	568-433
6-1/8	5-3/8	1/4	568-434
6-1/4	5-3/4	1/4	568-435
6-3/8	5-7/8	1/4	568-436
6-1/2	6	1/4	568-437
6-3/4	6-1/4	1/4	568-438
7	6-1/2	1/4	568-439
7-1/4	6-3/4	1/4	568-440
7-1/2	7	1/4	568-441
7-3/4	7-1/4	1/4	568-442
8	7-1/2	1/4	568-443
8-1/4	7-3/4	1/4	568-444
8-1/2	8	1/4	568-445
9	8-1/2	1/4	568-446
9-1/2	9	1/4	568-447
10	9-1/2	1/4	568-448
10-1/2	10	1/4	568-449
11	10-1/2	1/4	568-450
11-1/2	11	1/4	568-451
12	11-1/2	1/4	568-452
14-1/2	14	1/4	568-457

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Conversion Table for Hardness Testing
(Approximate Values)

Brinell		Rockwell		Tensile Strength	Brinell		Rockwell		Tensile Strength
Impression Diameter	Hardness No.	C Scale	B Scale		Impression Diameter	Hardness No.	C Scale	B Scale	
2.45	627	60	-	311	3.80	255	25	102	125
2.50	601	58	-	298	3.85	248	24	101	122
2.55	578	57	-	287	3.90	241	23	100	119
2.60	555	55	-	276	3.95	235	22	99	116
2.65	534	53	-	266	4.00	229	21	98	113
2.70	514	52	-	256	4.05	223	20	97	110
2.75	495	50	-	247	4.10	217	18	96	107
2.80	477	49	-	238	4.15	212	16	96	104
2.85	461	47	-	229	4.20	207	15	95	101
2.90	444	46	-	220	4.25	202	14	94	99
2.95	429	45	-	212	4.30	197	13	93	97
3.00	415	44	-	204	4.35	192	12	92	95
3.05	401	42	-	196	4.40	187	10	91	93
3.10	388	41	-	189	4.45	183	9	90	91
3.15	375	40	110	182	4.50	179	8	89	89
3.20	363	38	110	176	4.55	174	6	88	87
3.25	352	37	109	170	4.60	170	5	87	85
3.30	341	36	109	165	4.65	166	4	86	83
3.35	331	35	108	160	4.70	163	3	85	82
3.40	321	34	108	155	4.75	159	-	84	80
3.45	311	33	107	150	4.80	156	-	83	78
3.50	302	32	107	146	4.85	153	-	82	76
3.55	293	31	106	142	4.90	149	-	81	75
3.60	285	30	105	138	4.95	146	-	80	74
3.65	277	29	104	134	5.00	143	-	79	72
3.70	269	28	104	131	5.05	140	-	78	71
3.75	262	26	103	128	5.10	137	-	77	70

Diameter of Impression 3,000 kg load - 10 mm Steel Ball
Rockwell B-Scale 100 kg load - .0625 in. Steel Ball
Rockwell C-Scale 150 kg load - 120° Diamond Cone
Tensile Strength 1,000 pounds per square inch

Jet Nozzle Flow Areas

Nozzle Size		Nozzle Number	Flow Area of 1 Nozzle		Flow Area of 2 Nozzles		Flow Area of 3 Nozzles		Flow Area of 4 Nozzles	
in.	*mm*		in.^{2}	*mm^2*	in.^{2}	*mm^2*	in.^{2}	*mm^2*	in.^{2}	*mm^2*
7/32	*5.5*	7	.0376	*24.3*	.0752	*48.5*	.1127	*72.9*	.1503	*97.0*
1/4	*6.4*	8	.0491	*31.7*	.0982	*63.4*	.1473	*95.0*	.1963	*126.7*
9/32	*7.1*	9	.0621	*40.1*	.1242	*80.1*	.1864	*120.2*	.2485	*160.3*
5/16	*7.9*	10	.0767	*49.5*	.1534	*99.0*	.2301	*148.4*	.3068	*197.9*
11/32	*8.7*	11	.0928	*59.9*	.1856	*119.7*	.2784	*179.6*	.3712	*239.5*
3/8	*9.5*	12	.1104	*71.2*	.2209	*142.5*	.3313	*213.7*	.4418	*285.0*
13/32	*10.3*	13	.1296	*83.6*	.2592	*167.2.*	.3889	*250.9*	.5185	*334.5*
7/16	*11.1*	14	.1503	*97.0*	.3007	*194.0*	.4510	*291.0*	.6013	*388.0*
15/32	*11.9*	15	.1726	*111.4*	.3451	*222.8*	.5177	*334.2*	.6903	*445.4*
1/2	*12.7*	16	.1963	*126.6*	.3927	*253.2*	.5890	*379.8*	.7854	*506.7*
9/16	*14.3*	18	.2485	*160.3*	.4970	*320.6*	.7455	*481.0*	.9940	*641.3*
5/8	*15.9*	20	.3068	*197.9*	.6136	*395.9*	.9204	*593.8*	1.2272	*791.8*
11/16	*17.5*	22	.3712	*239.5*	.7424	*479.0*	1.1137	*718.5*	1.4849	*958.1*
3/4	*19.0*	24	.4418	*285.0*	.8836	*570.1*	1.3254	*855.0*	1.7672	*1140.2*
7/8	*22.2*	28	.6013	*387.9*	1.2026	*775.9*	1.8040	*1163.7*	2.4053	*1551.9*

Pressure Drop Across a Single Nozzle (Orifice)
Using 10 lb/Gal Mud and a Nozzle Coefficient of .95

Volume Flow Rate (G) in GPM	Pressure Drop in psi Across Nozzles of Diameters Shown Below (in.)							
	1/8	9/64	5/32	11/64	3/16	13/64	7/32	15/64
10	612	382	250	171	121	88	65	49
12	881	550	361	246	174	126	94	71
14	1,199	748	491	335	237	172	128	97
16	1,566	977	641	438	309	225	167	127
18	-	1,237	812	554	391	284	211	160
20	-	1,527	1,002	684	483	351	261	198
22	-	-	1,212	828	585	424	316	239
24	-	-	1,443	985	696	505	376	285
26	-	-	1,693	1,157	817	593	441	334
28	-	-	-	1,341	947	688	511	388
30	-	-	-	1,540	1,087	789	587	445
32	-	-	-	-	1,237	898	668	507
34	-	-	-	-	1,396	1,014	754	572
36	-	-	-	-	1,566	1,137	845	641
38	-	-	-	-	-	1,266	942	714
40	-	-	-	-	-	1,403	1,043	792
42	-	-	-	-	-	1,547	1,150	873
44	-	-	-	-	-	-	1,262	958
46	-	-	-	-	-	-	1,380	1,047
48	-	-	-	-	-	-	1,502	1,140
50	-	-	-	-	-	-	-	1,237
52	-	-	-	-	-	-	-	1,338
54	-	-	-	-	-	-	-	1,443
56	-	-	-	-	-	-	-	1,552
58	-	-	-	-	-	-	-	1,664
60	-	-	-	-	-	-	-	1,781

Formula used: $P = \frac{G^2 D}{12{,}031\ A^2 C^2}$

Where formula applies:

IP = Pressure drop (psi) across rock bit nozzle
G = Flow rate of circulated fluid (gpm)
D = Fluid density (pounds per gallon)
A = Nozzle area in square inches
C = The coefficient of the orifice

Pressure Drop Across a Single Nozzle (Orifice)
Using 10 lb/Gal Mud and Nozzle Coefficient Of .95 (Continued)

Volume Flow Rate (G) in GPM	Pressure Drop in psi Across Nozzles of Diameters Shown Below (in.)							
	1/4	17/64	9/32	19/64	5/16	11/32	3/8	13/32
20	153	120	95	77	63	43	30	22
21	169	132	105	85	69	47	33	24
25	239	187	149	120	98	67	47	34
30	344	270	215	173	141	96	68	49
35	468	367	292	235	192	131	92	67
40	612	480	382	308	250	171	121	88
42	674	529	421	339	276	189	133	97
45	774	607	483	389	317	217	153	111
50	956	750	597	481	391	267	189	137
55	1,156	907	722	581	474	323	228	166
60	1,376	1,080	859	692	564	385	272	197
63	1,517	1,190	947	763	621	424	300	218
65	1,615	1,267	1,008	812	661	452	319	232
70	-	1,470	1,169	942	767	524	370	269
75	-	1,687	1,342	1,081	881	601	425	308
80	-	-	1,527	1,230	1,002	684	483	351
84	-	-	1,684	1,356	1,105	754	533	387
85	-	-	-	1,389	1,131	773	545	396
90	-	-	-	1,557	1,268	866	612	444
95	-	-	-	-	1,413	965	681	495
100	-	-	-	-	1,566	1,069	755	548
105	-	-	-	-	1,726	1,179	832	604
110	-	-	-	-	-	1,294	914	663
115	-	-	-	-	-	1,414	998	725
120	-	-	-	-	-	1,540	1,087	789
126	-	-	-	-	-	1,698	1,199	870
130	-	-	-	-	-	-	1,276	926
140	-	-	-	-	-	-	1,480	1,074
147	-	-	-	-	-	-	1,631	1,184
150	-	-	-	-	-	-	-	1,233
160	-	-	-	-	-	-	-	1,403
168	-	-	-	-	-	-	-	1,547

Formula used: $P = \frac{G^2 D}{12{,}031\ A^2\ C^2}$

Where formula applies:

P = Pressure drop (psi) across rock bit nozzle A = Nozzle area in square inches

G = Flow rate of circulated fluid (gpm) C = The coefficient of the orifice

D = Fluid density (pounds per gallon)

Pressure Drop Across A Single Nozzle (Orifice)
Using 10 lb/Gal Mud And A Nozzle Coefficient Of .95 (Continued)

Volume Flow Rate (G) in GPM	Pressure Drop In psi Across Nozzles of Diameters Shown Below (in.)								
	7/16	15/32	1/2	9/16	5/8	11/16	3/4	13/16	7/8
30	37	-	-	-	-	-	-	-	-
40	65	-	-	-	-	-	-	-	-
50	102	77	-	-	-	-	-	-	-
60	147	111	86	-	-	-	-	-	-
70	200	152	117	73	-	-	-	-	-
80	261	198	153	95	63	43	-	-	-
90	330	250	193	121	79	54	38	28	-
100	408	309	239	149	98	67	47	34	25
110	493	374	289	180	118	81	57	41	31
120	587	445	344	215	141	96	68	49	37
130	689	523	404	252	165	113	80	58	43
140	799	606	468	292	192	131	92	67	50
150	917	696	537	336	220	150	106	77	57
160	1,043	792	612	382	250	171	121	88	65
180	-	1,002	774	483	317	217	153	111	83
200	-	1,237	956	597	391	267	189	137	102
220	-	1,497	1,156	722	474	323	228	166	123
240	-	-	1,376	859	564	385	272	197	147
260	-	-	1,615	1,008	661	452	319	232	172
280	-	-	1,873	1,169	767	524	370	269	200
300	-	-	2,150	1,342	881	601	425	308	229
320	-	-	-	1,527	1,002	684	483	351	261
340	-	-	-	1,724	1,131	773	545	396	294
360	-	-	-	-	1,268	866	612	444	330
380	-	-	-	-	1,413	965	681	495	368
400	-	-	-	-	1,566	1,069	755	548	408
450	-	-	-	-	-	-	956	694	516
500	-	-	-	-	-	-	1,180	856	637

Formula used: $P = \frac{G^2 D}{12{,}031\ A^2\ C^2}$

Where formula applies:

P = Pressure drop (psi) across rock bit nozzle
G = Flow rate of circulated fluid (gpm)
D = Fluid density (pounds per gallon)
A = Nozzle area in square inches
C = The coefficient of the orifice

Pump Output Tables - Single Acting Triplex Pump

Stroke	Bore	100% Efficiency		90% Efficiency	
in.	in.	cu ft	bbl	cu ft	bbl
4	3.00	.0491	.0087	.0442	.0078
	3.25	.0576	.0103	.0518	.0093
	3.50	.0668	.0119	.0601	.0107
	3.75	.0767	.0137	.0690	.0123
	4.00	.0873	.0155	.0786	.0140
	4.50	.1104	.0197	.0994	.0177
	5.00	.1364	.0243	.1228	.0219
	6.00	.1963	.0350	.1767	.0315
	8.00	.3491	.0622	.3142	.0560
6	3.00	.0737	.0131	.0663	.0117
	3.25	.0864	.0155	.0777	.0140
	3.50	.1002	.0179	.0902	.0161
	3.75	.1151	.0206	.1035	.0185
	4.00	.1310	.0233	.1179	.0210
	4.50	.1656	.0296	.1491	.0266
	5.00	.2046	.0365	.1842	.0329
	6.00	.2945	.0525	.2651	.0473
	8.00	.5237	.0933	.4713	.0840
8	3.00	.0982	.0174	.0884	.0156
	3.25	.1152	.0206	.1036	.0186
	3.50	.1336	.0238	.1202	.0214
	3.75	.1534	.0274	.1380	.0246
	4.00	.1746	.0310	.1572	.0280
	4.50	.2208	.0394	.1988	.0354
	5.00	.2728	.0486	.2456	.0438
	6.00	.3926	.0700	.3534	.0630
	8.00	.6982	.1244	.6284	.1120
10	3.00	.1228	.0218	.1105	.0195
	3.25	.1440	.0256	.1295	.0233
	3.50	.1670	.0298	.1503	.0268
	3.75	.1918	.0343	.1725	.0308
	4.00	.2183	.0388	.1965	.0350
	4.50	.2760	.0493	.2486	.0443
	5.00	.3410	.0608	.3070	.0548
	6.00	.4908	.0875	.4418	.0788
	8.00	.8728	.1555	.7855	.1400

