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SECTION 1

CAPACITY



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CAPACITY FORMULAS

The tables in this section contain information that is sufficient for normal conditions. If it is necessary to calculate capacity data for conditions not covered by the tables, the following formulas may be used:

$$\text{Barrels per Lin Ft} = 0.0009714\ (D^2)$$

$$\text{Lin Ft per Barrel} = \frac{1029.4}{D^2}$$

$$\text{Cu Ft per Lin Ft} = 0.005454\ (D^2)$$

$$\text{Lin Ft per Cu Ft} = \frac{183.35}{D^2}$$

$$\text{Gallons per Lin Ft} = 0.0408\ (D^2)$$

$$\text{Lin Ft per Gallon} = \frac{24.51}{D^2}$$

WHERE:

D = diameter in inches

* No allowance made for internal restrictions and tool joints.

Size OD (in)	Wt / Ft with Couplings (lb)		ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
	Non-Upset	Upset							
3/4		1.20	.824	.00066	1516.1	.00370	270.04	.0277	36.098
		1.50	.742	.00053	1869.7	.00300	333.02	.0225	44.518
1		1.80	1.049	.00107	935.5	.00600	166.62	.0449	22.274
		2.25	.957	.00089	1124.0	.00500	200.20	.0374	26.762
1 1/4		2.10*	1.410	.00193	517.8	.01084	92.22	.0811	12.328
	2.30	2.40	1.380	.00185	540.5	.01039	96.28	.0777	12.870
		3.02	1.278	.00159	630.3	.00891	112.26	.0666	15.007
1 1/2		2.40*	1.650	.00264	378.1	.01485	67.35	.1111	9.003
	2.75	2.90	1.610	.00252	397.1	.01414	70.73	.1058	9.456
		3.64	1.500	.00219	457.5	.01227	81.49	.0918	10.893
2 1/16	3.20	3.25*	1.751	.00298	335.7	.01672	59.80	.1251	7.994
2 3/8	4.00		2.041	.00405	247.1	.02272	44.01	.1700	5.884
	4.60	4.70	1.995	.00387	258.6	.02171	46.07	.1624	6.158
		5.30	1.939	.00365	273.8	.02051	48.77	.1534	6.519
		5.95	1.867	.00339	295.3	.01901	52.60	.1422	7.032
		6.20	1.853	.00334	299.8	.01873	53.40	.1401	7.138
		7.70	1.703	.00282	354.9	.01582	63.22	.1183	8.451
2 7/8 (2 1/2 Nominal)	6.40	6.50	2.441	.00579	172.8	.03250	30.77	.2431	4.113
		7.90	2.323	.00524	190.8	.02943	33.98	.2202	4.542
	8.60	8.70	2.259	.00496	201.7	.02783	35.93	.2082	4.803
		9.50	2.195	.00468	213.7	.02628	38.06	.1966	5.087
		10.70	2.091	.00425	235.4	.02385	41.93	.1784	5.606
		11.00	2.065	.00414	241.4	.02326	43.00	.1740	5.748
3 1/2 (3 Nominal)	7.70		3.068	.00914	109.4	.05134	19.48	.3840	2.604
	9.20	9.30	2.992	.00870	115.0	.04882	20.48	.3652	2.738
	10.20		2.922	.00829	120.6	.04657	21.47	.3484	2.871
		12.80	2.764	.00742	134.7	.04167	24.00	.3117	3.208
	12.70	12.95	2.750	.00735	136.1	.04125	24.24	.3086	3.241
		15.80	2.548	.00631	158.6	.03541	28.24	.2649	3.775
		16.70	2.480	.00597	167.4	.03354	29.81	.2509	3.985
4 (3 1/2 Nominal)	9.50		3.548	.01223	81.8	.06866	14.57	.5136	1.947
		11.00	3.476	.01174	85.2	.06590	15.17	.4930	2.029
		11.60	3.428	.01142	87.6	.06409	15.60	.4794	2.086
		13.40	3.340	.01084	92.3	.06084	16.44	.4551	2.197
4 1/2 (4 Nominal)	12.60	12.75	3.958	.01522	65.7	.08544	11.70	.6392	1.565
		13.50	3.920	.01493	67.0	.08381	11.93	.6269	1.595
		15.50	3.826	.01422	70.3	.07984	12.53	.5972	1.674
		19.20	3.640	.01287	77.7	.07226	13.84	.5406	1.850

*Integral Joint

CAPACITY of COILED TUBING

Size OD (in)	Wt/Ft (lb)	ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
1	.743	.850	.00070	1424.8	.00394	253.77	.0295	33.924
	.850	.826	.00066	1508.8	.00372	268.73	.0278	35.924
	.920	.810	.00064	1569.0	.00358	279.45	.0268	37.357
	.981	.796	.00062	1624.6	.00346	289.37	.0259	38.683
	1.040	.782	.00059	1683.3	.00334	299.82	.0250	40.080
1 1/4	.944	1.100	.00118	850.7	.00660	151.53	.0494	20.256
	1.083	1.076	.00112	889.1	.00631	158.36	.0472	21.170
	1.175	1.060	.00109	916.2	.00613	163.18	.0458	21.814
	1.254	1.046	.00106	940.9	.00597	167.58	.0446	22.402
	1.332	1.032	.00103	966.6	.00581	172.16	.0435	23.014
	1.506	1.000	.00097	1029.4	.00545	183.35	.0408	24.510
	1.601	.982	.00094	1067.5	.00526	190.13	.0393	25.417
	1.827	.938	.00085	1170.0	.00480	208.39	.0359	27.857
	2.014	.900	.00079	1270.9	.00442	226.36	.0330	30.259
1 1/2	1.429	1.310	.00167	599.8	.00936	106.84	.0700	14.282
	1.527	1.296	.00163	612.9	.00916	109.16	.0685	14.593
	1.623	1.282	.00160	626.3	.00896	111.56	.0671	14.913
	1.840	1.250	.00152	658.8	.00852	117.34	.0638	15.686
	1.960	1.232	.00147	678.2	.00828	120.80	.0619	16.148
	2.245	1.188	.00137	729.4	.00770	129.91	.0576	17.366
	2.483	1.150	.00128	778.4	.00721	138.64	.0540	18.533
1 3/4	1.915	1.532	.00228	438.6	.01280	78.12	.0958	10.443
	2.175	1.500	.00219	457.5	.01227	81.49	.0918	10.893
	2.318	1.482	.00213	468.7	.01198	83.48	.0896	11.160
	2.662	1.438	.00201	497.8	.01128	88.67	.0844	11.853
	2.951	1.400	.00190	525.2	.01069	93.55	.0800	12.505
2	2.207	1.783	.00309	323.8	.01734	57.67	.1297	7.710
	2.509	1.750	.00297	336.1	.01670	59.87	.1250	8.003
	2.677	1.732	.00291	343.2	.01636	61.12	.1224	8.170
	3.080	1.688	.00277	361.3	.01554	64.35	.1163	8.602
	3.419	1.650	.00264	378.1	.01485	67.35	.1111	9.003
2 3/8	3.011	2.125	.00439	228.0	.02463	40.60	.1842	5.428
	3.215	2.107	.00431	231.9	.02421	41.30	.1811	5.521
	3.706	2.063	.00413	241.9	.02321	43.08	.1736	5.759
	4.122	2.025	.00398	251.0	.02236	44.71	.1673	5.977
	4.445	1.995	.00387	258.6	.02171	46.07	.1624	6.158
2 7/8	3.932	2.607	.00660	151.5	.03707	26.98	.2773	3.606
	4.554	2.563	.00638	156.7	.03583	27.91	.2680	3.731
	5.059	2.525	.00619	161.5	.03477	28.76	.2601	3.844
	5.462	2.495	.00605	165.4	.03395	29.45	.2540	3.937
3 1/2	6.230	3.150	.00964	103.7	.05412	18.48	.4048	2.470
	6.733	3.120	.00946	105.7	.05309	18.84	.3972	2.518

CAPACITY of INTERNAL UPSET DRILL PIPE*

Size OD (in)	Wt/Ft Couplings (lb)	ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
2 3/8	4.80	2.000	.00389	257.35	.0218	45.838	.1632	6.1275
	6.65	1.815	.00320	312.49	.0180	55.658	.1344	7.4403
2 7/8	6.45	2.469	.00592	168.87	.0332	30.077	.2487	4.0207
	8.35	2.323	.00524	190.76	.0294	33.977	.2202	4.5420
	10.40	2.151	.00449	222.49	.0252	39.628	.1888	5.2974
3 1/2	8.50	3.063	.00911	109.72	.0512	19.543	.3828	2.6125
	11.20	2.900	.00817	122.40	.0459	21.801	.3431	2.9144
	13.30	2.764	.00742	134.74	.0417	24.000	.3117	3.2082
	15.50	2.602	.00658	152.04	.0369	27.081	.2762	3.6202
4	14.00	3.340	.01084	92.28	.0608	16.436	.4551	2.1971
	15.70	3.240	.01020	98.06	.0573	17.466	.4283	2.3348
4 1/2	12.75	4.000	.01554	64.34	.0873	11.459	.6528	1.5319
	13.75	3.958	.01522	65.71	.0854	11.704	.6392	1.5646
	16.60	3.826	.01422	70.32	.0798	12.525	.5972	1.6744
	20.00	3.640	.01287	77.69	.0723	13.838	.5406	1.8499
5	19.50	4.276	.01776	56.30	.0997	10.028	.7460	1.3405
5 1/2	21.90	4.778	.02218	45.09	.1245	8.031	.9314	1.0736
	24.70	4.670	.02119	47.20	.1189	8.407	.8898	1.1239
5 9/16	19.00	4.975	.02404	41.59	.1350	7.408	1.0098	.9903
	22.20	4.859	.02293	43.60	.1288	7.766	.9633	1.0381
	25.25	4.733	.02176	45.95	.1222	8.185	.9140	1.0941
6 5/8	22.20	6.065	.03573	27.98	.2006	4.984	1.5008	.6663
	25.20	5.965	.03456	28.93	.1941	5.153	1.4517	.6888
	31.90	5.761	.03224	31.02	.1810	5.524	1.3541	.7385
7 5/8	29.25	6.969	.04718	21.20	.2649	3.775	1.9815	.5047
8 5/8	40.00	7.825	.05948	16.81	.3340	2.994	2.4982	.4003

* No allowance made for internal restrictions and tool joints

CAPACITY of HYDRIL INTERNAL FLUSH, EXTERNAL UPSET DRILL PIPE*

Size OD (in)	Wt Per Ft (lb)	ID (in)	Tool Joint OD (in)	Tool Joint ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
2 3/8	6.65	1.815	3 3/8	1 3/4	.00320	312.49	.0180	55.658	.1344	7.4403
2 7/8	10.40	2.151	3 7/8	2 3/32	.00449	222.49	.0252	39.628	.1888	5.2974
3 1/2	13.30	2.764	4 1/4	2 11/16	.00742	134.74	.0417	24.000	.3117	3.2082
	15.50	2.602	4 1/2	2 17/32	.00658	152.04	.0369	27.081	.2762	3.6202
4 1/2	16.60	3.826	6	3 11/16	.01422	70.32	.0798	12.525	.5972	1.6744
	18.15	3.754	6	3 3/4	.01369	73.05	.0769	13.010	.5750	1.7392
	20.00	3.640	6	3 9/16	.01287	77.69	.0723	13.838	.5406	1.8499
5	20.50	4.214	6 5/8	4 3/16	.01725	57.97	.0969	10.325	.7245	1.3802

CAPACITY of HYDRIL INTERNAL AND EXTERNAL UPSET DRILL PIPE*

Size OD (in)	Wt Per Ft (lb)	ID (in)	Tool Joint OD (in)	Tool Joint ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
3 1/2	13.30	2.764	4 5/16	2 7/16	.00742	134.74	.0417	24.000	.3117	3.2082
	15.50	2.602	4 5/16	2 7/16	.00658	152.04	.0369	27.081	.2762	3.6202
4	14.00	3.340	5 9/16	3 1/8	.01084	92.28	.0608	16.436	.4551	2.1971
	15.30	3.244	5 9/16	3 1/8	.01022	97.82	.0574	17.423	.4294	2.3291
4 1/2	16.60	3.826	5 3/4	3 3/32	.01422	70.32	.0798	12.525	.5972	1.6744
	18.15	3.754	5 3/4	3 3/32	.01369	73.05	.0769	13.010	.5750	1.7392
	20.00	3.640	5 3/4	3 3/32	.01287	77.69	.0723	13.838	.5406	1.8499
5 1/2	21.90	4.778	7	4	.02218	45.09	.1245	8.031	.9314	1.0736
	24.70	4.670	7	4	.02119	47.20	.1189	8.407	.8898	1.1239
5	22.20	4.859	7	3	.02293	43.60	.1288	7.766	.9633	1.0381
6 5/8	25.20	5.965	8	5	.03456	28.93	.1941	5.153	1.4517	.6888

CAPACITY of HYDRIL INTERNAL UPSET, EXTERNAL FLUSH DRILL PIPE*

Size OD (in)	Wt Per Ft (lb)	ID (in)	Upset ID (in)	Tool Jt. ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
2 3/8	4.80	2.000	1 1/8	1	.0039	257.35	.0218	45.838	.1632	6.1275
	6.65	1.815	1 1/8	1	.0032	312.49	.0180	55.658	.1344	7.4403
2 7/8	10.40	2.151	1 7/16	1 1/4	.0045	222.49	.0252	39.628	.1888	5.2974
3 1/2	13.30	2.764	1 3/4	1 1/2	.0074	134.74	.0417	24.000	.3117	3.2082
4 1/2	16.60	3.826	2 3/8	2 3/8	.0142	70.32	.0798	12.525	.5972	1.6744
5	20.50	4.214	2 7/16	2 5/16	.0172	57.97	.0969	10.325	.7245	1.3802
5 1/2	21.90	4.778	3 1/8	2 3/4	.0222	45.09	.1245	8.031	.9314	1.0736
5	22.20	4.859	3 1/8	2 3/4	.0229	43.60	.1288	7.766	.9633	1.0381
6 5/8	25.20	5.965	3	3 1/2	.0346	28.93	.1941	5.153	1.4517	.6888

* No allowance made for internal restrictions and tool joints.

CAPACITY of CASING

Size OD (in)	Wt/Ft with Couplings (lb)	ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
4 1/2	9.50	4.090	.0162	61.54	.0912	10.961	.6825	1.4652
	10.50	4.052	.0159	62.70	.0895	11.167	.6699	1.4928
	11.60	4.000	.0155	64.34	.0873	11.459	.6528	1.5319
	13.50	3.920	.0149	66.99	.0838	11.932	.6269	1.5950
	15.10	3.826	.0142	70.32	.0798	12.525	.5972	1.6744
4 3/4	16.00	4.082	.0162	61.78	.0909	11.004	.6798	1.4709
5	11.50	4.560	.0202	49.51	.1134	8.818	.8484	1.1787
	13.00	4.494	.0196	50.97	.1101	9.079	.8240	1.2136
	15.00	4.408	.0189	52.98	.1060	9.436	.7928	1.2614
	18.00	4.276	.0178	56.30	.0997	10.028	.7460	1.3405
	21.00	4.154	.0168	59.66	.0941	10.625	.7040	1.4204
5 1/2	13.00	5.044	.0247	40.46	.1388	7.207	1.0380	.9634
	14.00	5.012	.0244	40.98	.1370	7.299	1.0249	.9757
	15.00	4.974	.0240	41.61	.1349	7.411	1.0094	.9907
	15.50	4.950	.0238	42.01	.1336	7.483	.9997	1.0003
	17.00	4.892	.0232	43.01	.1305	7.661	.9764	1.0242
	20.00	4.778	.0222	45.09	.1245	8.031	.9314	1.0736
	23.00	4.670	.0212	47.20	.1189	8.407	.8898	1.1239
5 3/4	14.00	5.290	.0272	36.79	.1526	6.552	1.1418	.8759
	17.00	5.190	.0262	38.22	.1469	6.807	1.0990	.9099
	19.50	5.090	.0252	39.73	.1413	7.077	1.0571	.9460
	22.50	4.990	.0242	41.34	.1358	7.363	1.0159	.9843
6	15.00	5.524	.0296	33.73	.1664	6.009	1.2450	.8032
	16.00	5.500	.0294	34.03	.1650	6.061	1.2342	.8102
	17.00	5.450	.0289	34.66	.1620	6.173	1.2119	.8252
	18.00	5.424	.0286	34.99	.1605	6.232	1.2003	.8331
	20.00	5.352	.0278	35.94	.1562	6.401	1.1687	.8557
	23.00	5.240	.0267	37.49	.1498	6.678	1.1203	.8926
	26.00	5.132	.0256	39.09	.1436	6.962	1.0746	.9306
6 5/8	17.00	6.135	.0366	27.35	.2053	4.871	1.5356	.6512
	20.00	6.049	.0355	28.13	.1996	5.011	1.4929	.6698
	22.00	5.989	.0348	28.70	.1956	5.112	1.4634	.6833
	24.00	5.921	.0341	29.36	.1912	5.230	1.4304	.6991
	26.00	5.855	.0333	30.03	.1870	5.348	1.3987	.7150
	28.00	5.791	.0326	30.70	.1829	5.467	1.3683	.7309
	29.00	5.761	.0322	31.02	.1810	5.524	1.3541	.7385
	32.00	5.675	.0313	31.96	.1756	5.693	1.3140	.7610

CAPACITY of CASING

Size OD (in)	Wt/Ft with Couplings (lb)	ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
7	17.00	6.538	.0415	24.08	.2331	4.289	1.7440	.5734
	20.00	6.456	.0405	24.70	.2273	4.399	1.7005	.5881
	22.00	6.398	.0398	25.15	.2233	4.479	1.6701	.5988
	23.00	6.366	.0394	25.40	.2210	4.524	1.6535	.6048
	24.00	6.336	.0390	25.64	.2190	4.567	1.6379	.6105
	26.00	6.276	.0383	26.13	.2148	4.655	1.6070	.6223
	28.00	6.214	.0375	26.66	.2106	4.748	1.5754	.6347
	29.00	6.184	.0371	26.92	.2086	4.794	1.5603	.6409
	30.00	6.154	.0368	27.18	.2066	4.841	1.5452	.6472
	32.00	6.094	.0361	27.72	.2025	4.937	1.5152	.6600
	34.00	6.040	.0354	28.22	.1990	5.026	1.4884	.6718
	35.00	6.004	.0350	28.56	.1966	5.086	1.4708	.6799
	38.00	5.920	.0340	29.37	.1911	5.232	1.4299	.6994
	40.00	5.836	.0331	30.22	.1858	5.383	1.3896	.7196
7 5/8	20.00	7.125	.0493	20.28	.2769	3.612	2.0712	.4828
	24.00	7.025	.0479	20.86	.2692	3.715	2.0135	.4967
	26.40	6.969	.0472	21.20	.2649	3.775	1.9815	.5047
	29.70	6.875	.0459	21.78	.2578	3.879	1.9284	.5186
	33.70	6.765	.0445	22.49	.2496	4.006	1.8672	.5356
	39.00	6.625	.0426	23.45	.2394	4.177	1.7907	.5584
8	26.00	7.386	.0530	18.87	.2975	3.361	2.2258	.4493
8 1/8	28.00	7.485	.0544	18.37	.3056	3.273	2.2858	.4375
	32.00	7.385	.0530	18.87	.2975	3.362	2.2252	.4494
	35.50	7.285	.0516	19.40	.2895	3.455	2.1653	.4618
	39.50	7.185	.0501	19.94	.2816	3.552	2.1063	.4748
8 5/8	24.00	8.097	.0637	15.70	.3576	2.797	2.6749	.3738
	28.00	8.017	.0624	16.02	.3505	2.853	2.6223	.3813
	32.00	7.921	.0609	16.41	.3422	2.922	2.5599	.3906
	36.00	7.825	.0595	16.81	.3340	2.994	2.4982	.4003
	38.00	7.775	.0587	17.03	.3297	3.033	2.4664	.4055
	40.00	7.725	.0580	17.25	.3255	3.072	2.4348	.4107
	43.00	7.651	.0569	17.59	.3193	3.132	2.3883	.4187
	44.00	7.625	.0565	17.71	.3171	3.154	2.3721	.4216
	49.00	7.511	.0548	18.25	.3077	3.250	2.3017	.4345
9	34.00	8.290	.0668	14.98	.3748	2.668	2.8039	.3566
	38.00	8.196	.0653	15.32	.3664	2.729	2.7407	.3649
	40.00	8.150	.0645	15.50	.3623	2.760	2.7100	.3690
	45.00	8.032	.0627	15.96	.3519	2.842	2.6321	.3799
	55.00	7.812	.0593	16.87	.3328	3.004	2.4899	.4016

CAPACITY of CASING

Size OD (in)	Wt/Ft with Couplings (lb)	ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
9 5/8	29.30	9.063	.0798	12.53	.4480	2.232	3.3512	.2984
	32.30	9.001	.0787	12.71	.4419	2.263	3.3055	.3025
	36.00	8.921	.0773	12.93	.4341	2.304	3.2470	.3080
	38.00	8.877	.0765	13.06	.4298	2.327	3.2151	.3110
	40.00	8.835	.0758	13.19	.4257	2.349	3.1847	.3140
	43.50	8.755	.0745	13.43	.4180	2.392	3.1273	.3198
	47.00	8.681	.0732	13.66	.4110	2.433	3.0747	.3252
	53.50	8.535	.0708	14.13	.3973	2.517	2.9721	.3365
10	33.00	9.384	.0855	11.69	.4803	2.082	3.5928	.2783
10 3/4	32.75	10.192	.1009	9.91	.5665	1.765	4.2382	.2360
	35.75	10.136	.0998	10.02	.5603	1.785	4.1917	.2386
	40.50	10.050	.0981	10.19	.5509	1.815	4.1209	.2427
	45.50	9.950	.0962	10.40	.5400	1.852	4.0393	.2476
	51.00	9.850	.0942	10.61	.5292	1.890	3.9585	.2526
	54.00	9.784	.0930	10.75	.5221	1.915	3.9056	.2560
	55.50	9.760	.0925	10.81	.5195	1.925	3.8865	.2573
	60.70	9.660	.0906	11.03	.5089	1.965	3.8073	.2627
	65.70	9.560	.0888	11.26	.4985	2.006	3.7289	.2682
11 3/4	38.00	11.150	.1208	8.28	.6781	1.475	5.0724	.1971
	42.00	11.084	.1193	8.38	.6701	1.492	5.0125	.1995
	47.00	11.000	.1175	8.51	.6599	1.515	4.9368	.2026
	54.00	10.880	.1150	8.70	.6456	1.549	4.8297	.2071
	60.00	10.772	.1127	8.87	.6329	1.580	4.7343	.2112
12	40.00	11.384	.1259	7.94	.7068	1.415	5.2875	.1891
13	40.00	12.438	.1503	6.65	.8438	1.185	6.3119	.1584
	45.00	12.360	.1484	6.74	.8332	1.200	6.2330	.1604
	50.00	12.282	.1465	6.82	.8227	1.215	6.1546	.1625
	54.00	12.220	.1451	6.89	.8144	1.228	6.0926	.1641
13 3/8	48.00	12.715	.1570	6.37	.8818	1.134	6.5962	.1516
	54.50	12.615	.1546	6.47	.8679	1.152	6.4928	.1540
	61.00	12.515	.1521	6.57	.8542	1.171	6.3903	.1565
	68.00	12.415	.1497	6.68	.8406	1.190	6.2886	.1590
	72.00	12.347	.1481	6.75	.8315	1.203	6.2199	.1608
	83.00	12.175	.1440	6.94	.8084	1.237	6.0478	.1654
14	50.00	13.344	.1730	5.78	.9712	1.030	7.2649	.1376
16	55.00	15.376	.2297	4.35	1.2894	.776	9.6460	.1037
	65.00	15.250	.2259	4.43	1.2684	.788	9.4886	.1054
	70.00	15.198	.2244	4.46	1.2598	.794	9.4240	.1061
	75.00	15.124	.2222	4.50	1.2475	.802	9.3324	.1072
	84.00	15.010	.2189	4.57	1.2288	.814	9.1922	.1088

CAPACITY of CASING

Size OD (in)	Wt/Ft Coupling (lb)	ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
18	78.00	17.194	.2872	3.48	1.6124	.620	12.0619	.0829
	87.50	17.088	.2836	3.53	1.5926	.628	11.9136	.0839
	96.50	16.986	.2803	3.57	1.5736	.635	11.7718	.0849
18 5/8	78.00	17.855	.3097	3.23	1.7387	.575	13.0071	.0769
	87.50	17.755	.3062	3.27	1.7193	.582	12.8618	.0778
	96.50	17.655	.3028	3.30	1.7000	.588	12.7173	.0786
20	90.00	19.166	.3568	2.80	2.0034	.499	14.9873	.0667
	94.00	19.124	.3553	2.81	1.9947	.501	14.9217	.0670
21 1/2	92.50	20.710	.4166	2.40	2.3392	.427	17.4993	.0571
	103.00	20.610	.4126	2.42	2.3167	.432	17.3307	.0577
	114.00	20.510	.4086	2.45	2.2943	.436	17.1629	.0583
22	92.50	21.222	.4375	2.29	2.4563	.407	18.3752	.0544
	103.00	21.128	.4336	2.31	2.4346	.411	18.2128	.0549
	114.00	21.028	.4295	2.33	2.4116	.415	18.0408	.0554
24	100.50	23.226	.5240	1.91	2.9421	.340	22.0094	.0454
	113.00	23.124	.5194	1.93	2.9164	.343	21.8166	.0458
24 1/2	88.00	23.850	.5526	1.81	3.1024	.322	23.2080	.0431
	100.50	23.750	.5479	1.82	3.0764	.325	23.0138	.0435
	113.00	23.650	.5433	1.84	3.0505	.328	22.8204	.0438

CAPACITY of HYDRIL EXTERNAL UPSET CASING*

Size OD (in)	Wt Per Ft (lb)	ID (in)	Joint Dimensions OD (in)	Joint Dimensions ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
4 1/2	11.60	4.000	4.856	3.920	.0155	64.34	.0873	11.459	.6528	1.5319
	13.50	3.920	4.856	3.840	.0149	66.99	.0838	11.932	.6269	1.5950
5	15.00	4.408	5.370	4.328	.0189	52.98	.1060	9.436	.7928	1.2614
	18.00	4.276	5.370	4.196	.0178	56.30	.0997	10.028	.7460	1.3405
5 1/2	15.50	4.950	5.385	4.870	.0238	42.01	.1336	7.483	.9997	1.0003
	17.00	4.892	5.385	4.812	.0232	43.01	.1305	7.661	.9764	1.0242
	20.00	4.778	5.385	4.698	.0222	45.09	.1245	8.031	.9314	1.0736
	23.00	4.670	5.385	4.590	.0212	47.20	.1189	8.407	.8898	1.1239
6	18.00	5.424	6.375	5.344	.0286	34.99	.1605	6.232	1.2003	.8331
	20.00	5.352	6.375	5.272	.0278	35.94	.1562	6.401	1.1687	.8557
	23.00	5.240	6.375	5.160	.0267	37.49	.1498	6.678	1.1203	.8926
6 5/8	24.00	5.921	7.007	5.811	.0341	29.36	.1912	5.230	1.4304	.6991
	28.00	5.791	7.007	5.711	.0326	30.70	.1829	5.467	1.3683	.7309
	32.00	5.675	7.007	5.595	.0313	31.96	.1756	5.693	1.3140	.7610
7	23.00	6.366	7.379	6.256	.0394	25.40	.2210	4.524	1.6535	.6048
	26.00	6.276	7.379	6.196	.0383	26.13	.2148	4.655	1.6070	.6223
	29.00	6.184	7.379	6.104	.0371	26.92	.2086	4.794	1.5603	.6409
	32.00	6.094	7.379	6.014	.0361	27.72	.2025	4.937	1.5152	.6600
	35.00	6.004	7.379	5.924	.0350	28.56	.1966	5.086	1.4708	.6799
	38.00	5.920	7.379	5.840	.0340	29.37	.1911	5.232	1.4299	.6994
7 5/8	26.42	6.969	8.027	6.859	.0472	21.20	.2649	3.775	1.9815	.5047
	29.70	6.875	8.027	6.795	.0459	21.78	.2578	3.879	1.9284	.5186
	33.70	6.765	8.027	6.685	.0445	22.49	.2496	4.006	1.8672	.5356
	39.00	6.625	8.027	6.545	.0426	23.45	.2394	4.177	1.7907	.5584
8 5/8	32.00	7.921	9.070	7.811	.0609	16.41	.3422	2.922	2.5599	.3906
	36.00	7.825	9.070	7.745	.0595	16.81	.3340	2.994	2.4982	.4003
	40.00	7.725	9.070	7.645	.0580	17.25	.3255	3.072	2.4348	.4107
	44.00	7.625	9.070	7.545	.0565	17.71	.3171	3.154	2.3721	.4216
	49.00	7.511	9.070	7.431	.0548	18.25	.3077	3.250	2.3017	.4345
9 5/8	36.00	8.921	10.107	8.781	.0773	12.93	.4341	2.304	3.2470	.3080
	40.00	8.835	10.107	8.725	.0758	13.19	.4257	2.349	3.1847	.3140
	43.50	8.755	10.107	8.675	.0745	13.43	.4180	2.392	3.1273	.3198
	47.00	8.681	10.107	8.601	.0732	13.66	.4110	2.433	3.0747	.3252
	53.50	8.535	10.107	8.455	.0708	14.13	.3973	2.517	2.9721	.3365

*No allowance made for internal restrictions of joints and upsets

CAPACITY of SPANG-CHALFANT EXTREME LINE CASING**

Size OD (in)	Wt Per Ft (lb)	ID (in)	Joint Dimension OD (in)	Joint Dimension ID (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
4 1/2	11.60	4.000	4.810	3.905	.0155	64.34	.0873	11.459	.6528	1.5319
	13.50	3.920	4.810*	3.823	.0149	66.99	.0838	11.932	.6269	1.5950
5	15.00	4.408	5.360	4.198	.0189	52.98	.1060	9.436	.7928	1.2614
	18.00	4.276	5.360	4.198	.0178	56.30	.0997	10.028	.7460	1.3405
5 1/2	15.50	4.950	5.860*	4.736	.0238	42.01	.1336	7.483	.9997	1.0003
	17.00	4.892	5.860*	4.701	.0232	43.01	.1305	7.661	.9764	1.0242
	20.00	4.778	5.860*	4.701	.0222	45.09	.1245	8.031	.9314	1.0736
	23.00	4.670	5.860*	4.610	.0212	47.20	.1189	8.407	.8898	1.1239
	26.00	4.548	6.045	4.378	.0201	49.77	.1128	8.864	.8439	1.1850
6	18.00	5.424	6.400*	5.248	.0286	34.99	.1605	6.232	1.2003	.8331
	20.00	5.352	6.400*	5.248	.0278	35.94	.1562	6.401	1.1687	.8557
	23.00	5.240	6.400*	5.180	.0267	37.49	.1498	6.678	1.1203	.8926
6 5/8	24.00	5.921	7.000*	5.781	.0341	29.36	.1912	5.230	1.4304	.6991
	28.00	5.791	7.000*	5.731	.0326	30.70	.1829	5.467	1.3683	.7309
	32.00	5.675	7.000*	5.615	.0313	31.96	.1756	5.693	1.3140	.7610
7	23.00	6.366	7.390*	6.171	.0394	25.40	.2210	4.524	1.6535	.6048
	26.00	6.276	7.390*	6.171	.0383	26.13	.2148	4.655	1.6070	.6223
	29.00	6.184	7.390*	6.123	.0371	26.92	.2086	4.794	1.5603	.6409
	32.00	6.094	7.390*	6.032	.0361	27.72	.2025	4.937	1.5152	.6600
	35.00	6.004	7.530*	5.940	.0350	28.56	.1966	5.086	1.4708	.6799
	38.00	5.920	7.530*	5.860	.0340	29.37	.1911	5.232	1.4299	.6994
7 5/8	26.40	6.969	8.010*	6.770	.0472	21.20	.2649	3.775	1.9815	.5047
	29.70	6.875	8.010*	6.770	.0459	21.78	.2578	3.879	1.9284	.5186
	33.70	6.765	8.010*	6.705	.0445	22.49	.2496	4.006	1.8672	.5356
	39.00	6.625	8.010*	6.565	.0426	23.45	.2394	4.177	1.7907	.5584
8 5/8	32.00	7.921	9.120*	7.725	.0609	16.41	.3422	2.922	2.5599	.3906
	36.00	7.825	9.120*	7.725	.0595	16.81	.3340	2.994	2.4982	.4003
	40.00	7.725	9.120*	7.663	.0580	17.25	.3255	3.072	2.4348	.4107
	44.00	7.625	9.120*	7.565	.0565	17.71	.3171	3.154	2.3721	.4216
	49.00	7.511	9.120*	7.451	.0548	18.25	.3077	3.250	2.3017	.4345
9 5/8	40.00	8.835	10.100*	8.665	.0758	13.19	.4257	2.349	3.1847	.3140
	43.50	8.755	10.100*	8.665	.0745	13.43	.4180	2.392	3.1273	.3198
	47.00	8.681	10.100*	8.621	.0732	13.66	.4110	2.433	3.0747	.3252
	53.50	8.535	10.100*	8.475	.0708	14.13	.3973	2.517	2.9721	.3365
10 3/4	45.50	9.950	11.460	9.819	.0962	10.40	.5400	1.852	4.0393	.2476
	51.00	9.850	11.460	9.719	.0942	10.61	.5292	1.890	3.9585	.2526
	55.50	9.760	11.460	9.629	.0925	10.81	.5195	1.925	3.8865	.2573
	60.70	9.660	11.460	9.529	.0906	11.03	.5089	1.965	3.8073	.2627

* Also made with special joints.

** No allowance made for internal restrictions of joints and upsets.

CAPACITY of HOLE

Diameter of Hole (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
2	.0039	257.3500	.0218	45.8375	.1632	6.1275
1/8	.0044	227.9640	.0246	40.6035	.1842	5.4278
1/4	.0049	203.3383	.0276	36.2173	.2066	4.8415
3/8	.0055	182.4975	.0308	32.5053	.2301	4.3453
1/2	.0061	164.7040	.0341	29.3360	.2550	3.9216
5/8	.0067	149.3914	.0376	26.6086	.2811	3.5570
3/4	.0073	136.1190	.0412	24.2446	.3086	3.2410
7/8	.0080	124.5399	.0451	22.1822	.3372	2.9653
3	.0087	114.3778	.0491	20.3722	.3672	2.7233
1/8	.0095	105.4106	.0533	18.7750	.3984	2.5098
1/4	.0103	97.4580	.0576	17.3586	.4310	2.3205
3/8	.0111	90.3726	.0621	16.0966	.4647	2.1518
1/2	.0119	84.0327	.0668	14.9673	.4998	2.0008
5/8	.0128	78.3372	.0717	13.9529	.5361	1.8652
3/4	.0137	73.2018	.0767	13.0382	.5738	1.7429
7/8	.0146	68.5553	.0819	12.2106	.6126	1.6323
4	.0155	64.3375	.0873	11.4594	.6528	1.5319
1/8	.0165	60.4973	.0928	10.7754	.6942	1.4404
1/4	.0175	56.9910	.0985	10.1509	.7370	1.3570
3/8	.0186	53.7809	.1044	9.5791	.7809	1.2805
1/2	.0197	50.8346	.1104	9.0543	.8262	1.2104
5/8	.0208	48.1239	.1167	8.5715	.8727	1.1458
3/4	.0219	45.6244	.1231	8.1263	.9206	1.0863
7/8	.0231	43.3147	.1296	7.7149	.9696	1.0313
5	.0243	41.1760	.1364	7.3340	1.0200	.9804
1/8	.0255	39.1919	.1433	6.9806	1.0716	.9332
1/4	.0268	37.3478	.1503	6.6522	1.1246	.8893
3/8	.0281	35.6309	.1576	6.3463	1.1787	.8484
1/2	.0294	34.0298	.1650	6.0612	1.2342	.8102
5/8	.0307	32.5341	.1726	5.7948	1.2909	.7746
3/4	.0321	31.1350	.1803	5.5456	1.3490	.7413
7/8	.0335	29.8242	.1882	5.3121	1.4082	.7101
6	.0350	28.5944	.1963	5.0931	1.4688	.6808
1/8	.0364	27.4392	.2046	4.8873	1.5306	.6533
1/4	.0379	26.3526	.2130	4.6938	1.5938	.6275
3/8	.0395	25.3293	.2217	4.5115	1.6581	.6031
1/2	.0410	24.3645	.2304	4.3396	1.7238	.5801
5/8	.0426	23.4538	.2394	4.1774	1.7907	.5584
3/4	.0443	22.5931	.2485	4.0241	1.8590	.5379
7/8	.0459	21.7790	.2578	3.8791	1.9284	.5186

CAPACITY of HOLE

Diameter of Hole (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
7	.0476	21.0082	.2672	3.7418	1.9992	.5002
1/8	.0493	20.2775	.2769	3.6117	2.0712	.4828
1/4	.0511	19.5843	.2867	3.4882	2.1446	.4663
3/8	.0528	18.9261	.2966	3.3710	2.2191	.4506
1/2	.0546	18.3004	.3068	3.2596	2.2950	.4357
5/8	.0565	17.7053	.3171	3.1536	2.3721	.4216
3/4	.0583	17.1388	.3276	3.0527	2.4506	.4081
7/8	.0602	16.5990	.3382	2.9565	2.5302	.3952
8	.0622	16.0844	.3491	2.8648	2.6112	.3830
1/8	.0641	15.5933	.3600	2.7774	2.6934	.3713
1/4	.0661	15.1243	.3712	2.6938	2.7770	.3601
3/8	.0681	14.6762	.3825	2.6140	2.8617	.3494
1/2	.0702	14.2478	.3941	2.5377	2.9478	.3392
5/8	.0723	13.8378	.4057	2.4647	3.0351	.3295
3/4	.0744	13.4452	.4176	2.3948	3.1238	.3201
7/8	.0765	13.0692	.4296	2.3278	3.2136	.3112
9	.0787	12.7086	.4418	2.2636	3.3048	.3026
1/8	.0809	12.3628	.4541	2.2020	3.3972	.2944
1/4	.0831	12.0310	.4667	2.1429	3.4910	.2865
3/8	.0854	11.7123	.4794	2.0861	3.5859	.2789
1/2	.0877	11.4061	.4922	2.0316	3.6822	.2716
5/8	.0900	11.1118	.5053	1.9792	3.7797	.2646
3/4	.0923	10.8287	.5185	1.9287	3.8786	.2578
7/8	.0947	10.5563	.5319	1.8802	3.9786	.2513
10	.0971	10.2940	.5454	1.8335	4.0800	.2451
1/8	.0996	10.0414	.5591	1.7885	4.1826	.2391
1/4	.1021	9.7980	.5730	1.7452	4.2866	.2333
3/8	.1046	9.5633	.5871	1.7034	4.3917	.2277
1/2	.1071	9.3370	.6013	1.6630	4.4982	.2223
5/8	.1097	9.1186	.6157	1.6241	4.6059	.2171
3/4	.1123	8.9077	.6303	1.5866	4.7150	.2121
7/8	.1149	8.7041	.6450	1.5503	4.8252	.2072
11	.1175	8.5074	.6599	1.5153	4.9368	.2026
1/8	.1202	8.3173	.6750	1.4814	5.0496	.1980
1/4	.1229	8.1335	.6903	1.4487	5.1638	.1937
3/8	.1257	7.9558	.7057	1.4170	5.2791	.1894
1/2	.1285	7.7837	.7213	1.3864	5.3958	.1853
5/8	.1313	7.6173	.7371	1.3567	5.5137	.1814
3/4	.1341	7.4560	.7530	1.3280	5.6330	.1775
7/8	.1370	7.2999	.7691	1.3002	5.7534	.1738