Pump Output Tables - Double Acting Duplex Pump

Stroke	Bore	Rod D	100% Efficiency		90% Efficiency	
in.	in.	in.	cu ft	bbl	cu ft	bbl
6	4.00	1.50	0.1623	0.0289	0.1460	0.0260
8	4.00	1.50	0.2163	0.0385	0.1947	0.0347
	4.50		0.2782	0.0495	0.2503	0.0446
	5.00		0.3472	0.0618	0.3125	0.0557
10	4.00	1.50	0.2704	0.0482	0.2434	0.0433
	4.50		0.3477	0.0619	0.3129	0.0557
	5.00	2.00	0.4182	0.0745	0.3763	0.0670
12	4.00	1.50	0.3245	0.0578	0.2921	0.0520
	4.50		0.4172	0.0743	0.3755	0.0669
	5.00	2.00	0.5018	0.0894	0.4516	0.0804
	5.50		0.6163	0.1098	0.5547	0.0988
14	4.50	1.50	0.4868	0.0867	0.4381	0.0780
	5.00	2.00	0.5854	0.1043	0.5269	0.0938
	5.50		0.7190	0.1281	0.6471	0.1153
	6.00		0.8654	0.1541	0.7789	0.1387
	6.25		0.9433	0.1680	0.8490	0.1512
	6.50		1.0245	0.1825	0.9220	0.1642
	6.75		1.1088	0.1975	O.9979	0.1777
	7.00		1.1963	0.2131	1.0766	0.1918
	7.25	2.50	1.2583	0.2241	1.1325	0.2017
	7.50		1.3522	0.2408	1.2170	0.2167
	7.75		1.4492	0.2581	1.3043	0.2323
16	5.00	2.50	0.6363	0.1133	0.5727	0.1020
	5.50		0.7890	0.1405	0.7101	0.1265
	6.00		0.9563	0.1703	0.8607	0.1533
	6.25		1.0454	0.1862	0.9408	0.1676
	6.50		1.1381	0.2027	1.0245	0.1824
	6.75		1.2345	0.2199	1.1110	0.1979
	7.00		1.3344	0.2377	1.2010	0.2139
	7.25		1.4381	0.2561	1.2943	0.2305
	7.50		1.5453	0.2752	1.3908	0.2477
	7.75		1.6562	0.2950	1.4906	0.2655
18	5.00	2.50	0.7159	0.1275	0.6443	0.1147
	5.50		0.8877	0.1581	0.7989	0.1423
	6.00		1.0758	0.1916	0.9682	0.1725
	6.25		1.1761	0.2095	1.0584	0.1885
	6.50		1.2804	0.2280	1.1523	0.2052
	6.75		1.3888	0.2473	1.2499	0.2226
	7.00		1.5013	0.2674	1.3511	0.2406
	7.25		1.6178	0.2881	1.4561	0.2593
	7.50		1.7385	0.3096	1.5647	0.2787
	7.75		1.8633	0.3319	1.6769	0.2987
20	6.50	2.50	1.4226	0.2534	1.2804	0.2280
	6.75		1.5431	0.2748	1.3888	0.2473
	7.00		1.6681	0.2971	1.5013	0.2674
	7.25		1.7976	0.3202	1.6178	0.2881
	7.50		1.9317	0.3440	1.7385	0.3096
	7.75		2.0703	0.3687	1.8633	0.3319
	8.00		2.2135	0.3942	1.9921	0.3548

Notes: 1. Volumes shown are for one complete cycle or revolution.
2.To get output in volume/minute, multiply output/cycle by pump RPM.
3. For triplex double acting pump, multiply output by 1.5.

Baker Atlas: Single Conductor Wirelines

Nominal Diameter (in.)	3/16	7/32	5/16	3/8	7/16
Breaking Load (lb)	3,700	5,200	11,000	14,600	17,800
Yield Strength (lb)	2,590	3,640	7,700	10,220	12,460
Weight (lb/1,000 ft) (in air)	67	97	195	261	317

Baker Atlas: Seven-Conductor Wirelines

Nominal Diameter (in.)	5/16	3/8	7/16	15/32	.472 Standard "Slammer"	.472 EEIPS "Slammer"	.484	.490	17/32
Breaking Load (lb)	9,500	12,800	18,000	18,000	22,000	23,600	27,600	25,500	24,500
Yield Strength (lb)	6,650	8,960	12,600	12,600	15,400	16,520	19,320	17,850	17,150
Weight (lb/1,000 ft) (in air)	188	247	322	341	392	392	418	405	455

Data provided by Baker Atlas, a division of Baker Hughes, Inc., and is based upon published manufacturers' data; October, 2005

Notes:

Yield Strength is the point at which irreversible mechanical and electrical damage to the wireline occurs. The wireline cannot be used and must be replaced if the yield strength is exceeded.

Data provided is for new wirelines. Age and/or wellbore conditions may significantly degrade wirelines.

Wirelines are available from various manufacturers and may be constructed using a variety of alloys. Values quoted are for the lowest rated general service alloy ("improved plow steel") wireline of each size. Special purpose wirelines (such as H_2S service alloys) may have considerably different ratings; consult manufacturer's data sheets for ratings of specialty wirelines.

Strength of J-Type Safety Joint

Size	Joint Part No.	Torsional Strength	Tensile Strength	Make-up Torque
in.		ft-lb	lb	ft-lb
2-3/8 EUE	1-1535	5,000	225,000	1,800
2-3/8 API-IF	1-1595	10,000	300,000	3,000
2-7/8 API-IF	1-1530	12,000	300,000	5,000
3-1/2 API-IF	1-1538	14,000	375,000	6,500
4 API-FH	1-1904	22,000	550,000	8,500
4-1/2 API-FH	1-1518	30,000	600,000	11,500
4-1/2 API-IF	1-2345	39,000	800,000	12,500
4-1/2 X-Hole	1-1653	35,500■	800,000	12,000
5-1/2 API-Reg	1-1520	64,000■	800,000▲	20,500
6-5/8 API-Reg	1-1356	87,000■	1,300,000▲	27,000

■ Joint strength ▲ Shear on lugs

Strength data based on: 125,000 psi minimum tensile yield strength

62,500 psi minimum torsional yield strength

All calculations are theoretical and do not constitute or imply guarantee of strength

Bowen Releasing and Circulating Overshots - Series “150”

Bowl No.	Maximum Catch Size (With Spiral Grapple)	OD	Load Capacity at Yield Pt (lb)		
			Spiral Grapple	Basket Grapple	
				Without Stop	With Stop
		in.			
249	6	7-5/8	670,000	580,000	442,000
266	8	9-5/8	602,700	510,750	398,600
M-266	8	9-5/8	625,000	537,800	406,600
277	6-3/4	8-3/8	637,000	542,250	408,250
905	4-7/8	6-1/8	405,000	367,000	298,000
M-1026-1	7-1/4	8-7/8	586,900	515,600	426,500
B-1231	8-3/8	10-1/16	637,500	574,300	462,000
1248	3-1/2	4-5/8	241,000	256,000	177,000
1283	7-3/4	9-3/8	637,000	542,250	408,250
1446	2-3/8	4-1/8	455,000	390,000	265,000
B-1501	7-3/4	9-3/8	592,000	520,000	340,000
1641	6-1/4	7-5/8	502,100	449,900	363,200
M-1641	6-1/4	7-5/8	542,468	479,044	364,490
1657	6-1/4	7-7/8	627,600	542,400	395,000
M-1657	6-1/4	7-7/8	645,300	564,000	482,000
B-1828	2-7/8	3-3/4	214,000	192,800	121,400
B-1836	3-1/8	3-7/8	155,100	144,200	98,000
B-1871	8-7/8	11-1/4	1,605,000	1,580,000	1,395,000
1875	6-1/4	7-5/8	542,468	479,044	364,490
B-1881	10-1/8	12-1/2	1,364,000	1,207,000	941,700
B-2109	6-1/4	7-7/8	586,800	515,600	413,700
C-2205	6-1/4	7-7/8	640,000	560,000	468,000
B-4688	3-3/4	5-1/8	489,000	447,000	354,000
B-4693	6-1/4	7-3/8	414,100	373,100	283,600
4717	4-1/4	5-1/4	312,500	264,000	196,000
B-4734	3-1/2	4-13/16	456,000	396,000	286,000
B-4738	2-7/8	4	304,000	221,500	199,000
B-4743	2-3/8	3-1/2	309,000	265,500	167,000
B-4816	4-1/2	5-13/16	439,200	396,000	286,000
B-4821	4-1/4	5-9/16	439,200	396,000	286,000
B-4824	3-1/8	4-1/4	291,800	263,000	118,200
B-4827	5	6-5/8	637,000	574,300	462,000
B-4831	4-3/4	6-1/16	431,000	381,000	275,500
B-4846	4-5/8	5-15/16	439,200	395,800	285,800
B-4971	4-5/8	5-1/2	297,000	258,000	186,200
B-5074	2-3/8	3-1/4	211,500	190,000	119,800
B-5082	2-1/2	3-5/8	291,800	263,000	118,200
B-5088	2-1/2	3-3/8	218,000	196,500	123,700
B-5100	3-1/16	4-3/16	291,800	263,000	118,200
B-5103	3-1/16	3-15/16	265,400	219,000	160,100
B-5106	3-1/8	4	262,900	217,000	125,100
B-5114	3-1/4	4-3/8	254,000	234,200	147,500
B-5117	3-1/4	4-1/8	225,000	202,000	127,500
B-5125	3-3/8	4-1/2	320,000	280,000	176,000
B-5128	3-3/8	4-1/4	262,900	217,000	116,800
B-5131	3-3/4	4-5/8	220,000	198,000	126,000
B-5138	3-7/8	5-3/16	391,000	352,500	254,500
B-5141	3-7/8	4-3/4	370,000	232,000	160,000
B-5144	4	5-5/16	402,000	351,000	273,000
B-5150	3-21/32	5	394,000	338,000	210,000
B-5153	3-21/32	4-9/16	276,400	228,100	157,900
5156	4	4-7/8	306,200	222,000	126,000
B-5156	4	4-7/8	385,000	241,000	167,000
B-5164	4-1/4	5-1/8	356,800	301,000	232,200
B-5167	4-1/2	5-3/8	297,000	258,000	186,200
B-5170	4-3/4	5-5/8	360,400	308,400	234,500
B-5173	5	5-7/8	323,500	283,500	218,500
B-5179	5-1/2	6-5/8	399,000	350,500	281,300
B-5187	5-9/16	6-11/16	420,000	369,000	296,000
B-5195	5-3/4	6-7/8	399,000	350,500	238,000
B-5198	6	7-1/8	435,000	392,000	298,000
B-5208	6-1/8	7-1/4	435,000	392,000	298,000
B-5216	6-5/8	7-3/4	350,000	306,000	246,000
B-5224	6-3/4	8-1/8	531,900	467,300	375,000
B-5232	7-3/8	9	637,000	574,300	462,000
B-5235	7-3/8	8-1/2	416,000	365,000	292,000
B-5243	7-5/8	9-1/4	657,000	578,000	465,000

Bowl No.	Maximum Catch Size (With Spiral Grapple)	OD	Load Capacity at Yield Pt (lb)		
			Spiral Grapple	Basket Grapple	
				Without Stop	With Stop
		in.			
2382	6-1/2	8-1/4	760,000	650,000	552,000
B-2716	8	9-5/8	578,300	508,100	345,000
B-2791	5-1/2	7-1/8	637,500	574,300	462,000
B-3034	6-5/8	8-1/4	637,500	574,300	462,000
3075	4-7/8	6-3/8	558,000	510,000	369,000
B-3264	7	8-1/8	439,200	395,800	318,400
B-3366	6	7-5/8	637,500	574,300	462,000
B-3522	5-3/4	7-3/8	637,500	574,300	462,000
B-3711	6-1/2	8-1/8	586,500	515,500	413,500
A-3795	3-1/2	4-1/2	271,000	226,000	146,500
B-3798	4-1/2	5-5/8	268,000	320,000	211,000
B-3812	5-9/16	7-1/4	675,200	608,400	489,400
B-3816	6-3/4	8-3/8	612,199	537,860	365,214
B-3819	7	8-5/8	637,000	574,300	462,000
B-4218	6-1/8	7-3/4	637,000	574,300	462,000
4392	2-7/8	4-1/8	349,000	264,000	176,000
4503	5-1/4	6-3/8	403,000	356,000	256,000
M-4503	5-1/4	6-3/8	397,400	358,400	278,500
B-4516	7-1/2	9-1/8	637,000	574,300	462,000
B-4519	5-1/4	6-7/8	637,000	574,300	462,000
B-4563	3-1/2	5-1/8	625,000	526,000	330,000
B-4621	3-1/2	4-3/8	267,400	220,700	144,300
B-5283	8-1/2	10-1/8	637,000	574,300	462,000
B-5286	8-1/2	9-5/8	419,500	376,000	341,000
B-5294	8-5/8	11	1,308,000	1,240,000	1,130,000
B-5299	8-5/8	10-1/4	657,000	578,000	465,000
B-5307	8-7/8	10-1/2	586,600	515,400	413,600
B-5315	9	11-3/8	1,364,000	1,207,000	942,000
5323	9	10-5/8	660,000	556,000	445,000
B-5323	9	10-5/8	586,800	515,600	426,500
5331	10-1/8	11-3/4	616,000	528,000	435,000
B-5331	10-1/8	11-3/4	660,000	580,000	468,000
B-5346	6-1/2	7-5/8	430,000	385,000	295,000
B-5356	7-1/4	8-3/8	430,000	385,000	295,000
B-5427	4-1/8	5-7/16	547,600	435,500	277,100
B-5430	4-1/8	5	296,500	258,500	201,000
5700	4-5/8	5-5/8	420,000	378,500	273,000
M-5700	4-5/8	5-5/8	349,600	315,000	227,000
5735	4-5/8	5-15/16	514,100	421,300	297,400
5735	4-5/8	5-15/16	514,100	421,300	297,400
5898	4-1/4	5-9/16	526,600	494,300	362,500
6152	5-3/4	7-3/8	637,000	542,250	421,750
M-6152	5-3/4	7-3/8	656,800	564,000	372,700
B-6232	3-7/8	4-5/8	186,800	166,700	104,200
B-7095	4-7/8	6-3/16	404,500	341,200	282,700
B-7098	4-7/8	5-3/4	273,500	230,700	178,000
B-7103	7-1/2	8-5/8	436,000	385,000	309,000
B-7499	3-13/16	5-1/8	431,000	381,000	275,000
7574	6	7-5/8	611,300	532,600	404,300
7788	5	6-1/8	468,000	440,000	322,000
7797	6-1/2	8-1/4	760,000	650,000	552,000
7801	7	8-5/8	637,000	542,250	408,250
7806	7-1/4	8-7/8	637,000	542,250	408,250
7811	7-3/4	9-3/8	540,000	475,000	359,000
7831	7-1/4	8-7/8	637,300	564,000	427,700
8223	3-1/8	4-1/8	310,200	255,000	170,000
8617	5-1/2	6-5/8	386,000	325,000	232,000
B-8921	2	2-5/16	50,400	36,300	28,900
8942	4-3/4	6	422,000	354,000	253,000
8962	8-1/2	10-1/8	602,700	492,000	391,000
M-8962	8-1/2	10-1/8	624,300	576,700	445,500
8965	8-3/4	10-1/2	296,000	251,000	200,000
8971	10	11-7/8	828,300	744,000	558,800
8977	4-3/4	5-7/8	432,900	411,600	303,275
M-8977	4-3/4	5-3/4	338,000	233,000	116,600
8980	5-3/4	6-7/8	367,000	332,000	253,000
8997	6-7/8	8	443,000	410,000	318,000