CAPACITY of HOLE

Diameter of Hole (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
12	.1399	7.1486	.7854	1.2733	5.8752	.1702
1/8	.1428	7.0020	.8018	1.2471	5.9982	.1667
1/4	.1458	6.8598	.8184	1.2218	6.1226	.1633
3/8	.1488	6.7219	.8352	1.1973	6.2481	.1600
1/2	.1518	6.5882	.8522	1.1734	6.3750	.1569
5/8	.1548	6.4583	.8693	1.1503	6.5031	.1538
3/4	.1579	6.3323	.8866	1.1279	6.6326	.1508
7/8	.1610	6.2100	.9041	1.1061	6.7632	.1479
13	.1642	6.0911	.9217	1.0849	6.8952	.1450
1/8	.1673	5.9757	.9395	1.0643	7.0284	.1423
1/4	.1705	5.8634	.9575	1.0444	7.1630	.1396
3/8	.1738	5.7544	.9757	1.0249	7.2987	.1370
1/2	.1770	5.6483	.9940	1.0060	7.4358	.1345
5/8	.1803	5.5451	1.0125	.9877	7.5741	.1320
3/4	.1837	5.4448	1.0311	.9698	7.7138	.1296
7/8	.1870	5.3471	1.0500	.9524	7.8546	.1273
14	.1904	5.2520	1.0690	.9355	7.9968	.1251
1/8	.1938	5.1595	1.0882	.9190	8.1402	.1228
1/4	.1973	5.0694	1.1075	.9029	8.2850	.1207
3/8	.2007	4.9816	1.1270	.8873	8.4309	.1186
1/2	.2042	4.8961	1.1467	.8721	8.5782	.1166
5/8	.2078	4.8127	1.1666	.8572	8.7267	.1146
3/4	.2113	4.7315	1.1866	.8427	8.8766	.1127
7/8	.2149	4.6523	1.2068	.8286	9.0276	.1108
15	.2186	4.5751	1.2272	.8149	9.1800	.1089
1/8	.2222	4.4998	1.2477	.8015	9.3336	.1071
1/4	.2259	4.4263	1.2684	.7884	9.4886	.1054
3/8	.2296	4.3547	1.2893	.7756	9.6447	.1037
1/2	.2334	4.2847	1.3103	.7632	9.8022	.1020
5/8	.2372	4.2164	1.3315	.7510	9.9609	.1004
3/4	.2410	4.1498	1.3529	.7391	10.1210	.0988
7/8	.2448	4.0847	1.3745	.7275	10.2822	.0973
16	.2487	4.0211	1.3962	.7162	10.4448	.0957
1/4	.2565	3.8983	1.4402	.6943	10.7738	.0928
1/2	.2645	3.7811	1.4849	.6735	11.1078	.0900
3/4	.2725	3.6691	1.5302	.6535	11.4470	.0874
17	.2807	3.5619	1.5762	.6344	11.7912	.0848
1/4	.2891	3.4594	1.6229	.6162	12.1406	.0824
1/2	.2975	3.3613	1.6703	.5987	12.4950	.0800
3/4	.3061	3.2673	1.7184	.5819	12.8546	.0778

CAPACITY of HOLE

Diameter of Hole (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
18	.3147	3.1772	1.7671	.5659	13.2192	.0756
1/4	.3235	3.0907	1.8165	.5505	13.5890	.0736
1/2	.3325	3.0077	1.8666	.5357	13.9638	.0716
3/4	.3415	2.9281	1.9174	.5215	14.3438	.0697
19	.3507	2.8515	1.9689	.5079	14.7288	.0679
1/4	.3600	2.7779	2.0210	.4948	15.1190	.0661
1/2	.3694	2.7072	2.0739	.4822	15.5142	.0645
3/4	.3789	2.6391	2.1274	.4701	15.9146	.0628
20	.3886	2.5735	2.1816	.4584	16.3200	.0613
1/4	.3983	2.5103	2.2365	.4471	16.7306	.0598
1/2	.4082	2.4495	2.2920	.4363	17.1462	.0583
3/4	.4182	2.3908	2.3483	.4258	17.5670	.0569
21	.4284	2.3342	2.4052	.4158	17.9928	.0556
1/4	.4386	2.2796	2.4628	.4060	18.4238	.0543
1/2	.4490	2.2269	2.5211	.3966	18.8598	.0530
3/4	.4595	2.1760	2.5801	.3876	19.3010	.0518
22	.4702	2.1269	2.6397	.3788	19.7472	.0506
1/4	.4809	2.0793	2.7001	.3704	20.1986	.0495
1/2	.4918	2.0334	2.7611	.3622	20.6550	.0484
3/4	.5028	1.9889	2.8228	.3543	21.1166	.0474
23	.5139	1.9459	2.8852	.3466	21.5832	.0463
1/4	.5251	1.9043	2.9482	.3392	22.0550	.0453
1/2	.5365	1.8640	3.0120	.3320	22.5318	.0444
3/4	.5479	1.8250	3.0764	.3251	23.0138	.0435
24	.5595	1.7872	3.1415	.3183	23.5008	.0426
1/4	.5712	1.7505	3.2073	.3118	23.9930	.0417
1/2	.5831	1.7150	3.2738	.3055	24.4902	.0408
3/4	.5950	1.6805	3.3409	.2993	24.9926	.0400
25	.6071	1.6470	3.4088	.2934	25.5000	.0392
1/4	.6193	1.6146	3.4773	.2876	26.0126	.0384
1/2	.6317	1.5831	3.5465	.2820	26.5302	.0377
3/4	.6441	1.5525	3.6163	.2765	27.0530	.0370
26	.6567	1.5228	3.6869	.2712	27.5808	.0363
1/4	.6694	1.4939	3.7581	.2661	28.1138	.0356
1/2	.6822	1.4659	3.8301	.2611	28.6518	.0349
3/4	.6951	1.4386	3.9027	.2562	29.1950	.0343
27	.7082	1.4121	3.9760	.2515	29.7432	.0336
1/4	.7213	1.3863	4.0499	.2469	30.2966	.0330
1/2	.7346	1.3612	4.1246	.2424	30.8550	.0324
3/4	.7480	1.3368	4.1999	.2381	31.4186	.0318

CAPACITY of HOLE

Diameter of Hole (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
28	.7616	1.3130	4.2759	.2339	31.9872	.0313
1/4	.7752	1.2899	4.3526	.2297	32.5610	.0307
1/2	.7890	1.2673	4.4300	.2257	33.1398	.0302
3/4	.8029	1.2454	4.5081	.2218	33.7238	.0297
29	.8169	1.2240	4.5868	.2180	34.3128	.0291
1/4	.8311	1.2032	4.6662	.2143	34.9070	.0286
1/2	.8454	1.1829	4.7463	.2107	35.5062	.0282
3/4	.8597	1.1631	4.8271	.2072	36.1106	.0277
30	.8743	1.1438	4.9086	.2037	36.7200	.0272
1/4	.8889	1.1250	4.9908	.2004	37.3346	.0268
1/2	.9036	1.1066	5.0736	.1971	37.9542	.0263
3/4	.9185	1.0887	5.1571	.1939	38.5790	.0259
31	.9335	1.0712	5.2413	.1908	39.2088	.0255
1/4	.9486	1.0541	5.3262	.1878	39.8438	.0251
1/2	.9639	1.0374	5.4117	.1848	40.4838	.0247
3/4	.9792	1.0212	5.4980	.1819	41.1290	.0243
32	.9947	1.0053	5.5849	.1791	41.7792	.0239
1/4	1.0103	.9897	5.6725	.1763	42.4346	.0236
1/2	1.0260	.9746	5.7608	.1736	43.0950	.0232
3/4	1.0419	.9598	5.8498	.1709	43.7606	.0229
33	1.0579	.9453	5.9394	.1684	44.4312	.0225
1/4	1.0739	.9311	6.0297	.1658	45.1070	.0222
1/2	1.0902	.9173	6.1208	.1634	45.7878	.0218
3/4	1.1065	.9037	6.2124	.1610	46.4738	.0215
34	1.1229	.8905	6.3048	.1586	47.1648	.0212
1/4	1.1395	.8775	6.3979	.1563	47.8610	.0209
1/2	1.1562	.8649	6.4916	.1540	48.5622	.0206
3/4	1.1730	.8525	6.5860	.1518	49.2686	.0203
35	1.1900	.8403	6.6812	.1497	49.9800	.0200
1/4	1.2070	.8284	6.7769	.1476	50.6966	.0197
1/2	1.2242	.8168	6.8734	.1455	51.4182	.0194
3/4	1.2415	.8054	6.9706	.1435	52.1450	.0192
36	1.2589	.7943	7.0684	.1415	52.8768	.0189
1/4	1.2765	.7834	7.1669	.1395	53.6138	.0187
1/2	1.2941	.7727	7.2661	.1376	54.3558	.0184
3/4	1.3119	.7622	7.3660	.1358	55.1030	.0181
37	1.3298	.7519	7.4665	.1339	55.8552	.0179
1/4	1.3479	.7419	7.5678	.1321	56.6126	.0177
1/2	1.3660	.7320	7.6697	.1304	57.3750	.0174
3/4	1.3843	.7224	7.7723	.1287	58.1426	.0172

CAPACITY of HOLE

Diameter of Hole (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
38	1.4027	.7129	7.8756	.1270	58.9152	.0170
1/4	1.4212	.7036	7.9795	.1253	59.6930	.0168
1/2	1.4399	.6945	8.0842	.1237	60.4758	.0165
3/4	1.4586	.6856	8.1895	.1221	61.2638	.0163
39	1.4775	.6768	8.2955	.1205	62.0568	.0161
1/4	1.4965	.6682	8.4022	.1190	62.8550	.0159
1/2	1.5156	.6598	8.5096	.1175	63.6582	.0157
3/4	1.5349	.6515	8.6177	.1160	64.4666	.0155
40	1.5542	.6434	8.7264	.1146	65.2800	.0153
1/4	1.5737	.6354	8.8358	.1132	66.0986	.0151
1/2	1.5933	.6276	8.9459	.1118	66.9222	.0149
3/4	1.6131	.6199	9.0567	.1104	67.7510	.0148
41	1.6329	.6124	9.1682	.1091	68.5848	.0146
1/4	1.6529	.6050	9.2803	.1078	69.4238	.0144
1/2	1.6730	.5977	9.3932	.1065	70.2678	.0142
3/4	1.6932	.5906	9.5067	.1052	71.1170	.0141
42	1.7135	.5836	9.6209	.1039	71.9712	.0139
1/4	1.7340	.5767	9.7357	.1027	72.8306	.0137
1/2	1.7546	.5699	9.8513	.1015	73.6950	.0136
3/4	1.7753	.5633	9.9675	.1003	74.5646	.0134
43	1.7961	.5567	10.0844	.0992	75.4392	.0133
1/4	1.8171	.5503	10.2020	.0980	76.3190	.0131
1/2	1.8381	.5440	10.3203	.0969	77.2038	.0130
3/4	1.8593	.5378	10.4393	.0958	78.0938	.0128
44	1.8806	.5317	10.5589	.0947	78.9888	.0127
1/4	1.9021	.5257	10.6793	.0936	79.8890	.0125
1/2	1.9236	.5198	10.8003	.0926	80.7942	.0124
3/4	1.9453	5140	10.9220	.0916	81.7046	.0122
45	1.9671	.5083	11.0444	.0905	82.6200	.0121
1/4	1.9890	.5027	11.1674	.0895	83.5406	.0120
1/2	2.0110	.4972	11.2911	.0886	84.4662	.0118
3/4	2.0332	.4918	11.4156	.0876	85.3970	.0117
46	2.0555	.4865	11.5407	.0866	86.3328	.0116
1/4	2.0779	.4812	11.6664	.0857	87.2738	.0115
1/2	2.1004	.4761	11.7929	.0848	88.2198	.0113
3/4	2.1231	.4710	11.9201	.0839	89.1710	.0112
47	2.1458	.4660	12.0479	.0830	90.1272	.0111
1/4	2.1687	.4611	12.1764	.0821	91.0886	.0110
1/2	2.1917	.4562	12.3056	.0813	92.0550	.0109
3/4	2.2149	.4515	12.4355	.0804	93.0266	.0107

CAPACITY of HOLE

Diameter of Hole (in)	Bbl Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
48	2.2381	.4468	12.5660	.0796	94.0032	.0106
1/4	2.2615	.4422	12.6973	.0788	94.9850	.0105
1/2	2.2850	.4376	12.8292	.0779	95.9718	.0104
3/4	2.3086	.4331	12.9618	.0771	96.9638	.0103
49	2.3323	.4287	13.0951	.0764	97.9608	.0102
1/4	2.3562	.4244	13.2290	.0756	98.9630	.0101
1/2	2.3802	.4201	13.3637	.0748	99.9702	.0100
3/4	2.4043	.4159	13.4990	.0741	100.9826	.0099
50	2.4285	.4118	13.6350	.0733	102.0000	.0098
1/4	2.4528	.4077	13.7717	.0726	103.0226	.0097
1/2	2.4773	.4036	13.9091	.0719	104.0502	.0096
3/4	2.5019	.3997	14.0471	.0712	105.0830	.0095
51	2.5266	.3958	14.1859	.0705	106.1208	.0094
1/4	2.5514	.3919	14.3253	.0698	107.1638	.0093
1/2	2.5764	.3881	14.4654	.0691	108.2118	.0092
3/4	2.6015	.3844	14.6062	.0685	109.2650	.0092
52	2.6267	.3807	14.7476	.0678	110.3232	.0091
1/4	2.6520	.3771	14.8898	.0672	111.3866	.0090
1/2	2.6774	.3735	15.0326	.0665	112.4550	.0089
3/4	2.7030	.3699	15.1761	.0659	113.5286	.0088
53	2.7287	.3665	15.3203	.0653	114.6072	.0087
1/4	2.7545	.3630	15.4652	.0647	115.6910	.0086
1/2	2.7804	.3596	15.6107	.0641	116.7798	.0086
3/4	2.8064	.3563	15.7569	.0635	117.8738	.0085
54	2.8326	.3530	15.9039	.0629	118.9728	.0084
1/4	2.8589	.3498	16.0515	.0623	120.0770	.0083
1/2	2.8853	.3466	16.1997	.0617	121.1862	.0083
3/4	2.9118	.3434	16.3487	.0612	122.3006	.0082
55	2.9385	.3403	16.4984	.0606	123.4200	.0081
1/4	2.9653	.3372	16.6487	.0601	124.5446	.0080
1/2	2.9922	.3342	16.7997	.0595	125.6742	.0080
3/4	3.0192	.3312	16.9514	.0590	126.8090	.0079

SECTION 2

VOLUME AND HEIGHT



VOLUME AND HEIGHT FORMULAS 1
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VOLUME AND HEIGHT FORMULAS

The following tables contain information that is sufficient for normal conditions. If it is necessary to calculate volume and height data for conditions not covered by the tables, the following formulas may be used:

Barrels per Lin Ft = $(D^2-d^2)\ 0.0009714$

Lin Ft per Barrel = $\frac{1029.4}{\left(D^2 - d^2\right)}$

Cu Ft per Lin Ft = $(D^2-d^2)\ 0.005454$

Lin Ft per Cu Ft = $\frac{183.35}{\left(D^2 - d^2\right)}$

Gallons per Lin Ft = $(D^2-d^2)\ 0.0408$

Lin Ft per Gallon = $\frac{24.51}{\left(D^2 - d^2\right)}$

WHERE:

For Volume and Height Between Pipe and Hole
D = diameter of hole, inches
d = outside diameter of pipe, inches

For Volume and Height Between Pipe and Pipe
D = inside diameter of pipe, inches
d = outside diameter of pipe, inches

3/4" Pipe
OD 1.050"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
2 3/8	4.00	2.041	.0030	336.06	.0167	59.856	.1250	8.0015
	4.70	1.995	.0028	357.74	.0157	63.718	.1174	8.5177
	5.95	1.867	.0023	431.94	.0130	76.935	.0972	10.2845
2 7/8	6.50	2.441	.0047	211.99	.0265	37.758	.1981	5.0474
	8.70	2.259	.0039	257.31	.0218	45.831	.1632	6.1266
3 1/2	7.70	3.068	.0081	123.87	.0453	22.063	.3391	2.9494
	9.30	2.992	.0076	131.14	.0428	23.358	.3203	3.1225
	10.20	2.922	.0072	138.44	.0406	24.658	.3034	3.2963
	12.95	2.750	.0063	159.35	.0352	28.382	.2636	3.7941
4 1/2	9.50	4.090	.0152	65.88	.0852	11.734	.6375	1.5686
	10.50	4.052	.0149	67.21	.0835	11.971	.6249	1.6003
	11.60	4.000	.0145	69.10	.0813	12.307	.6078	1.6452
	13.50	3.920	.0139	72.17	.0778	12.854	.5820	1.7183
	15.10	3.826	.0131	76.05	.0738	13.546	.5523	1.8108
5	11.50	4.560	.0191	52.28	.1074	9.311	.8034	1.2447
	13.00	4.494	.0185	53.91	.1041	9.603	.7790	1.2837
	15.00	4.408	.0178	56.17	.1000	10.004	.7478	1.3373
	18.00	4.276	.0167	59.91	.0937	10.671	.7010	1.4265
5 1/2	13.00	5.044	.0236	42.29	.1327	7.533	.9930	1.0070
	14.00	5.012	.0233	42.86	.1310	7.634	.9799	1.0205
	15.50	4.950	.0227	43.99	.1276	7.835	.9547	1.0474
	17.00	4.892	.0222	45.09	.1245	8.031	.9314	1.0736
	20.00	4.778	.0211	47.38	.1185	8.439	.8865	1.1281
	23.00	4.670	.0201	49.71	.1129	8.855	.8448	1.1837
6	15.00	5.524	.0286	35.00	.1604	6.234	1.2000	.8333
	18.00	5.424	.0275	36.35	.1544	6.475	1.1553	.8655
	20.00	5.352	.0268	37.38	.1502	6.657	1.1237	.8899
	23.00	5.240	.0256	39.06	.1437	6.957	1.0753	.9300
	26.00	5.132	.0245	40.79	.1376	7.266	1.0296	.9713
6 5/8	17.00	6.135	.0355	28.18	.1993	5.018	1.4907	.6709
	20.00	6.049	.0345	29.01	.1936	5.167	1.4479	.6907
	24.00	5.921	.0330	30.32	.1852	5.400	1.3854	.7218
	28.00	5.791	.0315	31.74	.1769	5.653	1.3233	.7557
	32.00	5.675	.0302	33.10	.1696	5.895	1.2690	.7880
7	17.00	6.538	.0355	28.18	.1993	5.018	1.4907	.6709
	20.00	6.456	.0345	29.01	.1936	5.167	1.4479	.6907
	23.00	6.366	.0330	30.32	.1852	5.400	1.3854	.7218
	26.00	6.276	.0315	31.74	.1769	5.653	1.3233	.7557
	29.00	6.184	.0302	33.10	.1696	5.895	1.2690	.7880
	32.00	6.094	.0405	24.72	.2271	4.403	1.6990	.5886
	35.00	6.004	.0394	25.37	.2213	4.519	1.6556	.6040
	38.00	5.920	.0383	26.11	.2150	4.651	1.6085	.6217
7 5/8	20.00	7.125	.0372	26.89	.2088	4.789	1.5621	.6402
	24.00	7.025	.0361	27.72	.2026	4.937	1.5153	.6599
	26.40	6.969	.0350	28.57	.1965	5.088	1.4702	.6802
	29.70	6.875	.0339	29.46	.1906	5.247	1.4258	.7014
	33.70	6.765	.0330	30.33	.1851	5.402	1.3849	.7221
	39.00	6.625	.0482	20.73	.2709	3.692	2.0263	.4935

1” Pipe
OD 1.315”

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
2 7/8	6.50	2.441	.0041	243.40	.0231	43.353	.1726	5.7953
	8.70	2.259	.0033	305.11	.0184	54.344	.1377	7.2647
3 1/2	7.70	3.068	.0075	133.98	.0419	23.863	.3135	3.1900
	9.30	2.992	.0070	142.52	.0394	25.385	.2947	3.3934
	10.20	2.922	.0066	151.19	.0371	26.928	.2778	3.5997
	12.95	2.750	.0057	176.47	.0318	31.432	.2380	4.2018
4 1/2	9.50	4.090	.0146	68.63	.0818	12.224	.6120	1.6341
	10.50	4.052	.0143	70.08	.0801	12.482	.5993	1.6685
	11.60	4.000	.0139	72.13	.0778	12.848	.5822	1.7175
	13.50	3.920	.0132	75.48	.0744	13.445	.5564	1.7973
	15.10	3.826	.0125	79.74	.0704	14.203	.5267	1.8987
5	11.50	4.560	.0185	54.00	.1040	9.617	.7778	1.2856
	13.00	4.494	.0179	55.74	.1007	9.929	.7534	1.3272
	15.00	4.408	.0172	58.15	.0965	10.358	.7222	1.3846
	18.00	4.276	.0161	62.18	.0903	11.075	.6754	1.4805
5 1/2	13.00	5.044	.0230	43.41	.1293	7.732	.9675	1.0336
	14.00	5.012	.0227	44.01	.1276	7.839	.9543	1.0478
	15.50	4.950	.0221	45.20	.1242	8.051	.9291	1.0763
	17.00	4.892	.0216	46.36	.1211	8.258	.9059	1.1039
	20.00	4.778	.0205	48.79	.1151	8.690	.8609	1.1616
	23.00	4.670	.0195	51.27	.1095	9.131	.8193	1.2206
6	15.00	5.524	.0280	35.76	.1570	6.370	1.1744	.8515
	18.00	5.424	.0269	37.18	.1510	6.621	1.1298	.8851
	20.00	5.352	.0261	38.25	.1468	6.812	1.0981	.9107
	23.00	5.240	.0250	40.01	.1403	7.126	1.0497	.9526
	26.00	5.132	.0239	41.83	.1342	7.451	1.0040	.9960
6 5/8	17.00	6.135	.0349	28.67	.1958	5.106	1.4651	.6826
	20.00	6.049	.0339	29.53	.1901	5.259	1.4223	.7031
	24.00	5.921	.0324	30.89	.1818	5.501	1.3598	.7354
	28.00	5.791	.0309	32.36	.1735	5.765	1.2977	.7706
	32.00	5.675	.0296	33.78	.1662	6.016	1.2434	.8042
7	17.00	6.538	.0398	25.10	.2237	4.470	1.6735	.5976
	20.00	6.456	.0388	25.77	.2179	4.589	1.6300	.6135
	23.00	6.366	.0377	26.53	.2116	4.726	1.5829	.6318
	26.00	6.276	.0366	27.33	.2054	4.869	1.5365	.6508
	29.00	6.184	.0355	28.19	.1991	5.022	1.4897	.6713
	32.00	6.094	.0344	29.07	.1931	5.178	1.4446	.6922
	35.00	6.004	.0333	30.00	.1872	5.343	1.4002	.7142
	38.00	5.920	.0324	30.90	.1817	5.503	1.3593	.7357
7 5/8	20.00	7.125	.0476	20.99	.2674	3.739	2.0007	.4998
	24.00	7.025	.0463	21.62	.2597	3.850	1.9430	.5147
	26.40	6.969	.0455	21.98	.2555	3.915	1.9110	.5233
	29.70	6.875	.0442	22.61	.2484	4.026	1.8579	.5383
	33.70	6.765	.0428	23.38	.2402	4.164	1.7967	.5566
	39.00	6.625	.0410	24.42	.2299	4.349	1.7202	.5813

1 1/4" Pipe
OD 1.660"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
2 7/8	6.50	2.441	.0031	321.40	.0175	57.245	.1307	7.6525
	8.70	2.259	.0023	438.51	.0128	78.105	.0958	10.4410
3 1/2	7.70	3.068	.0065	154.63	.0363	27.542	.2716	3.6818
	9.30	2.992	.0060	166.13	.0338	29.589	.2528	3.9555
	10.20	2.922	.0056	178.02	.0315	31.708	.2359	4.2387
	12.95	2.750	.0047	214.15	.0262	38.143	.1961	5.0989
4 1/2	9.50	4.090	.0136	73.67	.0762	13.122	.5701	1.7542
	10.50	4.052	.0133	75.34	.0745	13.419	.5575	1.7939
	11.60	4.000	.0129	77.72	.0722	13.844	.5404	1.8506
	13.50	3.920	.0123	81.63	.0688	14.539	.5145	1.9436
	15.10	3.826	.0115	86.63	.0648	15.430	.4848	2.0627
5	11.50	4.560	.0175	57.07	.0984	10.165	.7360	1.3588
	13.00	4.494	.0169	59.02	.0951	10.513	.7116	1.4054
	15.00	4.408	.0162	61.73	.0909	10.996	.6803	1.4699
	18.00	4.276	.0151	66.29	.0847	11.807	.6336	1.5784
5 1/2	13.00	5.044	.0220	45.38	.1237	8.082	.9256	1.0804
	14.00	5.012	.0217	46.03	.1220	8.198	.9125	1.0959
	15.50	4.950	.0211	47.34	.1186	8.431	.8873	1.1271
	17.00	4.892	.0206	48.61	.1155	8.658	.8640	1.1574
	20.00	4.778	.0195	51.28	.1095	9.134	.8190	1.2210
	23.00	4.670	.0185	54.03	.1039	9.623	.7774	1.2864
6	15.00	5.524	.0270	37.08	.1514	6.605	1.1326	.8830
	18.00	5.424	.0259	38.61	.1454	6.876	1.0879	.9192
	20.00	5.352	.0251	39.76	.1412	7.082	1.0562	.9468
	23.00	5.240	.0240	41.67	.1347	7.422	1.0078	.9922
	26.00	5.132	.0229	43.65	.1286	7.775	.9621	1.0394
6 5/8	17.00	6.135	.0339	29.51	.1902	5.256	1.4232	.7026
	20.00	6.049	.0329	30.42	.1845	5.419	1.3805	.7244
	24.00	5.921	.0314	31.87	.1762	5.676	1.3179	.7588
	28.00	5.791	.0299	33.44	.1679	5.957	1.2558	.7963
	32.00	5.675	.0286	34.95	.1606	6.226	1.2016	.8323
7	17.00	6.538	.0388	25.74	.2181	4.585	1.6316	.6129
	20.00	6.456	.0378	26.45	.2123	4.710	1.5881	.6297
	23.00	6.366	.0367	27.25	.2060	4.854	1.5410	.6489
	26.00	6.276	.0356	28.10	.1998	5.005	1.4946	.6691
	29.00	6.184	.0345	29.01	.1935	5.167	1.4478	.6907
	32.00	6.094	.0334	29.94	.1875	5.333	1.4028	.7129
	35.00	6.004	.0323	30.92	.1816	5.507	1.3583	.7362
	38.00	5.920	.0314	31.88	.1761	5.678	1.3175	.7590
7 5/8	20.00	7.125	.0466	21.44	.2618	3.819	1.9588	.5105
	24.00	7.025	.0453	22.09	.2541	3.935	1.9011	.5260
	26.40	6.969	.0445	22.47	.2499	4.002	1.8691	.5350
	29.70	6.875	.0432	23.13	.2428	4.119	1.8160	.5507
	33.70	6.765	.0418	23.93	.2346	4.263	1.7548	.5699
	39.00	6.625	.0400	25.02	.2244	4.457	1.6783	.5958

1 1/2" Pipe
OD 1.900"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
3 1/2	7.70	3.068	.0056	177.40	.0316	31.598	.2367	4.2240
	9.30	2.992	.0052	192.70	.0291	34.322	.2180	4.5881
	10.20	2.922	.0048	208.88	.0269	37.205	.2011	4.9735
	12.95	2.750	.0038	260.44	.0216	46.388	.1613	6.2011
4 1/2	9.50	4.090	.0127	78.47	.0715	13.977	.5352	1.8684
	10.50	4.052	.0124	80.37	.0699	14.314	.5226	1.9135
	11.60	4.000	.0120	83.08	.0676	14.798	.5055	1.9782
	13.50	3.920	.0114	87.56	.0641	15.596	.4797	2.0848
	15.10	3.826	.0107	93.34	.0601	16.625	.4500	2.2225
5	11.50	4.560	.0167	59.91	.0937	10.670	.7011	1.4264
	13.00	4.494	.0161	62.06	.0905	11.054	.6767	1.4777
	15.00	4.408	.0154	65.07	.0863	11.589	.6455	1.5493
	18.00	4.276	.0143	70.15	.0800	12.495	.5987	1.6703
5 1/2	13.00	5.044	.0212	47.15	.1191	8.398	.8907	1.1227
	14.00	5.012	.0209	47.86	.1173	8.524	.8776	1.1395
	15.50	4.950	.0203	49.27	.1139	8.776	.8524	1.1731
	17.00	4.892	.0197	50.66	.1108	9.022	.8291	1.2061
	20.00	4.778	.0187	53.56	.1048	9.540	.7841	1.2753
	23.00	4.670	.0177	56.56	.0993	10.075	.7425	1.3468
6	15.00	5.524	.0261	38.26	.1467	6.815	1.0977	.9110
	18.00	5.424	.0251	39.88	.1408	7.104	1.0530	.9496
	20.00	5.352	.0243	41.12	.1365	7.324	1.0214	.9791
	23.00	5.240	.0232	43.17	.1301	7.688	.9730	1.0278
	26.00	5.132	.0221	45.29	.1240	8.067	.9273	1.0784
6 5/8	17.00	6.135	.0331	30.25	.1856	5.388	1.3884	.7203
	20.00	6.049	.0320	31.21	.1799	5.559	1.3456	.7432
	24.00	5.921	.0305	32.73	.1715	5.830	1.2831	.7794
	28.00	5.791	.0291	34.40	.1632	6.127	1.2210	.8190
	32.00	5.675	.0278	36.00	.1560	6.412	1.1667	.8571
7	17.00	6.538	.0380	26.30	.2134	4.685	1.5967	.6263
	20.00	6.456	.0370	27.04	.2076	4.816	1.5533	.6438
	23.00	6.366	.0359	27.88	.2013	4.967	1.5062	.6639
	26.00	6.276	.0348	28.77	.1951	5.125	1.4597	.6851
	29.00	6.184	.0336	29.72	.1889	5.294	1.4130	.7077
	32.00	6.094	.0326	30.70	.1829	5.469	1.3679	.7311
	35.00	6.004	.0315	31.73	.1769	5.652	1.3235	.7556
	38.00	5.920	.0305	32.75	.1715	5.832	1.2826	.7797
7 5/8	20.00	7.125	.0458	21.83	.2572	3.888	1.9239	.5198
	24.00	7.025	.0444	22.51	.2495	4.008	1.8662	.5358
	26.40	6.969	.0437	22.90	.2452	4.078	1.8342	.5452
	29.70	6.875	.0424	23.58	.2381	4.200	1.7811	.5614
	33.70	6.765	.0409	24.42	.2299	4.349	1.7199	.5814
	39.00	6.625	.0391	25.56	.2197	4.552	1.6434	.6085

2 1/16" Pipe
OD 2.063"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
4 1/2	9.50	4.090	.0121	82.54	.0680	14.701	.5089	1.9652
	10.50	4.052	.0118	84.64	.0663	15.075	.4962	2.0152
	11.60	4.000	.0114	87.65	.0641	15.612	.4792	2.0870
	13.50	3.920	.0108	92.65	.0606	16.503	.4533	2.2060
	15.10	3.826	.0101	99.15	.0566	17.660	.4236	2.3607
4 3/4	16.00	4.082	.0121	82.97	.0677	14.778	.5062	1.9755
5	11.50	4.560	.0161	62.25	.0902	11.087	.6747	1.4821
	13.00	4.494	.0155	64.58	.0869	11.502	.6504	1.5376
	15.00	4.408	.0147	67.84	.0828	12.083	.6191	1.6152
	18.00	4.276	.0136	73.38	.0765	13.070	.5724	1.7472
5 1/2	13.00	5.044	.0206	48.59	.1155	8.654	.8644	1.1569
	14.00	5.012	.0203	49.34	.1138	8.788	.8513	1.1747
	15.50	4.950	.0197	50.84	.1104	9.056	.8261	1.2106
	17.00	4.892	.0191	52.32	.1073	9.319	.8028	1.2457
	20.00	4.778	.0180	55.42	.1013	9.872	.7578	1.3196
	23.00	4.670	.0171	58.65	.0957	10.446	.7162	1.3963
5 3/4	14.00	5.290	.0230	43.38	.1294	7.727	.9681	1.0330
	17.00	5.190	.0220	45.39	.1237	8.084	.9253	1.0807
	19.50	5.090	.0210	47.54	.1181	8.468	.8834	1.1320
	22.50	4.990	.0201	49.86	.1126	8.881	.8423	1.1873
6	15.00	5.524	.0255	39.20	.1432	6.982	1.0714	.9334
	16.00	5.500	.0253	39.60	.1418	7.054	1.0606	.9429
	17.00	5.450	.0247	40.45	.1388	7.205	1.0382	.9632
	18.00	5.424	.0244	40.91	.1372	7.286	1.0267	.9740
	20.00	5.352	.0237	42.21	.1330	7.518	.9950	1.0050
	23.00	5.240	.0225	44.37	.1265	7.902	.9466	1.0564
	26.00	5.132	.0214	46.62	.1204	8.303	.9009	1.1100
6 5/8	17.00	6.135	.0324	30.84	.1821	5.492	1.3620	.7342
	20.00	6.049	.0314	31.84	.1764	5.670	1.3192	.7580
	22.00	5.989	.0307	32.56	.1724	5.800	1.2898	.7753
	24.00	5.921	.0299	33.42	.1680	5.952	1.2567	.7957
	26.00	5.855	.0292	34.28	.1638	6.107	1.2250	.8163
	28.00	5.791	.0284	35.16	.1597	6.262	1.1946	.8371
	32.00	5.675	.0272	36.83	.1524	6.560	1.1403	.8769
7	17.00	6.538	.0374	26.74	.2099	4.764	1.5704	.6368
	20.00	6.456	.0364	27.51	.2041	4.899	1.5269	.6549
	22.00	6.398	.0356	28.07	.2000	4.999	1.4965	.6682
	23.00	6.366	.0352	28.38	.1978	5.055	1.4798	.6758
	24.00	6.336	.0349	28.68	.1957	5.109	1.4643	.6829
	26.00	6.276	.0341	29.30	.1916	5.219	1.4334	.6977
	28.00	6.214	.0334	29.96	.1874	5.336	1.4018	.7134
	29.00	6.184	.0330	30.29	.1854	5.395	1.3866	.7212
	30.00	6.154	.0327	30.62	.1833	5.454	1.3715	.7291
	32.00	6.094	.0319	31.31	.1793	5.576	1.3415	.7454
	34.00	6.040	.0313	31.94	.1758	5.690	1.3148	.7606
	35.00	6.004	.0309	32.38	.1734	5.767	1.2971	.7709
	38.00	5.920	.0299	33.43	.1679	5.955	1.2562	.7960
	40.00	5.836	.0290	34.54	.1625	6.152	1.2160	.8224

2 1/16” Pipe
OD 2.063”

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
7 5/8	20.00	7.125	.0452	22.13	.2537	3.942	1.8976	.5270
	24.00	7.025	.0438	22.83	.2459	4.066	1.8399	.5435
	26.40	6.969	.0430	23.23	.2417	4.138	1.8079	.5531
	29.70	6.875	.0418	23.93	.2346	4.263	1.7548	.5699
	33.70	6.765	.0403	24.80	.2264	4.417	1.6936	.5905
	39.00	6.625	.0385	25.97	.2162	4.626	1.6171	.6184

2” Pipe
OD 2 3/8” (2.375”)

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
4 1/2	9.50	4.090	.0108	92.84	.0605	16.537	.4524	2.2106
	10.50	4.052	.0105	95.51	.0588	17.011	.4397	2.2741
	11.60	4.000	.0101	99.37	.0565	17.699	.4227	2.3660
	13.50	3.920	.0094	105.84	.0530	18.852	.3968	2.5201
	15.10	3.826	.0087	114.41	.0491	20.378	.3671	2.7240
5	11.50	4.560	.0147	67.93	.0826	12.100	.6182	1.6175
	13.00	4.494	.0141	70.72	.0794	12.597	.5939	1.6839
	15.00	4.408	.0134	74.65	.0752	13.296	.5626	1.7774
	18.00	4.276	.0123	81.42	.0690	14.501	.5159	1.9385
5 1/2	13.00	5.044	.0192	51.99	.1080	9.259	.8079	1.2378
	14.00	5.012	.0189	52.85	.1062	9.412	.7948	1.2582
	15.50	4.950	.0183	54.58	.1029	9.721	.7696	1.2994
	17.00	4.892	.0178	56.28	.0998	10.024	.7463	1.3400
	20.00	4.778	.0167	59.89	.0937	10.667	.7013	1.4259
	23.00	4.670	.0157	63.67	.0882	11.340	.6597	1.5159
6	15.00	5.524	.0242	41.38	.1357	7.371	1.0149	.9854
	18.00	5.424	.0231	43.29	.1297	7.711	.9702	1.0307
	20.00	5.352	.0223	44.75	.1255	7.971	.9385	1.0655
	23.00	5.240	.0212	47.18	.1190	8.404	.8901	1.1234
	26.00	5.132	.0201	49.74	.1129	8.859	.8444	1.1842
6 5/8	17.00	6.135	.0311	32.17	.1745	5.730	1.3055	.7660
	20.00	6.049	.0301	33.26	.1688	5.924	1.2628	.7919
	24.00	5.921	.0286	34.99	.1604	6.233	1.2002	.8332
	28.00	5.791	.0271	36.90	.1521	6.573	1.1381	.8787
	32.00	5.675	.0258	38.75	.1449	6.902	1.0839	.9226
7	17.00	6.538	.0360	27.74	.2024	4.941	1.5139	.6606
	20.00	6.456	.0350	28.56	.1966	5.088	1.4704	.6801
	23.00	6.366	.0339	29.51	.1903	5.256	1.4233	.7026
	26.00	6.276	.0328	30.50	.1841	5.433	1.3769	.7263
	29.00	6.184	.0317	31.58	.1778	5.624	1.3301	.7518
	32.00	6.094	.0306	32.68	.1718	5.821	1.2850	.7782
	35.00	6.004	.0295	33.85	.1658	6.030	1.2406	.8061
	38.00	5.920	.0286	35.01	.1604	6.235	1.1998	.8335
7 5/8	20.00	7.125	.0438	22.81	.2461	4.063	1.8411	.5432
	24.00	7.025	.0425	23.55	.2384	4.195	1.7834	.5607
	26.40	6.969	.0417	23.98	.2341	4.271	1.7514	.5710
	29.70	6.875	.0404	24.73	.2270	4.405	1.6983	.5888
	33.70	6.765	.0390	25.66	.2188	4.570	1.6371	.6108
	39.00	6.625	.0372	26.91	.2086	4.793	1.5606	.6408
8 5/8	24.00	8.097	.0582	17.18	.3268	3.060	2.4448	.4090
	28.00	8.017	.0570	17.56	.3198	3.127	2.3922	.4180
	32.00	7.921	.0555	18.03	.3114	3.211	2.3297	.4292
	36.00	7.825	.0540	18.52	.3032	3.298	2.2681	.4409
	40.00	7.725	.0525	19.05	.2947	3.393	2.2046	.4536
	44.00	7.625	.0510	19.61	.2863	3.492	2.1420	.4669
	49.00	7.511	.0493	20.27	.2769	3.611	2.0716	.4827
9 5/8	29.30	9.063	.0743	13.46	.4172	2.397	3.1211	.3204
	32.30	9.001	.0732	13.66	.4111	2.432	3.0754	.3252

2 1/2" Pipe
OD 2 7/8" (2.875")

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
4 1/2	9.50	4.090	.0082	121.64	.0462	21.666	.3453	2.8963
	10.50	4.052	.0079	126.26	.0445	22.488	.3326	3.0062
	11.60	4.000	.0075	133.09	.0422	23.706	.3156	3.1690
	13.50	3.920	.0069	144.97	.0387	25.821	.2897	3.4517
	15.10	3.826	.0062	161.53	.0348	28.771	.2600	3.8461
5	11.50	4.560	.0122	82.17	.0683	14.635	.5111	1.9564
	13.00	4.494	.0116	86.28	.0651	15.368	.4868	2.0544
	15.00	4.408	.0108	92.20	.0609	16.422	.4555	2.1953
	18.00	4.276	.0097	102.75	.0546	18.301	.4088	2.4465
5 1/2	13.00	5.044	.0167	59.93	.0937	10.675	.7008	1.4270
	14.00	5.012	.0164	61.08	.0919	10.878	.6877	1.4542
	15.50	4.950	.0158	63.40	.0886	11.292	.6625	1.5095
	17.00	4.892	.0152	65.71	.0854	11.704	.6392	1.5645
	20.00	4.778	.0141	70.68	.0794	12.590	.5942	1.6830
	23.00	4.670	.0132	76.01	.0739	13.538	.5526	1.8098
6	15.00	5.524	.0216	46.27	.1213	8.241	.9078	1.1016
	18.00	5.424	.0205	48.66	.1154	8.667	.8631	1.1586
	20.00	5.352	.0198	50.51	.1111	8.997	.8314	1.2028
	23.00	5.240	.0186	53.64	.1047	9.553	.7830	1.2771
	26.00	5.132	.0176	56.96	.0986	10.146	.7373	1.3563
6 5/8	17.00	6.135	.0285	35.05	.1602	6.242	1.1984	.8345
	20.00	6.049	.0275	36.34	.1545	6.473	1.1557	.8653
	24.00	5.921	.0260	38.42	.1461	6.843	1.0931	.9148
	28.00	5.791	.0245	40.74	.1378	7.256	1.0310	.9699
	32.00	5.675	.0233	43.00	.1306	7.659	.9768	1.0238
7	17.00	6.538	.0335	29.86	.1881	5.318	1.4068	.7109
	20.00	6.456	.0325	30.81	.1822	5.487	1.3633	.7335
	23.00	6.366	.0313	31.91	.1759	5.683	1.3162	.7598
	26.00	6.276	.0302	33.08	.1697	5.891	1.2698	.7875
	29.00	6.184	.0291	34.34	.1635	6.117	1.2230	.8176
	32.00	6.094	.0280	35.65	.1575	6.351	1.1779	.8489
	35.00	6.004	.0270	37.05	.1515	6.600	1.1335	.8822
	38.00	5.920	.0260	38.44	.1461	6.846	1.0927	.9152
7 5/8	20.00	7.125	.0413	24.22	.2318	4.314	1.7340	.5767
	24.00	7.025	.0399	25.06	.2241	4.463	1.6763	.5966
	26.40	6.969	.0391	25.54	.2198	4.549	1.6443	.6082
	29.70	6.875	.0379	26.39	.2127	4.701	1.5912	.6285
	33.70	6.765	.0364	27.45	.2045	4.889	1.5300	.6536
	39.00	6.625	.0346	28.90	.1943	5.147	1.4535	.6880
8 5/8	24.00	8.097	.0557	17.97	.3125	3.200	2.3377	.4278
	28.00	8.017	.0544	18.38	.3055	3.274	2.2851	.4376
	32.00	7.921	.0529	18.90	.2971	3.366	2.2226	.4499
	36.00	7.825	.0515	19.44	.2889	3.462	2.1610	.4628
	40.00	7.725	.0499	20.02	.2804	3.566	2.0975	.4768
	44.00	7.625	.0484	20.64	.2720	3.676	2.0349	.4914
	49.00	7.511	.0468	21.38	.2626	3.808	1.9645	.5090

2 1/2" Pipe
OD 2 7/8" (2.875")

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
9 5/8	29.30	9.063	.0718	13.93	.4029	2.482	3.0140	.3318
	32.30	9.001	.0707	14.15	.3968	2.520	2.9683	.3369
	36.00	8.921	.0693	14.43	.3890	2.571	2.9098	.3437
	38.00	8.877	.0685	14.59	.3847	2.599	2.8778	.3475
	40.00	8.835	.0678	14.75	.3806	2.627	2.8475	.3512
	43.50	8.755	.0664	15.05	.3730	2.681	2.7901	.3584
	47.00	8.681	.0652	15.34	.3659	2.733	2.7374	.3653
	53.50	8.535	.0627	15.94	.3522	2.839	2.6349	.3795
10	33.00	9.384	.0775	12.90	.4352	2.298	3.2556	.3072
10 3/4	32.75	10.192	.0929	10.77	.5215	1.918	3.9009	.2564
	35.75	10.136	.0918	10.90	.5153	1.941	3.8545	.2594
	40.50	10.050	.0901	11.10	.5058	1.977	3.7837	.2643
	45.50	9.950	.0881	11.34	.4949	2.021	3.7021	.2701
	51.00	9.850	.0862	11.60	.4841	2.066	3.6213	.2761
	54.00	9.784	.0850	11.77	.4770	2.096	3.5684	.2802
	55.50	9.760	.0845	11.83	.4745	2.108	3.5493	.2818
	60.70	9.660	.0826	12.10	.4639	2.156	3.4700	.2882
	65.70	9.560	.0808	12.38	.4534	2.206	3.3916	.2948

3” Pipe
OD 3 1/2” (3.500”)

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
5 1/2	13.00	5.044	.0128	78.03	.0719	13.899	.5382	1.8580
	14.00	5.012	.0125	79.98	.0702	14.246	.5251	1.9044
	15.50	4.950	.0119	84.02	.0668	14.964	.4999	2.0004
	17.00	4.892	.0113	88.12	.0637	15.696	.4766	2.0982
	20.00	4.778	.0103	97.30	.0577	17.331	.4316	2.3168
	23.00	4.670	.0093	107.69	.0521	19.181	.3900	2.5641
6	15.00	5.524	.0177	56.36	.0996	10.039	.7452	1.3419
	18.00	5.424	.0167	59.95	.0936	10.679	.7005	1.4275
	20.00	5.352	.0159	62.79	.0894	11.184	.6689	1.4951
	23.00	5.240	.0148	67.69	.0829	12.056	.6205	1.6117
	26.00	5.132	.0137	73.07	.0768	13.015	.5748	1.7398
6 5/8	17.00	6.135	.0247	40.55	.1385	7.222	1.0358	.9654
	20.00	6.049	.0236	42.29	.1328	7.533	.9931	1.0070
	24.00	5.921	.0222	45.13	.1244	8.039	.9306	1.0746
	28.00	5.791	.0207	48.36	.1161	8.614	.8685	1.1515
	32.00	5.675	.0194	51.58	.1088	9.188	.8142	1.2282
7	17.00	6.538	.0296	33.76	.1663	6.012	1.2442	.8037
	20.00	6.456	.0286	34.98	.1605	6.230	1.2007	.8328
	23.00	6.366	.0275	36.41	.1542	6.484	1.1537	.8668
	26.00	6.276	.0264	37.93	.1480	6.756	1.1072	.9032
	29.00	6.184	.0252	39.60	.1418	7.054	1.0605	.9430
	32.00	6.094	.0242	41.36	.1357	7.367	1.0154	.9849
	35.00	6.004	.0231	43.26	.1298	7.704	.9710	1.0299
	38.00	5.920	.0221	45.16	.1243	8.043	.9301	1.0752
7 5/8	20.00	7.125	.0374	26.73	.2101	4.760	1.5714	.6364
	24.00	7.025	.0360	27.75	.2023	4.942	1.5137	.6606
	26.40	6.969	.0353	28.34	.1981	5.049	1.4817	.6749
	29.70	6.875	.0340	29.40	.1910	5.236	1.4286	.7000
	33.70	6.765	.0326	30.71	.1828	5.471	1.3674	.7313
	39.00	6.625	.0307	32.53	.1726	5.795	1.2909	.7746
8 5/8	24.00	8.097	.0518	19.31	.2908	3.439	2.1751	.4598
	28.00	8.017	.0505	19.79	.2837	3.524	2.1225	.4711
	32.00	7.921	.0490	20.39	.2754	3.631	2.0601	.4854
	36.00	7.825	.0476	21.02	.2671	3.743	1.9984	.5004
	40.00	7.725	.0461	21.71	.2587	3.866	1.9350	.5168
	44.00	7.625	.0446	22.43	.2503	3.995	1.8723	.5341
	49.00	7.511	.0429	23.31	.2409	4.151	1.8019	.5550
9 5/8	29.30	9.063	.0679	14.73	.3812	2.623	2.8514	.3507
	32.30	9.001	.0668	14.97	.3751	2.666	2.8057	.3564
	36.00	8.921	.0654	15.29	.3672	2.723	2.7472	.3640
	40.00	8.835	.0639	15.64	.3589	2.786	2.6849	.3725
	43.50	8.755	.0626	15.98	.3512	2.847	2.6275	.3806
	47.00	8.681	.0613	16.31	.3442	2.905	2.5749	.3884
	53.50	8.535	.0589	16.99	.3305	3.026	2.4723	.4045
10 3/4	32.75	10.192	.0890	11.23	.4997	2.001	3.7384	.2675
	40.50	10.050	.0862	11.60	.4841	2.066	3.6211	.2762
	45.50	9.950	.0843	11.87	.4731	2.113	3.5395	.2825
	51.00	9.850	.0823	12.14	.4623	2.163	3.4587	.2891
	55.50	9.760	.0806	12.40	.4527	2.209	3.3867	.2953

3 1/2" Pipe
OD 4" (4.000")

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
5 1/2	13.00	5.044	.0092	109.02	.0515	19.419	.3852	2.5959
	14.00	5.012	.0089	112.87	.0497	20.104	.3721	2.6875
	15.50	4.950	.0083	121.07	.0464	21.564	.3469	2.8827
	17.00	4.892	.0077	129.78	.0433	23.116	.3236	3.0901
	20.00	4.778	.0066	150.73	.0372	26.848	.2786	3.5890
	23.00	4.670	.0056	177.21	.0317	31.564	.2370	4.2194
6	15.00	5.524	.0141	70.92	.0792	12.632	.5922	1.6886
	18.00	5.424	.0130	76.71	.0732	13.663	.5475	1.8264
	20.00	5.352	.0123	81.41	.0690	14.501	.5159	1.9385
	23.00	5.240	.0111	89.84	.0625	16.002	.4675	2.1392
	26.00	5.132	.0100	99.58	.0564	17.737	.4218	2.3710
6 5/8	17.00	6.135	.0210	47.57	.1180	8.473	.8828	1.1327
	20.00	6.049	.0200	49.99	.1123	8.905	.8401	1.1904
	24.00	5.921	.0185	54.01	.1039	9.621	.7776	1.2861
	28.00	5.791	.0170	58.70	.0956	10.456	.7155	1.3977
	32.00	5.675	.0157	63.52	.0884	11.314	.6612	1.5124
7	17.00	6.538	.0260	38.49	.1459	6.855	1.0912	.9164
	20.00	6.456	.0249	40.09	.1401	7.140	1.0477	.9544
	23.00	6.366	.0238	41.97	.1338	7.476	1.0007	.9993
	26.00	6.276	.0227	44.01	.1276	7.839	.9542	1.0480
	29.00	6.184	.0216	46.28	.1213	8.243	.9075	1.1020
	32.00	6.094	.0205	48.70	.1153	8.674	.8624	1.1596
	35.00	6.004	.0195	51.35	.1093	9.146	.8180	1.2226
	38.00	5.920	.0185	54.05	.1039	9.626	.7771	1.2869
7 5/8	20.00	7.125	.0338	29.61	.1896	5.274	1.4184	.7050
	24.00	7.025	.0324	30.87	.1819	5.498	1.3607	.7349
	26.40	6.969	.0316	31.61	.1776	5.630	1.3287	.7526
	29.70	6.875	.0304	32.92	.1705	5.864	1.2756	.7839
	33.70	6.765	.0289	34.58	.1623	6.160	1.2144	.8234
	39.00	6.625	.0271	36.91	.1521	6.574	1.1379	.8788
8 5/8	24.00	8.097	.0481	20.77	.2703	3.699	2.0221	.4945
	28.00	8.017	.0469	21.32	.2633	3.798	1.9695	.5077
	32.00	7.921	.0454	22.02	.2549	3.923	1.9071	.5244
	36.00	7.825	.0439	22.76	.2467	4.054	1.8454	.5419
	40.00	7.725	.0424	23.57	.2382	4.198	1.7820	.5612
	44.00	7.625	.0409	24.43	.2298	4.351	1.7193	.5816
	49.00	7.511	.0393	25.47	.2204	4.537	1.6489	.6065
9 5/8	29.30	9.063	.0642	15.56	.3607	2.772	2.6984	.3706
	32.30	9.001	.0632	15.83	.3546	2.820	2.6527	.3770
	36.00	8.921	.0618	16.19	.3468	2.884	2.5942	.3855
	40.00	8.835	.0603	16.59	.3385	2.955	2.5319	.3950
	43.50	8.755	.0589	16.97	.3308	3.023	2.4745	.4041
	47.00	8.681	.0577	17.34	.3237	3.089	2.4219	.4129
	53.50	8.535	.0552	18.11	.3100	3.225	2.3193	.4312
10 3/4	32.75	10.192	.0854	11.71	.4793	2.086	3.5854	.2789
	40.50	10.050	.0826	12.11	.4636	2.157	3.4681	.2883
	45.50	9.950	.0806	12.40	.4527	2.209	3.3865	.2953
	51.00	9.850	.0787	12.71	.4419	2.263	3.3057	.3025
	55.50	9.760	.0770	12.99	.4323	2.313	3.2337	.3092

4 1/2" Pipe
OD 4.500"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
5 1/2	13.00	5.044	.0050	198.27	.0283	35.314	.2118	4.7208
	14.00	5.012	.0047	211.37	.0266	37.648	.1987	5.0327
	15.50	4.950	.0041	242.07	.0232	43.116	.1735	5.7637
	17.00	4.892	.0036	279.60	.0201	49.801	.1502	6.6573
	20.00	4.778	.0025	399.10	.0141	71.086	.1052	9.5026
	23.00	4.670	.0015	660.34	.0085	117.615	.0636	15.7226
6	15.00	5.524	.0100	100.29	.0560	17.862	.4188	2.3878
	18.00	5.424	.0089	112.26	.0500	19.995	.3741	2.6729
	20.00	5.352	.0082	122.64	.0458	21.843	.3425	2.9200
	23.00	5.240	.0070	142.82	.0393	25.438	.2941	3.4006
	26.00	5.132	.0059	169.10	.0332	30.119	.2484	4.0263
6 5/8	17.00	6.135	.0169	59.20	.0948	10.544	.7094	1.4096
	20.00	6.049	.0159	63.00	.0891	11.221	.6667	1.5000
	24.00	5.921	.0144	69.52	.0808	12.382	.6042	1.6552
	28.00	5.791	.0129	77.48	.0725	13.801	.5421	1.8448
	32.00	5.675	.0116	86.10	.0652	15.336	.4878	2.0501
7	17.00	6.538	.0219	45.76	.1227	8.151	.9178	1.0896
	20.00	6.456	.0208	48.04	.1169	8.556	.8743	1.1437
	23.00	6.366	.0197	50.77	.1106	9.043	.8273	1.2088
	26.00	6.276	.0186	53.79	.1044	9.580	.7808	1.2807
	29.00	6.184	.0175	57.21	.0981	10.191	.7341	1.3623
	32.00	6.094	.0164	60.96	.0921	10.858	.6890	1.4514
	35.00	6.004	.0153	65.16	.0862	11.606	.6446	1.5515
	38.00	5.920	.0144	69.57	.0807	12.392	.6037	1.6565
7 5/8	20.00	7.125	.0296	33.73	.1664	6.008	1.2450	.8032
	24.00	7.025	.0283	35.37	.1587	6.301	1.1873	.8422
	26.40	6.969	.0275	36.35	.1544	6.475	1.1553	.8656
	29.70	6.875	.0262	38.10	.1473	6.787	1.1022	.9073
	33.70	6.765	.0248	40.34	.1392	7.186	1.0410	.9606
	39.00	6.625	.0230	43.54	.1289	7.756	.9645	1.0368
8 5/8	24.00	8.097	.0440	22.72	.2471	4.046	1.8487	.5409
	28.00	8.017	.0428	23.38	.2401	4.165	1.7961	.5568
	32.00	7.921	.0413	24.23	.2318	4.315	1.7337	.5768
	36.00	7.825	.0398	25.12	.2235	4.474	1.6720	.5981
	40.00	7.725	.0383	26.11	.2150	4.651	1.6086	.6217
	44.00	7.625	.0368	27.17	.2067	4.839	1.5459	.6469
	49.00	7.511	.0351	28.46	.1972	5.070	1.4755	.6777
9 5/8	29.30	9.063	.0601	16.63	.3375	2.963	2.5250	.3960
	32.30	9.001	.0590	16.94	.3314	3.017	2.4793	.4033
	36.00	8.921	.0576	17.35	.3236	3.090	2.4208	.4131
	40.00	8.835	.0562	17.81	.3153	3.172	2.3585	.4240
	43.50	8.755	.0548	18.25	.3076	3.251	2.3011	.4346
	47.00	8.681	.0535	18.68	.3006	3.327	2.2485	.4447
	53.50	8.535	.0511	19.57	.2869	3.486	2.1459	.4660

4 3/4" Inner Pipe
OD 4.750"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
6	15.00	5.524	.0077	129.45	.0434	23.057	.3244	3.0822
	16.00	5.500	.0075	133.91	.0419	23.850	.3137	3.1883
	17.00	5.450	.0069	144.17	.0389	25.679	.2913	3.4328
	18.00	5.424	.0067	150.12	.0374	26.738	.2798	3.5743
	20.00	5.352	.0059	169.27	.0332	30.149	.2481	4.0303
	23.00	5.240	.0048	210.29	.0267	37.456	.1997	5.0070
	26.00	5.132	.0037	272.69	.0206	48.571	.1540	6.4928
6 5/8	17.00	6.135	.0146	68.28	.0822	12.162	.6151	1.6258
	20.00	6.049	.0136	73.38	.0765	13.070	.5723	1.7472
	22.00	5.989	.0129	77.37	.0726	13.780	.5429	1.8421
	24.00	5.921	.0121	82.38	.0682	14.673	.5098	1.9615
	26.00	5.855	.0114	87.84	.0639	15.646	.4781	2.0916
	28.00	5.791	.0107	93.81	.0598	16.709	.4477	2.2336
	29.00	5.761	.0103	96.87	.0580	17.254	.4336	2.3065
	32.00	5.675	.0094	106.75	.0526	19.014	.3934	2.5417
7	17.00	6.538	.0196	51.00	.1101	9.084	.8235	1.2144
	20.00	6.456	.0186	53.85	.1043	9.591	.7800	1.2821
	22.00	6.398	.0178	56.03	.1002	9.980	.7496	1.3341
	23.00	6.366	.0174	57.31	.0980	10.207	.7329	1.3644
	24.00	6.336	.0171	58.55	.0959	10.428	.7174	1.3940
	26.00	6.276	.0163	61.18	.0918	10.897	.6865	1.4567
	28.00	6.214	.0156	64.13	.0875	11.423	.6549	1.5270
	29.00	6.184	.0152	65.65	.0855	11.694	.6397	1.5632
	30.00	6.154	.0149	67.24	.0835	11.976	.6246	1.6010
	32.00	6.094	.0142	70.63	.0795	12.580	.5946	1.6817
	34.00	6.040	.0135	73.96	.0759	13.173	.5679	1.7609
	35.00	6.004	.0131	76.33	.0736	13.596	.5502	1.8175
	38.00	5.920	.0121	82.46	.0681	14.687	.5093	1.9633
	40.00	5.836	.0112	89.54	.0627	15.948	.4691	2.1320
7 5/8	20.00	7.125	.0274	36.50	.1538	6.501	1.1507	.8691
	24.00	7.025	.0260	38.43	.1461	6.844	1.0930	.9150
	26.40	6.969	.0253	39.59	.1418	7.051	1.0610	.9425
	29.70	6.875	.0240	41.67	.1347	7.422	1.0079	.9922
	33.70	6.765	.0225	44.37	.1265	7.902	.9467	1.0563
	39.00	6.625	.0207	48.26	.1163	8.597	.8702	1.1492
8	26.00	7.386	.0311	32.18	.1745	5.731	1.3052	.7662
8 1/8	28.00	7.485	.0325	30.76	.1825	5.479	1.3653	.7325
	32.00	7.385	.0311	32.19	.1744	5.734	1.3046	.7665
	35.50	7.850	.0379	26.35	.2130	4.694	1.5936	.6275
	39.50	7.185	.0282	35.42	.1585	6.309	1.1857	.8434
8 5/8	24.00	8.097	.0418	23.94	.2345	4.264	1.7544	.5700
	28.00	8.017	.0405	24.68	.2275	4.396	1.7018	.5876
	32.00	7.921	.0390	25.62	.2191	4.563	1.6393	.6100
	36.00	7.825	.0376	26.62	.2109	4.742	1.5777	.6339
	38.00	7.775	.0368	27.17	.2066	4.839	1.5458	.6469
	40.00	7.725	.0361	27.74	.2024	4.940	1.5142	.6604
	43.00	7.651	.0349	28.61	.1962	5.097	1.4678	.6813
	44.00	7.625	.0346	28.93	.1940	5.153	1.4516	.6889
	49.00	7.511	.0329	30.41	.1846	5.416	1.3812	.7240

5” Inner Pipe
OD 5.000”

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
7	17.00	6.538	.0172	58.01	.0968	10.332	.7240	1.3812
	20.00	6.456	.0162	61.71	.0910	10.992	.6805	1.4694
	23.00	6.366	.0151	66.30	.0847	11.809	.6335	1.5786
	26.00	6.276	.0140	71.54	.0785	12.743	.5870	1.7035
	29.00	6.184	.0129	77.74	.0722	13.846	.5403	1.8509
	32.00	6.094	.0118	84.82	.0662	15.107	.4952	2.0195
	35.00	6.004	.0107	93.18	.0603	16.596	.4508	2.2185
	38.00	5.920	.0098	102.46	.0548	18.250	.4099	2.4397
7 5/8	20.00	7.125	.0250	39.95	.1405	7.116	1.0512	.9513
	24.00	7.025	.0237	42.27	.1328	7.530	.9935	1.0065
	26.40	6.969	.0229	43.68	.1285	7.780	.9615	1.0400
	29.70	6.875	.0216	46.23	.1214	8.235	.9084	1.1008
	33.70	6.765	.0202	49.57	.1133	8.830	.8472	1.1803
	39.00	6.625	.0184	54.49	.1030	9.706	.7707	1.2975
8 5/8	24.00	8.097	.0394	25.38	.2212	4.520	1.6549	.6043
	28.00	8.017	.0381	26.21	.2142	4.669	1.6023	.6241
	32.00	7.921	.0367	27.27	.2058	4.858	1.5399	.6494
	36.00	7.825	.0352	28.41	.1976	5.061	1.4782	.6765
	40.00	7.725	.0337	29.69	.1891	5.288	1.4148	.7068
	44.00	7.625	.0322	31.06	.1807	5.532	1.3521	.7396
	49.00	7.511	.0305	32.77	.1713	5.836	1.2817	.7802
9 5/8	29.30	9.063	.0555	18.02	.3116	3.209	2.3312	.4290
	32.30	9.001	.0544	18.38	.3055	3.273	2.2855	.4375
	36.00	8.921	.0530	18.86	.2977	3.359	2.2270	.4490
	40.00	8.835	.0515	19.40	.2894	3.456	2.1647	.4620
	43.50	8.755	.0502	19.93	.2817	3.550	2.1073	.4745
	47.00	8.681	.0489	20.44	.2747	3.641	2.0547	.4867
	53.50	8.535	.0465	21.51	.2610	3.832	1.9521	.5123
10 3/4	32.75	10.192	.0766	13.05	.4302	2.325	3.2182	.3107
	40.50	10.050	.0738	13.54	.4145	2.412	3.1009	.3225
	45.50	9.950	.0719	13.91	.4036	2.478	3.0193	.3312
	51.00	9.850	.0700	14.29	.3928	2.546	2.9385	.3403
	55.50	9.760	.0682	14.65	.3832	2.610	2.8665	.3489
	60.70	9.660	.0664	15.07	.3726	2.684	2.7873	.3588
	65.70	9.560	.0645	15.50	.3621	2.762	2.7089	.3692
11 3/4	38.00	11.150	.0965	10.36	.5417	1.846	4.0524	.2468
	42.00	11.084	.0951	10.52	.5337	1.874	3.9925	.2505
	47.00	11.000	.0933	10.72	.5236	1.910	3.9168	.2553
	54.00	10.880	.0907	11.02	.5093	1.964	3.8097	.2625
	60.00	10.772	.0884	11.31	.4965	2.014	3.7143	.2692
13 3/8	48.00	12.715	.1328	7.53	.7454	1.342	5.5762	.1793
	54.50	12.615	.1303	7.67	.7316	1.367	5.4728	.1827
	61.00	12.515	.1279	7.82	.7179	1.393	5.3703	.1862
	68.00	12.415	.1254	7.97	.7043	1.420	5.2686	.1898
	72.00	12.347	.1238	8.08	.6951	1.439	5.1999	.1923

5 1/2" Inner Pipe
OD 5.500"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
7	17.00	6.538	.0121	82.38	.0682	14.673	.5098	1.9615
	20.00	6.456	.0111	90.06	.0623	16.041	.4663	2.1444
	23.00	6.366	.0100	100.18	.0560	17.843	.4193	2.3852
	26.00	6.276	.0089	112.65	.0498	20.064	.3728	2.6822
	29.00	6.184	.0078	128.81	.0436	22.942	.3261	3.0669
	32.00	6.094	.0067	149.47	.0376	26.623	.2810	3.5590
	35.00	6.004	.0056	177.54	.0316	31.623	.2366	4.2273
	38.00	5.920	.0047	214.62	.0262	38.227	.1957	5.1101
7 5/8	20.00	7.125	.0199	50.18	.1119	8.937	.8370	1.1947
	24.00	7.025	.0186	53.89	.1042	9.599	.7793	1.2832
	26.40	6.969	.0178	56.20	.0999	10.010	.7473	1.3381
	29.70	6.875	.0165	60.50	.0928	10.775	.6942	1.4404
	33.70	6.765	.0151	66.35	.0846	11.817	.6330	1.5797
	39.00	6.625	.0133	75.47	.0744	13.441	.5565	1.7968
8 5/8	24.00	8.097	.0343	29.15	.1926	5.192	1.4407	.6941
	28.00	8.017	.0330	30.26	.1856	5.389	1.3881	.7204
	32.00	7.921	.0316	31.68	.1772	5.643	1.3257	.7543
	36.00	7.825	.0301	33.23	.1690	5.918	1.2640	.7911
	40.00	7.725	.0286	34.98	.1605	6.231	1.2006	.8329
	44.00	7.625	.0271	36.91	.1521	6.574	1.1379	.8788
	49.00	7.511	.0254	39.34	.1427	7.007	1.0675	.9367
9 5/8	29.30	9.063	.0504	19.84	.2830	3.534	2.1170	.4724
	32.30	9.001	.0493	20.28	.2769	3.612	2.0713	.4828
	36.00	8.921	.0479	20.87	.2691	3.716	2.0128	.4968
	40.00	8.835	.0464	21.53	.2607	3.835	1.9505	.5127
	43.50	8.755	.0451	22.19	.2531	3.952	1.8931	.5282
	47.00	8.681	.0438	22.82	.2460	4.065	1.8405	.5433
	53.50	8.535	.0414	24.17	.2323	4.304	1.7379	.5754
10 3/4	32.75	10.192	.0715	13.98	.4016	2.490	3.0040	.3329
	40.50	10.050	.0687	14.55	.3859	2.591	2.8867	.3464
	45.50	9.950	.0668	14.97	.3750	2.667	2.8051	.3565
	51.00	9.850	.0649	15.42	.3642	2.746	2.7243	.3671
	55.50	9.760	.0631	15.84	.3546	2.820	2.6523	.3770
	60.70	9.660	.0613	16.32	.3440	2.907	2.5731	.3886
	65.70	9.560	.0594	16.84	.3335	2.999	2.4947	.4009
11 3/4	38.00	11.150	.0914	10.94	.5131	1.949	3.8382	.2605
	42.00	11.084	.0900	11.12	.5051	1.980	3.7783	.2647
	47.00	11.000	.0882	11.34	.4950	2.020	3.7026	.2701
	54.00	10.880	.0856	11.68	.4806	2.081	3.5955	.2781
	60.00	10.772	.0833	12.00	.4679	2.137	3.5001	.2857
13 3/8	48.00	12.715	.1277	7.83	.7168	1.395	5.3620	.1865
	54.50	12.615	.1252	7.99	.7030	1.423	5.2586	.1902
	61.00	12.515	.1228	8.15	.6893	1.451	5.1561	.1939
	68.00	12.415	.1203	8.31	.6757	1.480	5.0544	.1978
	72.00	12.347	.1187	8.42	.6665	1.500	4.9857	.2006

5 3/4" Inner Pipe
OD 5.750"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
7	17.00	6.538	.0094	106.31	.0528	18.935	.3951	2.5313
	20.00	6.456	.0084	119.46	.0470	21.277	.3516	2.8442
	22.00	6.398	.0076	130.77	.0429	23.292	.3212	3.1136
	23.00	6.366	.0073	137.93	.0407	24.566	.3045	3.2840
	24.00	6.336	.0069	145.35	.0386	25.888	.2890	3.4607
	26.00	6.276	.0061	162.73	.0345	28.985	.2581	3.8747
	28.00	6.214	.0054	185.43	.0303	33.028	.2265	4.4152
	29.00	6.184	.0050	198.75	.0282	35.400	.2113	4.7322
	30.00	6.154	.0047	214.05	.0262	38.125	.1962	5.0965
	32.00	6.094	.0040	252.65	.0222	45.001	.1662	6.0157
	34.00	6.040	.0033	301.07	.0186	53.625	.1395	7.1686
	35.00	6.004	.0029	344.80	.0163	61.413	.1218	8.2096
	38.00	5.920	.0019	518.88	.0108	92.419	.0809	12.3545
	40.00	5.836	.0010	33.14	.0054	184.013	.0407	24.5987
7 5/8	20.00	7.125	.0172	58.15	.0966	10.357	.7223	1.3845
	24.00	7.025	.0158	63.20	.0888	11.257	.6646	1.5048
	26.40	6.969	.0151	66.39	.0846	11.826	.6326	1.5808
	29.70	6.875	.0138	72.48	.0775	12.909	.5795	1.7257
	33.70	6.765	.0123	81.04	.0693	14.434	.5183	1.9295
	39.00	6.625	.0105	95.07	.0591	16.933	.4418	2.2635
8	26.00	7.386	.0209	47.90	.1172	8.532	.8768	1.1405
8 1/8	28.00	7.485	.0223	44.83	.1252	7.985	.9369	1.0674
	32.00	7.385	.0209	47.93	.1171	8.538	.8762	1.1413
	35.50	7.285	.0194	51.45	.1091	9.164	.8164	1.2250
	39.50	7.185	.0180	55.46	.1012	9.878	.7573	1.3205
8 5/8	24.00	8.097	.0316	31.67	.1772	5.642	1.3260	.7542
	28.00	8.017	.0303	32.98	.1702	5.875	1.2734	.7853
	32.00	7.921	.0288	34.68	.1619	6.178	1.2109	.8258
	36.00	7.825	.0274	36.54	.1536	6.509	1.1493	.8701
	40.00	7.725	.0259	38.68	.1451	6.889	1.0858	.9210
	43.00	7.651	.0247	40.41	.1389	7.197	1.0394	.9621
	44.00	7.625	.0244	41.05	.1368	7.311	1.0232	.9773
	49.00	7.511	.0227	44.08	.1274	7.851	.9528	1.0496
9	34.00	8.290	.0346	28.87	.1945	5.141	1.4550	.6873
	38.00	8.196	.0331	30.18	.1860	5.375	1.3918	.7185
	40.00	8.150	.0324	30.86	.1819	5.496	1.3611	.7347
	45.00	8.032	.0306	32.73	.1715	5.830	1.2832	.7793
	55.00	7.812	.0272	36.81	.1525	6.556	1.1410	.8765
9 5/8	29.30	9.063	.0477	20.98	.2677	3.736	2.0023	.4994
	32.30	9.001	.0466	21.47	.2615	3.823	1.9566	.5111
	36.00	8.921	.0452	22.13	.2537	3.941	1.8981	.5269
	40.00	8.835	.0437	22.88	.2454	4.075	1.8358	.5447
	43.50	8.755	.0423	23.62	.2377	4.206	1.7784	.5623
	47.00	8.681	.0411	24.34	.2307	4.335	1.7257	.5795
	53.50	8.535	.0386	25.87	.2170	4.609	1.6232	.6161

5 3/4” Inner Pipe
OD 5.750”

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe			Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
Size OD In	Wt/Ft with Couplings Lb	ID In						
10	33.00	9.284	.0516	19.38	.2898	3.451	2.1677	.4613
10 3/4	32.75	10.192	.0688	14.54	.3862	2.589	2.8892	.3461
	35.75	10.136	.0677	14.77	.3800	2.631	2.8428	.3518
	40.50	10.050	.0660	15.15	.3705	2.699	2.7720	.3608
	45.50	9.950	.0641	15.61	.3596	2.781	2.6904	.3717
	51.00	9.850	.0621	16.09	.3488	2.867	2.6096	.3832
	54.00	9.784	.0609	16.43	.3418	2.926	2.5567	.3911
	55.50	9.760	.0604	16.55	.3392	2.948	2.5376	.3941
	60.70	9.660	.0585	17.08	.3286	3.043	2.4583	.4068
	65.70	9.560	.0567	17.65	.3181	3.143	2.3799	.4202

6” Inner Pipe
OD 6.000”

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
7 5/8	20.00	7.125	.0143	69.72	.0805	12.417	.6024	1.6599
	24.00	7.025	.0130	77.11	.0728	13.733	.5447	1.8359
	26.40	6.969	.0122	81.91	.0685	14.590	.5127	1.9504
	29.70	6.875	.0109	91.38	.0614	16.275	.4596	2.1756
	33.70	6.765	.0095	105.41	.0533	18.776	.3984	2.5099
	39.00	6.625	.0077	130.46	.0430	23.236	.3219	3.1062
8 5/8	24.00	8.097	.0287	34.82	.1612	6.202	1.2061	.8291
	28.00	8.017	.0275	36.41	.1542	6.485	1.1535	.8669
	32.00	7.921	.0260	38.49	.1459	6.856	1.0911	.9165
	36.00	7.825	.0245	40.80	.1376	7.267	1.0294	.9714
	40.00	7.725	.0230	43.48	.1291	7.744	.9660	1.0352
	44.00	7.625	.0215	46.49	.1208	8.281	.9033	1.1070
	49.00	7.511	.0198	50.42	.1113	8.981	.8329	1.2006
9 5/8	29.30	9.063	.0448	22.31	.2516	3.974	1.8824	.5312
	32.30	9.001	.0437	22.87	.2455	4.073	1.8367	.5444
	36.00	8.921	.0423	23.62	.2377	4.207	1.7782	.5624
	40.00	8.835	.0409	24.48	.2294	4.360	1.7159	.5828
	43.50	8.755	.0395	25.32	.2217	4.510	1.6585	.6030
	47.00	8.681	.0382	26.15	.2147	4.658	1.6059	.6227
	53.50	8.535	.0358	27.94	.2010	4.976	1.5033	.6652
10 3/4	32.75	10.192	.0659	15.17	.3702	2.701	2.7694	.3611
	40.50	10.050	.0631	15.84	.3545	2.821	2.6521	.3771
	45.50	9.950	.0612	16.34	.3436	2.910	2.5705	.3890
	51.00	9.850	.0593	16.87	.3328	3.005	2.4897	.4017
	55.50	9.760	.0576	17.37	.3232	3.094	2.4177	.4136
	60.70	9.660	.0557	17.96	.3126	3.199	2.3385	.4276
	65.70	9.560	.0538	18.58	.3021	3.310	2.2601	.4425
11 3/4	38.00	11.150	.0858	11.66	.4817	2.076	3.6036	.2775
	42.00	11.084	.0844	11.85	.4737	2.111	3.5437	.2822
	47.00	11.000	.0826	12.11	.4636	2.157	3.4680	.2884
	54.00	10.880	.0800	12.50	.4493	2.226	3.3609	.2975
	60.00	10.772	.0777	12.86	.4365	2.291	3.2655	.3062
13 3/8	48.00	12.715	.1221	8.19	.6854	1.459	5.1274	.1950
	54.50	12.615	.1196	8.36	.6716	1.489	5.0240	.1990
	61.00	12.515	.1172	8.53	.6579	1.520	4.9215	.2032
	68.00	12.415	.1148	8.71	.6443	1.552	4.8198	.2075
	72.00	12.347	.1131	8.84	.6351	1.575	4.7511	.2105

6 5/8” Inner Pipe
OD 6.625”

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
7 5/8	20.00	7.125	.0067	149.73	.0375	26.669	.2805	3.5651
	24.00	7.025	.0053	188.53	.0298	33.581	.2228	4.4890
	26.40	6.969	.0045	220.13	.0255	39.208	.1908	5.2413
	29.70	6.875	.0033	305.01	.0184	54.326	.1377	7.2622
	33.70	6.765	.0018	549.13	.0102	97.808	.0765	13.0748
8 5/8	24.00	8.097	.0211	47.50	.1182	8.461	.8842	1.1310
	28.00	8.017	.0198	50.51	.1112	8.996	.8316	1.2026
	32.00	7.921	.0183	54.61	.1028	9.726	.7691	1.3002
	36.00	7.825	.0168	59.37	.0946	10.574	.7075	1.4135
	40.00	7.725	.0153	65.21	.0861	11.615	.6440	1.5527
	44.00	7.625	.0138	72.24	.0777	12.867	.5814	1.7200
	49.00	7.511	.0122	82.19	.0683	14.639	.5110	1.9570
9 5/8	29.30	9.063	.0372	26.91	.2086	4.794	1.5605	.6408
	32.30	9.001	.0361	27.73	.2025	4.938	1.5148	.6602
	36.00	8.921	.0347	28.84	.1947	5.137	1.4563	.6867
	40.00	8.835	.0332	30.13	.1863	5.366	1.3940	.7174
	43.50	8.755	.0318	31.42	.1787	5.597	1.3366	.7482
	47.00	8.681	.0306	32.71	.1716	5.826	1.2839	.7789
	53.50	8.535	.0281	35.55	.1579	6.332	1.1814	.8465
10 3/4	32.75	10.192	.0583	17.16	.3272	3.057	2.4474	.4086
	40.50	10.050	.0555	18.02	.3115	3.210	2.3302	.4292
	45.50	9.950	.0535	18.68	.3006	3.327	2.2486	.4447
	51.00	9.850	.0516	19.37	.2898	3.451	2.1678	.4613
	55.50	9.760	.0499	20.04	.2802	3.569	2.0958	.4772
	60.70	9.660	.0480	20.83	.2696	3.710	2.0165	.4959
	65.70	9.560	.0461	21.67	.2591	3.860	1.9381	.5160
11 3/4	38.00	11.150	.0781	12.80	.4387	2.280	3.2816	.3047
	42.00	11.084	.0767	13.04	.4307	2.322	3.2217	.3104
	47.00	11.000	.0749	13.35	.4206	2.378	3.1461	.3179
	54.00	10.880	.0724	13.82	.4062	2.462	3.0389	.3291
	60.00	10.772	.0701	14.27	.3935	2.541	2.9435	.3397
13 3/8	48.00	12.715	.1144	8.74	.6424	1.557	4.8054	.2081
	54.50	12.615	.1120	8.93	.6286	1.591	4.7021	.2127
	61.00	12.515	.1095	9.13	.6149	1.626	4.5996	.2174
	68.00	12.415	.1071	9.34	.6013	1.663	4.4979	.2223
	72.00	12.347	.1055	9.48	.5921	1.689	4.4292	.2258
16	55.00	15.376	.1870	5.35	1.0501	.952	7.8553	.1273
	65.00	15.250	.1833	5.46	1.0290	.972	7.6978	.1299
	75.00	15.124	.1796	5.57	1.0081	.992	7.5417	.1326
	84.00	15.010	.1762	5.67	.9894	1.011	7.4015	.1351
20	94.00	19.124	.3126	3.20	1.7553	.570	13.1309	.0762

7” Inner Pipe
OD 7.000”

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
8 5/8	24.00	8.097	.0161	62.16	.0903	11.071	.6757	1.4799
	28.00	8.017	.0148	67.40	.0833	12.005	.6231	1.6049
	32.00	7.921	.0133	74.91	.0750	13.342	.5607	1.7836
	36.00	7.825	.0119	84.17	.0667	14.991	.4990	2.0040
	40.00	7.725	.0104	96.43	.0582	17.175	.4356	2.2959
	44.00	7.625	.0089	112.62	.0499	20.059	.3729	2.6814
	49.00	7.511	.0072	138.82	.0404	24.727	.3025	3.3054
9 5/8	29.30	9.063	.0322	31.06	.1807	5.533	1.3520	.7396
	32.30	9.001	.0311	32.15	.1746	5.726	1.3063	.7655
	36.00	8.921	.0297	33.66	.1668	5.995	1.2478	.8014
	40.00	8.835	.0282	35.43	.1585	6.310	1.1855	.8435
	43.50	8.755	.0269	37.23	.1508	6.631	1.1281	.8864
	47.00	8.681	.0256	39.05	.1438	6.956	1.0755	.9298
	53.50	8.535	.0232	43.17	.1301	7.689	.9729	1.0278
10 3/4	32.75	10.192	.0533	18.76	.2993	3.341	2.2390	.4466
	40.50	10.050	.0505	19.80	.2836	3.526	2.1217	.4713
	45.50	9.950	.0486	20.59	.2727	3.667	2.0401	.4902
	51.00	9.850	.0466	21.44	.2619	3.818	1.9593	.5104
	55.50	9.760	.0449	22.25	.2523	3.964	1.8873	.5299
	60.70	9.660	.0430	23.23	.2417	4.137	1.8081	.5531
	65.70	9.560	.0412	24.28	.2312	4.325	1.7297	.5782
11 3/4	38.00	11.150	.0732	13.67	.4108	2.434	3.0732	.3254
	42.00	11.084	.0717	13.94	.4028	2.483	3.0133	.3319
	47.00	11.000	.0699	14.30	.3927	2.547	2.9376	.3404
	54.00	10.880	.0674	14.84	.3784	2.643	2.8305	.3533
	60.00	10.772	.0651	15.36	.3656	2.735	2.7351	.3656
13 3/8	48.00	12.715	.1094	9.14	.6145	1.627	4.5970	.2175
	54.50	12.615	.1070	9.35	.6007	1.665	4.4936	.2225
	61.00	12.515	.1045	9.56	.5870	1.704	4.3911	.2277
	68.00	12.415	.1021	9.79	.5734	1.744	4.2894	.2331
	72.00	12.347	.1005	9.95	.5642	1.772	4.2207	.2369
16	55.00	15.376	.1821	5.49	1.0222	.978	7.6468	.1308
	65.00	15.250	.1783	5.61	1.0011	.999	7.4894	.1335
	75.00	15.124	.1746	5.73	.9803	1.020	7.3332	.1364
	84.00	15.010	.1713	5.84	.9615	1.040	7.1930	.1390
20	94.00	19.124	.3077	3.25	1.7274	.579	12.9225	.0774