Data provided by National Oilwell, Bowen Manual No. 5/1150; 2003

Bowen Releasing and Circulating Overshots - Series "150" (Continued)

Bowl No.	Maximum Catch Size (With Spiral Grapple)	OD in.	Load Capacity at Yield Pt (lb) Spiral Grapple	Basket Grapple Without Stop	Basket Grapple With Stop
B-5251	7-5/8	8-3/4	430,000	385,000	295,000
5259	7-3/4	8-7/8	416,000	345,000	276,000
B-5259	7-3/4	8-7/8	430,000	385,000	295,000
B-5267	8	9-1/8	396,000	347,500	236,000
M-8997	6-7/8	8	436,000	406,900	350,000
9011	6-3/8	7-1/2	479,000	454,000	339,000
M-9011	6-3/8	7-1/2	459,600	435,300	323,700
9028	4-7/8	6	405,000	343,000	284,000

Data provided by National Oilwell, Bowen Manual No. 5/1150; 2003

Bowen Releasing and Circulating Overshots Series "150" (Continued)

Bowl No.	Maximum Catch Size (With Spiral Grapple)	OD in.	Load Capacity at Yield Pt (lb) Spiral Grapple	Basket Grapple Without Stop	Basket Grapple With Stop
9040	5-5/8	6-3/4	405,000	347,000	289,000
9062	8-3/8	9-1/2	422,000	402,000	309,000
9098	8-5/8	9-3/4	458,000	435,000	333,000
9107	3-1/8	4-1/8	310,200	255,000	170,000
M-9107	3-1/8	4-1/8	255,000	210,600	140,000
9111	3-21/32	4-11/16	332,000	279,000	199,500
M-9111	3-21/32	4-11/16	332,000	279,000	199,500
9121	3-3/4	4-11/16	261,300	233,000	138,000
M-9121	3-3/4	4-11/16	261,300	233,000	116,600
9134	6-5/8	7-3/4	422,000	400,000	318,000
M-9134	6-5/8	7-3/4	345,000	315,000	227,000
9164	6-3/8	7-3/4	385,500	325,000	232,000
9205	5-3/8	6-1/2	350,000	294,000	210,000
9211	5-1/2	6-5/8	444,000	379,000	293,000
9219	7	8-1/8	453,000	429,500	329,500
9233	7-3/8	8-1/2	422,000	400,000	309,000
9239	7-5/8	8-3/4	458,000	435,000	333,000
A-9239	3	3-5/8	129,184	107,435	55,313
9245	7-7/8	9	422,000	400,000	309,000
9271	2-7/8	3-5/8	193,500	157,400	78,700
M-9271	2-7/8	3-5/8	229,100	195,900	102,500
9291	7-1/2	9-1/8	660,200	547,500	409,000
B-9298	3-13/16	4-11/16	265,000	214,000	106,000
9306	2-3/8	3-1/8	193,500	173,200	118,000
M-9306	2-3/8	3-1/8	215,526	184,312	122,700
9337	6-5/8	8-1/8	590,000	500,000	403,000
M-9337	6-5/8	8-1/8	587,000	505,500	382,500
9517	3-7/8	5-1/4	451,000	389,500	276,500
9571	7-1/8	8-1/4	422,000	400,000	307,000
9637	3-3/8	4-3/8	281,500	249,400	167,900
M-9637	3-3/8	4-3/8	248,700	224,000	152,900
9694	6-1/4	7-3/8	450,400	427,283	327,900
M-9694	6-1/4	7-3/8	467,600	444,000	340,400
9727	3-3/4	5	391,000	342,600	244,700
9747	6-3/8	7-1/2	479,000	454,000	339,000
9748	6-1/2	8-1/8	420,000	400,000	325,000
9749	6-1/4	7-7/8	655,000	570,000	428,000
B-9775	3-13/16	4-7/16	137,500	118,000	444,800
9817	7	8-1/8	453,000	429,500	329,500
9852	7-3/4	8-7/8	458,000	435,000	333,000
9862	6-1/2	7-5/8	418,200	396,700	322,900
9984	6-1/4	7-7/8	655,000	570,000	428,000
9998	6	7-1/2	590,000	512,000	390,000
B-10201	2-1/8	2-5/8	101,600	86,400	61,000
B-11323	6-5/8	7-3/4	345,000	315,000	227,000
B-11825	5-1/8	5-3/4	135,000	115,000	71,500
12277	3-21/32	4-11/16	332,000	279,000	199,500
12566	6-1/4	7-3/8	471,000	448,000	283,000
12568	6-1/4	7-3/8	471,000	448,000	283,000
12694	7-1/2	8-5/8	458,000	414,400	313,400
B-12824	9-5/8	11-1/4	586,800	515,600	413,700
B-13681	2-7/8	3-3/4	214,000	192,800	121,400
B-13722	4-3/4	6-1/16	431,000	381,000	275,500
B-14142	6-1/8	7-1/4	435,000	392,000	298,000
14762	6-3/4	7-7/8	425,000	381,000	288,000
15252	9-1/2	11-3/4	966,500	852,000	635,000
15802	11-1/4	12-3/4	605,000	562,250	444,000
16397	2-1/8	2-7/8	193,500	173,200	110,200
16502	6-3/4	7-7/8	413,000	362,500	246,000
17203	3-21/32	4-17/32	260,400	233,400	170,500
17209	7	8-3/8	587,977	557,764	428,051
17422	3-21/32	4-1/2	320,000	295,000	200,500
18439	5-1/4	6-3/8	403,000	356,000	256,000
19092	6-1/4	7-5/8	542,500	479,000	364,500
19477	3-1/16	3-5/8	169,300	178,500	97,600
19841	3-21/32	4-11/16	355,000	300,000	213,000
20167	8-1/2	10-1/8	600,000	492,000	391,000
21302	3-3/8	3-7/8	102,500	97,500	66,500
21381	4-3/4	5-3/4	449,000	420,000	308,000
22991	4-3/4	5-3/4	428,000	410,000	303,000
26352	4-3/4	5-3/4	449,000	420,000	308,000
27901	6	7-5/8	670,000	580,000	442,000
28072	22	24-3/4	1,270,000	1,253,800	1,076,250
28332	2-1/16	2-3/8	68,000	48,900	32,900
28500	2	2-5/16	50,000	36,000	28,500
30082	3-1/16	4-1/8	347,200	347,200	190,400
31655	16-3/4	20-1/4	N/A	1,479,060	1,344,600
31765	4-3/4	5-3/4	432,900	411,600	303,275
32775	2-5/32	3-7/32	185,700	166,100	81,200
33008	11-7/8	13-3/4	1,022,314	745,564	-
64555	14-3/4	16-3/4	1,197,674	1,226,777	-
36537	9-1/4	11	707,400	644,200	520,000
37587	3-1/16	3-3/4	217,700	221,200	179,700
47475	3-7/8	5-1/4	451,000	389,500	276,500
68030	14	16	1,164,000	1,175,000	-

Data provided by National Oilwell, Bowen Manual No. 5/1150; 2003

Itco Type Bowen Releasing Spears

Spear Assembly No.	Grapple No.	Body Yield Strength lb	Spear Assembly No.	Grapple No.	Body Yield Strength lb
530	532	530,000	17234	17236	1,175,000
1227	1230	270,000	17237	17239	972,000
1332	1334	920,000	17243	17245	1,946,000
1344	1348	132,000	17246	17248	2,700,000
9266	9268	972,000	17470	17472	116,400
9281	9283	2,700,000	17475	17477	725,000
9380	9382	1,946,000	18270	18272	920,000
9410	9412	357,000	19350	19352	29,400
9485	9487	530,000	20115	20119	920,000
9572	9574	1,800,000	20120	20122	2,700,000
9645	9647	116,400	20890	20892	920,000
9680	9682	920,000	27780	27782	5,600,000
9715	9717	1,175,000	35841	35843	43,600
9915	9917	62,000	42069	42071	132,000
9945	9947	357,000	58292	58294	1,175,000
11195	11197	43,600	62198	49888	270,000
13200	13202	725,000	62242	1230	270,000
16455	16457	20,800	74509	74555	116,400
17228	17230	132000	81470	9283	2,700,000
17231	17233	270,000	195015	145017	270,000

The strengths shown are theoretical calculations based on yield strength of the material used in each case. The strengths shown are therefore accurate, plus or minus 20 percent of the figures shown only. These figures do not constitute a guarantee, actual or implied; they are meant to serve as a guide only, and appropriate allowance must be made in use, as a safety factor.
Data provided by Bowen, from Bowen Manual No. 5/2300; June, 2005

Bowen Super Fishing Jar

Jar Assembly No.	Jar Size			Max Rec Jarring Load In Hole■	Tensile at Yield After Jarring	Torque at Yield
	Connection	OD in.	ID in.	lb	lb	ft-lb
72888	2-3/8 Reg	3-1/8	1	59,000	240,000	3,280
145737	2-7/8 Reg	3-3/4	1-1/4	78,000	324,000	5,000
146544	2-3/8 IF	3-3/4	1-1/2	66,000	333,000	4,800
147902	2-3/8 EUE	3-3/4	1-7/8	48,000	258,000	4,520
80468	2-7/8 IF	4-1/4	2	62,000	374,000	6,800
79789	3-1/2 FH 3-1/2 IF	4-3/4	2	98,000	575,000	11,460
145484	4-1/2 FH	6	2	196,000	913,000	20,900
79691	4-1/2 IF	6-1/4	2-1/4	200,000	1.1 million	27,200
145440	5-1/2 Reg	6-3/4	2-3/8	250,000	1.2 million	31,960
72978	6-5/8 Reg	7-3/4	3-1/16	265,000	1.7 million	56,600

■ Loads shown are maximum recommended pull loads. Pulling above the value shown can damage the tools.

All jarring and pulling loads shown assume that the force is acting alone and is essentially along with major axis of the tool. if torque and tension or bending and tension are used together, the resulting combined stresses may lead to failure at substantially less than rated loads. rotation and bending together can lead to fatigue.

Data provided by National Oilwell, Bowen Manual 5/4100; November, 2003

"Type Z™" Bowen Oil Jars

Jar Assembly No.	Jar Type	OD	ID	Rec Max Jarring Load ■	Lift Load After Jarring at Yield	Torque to Failure	Rec Wt Of Collars Above Jar▲
		in.	in.	lb	lb	ft-lb	lb
70822	Sub Type	1-5/8	1/4	15,400	46,300	260	1,100 - 1,450
74723	Sub Type	1-13/16	5/16	18,000	59,400	340	1,360 - 1,800
54020	Integral Mandrel	2-1/4	3/8	21,000	118,500	1,800	1,560 - 2,100
68010	Sub Type	2-29/32	1	35,400	194,800	2,260	2,200 - 3,000
55670	Sub Type	3-1/16	1-1/2	27,800	160,200	2,200	2,300 - 3,100
52504	Integral Mandrel	3-1/8	1	32,400	229,200	4,060	2,400 - 3,300
52506	Integral Mandrel	3-3/4	1-1/4	56,500	345,000	7,640	4,200 - 5,700
52528	Sub Type	3-3/4	1-1/2	46,000	299,700	5,340	3,400 - 4,600
52497	Sub Type	3-3/4	1-7/8	46,500	179,500	2,980	3,500 - 4,700
52502	Integral Mandrel	4-1/4	1-15/16	46,700	430,300	9,920	3,500 - 4,700
52653	Integral Mandrel	4-1/2	2-3/8	49,000	375,000	11,160	3,600 - 4,900
52530	Integral Mandrel	4-3/4	1-1/2	85,000	591,900	18,420	6,300 - 8,500
52500	Integral Mandrel	4-3/4	2	74,500	468,800	17,200	5,600 - 7,500
52498	Integral Mandrel	6	2	136,400	937,000	34,320	10,200 - 13,800
52544	Integral Mandrel	6-1/4	2-1/4	159,000	917,400	40,680	11,800 - 16,000
52680	Integral Mandrel	6-3/4	2-3/8	172,800	1,013,800	48,660	13,000 - 17,500
52711	Integral Mandrel	7-3/4	3-1/16	149,000	1,587,900	64,020	11,000 - 15,000
66346	Integral Mandrel	9	3-3/4	215,000	1,621,000	92,260	14,300 - 19,600

■ Based on 80 percent of calculated load at yield point.

▲ Optimum weights can be determined only by calculation and only if sufficient well data is available.

These figures do not constitute a guarantee, actual or implied; they are meant to serve as a guide only, and appropriate allowance must be made in use, as a safety factor. "Type Z" is a trademark of Bowen Tools, Inc.