7 5/8" Inner Pipe
OD 7.625"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
8 5/8	24.00	8.097	.0072	138.72	.0405	24.708	.3028	3.3029
	28.00	8.017	.0060	167.88	.0334	29.902	.2502	3.9973
	32.00	7.921	.0045	223.70	.0251	39.845	.1877	5.3264
	36.00	7.825	.0030	333.14	.0169	59.337	.1261	7.9320
	38.00	7.775	.0022	445.63	.0126	79.372	.0942	10.6104
9 5/8	29.30	9.063	.0233	42.90	.1309	7.640	.9791	1.0214
	32.30	9.001	.0222	45.00	.1248	8.014	.9334	1.0714
	36.00	8.921	.0208	48.00	.1170	8.550	.8749	1.1430
	40.00	8.835	.0193	51.69	.1086	9.206	.8126	1.2306
	43.50	8.755	.0180	55.61	.1010	9.906	.7552	1.3242
	47.00	8.681	.0167	59.78	.0939	10.648	.7025	1.4234
	53.50	8.535	.0143	70.00	.0802	12.468	.6000	1.6667
10 3/4	32.75	10.192	.0444	22.51	.2494	4.009	1.8660	.5359
	40.50	10.050	.0416	24.02	.2338	4.278	1.7488	.5718
	45.50	9.950	.0397	25.19	.2229	4.487	1.6672	.5998
	51.00	9.850	.0378	26.48	.2121	4.716	1.5864	.6304
	55.50	9.760	.0361	27.73	.2024	4.940	1.5144	.6603
	60.70	9.660	.0342	29.27	.1918	5.213	1.4351	.6968
	65.70	9.560	.0323	30.96	.1814	5.514	1.3567	.7371
11 3/4	38.00	11.150	.0643	15.55	.3610	2.770	2.7002	.3703
	42.00	11.084	.0629	15.91	.3530	2.833	2.6403	.3787
	47.00	11.000	.0611	16.38	.3428	2.917	2.5647	.3899
	54.00	10.880	.0585	17.09	.3285	3.044	2.4575	.4069
	60.00	10.772	.0562	17.78	.3158	3.167	2.3621	.4233
13 3/8	48.00	12.715	.1006	9.94	.5647	1.771	4.2240	.2367
	54.50	12.615	.0981	10.19	.5508	1.815	4.1207	.2427
	61.00	12.515	.0957	10.45	.5371	1.862	4.0182	.2489
	68.00	12.415	.0932	10.72	.5235	1.910	3.9165	.2553
	72.00	12.347	.0916	10.92	.5144	1.944	3.8478	.2599
16	55.00	15.376	.1732	5.77	.9723	1.028	7.2739	.1375
	65.00	15.250	.1694	5.90	.9513	1.051	7.1164	.1405
	75.00	15.124	.1657	6.03	.9304	1.075	6.9603	.1437
	84.00	15.010	.1624	6.16	.9117	1.097	6.8201	.1466
20	94.00	19.124	.2988	3.35	1.6776	.596	12.5495	.0797

8 5/8” Inner Pipe
OD 8.625”

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
9 5/8	29.30	9.063	.0075	132.87	.0423	23.666	.3161	3.1637
	32.30	9.001	.0064	155.33	.0361	27.666	.2704	3.6983
	36.00	8.921	.0050	198.20	.0283	35.303	.2119	4.7193
	40.00	8.835	.0036	280.75	.0200	50.005	.1496	6.6847
	43.50	8.755	.0022	455.61	.0123	81.150	.0922	10.8480
10 3/4	32.75	10.192	.0286	34.91	.1608	6.218	1.2030	.8312
	40.50	10.050	.0259	38.68	.1451	6.890	1.0858	.9210
	45.50	9.950	.0239	41.83	.1342	7.450	1.0042	.9959
	51.00	9.850	.0220	45.48	.1234	8.101	.9234	1.0830
	55.50	9.760	.0203	49.33	.1138	8.787	.8514	1.1746
	60.70	9.660	.0184	54.39	.1032	9.688	.7721	1.2951
	65.70	9.560	.0165	60.54	.0927	10.783	.6937	1.4415
11 3/4	38.00	11.150	.0485	20.62	.2723	3.672	2.0372	.4909
	42.00	11.084	.0471	21.24	.2643	3.783	1.9773	.5057
	47.00	11.000	.0453	22.09	.2542	3.934	1.9017	.5259
	54.00	10.880	.0427	23.40	.2399	4.169	1.7945	.5573
	60.00	10.772	.0405	24.72	.2271	4.403	1.6991	.5885
13 3/8	48.00	12.715	.0848	11.79	.4760	2.101	3.5610	.2808
	54.50	12.615	.0823	12.15	.4622	2.163	3.4577	.2892
	61.00	12.515	.0799	12.52	.4485	2.230	3.3552	.2980
	68.00	12.415	.0775	12.91	.4349	2.299	3.2535	.3074
	72.00	12.347	.0758	13.19	.4257	2.349	3.1848	.3140
16	55.00	15.376	.1574	6.35	.8837	1.132	6.6109	.1513
	65.00	15.250	.1536	6.51	.8627	1.159	6.4534	.1550
	75.00	15.124	.1499	6.67	.8418	1.188	6.2973	.1588
	84.00	15.010	.1466	6.82	.8231	1.215	6.1571	.1624
20	94.00	19.124	.2830	3.53	1.5890	.629	11.8865	.0841

9 5/8" Inner Pipe
OD 9.625"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
10 3/4	32.75	10.192	.0109	91.61	.0613	16.318	.4584	2.1813
	40.50	10.050	.0081	123.11	.0456	21.927	.3412	2.9312
	45.50	9.950	.0062	161.81	.0347	28.820	.2596	3.8526
	51.00	9.850	.0043	234.92	.0239	41.843	.1788	5.5935
	55.50	9.760	.0025	393.35	.0143	70.062	.1068	9.3658
11 3/4	38.00	11.150	.0308	32.49	.1728	5.787	1.2926	.7736
	42.00	11.084	.0294	34.07	.1648	6.068	1.2327	.8112
	47.00	11.000	.0275	36.30	.1547	6.465	1.1571	.8643
	54.00	10.880	.0250	40.00	.1404	7.125	1.0499	.9524
	60.00	10.772	.0227	44.00	.1276	7.837	.9545	1.0476
13 3/8	48.00	12.715	.0671	14.91	.3765	2.656	2.8164	.3551
	54.50	12.615	.0646	15.48	.3627	2.757	2.7131	.3686
	61.00	12.515	.0622	16.09	.3490	2.866	2.6106	.3831
	68.00	12.415	.0597	16.74	.3354	2.982	2.5089	.3986
	72.00	12.347	.0581	17.21	.3262	3.066	2.4402	.4098
16	55.00	15.376	.1397	7.16	.7842	1.275	5.8663	.1705
	65.00	15.250	.1359	7.36	.7631	1.310	5.7088	.1752
	75.00	15.124	.1322	7.56	.7423	1.347	5.5527	.1801
	84.00	15.010	.1289	7.76	.7235	1.382	5.4125	.1848
20	94.00	19.124	.2653	3.77	1.4894	.671	11.1419	.0898

10 3/4" Inner Pipe
OD 10.750"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
11 3/4	38.00	11.150	.0085	117.51	.0478	20.930	.3574	2.7979
	42.00	11.084	.0071	141.16	.0398	25.142	.2975	3.3610
	47.00	11.000	.0053	189.31	.0297	33.720	.2219	4.5076
	54.00	10.880	.0027	366.09	.0153	65.205	.1147	8.7165
13 3/8	48.00	12.715	.0448	22.33	.2515	3.976	1.8812	.5316
	54.50	12.615	.0423	23.62	.2377	4.208	1.7779	.5625
	61.00	12.515	.0399	25.07	.2240	4.465	1.6754	.5969
	68.00	12.415	.0375	26.69	.2104	4.754	1.5736	.6355
	72.00	12.347	.0358	27.91	.2012	4.971	1.5049	.6645
16	55.00	15.376	.1174	8.52	.6592	1.517	4.9310	.2028
	65.00	15.250	.1137	8.80	.6381	1.567	4.7736	.2095
	75.00	15.124	.1099	9.10	.6172	1.620	4.6175	.2166
	84.00	15.010	.1066	9.38	.5985	1.671	4.4773	.2234
20	94.00	19.124	.2430	4.11	1.3644	.733	10.2067	.0980

11 3/4" Inner Pipe
OD 11.750"

VOLUME AND HEIGHT BETWEEN PIPE AND PIPE

Outer Pipe			Bbls	Lin Ft	Cu Ft	Lin Ft	Gal	Lin Ft
Size OD In	Wt/Ft with Couplings Lb	ID In	Per Lin Ft	Per Bbl	Per Lin Ft	Per Cu Ft	Per Lin Ft	Per Gal
13 3/8	48.00	12.715	.0229	43.60	.1288	7.766	.9632	1.0382
	54.50	12.615	.0205	48.84	.1149	8.700	.8599	1.1629
	61.00	12.515	.0180	55.46	.1012	9.877	.7574	1.3204
	68.00	12.415	.0156	64.06	.0876	11.410	.6556	1.5252
	72.00	12.347	.0140	71.56	.0785	12.745	.5869	1.7038
16	55.00	15.376	.0955	10.47	.5364	1.864	4.0130	.2492
	65.00	15.250	.0918	10.89	.5154	1.940	3.8556	.2594
	75.00	15.124	.0881	11.35	.4945	2.022	3.6995	.2703
	84.00	15.010	.0847	11.80	.4758	2.102	3.5593	.2810
20	94.00	19.124	.2212	4.52	1.2417	.805	9.2887	.1077

13 3/8" Inner Pipe **VOLUME AND HEIGHT BETWEEN PIPE AND PIPE**
PD 13.375"

Outer Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
16	55.00	15.376	.0559	17.89	.3138	3.187	2.3473	.4260
	65.00	15.250	.0521	19.18	.2927	3.416	2.1898	.4567
	75.00	15.124	.0484	20.65	.2719	3.678	2.0337	.4917
	84.00	15.010	.0451	22.18	.2531	3.951	1.8935	.5281
20	94.00	19.124	.1815	5.51	1.0190	.981	7.6229	.1312

16" Inner Pipe **VOLUME AND HEIGHT BETWEEN PIPE AND PIPE**
OD 16.000"

Outer Pipe								
Size OD In	Wt/Ft with Couplings Lb	ID In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
20	94.00	19.124	.1066	9.38	.5985	1.671	4.4769	.2234

3/4" Pipe
OD 1.050"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
3 1/2	.0108	92.3436	.0608	16.4476	.4548	2.1987
5/8	.0117	85.5117	.0657	15.2308	.4912	2.0360
3/4	.0126	79.4290	.0707	14.1474	.5288	1.8912
7/8	.0135	73.9877	.0759	13.1782	.5677	1.7616
4	.0145	69.0988	.0813	12.3074	.6078	1.6452
1/8	.0155	64.6887	.0868	11.5219	.6493	1.5402
1/4	.0165	60.6958	.0925	10.8107	.6920	1.4452
3/8	.0175	57.0680	.0984	10.1646	.7360	1.3588
1/2	.0186	53.7616	.1044	9.5757	.7812	1.2801
5/8	.0197	50.7390	.1107	9.0373	.8278	1.2081
3/4	.0208	47.9683	.1170	8.5438	.8756	1.1421
7/8	.0220	45.4218	.1236	8.0902	.9247	1.0815
5	.0232	43.0756	.1303	7.6724	.9750	1.0256
1/8	.0244	40.9091	.1372	7.2865	1.0267	.9740
1/4	.0257	38.9040	.1443	6.9293	1.0796	.9263
3/8	.0270	37.0446	.1516	6.5981	1.1338	.8820
1/2	.0283	35.3169	.1590	6.2904	1.1892	.8409
5/8	.0297	33.7087	.1666	6.0040	1.2460	.8026
3/4	.0310	32.2090	.1743	5.7369	1.3040	.7669
7/8	.0325	30.8083	.1822	5.4874	1.3633	.7335
6	.0339	29.4978	.1903	5.2540	1.4238	.7023
1/8	.0354	28.2700	.1986	5.0353	1.4857	.6731
1/4	.0369	27.1180	.2070	4.8301	1.5488	.6457
3/8	.0384	26.0356	.2156	4.6373	1.6132	.6199
1/2	.0400	25.0173	.2244	4.4559	1.6788	.5957
5/8	.0416	24.0581	.2334	4.2851	1.7458	.5728
3/4	.0432	23.1534	.2425	4.1239	1.8140	.5513
7/8	.0448	22.2992	.2518	3.9718	1.8835	.5309
7	.0465	21.4917	.2612	3.8280	1.9542	.5117
1/8	.0482	20.7277	.2709	3.6919	2.0263	.4935
1/4	.0500	20.0039	.2807	3.5630	2.0996	.4763
3/8	.0518	19.3176	.2906	3.4407	2.1742	.4600
1/2	.0536	18.6663	.3008	3.3247	2.2500	.4444
5/8	.0554	18.0476	.3111	3.2145	2.3272	.4297
3/4	.0573	17.4593	.3216	3.1097	2.4056	.4157
7/8	.0592	16.8995	.3322	3.0100	2.4853	.4024
8	.0611	16.3663	.3430	2.9151	2.5662	.3897
1/8	.0631	15.8581	.3540	2.8245	2.6485	.3776
1/4	.0650	15.3734	.3652	2.7382	2.7320	.3660
3/8	.0671	14.9106	.3765	2.6558	2.8168	.3550
1/2	.0691	14.4685	.3880	2.5770	2.9028	.3445
5/8	.0712	14.0459	.3997	2.5018	2.9902	.3344
3/4	.0733	13.6417	.4116	2.4298	3.0788	.3248
7/8	.0754	13.2547	.4236	2.3608	3.1687	.3156
9	.0776	12.8840	.4358	2.2948	3.2598	.3068
1/8	.0798	12.5287	.4481	2.2315	3.3523	.2983
1/4	.0820	12.1880	.4606	2.1709	3.4460	.2902
3/8	.0843	11.8611	.4733	2.1126	3.5410	.2824

1” Pipe
OD 1.315”

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
3	.0071	141.5805	.0397	25.2174	.2966	3.3710
1/2	.0102	97.8445	.0574	17.4274	.4292	2.3297
5/8	.0111	90.2080	.0622	16.0673	.4656	2.1479
3/4	.0120	83.4653	.0673	14.8663	.5032	1.9873
7/8	.0129	77.4777	.0725	13.7998	.5421	1.8447
4	.0139	72.1334	.0778	12.8479	.5822	1.7175
1/8	.0148	67.3409	.0834	11.9943	.6237	1.6034
1/4	.0159	63.0247	.0891	11.2256	.6664	1.5006
3/8	.0169	59.1222	.0950	10.5305	.7104	1.4077
1/2	.0180	55.5808	.1010	9.8997	.7556	1.3234
5/8	.0191	52.3564	.1072	9.3254	.8022	1.2466
3/4	.0202	49.4113	.1136	8.8008	.8500	1.1765
7/8	.0214	46.7136	.1202	8.3203	.8991	1.1123
5	.0226	44.2357	.1269	7.8790	.9494	1.0533
1/8	.0238	41.9540	.1338	7.4726	1.0011	.9989
1/4	.0251	39.8478	.1409	7.0974	1.0540	.9488
3/8	.0264	37.8994	.1481	6.7504	1.1082	.9024
1/2	.0277	36.0930	.1556	6.4286	1.1636	.8594
5/8	.0291	34.4150	.1631	6.1298	1.2204	.8194
3/4	.0304	32.8533	.1709	5.8516	1.2784	.7822
7/8	.0318	31.3972	.1788	5.5923	1.3377	.7476
6	.0333	30.0373	.1869	5.3500	1.3982	.7152
1/8	.0348	28.7651	.1952	5.1235	1.4601	.6849
1/4	.0363	27.5733	.2036	4.9112	1.5232	.6565
3/8	.0378	26.4550	.2122	4.7120	1.5876	.6299
1/2	.0394	25.4043	.2210	4.5248	1.6532	.6049
5/8	.0410	24.4157	.2299	4.3488	1.7202	.5813
3/4	.0426	23.4844	.2391	4.1829	1.7884	.5592
7/8	.0442	22.6061	.2484	4.0264	1.8579	.5383
7	.0459	21.7767	.2578	3.8787	1.9286	.5185
1/8	.0476	20.9926	.2674	3.7391	2.0007	.4998
1/4	.0494	20.2505	.2772	3.6069	2.0740	.4822
3/8	.0512	19.5475	.2872	3.4817	2.1486	.4654
1/2	.0530	18.8809	.2974	3.3629	2.2244	.4496
5/8	.0548	18.2481	.3077	3.2502	2.3016	.4345
3/4	.0567	17.6469	.3181	3.1431	2.3800	.4202
7/8	.0586	17.0752	.3288	3.0413	2.4597	.4066
8	.0605	16.5310	.3396	2.9444	2.5406	.3936
1/8	.0624	16.0127	.3506	2.8521	2.6229	.3813
1/4	.0644	15.5186	.3618	2.7641	2.7064	.3695
3/8	.0665	15.0472	.3731	2.6801	2.7912	.3583
1/2	.0685	14.5971	.3846	2.5999	2.8772	.3476
5/8	.0706	14.1671	.3963	2.5233	2.9646	.3373
3/4	.0727	13.7559	.4081	2.4501	3.0532	.3275
7/8	.0748	13.3625	.4202	2.3800	3.1431	.3182
9	.0770	12.9859	.4323	2.3130	3.2342	.3092
1/8	.0792	12.6250	.4447	2.2487	3.3267	.3006
1/4	.0814	12.2791	.4572	2.1871	3.4204	.2924
3/8	.0837	11.9473	.4699	2.1280	3.5154	.2845
1/2	.0860	11.6289	.4828	2.0713	3.6116	.2769

1 1/4" Pipe
OD 1.600"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
3	.0061	164.8517	.0341	29.3623	.2548	3.9251
1/2	.0092	108.4218	.0518	19.3114	.3874	2.5815
5/8	.0101	99.1235	.0566	17.6552	.4237	2.3601
3/4	.0110	91.0418	.0617	16.2158	.4613	2.1677
7/8	.0119	83.9639	.0669	14.9551	.5002	1.9992
4	.0129	77.7234	.0722	13.8436	.5404	1.8506
1/8	.0139	72.1878	.0778	12.8576	.5818	1.7188
1/4	.0149	67.2507	.0835	11.9783	.6245	1.6012
3/8	.0159	62.8257	.0894	11.1901	.6685	1.4959
1/2	.0170	58.8417	.0954	10.4805	.7138	1.4010
5/8	.0181	55.2401	.1016	9.8390	.7603	1.3153
3/4	.0192	51.9718	.1080	9.2569	.8081	1.2374
7/8	.0204	48.9957	.1146	8.7268	.8572	1.1666
5	.0216	46.2768	.1213	8.2425	.9076	1.1019
1/8	.0228	43.7856	.1282	7.7988	.9592	1.0425
1/4	.0241	41.4965	.1353	7.3911	1.0121	.9880
3/8	.0254	39.3878	.1425	7.0155	1.0663	.9378
1/2	.0267	37.4404	.1500	6.6686	1.1218	.8915
5/8	.0281	35.6378	.1575	6.3476	1.1785	.8485
3/4	.0294	33.9659	.1653	6.0498	1.2365	.8087
7/8	.0309	32.4118	.1732	5.7730	1.2958	.7717
6	.0323	30.9646	.1813	5.5152	1.3564	.7373
1/8	.0338	29.6145	.1896	5.2747	1.4182	.7051
1/4	.0353	28.3527	.1980	5.0500	1.4813	.6751
3/8	.0368	27.1717	.2066	4.8396	1.5457	.6470
1/2	.0384	26.0645	.2154	4.6424	1.6114	.6206
5/8	.0400	25.0249	.2244	4.4573	1.6783	.5958
3/4	.0416	24.0475	.2335	4.2832	1.7465	.5726
7/8	.0432	23.1274	.2428	4.1193	1.8160	.5507
7	.0449	22.2600	.2522	3.9648	1.8868	.5300
1/8	.0466	21.4414	.2618	3.8190	1.9588	.5105
1/4	.0484	20.6678	.2716	3.6812	2.0321	.4921
3/8	.0502	19.9361	.2816	3.5509	2.1067	.4747
1/2	.0520	19.2431	.2918	3.4275	2.1826	.4582
5/8	.0538	18.5863	.3021	3.3105	2.2597	.4425
3/4	.0557	17.9629	.3126	3.1994	2.3381	.4277
7/8	.0576	17.3709	.3232	3.0940	2.4178	.4136
8	.0595	16.8081	.3340	2.9937	2.4988	.4002
1/8	.0615	16.2725	.3450	2.8984	2.5810	.3874
1/4	.0634	15.7625	.3562	2.8075	2.6645	.3753
3/8	.0655	15.2764	.3675	2.7209	2.7493	.3637
1/2	.0675	14.8127	.3790	2.6383	2.8354	.3527
5/8	.0696	14.3701	.3907	2.5595	2.9227	.3422
3/4	.0717	13.9472	.4025	2.4842	3.0113	.3321
7/8	.0738	13.5430	.4146	2.4122	3.1012	.3225
9	.0760	13.1562	.4267	2.3433	3.1924	.3132
1/8	.0782	12.7860	.4391	2.2774	3.2848	.3044
1/4	.0804	12.4313	.4516	2.2142	3.3785	.2960
3/8	.0827	12.0914	.4643	2.1536	3.4735	.2879
1/2	.0850	11.7653	.4772	2.0956	3.5698	.2801

1 1/2" Pipe
OD 1.900"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
3	.0052	190.9833	.0294	34.0167	.2199	4.5473
1/2	.0084	119.1435	.0471	21.2211	.3525	2.8368
5/8	.0093	108.0097	.0520	19.2380	.3888	2.5717
3/4	.0102	98.4836	.0570	17.5413	.4265	2.3449
7/8	.0111	90.2537	.0622	16.0754	.4653	2.1489
4	.0120	83.0831	.0676	14.7982	.5055	1.9782
1/8	.0130	76.7887	.0731	13.6771	.5469	1.8283
1/4	.0140	71.2264	.0788	12.6864	.5897	1.6959
3/8	.0151	66.2819	.0847	11.8057	.6336	1.5782
1/2	.0162	61.8630	.0908	11.0186	.6789	1.4730
5/8	.0173	57.8945	.0970	10.3118	.7254	1.3785
3/4	.0184	54.3147	.1034	9.6742	.7733	1.2932
7/8	.0196	51.0726	.1099	9.0967	.8223	1.2160
5	.0208	48.1253	.1167	8.5718	.8727	1.1459
1/8	.0220	45.4368	.1236	8.0929	.9243	1.0819
1/4	.0233	42.9767	.1306	7.6547	.9773	1.0233
3/8	.0246	40.7189	.1379	7.2526	1.0314	.9695
1/2	.0259	38.6411	.1453	6.8825	1.0869	.9200
5/8	.0272	36.7241	.1529	6.5411	1.1436	.8744
3/4	.0286	34.9512	.1606	6.2253	1.2017	.8322
7/8	.0300	33.3079	.1686	5.9326	1.2609	.7931
6	.0315	31.7814	.1767	5.6607	1.3215	.7567
1/8	.0329	30.3607	.1849	5.4077	1.3833	.7229
1/4	.0344	29.0360	.1934	5.1717	1.4465	.6913
3/8	.0360	27.7986	.2020	4.9513	1.5108	.6619
1/2	.0375	26.6408	.2107	4.7451	1.5765	.6343
5/8	.0391	25.5557	.2197	4.5518	1.6434	.6085
3/4	.0408	24.5373	.2288	4.3704	1.7117	.5842
7/8	.0424	23.5800	.2381	4.1999	1.7811	.5614
7	.0441	22.6790	.2476	4.0394	1.8519	.5400
1/8	.0458	21.8298	.2572	3.8882	1.9239	.5198
1/4	.0476	21.0285	.2670	3.7455	1.9973	.5007
3/8	.0493	20.2715	.2770	3.6106	2.0718	.4827
1/2	.0511	19.5555	.2871	3.4831	2.1477	.4656
5/8	.0530	18.8775	.2974	3.3623	2.2248	.4495
3/4	.0548	18.2348	.3079	3.2479	2.3033	.4342
7/8	.0567	17.6250	.3185	3.1393	2.3829	.4197
8	.0587	17.0459	.3294	3.0361	2.4639	.4059
1/8	.0606	16.4953	.3404	2.9380	2.5461	.3928
1/4	.0626	15.9715	.3515	2.8447	2.6297	.3803
3/8	.0646	15.4726	.3629	2.7559	2.7144	.3684
1/2	.0667	14.9971	.3744	2.6712	2.8005	.3571
5/8	.0688	14.5435	.3860	2.5904	2.8878	.3463
3/4	.0709	14.1106	.3979	2.5133	2.9765	.3360
7/8	.0730	13.6969	.4099	2.4396	3.0663	.3261
9	.0752	13.3015	.4221	2.3692	3.1575	.3167
1/8	.0774	12.9231	.4344	2.3018	3.2499	.3077
1/4	.0796	12.5609	.4470	2.2373	3.3437	.2991
3/8	.0819	12.2140	.4597	2.1755	3.4386	.2908
1/2	.0842	11.8813	.4725	2.1162	3.5349	.2829

2 1/16" Pipe
OD 2.063"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
2 1/2	.0019	516.2407	.0109	91.9494	.0814	12.2917
5/8	.0026	390.7151	.0144	69.5916	.1075	9.3029
3/4	.0032	311.3233	.0180	55.4509	.1349	7.4126
7/8	.0039	256.7303	.0219	45.7271	.1636	6.1127
3	.0046	216.9885	.0259	38.6486	.1936	5.1665
1/8	.0054	186.8356	.0300	33.2779	.2248	4.4486
1/4	.0061	163.2276	.0344	29.0730	.2573	3.8864
3/8	.0069	144.2817	.0389	25.6985	.2911	3.4353
1/2	.0078	128.7711	.0436	22.9359	.3262	3.0660
5/8	.0086	115.8627	.0485	20.6367	.3625	2.7587
3/4	.0095	104.9709	.0535	18.6967	.4001	2.4994
7/8	.0105	95.6722	.0587	17.0405	.4390	2.2780
4	.0114	87.6530	.0641	15.6122	.4792	2.0870
1/8	.0124	80.6762	.0696	14.3695	.5206	1.9209
1/4	.0134	74.5589	.0753	13.2799	.5633	1.7752
3/8	.0145	69.1585	.0812	12.3181	.6073	1.6467
1/2	.0155	64.3615	.0872	11.4637	.6526	1.5324
5/8	.0166	60.0771	.0935	10.7005	.6991	1.4304
3/4	.0178	56.2313	.0998	10.0156	.7469	1.3389
7/8	.0190	52.7636	.1064	9.3979	.7960	1.2563
5	.0202	49.6239	.1131	8.8387	.8464	1.1815
1/8	.0214	46.7704	.1200	8.3304	.8980	1.1136
1/4	.0226	44.1679	.1271	7.8669	.9509	1.0516
3/8	.0239	41.7867	.1344	7.4428	1.0051	.9949
1/2	.0253	39.6014	.1418	7.0535	1.0606	.9429
5/8	.0266	37.5904	.1494	6.6954	1.1173	.8950
3/4	.0280	35.7350	.1571	6.3649	1.1753	.8508
7/8	.0294	34.0189	.1650	6.0592	1.2346	.8100
6	.0308	32.4281	.1731	5.7759	1.2952	.7721
1/8	.0323	30.9504	.1814	5.5127	1.3570	.7369
1/4	.0338	29.5749	.1898	5.2677	1.4201	.7042
3/8	.0353	28.2921	.1984	5.0392	1.4845	.6736
1/2	.0369	27.0937	.2072	4.8258	1.5502	.6451
5/8	.0385	25.9722	.2162	4.6260	1.6171	.6184
3/4	.0401	24.9210	.2253	4.4388	1.6853	.5934
7/8	.0418	23.9342	.2346	4.2630	1.7548	.5699
7	.0435	23.0064	.2440	4.0978	1.8256	.5478
1/8	.0452	22.1330	.2537	3.9422	1.8976	.5270
1/4	.0469	21.3097	.2635	3.7956	1.9709	.5074
3/8	.0487	20.5327	.2734	3.6572	2.0455	.4889
1/2	.0505	19.7984	.2836	3.5264	2.1214	.4714
5/8	.0523	19.1038	.2939	3.4026	2.1985	.4549
3/4	.0542	18.4459	.3044	3.2855	2.2769	.4392
7/8	.0561	17.8221	.3150	3.1744	2.3566	.4243
8	.0580	17.2302	.3258	3.0689	2.4376	.4103
1/8	.0600	16.6678	.3368	2.9688	2.5198	.3969
1/4	.0620	16.1331	.3480	2.8735	2.6033	.3841
3/8	.0640	15.6243	.3593	2.7829	2.6881	.3720
1/2	.0660	15.1396	.3708	2.6966	2.7742	.3605
5/8	.0681	14.6775	.3825	2.6143	2.8615	.3495
3/4	.0702	14.2366	.3944	2.5357	2.9501	.3390
7/8	.0724	13.8157	.4064	2.4608	3.0400	.3290
9	.0745	13.4134	.4186	2.3891	3.1312	.3194
1/8	.0767	13.0288	.4309	2.3206	3.2236	.3102
1/4	.0790	12.6607	.4434	2.2550	3.3173	.3015
3/8	.0812	12.3083	.4561	2.1923	3.4123	.2931
1/2	.0835	11.9706	.4690	2.1321	3.5086	.2850

2" Pipe
OD 2 3/8" (2.375")

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
3	.0033	306.4260	.0183	54.5786	.1371	7.2960
1/2	.0064	155.7485	.0360	27.7409	.2697	3.7084
5/8	.0073	137.2533	.0409	24.4467	.3060	3.2680
3/4	.0082	122.2293	.0459	21.7707	.3436	2.9103
7/8	.0091	109.8027	.0511	19.5573	.3825	2.6144
4	.0101	99.3689	.0565	17.6989	.4227	2.3660
1/8	.0110	90.4967	.0620	16.1187	.4641	2.1547
1/4	.0121	82.8699	.0677	14.7603	.5068	1.9731
3/8	.0131	76.2519	.0736	13.5815	.5508	1.8156
1/2	.0142	70.4616	.0797	12.5502	.5961	1.6777
5/8	.0153	65.3587	.0859	11.6413	.6426	1.5562
3/4	.0164	60.8325	.0923	10.8351	.6904	1.4484
7/8	.0176	56.7945	.0989	10.1159	.7395	1.3523
5	.0188	53.1732	.1056	9.4709	.7899	1.2661
1/8	.0200	49.9103	.1125	8.8897	.8415	1.1884
1/4	.0213	46.9577	.1196	8.3638	.8944	1.1181
3/8	.0226	44.2753	.1268	7.8860	.9486	1.0542
1/2	.0239	41.8296	.1342	7.4504	1.0041	.9960
5/8	.0253	39.5923	.1418	7.0519	1.0608	.9427
3/4	.0266	37.5394	.1496	6.6863	1.1188	.8938
7/8	.0280	35.6502	.1575	6.3498	1.1781	.8488
6	.0295	33.9072	.1656	6.0393	1.2387	.8073
1/8	.0310	32.2949	.1738	5.7522	1.3005	.7689
1/4	.0325	30.8002	.1823	5.4859	1.3636	.7334
3/8	.0340	29.4114	.1909	5.2386	1.4280	.7003
1/2	.0356	28.1185	.1997	5.0083	1.4937	.6695
5/8	.0372	26.9124	.2086	4.7935	1.5606	.6408
3/4	.0388	25.7854	.2177	4.5927	1.6288	.6139
7/8	.0404	24.7303	.2270	4.4048	1.6983	.5888
7	.0421	23.7411	.2365	4.2286	1.7691	.5653
1/8	.0438	22.8122	.2461	4.0632	1.8411	.5432
1/4	.0456	21.9386	.2559	3.9076	1.9144	.5224
3/8	.0474	21.1159	.2659	3.7610	1.9890	.5028
1/2	.0492	20.3401	.2760	3.6228	2.0649	.4843
5/8	.0510	19.6076	.2863	3.4924	2.1420	.4669
3/4	.0529	18.9152	.2968	3.3690	2.2204	.4504
7/8	.0548	18.2599	.3075	3.2523	2.3001	.4348
8	.0567	17.6390	.3183	3.1417	2.3811	.4200
1/8	.0586	17.0501	.3293	3.0369	2.4633	.4060
1/4	.0606	16.4910	.3404	2.9373	2.5468	.3927
3/8	.0627	15.9597	.3518	2.8426	2.6316	.3800
1/2	.0647	15.4543	.3633	2.7526	2.7177	.3680
5/8	.0668	14.9731	.3750	2.6669	2.8050	.3565
3/4	.0689	14.5146	.3868	2.5852	2.8936	.3456
7/8	.0710	14.0773	.3988	2.5074	2.9835	.3352
9	.0732	13.6599	.4110	2.4330	3.0747	.3252
1/8	.0754	13.2612	.4234	2.3620	3.1671	.3157
1/4	.0776	12.8801	.4359	2.2941	3.2608	.3067
3/8	.0799	12.5155	.4486	2.2292	3.3558	.2980
1/2	.0822	12.1665	.4615	2.1670	3.4521	.2897

2 1/2" Pipe
OD 2 7/8" (2.875")

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
3 1/2	.0039	258.3592	.0217	46.0173	.1626	6.1515
5/8	.0047	211.1590	.0266	37.6103	.1989	5.0277
3/4	.0056	177.5784	.0316	31.6291	.2365	4.2281
7/8	.0066	152.5037	.0368	27.1630	.2754	3.6311
4	.0075	133.0941	.0422	23.7059	.3156	3.1690
1/8	.0085	117.6457	.0477	20.9543	.3570	2.8011
1/4	.0095	105.0743	.0534	18.7152	.3997	2.5018
3/8	.0106	94.6575	.0593	16.8598	.4437	2.2538
1/2	.0116	85.8952	.0654	15.2991	.4890	2.0452
5/8	.0127	78.4305	.0716	13.9695	.5355	1.8674
3/4	.0139	72.0017	.0780	12.8245	.5833	1.7144
7/8	.0151	66.4129	.0845	11.8290	.6324	1.5813
5	.0163	61.5141	.0913	10.9565	.6828	1.4646
1/8	.0175	57.1889	.0982	10.1861	.7344	1.3617
1/4	.0187	53.3454	.1052	9.5015	.7873	1.2702
3/8	.0200	49.9103	.1125	8.8897	.8415	1.1884
1/2	.0214	46.8242	.1199	8.3400	.8970	1.1149
5/8	.0227	44.0385	.1275	7.8439	.9537	1.0486
3/4	.0241	41.5133	.1352	7.3941	1.0117	.9884
7/8	.0255	39.2152	.1432	6.9848	1.0710	.9337
6	.0269	37.1164	.1513	6.6109	1.1316	.8837
1/8	.0284	35.1932	.1595	6.2684	1.1934	.8379
1/4	.0299	33.4255	.1680	5.9535	1.2565	.7959
3/8	.0314	31.7961	.1766	5.6633	1.3209	.7571
1/2	.0330	30.2904	.1854	5.3951	1.3866	.7212
5/8	.0346	28.8954	.1943	5.1467	1.4535	.6880
3/4	.0362	27.6002	.2034	4.9160	1.5217	.6572
7/8	.0379	26.3949	.2127	4.7013	1.5912	.6285
7	.0396	25.2710	.2222	4.5011	1.6620	.6017
1/8	.0413	24.2212	.2318	4.3141	1.7340	.5767
1/4	.0430	23.2387	.2416	4.1391	1.8073	.5533
3/8	.0448	22.3176	.2516	3.9751	1.8819	.5314
1/2	.0466	21.4528	.2617	3.8210	1.9578	.5108
5/8	.0484	20.6396	.2720	3.6762	2.0349	.4914
3/4	.0503	19.8738	.2825	3.5398	2.1133	.4732
7/8	.0522	19.1516	.2932	3.4112	2.1930	.4560
8	.0541	18.4698	.3040	3.2897	2.2740	.4398
1/8	.0561	17.8251	.3150	3.1749	2.3562	.4244
1/4	.0581	17.2149	.3261	3.0662	2.4397	.4099
3/8	.0601	16.6368	.3375	2.9632	2.5245	.3961
1/2	.0622	16.0883	.3490	2.8655	2.6106	.3831
5/8	.0642	15.5675	.3606	2.7728	2.6979	.3707
3/4	.0663	15.0724	.3725	2.6846	2.7865	.3589
7/8	.0685	14.6014	.3845	2.6007	2.8764	.3477
9	.0707	14.1529	.3967	2.5208	2.9676	.3370
1/8	.0729	13.7253	.4091	2.4447	3.0600	.3268
1/4	.0751	13.3175	.4216	2.3720	3.1537	.3171
3/8	.0773	12.9281	.4343	2.3027	3.2487	.3078
1/2	.0796	12.5561	.4471	2.2364	3.3450	.2990

3" Pipe
OD 3 1/2" (3.500")

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
4	.0036	274.5067	.0205	48.8933	.1530	6.5360
1/8	.0046	216.0052	.0260	38.4734	.1944	5.1431
1/4	.0056	177.1011	.0317	31.5441	.2372	4.2168
3/8	.0067	149.3914	.0376	26.6086	.2811	3.5570
1/2	.0078	128.6750	.0436	22.9188	.3264	3.0638
5/8	.0089	112.6181	.0499	20.0588	.3729	2.6814
3/4	.0100	99.8206	.0562	17.7794	.4208	2.3767
7/8	.0112	89.3916	.0628	15.9218	.4698	2.1284
5	.0124	80.7373	.0695	14.3804	.5202	1.9224
1/8	.0136	73.4466	.0764	13.0818	.5718	1.7488
1/4	.0149	67.2261	.0835	11.9739	.6248	1.6007
3/8	.0162	61.8607	.0908	11.0182	.6789	1.4729
1/2	.0175	57.1889	.0982	10.1861	.7344	1.3617
5/8	.0188	53.0875	.1058	9.4556	.7911	1.2640
3/4	.0202	49.4607	.1135	8.8096	.8492	1.1777
7/8	.0216	46.2327	.1214	8.2347	.9084	1.1008
6	.0231	43.3432	.1295	7.7200	.9690	1.0320
1/8	.0245	40.7431	.1378	7.2569	1.0308	.9701
1/4	.0260	38.3925	.1462	6.8382	1.0940	.9141
3/8	.0276	36.2584	.1548	6.4581	1.1583	.8633
1/2	.0291	34.3133	.1636	6.1117	1.2240	.8170
5/8	.0307	32.5341	.1726	5.7948	1.2909	.7746
3/4	.0324	30.9013	.1817	5.5039	1.3592	.7358
7/8	.0340	29.3983	.1910	5.2362	1.4286	.7000
7	.0357	28.0109	.2004	4.9891	1.4994	.6669
1/8	.0374	26.7268	.2101	4.7604	1.5714	.6364
1/4	.0392	25.5355	.2199	4.5482	1.6448	.6080
3/8	.0409	24.4277	.2298	4.3509	1.7193	.5816
1/2	.0427	23.3955	.2400	4.1670	1.7952	.5570
5/8	.0446	22.4316	.2503	3.9954	1.8723	.5341
3/4	.0464	21.5299	.2608	3.8348	1.9508	.5126
7/8	.0483	20.6850	.2714	3.6843	2.0304	.4925
8	.0503	19.8918	.2822	3.5430	2.1114	.4736
1/8	.0522	19.1461	.2932	3.4102	2.1936	.4559
1/4	.0542	18.4439	.3044	3.2851	2.2772	.4391
3/8	.0562	17.7818	.3157	3.1672	2.3619	.4234
1/2	.0583	17.1567	.3272	3.0558	2.4480	.4085
5/8	.0604	16.5657	.3389	2.9506	2.5353	.3944
3/4	.0625	16.0062	.3508	2.8509	2.6240	.3811
7/8	.0646	15.4761	.3628	2.7565	2.7138	.3685
9	.0668	14.9731	.3750	2.6669	2.8050	.3565
1/8	.0690	14.4954	.3873	2.5818	2.8974	.3451
1/4	.0712	14.0413	.3998	2.5009	2.9912	.3343
3/8	.0735	13.6091	.4125	2.4240	3.0861	.3240
1/2	.0758	13.1974	.4254	2.3506	3.1824	.3142
5/8	.0781	12.8050	.4385	2.2807	3.2799	.3049
3/4	.0804	12.4305	.4517	2.2140	3.3788	.2960
7/8	.0828	12.0729	.4650	2.1503	3.4788	.2875
10	.0852	11.7311	.4786	2.0895	3.5802	.2793

3 1/2" Pipe
OD 4" (4.000")

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
4 1/4	.0020	499.1030	.0112	88.8970	.0842	11.8836
3/8	.0031	327.7692	.0171	58.3801	.1281	7.8042
1/2	.0041	242.2118	.0232	43.1412	.1734	5.7671
5/8	.0052	190.9612	.0294	34.0128	.2199	4.5468
3/4	.0064	156.8610	.0358	27.9390	.2678	3.7349
7/8	.0075	132.5586	.0424	23.6105	.3168	3.1562
5	.0087	114.3778	.0491	20.3722	.3672	2.7233
1/8	.0100	100.2764	.0560	17.8606	.4188	2.3876
1/4	.0112	89.0292	.0631	15.8573	.4718	2.1198
3/8	.0125	79.8565	.0703	14.2235	.5259	1.9014
1/2	.0138	72.2386	.0777	12.8667	.5814	1.7200
5/8	.0152	65.8158	.0853	11.7227	.6381	1.5671
3/4	.0166	60.3311	.0931	10.7458	.6962	1.4365
7/8	.0180	55.5963	.1010	9.9024	.7554	1.3237
6	.0194	51.4700	.1091	9.1675	.8160	1.2255
1/8	.0209	47.8443	.1173	8.5217	.8778	1.1392
1/4	.0224	44.6352	.1258	7.9501	.9410	1.0628
3/8	.0239	41.7765	.1344	7.4410	1.0053	.9947
1/2	.0255	39.2152	.1432	6.9848	1.0710	.9337
5/8	.0271	36.9085	.1521	6.5739	1.1379	.8788
3/4	.0287	34.8211	.1612	6.2021	1.2062	.8291
7/8	.0304	32.9243	.1705	5.8643	1.2756	.7839
7	.0321	31.1939	.1800	5.5561	1.3464	.7427
1/8	.0338	29.6097	.1896	5.2739	1.4184	.7050
1/4	.0355	28.1545	.1994	5.0147	1.4918	.6704
3/8	.0373	26.8138	.2094	4.7759	1.5663	.6384
1/2	.0391	25.5752	.2195	4.5553	1.6422	.6089
5/8	.0409	24.4277	.2298	4.3509	1.7193	.5816
3/4	.0428	23.3623	.2403	4.1611	1.7978	.5563
7/8	.0447	22.3707	.2510	3.9845	1.8774	.5326
8	.0466	21.4458	.2618	3.8198	1.9584	.5106
1/8	.0486	20.5816	.2728	3.6659	2.0406	.4900
1/4	.0506	19.7724	.2839	3.5217	2.1242	.4708
3/8	.0526	19.0134	.2953	3.3866	2.2089	.4527
1/2	.0546	18.3004	.3068	3.2596	2.2950	.4357
5/8	.0567	17.6295	.3185	3.1401	2.3823	.4198
3/4	.0588	16.9973	.3303	3.0275	2.4710	.4047
7/8	.0610	16.4007	.3423	2.9212	2.5608	.3905
9	.0631	15.8369	.3545	2.8208	2.6520	.3771
1/8	.0653	15.3035	.3669	2.7258	2.7444	.3644
1/4	.0676	14.7982	.3794	2.6358	2.8382	.3523
3/8	.0698	14.3190	.3921	2.5504	2.9331	.3409
1/2	.0721	13.8640	.4050	2.4694	3.0294	.3301
5/8	.0744	13.4315	.4180	2.3923	3.1269	.3198
3/4	.0768	13.0201	.4312	2.3191	3.2258	.3100
7/8	.0792	12.6283	.4446	2.2493	3.3258	.3007
10	.0816	12.2548	.4581	2.1827	3.4272	.2918

4" Pipe
OD 4 1/2" (4.500")

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
5	.0046	216.7158	.0259	38.6000	.1938	5.1600
1/8	.0058	171.1210	.0328	30.4790	.2454	4.0744
1/4	.0071	140.7726	.0399	25.0735	.2984	3.3518
3/8	.0084	119.1349	.0471	21.2195	.3525	2.8366
1/2	.0097	102.9400	.0545	18.3350	.4080	2.4510
5/8	.0111	90.3726	.0621	16.0966	.4647	2.1518
3/4	.0124	80.3434	.0699	14.3102	.5228	1.9130
7/8	.0139	72.1595	.0778	12.8526	.5820	1.7181
6	.0153	65.3587	.0859	11.6413	.6426	1.5562
1/8	.0168	59.6214	.0942	10.6194	.7044	1.4196
1/4	.0183	54.7189	.1026	9.7462	.7676	1.3029
3/8	.0198	50.4840	.1112	8.9919	.8319	1.2020
1/2	.0214	46.7909	.1200	8.3341	.8976	1.1141
5/8	.0230	43.5437	.1289	7.7557	.9645	1.0368
3/4	.0246	40.6677	.1381	7.2435	1.0328	.9683
7/8	.0262	38.1039	.1473	6.7868	1.1022	.9073
7	.0279	35.8052	.1568	6.3774	1.1730	.8525
1/8	.0296	33.7335	.1664	6.0084	1.2450	.8032
1/4	.0314	31.8576	.1762	5.6743	1.3184	.7585
3/8	.0332	30.1518	.1862	5.3704	1.3929	.7179
1/2	.0350	28.5944	.1963	5.0931	1.4688	.6808
5/8	.0368	27.1677	.2067	4.8389	1.5459	.6469
3/4	.0387	25.8562	.2171	4.6053	1.6244	.6156
7/8	.0406	24.6471	.2278	4.3900	1.7040	.5868
8	.0425	23.5291	.2386	4.1909	1.7850	.5602
1/8	.0445	22.4929	.2496	4.0063	1.8672	.5356
1/4	.0464	21.5299	.2608	3.8348	1.9508	.5126
3/8	.0485	20.6331	.2721	3.6750	2.0355	.4913
1/2	.0505	19.7962	.2836	3.5260	2.1216	.4713
5/8	.0526	19.0134	.2953	3.3866	2.2089	.4527
3/4	.0547	18.2801	.3071	3.2559	2.2976	.4352
7/8	.0568	17.5919	.3191	3.1334	2.3874	.4189
9	.0590	16.9449	.3313	3.0181	2.4786	.4035
1/8	.0612	16.3356	.3437	2.9096	2.5710	.3890
1/4	.0634	15.7611	.3562	2.8073	2.6648	.3753
3/8	.0657	15.2187	.3689	2.7106	2.7597	.3624
1/2	.0680	14.7057	.3818	2.6193	2.8560	.3501
5/8	.0703	14.2201	.3948	2.5328	2.9535	.3386
3/4	.0727	13.7597	.4080	2.4508	3.0524	.3276
7/8	.0751	13.3229	.4214	2.3730	3.1524	.3172
10	.0775	12.9078	.4350	2.2991	3.2538	.3073
1/8	.0799	12.5131	.4487	2.2288	3.3564	.2979
1/4	.0824	12.1374	.4626	2.1618	3.4604	.2890
3/8	.0849	11.7793	.4766	2.0981	3.5655	.2805
1/2	.0874	11.4378	.4909	2.0372	3.6720	.2723
5/8	.0900	11.1118	.5053	1.9792	3.7797	.2646
3/4	.0926	10.8003	.5198	1.9237	3.8888	.2572
7/8	.0952	10.5024	.5346	1.8706	3.9990	.2501
11	.0979	10.2174	.5495	1.8199	4.1106	.2433

4 3/4" Pipe
OD 4.750"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
5	.0024	422.3179	.0133	75.2205	.0995	10.0554
1/8	.0036	277.9814	.0202	49.5122	.1511	6.6187
1/4	.0049	205.8800	.0273	36.6700	.2040	4.9020
3/8	.0061	162.6706	.0345	28.9738	.2582	3.8732
1/2	.0075	133.9057	.0419	23.8504	.3137	3.1883
5/8	.0088	113.3935	.0495	20.1969	.3704	2.6999
3/4	.0102	98.0381	.0573	17.4619	.4284	2.3343
7/8	.0116	86.1197	.0652	15.3391	.4877	2.0505
6	.0131	76.6065	.0733	13.6447	.5483	1.8240
1/8	.0145	68.8418	.0816	12.2617	.6101	1.6391
1/4	.0160	62.3879	.0900	11.1121	.6732	1.4855
3/8	.0176	56.9417	.0986	10.1421	.7376	1.3558
1/2	.0191	52.2870	.1074	9.3130	.8033	1.2450
5/8	.0207	48.2649	.1163	8.5966	.8702	1.1492
3/4	.0223	44.7565	.1254	7.9717	.9384	1.0657
7/8	.0240	41.6708	.1347	7.4221	1.0079	.9922
7	.0257	38.9371	.1442	6.9352	1.0787	.9271
1/8	.0274	36.4995	.1538	6.5011	1.1507	.8691
1/4	.0291	34.3133	.1636	6.1117	1.2240	.8170
3/8	.0309	32.3425	.1736	5.7606	1.2986	.7701
1/2	.0327	30.5573	.1837	5.4427	1.3745	.7276
5/8	.0346	28.9335	.1940	5.1534	1.4516	.6889
3/4	.0364	27.4507	.2045	4.8893	1.5300	.6536
7/8	.0383	26.0917	.2152	4.6473	1.6097	.6212
8	.0403	24.8422	.2260	4.4247	1.6907	.5915
1/8	.0422	23.6899	.2370	4.2195	1.7729	.5641
1/4	.0442	22.6242	.2482	4.0297	1.8564	.5387
3/8	.0462	21.6360	.2595	3.8537	1.9412	.5152
1/2	.0483	20.7175	.2710	3.6901	2.0273	.4933
5/8	.0503	19.8618	.2827	3.5377	2.1146	.4729
3/4	.0525	19.0630	.2945	3.3954	2.2032	.4539
7/8	.0546	18.3157	.3065	3.2623	2.2931	.4361
9	.0568	17.6154	.3187	3.1375	2.3843	.4194
1/8	.0590	16.9579	.3311	3.0204	2.4767	.4038
1/4	.0612	16.3397	.3436	2.9103	2.5704	.3890
3/8	.0635	15.7574	.3563	2.8066	2.6654	.3752
1/2	.0658	15.2081	.3692	2.7088	2.7617	.3621
5/8	.0681	14.6893	.3822	2.6164	2.8592	.3498
3/4	.0704	14.1986	.3954	2.5290	2.9580	.3381
7/8	.0728	13.7339	.4088	2.4462	3.0581	.3270
10	.0752	13.2933	.4223	2.3677	3.1595	.3165
1/8	.0777	12.8750	.4361	2.2932	3.2621	.3066
1/4	.0801	12.4776	.4500	2.2224	3.3660	.2971
3/8	.0826	12.0995	.4640	2.1551	3.4712	.2881
1/2	.0852	11.7394	.4782	2.0909	3.5777	.2795
5/8	.0877	11.3962	.4926	2.0298	3.6854	.2713
3/4	.0903	11.0688	.5072	1.9715	3.7944	.2635
7/8	.0930	10.7562	.5220	1.9158	3.9047	.2561
11	.0956	10.4574	.5369	1.8626	4.0163	.2490

5" Pipe
OD 5.000"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
5 1/2	.0051	196.0762	.0286	34.9238	.2142	4.6686
5/8	.0065	155.0155	.0362	27.6104	.2709	3.6909
3/4	.0078	127.6775	.0440	22.7411	.3290	3.0400
7/8	.0092	108.1800	.0519	19.2683	.3882	2.5758
6	.0107	93.5818	.0600	16.6682	.4488	2.2282
1/8	.0122	82.2492	.0683	14.6497	.5106	1.9584
1/4	.0137	73.2018	.0767	13.0382	.5738	1.7429
3/8	.0152	65.8158	.0853	11.7227	.6381	1.5671
1/2	.0168	59.6754	.0941	10.6290	.7038	1.4209
5/8	.0184	54.4926	.1030	9.7059	.7707	1.2975
3/4	.0200	50.0620	.1121	8.9167	.8390	1.1920
7/8	.0216	46.2327	.1214	8.2347	.9084	1.1008
7	.0233	42.8917	.1309	7.6396	.9792	1.0213
1/8	.0250	39.9525	.1405	7.1161	1.0512	.9513
1/4	.0268	37.3478	.1503	6.6522	1.1246	.8893
3/8	.0286	35.0248	.1603	6.2384	1.1991	.8339
1/2	.0304	32.9408	.1704	5.8672	1.2750	.7843
5/8	.0322	31.0616	.1807	5.5325	1.3521	.7396
3/4	.0341	29.3590	.1912	5.2292	1.4306	.6990
7/8	.0360	27.8099	.2019	4.9533	1.5102	.6622
8	.0379	26.3949	.2127	4.7013	1.5912	.6285
1/8	.0398	25.0978	.2237	4.4702	1.6734	.5976
1/4	.0418	23.9048	.2349	4.2578	1.7570	.5692
3/8	.0438	22.8043	.2462	4.0618	1.8417	.5430
1/2	.0459	21.7862	.2577	3.8804	1.9278	.5187
5/8	.0480	20.8420	.2694	3.7122	2.0151	.4962
3/4	.0501	19.9641	.2812	3.5559	2.1038	.4753
7/8	.0522	19.1461	.2932	3.4102	2.1936	.4559
9	.0544	18.3821	.3054	3.2741	2.2848	.4377
1/8	.0566	17.6674	.3178	3.1468	2.3772	.4207
1/4	.0588	16.9973	.3303	3.0275	2.4710	.4047
3/8	.0611	16.3681	.3430	2.9154	2.5659	.3897
1/2	.0634	15.7762	.3559	2.8100	2.6622	.3756
5/8	.0657	15.2187	.3689	2.7106	2.7597	.3624
3/4	.0681	14.6926	.3821	2.6169	2.8586	.3498
7/8	.0704	14.1956	.3955	2.5284	2.9586	.3380
10	.0729	13.7253	.4091	2.4447	3.0600	.3268
1/8	.0753	13.2799	.4228	2.3653	3.1626	.3162
1/4	.0778	12.8575	.4367	2.2901	3.2666	.3061
3/8	.0803	12.4563	.4507	2.2186	3.3717	.2966
1/2	.0828	12.0751	.4650	2.1507	3.4782	.2875
5/8	.0854	11.7123	.4794	2.0861	3.5859	.2789
3/4	.0880	11.3667	.4939	2.0246	3.6950	.2706
7/8	.0906	11.0373	.5087	1.9659	3.8052	.2628
11	.0933	10.7229	.5236	1.9099	3.9168	.2553
1/8	.0959	10.4227	.5387	1.8564	4.0296	.2482
1/4	.0987	10.1356	.5539	1.8053	4.1438	.2413
3/8	.1014	9.8610	.5693	1.7564	4.2591	.2348
1/2	.1042	9.5981	.5849	1.7096	4.3758	.2285

5 1/2" Pipe
OD 5.500"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
5 5/8	.0014	740.2427	.0076	131.8472	.0567	17.6252
3/4	.0027	366.0089	.0153	65.1911	.1148	8.7147
7/8	.0041	241.3245	.0233	42.9832	.1740	5.7459
6	.0056	179.0261	.0314	31.8870	.2346	4.2626
1/8	.0071	141.6809	.0396	25.2353	.2964	3.3734
1/4	.0086	116.8113	.0481	20.8057	.3596	2.7813
3/8	.0101	99.0701	.0567	17.6457	.4239	2.3589
1/2	.0117	85.7833	.0654	15.2792	.4896	2.0425
5/8	.0133	75.4658	.0744	13.4415	.5565	1.7968
3/4	.0149	67.2261	.0835	11.9739	.6248	1.6007
7/8	.0165	60.4973	.0928	10.7754	.6942	1.4404
7	.0182	54.9013	.1023	9.7787	.7650	1.3072
1/8	.0199	50.1764	.1119	8.9371	.8370	1.1947
1/4	.0217	46.1356	.1217	8.2174	.9104	1.0985
3/8	.0235	42.6418	.1317	7.5951	.9849	1.0153
1/2	.0253	39.5923	.1418	7.0519	1.0608	.9427
5/8	.0271	36.9085	.1521	6.5739	1.1379	.8788
3/4	.0290	34.5291	.1626	6.1501	1.2164	.8221
7/8	.0309	32.4061	.1732	5.7720	1.2960	.7716
8	.0328	30.5007	.1841	5.4326	1.3770	.7262
1/8	.0347	28.7818	.1951	5.1264	1.4592	.6853
1/4	.0367	27.2238	.2062	4.8489	1.5428	.6482
3/8	.0387	25.8056	.2176	4.5963	1.6275	.6144
1/2	.0408	24.5095	.2291	4.3655	1.7136	.5836
5/8	.0429	23.3209	.2407	4.1538	1.8009	.5553
3/4	.0450	22.2273	.2526	3.9590	1.8896	.5292
7/8	.0471	21.2179	.2646	3.7792	1.9794	.5052
9	.0493	20.2837	.2768	3.6128	2.0706	.4830
1/8	.0515	19.4169	.2891	3.4584	2.1630	.4623
1/4	.0537	18.6106	.3017	3.3148	2.2568	.4431
3/8	.0560	17.8589	.3144	3.1809	2.3517	.4252
1/2	.0583	17.1567	.3272	3.0558	2.4480	.4085
5/8	.0606	16.4993	.3403	2.9387	2.5455	.3928
3/4	.0630	15.8827	.3535	2.8289	2.6444	.3782
7/8	.0653	15.3035	.3669	2.7258	2.7444	.3644
10	.0678	14.7584	.3804	2.6287	2.8458	.3514
1/8	.0702	14.2447	.3941	2.5372	2.9484	.3392
1/4	.0727	13.7597	.4080	2.4508	3.0524	.3276
3/8	.0752	13.3014	.4221	2.3692	3.1575	.3167
1/2	.0777	12.8675	.4363	2.2919	3.2640	.3064
5/8	.0803	12.4563	.4507	2.2186	3.3717	.2966
3/4	.0829	12.0662	.4653	2.1492	3.4808	.2873
7/8	.0855	11.6957	.4800	2.0832	3.5910	.2785
11	.0882	11.3433	.4950	2.0204	3.7026	.2701
1/8	.0908	11.0078	.5100	1.9606	3.8154	.2621
1/4	.0936	10.6881	.5253	1.9037	3.9296	.2545
3/8	.0963	10.3832	.5407	1.8494	4.0449	.2472
1/2	.0991	10.0922	.5563	1.7975	4.1616	.2403

5 3/4" Pipe
OD 5.750"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
6	.0029	350.4340	.0160	62.4170	.1199	8.3438
1/8	.0043	231.1635	.0243	41.1733	.1817	5.5040
1/4	.0058	171.5667	.0327	30.5583	.2448	4.0850
3/8	.0074	135.8384	.0413	24.1946	.3092	3.2343
1/2	.0089	112.0435	.0501	19.9565	.3749	2.6678
5/8	.0105	95.0672	.0591	16.9328	.4418	2.2635
3/4	.0121	82.3520	.0682	14.6680	.5100	1.9608
7/8	.0138	72.4770	.0775	12.9091	.5795	1.7257
7	.0155	64.5898	.0869	11.5043	.6503	1.5379
1/8	.0172	58.1479	.0966	10.3569	.7223	1.3845
1/4	.0189	52.7897	.1064	9.4026	.7956	1.2569
3/8	.0207	48.2649	.1163	8.5966	.8702	1.1492
1/2	.0225	44.3946	.1265	7.9073	.9461	1.0570
5/8	.0244	41.0477	.1368	7.3112	1.0232	.9773
3/4	.0262	38.1259	.1473	6.7907	1.1016	.9078
7/8	.0281	35.5540	.1579	6.3326	1.1813	.8465
8	.0301	33.2735	.1687	5.9265	1.2623	.7922
1/8	.0320	31.2383	.1797	5.5640	1.3445	.7438
1/4	.0340	29.4114	.1909	5.2386	1.4280	.7003
3/8	.0360	27.7630	.2022	4.9450	1.5128	.6610
1/2	.0381	26.2686	.2137	4.6788	1.5989	.6255
5/8	.0401	24.9080	.2254	4.4364	1.6862	.5931
3/4	.0423	23.6644	.2372	4.2149	1.7748	.5634
7/8	.0444	22.5236	.2493	4.0118	1.8647	.5363
9	.0466	21.4738	.2615	3.8248	1.9559	.5113
1/8	.0488	20.5047	.2738	3.6522	2.0483	.4882
1/4	.0510	19.6076	.2863	3.4924	2.1420	.4669
3/8	.0533	18.7750	.2990	3.3441	2.2370	.4470
1/2	.0556	18.0004	.3119	3.2061	2.3333	.4286
5/8	.0579	17.2782	.3249	3.0775	2.4308	.4114
3/4	.0602	16.6032	.3381	2.9573	2.5296	.3953
7/8	.0626	15.9713	.3515	2.8447	2.6297	.3803
10	.0650	15.3785	.3651	2.7391	2.7311	.3662
1/8	.0675	14.8215	.3788	2.6399	2.8337	.3529
1/4	.0699	14.2972	.3927	2.5465	2.9376	.3404
3/8	.0724	13.8030	.4067	2.4585	3.0428	.3286
1/2	.0750	13.3364	.4210	2.3754	3.1493	.3175
5/8	.0775	12.8952	.4354	2.2968	3.2570	.3070
3/4	.0801	12.4776	.4500	2.2224	3.3660	.2971
7/8	.0828	12.0817	.4647	2.1519	3.4763	.2877
11	.0854	11.7060	.4796	2.0850	3.5879	.2787
1/8	.0881	11.3491	.4947	2.0214	3.7007	.2702
1/4	.0908	11.0096	.5099	1.9610	3.8148	.2621
3/8	.0936	10.6864	.5254	1.9034	3.9302	.2544
1/2	.0964	10.3783	.5410	1.8485	4.0469	.2471
5/8	.0992	10.0844	.5567	1.7962	4.1648	.2401
3/4	.1020	9.8038	.5727	1.7462	4.2840	.2334
7/8	.1049	9.5356	.5888	1.6984	4.4045	.2270
12	.1078	9.2791	.6051	1.6527	4.5263	.2209

6” Pipe
OD 6.000”

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
6 1/8	.0015	679.1918	.0083	120.9732	.0618	16.1715
1/4	.0030	336.1306	.0167	59.8694	.1250	8.0033
3/8	.0045	221.8236	.0253	39.5098	.1893	5.2816
1/2	.0061	164.7040	.0341	29.3360	.2550	3.9216
5/8	.0077	130.4586	.0430	23.2364	.3219	3.1062
3/4	.0093	107.6497	.0522	19.1739	.3902	2.5631
7/8	.0109	91.3753	.0614	16.2752	.4596	2.1756
7	.0126	79.1846	.0709	14.1038	.5304	1.8854
1/8	.0143	69.7160	.0805	12.4174	.6024	1.6599
1/4	.0161	62.1525	.0903	11.0702	.6758	1.4798
3/8	.0179	55.9742	.1003	9.9698	.7503	1.3327
1/2	.0197	50.8346	.1104	9.0543	.8262	1.2104
5/8	.0215	46.4937	.1208	8.2812	.9033	1.1070
3/4	.0234	42.7803	.1312	7.6197	.9818	1.0186
7/8	.0253	39.5685	.1419	7.0477	1.0614	.9421
8	.0272	36.7643	.1527	6.5482	1.1424	.8754
1/8	.0292	34.2955	.1637	6.1085	1.2246	.8166
1/4	.0311	32.1060	.1749	5.7185	1.3082	.7644
3/8	.0332	30.1518	.1862	5.3704	1.3929	.7179
1/2	.0352	28.3972	.1977	5.0579	1.4790	.6761
5/8	.0373	26.8138	.2094	4.7759	1.5663	.6384
3/4	.0394	25.3781	.2212	4.5202	1.6550	.6043
7/8	.0415	24.0707	.2332	4.2873	1.7448	.5731
9	.0437	22.8756	.2454	4.0744	1.8360	.5447
1/8	.0459	21.7790	.2578	3.8791	1.9284	.5186
1/4	.0481	20.7697	.2703	3.6994	2.0222	.4945
3/8	.0504	19.8379	.2830	3.5334	2.1171	.4723
1/2	.0527	18.9751	.2959	3.3797	2.2134	.4518
5/8	.0550	18.1742	.3089	3.2371	2.3109	.4327
3/4	.0574	17.4290	.3221	3.1043	2.4098	.4150
7/8	.0598	16.7340	.3355	2.9805	2.5098	.3984
10	.0622	16.0844	.3491	2.8648	2.6112	.3830
1/8	.0646	15.4761	.3628	2.7565	2.7138	.3685
1/4	.0671	14.9053	.3767	2.6548	2.8178	.3549
3/8	.0696	14.3689	.3907	2.5593	2.9229	.3421
1/2	.0721	13.8640	.4050	2.4694	3.0294	.3301
5/8	.0747	13.3878	.4194	2.3846	3.1371	.3188
3/4	.0773	12.9383	.4339	2.3045	3.2462	.3081
7/8	.0799	12.5131	.4487	2.2288	3.3564	.2979
11	.0826	12.1106	.4636	2.1571	3.4680	.2884
1/8	.0853	11.7290	.4787	2.0891	3.5808	.2793
1/4	.0880	11.3667	.4939	2.0246	3.6950	.2706
3/8	.0907	11.0225	.5094	1.9633	3.8103	.2624
1/2	.0935	10.6951	.5249	1.9049	3.9270	.2546
5/8	.0963	10.3832	.5407	1.8494	4.0449	.2472
3/4	.0991	10.0860	.5566	1.7964	4.1642	.2401
7/8	.1020	9.8024	.5728	1.7459	4.2846	.2334
12	.1049	9.5315	.5890	1.6977	4.4064	.2269

6 5/8" Pipe
OD 6.625"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
7	.0050	201.4728	.0279	35.8850	.2085	4.7971
1/8	.0067	149.7309	.0375	26.6691	.2805	3.5651
1/4	.0084	118.7056	.0473	21.1431	.3538	2.8264
3/8	.0102	98.0381	.0573	17.4619	.4284	2.3343
1/2	.0120	83.2890	.0674	14.8349	.5043	1.9831
5/8	.0138	72.2386	.0777	12.8667	.5814	1.7200
3/4	.0157	63.6537	.0882	11.3376	.6598	1.5156
7/8	.0176	56.7945	.0989	10.1159	.7395	1.3523
8	.0195	51.1901	.1097	9.1176	.8205	1.2188
1/8	.0215	46.5266	.1207	8.2870	.9027	1.1078
1/4	.0235	42.5867	.1318	7.5853	.9862	1.0140
3/8	.0255	39.2152	.1432	6.9848	1.0710	.9337
1/2	.0275	36.2984	.1547	6.4652	1.1571	.8643
5/8	.0296	33.7508	.1663	6.0115	1.2444	.8036
3/4	.0317	31.5072	.1782	5.6119	1.3330	.7502
7/8	.0339	29.5168	.1902	5.2573	1.4229	.7028
9	.0360	27.7396	.2024	4.9408	1.5141	.6605
1/8	.0382	26.1435	.2148	4.6565	1.6065	.6225
1/4	.0405	24.7025	.2273	4.3999	1.7002	.5882
3/8	.0427	23.3955	.2400	4.1670	1.7952	.5570
1/2	.0450	22.2048	.2528	3.9550	1.8915	.5287
5/8	.0474	21.1159	.2659	3.7610	1.9890	.5028
3/4	.0497	20.1165	.2791	3.5830	2.0878	.4790
7/8	.0521	19.1963	.2925	3.4191	2.1879	.4571
10	.0545	18.3463	.3060	3.2677	2.2893	.4368
1/8	.0569	17.5591	.3197	3.1275	2.3919	.4181
1/4	.0594	16.8280	.3336	2.9973	2.4958	.4007
3/8	.0619	16.1475	.3477	2.8761	2.6010	.3845
1/2	.0645	15.5125	.3619	2.7630	2.7075	.3694
5/8	.0670	14.9188	.3763	2.6572	2.8152	.3552
3/4	.0696	14.3627	.3909	2.5582	2.9242	.3420
7/8	.0722	13.8407	.4056	2.4652	3.0345	.3295
11	.0749	13.3499	.4206	2.3778	3.1461	.3179
1/8	.0776	12.8876	.4356	2.2955	3.2589	.3069
1/4	.0803	12.4516	.4509	2.2178	3.3730	.2965
3/8	.0831	12.0398	.4663	2.1444	3.4884	.2867
1/2	.0858	11.6502	.4819	2.0750	3.6051	.2774
5/8	.0886	11.2811	.4977	2.0093	3.7230	.2686
3/4	.0915	10.9311	.5136	1.9470	3.8422	.2603
7/8	.0943	10.5987	.5297	1.8878	3.9627	.2524
12	.0972	10.2828	.5460	1.8315	4.0845	.2448
1/8	.1002	9.9821	.5624	1.7779	4.2075	.2377
1/4	.1031	9.6956	.5791	1.7269	4.3318	.2309
3/8	.1061	9.4224	.5958	1.6783	4.4574	.2243
1/2	.1091	9.1617	.6128	1.6318	4.5843	.2181
5/8	.1122	8.9126	.6299	1.5874	4.7124	.2122
3/4	.1153	8.6743	.6472	1.5450	4.8418	.2065
7/8	.1184	8.4464	.6647	1.5044	4.9725	.2011
13	.1215	8.2280	.6823	1.4655	5.1045	.1959

7" Pipe
OD 7.000"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
7 1/8	.0017	583.0230	.0096	103.8442	.0720	13.8818
1/4	.0035	288.9544	.0194	51.4667	.1454	6.8800
3/8	.0052	190.9612	.0294	34.0128	.2199	4.5468
1/2	.0070	141.9862	.0395	25.2897	.2958	3.3807
5/8	.0089	112.6181	.0499	20.0588	.3729	2.6814
3/4	.0107	93.0531	.0603	16.5740	.4514	2.2156
7/8	.0126	79.0896	.0710	14.0869	.5310	1.8831
8	.0146	68.6267	.0818	12.2233	.6120	1.6340
1/8	.0165	60.4973	.0928	10.7754	.6942	1.4404
1/4	.0185	54.0013	.1040	9.6184	.7778	1.2858
3/8	.0205	48.6930	.1153	8.6729	.8625	1.1594
1/2	.0226	44.2753	.1268	7.8860	.9486	1.0542
5/8	.0247	40.5425	.1385	7.2212	1.0359	.9653
3/4	.0268	37.3478	.1503	6.6522	1.1246	.8893
7/8	.0289	34.5835	.1623	6.1598	1.2144	.8234
9	.0311	32.1688	.1745	5.7297	1.3056	.7659
1/8	.0333	30.0418	.1869	5.3508	1.3980	.7153
1/4	.0355	28.1545	.1994	5.0147	1.4918	.6704
3/8	.0378	26.4691	.2121	4.7145	1.5867	.6302
1/2	.0401	24.9552	.2250	4.4448	1.6830	.5942
5/8	.0424	23.5881	.2380	4.2014	1.7805	.5616
3/4	.0447	22.3479	.2512	3.9805	1.8794	.5321
7/8	.0471	21.2179	.2646	3.7792	1.9794	.5052
10	.0495	20.1843	.2782	3.5951	2.0808	.4806
1/8	.0520	19.2355	.2919	3.4261	2.1834	.4580
1/4	.0545	18.3616	.3058	3.2705	2.2874	.4372
3/8	.0570	17.5544	.3198	3.1267	2.3925	.4180
1/2	.0595	16.8065	.3341	2.9935	2.4990	.4002
5/8	.0621	16.1119	.3485	2.8697	2.6067	.3836
3/4	.0647	15.4652	.3630	2.7546	2.7158	.3682
7/8	.0673	14.8616	.3778	2.6471	2.8260	.3539
11	.0699	14.2972	.3927	2.5465	2.9376	.3404
1/8	.0726	13.7684	.4078	2.4523	3.0504	.3278
1/4	.0753	13.2719	.4230	2.3639	3.1646	.3160
3/8	.0781	12.8050	.4385	2.2807	3.2799	.3049
1/2	.0809	12.3652	.4540	2.2024	3.3966	.2944
5/8	.0837	11.9502	.4698	2.1285	3.5145	.2845
3/4	.0865	11.5582	.4857	2.0587	3.6338	.2752
7/8	.0894	11.1872	.5019	1.9926	3.7542	.2664
12	.0923	10.8358	.5181	1.9300	3.8760	.2580
1/8	.0952	10.5024	.5346	1.8706	3.9990	.2501
1/4	.0982	10.1858	.5512	1.8142	4.1234	.2425
3/8	.1012	9.8847	.5680	1.7606	4.2489	.2354
1/2	.1042	9.5981	.5849	1.7096	4.3758	.2285
5/8	.1072	9.3251	.6021	1.6609	4.5039	.2220
3/4	.1103	9.0646	.6194	1.6145	4.6334	.2158
7/8	.1134	8.8160	.6368	1.5702	4.7640	.2099
13	.1166	8.5783	.6545	1.5279	4.8960	.2043

7 5/8" Pipe
OD 7.625"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
8	.0057	175.6843	.0320	31.2917	.2391	4.1830
1/8	.0076	130.7175	.0430	23.2825	.3213	3.1124
1/4	.0096	103.7506	.0541	18.4794	.4048	2.4703
3/8	.0117	85.7833	.0654	15.2792	.4896	2.0425
1/2	.0137	72.9586	.0770	12.9949	.5757	1.7371
5/8	.0158	63.3477	.0886	11.2831	.6630	1.5083
3/4	.0179	55.8792	.1005	9.9528	.7516	1.3305
7/8	.0200	49.9103	.1125	8.8897	.8415	1.1884
9	.0222	45.0319	.1247	8.0208	.9327	1.0722
1/8	.0244	40.9711	.1370	7.2975	1.0251	.9755
1/4	.0266	37.5394	.1496	6.6863	1.1188	.8938
3/8	.0289	34.6017	.1623	6.1630	1.2138	.8239
1/2	.0312	32.0592	.1751	5.7102	1.3101	.7633
5/8	.0335	29.8377	.1882	5.3145	1.4076	.7104
3/4	.0359	27.8805	.2014	4.9659	1.5064	.6638
7/8	.0382	26.1435	.2148	4.6565	1.6065	.6225
10	.0407	24.5919	.2283	4.3801	1.7079	.5855
1/8	.0431	23.1977	.2420	4.1318	1.8105	.5523
1/4	.0456	21.9386	.2559	3.9076	1.9144	.5224
3/8	.0481	20.7960	.2700	3.7040	2.0196	.4952
1/2	.0506	19.7546	.2842	3.5186	2.1261	.4704
5/8	.0532	18.8018	.2986	3.3489	2.2338	.4477
3/4	.0558	17.9270	.3132	3.1930	2.3428	.4268
7/8	.0584	17.1210	.3279	3.0495	2.4531	.4077
11	.0611	16.3762	.3428	2.9168	2.5647	.3899
1/8	.0637	15.6861	.3579	2.7939	2.6775	.3735
1/4	.0665	15.0449	.3732	2.6797	2.7916	.3582
3/8	.0692	14.4477	.3886	2.5733	2.9070	.3440
1/2	.0720	13.8903	.4042	2.4740	3.0237	.3307
5/8	.0748	13.3688	.4200	2.3812	3.1416	.3183
3/4	.0776	12.8801	.4359	2.2941	3.2608	.3067
7/8	.0805	12.4211	.4520	2.2124	3.3813	.2957
12	.0834	11.9894	.4683	2.1355	3.5031	.2855
1/8	.0863	11.5826	.4847	2.0630	3.6261	.2758
1/4	.0893	11.1986	.5013	1.9946	3.7504	.2666
3/8	.0923	10.8358	.5181	1.9300	3.8760	.2580
1/2	.0953	10.4924	.5351	1.8688	4.0029	.2498
5/8	.0984	10.1669	.5522	1.8109	4.1310	.2421
3/4	.1014	9.8581	.5695	1.7559	4.2604	.2347
7/8	.1045	9.5647	.5870	1.7036	4.3911	.2277
13	.1077	9.2856	.6046	1.6539	4.5231	.2211
1/8	.1109	9.0199	.6224	1.6066	4.6563	.2148
1/4	.1141	8.7667	.6404	1.5615	4.7908	.2087
3/8	.1173	8.5251	.6586	1.5184	4.9266	.2030
1/2	.1206	8.2943	.6769	1.4773	5.0637	.1975
5/8	.1239	8.0737	.6954	1.4380	5.2020	.1922
3/4	.1272	7.8627	.7140	1.4005	5.3416	.1872
7/8	.1305	7.6607	.7329	1.3645	5.4825	.1824
14	.1339	7.4670	.7519	1.3300	5.6247	.1778
1/8	.1373	7.2813	.7711	1.2969	5.7681	.1734
1/4	.1408	7.1031	.7904	1.2652	5.9128	.1691
3/8	.1443	6.9320	.8099	1.2347	6.0588	.1651

8" Pipe
OD 8.000"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
8 1/2	.0080	124.7758	.0450	22.2242	.3366	2.9709
5/8	.0101	99.0701	.0567	17.6457	.4239	2.3589
3/4	.0122	81.9423	.0685	14.5950	.5126	1.9510
7/8	.0143	69.7160	.0805	12.4174	.6024	1.6599
9	.0165	60.5529	.0927	10.7853	.6936	1.4418
1/8	.0187	53.4320	.1051	9.5170	.7860	1.2722
1/4	.0209	47.7403	.1176	8.5032	.8798	1.1367
3/8	.0232	43.0880	.1303	7.6746	.9747	1.0259
1/2	.0255	39.2152	.1432	6.9848	1.0710	.9337
5/8	.0278	35.9420	.1562	6.4017	1.1685	.8558
3/4	.0302	33.1396	.1694	5.9026	1.2674	.7891
7/8	.0326	30.7140	.1828	5.4706	1.3674	.7313
10	.0350	28.5944	.1963	5.0931	1.4688	.6808
1/8	.0374	26.7268	.2101	4.7604	1.5714	.6364
1/4	.0399	25.0691	.2240	4.4651	1.6754	.5969
3/8	.0424	23.5881	.2380	4.2014	1.7805	.5616
1/2	.0449	22.2573	.2522	3.9643	1.8870	.5299
5/8	.0475	21.0552	.2666	3.7502	1.9947	.5013
3/4	.0501	19.9641	.2812	3.5559	2.1038	.4753
7/8	.0527	18.9697	.2960	3.3788	2.2140	.4517
11	.0554	18.0596	.3109	3.2167	2.3256	.4300
1/8	.0581	17.2239	.3260	3.0678	2.4384	.4101
1/4	.0608	16.4539	.3412	2.9307	2.5526	.3918
3/8	.0635	15.7423	.3566	2.8039	2.6679	.3748
1/2	.0663	15.0828	.3722	2.6864	2.7846	.3591
5/8	.0691	14.4699	.3880	2.5773	2.9025	.3445
3/4	.0719	13.8991	.4039	2.4756	3.0218	.3309
7/8	.0748	13.3661	.4200	2.3807	3.1422	.3182
12	.0777	12.8675	.4363	2.2919	3.2640	.3064
1/8	.0806	12.4001	.4528	2.2086	3.3870	.2952
1/4	.0836	11.9611	.4694	2.1304	3.5114	.2848
3/8	.0866	11.5480	.4862	2.0569	3.6369	.2750
1/2	.0896	11.1588	.5031	1.9875	3.7638	.2657
5/8	.0927	10.7914	.5203	1.9221	3.8919	.2569
3/4	.0957	10.4441	.5376	1.8602	4.0214	.2487
7/8	.0989	10.1154	.5550	1.8017	4.1520	.2408
13	.1020	9.8038	.5727	1.7462	4.2840	.2334
1/8	.1052	9.5081	.5905	1.6935	4.4172	.2264
1/4	.1084	9.2271	.6085	1.6435	4.5518	.2197
3/8	.1116	8.9598	.6266	1.5959	4.6875	.2133
1/2	.1149	8.7053	.6449	1.5505	4.8246	.2073
5/8	.1182	8.4626	.6634	1.5073	4.9629	.2015
3/4	.1215	8.2311	.6821	1.4661	5.1026	.1960
7/8	.1248	8.0099	.7009	1.4267	5.2434	.1907
14	.1282	7.7985	.7199	1.3890	5.3856	.1857
1/8	.1316	7.5962	.7391	1.3530	5.5290	.1809
1/4	.1351	7.4024	.7584	1.3185	5.6738	.1763
3/8	.1386	7.2167	.7780	1.2854	5.8197	.1718