Data provided by Bowen from Bowen Manual No. 5/4065; November, 2003

Bowen Super II Fishing Jar Specifications

Outside Diameter (OD)	(inches)	3-1/8	4-3/4	6-1/4	7-3/4
Inside Diameter (ID)	(inches)	1	2-1/4	2-1/4	3-1/16
Connection		2-3/8 API Reg	3-1/2 IF	4-1/2 IF	6-5/8 API Reg
Assembly Number		153283	152790	152564	152408
Length (Closed Position)	(feet - inches)	9 - 10-3/8	12 - 6-7/8	12 - 10-5/16	13 - 2
Stroke	(inches)	11-3/4	12	12	12
Pump Open Areas	(square inches)	2.4	6.5	8.3	16.8
Drill Collar Weight Range (See Note 7)	(lb)	2,100 to 3,600	440 to 7,500	8,100 to 13,600	12,100 to 20,500

Strength and Test Data

Jar Tester Low Test Pull Load (See Note 1)	(min/max lb)	9,000 / 12,000	14,000 / 20,000	16,000 / 25,000	16,000 / 20,000
Jar Tester Standard Pull Load (See Note 1)	(lb)	30,000	50,000	100,000	110,000
Field Load: Max Pull Load (During Pull Stroke) (See Notes 2, 3 and 4)	(lb)	59,000	100,000	200,000	265,000
Lift Load: Tensile At Yield (Jar Fully Extended) (See Notes 2 and 4)	(lb)	257,000	484,000	900,000	1.58 million
Torque at Yield (See Notes 2, 4 and 5)	(ft-lb)	5,630	16,700	36,300	76,000

NOTES:

1) If jar does not test at Low and Standard Pull Loads shown, disassemble, inspect and repair tool.
2) All strengths listed are calculated theoretical yield points and are accurate within 20%. The strength values shown are based on only one (1) load type being applied at a time; this is consistent with API methods for their published strength values for drill string components. When two (2) or more load types (pull, lift, torque, rotation and/or bending) are applied at the same time, the stresses on the tool are increased and the listed load ratings are reduced substantially. This is particularly true in milling, washover or drilling operations; in deviated or directional holes; and in the neutral zone, where combining loads (stress) can also lead to fatigue failure. The need for operating under such conditions is acknowledged. This is not intended to advise against such operations, but merely to caution the operator of possible risks when operating in these conditions. Rotation and bending together can lead to fatigue failure. As with all oil field equipment, a safety factor should be applied with running the tools to avoid damage.
3) Loads indicated are Maximum Recommended Pull Loads during the pull stroke of the jars. Pulling above the value show can damage the jar. The Bowen Jar Placement Program should also be run to avoid excessively high impact loads.
4) The values shown do not cover API tool joints or other downhole connection strengths since various connections may be used on either end of the tools. Users should be guided by AP or other published specifications covering downhole connections for the connection strengths.
5) Torque at Yield is the value that will cause yield of the material in one (1) or more parts of a tool. It may or may not refer to yielding of a threaded connection within the tool, but will always refer to the weakest torsional components with the tool.
6) The make up torques are in maximum recommended make up torques for each connection. They are set at 50% of the calculated theoretical yield toque. Tightening torque values were calculated assuming Itcolube or similar anti-galling grease with low coefficient of friction being applied to all threads and butting shoulders of the connections. Tightening Torque values are in ft-lb. Multiply chart value by 0.1382 to obtain kg-m.
7) These weight values are provided as a guideline to the weight of drill collars to be used, and do not necessarily constitute the optimum weight for each hole condition which may be encountered. It is recommended that the Bowen Fishing Jar Placement Program be used.

Bowen Intensifiers

Intensifier Assembly	OD	ID	Rec Drill Collar Wt Range	Pull Load to Open	Min Pull to Obtain Eff Blow (Above String and Collar Wt)	Tensile At Yield■	Torque		Used With Jar No.	Used With Super Fishing Jar No.
							Maximum Operating	At Yield		
	in.	in.	lb	lb	lb	lb	ft-lb	ft-lb		
70957	1-5/8	1/4	1,100-1,400	14,000	8,400	43,200 46,300	130	260	70822	-
64460	1-13/16	5/16	1,360-1,800	18,100	10,800	59,400	170	340	74223 21150 78074	-
50640	2-1/4	3/8	1,560-2,100	20,700	13,800	118,500	900	1,800	18775 54020	-
68262	2-29/32	1	2,200-3,000	37,000	24,600	194,800	1,130	2,260	68010	-
55867	3-1/8	1	2,400-3,300	30,000	21,000	229,200	2,034	4,068	42736 52504	72888
55895	3-3/4	1-1/4	4,200-5,700	52,000	36,000	345,000	3,820	7,640	38040 13255 52506	145737
55747	3-3/4	1-1/2	3,400-4,600	43,500	30,000	299,700	2,670	5,340	37406 52528	-
50660	3-3/4	1-7/8	3,500-4,700	43,000	30,000	179,500	1,490	2,980	41355 20150 52497	-
55664	4-1/4	1-15/16	3,500-4,700	43,000	30,000	430,300	4,960	9,920	44483 13640 52502	80468
50708	4-1/2	2-3/8	3,600-4,900	49,000	32,000	375,000	5,580	11,160	35849 52653	-
50700	4-3/4	1-1/2	6,300-8,500	78,000	54,000	591,900	9,210	18,420	25960 52530	-
55812	4-3/4	2	5,600-7,500	63,000	43,000	468,800	8,600	17,200	38110 52500	79789
55860	6	2	10,200-13,800	128,500	77,000	937,000	17,160	34,320	14710 52498	145484
55905	6-1/4	2-1/4	11,800-16,000	147,000	102,000	917,400	20,340	40,680	12370 52544	79691
50720	6-3/4	2-3/8	13,000-17,500	172,900	102,000	1,013,800	24,330	48,660	11130 52680	145400
55910	7-3/4	3-1/16	11,000-15,000	126,000	88,000	1,587,900	32,010	64,020	15160 52711	-
78964▲	7-3/4	3-1/16	12,100-20,500	220,000	123,000	1,600,000	26,350	52,700	-	72978
66372	9	3-3/4	12,000-16,000	200,000	100,000	1,621,000	46,130	92,260	66346	-

■ The strengths shown are theoretical calculations based on yield strength of the material used in each case. The strengths shown are therefore accurate, plus or minus 20 percent of the figures shown only. These figures do not constitute a guarantee, actual or implied; they are meant to serve as a guide only, and appropriate Allowance must be made in use, as a safety factor.

▲ Bowen Super Intensifier

Data provided by National Oilwell; April, 2004

Lubricated Bumper Sub Strength Data

Assembly No.	OD	ID	Connection	Tensile Strength (Yield)	Yield Torque	
					Bumper Sub	Maximum Operating Torque
	in.	in.		lb	ft-lb	ft-lb
54781	1-13/16	3/8	1-13/16" Wilson FJ	75,400	480	240
41490	2-1/4	3/8	1-1/4" API Reg	116,415	1,740	870
43501	3-1/8	1	2-3/8" API Reg	239,070	3,400	1,700
39712	3-3/8	7/8	2-3/8" API IF	321,000	6,060	3,030
43470	3-3/4	1-1/2	2-3/8" API IF	300,750	7,100	3,550
43521	3-3/4	1-7/8	2-3/8" EUE	291,735	4,920	2,460
43509	3-3/4	1-1/4	2-7/8" API Reg	363,780	7,100	3,550
43531	4-1/4	1-15/16	2-7/8" API IF	397,650	9,260	4,630
42700	4-1/2	2-3/8	2-7/8" EUE	388,650	7,100	3,550
39727	4-5/8	2	3-1/2" API FH	484,650	11,030	5,518
	4-3/4				15,000	7,500
152719	4-3/4	2-1/4	3-1/2" API IF	433,000	15,000	7,500
39732	5-3/4	2-13/16	4-1/2" API FH	622,295	23,000	11,500
	6					
39737	6-1/4	3-1/8	4-1/2" API IF	777,150	32,600	16,300
39778	6-3/4	2-3/4	5-1/2" API Reg	1,130,400	43,200	21,600
39752	7-3/4	3-1/2	6-5/8" API Reg	1,276,950	62,400	31,200

The above tensile strengths are calculated theoretical yield strengths and are considered accurate to ± 20%.

The above operating torque is set at 50% of the calculated theoretical yield torque and is the maximum recommended operating torque.

The figures do not constitute a guarantee, actual or implied; they are meant to serve as a guide only, and appropriate allowance must be made in use, as a safety factor.

Data provided by National Oilwell, Bowen Manual No. 5/4445; November, 2003

Smith Services: Hydra-Jar Double-Acting Hydraulic Drilling Jar

Tool OD (in.)	3-3/8	4-1/4	4-3/4	4-3/4	6-1/4	6-1/4	6-1/2	7	7-1/4	7-3/4	8	8-1/4	8-1/2	9-1/2
Tool ID (in.)	1-1/2	2	2-1/4	2-1/4	2-3/4	2-3/4	2-3/4	2-3/4	2-3/4	3	3	3	3	3
Tool Joint Connection	2-3/8 API IF	2-7/8 API IF	3-1/2 API IF	4-1/2 API IF	4-1/2 XH	4-1/2 XH	4-1/2 API IF	5 H90	5-1/2 H90	6-5/8 API Reg	6-5/8 API Reg	6-5/8 API Reg	6-5/8 API Reg	7-5/8 API Reg
Assembly Number	16577	15360	16305	16790	16893	17096	16293	16300	16334	16255	16257	16259	16316	16250
Overall Extended Length (ft, in.)	24' 5"	29' 10"	29' 10"	29' 10"	31' 2"	31' 2"	31' 2"	31' 6"	31' 6"	32'	32'	32'	32'	32' 6"
Max Detent Working Load (lbf)	44,000	70,000	80,000	95,000	150,000	150,000	175,000	230,000	240,000	260,000	300,000	350,000	350,000	500,000
Tensile Yield Strength (lbf)	236,000	377,870	492,280	492,280	730,320	964,200	900,000	1,179,930	1,261,160	1,315,220	1,621,560	1,819,380	1,846,260	1,654,170
Torsional Yield Strength (lbf-ft)	6,480	15,830	19,120	19,120	40,500	50,750	54,790	67,390	84,150	86,840	98,490	115,418	115,418	152,800
Free Stroke - Up (in.)	7	8	8	8	8	8	8	8	8	8	8	8	8	8
Free Stroke - Down (in.)	7	7	7	7	7	7	7	8	8	7	7	8	8	8
Total Stroke (in.)	21	25	25	25	25	25	25	25	25	25	25	25	25	25
Tool Weight (lb)	500	800	1,050	1,050	1,600	1,600	1,850	2,600	3,000	3,200	3,550	4,000	4,500	5,600

Data provided by Smith Services; February, 2006

Smith Services: Double-Acting Hydraulic Accelerator

Tool OD (in.)	3-3/8	4-1/4	4-3/4	4-3/4	6-1/4	6-1/2	7	7-1/4	7-3/4	8	8-1/4	8-1/2	9-1/2
Tool ID (in.)	1-1/2	2	2-1/4	2-1/4	2-3/4	2-3/4	2-3/4	2-3/4	3	3	3	3	3
Tool Joint Connection	2-3/8 API IF	2-7/8 API IF	3-1/2 API IF	3-1/2 API IF	4-1/2 XH	4-1/2 API IF	5 H90	5-1/2 H90	6-5/8 API Reg	6-5/8 API Reg	6-5/8 API Reg	6-5/8 API Reg	7-5/8 API Reg
Assembly Number	16589	16655	16313	16794	16311	16312	16338	16337	16332	16272	16272	N/A	N/A
Overall Extended Length (ft, in.)	27'	30' 2"	32' 3"	32' 3"	33' 4"	33' 4"	33' 5"	33' 5"	34'	34'	34'	34'	35' 4"
Max Detent Working Load (lbf)	44,000	70,000	80,000	95,000	150,000	175,000	230,000	240,000	260,000	300,000	350,000	350,000	500,000
Tensile Yield Strength (lbf)	236,000	377,870	492,280	492,280	730,320	964,200	1,179,930	1,261,160	1,315,220	1,621,560	1,819,380	1,846,260	1,654,170
Torsional Yield Strength (lbf-ft)	6,480	15,380	19,120	19,120	40,500	54,790	67,390	84,150	86,840	98,490	115,418	115,418	152,800
Compression Stroke - Up (in.)	7	8	8	8	8	8	8	8	8	8	8	8	8
Compression Stroke - Down (in.)	7	7	7	7	7	7	8	8	7	7	8	8	8
Total Stroke (in.)	21	25	25	25	25	25	25	25	25	25	25	25	25
Tool Weight (lb)	450	500	1,050	1,050	1,600	1,850	2,600	3,000	3,200	3,550	4,000	4,500	5,600

Data provided by Smith Services; February, 2006

Smith Services: Hydra-Stroke Bumper Subs

Type	AEBLP		AEBB	AEBLP	AEBB	AEBLP	AEBB	AEBLP	AEBB
	Partial Balance	Partial Balance	Fully Balance	Partial Balance	Fully Balance	Partial Balance	Fully Balance	Partial Balance	Fully Balance
Tool OD (in.)	4-1/2	4-3/4	5-1/4	6-1/2	6-1/2	8	8	8-1/4	8-1/4
Tool ID (in.)	2	2	2-1/4	2-3/4	2-3/4	3	3	4-1/8	4-1/8
Tool Joint Connection	2-7/8 API IF	3-1/2 API IF	3-1/2 API IF	4-1/2 API IF	4-1/2 API IF	6-5/8 API Reg	6-5/8 API Reg	6-5/8 API FH	6-5/8 API FH
Tensile Yield (lbf)	406,270	425,360	600,000	964,207	964,207	1,571,980	1,571,980	1,405,420	1,405,420
Torsional Yield (lbf-ft)	15,800	19,164	28,000	58,300	58,300	114,000	114,000	97,679	97,679
Total Stroke (in.)	48	72	72	72	72	72	72	72	72
Closed Length (ft, in.)	18'	22'	35' 3"	24' 2"	32' 8"	26' 8"	36' 2"	26' 8"	36' 2"
Tool Weight (lb)	650	850	1,500	2,300	3,200	2,910	3,340	3,510	3,760