8 1/8" Pipe
OD 8.125"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
8 1/2	.0061	165.1168	.0340	29.4095	.2544	3.9314
5/8	.0081	122.9134	.0457	21.8925	.3417	2.9266
3/4	.0102	97.6024	.0575	17.3843	.4303	2.3239
7/8	.0124	80.7373	.0695	14.3804	.5202	1.9224
9	.0146	68.6982	.0817	12.2361	.6114	1.6357
1/8	.0168	59.6754	.0941	10.6290	.7038	1.4209
1/4	.0190	52.6631	.1066	9.3800	.7975	1.2539
3/8	.0212	47.0583	.1193	8.3817	.8925	1.1205
1/2	.0235	42.4769	.1322	7.5657	.9888	1.0114
5/8	.0259	38.6629	.1452	6.8864	1.0863	.9206
3/4	.0282	35.4393	.1584	6.3122	1.1851	.8438
7/8	.0306	32.6794	.1718	5.8206	1.2852	.7781
10	.0330	30.2904	.1854	5.3951	1.3866	.7212
1/8	.0355	28.2027	.1991	5.0233	1.4892	.6715
1/4	.0379	26.3632	.2130	4.6956	1.5931	.6277
3/8	.0404	24.7303	.2270	4.4048	1.6983	.5888
1/2	.0430	23.2715	.2413	4.1450	1.8048	.5541
5/8	.0455	21.9605	.2557	3.9115	1.9125	.5229
3/4	.0481	20.7763	.2702	3.7005	2.0215	.4947
7/8	.0508	19.7014	.2850	3.5091	2.1318	.4691
11	.0534	18.7217	.2999	3.3346	2.2434	.4458
1/8	.0561	17.8251	.3150	3.1749	2.3562	.4244
1/4	.0588	17.0017	.3302	3.0282	2.4703	.4048
3/8	.0616	16.2430	.3456	2.8931	2.5857	.3867
1/2	.0643	15.5418	.3612	2.7682	2.7024	.3700
5/8	.0671	14.8919	.3770	2.6524	2.8203	.3546
3/4	.0700	14.2879	.3929	2.5449	2.9395	.3402
7/8	.0729	13.7253	.4091	2.4447	3.0600	.3268
12	.0758	13.2001	.4253	2.3511	3.1818	.3143
1/8	.0787	12.7086	.4418	2.2636	3.3048	.3026
1/4	.0816	12.2479	.4584	2.1815	3.4291	.2916
3/8	.0846	11.8152	.4752	2.1044	3.5547	.2813
1/2	.0877	11.4081	.4921	2.0319	3.6816	.2716
5/8	.0907	11.0244	.5093	1.9636	3.8097	.2625
3/4	.0938	10.6622	.5266	1.8991	3.9391	.2539
7/8	.0969	10.3198	.5440	1.8381	4.0698	.2457
13	.1000	9.9957	.5617	1.7804	4.2018	.2380
1/8	.1032	9.6885	.5795	1.7256	4.3350	.2307
1/4	.1064	9.3969	.5975	1.6737	4.4695	.2237
3/8	.1096	9.1198	.6156	1.6244	4.6053	.2171
1/2	.1129	8.8562	.6339	1.5774	4.7424	.2109
5/8	.1162	8.6052	.6524	1.5327	4.8807	.2049
3/4	.1195	8.3659	.6711	1.4901	5.0203	.1992
7/8	.1229	8.1375	.6899	1.4494	5.1612	.1938
14	.1263	7.9194	.7089	1.4106	5.3034	.1886
1/8	.1297	7.7109	.7281	1.3734	5.4468	.1836
1/4	.1331	7.5113	.7475	1.3379	5.5915	.1788
3/8	.1366	7.3202	.7670	1.3038	5.7375	.1743

8 5/8" Pipe
OD 8.625"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
9	.0064	155.7485	.0360	27.7409	.2697	3.7084
1/8	.0086	115.9887	.0484	20.6592	.3621	2.7617
1/4	.0109	92.1421	.0609	16.4117	.4558	2.1939
3/8	.0131	76.2519	.0736	13.5815	.5508	1.8156
1/2	.0154	64.9080	.0865	11.5610	.6471	1.5455
5/8	.0177	56.4055	.0995	10.0466	.7446	1.3430
3/4	.0201	49.7971	.1127	8.8695	.8434	1.1857
7/8	.0225	44.5146	.1261	7.9286	.9435	1.0599
10	.0249	40.1962	.1397	7.1595	1.0449	.9571
1/8	.0273	36.6009	.1534	6.5191	1.1475	.8715
1/4	.0298	33.5617	.1673	5.9778	1.2514	.7991
3/8	.0323	30.9594	.1813	5.5143	1.3566	.7371
1/2	.0348	28.7066	.1956	5.1130	1.4631	.6835
5/8	.0374	26.7377	.2100	4.7623	1.5708	.6366
3/4	.0400	25.0025	.2246	4.4533	1.6798	.5953
7/8	.0426	23.4621	.2393	4.1789	1.7901	.5586
11	.0453	22.0857	.2542	3.9338	1.9017	.5259
1/8	.0480	20.8486	.2693	3.7134	2.0145	.4964
1/4	.0507	19.7309	.2845	3.5143	2.1286	.4698
3/8	.0534	18.7164	.3000	3.3336	2.2440	.4456
1/2	.0562	17.7914	.3156	3.1689	2.3607	.4236
5/8	.0590	16.9449	.3313	3.0181	2.4786	.4035
3/4	.0619	16.1673	.3473	2.8796	2.5978	.3849
7/8	.0647	15.4507	.3634	2.7520	2.7183	.3679
12	.0676	14.7882	.3796	2.6340	2.8401	.3521
1/8	.0705	14.1742	.3961	2.5246	2.9631	.3375
1/4	.0735	13.6035	.4127	2.4230	3.0874	.3239
3/8	.0765	13.0717	.4295	2.3283	3.2130	.3112
1/2	.0795	12.5752	.4465	2.2398	3.3399	.2994
5/8	.0826	12.1106	.4636	2.1571	3.4680	.2884
3/4	.0857	11.6749	.4809	2.0795	3.5974	.2780
7/8	.0888	11.2657	.4984	2.0066	3.7281	.2682
13	.0919	10.8805	.5160	1.9380	3.8601	.2591
1/8	.0951	10.5175	.5338	1.8733	3.9933	.2504
1/4	.0983	10.1748	.5518	1.8123	4.1278	.2423
3/8	.1015	9.8507	.5699	1.7545	4.2636	.2345
1/2	.1048	9.5439	.5883	1.6999	4.4007	.2272
5/8	.1081	9.2530	.6068	1.6481	4.5390	.2203
3/4	.1114	8.9769	.6254	1.5989	4.6786	.2137
7/8	.1147	8.7145	.6443	1.5522	4.8195	.2075
14	.1181	8.4648	.6633	1.5077	4.9617	.2015
1/8	.1215	8.2270	.6824	1.4653	5.1051	.1959
1/4	.1250	8.0002	.7018	1.4249	5.2498	.1905
3/8	.1285	7.7837	.7213	1.3864	5.3958	.1853
1/2	.1320	7.5770	.7410	1.3496	5.5431	.1804
5/8	.1355	7.3792	.7608	1.3143	5.6916	.1757
3/4	.1391	7.1900	.7809	1.2806	5.8414	.1712
7/8	.1427	7.0087	.8011	1.2483	5.9925	.1669
15	.1463	6.8349	.8214	1.2174	6.1449	.1627

9" Pipe
OD 9.000"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
9 1/8	.0022	454.3559	.0124	80.9269	.0924	10.8182
1/4	.0044	225.6219	.0249	40.1863	.1862	5.3721
3/8	.0067	149.3914	.0376	26.6086	.2811	3.5570
1/2	.0090	111.2865	.0504	19.8216	.3774	2.6497
5/8	.0113	88.4317	.0635	15.7509	.4749	2.1056
3/4	.0137	73.2018	.0767	13.0382	.5738	1.7429
7/8	.0160	62.3289	.0901	11.1016	.6738	1.4840
10	.0185	54.1789	.1036	9.6500	.7752	1.2900
1/8	.0209	47.8443	.1173	8.5217	.8778	1.1392
1/4	.0234	42.7803	.1312	7.6197	.9818	1.0186
3/8	.0259	38.6402	.1453	6.8823	1.0869	.9200
1/2	.0284	35.1932	.1595	6.2684	1.1934	.8379
5/8	.0310	32.2791	.1739	5.7493	1.3011	.7686
3/4	.0336	29.7837	.1885	5.3049	1.4102	.7092
7/8	.0362	27.6233	.2032	4.9201	1.5204	.6577
11	.0389	25.7350	.2182	4.5838	1.6320	.6128
1/8	.0415	24.0707	.2332	4.2873	1.7448	.5731
1/4	.0443	22.5931	.2485	4.0241	1.8590	.5379
3/8	.0470	21.2727	.2639	3.7890	1.9743	.5065
1/2	.0498	20.0859	.2795	3.5776	2.0910	.4782
5/8	.0526	19.0134	.2953	3.3866	2.2089	.4527
3/4	.0554	18.0399	.3112	3.2131	2.3282	.4295
7/8	.0583	17.1522	.3273	3.0550	2.4486	.4084
12	.0612	16.3397	.3436	2.9103	2.5704	.3890
1/8	.0641	15.5933	.3600	2.7774	2.6934	.3713
1/4	.0671	14.9053	.3767	2.6548	2.8178	.3549
3/8	.0701	14.2694	.3935	2.5416	2.9433	.3398
1/2	.0731	13.6797	.4104	2.4365	3.0702	.3257
5/8	.0761	13.1317	.4275	2.3389	3.1983	.3127
3/4	.0792	12.6210	.4448	2.2480	3.3278	.3005
7/8	.0823	12.1441	.4623	2.1630	3.4584	.2892
13	.0855	11.6977	.4800	2.0835	3.5904	.2785
1/8	.0887	11.2792	.4978	2.0090	3.7236	.2686
1/4	.0919	10.8859	.5157	1.9389	3.8582	.2592
3/8	.0951	10.5158	.5339	1.8730	3.9939	.2504
1/2	.0984	10.1669	.5522	1.8109	4.1310	.2421
5/8	.1016	9.8375	.5707	1.7522	4.2693	.2342
3/4	.1050	9.5260	.5894	1.6967	4.4090	.2268
7/8	.1083	9.2310	.6082	1.6442	4.5498	.2198
14	.1117	8.9513	.6272	1.5943	4.6920	.2131
1/8	.1151	8.6858	.6464	1.5471	4.8354	.2068
1/4	.1186	8.4334	.6657	1.5021	4.9802	.2008
3/8	.1220	8.1932	.6852	1.4593	5.1261	.1951
1/2	.1256	7.9644	.7049	1.4186	5.2734	.1896
5/8	.1291	7.7462	.7248	1.3797	5.4219	.1844
3/4	.1327	7.5379	.7448	1.3426	5.5718	.1795
7/8	.1363	7.3389	.7650	1.3072	5.7228	.1747
15	.1399	7.1486	.7854	1.2733	5.8752	.1702

9 5/8" Pipe
OD 9.625"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
10	.0071	139.8760	.0401	24.9138	.3003	3.3304
1/8	.0096	104.2430	.0539	18.5671	.4029	2.4820
1/4	.0121	82.8699	.0677	14.7603	.5068	1.9731
3/8	.0146	68.6267	.0818	12.2233	.6120	1.6340
1/2	.0171	58.4575	.0960	10.4121	.7185	1.3919
5/8	.0197	50.8346	.1104	9.0543	.8262	1.2104
3/4	.0223	44.9091	.1250	7.9989	.9352	1.0693
7/8	.0249	40.1717	.1398	7.1551	1.0455	.9565
11	.0275	36.2984	.1547	6.4652	1.1571	.8643
1/8	.0302	33.0731	.1698	5.8908	1.2699	.7875
1/4	.0330	30.3462	.1850	5.4051	1.3840	.7225
3/8	.0357	28.0109	.2004	4.9891	1.4994	.6669
1/2	.0385	25.9888	.2160	4.6290	1.6161	.6188
5/8	.0413	24.2212	.2318	4.3141	1.7340	.5767
3/4	.0441	22.6631	.2477	4.0366	1.8532	.5396
7/8	.0470	21.2796	.2638	3.7902	1.9737	.5067
12	.0499	20.0431	.2801	3.5699	2.0955	.4772
1/8	.0528	18.9315	.2966	3.3720	2.2185	.4508
1/4	.0558	17.9270	.3132	3.1930	2.3428	.4268
3/8	.0588	17.0149	.3300	3.0306	2.4684	.4051
1/2	.0618	16.1831	.3469	2.8824	2.5953	.3853
5/8	.0648	15.4217	.3641	2.7468	2.7234	.3672
3/4	.0679	14.7221	.3814	2.6222	2.8528	.3505
7/8	.0710	14.0773	.3988	2.5074	2.9835	.3352
13	.0742	13.4810	.4165	2.4011	3.1155	.3210
1/8	.0773	12.9281	.4343	2.3027	3.2487	.3078
1/4	.0806	12.4141	.4523	2.2111	3.3832	.2956
3/8	.0838	11.9351	.4704	2.1258	3.5190	.2842
1/2	.0870	11.4876	.4887	2.0461	3.6561	.2735
5/8	.0903	11.0688	.5072	1.9715	3.7944	.2635
3/4	.0937	10.6760	.5259	1.9015	3.9340	.2542
7/8	.0970	10.3069	.5447	1.8358	4.0749	.2454
14	.1004	9.9594	.5637	1.7739	4.2171	.2371
1/8	.1038	9.6318	.5829	1.7156	4.3605	.2293
1/4	.1073	9.3224	.6022	1.6604	4.5052	.2220
3/8	.1107	9.0298	.6218	1.6083	4.6512	.2150
1/2	.1142	8.7527	.6414	1.5590	4.7985	.2084
5/8	.1178	8.4899	.6613	1.5122	4.9470	.2021
3/4	.1213	8.2404	.6813	1.4677	5.0968	.1962
7/8	.1249	8.0031	.7015	1.4255	5.2479	.1906
15	.1286	7.7773	.7219	1.3852	5.4003	.1852
1/8	.1322	7.5622	.7424	1.3469	5.5539	.1801
1/4	.1359	7.3570	.7631	1.3104	5.7088	.1752
3/8	.1396	7.1610	.7840	1.2755	5.8650	.1705
1/2	.1434	6.9738	.8051	1.2421	6.0225	.1660
5/8	.1472	6.7947	.8263	1.2102	6.1812	.1618
3/4	.1510	6.6233	.8477	1.1797	6.3412	.1577
7/8	.1548	6.4590	.8692	1.1504	6.5025	.1538
16	.1587	6.3014	.8910	1.1224	6.6651	.1500

10” Pipe
OD 10.000”

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
10 1/8	.0024	409.2025	.0137	72.8845	.1026	9.7431
1/4	.0049	203.3383	.0276	36.2173	.2066	4.8415
3/8	.0074	134.7272	.0417	23.9967	.3117	3.2079
1/2	.0100	100.4293	.0559	17.8878	.4182	2.3912
5/8	.0125	79.8565	.0703	14.2235	.5259	1.9014
3/4	.0151	66.1462	.0849	11.7815	.6350	1.5749
7/8	.0177	56.3572	.0996	10.0380	.7452	1.3419
11	.0204	49.0190	.1145	8.7310	.8568	1.1671
1/8	.0231	43.3147	.1296	7.7149	.9696	1.0313
1/4	.0258	38.7539	.1449	6.9026	1.0838	.9227
3/8	.0286	35.0248	.1603	6.2384	1.1991	.8339
1/2	.0313	31.9194	.1759	5.6853	1.3158	.7600
5/8	.0341	29.2937	.1917	5.2176	1.4337	.6975
3/4	.0370	27.0450	.2076	4.8171	1.5530	.6439
7/8	.0398	25.0978	.2237	4.4702	1.6734	.5976
12	.0427	23.3955	.2400	4.1670	1.7952	.5570
1/8	.0457	21.8948	.2564	3.8998	1.9182	.5213
1/4	.0486	20.5623	.2730	3.6624	2.0426	.4896
3/8	.0516	19.3712	.2898	3.4503	2.1681	.4612
1/2	.0546	18.3004	.3068	3.2596	2.2950	.4357
5/8	.0577	17.3327	.3239	3.0872	2.4231	.4127
3/4	.0608	16.4539	.3412	2.9307	2.5526	.3918
7/8	.0639	15.6526	.3587	2.7879	2.6832	.3727
13	.0670	14.9188	.3763	2.6572	2.8152	.3552
1/8	.0702	14.2447	.3941	2.5372	2.9484	.3392
1/4	.0734	13.6232	.4121	2.4265	3.0830	.3244
3/8	.0766	13.0484	.4303	2.3241	3.2187	.3107
1/2	.0799	12.5155	.4486	2.2292	3.3558	.2980
5/8	.0832	12.0200	.4671	2.1409	3.4941	.2862
3/4	.0865	11.5582	.4857	2.0587	3.6338	.2752
7/8	.0899	11.1268	.5046	1.9818	3.7746	.2649
14	.0933	10.7229	.5236	1.9099	3.9168	.2553
1/8	.0967	10.3441	.5428	1.8424	4.0602	.2463
1/4	.1001	9.9881	.5621	1.7790	4.2050	.2378
3/8	.1036	9.6530	.5816	1.7193	4.3509	.2298
1/2	.1071	9.3370	.6013	1.6630	4.4982	.2223
5/8	.1106	9.0385	.6212	1.6099	4.6467	.2152
3/4	.1142	8.7562	.6412	1.5596	4.7966	.2085
7/8	.1178	8.4888	.6614	1.5120	4.9476	.2021
15	.1214	8.2352	.6818	1.4668	5.1000	.1961
1/8	.1251	7.9944	.7023	1.4239	5.2536	.1903
1/4	.1288	7.7654	.7230	1.3831	5.4086	.1849
3/8	.1325	7.5474	.7439	1.3443	5.5647	.1797
1/2	.1362	7.3398	.7649	1.3073	5.7222	.1748
5/8	.1400	7.1416	.7861	1.2720	5.8809	.1700
3/4	.1438	6.9525	.8075	1.2383	6.0410	.1655
7/8	.1477	6.7717	.8291	1.2061	6.2022	.1612
16	.1515	6.5987	.8508	1.1753	6.3648	.1571

10 3/4" Pipe
OD 10.750"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
11 1/2	.0162	61.6869	.0910	10.9873	.6809	1.4688
5/8	.0190	52.5791	.1068	9.3650	.7988	1.2519
3/4	.0219	45.7511	.1227	8.1489	.9180	1.0893
7/8	.0247	40.4430	.1388	7.2034	1.0385	.9629
12	.0276	36.1987	.1551	6.4475	1.1603	.8619
1/8	.0306	32.7281	.1715	5.8293	1.2833	.7793
1/4	.0335	29.8377	.1882	5.3145	1.4076	.7104
3/8	.0365	27.3936	.2050	4.8792	1.5332	.6522
1/2	.0395	25.3002	.2219	4.5063	1.6601	.6024
5/8	.0426	23.4872	.2390	4.1834	1.7882	.5592
3/4	.0457	21.9021	.2563	3.9011	1.9176	.5215
7/8	.0488	20.5047	.2738	3.6522	2.0483	.4882
13	.0519	19.2636	.2914	3.4311	2.1803	.4587
1/8	.0551	18.1542	.3093	3.2335	2.3135	.4323
1/4	.0583	17.1567	.3272	3.0558	2.4480	.4085
3/8	.0615	16.2550	.3454	2.8952	2.5838	.3870
1/2	.0648	15.4362	.3637	2.7494	2.7209	.3675
5/8	.0681	14.6893	.3822	2.6164	2.8592	.3498
3/4	.0714	14.0054	.4009	2.4946	2.9988	.3335
7/8	.0748	13.3770	.4197	2.3826	3.1397	.3185
14	.0781	12.7975	.4387	2.2794	3.2819	.3047
1/8	.0816	12.2616	.4579	2.1840	3.4253	.2919
1/4	.0850	11.7646	.4772	2.0954	3.5700	.2801
3/8	.0885	11.3024	.4967	2.0131	3.7160	.2691
1/2	.0920	10.8716	.5164	1.9364	3.8633	.2589
5/8	.0955	10.4690	.5363	1.8647	4.0118	.2493
3/4	.0991	10.0922	.5563	1.7975	4.1616	.2403
7/8	.1027	9.7386	.5765	1.7346	4.3127	.2319
15	.1063	9.4063	.5969	1.6754	4.4651	.2240
1/8	.1100	9.0934	.6174	1.6197	4.6187	.2165
1/4	.1137	8.7983	.6381	1.5671	4.7736	.2095
3/8	.1174	8.5195	.6590	1.5174	4.9298	.2029
1/2	.1211	8.2558	.6800	1.4705	5.0873	.1966
5/8	.1249	8.0060	.7013	1.4260	5.2460	.1906
3/4	.1287	7.7691	.7227	1.3838	5.4060	.1850
7/8	.1326	7.5440	.7442	1.3437	5.5673	.1796
16	.1364	7.3300	.7659	1.3056	5.7299	.1745
1/8	.1403	7.1262	.7878	1.2693	5.8937	.1697
1/4	.1443	6.9320	.8099	1.2347	6.0588	.1651
3/8	.1482	6.7467	.8322	1.2017	6.2252	.1606
1/2	.1522	6.5698	.8546	1.1702	6.3929	.1564
5/8	.1562	6.4006	.8772	1.1400	6.5618	.1524
3/4	.1603	6.2388	.8999	1.1112	6.7320	.1485
7/8	.1644	6.0838	.9228	1.0836	6.9035	.1449
17	.1685	5.9353	.9459	1.0572	7.0763	.1413
1/4	.1768	5.6560	.9926	1.0074	7.4256	.1347
1/2	.1852	5.3984	1.0400	.9615	7.7801	.1285
3/4	.1938	5.1599	1.0881	.9190	8.1396	.1229
18	.2025	4.9387	1.1368	.8796	8.5043	.1176

11 3/4" Pipe
OD 11.750"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
12	.0058	173.3726	.0324	30.8800	.2423	4.1280
1/8	.0087	114.9766	.0488	20.4789	.3653	2.7376
1/4	.0117	85.7833	.0654	15.2792	.4896	2.0425
3/8	.0146	68.2711	.0822	12.1600	.6152	1.6255
1/2	.0177	56.5993	.0992	10.0811	.7421	1.3476
5/8	.0207	48.2649	.1163	8.5966	.8702	1.1492
3/4	.0238	42.0163	.1336	7.4837	.9996	1.0004
7/8	.0269	37.1583	.1511	6.6184	1.1303	.8847
13	.0301	33.2735	.1687	5.9265	1.2623	.7922
1/8	.0332	30.0967	.1865	5.3606	1.3955	.7166
1/4	.0364	27.4507	.2045	4.8893	1.5300	.6536
3/8	.0397	25.2130	.2227	4.4908	1.6658	.6003
1/2	.0429	23.2962	.2410	4.1494	1.8029	.5547
5/8	.0462	21.6360	.2595	3.8537	1.9412	.5152
3/4	.0495	20.1843	.2782	3.5951	2.0808	.4806
7/8	.0529	18.9043	.2970	3.3671	2.2217	.4501
14	.0563	17.7674	.3160	3.1646	2.3639	.4230
1/8	.0597	16.7510	.3352	2.9836	2.5073	.3988
1/4	.0631	15.8369	.3545	2.8208	2.6520	.3771
3/8	.0666	15.0106	.3740	2.6736	2.7980	.3574
1/2	.0701	14.2601	.3937	2.5399	2.9453	.3395
5/8	.0737	13.5754	.4136	2.4180	3.0938	.3232
3/4	.0772	12.9484	.4336	2.3063	3.2436	.3083
7/8	.0808	12.3721	.4538	2.2036	3.3947	.2946
15	.0845	11.8407	.4742	2.1090	3.5471	.2819
1/8	.0881	11.3491	.4947	2.0214	3.7007	.2702
1/4	.0918	10.8931	.5154	1.9402	3.8556	.2594
3/8	.0955	10.4690	.5363	1.8647	4.0118	.2493
1/2	.0993	10.0736	.5573	1.7943	4.1693	.2399
5/8	.1030	9.7042	.5786	1.7284	4.3280	.2311
3/4	.1069	9.3582	.5999	1.6668	4.4880	.2228
7/8	.1107	9.0335	.6215	1.6090	4.6493	.2151
16	.1146	8.7284	.6432	1.5546	4.8119	.2078
1/4	.1224	8.1698	.6872	1.4552	5.1408	.1945
1/2	.1303	7.6714	.7319	1.3664	5.4749	.1827
3/4	.1384	7.2239	.7772	1.2867	5.8140	.1720
17	.1466	6.8200	.8232	1.2147	6.1583	.1624
1/4	.1549	6.4539	.8699	1.1495	6.5076	.1537
1/2	.1634	6.1205	.9173	1.0902	6.8621	.1457
3/4	.1719	5.8158	.9654	1.0359	7.2216	.1385
18	.1806	5.5363	1.0141	.9861	7.5863	.1318
14	.1894	5.2790	1.0635	.9403	7.9560	.1257
1/2	.1983	5.0414	1.1136	.8979	8.3309	.1200
3/4	.2074	4.8215	1.1644	.8588	8.7108	.1148
19	.2166	4.6174	1.2159	.8224	9.0959	.1099
1/4	.2259	4.4275	1.2681	.7886	9.4860	.1054
1/2	.2353	4.2504	1.3209	.7571	9.8813	.1012
3/4	.2448	4.0849	1.3744	.7276	10.2816	.0973
20	.2544	3.9299	1.4286	.7000	10.6871	.0936

13” Pipe
OD 13.000”

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
14	.0262	38.1259	.1473	6.7907	1.1016	.9078
1/8	.0296	33.7335	.1664	6.0084	1.2450	.8032
1/4	.0331	30.2209	.1858	5.3828	1.3898	.7196
3/8	.0366	27.3481	.2053	4.8711	1.5357	.6512
1/2	.0401	24.9552	.2250	4.4448	1.6830	.5942
5/8	.0436	22.9313	.2448	4.0844	1.8315	.5460
3/4	.0472	21.1974	.2649	3.7755	1.9814	.5047
7/8	.0508	19.6955	.2851	3.5080	2.1324	.4690
15	.0544	18.3821	.3054	3.2741	2.2848	.4377
1/8	.0581	17.2239	.3260	3.0678	2.4384	.4101
1/4	.0617	16.1951	.3467	2.8846	2.5934	.3856
3/8	.0655	15.2751	.3675	2.7207	2.7495	.3637
1/2	.0692	14.4477	.3886	2.5733	2.9070	.3440
5/8	.0730	13.6996	.4098	2.4401	3.0657	.3262
3/4	.0768	13.0201	.4312	2.3191	3.2258	.3100
7/8	.0806	12.4001	.4528	2.2086	3.3870	.2952
16	.0845	11.8322	.4745	2.1075	3.5496	.2817
1/4	.0923	10.8287	.5185	1.9287	3.8786	.2578
1/2	.1003	9.9700	.5631	1.7758	4.2126	.2374
3/4	.1084	9.2271	.6085	1.6435	4.5518	.2197
17	.1166	8.5783	.6545	1.5279	4.8960	.2043
1/4	.1249	8.0070	.7012	1.4262	5.2454	.1906
1/2	.1333	7.5002	.7486	1.3359	5.5998	.1786
3/4	.1419	7.0477	.7966	1.2553	5.9594	.1678
18	.1506	6.6413	.8454	1.1829	6.3240	.1581
1/4	.1594	6.2744	.8948	1.1176	6.6938	.1494
1/2	.1683	5.9417	.9449	1.0583	7.0686	.1415
3/4	.1773	5.6386	.9957	1.0043	7.4486	.1343
19	.1865	5.3615	1.0472	.9549	7.8336	.1277
1/4	.1958	5.1071	1.0993	.9096	8.2238	.1216
1/2	.2052	4.8729	1.1522	.8679	8.6190	.1160
3/4	.2147	4.6566	1.2057	.8294	9.0194	.1109
20	.2244	4.4563	1.2599	.7937	9.4248	.1061
1/4	.2342	4.2703	1.3148	.7606	9.8354	.1017
1/2	.2441	4.0971	1.3703	.7298	10.2510	.0976
3/4	.2541	3.9356	1.4266	.7010	10.6718	.0937
21	.2642	3.7846	1.4835	.6741	11.0976	.0901
1/4	.2745	3.6431	1.5411	.6489	11.5286	.0867
1/2	.2849	3.5103	1.5994	.6252	11.9646	.0836
3/4	.2954	3.3855	1.6584	.6030	12.4058	.0806
22	.3060	3.2679	1.7180	.5821	12.8520	.0778
1/4	.3167	3.1571	1.7783	.5623	13.3034	.0752
1/2	.3276	3.0523	1.8394	.5437	13.7598	.0727
3/4	.3386	2.9533	1.9011	.5260	14.2214	.0703
23	.3497	2.8594	1.9634	.5093	14.6880	.0681
1/4	.3609	2.7705	2.0265	.4935	15.1598	.0660
1/2	.3723	2.6860	2.0902	.4784	15.6366	.0640
3/4	.3838	2.6057	2.1547	.4641	16.1186	.0620
24	.3954	2.5292	2.2198	.4505	16.6056	.0602

13 3/8" Pipe
OD 13.375"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
14	.0166	60.1658	.0933	10.7163	.6981	1.4325
1/8	.0200	49.9103	.1125	8.8897	.8415	1.1884
1/4	.0235	42.5867	.1318	7.5853	.9862	1.0140
3/8	.0270	37.0955	.1513	6.6072	1.1322	.8832
1/2	.0305	32.8259	.1710	5.8467	1.2795	.7816
5/8	.0340	29.4114	.1909	5.2386	1.4280	.7003
3/4	.0376	26.6188	.2109	4.7412	1.5778	.6338
7/8	.0412	24.2926	.2311	4.3268	1.7289	.5784
15	.0448	22.3252	.2515	3.9764	1.8813	.5316
1/8	.0484	20.6396	.2720	3.6762	2.0349	.4914
1/4	.0521	19.1795	.2927	3.4161	2.1898	.4567
3/8	.0559	17.9026	.3136	3.1887	2.3460	.4263
1/2	.0596	16.7766	.3347	2.9881	2.5035	.3994
5/8	.0634	15.7762	.3559	2.8100	2.6622	.3756
3/4	.0672	14.8818	.3773	2.6506	2.8222	.3543
7/8	.0710	14.0773	.3988	2.5074	2.9835	.3352
16	.0749	13.3499	.4206	2.3778	3.1461	.3179
1/4	.0827	12.0861	.4645	2.1527	3.4750	.2878
1/2	.0907	11.0262	.5092	1.9639	3.8091	.2625
3/4	.0988	10.1247	.5545	1.8034	4.1482	.2411
17	.1070	9.3489	.6005	1.6652	4.4925	.2226
1/4	.1153	8.6743	.6472	1.5450	4.8418	.2065
1/2	.1237	8.0826	.6946	1.4396	5.1963	.1924
3/4	.1323	7.5596	.7427	1.3465	5.5558	.1800
18	.1410	7.0940	.7914	1.2635	5.9205	.1689
1/4	.1498	6.6770	.8409	1.1893	6.2902	.1590
1/2	.1587	6.3014	.8910	1.1224	6.6651	.1500
3/4	.1677	5.9616	.9418	1.0618	7.0450	.1419
19	.1769	5.6526	.9932	1.0068	7.4301	.1346
1/4	.1862	5.3706	1.0454	.9566	7.8202	.1279
1/2	.1956	5.1123	1.0982	.9106	8.2155	.1217
3/4	.2051	4.8747	1.1517	.8683	8.6158	.1161
20	.2148	4.6556	1.2059	.8292	9.0213	.1109
1/4	.2246	4.4530	1.2608	.7931	9.4318	.1060
1/2	.2345	4.2650	1.3164	.7597	9.8475	.1015
3/4	.2445	4.0902	1.3726	.7285	10.2682	.0974
21	.2546	3.9274	1.4295	.6995	10.6941	.0935
1/4	.2649	3.7752	1.4872	.6724	11.1250	.0899
1/2	.2753	3.6328	1.5454	.6471	11.5611	.0865
3/4	.2858	3.4993	1.6044	.6233	12.0022	.0833
22	.2964	3.3739	1.6641	.6009	12.4485	.0803
1/4	.3071	3.2558	1.7244	.5799	12.8998	.0775
1/2	.3180	3.1446	1.7854	.5601	13.3563	.0749
3/4	.3290	3.0395	1.8471	.5414	13.8178	.0724
23	.3401	2.9402	1.9095	.5237	14.2845	.0700
1/4	.3513	2.8462	1.9726	.5070	14.7562	.0678
1/2	.3627	2.7571	2.0363	.4911	15.2331	.0656
3/4	.3742	2.6726	2.1007	.4760	15.7150	.0636
24	.3858	2.5922	2.1658	.4617	16.2021	.0617

14" Pipe
OD 14.000"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
15	.0282	35.4966	.1582	6.3224	1.1832	.8452
1/8	.0318	31.4171	.1787	5.5958	1.3368	.7480
1/4	.0355	28.1545	.1994	5.0147	1.4918	.6704
3/8	.0392	25.4861	.2203	4.5394	1.6479	.6068
1/2	.0430	23.2633	.2413	4.1435	1.8054	.5539
5/8	.0468	21.3832	.2626	3.8086	1.9641	.5091
3/4	.0506	19.7724	.2839	3.5217	2.1242	.4708
7/8	.0544	18.3770	.3055	3.2732	2.2854	.4376
16	.0583	17.1567	.3272	3.0558	2.4480	.4085
1/4	.0661	15.1243	.3712	2.6938	2.7770	.3601
1/2	.0741	13.5003	.4159	2.4046	3.1110	.3214
3/4	.0821	12.1732	.4612	2.1682	3.4502	.2898
17	.0903	11.0688	.5072	1.9715	3.7944	.2635
1/4	.0987	10.1356	.5539	1.8053	4.1438	.2413
1/2	.1071	9.3370	.6013	1.6630	4.4982	.2223
3/4	.1157	8.6459	.6494	1.5399	4.8578	.2059
18	.1243	8.0422	.6981	1.4324	5.2224	.1915
1/4	.1331	7.5104	.7475	1.3377	5.5922	.1788
1/2	.1421	7.0386	.7976	1.2537	5.9670	.1676
3/4	.1511	6.6173	.8484	1.1786	6.3470	.1576
19	.1603	6.2388	.8999	1.1112	6.7320	.1485
1/4	.1696	5.8970	.9521	1.0503	7.1222	.1404
1/2	.1790	5.5870	1.0049	.9951	7.5174	.1330
3/4	.1885	5.3045	1.0584	.9448	7.9178	.1263
20	.1982	5.0461	1.1126	.8988	8.3232	.1201
1/4	.2079	4.8089	1.1675	.8565	8.7338	.1145
1/2	.2178	4.5904	1.2231	.8176	9.1494	.1093
3/4	.2279	4.3886	1.2793	.7817	9.5702	.1045
21	.2380	4.2016	1.3362	.7484	9.9960	.1000
1/4	.2483	4.0280	1.3938	.7174	10.4270	.0959
1/2	.2586	3.8663	1.4521	.6886	10.8630	.0921
3/4	.2691	3.7154	1.5111	.6618	11.3042	.0885
22	.2798	3.5743	1.5708	.6366	11.7504	.0851
1/4	.2905	3.4421	1.6311	.6131	12.2018	.0820
1/2	.3014	3.3180	1.6921	.5910	12.6582	.0790
3/4	.3124	3.2012	1.7538	.5702	13.1198	.0762
23	.3235	3.0913	1.8162	.5506	13.5864	.0736
1/4	.3347	2.9876	1.8792	.5321	14.0582	.0711
1/2	.3461	2.8895	1.9430	.5147	14.5350	.0688
3/4	.3575	2.7968	2.0074	.4981	15.0170	.0666
24	.3691	2.7089	2.0725	.4825	15.5040	.0645
1/4	.3808	2.6256	2.1383	.4677	15.9962	.0625
1/2	.3927	2.5464	2.2048	.4536	16.4934	.0606
3/4	.4046	2.4712	2.2719	.4402	16.9958	.0588
25	.4167	2.3995	2.3398	.4274	17.5032	.0571
1/4	.4289	2.3313	2.4083	.4152	18.0158	.0555
1/2	.4413	2.2662	2.4775	.4036	18.5334	.0540
3/4	.4537	2.2040	2.5474	.3926	19.0562	.0525
26	.4663	2.1446	2.6179	.3820	19.5840	.0511

16" Pipe
OD 16.000"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
17	.0321	31.1939	.1800	5.5561	1.3464	.7427
1/8	.0362	27.6233	.2032	4.9201	1.5204	.6577
1/4	.0404	24.7675	.2267	4.4114	1.6958	.5897
3/8	.0446	22.4316	.2503	3.9954	1.8723	.5341
1/2	.0488	20.4856	.2741	3.6488	2.0502	.4878
5/8	.0531	18.8395	.2980	3.3556	2.2293	.4486
3/4	.0574	17.4290	.3221	3.1043	2.4098	.4150
7/8	.0617	16.2070	.3464	2.8867	2.5914	.3859
18	.0661	15.1382	.3709	2.6963	2.7744	.3604
1/4	.0749	13.3580	.4203	2.3792	3.1442	.3181
1/2	.0838	11.9351	.4704	2.1258	3.5190	.2842
3/4	.0928	10.7720	.5212	1.9186	3.8990	.2565
19	.1020	9.8038	.5727	1.7462	4.2840	.2334
1/4	.1113	8.9855	.6248	1.6004	4.6742	.2139
1/2	.1207	8.2849	.6777	1.4757	5.0694	.1973
3/4	.1302	7.6785	.7312	1.3676	5.4698	.1828
20	.1399	7.1486	.7854	1.2733	5.8752	.1702
1/4	.1497	6.6817	.8403	1.1901	6.2858	.1591
1/2	.1596	6.2673	.8958	1.1163	6.7014	.1492
3/4	.1696	5.8970	.9521	1.0503	7.1222	.1404
21	.1797	5.5643	1.0090	.9911	7.5480	.1325
1/4	.1900	5.2638	1.0666	.9376	7.9790	.1253
1/2	.2004	4.9910	1.1249	.8890	8.4150	.1188
3/4	.2109	4.7424	1.1839	.8447	8.8562	.1129
22	.2215	4.5149	1.2435	.8042	9.3024	.1075
1/4	.2322	4.3060	1.3038	.7670	9.7538	.1025
1/2	.2431	4.1135	1.3649	.7327	10.2102	.0979
3/4	.2541	3.9356	1.4266	.7010	10.6718	.0937
23	.2652	3.7707	1.4889	.6716	11.1384	.0898
1/4	.2764	3.6175	1.5520	.6443	11.6102	.0861
1/2	.2878	3.4748	1.6157	.6189	12.0870	.0827
3/4	.2993	3.3415	1.6802	.5952	12.5690	.0796
24	.3108	3.2169	1.7453	.5730	13.0560	.0766
1/4	.3226	3.1000	1.8111	.5522	13.5482	.0738
1/2	.3344	2.9903	1.8775	.5326	14.0454	.0712
3/4	.3464	2.8870	1.9447	.5142	14.5478	.0687
25	.3584	2.7897	2.0125	.4969	15.0552	.0664
1/4	.3706	2.6979	2.0810	.4805	15.5678	.0642
1/2	.3830	2.6110	2.1502	.4651	16.0854	.0622
3/4	.3954	2.5288	2.2201	.4504	16.6082	.0602
26	.4080	2.4510	2.2907	.4365	17.1360	.0584
1/4	.4207	2.3770	2.3619	.4234	17.6690	.0566
1/2	.4335	2.3068	2.4338	.4109	18.2070	.0549
3/4	.4464	2.2400	2.5065	.3990	18.7502	.0533
27	.4595	2.1763	2.5797	.3876	19.2984	.0518
1/4	.4726	2.1157	2.6537	.3768	19.8518	.0504
1/2	.4859	2.0578	2.7284	.3665	20.4102	.0490
3/4	.4994	2.0025	2.8037	.3567	20.9738	.0477
28	.5129	1.9496	2.8797	.3473	21.5424	.0464