Data provided by Smith Services; February, 2006

Smith Services: TMC Bumper Sub

Tool OD (in.)	1-13/16	1-13/16	2-1/4	3-1/8	3-1/8	3-3/4	3-3/4	4-1/4	4-1/4	4-3/4	4-3/4	6-1/4	6-1/2	7-3/4	8
Tool ID (in.)	3/8	9/16	1/2	1	1-1/2	1-1/2	2	2	2-7/16	2	2-1/4	2-1/4	2-1/4	3-1/2	3-1/2
Tool Joint Connection	1-13/16 WFJ	1 AM MT	1-1/4 API Reg	2-3/8 API Reg	2-3/8 EUE	2-3/8 API IF	2-3/8 EUE	2-7/8 API IF	2-7/8 EUE	3-1/2 API FH	3-1/2 API IF	3-1/2 API IF	4-1/2 API IF	6-5/8 API Reg	6-5/8 API Reg
Assembly Number	16435	N/A	16471	16215	16461	16212	16385	16208	16377	16202	16415	16415	16374	16375	16376
Overall Length (ft, in.)	4' 8"	N/A	6'	7' 10"	6' 11"	8' 2"	6' 9"	8' 3"	9' 5"	8' 8"	9' 6"	9' 8"	9' 8"	10' 4"	10' 4"
Total Stroke (in.)	9-3/4	7-1/4	12	16	14	16	16	16	16	16	16	18	18	18	18
Tensile Yield (lbf)	56,000	69,000	95,800	192,000	185,000	257,000	233,000	348,000	320,000	422,000	510,000	900,000	928,000	1,304,000	1,304,000
*Torsional Yield (lbf-ft)	800	750	2,900	4,100	4,200	6,600	7,400	11,000	10,000	14,000	14,000	50,000	50,000	118,000	118,000
Tool Weight (lb)	48	54	75	125	100	142	120	232	260	337	314	794	890	955	1,110

* Torsional yield strength is based on the tool joint connection

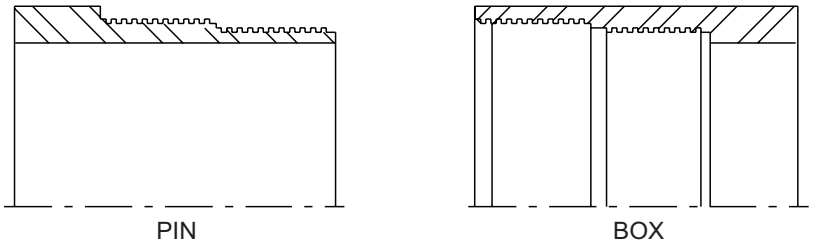
Data provided by Smith Services; February, 2006

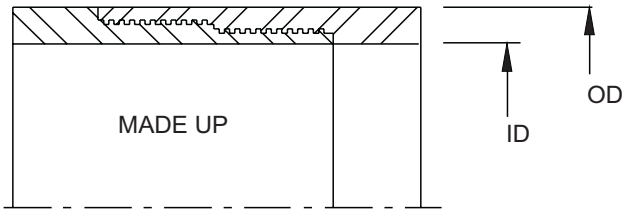
Smith Services: TMC Hydraulic Fishing Jar Single-Acting (Up Only)

Tool OD (in.)	1-13/16	1-13/16	2-1/4	3-1/8	3-1/8	3-3/4	3-3/4	4-1/4	4-1/4	4-3/4	4-3/4	6-1/4	6-1/2	7-3/4	8
Tool ID (in.)	3/8	9/16	1/2	1	1-1/2	1-1/2	2	2	2-7/8	2	2-1/4	2-1/4	2-1/4	3-1/2	3-1/2
Tool Joint Connection	1-13/16 WFJ	1 AM MT	1-1/4 API Reg	2-3/8 API Reg	2-3/8 EUE	2-3/8 API IF	2-3/8 EUE	2-7/8 API IF	2-7/8 EUE	3-1/2 API FH	3-1/2 API IF	4-1/2 API IF	4-1/2 API IF	6-5/8 API Reg	6-5/8 API Reg
Assembly Number	16420	16853	16421	16213	16457	16210	16349	16204	16348	16155	16143	16318	16363	16320	16366
Overall Length (ft, in.)	7'	5'	10'	12'	11'	12' 2"	11'	12' 10"	11'	13'	13' 6"	15'	15'	16'	16'
Recommended Max Overpull Working Load During Restricted Travel (lbf)	19,000	17,000	20,000	51,000	32,400	59,000	38,000	73,000	39,000	90,000	95,000	180,000	195,000	300,000	300,000
Total Stroke (in.)	9-3/4	7-1/4	12	16	14	16	16	16	16	16	16	18	18	18	18
Tensile Yield Strength (lbf)	56,000	69,000	95,800	192,000	185,000	257,000	233,000	348,000	320,000	422,000	422,000	900,000	928,000	1,304,000	1,304,000
Torsional Yield Strength (lbf-ft)	800	750	1,900	4,100	4,200	6,600	7,400	11,000	10,000	14,000	14,000	50,000	50,000	118,000	118,000
Tool Weight (lb)	75	54	125	200	225	240	325	375	400	425	375	950	1,078	1,400	1,570

Data provided by Smith Services; February, 2006

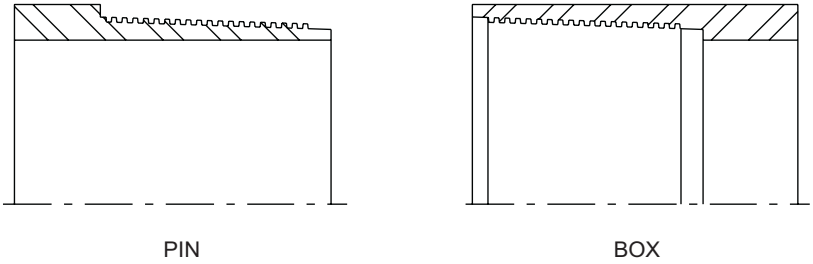
Baker Hughes Washpipe
(T.S.W.P.)

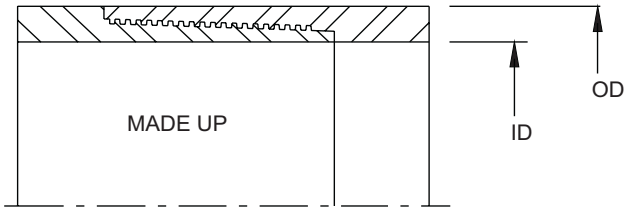




EXTERNAL FLUSH
INTERNAL FLUSH

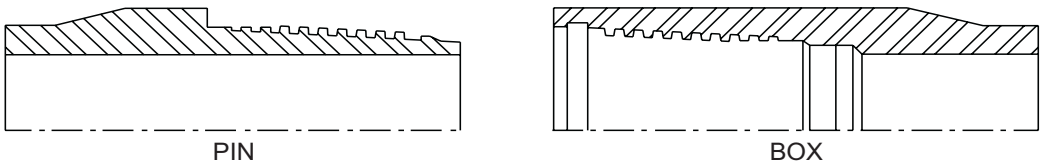
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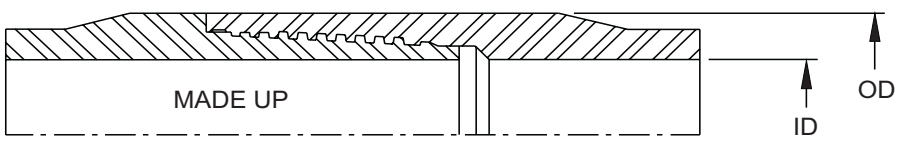




EXTERNAL FLUSH
INTERNAL FLUSH

X-Line Washpipe (X-Line)





EXTERNAL UPSET
INTERNAL FLUSH

Baker Hughes Washover Pipe Strength Chart

Size and Connection	Gauge No.	Weight Plain End	Inside Diameter	Wall Thickness	Upset Diameter	Drift Diameter	Make-up Torque		Joint Tensile Yield Strength	Joint Efficiency ■	Washover Size	
							Rec Δ	Max			Rec	Max
		lb/ft	in.	in.	in.	in.	ft-lb●		lb●	%		
3-3/8 TSWP	318	10.02	2.764	0.305	-	2.639	1,000	4,000	111,500	47	2-1/2	2-5/8
3-1/2 TSWP	127	12.31	2.764	0.368	-	2.639	1,100	4,500	160,000	54	2-1/2	2-5/8
	422	8.81	2.992	0.254		2.867	850	3,400	97,400	47	2-11/16	2-7/8
3-5/8 TSWP	674	7.06	3.240	0.192	-	3.115	630	2,550	74,000	45	3	3-1/8
3-3/4 TSWP	675	9.55	3.238	0.256	-	3.113	980	3,950	108,700	45	3	3-1/8
	196	10.46	3.185	0.283		3.060	1,115	4,470	123,100	50		
3-13/16 TSWP	75	11.70	3.187	0.313	-	3.062	1,225	5,050	138,500	50	3	3-1/8
4 TSWP	58	12.93	3.340	0.330	-	3.215	1,370	5,600	153,670	51	3-1/16	3-1/4
4-3/8 TSWP	91	12.02	3.826	0.275	-	3.701	1,400	5,600	134,000	47	3-1/2	3-3/4
		13.58	3.749	0.313		3.624	1,660	6,650	158,700	50		3-5/8
4-1/2 TSS	117	11.35	4.000	0.250	-	3.875	1,200	4,800	99,250	37	3-3/4	3-7/8
4-1/2 TSWP	148	13.04	3.920	0.290	-	3.795	1,460	5,860	160,800	52	3-5/8	3-3/4
	59	14.98	3.826	0.337		3.701	1,800	7,220	181,200	51	3-1/2	3-11/16
4-3/4 TSS	92	17.52	4.000	0.375	-	3.875	2,390	9,590	181,400	44	3-3/4	3-7/8
4-7/8 TSWP	105	11.57	4.408	0.233	-	4.283	1,380	5,540	134,600	49	4	4-1/8
5 TSWP	50	14.87	4.408	0.296	-	4.283	1,870	7,500	178,900	51	4	4-1/8
5 TSWP	57	14.87	4.408	0.296	-	4.283	1,870	7,500	184,600	53	4	4-1/8
5 X-LINE	73	15.00	4.375◆	0.296	5.360	4.283	2,700	9,550	282,640	80	4	4-1/4
		18.00	4.250◆	0.362		4.151			350,400	83		4-1/8
5 TSWP	158	17.93	4.276	0.362	-	4.151	2,460	9,850	218,500	52	4	4-1/8
5-3/8 TSS	53	20.02	4.625	0.375	-	4.500	2,900	11,600	222,800	47	4-1/4	4-1/2
5-1/2 TSWP	56	16.87	4.892	0.304	-	4.767	2,370	9,480	209,700	52	4-5/8	4-3/4
5-1/2 X-LINE	74	17.00	4.875◆	0.304	5.860	4.767	2,700	11,800	316,640	80	4-5/8	4-3/4
5-1/2 TSWP	164	19.81	4.778	0.361	-	4.653	2,970	11,900	237,200	51	4-1/2	4-5/8
5-3/4 TSWP	133	18.18	5.124	0.313	-	4.999	2,700	10,800	222,800	52	4-7/8	5
5-3/4 TSS	77	21.53	5.000	0.375	-	4.875	3,400	13,580	246,500	49	4-3/4	4-7/8
6 TSS	78	15.35	5.500	0.250	-	5.375	2,500	10,000	147,450	41	5-1/4	5-3/8
6 TSWP	428	19.64	5.352	0.324	-	5.227	3,170	12,700	238,800	52	5-1/8	5-1/4
	79	22.81	5.240	0.380		5.115	3,870	15,500	276,300	49	5	5-1/8
6-3/8 TSWP	129	24.03	5.625	0.375	-	5.500	4,250	17,000	288,300	51	5-3/8	5-1/2
6-5/8 TSWP	93	23.58	5.921	0.352	-	5.796	4,400	17,590	251,600	45	5-5/8	5-3/4
6-5/8 X-LINE	70	24.00	5.921	0.352	7.00	5.796	3,900	15,700	420,720	76	5-5/8	5-3/4
7 TSWP	96	25.66	6.276	0.362	-	6.151	4,970	19,880	315,200	52	6	6-1/8
7 X-LINE	71	26.00	6.276◆	0.362	7.39	6.151	4,500	20,900	482,640	80	6	6-1/8
7-1/4 TSWP	128	23.19	6.624	0.313	7.5	6.499	6,330	25,300	437,900	56	6-3/8	6-1/2
7-3/8 TSWP	94	28.04	6.625	0.375	-	6.500	5,700	22,800	343,000	52	6-3/8	6-1/2
	109						5,725	22,900	341,300			
7-5/8 TSWP	166	25.56	6.969	0.328	-	6.844	5,080	20,300	309,300	51	6-3/4	6-7/8
	122	29.04	6.875	0.375		6.750	5,650	22,600	378,500	55	6-5/8	6-3/4
	80						6,120	24,500	355,000	52		
	81	33.04	6.765	0.430		6.640	7,520	30,100	398,900	51	6-1/2	6-5/8
7-5/8 X-LINE	87	29.70	6.843◆	0.375	8.010	6.750	5,000	25,300	531,200	78	6-9/16	6-11/16
8 TSWP	121	30.54	7.250	0.375	-	7.125	6,600	26,400	362,900	51	7	7-1/8
8-1/8 TSWP	153	31.04	7.375	0.375	-	7.250	6,820	27,300	373,900	51	7-1/8	7-1/4
	97	35.96	7.250	0.437		7.125	8,370	33,500	398,500	47	7	7-1/8
	97	38.42	7.185	0.470		7.060	9,150	36,600	457,500	51	6-15/16	7-1/16
8-3/8 TSWP	163	33.95	7.578	0.399	-	7.453	7,500	30,000	404,900	51	7-1/4	7-3/8
8-3/8 TSS	106	37.07	7.500	0.437	-	7.375	7,000	28,100	441,000	55	7-1/4	7-3/8
8-5/8 TSWP	151	31.10	7.921	0.352	-	7.796	6,700	27,100	335,300	41	7-9/16	7-11/16
8-5/8 X-LINE	103	36.00	7.813◆	0.400	9.120	7.700	5,500	37,100	652,000	79	7-1/2	7-5/8
8-5/8 TSWP	110	39.29	7.725	0.450	-	7.600	9,950	39,800	475,200	51	7-1/2	7-11/16
9 TSWP	139	38.92	8.150	0.425	-	7.994	9,920	39,700	458,400	50	7-7/8	8
9-5/8 TSWP	152	38.94	8.835	0.395	-	8.679	10,450	41,800	463,400	51	8-1/2	8-3/4
	140	42.70	8.755	0.435	-	8.599	11,750	47,000	507,800		8-1/4	8-1/2
9-5/8 X-LINE	114	43.50	8.665	0.435	10.100	8.599	6,000	48,500	836,960	83	8-1/4	8-1/2