18 5/8" Pipe
OD 18.625"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
19	.0137	72.9586	.0770	12.9949	.5757	1.7371
1/8	.0183	54.5377	.1029	9.7139	.7701	1.2985
1/4	.0230	43.4862	.1291	7.7455	.9658	1.0354
3/8	.0277	36.1193	.1554	6.4333	1.1628	.8600
1/2	.0324	30.8579	.1819	5.4962	1.3611	.7347
5/8	.0372	26.9124	.2086	4.7935	1.5606	.6408
3/4	.0419	23.8442	.2355	4.2470	1.7614	.5677
7/8	.0467	21.3901	.2625	3.8099	1.9635	.5093
20	.0516	19.3826	.2897	3.4523	2.1669	.4615
1/4	.0614	16.2952	.3445	2.9024	2.5774	.3880
1/2	.0713	14.0323	.4001	2.4993	2.9931	.3341
3/4	.0813	12.3028	.4563	2.1913	3.4138	.2929
21	.0914	10.9383	.5133	1.9483	3.8397	.2604
1/4	.1017	9.8345	.5709	1.7517	4.2706	.2342
1/2	.1121	8.9234	.6292	1.5894	4.7067	.2125
3/4	.1226	8.1587	.6881	1.4532	5.1478	.1943
22	.1332	7.5079	.7478	1.3373	5.5941	.1788
1/4	.1439	6.9473	.8081	1.2374	6.0454	.1654
1/2	.1548	6.4596	.8691	1.1505	6.5019	.1538
3/4	.1658	6.0315	.9308	1.0743	6.9634	.1436
23	.1769	5.6526	.9932	1.0068	7.4301	.1346
1/4	.1881	5.3152	1.0563	.9467	7.9018	.1266
1/2	.1995	5.0127	1.1200	.8928	8.3787	.1194
3/4	.2110	4.7400	1.1845	.8443	8.8606	.1129
24	.2226	4.4931	1.2496	.8003	9.3477	.1070
1/4	.2343	4.2683	1.3154	.7602	9.8398	.1016
1/2	.2461	4.0630	1.3818	.7237	10.3371	.0967
3/4	.2581	3.8747	1.4490	.6901	10.8394	.0923
25	.2702	3.7014	1.5168	.6593	11.3469	.0881
1/4	.2824	3.5415	1.5853	.6308	11.8594	.0843
1/2	.2947	3.3933	1.6545	.6044	12.3771	.0808
3/4	.3071	3.2558	1.7244	.5799	12.8998	.0775
26	.3197	3.1278	1.7950	.5571	13.4277	.0745
1/4	.3324	3.0084	1.8662	.5358	13.9606	.0716
1/2	.3452	2.8968	1.9381	.5160	14.4987	.0690
3/4	.3581	2.7922	2.0107	.4973	15.0418	.0665
27	.3712	2.6940	2.0840	.4798	15.5901	.0641
1/4	.3844	2.6017	2.1580	.4634	16.1434	.0619
1/2	.3977	2.5147	2.2326	.4479	16.7019	.0599
3/4	.4111	2.4326	2.3080	.4333	17.2654	.0579
28	.4246	2.3550	2.3840	.4195	17.8341	.0561
1/4	.4383	2.2816	2.4607	.4064	18.4078	.0543
1/2	.4521	2.2121	2.5381	.3940	18.9867	.0527
3/4	.4660	2.1461	2.6161	.3822	19.5706	.0511
29	.4800	2.0833	2.6949	.3711	20.1597	.0496
1/4	.4941	2.0237	2.7743	.3604	20.7538	.0482
1/2	.5084	1.9669	2.8544	.3503	21.3531	.0468
3/4	.5228	1.9128	2.9352	.3407	21.9574	.0455
30	.5373	1.8611	3.0167	.3315	22.5669	.0443

20" Pipe
OD 20.000"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
21	.0398	25.1073	.2236	4.4720	1.6728	.5978
1/8	.0449	22.2498	.2523	3.9630	1.8876	.5298
1/4	.0501	19.9641	.2812	3.5559	2.1038	.4753
3/8	.0553	18.0944	.3103	3.2229	2.3211	.4308
1/2	.0605	16.5365	.3395	2.9454	2.5398	.3937
5/8	.0657	15.2187	.3689	2.7106	2.7597	.3624
3/4	.0710	14.0893	.3985	2.5095	2.9810	.3355
7/8	.0763	13.1108	.4282	2.3352	3.2034	.3122
22	.0816	12.2548	.4581	2.1827	3.4272	.2918
1/8	.0870	11.4997	.4882	2.0482	3.6522	.2738
1/4	.0923	10.8287	.5185	1.9287	3.8786	.2578
3/8	.0978	10.2285	.5489	1.8218	4.1061	.2435
1/2	.1032	9.6885	.5795	1.7256	4.3350	.2307
5/8	.1087	9.2001	.6103	1.6387	4.5651	.2191
3/4	.1142	8.7562	.6412	1.5596	4.7966	.2085
7/8	.1197	8.3511	.6723	1.4874	5.0292	.1988
23	.1253	7.9798	.7036	1.4213	5.2632	.1900
1/8	.1309	7.6384	.7350	1.3605	5.4984	.1819
1/4	.1365	7.3234	.7666	1.3044	5.7350	.1744
3/8	.1422	7.0319	.7984	1.2525	5.9727	.1674
1/2	.1479	6.7612	.8304	1.2043	6.2118	.1610
5/8	.1536	6.5094	.8625	1.1594	6.4521	.1550
3/4	.1594	6.2744	.8948	1.1176	6.6938	.1494
7/8	.1652	6.0547	.9273	1.0784	6.9366	.1442
24	.1710	5.8489	.9599	1.0418	7.1808	.1393
1/4	.1827	5.4737	1.0257	.9749	7.6730	.1303
1/2	.1945	5.1406	1.0922	.9156	8.1702	.1224
3/4	.2065	4.8428	1.1593	.8626	8.6726	.1153
25	.2186	4.5751	1.2272	.8149	9.1800	.1089
1/4	.2308	4.3332	1.2957	.7718	9.6926	.1032
1/2	.2431	4.1135	1.3649	.7327	10.2102	.0979
3/4	.2555	3.9131	1.4347	.6970	10.7330	.0932
26	.2681	3.7297	1.5053	.6643	11.2608	.0888
1/4	.2808	3.5612	1.5765	.6343	11.7938	.0848
1/2	.2936	3.4058	1.6485	.6066	12.3318	.0811
3/4	.3065	3.2621	1.7211	.5810	12.8750	.0777
27	.3196	3.1289	1.7944	.5573	13.4232	.0745
1/4	.3328	3.0050	1.8683	.5352	13.9766	.0715
1/2	.3461	2.8895	1.9430	.5147	14.5350	.0688
3/4	.3595	2.7817	2.0183	.4955	15.0986	.0662
28	.3730	2.6807	2.0943	.4775	15.6672	.0638
1/4	.3867	2.5860	2.1710	.4606	16.2410	.0616
1/2	.4005	2.4970	2.2484	.4448	16.8198	.0595
3/4	.4144	2.4132	2.3265	.4298	17.4038	.0575
29	.4284	2.3342	2.4052	.4158	17.9928	.0556
1/4	.4425	2.2596	2.4846	.4025	18.5870	.0538
1/2	.4568	2.1890	2.5647	.3899	19.1862	.0521
3/4	.4712	2.1222	2.6455	.3780	19.7906	.0505
30	.4857	2.0588	2.7270	.3667	20.4000	.0490

21 1/2" Pipe
OD 21.500"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
22	.0211	47.3287	.1186	8.4299	.8874	1.1269
1/8	.0265	37.7545	.1487	6.7246	1.1124	.8989
1/4	.0319	31.3722	.1790	5.5878	1.3388	.7470
3/8	.0373	26.8138	.2094	4.7759	1.5663	.6384
1/2	.0427	23.3955	.2400	4.1670	1.7952	.5570
5/8	.0482	20.7370	.2707	3.6935	2.0253	.4937
3/4	.0537	18.6106	.3017	3.3148	2.2568	.4431
7/8	.0593	16.8711	.3328	3.0050	2.4894	.4017
23	.0648	15.4217	.3641	2.7468	2.7234	.3672
1/8	.0704	14.1956	.3955	2.5284	2.9586	.3380
1/4	.0761	13.1448	.4271	2.3413	3.1952	.3130
3/8	.0817	12.2343	.4589	2.1791	3.4329	.2913
1/2	.0874	11.4378	.4909	2.0372	3.6720	.2723
5/8	.0931	10.7351	.5230	1.9121	3.9123	.2556
3/4	.0989	10.1107	.5553	1.8009	4.1540	.2407
7/8	.1047	9.5522	.5878	1.7014	4.3968	.2274
24	.1105	9.0497	.6204	1.6119	4.6410	.2155
1/4	.1222	8.1820	.6862	1.4573	5.1332	.1948
1/2	.1341	7.4594	.7527	1.3286	5.6304	.1776
3/4	.1460	6.8484	.8198	1.2198	6.1328	.1631
25	.1581	6.3250	.8876	1.1266	6.6402	.1506
1/4	.1703	5.8718	.9562	1.0458	7.1528	.1398
1/2	.1826	5.4755	1.0254	.9753	7.6704	.1304
3/4	.1951	5.1262	1.0952	.9130	8.1932	.1221
26	.2076	4.8159	1.1658	.8578	8.7210	.1147
1/4	.2203	4.5386	1.2370	.8084	9.2540	.1081
1/2	.2331	4.2892	1.3090	.7640	9.7920	.1021
3/4	.2461	4.0638	1.3816	.7238	10.3352	.0968
27	.2591	3.8590	1.4549	.6873	10.8834	.0919
1/4	.2723	3.6723	1.5288	.6541	11.4368	.0874
1/2	.2856	3.5014	1.6035	.6236	11.9952	.0834
3/4	.2990	3.3442	1.6788	.5957	12.5588	.0796
28	.3125	3.1994	1.7548	.5699	13.1274	.0762
1/4	.3262	3.0654	1.8315	.5460	13.7012	.0730
1/2	.3400	2.9411	1.9089	.5239	14.2800	.0700
3/4	.3539	2.8256	1.9870	.5033	14.8640	.0673
29	.3679	2.7179	2.0657	.4841	15.4530	.0647
1/4	.3821	2.6173	2.1451	.4662	16.0472	.0623
1/2	.3963	2.5230	2.2252	.4494	16.6464	.0601
3/4	.4107	2.4346	2.3060	.4336	17.2508	.0580
30	.4252	2.3516	2.3875	.4188	17.8602	.0560
1/4	.4399	2.2733	2.4696	.4049	18.4748	.0541
1/2	.4546	2.1996	2.5525	.3918	19.0944	.0524
3/4	.4695	2.1299	2.6360	.3794	19.7192	.0507
31	.4845	2.0640	2.7202	.3676	20.3490	.0491
1/4	.4996	2.0015	2.8051	.3565	20.9840	.0477
1/2	.5148	1.9423	2.8906	.3459	21.6240	.0462
3/4	.5302	1.8860	2.9769	.3359	22.2692	.0449
32	.5457	1.8325	3.0638	.3264	22.9194	.0436

24 1/2" Pipe
OD 24.500"

VOLUME AND HEIGHT BETWEEN PIPE AND HOLE

Diameter of Hole In	Bbls Per Lin Ft	Lin Ft Per Bbl	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gal Per Lin Ft	Lin Ft Per Gal
25	.0240	41.5919	.1350	7.4081	1.0098	.9903
1/8	.0301	33.1897	.1692	5.9115	1.2654	.7902
1/4	.0362	27.5886	.2035	4.9139	1.5224	.6569
3/8	.0424	23.5881	.2380	4.2014	1.7805	.5616
1/2	.0486	20.5880	.2727	3.6670	2.0400	.4902
5/8	.0548	18.2548	.3076	3.2514	2.3007	.4346
3/4	.0610	16.3885	.3426	2.9190	2.5628	.3902
7/8	.0673	14.8616	.3778	2.6471	2.8260	.3539
26	.0736	13.5894	.4131	2.4205	3.0906	.3236
1/4	.0863	11.5907	.4844	2.0645	3.6236	.2760
1/2	.0991	10.0922	.5563	1.7975	4.1616	.2403
3/4	.1120	8.9270	.6289	1.5900	4.7048	.2126
27	.1251	7.9953	.7022	1.4241	5.2530	.1904
1/4	.1382	7.2334	.7762	1.2884	5.8064	.1722
1/2	.1515	6.5987	.8508	1.1753	6.3648	.1571
3/4	.1650	6.0620	.9262	1.0797	6.9284	.1443
28	.1785	5.6022	1.0022	.9978	7.4970	.1334
1/4	.1922	5.2039	1.0789	.9269	8.0708	.1239
1/2	.2059	4.8557	1.1562	.8649	8.6496	.1156
3/4	.2198	4.5486	1.2343	.8102	9.2336	.1083
29	.2339	4.2758	1.3131	.7616	9.8226	.1018
1/4	.2480	4.0319	1.3925	.7181	10.4168	.0960
1/2	.2623	3.8126	1.4726	.6791	11.0160	.0908
3/4	.2767	3.6143	1.5534	.6438	11.6204	.0861
30	.2912	3.4342	1.6348	.6117	12.2298	.0818
1/4	.3058	3.2699	1.7170	.5824	12.8444	.0779
1/2	.3206	3.1194	1.7998	.5556	13.4640	.0743
3/4	.3354	2.9811	1.8833	.5310	14.0888	.0710
31	.3504	2.8535	1.9675	.5082	14.7186	.0679
1/4	.3655	2.7355	2.0524	.4872	15.3536	.0651
1/2	.3808	2.6260	2.1380	.4677	15.9936	.0625
3/4	.3961	2.5242	2.2242	.4496	16.6388	.0601
32	.4116	2.4293	2.3111	.4327	17.2890	.0578
1/4	.4272	2.3405	2.3987	.4169	17.9444	.0557
1/2	.4430	2.2575	2.4870	.4021	18.6048	.0538
3/4	.4588	2.1795	2.5760	.3882	19.2704	.0519
33	.4748	2.1062	2.6656	.3751	19.9410	.0501
1/4	.4909	2.0372	2.7560	.3628	20.6168	.0485
1/2	.5071	1.9720	2.8470	.3512	21.2976	.0470
3/4	.5234	1.9105	2.9387	.3403	21.9836	.0455
34	.5399	1.8523	3.0311	.3299	22.6746	.0441
1/4	.5564	1.7971	3.1241	.3201	23.3708	.0428
1/2	.5731	1.7447	3.2179	.3108	24.0720	.0415
3/4	.5899	1.6950	3.3123	.3019	24.7784	.0404
35	.6069	1.6477	3.4074	.2935	25.4898	.0392
1/4	.6239	1.6026	3.5032	.2855	26.2064	.0382
1/2	.6411	1.5597	3.5996	.2778	26.9280	.0371
3/4	.6584	1.5187	3.6968	.2705	27.6548	.0362
36	.6759	1.4796	3.7946	.2635	28.3866	.0352

SECTION 3

MULTIPLE STRINGS



MULTIPLE STRINGS FORMULAS 1
VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE 2
VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING 26

MULTIPLE STRINGS

The following tables contain information that is sufficient for normal conditions. If it is necessary to calculate volume and height data for conditions not covered by the tables, the following formulas may be used:

$$\text{Cu Ft per Lin Ft} = (D^2 - nd^2)\ 0.005454$$

$$\text{Lin Ft per Cu Ft} = \frac{183.35}{D^2 - nd^2}$$

$$\text{Gallons per Lin Ft} = (D^2 - nd^2)\ 0.0408$$

$$\text{Lin Ft per Gallon} = \frac{24.51}{D^2 - nd^2}$$

$$\text{Barrels per Lin Ft} = (D^2 - nd^2)\ 0.0009714$$

$$\text{Lin Ft per Barrel} = \frac{1029.4}{D^2 - nd^2}$$

WHERE:

For Volume and Height Between Tubing and Hole
- D = diameter of hole, inches
- d = outside diameter of tubing, inches
- n = number of tubing strings

For Volume and Height Between Tubing and Casing
- D = inside diameter of casing, inches
- d = outside diameter of tubing, inches
- n = number of tubing strings

For Volume and Height Between Casings
- D = inside diameter of outer casing, inches
- d = outside diameter of inner casing, inches
- n = number of casing strings

PLEASE NOTE:
No allowance made for upsets and couplings.

3/4" Tubing
OD (1.050")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
2	.0098	102.1448	.0732	13.6546	.0017	573.4819
3/4	.0292	34.2231	.2186	4.5749	.0052	192.1419
7/8	.0331	30.2527	.2473	4.0441	.0059	169.8505
3	.0371	26.9831	.2772	3.6071	.0066	151.4937
1/8	.0412	24.2506	.3085	3.2418	.0073	136.1528
1/4	.0456	21.9384	.3410	2.9327	.0081	123.1708
3/8	.0501	19.9605	.3748	2.6683	.0089	112.0664
1/2	.0548	18.2529	.4098	2.4400	.0098	102.4788
5/8	.0596	16.7663	.4462	2.2413	.0106	94.1327
3/4	.0647	15.4628	.4838	2.0670	.0115	86.8143
7/8	.0699	14.3123	.5227	1.9133	.0124	80.3552
4	.0752	13.2910	.5628	1.7767	.0134	74.6212
1/8	.0808	12.3796	.6043	1.6549	.0144	69.5042
1/4	.0865	11.5624	.6470	1.5456	.0154	64.9157
3/8	.0924	10.8263	.6910	1.4472	.0165	60.7831
1/2	.0984	10.1607	.7362	1.3583	.0175	57.0463
5/8	.1046	9.5566	.7828	1.2775	.0186	53.6548
3/4	.1110	9.0065	.8306	1.2040	.0198	50.5661
7/8	.1176	8.5039	.8797	1.1368	.0209	47.7444
5	.1243	8.0434	.9300	1.0752	.0221	45.1590
1/8	.1312	7.6203	.9817	1.0187	.0234	42.7836
1/4	.1383	7.2306	1.0346	.9666	.0246	40.5955
3/8	.1455	6.8707	1.0888	.9185	.0259	38.5751
1/2	.1530	6.5377	1.1442	.8740	.0272	36.7053
5/8	.1605	6.2288	1.2010	.8327	.0286	34.9712
3/4	.1683	5.9418	1.2590	.7943	.0300	33.3598
7/8	.1762	5.6746	1.3183	.7586	.0314	31.8595
6	.1843	5.4254	1.3788	.7253	.0328	30.4601
1/8	.1926	5.1925	1.4407	.6941	.0343	29.1527
1/4	.2010	4.9746	1.5038	.6650	.0358	27.9292
3/8	.2096	4.7703	1.5682	.6377	.0373	26.7824
1/2	.2184	4.5786	1.6338	.6121	.0389	25.7061
5/8	.2274	4.3984	1.7008	.5880	.0405	24.6944
3/4	.2365	4.2288	1.7690	.5653	.0421	23.7421
7/8	.2458	4.0690	1.8385	.5439	.0438	22.8448
7	.2552	3.9182	1.9092	.5238	.0455	21.9981
1/8	.2648	3.7757	1.9813	.5047	.0472	21.1982
1/4	.2746	3.6410	2.0546	.4867	.0489	20.4418
3/8	.2846	3.5134	2.1292	.4697	.0507	19.7257
1/2	.2948	3.3925	2.2050	.4535	.0525	19.0471
5/8	.3051	3.2779	2.2822	.4382	.0543	18.4033
3/4	.3156	3.1690	2.3606	.4236	.0562	17.7920
7/8	.3262	3.0655	2.4403	.4098	.0581	17.2110
8	.3370	2.9671	2.5212	.3966	.0600	16.6583
1/8	.3480	2.8733	2.6035	.3841	.0620	16.1321
1/4	.3592	2.7840	2.6870	.3722	.0640	15.6307
3/8	.3705	2.6989	2.7718	.3608	.0660	15.1526
1/2	.3820	2.6176	2.8578	.3499	.0680	14.6963
5/8	.3937	2.5400	2.9452	.3395	.0701	14.2605
3/4	.4055	2.4658	3.0338	.3296	.0722	13.8439
7/8	.4176	2.3948	3.1237	.3201	.0744	13.4456

3/4” Tubing
OD (1.050”)
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
3	.0310	32.2090	.2323	4.3057	.0055	180.8344
1/8	.0352	28.3906	.2635	3.7952	.0063	159.3961
1/4	.0396	25.2722	.2960	3.3784	.0070	141.8884
3/8	.0441	22.6831	.3298	3.0322	.0079	127.3517
1/2	.0488	20.5032	.3649	2.7408	.0087	115.1132
5/8	.0536	18.6462	.4012	2.4926	.0096	104.6870
3/4	.0587	17.0479	.4388	2.2789	.0104	95.7136
7/8	.0639	15.6601	.4777	2.0934	.0114	87.9218
4	.0692	14.4455	.5179	1.9311	.0123	81.1030
1/8	.0748	13.3753	.5593	1.7880	.0133	75.0942
1/4	.0805	12.4263	.6020	1.6611	.0143	69.7662
3/8	.0864	11.5802	.6460	1.5480	.0154	65.0156
1/2	.0924	10.8219	.6913	1.4467	.0165	60.7584
5/8	.0986	10.1393	.7378	1.3554	.0176	56.9260
3/4	.1050	9.5222	.7856	1.2729	.0187	53.4614
7/8	.1116	8.9622	.8347	1.1981	.0199	50.3174
5	.1183	8.4522	.8851	1.1299	.0211	47.4542
1/8	.1252	7.9863	.9367	1.0676	.0223	44.8382
1/4	.1323	7.5593	.9896	1.0105	.0236	42.4407
3/8	.1395	7.1668	1.0438	.9581	.0249	40.2375
1/2	.1469	6.8052	1.0993	.9097	.0262	38.2073
5/8	.1545	6.4712	1.1560	.8651	.0275	36.3320
3/4	.1623	6.1620	1.2140	.8237	.0289	34.5959
7/8	.1702	5.8751	1.2733	.7854	.0303	32.9850
6	.1783	5.6083	1.3339	.7497	.0318	31.4873
1/8	.1866	5.3598	1.3957	.7165	.0332	30.0923
1/4	.1950	5.1280	1.4588	.6855	.0347	28.7904
3/8	.2036	4.9112	1.5232	.6565	.0363	27.5734
1/2	.2124	4.7082	1.5889	.6294	.0378	26.4338
5/8	.2213	4.5179	1.6558	.6039	.0394	25.3652
3/4	.2305	4.3391	1.7240	.5800	.0410	24.3616
7/8	.2397	4.1710	1.7935	.5576	.0427	23.4177
7	.2492	4.0127	1.8643	.5364	.0444	22.5289
1/8	.2588	3.8634	1.9363	.5165	.0461	21.6907
1/4	.2686	3.7225	2.0096	.4976	.0478	20.8994
3/8	.2786	3.5892	2.0842	.4798	.0496	20.1515
1/2	.2887	3.4632	2.1601	.4630	.0514	19.4437
5/8	.2991	3.3438	2.2372	.4470	.0533	18.7733
3/4	.3095	3.2306	2.3156	.4319	.0551	18.1376
7/8	.3202	3.1231	2.3953	.4175	.0570	17.5342
8	.3310	3.0210	2.4763	.4038	.0590	16.9609
1/8	.3420	2.9239	2.5585	.3909	.0609	16.4157
1/4	.3532	2.8314	2.6420	.3785	.0629	15.8968
3/8	.3645	2.7434	2.7268	.3667	.0649	15.4025
1/2	.3760	2.6595	2.8129	.3555	.0670	14.9313
5/8	.3877	2.5794	2.9002	.3448	.0691	14.4816
3/4	.3995	2.5029	2.9888	.3346	.0712	14.0523
7/8	.4115	2.4298	3.0787	.3248	.0733	13.6420
9	.4237	2.3599	3.1699	.3155	.0755	13.2497
1/8	.4361	2.2931	3.2623	.3065	.0777	12.8742

3/4" Tubing
OD (1.050")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
3	.0250	39.9455	.1873	5.3399	.0045	224.2702
3/8	.0381	26.2656	.2848	3.5111	.0068	147.4653
1/2	.0428	23.3865	.3199	3.1263	.0076	131.3010
5/8	.0476	21.0008	.3562	2.8074	.0085	117.9068
3/4	.0526	18.9951	.3938	2.5392	.0094	106.6459
7/8	.0578	17.2880	.4327	2.3110	.0103	97.0617
4	.0632	15.8197	.4729	2.1148	.0113	88.8179
1/8	.0688	14.5451	.5143	1.9444	.0122	81.6620
1/4	.0745	13.4298	.5570	1.7953	.0133	75.4001
3/8	.0803	12.4469	.6010	1.6639	.0143	69.8816
1/2	.0864	11.5751	.6463	1.5473	.0154	64.9874
5/8	.0926	10.7976	.6928	1.4434	.0165	60.6220
3/4	.0990	10.1005	.7406	1.3502	.0176	56.7084
7/8	.1056	9.4727	.7897	1.2663	.0188	53.1835
5	.1123	8.9048	.8401	1.1904	.0200	49.9951
1/8	.1192	8.3891	.8917	1.1215	.0212	47.1000
1/4	.1263	7.9192	.9446	1.0586	.0225	44.4617
3/8	.1335	7.4896	.9988	1.0012	.0238	42.0496
1/2	.1409	7.0956	1.0543	.9485	.0251	39.8375
5/8	.1485	6.7332	1.1110	.9001	.0265	37.8030
3/4	.1563	6.3991	1.1690	.8554	.0278	35.9271
7/8	.1642	6.0902	1.2283	.8141	.0292	34.1929
6	.1723	5.8041	1.2889	.7759	.0307	32.5863
1/8	.1806	5.5383	1.3507	.7404	.0322	31.0944
1/4	.1890	5.2911	1.4138	.7073	.0337	29.7064
3/8	.1976	5.0606	1.4782	.6765	.0352	28.4124
1/2	.2064	4.8454	1.5439	.6477	.0368	27.2040
5/8	.2153	4.6441	1.6108	.6208	.0384	26.0735
3/4	.2244	4.4554	1.6790	.5956	.0400	25.0143
7/8	.2337	4.2783	1.7485	.5719	.0416	24.0202
7	.2432	4.1119	1.8193	.5497	.0433	23.0859
1/8	.2528	3.9553	1.8913	.5287	.0450	22.2066
1/4	.2626	3.8077	1.9646	.5090	.0468	21.3779
3/8	.2726	3.6684	2.0392	.4904	.0486	20.5960
1/2	.2827	3.5368	2.1151	.4728	.0504	19.8573
5/8	.2930	3.4124	2.1922	.4562	.0522	19.1585
3/4	.3035	3.2946	2.2706	.4404	.0541	18.4969
7/8	.3142	3.1828	2.3503	.4255	.0560	17.8698
8	.3250	3.0769	2.4313	.4113	.0579	17.2747
1/8	.3360	2.9762	2.5135	.3979	.0598	16.7095
1/4	.3472	2.8805	2.5970	.3851	.0618	16.1722
3/8	.3585	2.7894	2.6818	.3729	.0639	15.6609
1/2	.3700	2.7027	2.7679	.3613	.0659	15.1739
5/8	.3817	2.6200	2.8552	.3502	.0680	14.7098
3/4	.3935	2.5411	2.9438	.3397	.0701	14.2670
7/8	.4055	2.4659	3.0337	.3296	.0722	13.8443
9	.4177	2.3939	3.1249	.3200	.0744	13.4404
1/8	.4301	2.3251	3.2173	.3108	.0766	13.0542
1/4	.4426	2.2593	3.3110	.3020	.0788	12.6848
3/8	.4553	2.1963	3.4060	.2936	.0811	12.3310
1/2	.4682	2.1360	3.5023	.2855	.0834	11.9921

1" Tubing
OD (1.315")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
3	.0302	33.0864	.2261	4.4230	.0054	185.7603
3/8	.0433	23.1147	.3236	3.0899	.0077	129.7753
1/2	.0479	20.8553	.3587	2.7879	.0085	117.0897
5/8	.0528	18.9369	.3950	2.5315	.0094	106.3191
3/4	.0578	17.2906	.4326	2.3114	.0103	97.0761
7/8	.0630	15.8646	.4715	2.1208	.0112	89.0702
4	.0684	14.6194	.5117	1.9543	.0122	82.0792
1/8	.0739	13.5242	.5531	1.8079	.0132	75.9303
1/4	.0797	12.5547	.5958	1.6783	.0142	70.4873
3/8	.0855	11.6916	.6398	1.5629	.0152	65.6414
1/2	.0916	10.9192	.6851	1.4597	.0163	61.3046
5/8	.0978	10.2246	.7316	1.3668	.0174	57.4052
3/4	.1042	9.5974	.7794	1.2830	.0186	53.8839
7/8	.1108	9.0288	.8285	1.2070	.0197	50.6914
5	.1175	8.5115	.8789	1.1378	.0209	47.7867
1/8	.1244	8.0391	.9305	1.0747	.0222	45.1349
1/4	.1315	7.6066	.9834	1.0168	.0234	42.7065
3/8	.1387	7.2094	1.0376	.9637	.0247	40.4763
1/2	.1461	6.8436	1.0931	.9148	.0260	38.4226
5/8	.1537	6.5059	1.1498	.8697	.0274	36.5266
3/4	.1615	6.1934	1.2078	.8279	.0288	34.7723
7/8	.1694	5.9036	1.2671	.7892	.0302	33.1453
6	.1775	5.6343	1.3277	.7532	.0316	31.6334
1/8	.1857	5.3836	1.3895	.7197	.0331	30.2256
1/4	.1942	5.1497	1.4526	.6884	.0346	28.9124
3/8	.2028	4.9311	1.5170	.6592	.0361	27.6853
1/2	.2116	4.7265	1.5827	.6318	.0377	26.5367
5/8	.2205	4.5348	1.6496	.6062	.0393	25.4599
3/4	.2296	4.3547	1.7178	.5821	.0409	24.4490
7/8	.2389	4.1854	1.7873	.5595	.0426	23.4984
7	.2484	4.0260	1.8581	.5382	.0442	22.6035
1/8	.2580	3.8757	1.9301	.5181	.0460	21.7599
1/4	.2678	3.7339	2.0034	.4991	.0477	20.9636
3/8	.2778	3.5999	2.0780	.4812	.0495	20.2112
1/2	.2879	3.4731	2.1539	.4643	.0513	19.4993
5/8	.2982	3.3530	2.2310	.4482	.0531	18.8251
3/4	.3087	3.2392	2.3094	.4330	.0550	18.1860
7/8	.3194	3.1311	2.3891	.4186	.0569	17.5794
8	.3302	3.0285	2.4701	.4048	.0588	17.0032
1/8	.3412	2.9309	2.5523	.3918	.0608	16.4553
1/4	.3524	2.8381	2.6358	.3794	.0628	15.9340
3/8	.3637	2.7496	2.7206	.3676	.0648	15.4374
1/2	.3752	2.6653	2.8067	.3563	.0668	14.9640
5/8	.3869	2.5849	2.8940	.3455	.0689	14.5125
3/4	.3987	2.5081	2.9826	.3353	.0710	14.0813
7/8	.4107	2.4347	3.0725	.3255	.0732	13.6693
9	.3302	3.0285	2.4701	.4048	.0588	17.0032
1/8	.4353	2.2974	3.2561	.3071	.0775	12.8986
1/4	.4478	2.2331	3.3498	.2985	.0798	12.5377
3/8	.4605	2.1716	3.4448	.2903	.0820	12.1920
1/2	.4734	2.1125	3.5411	.2824	.0843	11.8606

1" Tubing
OD (1.315")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
3	.0208	48.0940	.1555	6.4291	.0037	270.0190
5/8	.0434	23.0543	.3245	3.0819	.0077	129.4362
3/4	.0484	20.6596	.3621	2.7617	.0086	115.9910
7/8	.0536	18.6560	.4010	2.4939	.0095	104.7421
4	.0590	16.9575	.4411	2.2669	.0105	95.2062
1/8	.0645	15.5014	.4826	2.0722	.0115	87.0311
1/4	.0702	14.2410	.5253	1.9037	.0125	79.9545
3/8	.0761	13.1406	.5693	1.7566	.0136	73.7765
1/2	.0821	12.1728	.6145	1.6272	.0146	68.3427
5/8	.0884	11.3158	.6611	1.5127	.0157	63.5316
3/4	.0948	10.5526	.7089	1.4107	.0169	59.2466
7/8	.1013	9.8692	.7580	1.3193	.0180	55.4098
5	.1081	9.2543	.8083	1.2371	.0192	51.9576
1/8	.1150	8.6987	.8600	1.1628	.0205	48.8378
1/4	.1220	8.1945	.9129	1.0954	.0217	46.0071
3/8	.1293	7.7353	.9671	1.0340	.0230	43.4292
1/2	.1367	7.3158	1.0225	.9780	.0243	41.0736
5/8	.1443	6.9312	1.0793	.9266	.0257	38.9144
3/4	.1520	6.5776	1.1373	.8793	.0271	36.9294
7/8	.1600	6.2517	1.1966	.8357	.0285	35.0996
6	.1681	5.9505	1.2571	.7955	.0299	33.4087
1/8	.1763	5.6716	1.3190	.7582	.0314	31.8424
1/4	.1848	5.4126	1.3821	.7235	.0329	30.3883
3/8	.1934	5.1716	1.4465	.6913	.0344	29.0357
1/2	.2021	4.9471	1.5121	.6613	.0360	27.7748
5/8	.2111	4.7374	1.5791	.6333	.0376	26.5975
3/4	.2202	4.5412	1.6473	.6071	.0392	25.4961
7/8	.2295	4.3574	1.7168	.5825	.0409	24.4641
7	.2390	4.1849	1.7875	.5594	.0426	23.4957
1/8	.2486	4.0228	1.8596	.5378	.0443	22.5855
1/4	.2584	3.8702	1.9329	.5174	.0460	21.7288
3/8	.2684	3.7264	2.0075	.4981	.0478	20.9215
1/2	.2785	3.5907	2.0833	.4800	.0496	20.1597
5/8	.2888	3.4625	2.1605	.4629	.0514	19.4399
3/4	.2993	3.3412	2.2389	.4467	.0533	18.7591
7/8	.3099	3.2264	2.3186	.4313	.0552	18.1143
8	.3208	3.1175	2.3995	.4167	.0571	17.5031
1/8	.3318	3.0142	2.4818	.4029	.0591	16.9231
1/4	.3429	2.9161	2.5653	.3898	.0611	16.3722
3/8	.3543	2.8228	2.6501	.3774	.0631	15.8484
1/2	.3658	2.7340	2.7361	.3655	.0651	15.3499
5/8	.3774	2.6495	2.8235	.3542	.0672	14.8751
3/4	.3893	2.5688	2.9121	.3434	.0693	14.4225
7/8	.4013	2.4919	3.0020	.3331	.0715	13.9906
9	.4135	2.4185	3.0931	.3233	.0736	13.5783
1/8	.4258	2.3483	3.1856	.3139	.0758	13.1843
1/4	.4384	2.2812	3.2793	.3049	.0781	12.8075
3/8	.4511	2.2170	3.3743	.2964	.0803	12.4470
1/2	.4639	2.1555	3.4705	.2881	.0826	12.1017
5/8	.4770	2.0966	3.5681	.2803	.0850	11.7709
3/4	.4902	2.0401	3.6669	.2727	.0873	11.4537

1" Tubing
OD (1.315")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4	.0495	20.1858	.3706	2.6984	.0088	113.3314
1/8	.0551	18.1558	.4120	2.4270	.0098	101.9337
1/4	.0608	16.4504	.4547	2.1991	.0108	92.3593
3/8	.0667	14.9995	.4987	2.0051	.0119	84.2133
1/2	.0727	13.7515	.5440	1.8383	.0130	77.2064
5/8	.0789	12.6678	.5905	1.6934	.0141	71.1220
3/4	.0853	11.7189	.6383	1.5666	.0152	65.7949
7/8	.0919	10.8821	.6874	1.4547	.0164	61.0966
5	.0986	10.1393	.7378	1.3554	.0176	56.9261
1/8	.1055	9.4761	.7894	1.2668	.0188	53.2025
1/4	.1126	8.8808	.8423	1.1872	.0201	49.8605
3/8	.1198	8.3441	.8965	1.1154	.0213	46.8469
1/2	.1273	7.8579	.9520	1.0504	.0227	44.1176
5/8	.1348	7.4160	1.0087	.9914	.0240	41.6361
3/4	.1426	7.0127	1.0667	.9374	.0254	39.3718
7/8	.1505	6.6434	1.1260	.8881	.0268	37.2988
6	.1586	6.3043	1.1866	.8428	.0283	35.3951
1/8	.1669	5.9921	1.2484	.8010	.0297	33.6419
1/4	.1753	5.7037	1.3115	.7625	.0312	32.0230
3/8	.1839	5.4368	1.3759	.7268	.0328	30.5245
1/2	.1927	5.1892	1.4416	.6937	.0343	29.1342
5/8	.2017	4.9589	1.5085	.6629	.0359	27.8414
3/4	.2108	4.7444	1.5767	.6342	.0375	26.6369
7/8	.2201	4.5441	1.6462	.6075	.0392	25.5126
7	.2295	4.3569	1.7170	.5824	.0409	24.4611
1/8	.2392	4.1814	1.7890	.5590	.0426	23.4762
1/4	.2490	4.0168	1.8623	.5370	.0443	22.5520
3/8	.2589	3.8621	1.9369	.5163	.0461	21.6836
1/2	.2691	3.7166	2.0128	.4968	.0479	20.8663
5/8	.2794	3.5794	2.0899	.4785	.0498	20.0962
3/4	.2899	3.4500	2.1683	.4612	.0516	19.3694
7/8	.3005	3.3277	2.2480	.4448	.0535	18.6828
8	.3113	3.2120	2.3290	.4294	.0555	18.0334
1/8	.3223	3.1024	2.4112	.4147	.0574	17.4183
1/4	.3335	2.9986	2.4947	.4008	.0594	16.8352
3/8	.3448	2.9000	2.5795	.3877	.0614	16.2819
1/2	.3563	2.8064	2.6656	.3752	.0635	15.7562
5/8	.3680	2.7174	2.7529	.3633	.0655	15.2563
3/4	.3798	2.6326	2.8415	.3519	.0677	14.7805
7/8	.3919	2.5519	2.9314	.3411	.0698	14.3273
9	.4040	2.4749	3.0226	.3308	.0720	13.8952
1/8	.4164	2.4015	3.1150	.3210	.0742	13.4829
1/4	.4289	2.3313	3.2087	.3117	.0764	13.0891
3/8	.4416	2.2643	3.3037	.3027	.0787	12.7128
1/2	.4545	2.2002	3.4000	.2941	.0809	12.3528
5/8	.4675	2.1388	3.4975	.2859	.0833	12.0083
3/4	.4807	2.0801	3.5963	.2781	.0856	11.6784
7/8	.4941	2.0238	3.6964	.2705	.0880	11.3622
10	.5077	1.9697	3.7978	.2633	.0904	11.0589
1/8	.5214	1.9179	3.9004	.2564	.0929	10.7679

1 1/4" Tubing
OD (1.660")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4	.0572	17.4806	.4279	2.3368	.0102	98.1428
1/8	.0627	15.9373	.4694	2.1305	.0112	89.4786
1/4	.0685	14.6080	.5121	1.9528	.0122	82.0154
3/8	.0743	13.4525	.5561	1.7983	.0132	75.5278
1/2	.0804	12.4400	.6013	1.6630	.0143	69.8429
5/8	.0866	11.5464	.6479	1.5435	.0154	64.8260
3/4	.0930	10.7528	.6957	1.4374	.0166	60.3708
7/8	.0996	10.0441	.7448	1.3427	.0177	56.3918
5	.1063	9.4080	.7951	1.2576	.0189	52.8201
1/8	.1132	8.8343	.8468	1.1810	.0202	49.5991
1/4	.1203	8.3147	.8997	1.1115	.0214	46.6821
3/8	.1275	7.8424	.9539	1.0484	.0227	44.0302
1/2	.1349	7.4114	1.0093	.9908	.0240	41.6107
5/8	.1425	7.0170	1.0661	.9380	.0254	39.3962
3/4	.1503	6.6549	1.1241	.8896	.0268	37.3630
7/8	.1582	6.3214	1.1834	.8450	.0282	35.4911
6	.1663	6.0137	1.2439	.8039	.0296	33.7632
1/8	.1746	5.7289	1.3058	.7658	.0311	32.1643
1/4	.1830	5.4648	1.3689	.7305	.0326	30.6814
3/8	.1916	5.2193	1.4333	.6977	.0341	29.3031
1/2	.2004	4.9906	1.4989	.6671	.0357	28.0194
5/8	.2093	4.7773	1.5659	.6386	.0373	26.8217
3/4	.2184	4.5779	1.6341	.6120	.0389	25.7020
7/8	.2277	4.3912	1.7036	.5870	.0406	24.6537
7	.2372	4.2160	1.7743	.5636	.0422	23.6705
1/8	.2468	4.0515	1.8464	.5416	.0440	22.7469
1/4	.2566	3.8968	1.9197	.5209	.0457	21.8782
3/8	.2666	3.7511	1.9943	.5014	.0475	21.0600
1/2	.2767	3.6136	2.0701	.4831	.0493	20.2882
5/8	.2870	3.4838	2.1473	.4657	.0511	19.5594
3/4	.2975	3.3611	2.2257	.4493	.0530	18.8703
7/8	.3082	3.2449	2.3054	.4338	.0549	18.2180
8	.3190	3.1348	2.3863	.4191	.0568	17.6000
1/8	.3300	3.0304	2.4686	.4051	.0588	17.0136
1/4	.3412	2.9312	2.5521	.3918	.0608	16.4569
3/8	.3525	2.8369	2.6369	.3792	.0628	15.9277
1/2	.3640	2.7473	2.7229	.3673	.0648	15.4243
5/8	.3757	2.6619	2.8103	.3558	.0669	14.9450
3/4	.3875	2.5805	2.8989	.3450	.0690	14.4881
7/8	.3995	2.5029	2.9888	.3346	.0712	14.0524
9	.4117	2.4288	3.0799	.3247	.0733	13.6365
1/8	.4241	2.3581	3.1724	.3152	.0755	13.2391
1/4	.4366	2.2904	3.2661	.3062	.0778	12.8593
3/8	.4493	2.2257	3.3611	.2975	.0800	12.4958
1/2	.4622	2.1637	3.4573	.2892	.0823	12.1479
5/8	.4752	2.1043	3.5549	.2813	.0846	11.8146
3/4	.4884	2.0474	3.6537	.2737	.0870	11.4951
7/8	.5018	1.9928	3.7538	.2664	.0894	11.1886
10	.5153	1.9404	3.8551	.2594	.0918	10.8944
1/8	.5291	1.8901	3.9578	.2527	.0942	10.6119