All strengths maximum value-apply safety factor of 2 to the joint tensile yield strength

Δ Recommended make-up torque = 25 percent of maximum make-up torque-does not apply to X-line connections

■ Ratio of the joint tensile yield strength to the pipe tensile yield strength

● N-80 pipe

◆ The internal upset has been reduced

❒ J-55 material

Baker Hughes Washover Pipe Strength Chart (Continued)

Size and Connection	Gauge No.	Weight Plain End	Inside Diameter	Wall Thickness	Upset Diameter	Drift Diameter	Make-up Torque		Joint Tensile Yield Strength	Joint Efficiency ■	Washover Size	
							Rec △	Max			Rec	Max
		lb/ft	in.	in.	in.	in.	ft-lb●		lb●	%		
9-5/8 TSWP	170	46.14	8.681	0.472	-	8.525	13,000	52,100	543,800	50	8-1/4	8-1/2
10-3/4 TSWP	155	44.22	9.950	0.400	-	9.794	13,150	52,600	531,000	51	9-1/2	9-3/4
	154	49.50	9.850	0.450		9.694	15,600	62,400	595,600		9-3/8	9-5/8
	124						14,250	57,000	606,000	52		
	147	54.21	9.760	0.495		9.604	17,550	70,200	641,800	50	9-1/4	9-1/2
11-3/4 TSWP	156	52.57	10.880	0.435	-	10.724	12,130	48,500	377,400❐	44	10-1/8	10-5/8
	125	58.81	10.772	0.489		10.616	13,230	52,900	470,400❐	49	10	10-1/2
12-3/4 TSWP	150	49.56	12.000	0.375	13.500	11.844	28,500	114,100	807,300❐	49	11	11-1/2
13-3/8 TSWP	134	66.11	12.415	0.480	13.750	12.259	25,000	100,300	788,900❐	52	11-1/2	12
16 TSWP	426	81.97	15.010	0.495	16.750	14.823	43,000	172,000	1,231,700❐	52	14-1/4	14-3/4

See Page 11-40 for footnote reference

Baker Hughes Washover Pipe Strength Chart
N-80 Pipe with W.P. Hydril Connections

Dimensions				Tensile			Torque			
Size OD	Wt	Wall	ID	Effective Area Calculated At	Calculated Yield	Joint Efficiency	Effective Area Calculated At	Calculated Max Working Torque	Joint Efficiency	Rec Make-up
in.	lb/ft	in.	in.		lb	%		ft-lb	%	ft-lb
2-1/4	4.12	.187	1.875	Box	52,000	53.50	Pin	650	33.70	100
2-3/4	6.68	.250	2.250	Box	81,000	51.70	Pin	1,600	43.10	230
3-1/4	8.00	.250	2.750	Box	98,000	52.10	Pin	2,300	42.90	320
3-1/2	9.91	.289	2.922	Box	119,000	51.20	Pin	3,400	47.10	500
3-3/4	9.32	.250	3.250	Box	115,000	52.20	Pin	3,200	42.50	450
4	11.60	.286	3.428	Box	139,000	52.10	Pin	4,500	46.60	650
	14.00	.330	3.340	Pin	131,000	47.10		4,600	42.30	
	15.70	.380	3.240	Box	175,000	50.80		6,000	50.70	870
4-3/8	12.00	.275	3.825	Box	145,000	51.10	Pin	4,900	43.30	700
4-1/2	11.60	.250	4.000	Box	140,000	52.30	Pin	4,200	38.20	600
	16.60	.337	3.826		182,000	51.60		6,700	47.00	960
5	15.00	.296	4.408	Box	180,000	51.40	Pin	7,000	43.50	1,000
	18.00	.362	4.276		219,000	51.80		9,400	49.50	1,300
5-1/2	17.00	.304	4.892	Box	204,000	51.30	Pin	9,000	44.20	1,300
5-5/8	17.70	.312	5.000	Pin	209,000	50.00	Pin	10,000	45.80	1,400
5-3/4	18.00	.313	5.125	Pin	222,000	52.00	Pin	10,300	45.10	1,500
	22.50	.380	4.990	Box	265,000	51.60		13,600	50.30	1,900
6	20.00	.324	5.352	Box	232,000	50.20	Pin	12,200	47.10	1,700
6-3/8	24.00	.375	5.625	Box	286,000	50.50	Pin	16,800	50.30	2,400
6-5/8	24.00	.352	5.921	Box	280,000	50.40	Pin	16,900	49.10	2,400
7	26.00	.362	6.276	Box	301,000	49.80	Pin	18,000	45.40	2,600
7-3/8	29.00	.375	6.625	Box	329,000	49.90	Pin	21,200	46.30	3,000
7-1/2	28.00	.368	6.765	Box	334,000	50.70	Pin	21,300	45.60	3,000
7-5/8	29.70	.375	6.875	Box	340,000	49.80	Pin	22,700	46.20	3,200
8-1/8	39.50	.470	7.185	Box	455,000	50.40	Pin	35,200	51.60	5,000
8-3/8	35.50	.375	7.625	Box	376,000	49.80	Pin	27,700	46.10	4,000
8-5/8	36.00	.400	7.825	Box	418,000	50.60	Pin	33,000	48.80	4,700
9	40.00	.425	8.150	Pin	463,000	50.50	Pin	38,400	49.30	5,500
9-5/8	43.50	.435	8.755	Box	502,000	49.90	Pin	46,100	50.10	6,600
10-3/4	51.00	.450	9.850	Box	578,000	49.60	Pin	60,300	50.30	8,600
11-3/4	60.00	.489	10.772	Box	687,000	49.70	Pin	81,000	51.90	11,600
13-3/8	72.00	.514	12.347	Box	833,000	50.10	Pin	90,400	42.20	12,900
16	84.00	.495	15.010	Box	970,000	50.30	Pin	123,000	40.70	17,600

Baker Hughes Washover Pipe Strength Chart
Wilson Specification 103 Special Tube with W.P. Hydril Connections

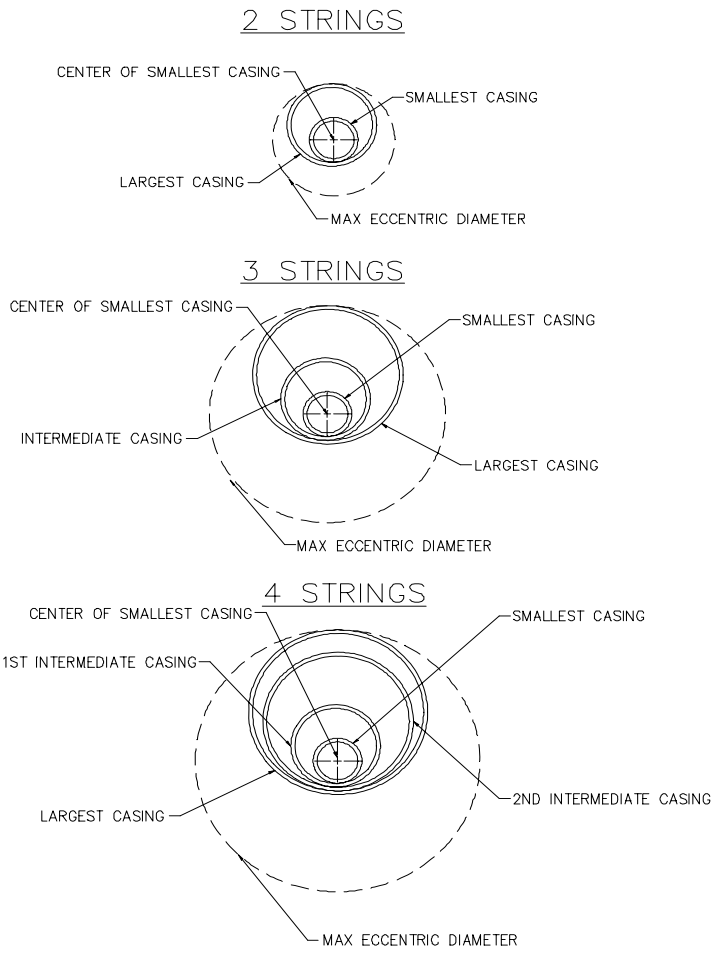
Dimensions				Tensile			Torque			
Size OD	Wt	Wall	ID	Effective Area Calculated At	Calculated Yield	Joint Efficiency	Effective Area Calculated At	Calculated Max Working Torque	Joint Efficiency	Rec Make-up
in.	lb/ft	in.	in.		lb	%		ft-lb	%	ft-lb
2-1/4	4.12	0.187	1.875	Box	65,000	53.50	Pin	800	33.70	125
2-3/4	6.68	0.250	2.250	Box	101,000	51.70	Pin	2,000	43.10	290
3-1/4	8.00	0.250	2.750	Box	123,000	52.10	Pin	2,900	42.90	400
3-1/2	9.91	0.289	2.922	Box	149,000	51.20	Pin	4,300	47.10	600
3-3/4	9.32	0.250	3.250	Box	144,000	52.20	Pin	4,000	42.50	560
4	11.60	0.286	3.428	Box	174,000	52.10	Pin	5,600	46.60	800
	14.00	0.330	3.340	Pin	164,000	47.10		5,800	42.30	
	15.70	0.380	3.240	Box	219,000	50.80		7,500	50.70	1,100
4-3/8	12.00	0.275	3.825	Box	181,000	51.10	Pin	6,100	43.30	900
4-1/2	11.60	0.250	4.000	Box	175,000	52.30	Pin	5,300	38.20	800
	16.60	0.337	3.826		228,000	51.60		8,400	47.00	1,200
5	15.00	0.296	4.408	Box	225,000	51.40	Pin	8,800	43.50	1,300
	18.00	0.362	4.276		274,000	51.80		11,800	49.50	1,600
5-1/2	17.00	0.304	4.892	Box	255,000	51.30	Pin	11,300	44.20	1,600
5-5/8	17.70	0.312	5.000	Pin	261,000	50.00	Pin	12,500	45.80	1,800
5-3/4	18.00	0.313	5.125	Pin	278,000	52.00	Pin	12,900	45.10	1,900
	22.50	0.380	4.990	Box	331,000	51.60		17,000	50.30	2,400
6	20.00	0.324	5.352	Box	290,000	50.20	Pin	15,300	47.10	2,100
6-3/8	24.00	0.375	5.625	Box	358,000	50.50	Pin	21,000	50.30	3,000
6-5/8	24.00	0.352	5.921	Box	350,000	50.40	Pin	21,100	49.10	3,000
7	26.00	0.362	6.276	Box	376,000	49.80	Pin	22,500	45.40	3,300
7-3/8	29.00	0.375	6.625	Box	411,000	49.90	Pin	26,500	46.30	13,800
7-1/2	28.00	0.368	6.765	Box	418,000	50.70	Pin	26,600	45.60	3,800
7-5/8	29.70	0.375	6.875	Box	425,000	49.80	Pin	28,400	46.20	4,000
8-1/8	39.50	0.470	7.185	Box	569,000	50.40	Pin	44,000	51.60	6,300
8-3/8	35.50	0.375	7.625	Box	470,000	49.80	Pin	34,600	46.10	5,000
8-5/8	36.00	0.400	7.825	Box	523,000	50.60	Pin	41,300	48.80	5,900
9	40.00	0.425	8.150	Pin	579,000	50.50	Pin	48,000	49.30	6,900
9-5/8	43.50	0.435	8.755	Box	628,000	49.90	Pin	57,600	50.10	8,300
10-3/4	51.00	0.450	9.850	Box	695,000	49.60	Pin	75,400	50.30	10,800
11-3/4	60.00	0.489	10.772	Box	859,000	49.70	Pin	101,300	51.90	14,500
13-3/8	72.00	0.514	12.347	Box	1,041,000	50.10	Pin	113,000	42.20	16,100
16	84.00	0.495	15.010	Box	1,213,000	50.30	Pin	154,000	40.70	22,000

Baker Hughes Washover Pipe Strength Chart
N-80 Pipe with Wilson F.J. Connections

Dimensions				Tensile			Torque				
Size OD	Wt	Wall	ID	Collar OD	Effective Area Calculated At	Calculated Yield	Joint Efficiency	Effective Area Calculated At	Calculated Max Working Torque	Joint Efficiency	Rec Make-up
in.	lb/ft	in.	in.	in.		lb	%		ft-lb	%	ft-lb
3-3/4	9.32	0.250	3.250	3-13/16	Box	97,338	44.20	Box	3,424	45.50	2,920
4	11.60	0.286	3.428	4	Box	108,554	40.60	Box	4,058	42.10	3,256
4-1/2	16.60	0.375	3.812	4-9/16	Box	179,615	50.00	Box	6,951	48.10	5,392
4-3/4	15.80	0.365	4.082	4-13/16	Box	194,821	52.60	Box	7,608	47.70	5,848
5	18.00	0.362	4.276	5-1/6	Pin	207,562	49.20	Pin	7,078	37.20	6,224
5-3/8	18.89	0.352	4.670	5-7/16	Box	228,418	51.30	Box	9,991	45.70	6,856
5-1/2	17.00	0.319	4.892	5-9/16	Box	202,888	51.10	Box	8,230	40.40	6,088
5-3/4	19.00	0.330	5.090	5-13/16	Pin	224,139	49.90	Box	11,028	45.90	6,728
6	20.00	0.324	5.352	6-1/16	Pin	233,160	50.40	Box	11,282	43.50	6,992
6-3/8	22.50	0.350	5.675	6-7/16	Pin	276,358	52.10	Box	14,308	45.40	8,288
6-5/8	24.00	0.352	5.921	6-11/16	Pin	247,767	44.60	Pin	16,220	47.10	7,432
7	26.00	0.362	6.276	7-1/8	Pin	283,001	46.90	Pin	18,720	47.10	8,488
7-3/8	28.00	0.375	6.625	7-1/2	Pin	333,469	50.50	Box	21,868	47.80	10,008
7-5/8	29.70	0.375	6.875	7-3/4	Pin	366,722	53.70	Box	23,402	47.60	11,000
8-1/8	38.40	0.468	7.812	8-1/4	Pin	456,311	50.60	Box	37,180	54.60	13,690
8-3/8	34.00	0.400	7.575	8-1/2	Pin	449,309	56.00	Box	29,734	46.80	13,480
8-5/8	36.00	0.400	7.825	8-3/4	Box	465,666	56.30	Box	31,654	46.70	13,968
9	39.00	0.425	8.150	9-1/16	Pin	416,762	45.50	Pin	40,930	52.40	12,504
9-5/8	42.00	0.435	8.755	9-3/4	Box	498,525	49.60	Box	47,196	51.30	14,952
10-3/4	54.00	0.483	9.784	11	Pin	635,140	51.00	Pin	64,032	50.20	19,056
13-3/8	72.00	0.514	12.347	13-7/16	Pin	758,625	45.70	Pin	110,907	51.70	22,760

Determining the Eccentric OD for a Multiple Casing String Cut

The maximum eccentric OD must be considered when attempting to make a cut on multiple casing strings cemented into one another. Unless the casing is stabilized, the different size strings will lay to one side. In order to make a cut, the knives will have to swing out well beyond the OD of the largest size casing. See drawing below.



Max Eccentric OD=2*[OD $_{largest}$ -(t $_{smallest}$+t $_{1st\ intermediate}$ + t $_{2nd\ intermediate}$ + t $_{largest}$ + (ID $_{smallest}$/2))]

Definition Of Variables

Max Eccentric OD - has to be less than the max knife swing in order to perform a successful cut

OD $_{largest}$ - OD of the largest string of casing to be cut

t $_{smallest}$ - the casing wall thickness of the smallest diameter casing

t $_{1st\ intermediate}$ - the casing wall thickness of the 1st intermediate casing (used with 3 and 4 strings)

t $_{2nd\ intermediate}$ - the casing wall thickness of the 2nd intermediate casing (used with 4 strings only)

t $_{largest}$ - the casing wall thickness of the largest diameter casing

ID $_{smallest}$ - ID of the smallest string of casing to be cut

Example: What is the maximum knife swing necessary to cut 9-5/8" 47.0 # casing that is cemented in 13-3/8" 61.0 # and 24" casing with 1" wall.

First, the variables need to be defined:

Max Eccentric OD - this is what we are looking for OD $_{largest}$ - **24"**

t $_{smallest}$ - 9-5/8" 47.0# has a wall thickness of **.472"**

t $_{1st\ intermediate}$ - 13-3/8" 61.0# has a wall thickness of **.430"**

t $_{2nd\ intermediate}$ - **not needed**

t $_{largest}$ - 24" has a wall thickness of **1"**

ID $_{smallest}$ - 9-5/8" 47.0# has an ID of **8.681"**

Therefore:

Max Eccentric OD=2*[OD $_{largest}$- (t $_{smallest}$ + t $_{1st\ intermediate}$ + t $_{2nd\ intermediate}$ + t $_{largest}$ + (ID $_{smallest}$/2))]

Max Eccentric OD=2*[24"- (.472" + .430" + 1" + (8.681"/2))]

Max Eccentric OD=2*[24"- (.472" + .430" + 1" + (4.3405"))]

Max Eccentric OD=2*[24"- (1.902" + 4.3405")]

Max Eccentric OD=2*[24"- 6.2425"]

Max Eccentric OD=2*[17.7575"]

Max Eccentric OD = 35.515"

So the maximum knife swing must exceed 35.515"

IADC Code Roller Cone Comparison Chart

Series		Formations	Type	Features											
				1 Standard Roller Bearing				2 Roller Bearing Air Cooled				4 Sealed Roller Bearing			
				Reed	Hughes	Security	Smith	Reed	Hughes	Security	Smith	Reed	Hughes	Security	Smith
Milled Tooth Bits	1	Soft Formations with Low Compression Strength & High Drillability	1	Y11	RI	S3SJ	DSJ	-	-	-	-	-	GTX-1	S33S	SDS
			2	-	-	S3J	DTJ						-	S33	-
			3	Y13	R3	S4J, S4TJ, S4T	DGJ						GTX-3	S44	
	2	Medium to Medium-Hard Formations with High Compressive Strength	1	-	-	M4NJ	V2J	-	-	-	-	-	-	M44N	-
			2		DR5	-	-							-	
	3	Hard Semi-Abrasive or Abrasive Formations	1	-	-	H7, H7J	-	-	-	-	-	-	-	H77	-
			2		R7									-	
			3		-										
			4												
Tungsten Carbide Insert Bits	4	Soft Formations with Low Compressive Strength & High Drillability	1	-	-	-	-	-	-	-	-	-	-	-	-
			2												
			3												
			4	-	-	-	-	-	-	-	-	-	-	-	-
	5	Soft to Medium Formations with High Compressive Strength	1	-	-	-	-	-	-	-	-	-	-	-	-
			2												
			3												
			4												
	6	Medium-Hard Formations with High Compressive Strength	1	-	-	-	-	-	G44	-	4GA	-	-	-	-
			2						-		-				
			3						G55						
			4						-						
	7	Hard Semi-Abrasive & Abrasive Formations	3	-	-	-	-	-	-	-	7GA	-	-	IADC CODE EXAMPLE HP53: IADC 537 5 = SERIES (SOFT TO MEDIUM INSERT BIT) 3 = TYPE 7 = FEATURE (HP BEARING & GAUGE PROTECTION)	
			4								-				
	8	Extremely Hard & Abrasive Formations	1	-	-	-	-	-	-	-	-	-	-	IADC CODE EXAMPLE HP53: IADC 537 5 = SERIES (SOFT TO MEDIUM INSERT BIT) 3 = TYPE 7 = FEATURE (HP BEARING & GAUGE PROTECTION)	
			2								-				
			3								9JA				

EXPLANATION OF REED BIT TYPE DESIGNATIONS:
PREFIX:
EHP - Enhanced Performance bit with Threaded Ring* journal bearing and Mudpick* II hydraulics
EHT - Enhanced Hardmetal Tooth bit
EMS - Enhanced Motor Series bit with sealed roller bearing
ETS - Enhanced Turbine Series
HP - Premium journal bearing bit
MHP - Motor bit with journal bearing
MHT - Motor tooth bit with journal bearing and AmorClad* hardmetal
MS - Motor bit with sealed roller bearing
SL - Premium small diameter bits
Y - Non-sealed roller bearing bit

SUFFIXES ATTACHED AS PART OF REED NAME:
C - Center Jet
F - High velocity flame-blasted coating
G - Tungsten carbide heel pacs on steel tooth bits
JA - Bits for air applications
K - Shirttail protection
KPR - Premium shirttail protection - raised
L - Steel pads with tungsten carbide inserts
M - Mudpick II hydraulics
T - Gage Guard*

CUTTING STRUCTURE VARIANTS
A - Chisel-shaped inserts
H - Chisel-shaped inserts in 417-517 designs with 3-degree skew
X - Special cutting structure variations that may differ by bit type

DIAMOND ENHANCED SUFFIXES:
DA - Diamond Inner, Gauge & Heel Row Inserts
DG - Diamond Gauge Row Inserts
DGH - Diamond Gauge and Heel Row Inserts
DH - Diamond Heel Row Inserts
DI - Diamond Inner Row Inserts
DIH - Diamond Inner & Heel Row Inserts
DKP - Diamond Premium Shirttail Protection
DKPR - Diamond KPR
DL - Diamond Lug Pads
DN - Diamond Nose
DT - Diamond Gage Guard

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IADC Code Roller Cone Comparison Chart (Continued)

Series		Formations	Type	Features									
				5 Sealed Roller Bearing & Gauge Protection					6 Sealed Friction Bearing				
				Reed	Hughes Elastomer Seal	Hughes Metal Seal	Security	Smith	Reed	Hughes Elastomer Seal	Security	Smith
Milled Tooth Bits	1	Soft Formations with Low Compressi on Strength & High Drillability	1	T11, EMS11G, ETS11G	GTX-G1	MAX-GT1, MX-1, MXL-1	S33SG	MSDSH, MSDSSH	HP11		PSF, S33SF	FDS, FDS+, FDSS+
			2	-	-	-	S33G, SS33G	-	HP12		S33F	FDT
			3	T13, EMS13G, ETS136	GTX-G3	MAX-GT3, MX-3	S44G, SS44G	MSDGH, MSDGHOD, SDGH	HP13	-	S44F	FDG
	2	Medium to Medium-Hard Formations with High Compressi ve Strength	1	ETS21G	-	-	M44NG, MM44NG	SVH, MSVH	HP21	ATJ-4	M44NF	FV
			2	-			-	-	-	-	-	-
	3	Hard Semi-Abrasive or Abrasive Formations	1	-	-	-	-	-	-	-	H77F	-
			2									
			3				H77SG				-	
			4				-					
Tungsten Carbide Insert Bits	4	Soft Formations with Low Compressive Strength & High Drillability	1	T41, EMS41H	GTX-00, GTX-03	MAX GT-00, MAX GT-03, MXL-00, MXL-03	SS80	M01S, M02S, M02T, 02M	-	-	-	-
			2	T42, EMS42H	GTX-03C	-	SS81	05M, M05S, M05T, 05MD				
			3	T43, EMS43A, EMS43H	GTX-09, GTX-09H, GTX-11, GTX-11H,	MAXGT-09, MX-09, MX-09H, MX-11, MX-11S, MX-09G, MXL-09	SS82	10M, 10MD, 12M, 12MD, 12MY, M1S, M10T, M12T, M12TY				
			4	T44, EMS44H, EMS44A	-	MAXGT-18, MX-18	-	15M, 15MD M15S, M15SD M15T	-	-	-	-
	5	Soft to Medium Formations with High Compressive Strength	1	T51, EMS51A, EMS51H	GTX-20, GTX-20G, GTX-20H, GTX-22	MAXGT-20, MX-20, MX-22, MX-20H, MXL-20	SS84, 2SS82	20M, 20MD A1JSL, M2S M2SD, M20T MA1SL	-	-	-	-
			2	T52, EMS52H	GTX-20C	MAXGT-20CG, MX-28G, MX-20C, MX-20CG	-	M27S M27SD				
			3	T53, EMS53, EMS53A, ETS53A	-	MX-30H, MAXGT-30	S86 SS86	M3S				
			4	T54	GTX-30C, GTX-33	MAXGT-30CG, MX-33CG	SS88C	-				
	6	Medium-Hard Formations with High Compressive Strength	1	ETS61A	-	-	M84	4JS	-	-	-	-
			2	EMS62	GT-40C	MX-44C	MM88 M89T	5JS				
			3	-	-	MX-55	-	-				
			4	-	-	-						
	7	Hard Semi-Abrasive & Abrasive Formations	3	IADC CODE EXAMPLE HP53: IADC 537 5 = SERIES (SOFT TO MEDIUM INSERT BIT) 3 = TYPE 7 = FEATURE (HP BEARING & GAUGE PROTECTION)		-	-	-	-	-	-	-
			4									
	8	Extremely Hard & Abrasive Formations	1	IADC CODE EXAMPLE HP53: IADC 537 5 = SERIES (SOFT TO MEDIUM INSERT BIT) 3 = TYPE 7 = FEATURE (HP BEARING & GAUGE PROTECTION)		-	-	-	-	-	-	-
			2									
			3				H100 HH100					

EXPLANATION OF REED BIT TYPE DESIGNATIONS:
PREFIX:
EHP - Enhanced Performance bit with Threaded Ring* journal bearing and Mudpick* II hydraulics
EHT - Enhanced Hardmetal Tooth bit
EMS - Enhanced Motor Series bit with sealed roller bearing
ETS - Enhanced Turbine Series
HP - Premium journal bearing bit
MHP - Motor bit with journal bearing
MHT - Motor tooth bit with journal bearing and AmorClad* hardmetal
MS - Motor bit with sealed roller bearing
SL - Premium small diameter bits
Y - Non-sealed roller bearing bit

SUFFIXES ATTACHED AS PART OF REED NAME:
C - Center Jet
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IADC Code Roller Cone Comparison Chart (Continued)

Series		Formations	Type	Features				
				7 Sealed Friction Bearing & Gauge Protection				
				Reed	Hughes		Security	Smith
					Elastomer Seal	Metal Seal		
Milled Tooth Bits	1	Soft Formations with Low Compression Strength & High Drillability	1	SL11, TC10, TC11, TD11, D11	GT-1, GT-G1H, GT-G1, GT1, STR-1, STX-1	MX-1, MXL-1	ERA, MPSF, S33SGF, MPSF	-
			2	SL12, HP12	-	-	S33GF, S33TGF	FDS2, MFDSH, MFDSSH
			3	D13, HP13G	-	MX-3	S44GF	FDGH, MFDGH, MFDSHOD
	2	Medium to Medium-Hard Formations with High Compressive Strength	1	HP21G	ATJ-G4	-	M44NGF	FVH
			2	-	-		-	-
	3	Hard Semi-Abrasive or Abrasive Formations	1	-	-	-	-	-
			2					
			3					
			4		ATJ-G8			
Tungsten Carbide Insert Bits	4	Soft Formations with Low Compressive Strength & High Drillability	1	TD41H, TD41, TD41A	GT-00, GT-03, H-03, HX-03, HX-03C, STR-03, GX-00, GX-03	MX-00, MX-03, MXL-00, MXL-03	S80F, ERA03, ERA03D	02MF, F02T
			2	TD42H	STR-05C, HX-05C	-	ERA07, S81F	05MF, 05MFD, F05. F05T, F07, MF05, MF05T
			3	SL43H, TD43, TD43A, TD43H, D43, HP43A, HP43H	GT-09, GT-09C, STR-09, STR-09C, STX-09, STX-09C, STX-09H, H-09, H-09C, HX-09, GX-11, GX-11C, GX-11S	MX-09, MX-09G(H)(C), MX-09CG, MX-11, MX-11H, MX11S, MXL-09, MXL-11	ERA13, ERA13C, ERA13D, ERA14C, S82F, S82CF, SS82F	10MF, 10MFD, 12MF, 12MFD, 12MFY, F1, F10D, F10T, F12T, F14T, MF1, MF10T, MF12
			4	TD44, TD44H, TD44X, D44, HP44H, HP44X	GT-18, GT-18C, STR-18, STX-18, H-18, H-18C, H-18H, HX-18, HX-18H, GX-18, GX-18C	MX-18, MX-18H, MX-18C, MXL-18, MXL-18H	S83F, SS83F, ERA17, ERA17D	15MF, 15MFD, F15, F150D, F15T, MA15, MF15, MF15D, MF15t
	5	Soft to Medium Formations with High Compressive Strength	1	SL51H, TD51, TD51A, TD51H, TD51X, D51, HP51, HP51A, HP51H, HP51X	GT-20, GT-20S, STR-20, STX-20, STX-20H, H-20, HX-20, HX-20H, GX-20, GX-22, GX-22S, GX-23, GX-25	MX-20, MX-20G, HX-20H, MX-22, MXL-20	ERA22, ERA22C, ERA22D, HZS84F, S84F, S84CF, SS84F, DS84F	20MF, 25MF, A1, F2, F2D, F2H, F15H, F15HT, F17, F20T, F25, F25A, MF2, MF2D, MF20T, MF15H, MF25T
			2	TD52, TD52A, TD52H, TD52I, TD52X, HP52, HP52X	GT-20C, GT-28, GT-28C, H-28, H-20C, H-28C, HX-28, HX-28C, GX-20C, GX-28, GX-28C	MX-20C, MX-28, MX-28G, MX-20CH, MXL-28, MXL-28C	ERA25, ERA25C, S85F, S85CF	20MFY, F27, F27D, F27A, F27I, MF27, MF27D
			3	SL53, SL53A, TD53, TD53A, TD53B, TD53H, D53, HP53, HP53A, HP53H, JA53	XL-30A, STR-30, STX-30, STX-35, GT-30, GT-30H, GX-30, H-30, HX-30	MX-30, MX-30G, MX-30H, MXL-30	S86F, S86CF, ERA33, ERA33C	30MF, F3, F3D, F3H, F37D, MF3, MF3D, MF3H, MF30T
			4	TD54A, TD54X, TD54	GT-30C, STR-30C, STR-35C, H-30C, STX-30C, H-30CG, HR-38C, HR-30C, HR-35, HR-35C, GX-30C, GX-35, GX-38C, GX-38CH, HR-38CH	MX-35C, MX-35CG	S88F, S88CF, S88FA, S88CFH	F35, F37, F37A, F37H, MF37
	6	Medium-Hard Formations with High Compressive Strength	1	SL61, SL61A, TD61, TD61A, HP61A, HP61H	STR-40, HR-40, HR-44, HR-44G, STX-40, GX-44	MX-40, MX-40G, MX-44, MX-44G	M84F	F4, F4H, F45H, F4A, F47, F47A
			2	SL62, SL62A, SL62X, TD62, TD62A, HP62, HP62A, HP62H, JA62	XL-40A, STR-40C, STR-44C, STR-40CG, STX-44C, HR-40C, HR-44C, HR-44CH, GX-44C, GX-45C	MX-40CG, MX-40C, MX-44CH, MX-44C, MXL-44C	M89TF, M85F, M84CF, M86CF	F47H, F5, MF5, MF5D
			3	SL63, TD63, HP63	XL-50A, STR-50, STR050A, STR-50R, STX-50, HR-50, HR-50R, HR-50RG, HR-55RG, HR-55, HR-55R, HR-55H, GX-55	MX-50R, MX-50RG, MX-50, MX-55	M89F	F57
			4	TD64, TD64H, HP64, HP64H	HR-60, HR-66, HR-68, STX-60	MX-66, MX-68	-	F67
	7	Hard Semi-Abrasive & Abrasive Formations	3	SL73, HP73	STR-70, STX-70, HR-70	-	H87F	F7
			4	TD74, HP74	-	-	-	-
	8	Extremely Hard & Abrasive Formations	1	TD81, HP81	HR-80, HR-88, STX-80, STX-88, STR-80	MX-88	H89F	F8
			2	-	HR-89	-	-	-
			3	SL83, TD83, HP83	HR-90, HR-99, STX-90, STX-99, STR-90, HR-95, GX-95, GX-99	MX-99	H100F	F9

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Roller Cone Availability Chart

Bit Size	in.	3-7/8	4-1/2	4-5/8	4-3/4	5-1/2	5-7/8	6	6-1/8	6-1/4	6-1/2	6-3/4	7-7/8	8-3/8	8-1/2	8-3/4	9-1/2
	mm	*98.4*	*114.3*	*117.5*	*120.6*	*139.7*	*149.2*	*152.4*	*155.6*	*158.8*	*165.1*	*171.4*	*200.0*	*212.7*	*215.9*	*222.2*	*241.3*
Insert Bits	HP Series	HP53A HP63	-	-	-	-	-	-	-	-	-	-	HP41H, HP43, HP43-M, HP43A, HP43A-M, HP44, HP44-M, HP44X, HP44X-M, HP51A, HP51A-M, HP51H, HP51H-M, HP51X, HP51X-M, HP52, HP52A, HP52A-M, HP52-M, HP53, HP53A, HP53A-M, HP53H, HP54, HP61A, HP62, HP62A, HP63, HP64, HP73, HP74	HP51H, HP53, HP53A, HP63, HP73	HP41A, HP43, HP43A, HP51, HP51A, HP53, HP53A, HP62, HP62A, HP63, HP64, HP73, HP74, HP83	HP41H, HP43, HP43A, HP51A, HP51H, HP51X, HP52, HP52A, HP52X, HP53, HP53A, HP61, HP61A, HP62, HP62A, HP64, HP73, HP74, HP83	-
	Air Bits	-	-	-	-	-	-	-	-	-	-	-	HP53JA, HP62JA	-	-	HP62JA	-
Enhanced Performance Bits		-	-	-	-	-	-	-	-	-	-	-	EHT11, D44HT	-	EHT11G, EHP41, EHP41A, EHP43, EHP43A, EHP44H, D44HT, EHP51, EHP51A, EHP53, EHP53A, EHP61	EHT11G, EHP43, EHP43A, EHP44, EHP44H, EHP51A, EHP51X, EHP53, EHP53A	EHT11G
Sabre Bits		-	SL51HKPR, SL53AKPR, SL62KPR	SL62KPR	SL51HKPR, SL53AKPR, SL62KPR	SL73KPR, SL53AKPR	SL12TKPR, SL51HKPR, SL53KPR, SL53AKPR, SL63KPR, SL83KPR	SL12TKPR, SL43HKPR, SL51HKPR, SL53KPR, SL53AKPR, SL61AKPR, SL83KPR	SL12TKPR, SL43HKPR, SL51HKPR, SL53KPR, SL53AKPR, SL61AKPR, SL62AKPR, SL62KPR, SL63KPR, SL73KPR	SL12TKPR, SL43HKPR, SL51HKPR, SL53KPR, SL61AKPR, SL62AKPR	SL11TKPR, SL12TKPR, SL51HKPR, SL53AKPR, SL61KPR, SL62AKPR, SL63KPR, SL73KPR	SL12TKPR, SL51HKPR, SL53AKPR	-	-	-	-	-	-
*Motor Series		-	-	-	-	-	-	-	-	-	-	-	-	MHP13G, MHP61A, MHT13G	MHT11G, MHT13, ETS21G, ETS51, ETS51H	-	-
Mill Tooth Bits	HP Series	-	-	-	-	-	-	-	-	-	-	-	HP11, HP12, HP13G	-	HP11, HP12, HP13G	HP11, HP12, HP13G	-
	Y Series	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Std Pin Con		2 3/8	2 7/8	2 7/8	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	3 1/2	4 1/2	4 1/2	4 1/2	4 1/2	6 5/8
Opt Pin Con		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Roller Cone Availability Chart (Continued)

Bit Size	in.	9-7/8	10-5/8	11	11-5/8	12	12-1/4	13-1/2	13-3/4	14-3/4	15-1/2	16	17	17-1/2	18-1/2	20	22	24	26
	mm	*250.8*	*269.9*	*279.4*	*295.3*	*304.8*	*311.2*	*342.9*	*349.2*	*374.6*	*393.7*	*406.4*	*431.8*	*444.5*	*469.9*	*508*	*558.8*	*609.6*	*660.4*
Insert Bits	HP Series	HP43, HP51, HP51A. HP53, HP53A, HP61, HP61A, HP62A, HP63, HP64, HP74, HP83	HP62, HP62A, HP63, HP83	HP53, HP62	-	HP53A, HP61A	HP43, HP43A, HP51, HP51A, HP51H, HP53, HP53A, HP61, HP61A, HP62, HP62A, HP63, HP64	-	-	HP53A	-	-	-	-	-	-	-	-	-
	Air Bits	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Enhanced Performance Bits		EHT11G, EHP43A, EHP51A, EHP53, EHP53A	EHT11, EHP51H	-	-	-	EHT11G, EHP41H, EHP41HT, EHP43H, EHP44H, EHP51H, EHP52HT, EHP53, EHP53A	-	-	-	-	-	-	-	-	-	-	-	-
Sabre Bits		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
*Motor Series		EMS11GT, MHT11GT	-	-	ETS13G, ETS53A	-	EMS43H, EMS44H, EMS51H, EMS11GT, MHP61A, MHT11G, MHT13G	EMS11G	-	EMS11G, EMS51H, EMS53A, EMS63	MS13G, MS44H	EMS11G, EMS13G, EMS41H, EMS43H, EMS44H, EMS51A	EMS11G, EMS13G, EMS44A	EMS11G, EMS13G, EMS41H, EMS43A, EMS44H, EMS51A, MS53, MS62	EMS11G	-	EMS11G, EMS41H, EMS43H	-	EMS11G, EMS13H
Mill Tooth Bits	HP Series	HP11, HP13G	-	HP11	-	HP13	HP11, HP12, HP13G, HP21G	-	-	-	-	-	-	-	-	-	-	-	-
	Y Series	-	-	-	-	-	Y11	Y11	Y11	Y11	-	-	-	Y11, Y13	-	Y11	Y11, Y13	Y12	Y11, Y13
Std Pin Con		6 5/8	6 5/8	6 5/8	6 5/8	6 5/8	6 5/8	6 5/8	6 5/8	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8	7 5/8	8 5/8	8 5/8	8 5/8	8 5/8
Opt Pin Con		-	-	-	-	-	-	-	-	6 5/8	6 5/8	6 5/8	-	-	6 5/8	7 5/8	7 5/8	7 5/8	7 5/8

IADC Dull Bit Grading

Cutting Structure				Bearings/Seals (5)	Gauge (6)	Other Dull Characteris-tics (7)	Reason Pulled (8)
Inner (1)	Outer (2)	Dull Char. (3)	Location (4)				
1 Inner Cutting Structure (All inner rows.) **2 Outer Cutting Structure** (Gauge row only.) In columns 1 and 2 a linear scale from 0 to 8 is used to describe the condition of the cutting structure according to the following: **Steel Tooth Bits** A measure of lost tool height due to abrasion and/or damage. **0- No Loss of Tooth Height.** **8- Total Loss of Tooth Height.** **Insert Bits** A measure of total cutting structure reduction due to lost, worn and/or broken inserts. **0- No Lost, Worn and/or Broken Inserts.** **8- All Inserts Lost, Worn and/or Broken.**		**Fixed Cutter Bits** A measure of lost, worn and/or broken cutting structure. **0- No Lost, Worn and/or Cutting Structure.** **8- All of Cutting Structure Lost, Worn and/or Broken** **3** Dull Characteristics (Use only cutting structure related codes.) *BC - Broken Cone BF - Bond Failure BT - Broken Teeth/Cutters BU - Balled Up Bit *CC - Cracked Cone *CD - Cone Dragged CI - Cone Interference CR - Cored CT - Chipped Teeth/Cutters ER - Erosion FC - Flat Crested Wear HC - Heat Checking JD - Junk Damage *LC - Lost Cone LN - Lost Nozzle LT - Lost Teeth/Cutters OC - Off-Center Wear PB - Pinched Bit PN - Plugged Nozzle/Flow Passage RG - Rounded Gauge RO - Ring Out SD - Shirttail Damage SS - Self Sharpening Wear TR - Tracking WO - Washed Out Bit WT - Worn Teeth/Cutters NO - No Dull Characteristics * Show Cone # or #'s under location **4**		**4** Location - Roller Cone - Cone # N - Nose Row- 1 M - Middle Row- 2 G - Gauge Row- 3 A - All Rows Fixed Cutter C - Cone S - Shoulder N - Nose G - Gauge T - Taper A - All Areas **5** Bearings / Seals Non-Sealed Bearings A linear scale estimating bearing life used. (0 - No life used, 8 - All life used, i.e. no bearing life remaining.) Sealed Bearings E - Seals Effective F - Seals Failed N - Not Able to Grade X - Fixed Cutter Bit (Bearingless)	**6** Gauge Measure in 1/16 of an inch. I - In Gauge 1/16 - 1/16" Out of Gauge 2/16 - 1/8" Out of Gauge 4/16 - 1/4" Out of Gauge	**7** OTHER DULL CHARACTERISTIC Refer to column 3 codes. **8** Reason Pulled or Run Terminated BHA - Change Bottom Hole Assembly DMF - Downhole Motor Failure DTF - Downhole Tool Failure DSF - Downhole String Failure DST - Drill Stem Test LOG - Run Logs LIH - Left in Hole RIG - Rig Repair CM - Condition Mud CP - Core Point DP - Drill Plug FM - Formation Change HP - Hole Problems HR - Hours on Bit PP - Pump Pressure PR - Penetration Rate TD - Total Depth/Casing Depth TQ - Torque TW - Twist Off WC - Weather Conditions	

Recommended Roller Cone Make-up Torque

Bit Size		API Pin Size		Recommended Torque	
in.	*mm*	in.	*mm*	ft-lb	*Nm*
3-3/4 - 4-1/2	*95.2 - 114.3*	2-3/8	*60.3*	3,000 - 3,500	*4,000 - 4,800*
4-5/8 - 5	*117.5 - 127.0*	2-7/8	*73.0*	6,000 - 7,000	*8,000 - 9,500*
5-1/8 - 7-3/8	*136.5 - 187.3*	3-1/2	*88.9*	7,000 - 9,000	*9,500 - 12,000*
7-5/8 - 9	*193.7 - 228.6*	4-1/2	*114.3*	12,000 - 16,000	*16,000 - 22,000*
9-1/2 - 26	*241.3 - 660.4*	6-5/8	*168.3*	28,000 - 32,000	*38,000 - 43,000*
14-3/4 - 26	*374.6 - 660.4*	7-5/8	*193.7*	34,000 - 40,000	*46,000 - 54,000*

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