1 1/4" Tubing
OD (1.660")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4	.0422	23.7095	.3155	3.1695	.0075	133.1144
3/8	.0593	16.8616	.4437	2.2540	.0106	94.6677
1/2	.0654	15.3006	.4889	2.0454	.0116	85.9036
5/8	.0716	13.9708	.5355	1.8676	.0127	78.4375
3/4	.0780	12.8255	.5833	1.7145	.0139	72.0077
7/8	.0845	11.8299	.6324	1.5814	.0151	66.4179
5	.0913	10.9573	.6827	1.4648	.0163	61.5184
1/8	.0982	10.1868	.7344	1.3618	.0175	57.1926
1/4	.1052	9.5021	.7873	1.2702	.0187	53.3487
3/8	.1125	8.8902	.8415	1.1884	.0200	49.9131
1/2	.1199	8.3405	.8969	1.1149	.0214	46.8267
5/8	.1275	7.8442	.9537	1.0486	.0227	44.0407
3/4	.1352	7.3944	1.0117	.9885	.0241	41.5153
7/8	.1432	6.9851	1.0710	.9338	.0255	39.2170
6	.1513	6.6112	1.1315	.8838	.0269	37.1180
1/8	.1595	6.2686	1.1934	.8380	.0284	35.1946
1/4	.1680	5.9538	1.2565	.7959	.0299	33.4267
3/8	.1766	5.6635	1.3209	.7571	.0314	31.7973
1/2	.1853	5.3953	1.3865	.7212	.0330	30.2914
5/8	.1943	5.1468	1.4535	.6880	.0346	28.8964
3/4	.2034	4.9161	1.5217	.6572	.0362	27.6010
7/8	.2127	4.7014	1.5912	.6285	.0379	26.3957
7	.2222	4.5012	1.6619	.6017	.0396	25.2718
1/8	.2318	4.3142	1.7340	.5767	.0413	24.2218
1/4	.2416	4.1392	1.8073	.5533	.0430	23.2393
3/8	.2516	3.9752	1.8819	.5314	.0448	22.3182
1/2	.2617	3.8211	1.9577	.5108	.0466	21.4533
5/8	.2720	3.6763	2.0349	.4914	.0484	20.6401
3/4	.2825	3.5399	2.1133	.4732	.0503	19.8742
7/8	.2931	3.4112	2.1930	.4560	.0522	19.1520
8	.3040	3.2898	2.2739	.4398	.0541	18.4701
1/8	.3150	3.1750	2.3562	.4244	.0561	17.8255
1/4	.3261	3.0663	2.4397	.4099	.0581	17.2153
3/8	.3375	2.9633	2.5245	.3961	.0601	16.6371
1/2	.3490	2.8656	2.6105	.3831	.0622	16.0886
5/8	.3606	2.7728	2.6979	.3707	.0642	15.5678
3/4	.3725	2.6846	2.7865	.3589	.0663	15.0727
7/8	.3845	2.6008	2.8764	.3477	.0685	14.6017
9	.3967	2.5209	2.9675	.3370	.0707	14.1531
1/8	.4090	2.4447	3.0600	.3268	.0729	13.7255
1/4	.4216	2.3721	3.1537	.3171	.0751	13.3177
3/8	.4343	2.3027	3.2487	.3078	.0773	12.9283
1/2	.4471	2.2364	3.3449	.2990	.0796	12.5562
5/8	.4602	2.1731	3.4425	.2905	.0820	12.2005
3/4	.4734	2.1124	3.5413	.2824	.0843	11.8600
7/8	.4868	2.0544	3.6414	.2746	.0867	11.5340
10	.5003	1.9987	3.7427	.2672	.0891	11.2217
1/8	.5140	1.9454	3.8454	.2601	.0916	10.9222
1/4	.5279	1.8942	3.9493	.2532	.0940	10.6348
3/8	.5420	1.8451	4.0545	.2466	.0965	10.3589
1/2	.5562	1.7978	4.1609	.2403	.0991	10.0938

1 1/4" Tubing
OD (1.660")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4	.0271	36.8350	.2031	4.9241	.0048	206.8065
7/8	.0695	14.3880	.5199	1.9234	.0124	80.7802
5	.0762	13.1174	.5703	1.7535	.0136	73.6464
1/8	.0831	12.0283	.6219	1.6079	.0148	67.5316
1/4	.0902	11.0852	.6748	1.4819	.0161	62.2366
3/8	.0975	10.2612	.7290	1.3717	.0174	57.6106
1/2	.1049	9.5358	.7845	1.2747	.0187	53.5376
5/8	.1125	8.8926	.8412	1.1888	.0200	49.9267
3/4	.1202	8.3189	.8992	1.1121	.0214	46.7058
7/8	.1281	7.8044	.9585	1.0433	.0228	43.8169
6	.1362	7.3406	1.0191	.9813	.0243	41.2129
1/8	.1445	6.9206	1.0809	.9251	.0257	38.8552
1/4	.1529	6.5388	1.1440	.8741	.0272	36.7117
3/8	.1615	6.1904	1.2084	.8275	.0288	34.7556
1/2	.1703	5.8714	1.2741	.7849	.0303	32.9644
5/8	.1793	5.5783	1.3410	.7457	.0319	31.3190
3/4	.1884	5.3083	1.4092	.7096	.0336	29.8030
7/8	.1977	5.0589	1.4787	.6763	.0352	28.4025
7	.2071	4.8278	1.5495	.6454	.0369	27.1055
1/8	.2168	4.6134	1.6215	.6167	.0386	25.9013
1/4	.2266	4.4138	1.6948	.5900	.0404	24.7809
3/8	.2365	4.2277	1.7694	.5652	.0421	23.7363
1/2	.2467	4.0539	1.8453	.5419	.0439	22.7604
5/8	.2570	3.8913	1.9224	.5202	.0458	21.8472
3/4	.2675	3.7388	2.0008	.4998	.0476	20.9910
7/8	.2781	3.5956	2.0805	.4807	.0495	20.1870
8	.2889	3.4609	2.1615	.4626	.0515	19.4309
1/8	.2999	3.3340	2.2437	.4457	.0534	18.7187
1/4	.3111	3.2144	2.3272	.4297	.0554	18.0470
3/8	.3224	3.1014	2.4120	.4146	.0574	17.4126
1/2	.3339	2.9946	2.4981	.4003	.0595	16.8127
5/8	.3456	2.8934	2.5854	.3868	.0616	16.2447
3/4	.3575	2.7975	2.6740	.3740	.0637	15.7064
7/8	.3695	2.7065	2.7639	.3618	.0658	15.1956
9	.3817	2.6201	2.8551	.3503	.0680	14.7104
1/8	.3940	2.5380	2.9475	.3393	.0702	14.2491
1/4	.4065	2.4597	3.0412	.3288	.0724	13.8100
3/8	.4192	2.3853	3.1362	.3189	.0747	13.3917
1/2	.4321	2.3142	3.2325	.3094	.0770	12.9929
5/8	.4451	2.2464	3.3300	.3003	.0793	12.6124
3/4	.4584	2.1817	3.4288	.2916	.0816	12.2489
7/8	.4717	2.1198	3.5289	.2834	.0840	11.9015
10	.4853	2.0606	3.6303	.2755	.0864	11.5692
1/8	.4990	2.0040	3.7329	.2679	.0889	11.2511
1/4	.5129	1.9497	3.8368	.2606	.0914	10.9464
3/8	.5270	1.8977	3.9420	.2537	.0939	10.6543
1/2	.5412	1.8478	4.0485	.2470	.0964	10.3741
5/8	.5556	1.7999	4.1562	.2406	.0990	10.1052
3/4	.5702	1.7539	4.2652	.2345	.1016	9.8469
7/8	.5849	1.7097	4.3755	.2285	.1042	9.5987
11	.5998	1.6672	4.4871	.2229	.1068	9.3601

1 1/2" Tubing
OD (1.900")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4	.0479	20.8827	.3582	2.7916	.0085	117.2437
1/2	.0711	14.0714	.5316	1.8810	.0127	79.0023
5/8	.0773	12.9387	.5782	1.7296	.0138	72.6432
3/4	.0837	11.9505	.6260	1.5975	.0149	67.0947
7/8	.0902	11.0815	.6751	1.4814	.0161	62.2158
5	.0970	10.3121	.7254	1.3785	.0173	57.8965
1/8	.1039	9.6269	.7771	1.2869	.0185	54.0492
1/4	.1109	9.0131	.8300	1.2049	.0198	50.6034
3/8	.1182	8.4608	.8842	1.1310	.0211	47.5021
1/2	.1256	7.9614	.9396	1.0643	.0224	44.6982
5/8	.1332	7.5080	.9964	1.0037	.0237	42.1529
3/4	.1409	7.0949	1.0544	.9484	.0251	39.8336
7/8	.1489	6.7172	1.1137	.8979	.0265	37.7130
6	.1570	6.3707	1.1742	.8516	.0280	35.7679
1/8	.1652	6.0520	1.2361	.8090	.0294	33.9785
1/4	.1737	5.7580	1.2992	.7697	.0309	32.3279
3/8	.1823	5.4861	1.3636	.7334	.0325	30.8013
1/2	.1911	5.2341	1.4292	.6997	.0340	29.3862
5/8	.2000	4.9999	1.4962	.6684	.0356	28.0715
3/4	.2091	4.7819	1.5644	.6392	.0372	26.8475
7/8	.2184	4.5785	1.6339	.6121	.0389	25.7057
7	.2279	4.3885	1.7046	.5866	.0406	24.6386
1/8	.2375	4.2105	1.7767	.5629	.0423	23.6396
1/4	.2473	4.0437	1.8500	.5406	.0440	22.7028
3/8	.2573	3.8870	1.9246	.5196	.0458	21.8229
1/2	.2674	3.7395	2.0004	.4999	.0476	20.9953
5/8	.2777	3.6007	2.0776	.4813	.0495	20.2158
3/4	.2882	3.4697	2.1560	.4638	.0513	19.4805
7/8	.2989	3.3461	2.2357	.4473	.0532	18.7862
8	.3097	3.2291	2.3166	.4317	.0552	18.1296
1/8	.3207	3.1184	2.3989	.4169	.0571	17.5081
1/4	.3318	3.0135	2.4824	.4028	.0591	16.9191
3/8	.3432	2.9140	2.5672	.3895	.0611	16.3603
1/2	.3547	2.8195	2.6532	.3769	.0632	15.8296
5/8	.3663	2.7296	2.7406	.3649	.0652	15.3252
3/4	.3782	2.6441	2.8292	.3535	.0674	14.8452
7/8	.3902	2.5627	2.9191	.3426	.0695	14.3880
9	.4024	2.4851	3.0102	.3322	.0717	13.9523
1/8	.4148	2.4111	3.1027	.3223	.0739	13.5366
1/4	.4273	2.3404	3.1964	.3129	.0761	13.1397
3/8	.4400	2.2728	3.2914	.3038	.0784	12.7605
1/2	.4528	2.2082	3.3876	.2952	.0807	12.3979
5/8	.4659	2.1464	3.4852	.2869	.0830	12.0510
3/4	.4791	2.0873	3.5840	.2790	.0853	11.7187
7/8	.4925	2.0306	3.6841	.2714	.0877	11.4003
10	.5060	1.9762	3.7854	.2642	.0901	11.0951
1/8	.5197	1.9240	3.8881	.2572	.0926	10.8022
1/4	.5336	1.8739	3.9920	.2505	.0950	10.5210
3/8	.5477	1.8258	4.0972	.2441	.0975	10.2509
1/2	.5619	1.7796	4.2036	.2379	.1001	9.9913
5/8	.5763	1.7351	4.3114	.2319	.1026	9.7416

1 1/2" Tubing
OD (1.900")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4	.0282	35.4642	.2109	4.7408	.0050	199.1103
7/8	.0706	14.1740	.5278	1.8948	.0126	79.5787
5	.0773	12.9393	.5781	1.7297	.0138	72.6464
1/8	.0842	11.8784	.6298	1.5879	.0150	66.6899
1/4	.0913	10.9577	.6827	1.4648	.0163	61.5210
3/8	.0985	10.1519	.7369	1.3571	.0175	56.9969
1/2	.1059	9.4413	.7923	1.2621	.0189	53.0072
5/8	.1135	8.8104	.8491	1.1778	.0202	49.4651
3/4	.1213	8.2469	.9071	1.1024	.0216	46.3016
7/8	.1292	7.7410	.9664	1.0348	.0230	43.4610
6	.1373	7.2845	1.0269	.9738	.0245	40.8979
1/8	.1455	6.8707	1.0888	.9185	.0259	38.5751
1/4	.1540	6.4943	1.1519	.8681	.0274	36.4615
3/8	.1626	6.1505	1.2163	.8222	.0290	34.5313
1/2	.1714	5.8355	1.2819	.7801	.0305	32.7626
5/8	.1803	5.5459	1.3489	.7414	.0321	31.1367
3/4	.1894	5.2789	1.4171	.7057	.0337	29.6379
7/8	.1987	5.0322	1.4866	.6727	.0354	28.2526
7	.2082	4.8035	1.5573	.6421	.0371	26.9688
1/8	.2178	4.5911	1.6294	.6137	.0388	25.7765
1/4	.2276	4.3935	1.7027	.5873	.0405	24.6666
3/8	.2376	4.2091	1.7773	.5627	.0423	23.6314
1/2	.2477	4.0368	1.8531	.5396	.0441	22.6640
5/8	.2580	3.8755	1.9303	.5181	.0460	21.7583
3/4	.2685	3.7242	2.0087	.4978	.0478	20.9090
7/8	.2792	3.5821	2.0884	.4788	.0497	20.1111
8	.2900	3.4484	2.1693	.4610	.0516	19.3605
1/8	.3010	3.3224	2.2516	.4441	.0536	18.6534
1/4	.3121	3.2036	2.3351	.4283	.0556	17.9863
3/8	.3235	3.0914	2.4199	.4132	.0576	17.3561
1/2	.3350	2.9852	2.5059	.3991	.0597	16.7600
5/8	.3467	2.8846	2.5933	.3856	.0617	16.1956
3/4	.3585	2.7893	2.6819	.3729	.0639	15.6604
7/8	.3705	2.6989	2.7718	.3608	.0660	15.1526
9	.3827	2.6129	2.8629	.3493	.0682	14.6701
1/8	.3951	2.5312	2.9554	.3384	.0704	14.2112
1/4	.4076	2.4534	3.0491	.3280	.0726	13.7745
3/8	.4203	2.3793	3.1441	.3181	.0749	13.3583
1/2	.4332	2.3086	3.2403	.3086	.0771	12.9615
5/8	.4462	2.2412	3.3379	.2996	.0795	12.5827
3/4	.4594	2.1767	3.4367	.2910	.0818	12.2209
7/8	.4728	2.1151	3.5368	.2827	.0842	11.8751
10	.4863	2.0562	3.6381	.2749	.0866	11.5442
1/8	.5001	1.9998	3.7408	.2673	.0891	11.2275
1/4	.5139	1.9457	3.8447	.2601	.0915	10.9240
3/8	.5280	1.8939	3.9499	.2532	.0940	10.6331
1/2	.5422	1.8442	4.0563	.2465	.0966	10.3541
5/8	.5566	1.7965	4.1641	.2402	.0991	10.0862
3/4	.5712	1.7507	4.2731	.2340	.1017	9.8288
7/8	.5860	1.7066	4.3834	.2281	.1044	9.5816
11	.6009	1.6642	4.4949	.2225	.1070	9.3437

1 1/2" Tubing
OD (1.900")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
5	.0576	17.3627	.4308	2.3210	.0103	97.4811
1/2	.0862	11.5971	.6450	1.5503	.0154	65.1107
5/8	.0938	10.6595	.7018	1.4249	.0167	59.8467
3/4	.1016	9.8456	.7598	1.3161	.0181	55.2772
7/8	.1095	9.1330	.8191	1.2209	.0195	51.2761
6	.1176	8.5042	.8796	1.1368	.0209	47.7458
1/8	.1259	7.9456	.9415	1.0622	.0224	44.6098
1/4	.1343	7.4464	1.0046	.9954	.0239	41.8073
3/8	.1429	6.9979	1.0690	.9355	.0255	39.2891
1/2	.1517	6.5930	1.1346	.8813	.0270	37.0155
5/8	.1606	6.2257	1.2016	.8322	.0286	34.9534
3/4	.1697	5.8912	1.2698	.7875	.0302	33.0757
7/8	.1790	5.5856	1.3393	.7467	.0319	31.3596
7	.1885	5.3053	1.4100	.7092	.0336	29.7859
1/8	.1981	5.0474	1.4821	.6747	.0353	28.3381
1/4	.2079	4.8095	1.5554	.6429	.0370	27.0024
3/8	.2179	4.5894	1.6300	.6135	.0388	25.7668
1/2	.2280	4.3853	1.7058	.5862	.0406	24.6209
5/8	.2383	4.1956	1.7830	.5609	.0425	23.5557
3/4	.2488	4.0189	1.8614	.5372	.0443	22.5634
7/8	.2595	3.8539	1.9411	.5152	.0462	21.6371
8	.2703	3.6996	2.0220	.4946	.0481	20.7708
1/8	.2813	3.5550	2.1043	.4752	.0501	19.9590
1/4	.2925	3.4193	2.1878	.4571	.0521	19.1972
3/8	.3038	3.2917	2.2726	.4400	.0541	18.4809
1/2	.3153	3.1716	2.3586	.4240	.0562	17.8066
5/8	.3270	3.0584	2.4460	.4088	.0582	17.1708
3/4	.3388	2.9514	2.5346	.3945	.0603	16.5705
7/8	.3508	2.8503	2.6245	.3810	.0625	16.0030
9	.3630	2.7547	2.7156	.3682	.0647	15.4657
1/8	.3754	2.6640	2.8081	.3561	.0669	14.9566
1/4	.3879	2.5779	2.9018	.3446	.0691	14.4736
3/8	.4006	2.4962	2.9968	.3337	.0713	14.0149
1/2	.4135	2.4185	3.0930	.3233	.0736	13.5787
5/8	.4265	2.3446	3.1906	.3134	.0760	13.1636
3/4	.4397	2.2742	3.2894	.3040	.0783	12.7681
7/8	.4531	2.2070	3.3895	.2950	.0807	12.3911
10	.4666	2.1429	3.4908	.2865	.0831	12.0313
1/8	.4804	2.0817	3.5935	.2783	.0856	11.6877
1/4	.4943	2.0232	3.6974	.2705	.0880	11.3592
3/8	.5083	1.9673	3.8026	.2630	.0905	11.0450
1/2	.5225	1.9137	3.9090	.2558	.0931	10.7442
5/8	.5369	1.8624	4.0168	.2490	.0956	10.4560
3/4	.5515	1.8131	4.1258	.2424	.0982	10.1797
7/8	.5663	1.7659	4.2361	.2361	.1009	9.9147
11	.5812	1.7206	4.3476	.2300	.1035	9.6603
1/8	.5963	1.6771	4.4605	.2242	.1062	9.4159
1/4	.6115	1.6353	4.5746	.2186	.1089	9.1810
3/8	.6269	1.5950	4.6900	.2132	.1117	8.9551
1/2	.6425	1.5563	4.8066	.2080	.1144	8.7378
5/8	.6583	1.5190	4.9246	.2031	.1172	8.5285

2 1/16" Tubing
OD (2.063")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4	.0408	24.4856	.3055	3.2732	.0073	137.4722
7/8	.0832	12.0200	.6224	1.6068	.0148	67.4853
5	.0899	11.1202	.6727	1.4865	.0160	62.4331
1/8	.0968	10.3274	.7244	1.3806	.0172	57.9823
1/4	.1039	9.6244	.7773	1.2866	.0185	54.0352
3/8	.1111	8.9971	.8315	1.2027	.0198	50.5136
1/2	.1186	8.4345	.8869	1.1275	.0211	47.3547
5/8	.1261	7.9274	.9437	1.0597	.0225	44.5075
3/4	.1339	7.4683	1.0017	.9983	.0238	41.9298
7/8	.1418	7.0509	1.0610	.9426	.0253	39.5867
6	.1499	6.6702	1.1215	.8917	.0267	37.4490
1/8	.1582	6.3216	1.1834	.8451	.0282	35.4920
1/4	.1666	6.0015	1.2465	.8023	.0297	33.6950
3/8	.1752	5.7067	1.3109	.7629	.0312	32.0399
1/2	.1840	5.4345	1.3765	.7265	.0328	30.5115
5/8	.1930	5.1825	1.4435	.6928	.0344	29.0966
3/4	.2021	4.9486	1.5117	.6615	.0360	27.7837
7/8	.2114	4.7312	1.5812	.6325	.0376	26.5626
7	.2208	4.5285	1.6519	.6054	.0393	25.4248
1/8	.2305	4.3393	1.7240	.5801	.0410	24.3624
1/4	.2403	4.1623	1.7973	.5564	.0428	23.3686
3/8	.2502	3.9964	1.8719	.5342	.0446	22.4374
1/2	.2604	3.8408	1.9477	.5134	.0464	21.5635
5/8	.2707	3.6944	2.0249	.4939	.0482	20.7420
3/4	.2812	3.5567	2.1033	.4755	.0501	19.9687
7/8	.2918	3.4269	2.1830	.4581	.0520	19.2398
8	.3026	3.3043	2.2639	.4417	.0539	18.5517
1/8	.3136	3.1885	2.3462	.4262	.0559	17.9015
1/4	.3248	3.0789	2.4297	.4116	.0578	17.2862
3/8	.3361	2.9751	2.5145	.3977	.0599	16.7033
1/2	.3476	2.8766	2.6005	.3845	.0619	16.1505
5/8	.3593	2.7831	2.6879	.3720	.0640	15.6257
3/4	.3711	2.6943	2.7765	.3602	.0661	15.1270
7/8	.3832	2.6098	2.8664	.3489	.0682	14.6526
9	.3953	2.5294	2.9575	.3381	.0704	14.2010
1/8	.4077	2.4527	3.0500	.3279	.0726	13.7706
1/4	.4202	2.3796	3.1437	.3181	.0748	13.3601
3/8	.4329	2.3098	3.2387	.3088	.0771	12.9682
1/2	.4458	2.2431	3.3349	.2999	.0794	12.5939
5/8	.4588	2.1794	3.4325	.2913	.0817	12.2360
3/4	.4720	2.1184	3.5313	.2832	.0841	11.8936
7/8	.4854	2.0600	3.6314	.2754	.0865	11.5658
10	.4990	2.0041	3.7327	.2679	.0889	11.2517
1/8	.5127	1.9505	3.8354	.2607	.0913	10.9506
1/4	.5266	1.8990	3.9393	.2539	.0938	10.6618
3/8	.5406	1.8496	4.0445	.2473	.0963	10.3845
1/2	.5549	1.8022	4.1509	.2409	.0988	10.1181
5/8	.5693	1.7566	4.2587	.2348	.1014	9.8622
3/4	.5839	1.7127	4.3677	.2290	.1040	9.6160
7/8	.5986	1.6706	4.4780	.2233	.1066	9.3792
11	.6135	1.6300	4.5895	.2179	.1093	9.1512

2 1/16" Tubing
OD (2.063")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
5	.0667	14.9893	.4991	2.0037	.0119	84.1557
1/4	.0807	12.3930	.6036	1.6567	.0144	69.5795
3/8	.0879	11.3722	.6578	1.5202	.0157	63.8478
1/2	.0953	10.4879	.7133	1.4020	.0170	58.8831
5/8	.1029	9.7151	.7700	1.2987	.0183	54.5443
3/4	.1107	9.0344	.8280	1.2077	.0197	50.7229
7/8	.1186	8.4308	.8873	1.1270	.0211	47.3337
6	.1267	7.8921	.9479	1.0550	.0226	44.3094
1/8	.1350	7.4088	1.0097	.9904	.0240	41.5958
1/4	.1434	6.9729	1.0728	.9321	.0255	39.1487
3/8	.1520	6.5781	1.1372	.8794	.0271	36.9322
1/2	.1608	6.2190	1.2029	.8314	.0286	34.9161
5/8	.1697	5.8912	1.2698	.7875	.0302	33.0755
3/4	.1789	5.5909	1.3380	.7474	.0319	31.3893
7/8	.1882	5.3148	1.4075	.7105	.0335	29.8397
7	.1976	5.0604	1.4783	.6765	.0352	28.4113
1/8	.2072	4.8253	1.5503	.6450	.0369	27.0911
1/4	.2170	4.6074	1.6236	.6159	.0387	25.8678
3/8	.2270	4.4050	1.6982	.5889	.0404	24.7317
1/2	.2372	4.2167	1.7741	.5637	.0422	23.6741
5/8	.2475	4.0410	1.8512	.5402	.0441	22.6876
3/4	.2579	3.8768	1.9296	.5182	.0459	21.7657
7/8	.2686	3.7230	2.0093	.4977	.0478	20.9025
8	.2794	3.5788	2.0903	.4784	.0498	20.0929
1/8	.2904	3.4433	2.1725	.4603	.0517	19.3323
1/4	.3016	3.3159	2.2560	.4433	.0537	18.6166
3/8	.3129	3.1958	2.3408	.4272	.0557	17.9423
1/2	.3244	3.0824	2.4269	.4121	.0578	17.3060
5/8	.3361	2.9754	2.5142	.3977	.0599	16.7049
3/4	.3479	2.8741	2.6028	.3842	.0620	16.1362
7/8	.3600	2.7781	2.6927	.3714	.0641	15.5975
9	.3721	2.6872	2.7839	.3592	.0663	15.0867
1/8	.3845	2.6008	2.8763	.3477	.0685	14.6019
1/4	.3970	2.5187	2.9700	.3367	.0707	14.1412
3/8	.4097	2.4407	3.0650	.3263	.0730	13.7029
1/2	.4226	2.3664	3.1613	.3163	.0753	13.2857
5/8	.4356	2.2955	3.2588	.3069	.0776	12.8880
3/4	.4488	2.2280	3.3576	.2978	.0799	12.5087
7/8	.4622	2.1635	3.4577	.2892	.0823	12.1466
10	.4758	2.1019	3.5591	.2810	.0847	11.8007
1/8	.4895	2.0429	3.6617	.2731	.0872	11.4699
1/4	.5034	1.9866	3.7656	.2656	.0897	11.1534
3/8	.5174	1.9326	3.8708	.2583	.0922	10.8503
1/2	.5317	1.8809	3.9773	.2514	.0947	10.5599
5/8	.5461	1.8313	4.0850	.2448	.0973	10.2814
3/4	.5606	1.7837	4.1940	.2384	.0999	10.0141
7/8	.5754	1.7380	4.3043	.2323	.1025	9.7576
11	.5903	1.6940	4.4159	.2265	.1051	9.5110
1/8	.6054	1.6518	4.5287	.2208	.1078	9.2741
1/4	.6206	1.6112	4.6428	.2154	.1105	9.0461
3/8	.6361	1.5722	4.7582	.2102	.1133	8.8268

2 1/16" Tubing
OD (2.063")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
5	.0435	22.9874	.3254	3.0729	.0077	129.0602
3/4	.0875	11.4318	.6544	1.5282	.0156	64.1826
7/8	.0954	10.4821	.7137	1.4012	.0170	58.8506
6	.1035	9.6621	.7742	1.2916	.0184	54.2471
1/8	.1118	8.9475	.8361	1.1961	.0199	50.2349
1/4	.1202	8.3195	.8992	1.1121	.0214	46.7089
3/8	.1288	7.7636	.9636	1.0378	.0229	43.5877
1/2	.1376	7.2683	1.0292	.9716	.0245	40.8069
5/8	.1465	6.8244	1.0962	.9123	.0261	38.3150
3/4	.1556	6.4246	1.1644	.8588	.0277	36.0704
7/8	.1649	6.0628	1.2339	.8105	.0294	34.0390
7	.1744	5.7340	1.3046	.7665	.0311	32.1928
1/8	.1840	5.4339	1.3767	.7264	.0328	30.5082
1/4	.1938	5.1592	1.4500	.6897	.0345	28.9657
3/8	.2038	4.9068	1.5246	.6559	.0363	27.5486
1/2	.2139	4.6742	1.6004	.6248	.0381	26.2427
5/8	.2243	4.4593	1.6776	.5961	.0399	25.0360
3/4	.2347	4.2601	1.7560	.5695	.0418	23.9181
7/8	.2454	4.0752	1.8357	.5448	.0437	22.8798
8	.2562	3.9030	1.9166	.5218	.0456	21.9133
1/8	.2672	3.7425	1.9989	.5003	.0476	21.0117
1/4	.2784	3.5924	2.0824	.4802	.0496	20.1690
3/8	.2897	3.4518	2.1672	.4614	.0516	19.3800
1/2	.3012	3.3200	2.2532	.4438	.0536	18.6397
5/8	.3129	3.1961	2.3406	.4273	.0557	17.9442
3/4	.3247	3.0795	2.4292	.4117	.0578	17.2896
7/8	.3367	2.9696	2.5191	.3970	.0600	16.6727
9	.3489	2.8659	2.6102	.3831	.0621	16.0904
1/8	.3613	2.7679	2.7027	.3700	.0643	15.5400
1/4	.3738	2.6751	2.7964	.3576	.0666	15.0193
3/8	.3865	2.5873	2.8914	.3459	.0688	14.5259
1/2	.3994	2.5039	2.9876	.3347	.0711	14.0578
5/8	.4124	2.4247	3.0852	.3241	.0735	13.6134
3/4	.4256	2.3495	3.1840	.3141	.0758	13.1909
7/8	.4390	2.2779	3.2841	.3045	.0782	12.7889
10	.4526	2.2097	3.3854	.2954	.0806	12.4060
1/8	.4663	2.1447	3.4881	.2867	.0830	12.0409
1/4	.4802	2.0826	3.5920	.2784	.0855	11.6926
3/8	.4942	2.0234	3.6972	.2705	.0880	11.3599
1/2	.5085	1.9667	3.8036	.2629	.0906	11.0420
5/8	.5229	1.9126	3.9114	.2557	.0931	10.7378
3/4	.5374	1.8607	4.0204	.2487	.0957	10.4467
7/8	.5522	1.8110	4.1307	.2421	.0983	10.1677
11	.5671	1.7634	4.2422	.2357	.1010	9.9003
1/8	.5822	1.7177	4.3551	.2296	.1037	9.6438
1/4	.5974	1.6738	4.4692	.2238	.1064	9.3976
3/8	.6128	1.6317	4.5846	.2181	.1092	9.1611
1/2	.6284	1.5912	4.7012	.2127	.1119	8.9337
5/8	.6442	1.5523	4.8192	.2075	.1147	8.7151
3/4	.6601	1.5148	4.9384	.2025	.1176	8.5047
7/8	.6763	1.4787	5.0589	.1977	.1204	8.3022

2" Tubing
OD (2.375")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
5	.0748	13.3649	.5597	1.7866	.0133	75.0360
1/2	.1035	9.6659	.7739	1.2921	.0184	54.2682
5/8	.1110	9.0057	.8307	1.2039	.0198	50.5615
3/4	.1188	8.4178	.8887	1.1253	.0212	47.2608
7/8	.1267	7.8913	.9480	1.0549	.0226	44.3050
6	.1348	7.4174	1.0085	.9916	.0240	41.6445
1/8	.1431	6.9889	1.0704	.9343	.0255	39.2386
1/4	.1515	6.5998	1.1335	.8822	.0270	37.0538
3/8	.1601	6.2450	1.1979	.8348	.0285	35.0621
1/2	.1689	5.9205	1.2635	.7914	.0301	33.2400
5/8	.1779	5.6226	1.3305	.7516	.0317	31.5676
3/4	.1870	5.3484	1.3987	.7150	.0333	30.0281
7/8	.1963	5.0953	1.4682	.6811	.0350	28.6069
7	.2057	4.8610	1.5389	.6498	.0366	27.2915
1/8	.2153	4.6436	1.6110	.6208	.0384	26.0711
1/4	.2251	4.4415	1.6843	.5937	.0401	24.9363
3/8	.2351	4.2531	1.7589	.5686	.0419	23.8788
1/2	.2453	4.0773	1.8347	.5450	.0437	22.8915
5/8	.2556	3.9128	1.9119	.5231	.0455	21.9679
3/4	.2661	3.7586	1.9903	.5024	.0474	21.1024
7/8	.2767	3.6139	2.0700	.4831	.0493	20.2900
8	.2875	3.4779	2.1509	.4649	.0512	19.5263
1/8	.2985	3.3498	2.2332	.4478	.0532	18.8072
1/4	.3097	3.2291	2.3167	.4317	.0552	18.1292
3/8	.3210	3.1151	2.4015	.4164	.0572	17.4891
1/2	.3325	3.0073	2.4875	.4020	.0592	16.8841
5/8	.3442	2.9053	2.5749	.3884	.0613	16.3114
3/4	.3560	2.8086	2.6635	.3755	.0634	15.7687
7/8	.3681	2.7169	2.7534	.3632	.0656	15.2539
9	.3802	2.6299	2.8445	.3516	.0677	14.7650
1/8	.3926	2.5471	2.9370	.3405	.0699	14.3003
1/4	.4051	2.4683	3.0307	.3300	.0722	13.8581
3/8	.4178	2.3933	3.1257	.3199	.0744	13.4370
1/2	.4307	2.3218	3.2219	.3104	.0767	13.0355
5/8	.4437	2.2536	3.3195	.3013	.0790	12.6525
3/4	.4569	2.1884	3.4183	.2925	.0814	12.2868
7/8	.4703	2.1262	3.5184	.2842	.0838	11.9372
10	.4839	2.0666	3.6197	.2763	.0862	11.6030
1/8	.4976	2.0097	3.7224	.2686	.0886	11.2830
1/4	.5115	1.9551	3.8263	.2614	.0911	10.9766
3/8	.5255	1.9028	3.9315	.2544	.0936	10.6829
1/2	.5398	1.8526	4.0379	.2477	.0961	10.4013
5/8	.5542	1.8045	4.1457	.2412	.0987	10.1310
3/4	.5687	1.7582	4.2547	.2350	.1013	9.8714
7/8	.5835	1.7138	4.3650	.2291	.1039	9.6220
11	.5984	1.6711	4.4765	.2234	.1066	9.3822
1/8	.6135	1.6300	4.5894	.2179	.1093	9.1515
1/4	.6287	1.5905	4.7035	.2126	.1120	8.9295
3/8	.6442	1.5524	4.8189	.2075	.1147	8.7157
1/2	.6598	1.5157	4.9355	.2026	.1175	8.5096
5/8	.6755	1.4803	5.0535	.1979	.1203	8.3110

2" Tubing
OD (2.375")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
5	.0441	22.6971	.3296	3.0341	.0078	127.4306
7/8	.0960	10.4213	.7178	1.3931	.0171	58.5094
6	.1041	9.6105	.7784	1.2847	.0185	53.9571
1/8	.1123	8.9032	.8402	1.1902	.0200	49.9860
1/4	.1208	8.2812	.9033	1.1070	.0215	46.4937
3/8	.1294	7.7302	.9677	1.0334	.0230	43.4003
1/2	.1381	7.2390	1.0334	.9677	.0246	40.6426
5/8	.1471	6.7986	1.1003	.9088	.0262	38.1701
3/4	.1562	6.4017	1.1685	.8558	.0278	35.9420
7/8	.1655	6.0424	1.2380	.8077	.0295	33.9246
7	.1750	5.7157	1.3088	.7641	.0312	32.0904
1/8	.1846	5.4175	1.3808	.7242	.0329	30.4163
1/4	.1944	5.1444	1.4541	.6877	.0346	28.8828
3/8	.2044	4.8934	1.5287	.6541	.0364	27.4736
1/2	.2145	4.6621	1.6046	.6232	.0382	26.1747
5/8	.2248	4.4482	1.6817	.5946	.0400	24.9741
3/4	.2353	4.2501	1.7601	.5681	.0419	23.8615
7/8	.2459	4.0660	1.8398	.5435	.0438	22.8280
8	.2568	3.8946	1.9208	.5206	.0457	21.8658
1/8	.2678	3.7347	2.0030	.4992	.0477	20.9680
1/4	.2789	3.5852	2.0865	.4793	.0497	20.1288
3/8	.2903	3.4452	2.1713	.4606	.0517	19.3428
1/2	.3018	3.3139	2.2574	.4430	.0537	18.6054
5/8	.3134	3.1904	2.3447	.4265	.0558	17.9123
3/4	.3253	3.0742	2.4333	.4110	.0579	17.2600
7/8	.3373	2.9647	2.5232	.3963	.0601	16.6452
9	.3495	2.8614	2.6144	.3825	.0622	16.0648
1/8	.3618	2.7636	2.7068	.3694	.0644	15.5162
1/4	.3744	2.6712	2.8005	.3571	.0667	14.9969
3/8	.3871	2.5835	2.8955	.3454	.0689	14.5050
1/2	.3999	2.5004	2.9918	.3343	.0712	14.0383
5/8	.4130	2.4215	3.0893	.3237	.0736	13.5950
3/4	.4262	2.3464	3.1881	.3137	.0759	13.1737
7/8	.4396	2.2750	3.2882	.3041	.0783	12.7727
10	.4531	2.2070	3.3896	.2950	.0807	12.3907
1/8	.4668	2.1421	3.4922	.2864	.0831	12.0266
1/4	.4807	2.0802	3.5961	.2781	.0856	11.6791
3/8	.4948	2.0211	3.7013	.2702	.0881	11.3472
1/2	.5090	1.9646	3.8078	.2626	.0907	11.0299
5/8	.5234	1.9105	3.9155	.2554	.0932	10.7264
3/4	.5380	1.8588	4.0245	.2485	.0958	10.4359
7/8	.5527	1.8092	4.1348	.2419	.0984	10.1575
11	.5676	1.7617	4.2464	.2355	.1011	9.8906
1/8	.5827	1.7161	4.3592	.2294	.1038	9.6346
1/4	.5980	1.6723	4.4733	.2235	.1065	9.3889
3/8	.6134	1.6302	4.5887	.2179	.1093	9.1528
1/2	.6290	1.5898	4.7054	.2125	.1120	8.9258
5/8	.6448	1.5509	4.8233	.2073	.1148	8.7076
3/4	.6607	1.5135	4.9425	.2023	.1177	8.4976
7/8	.6768	1.4775	5.0630	.1975	.1205	8.2953
12	.6931	1.4428	5.1848	.1929	.1234	8.1005

2" Tubing
OD (2.375")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
6	.0733	13.6447	.5483	1.8240	.0131	76.6065
1/2	.1074	9.3130	.8033	1.2450	.0191	52.2870
5/8	.1163	8.5966	.8702	1.1492	.0207	48.2649
3/4	.1254	7.9717	.9384	1.0657	.0223	44.7565
7/8	.1347	7.4221	1.0079	.9922	.0240	41.6708
7	.1442	6.9352	1.0787	.9271	.0257	38.9371
1/8	.1538	6.5011	1.1507	.8691	.0274	36.4995
1/4	.1636	6.1117	1.2240	.8170	.0291	34.3133
3/8	.1736	5.7606	1.2986	.7701	.0309	32.3425
1/2	.1837	5.4427	1.3745	.7276	.0327	30.5573
5/8	.1940	5.1534	1.4516	.6889	.0346	28.9335
3/4	.2045	4.8893	1.5300	.6536	.0364	27.4507
7/8	.2152	4.6473	1.6097	.6212	.0383	26.0917
8	.2260	4.4247	1.6907	.5915	.0403	24.8422
1/8	.2370	4.2195	1.7729	.5641	.0422	23.6899
1/4	.2482	4.0297	1.8564	.5387	.0442	22.6242
3/8	.2595	3.8537	1.9412	.5152	.0462	21.6360
1/2	.2710	3.6901	2.0273	.4933	.0483	20.7175
5/8	.2827	3.5377	2.1146	.4729	.0503	19.8618
3/4	.2945	3.3954	2.2032	.4539	.0525	19.0630
7/8	.3065	3.2623	2.2931	.4361	.0546	18.3157
9	.3187	3.1375	2.3843	.4194	.0568	17.6154
1/8	.3311	3.0204	2.4767	.4038	.0590	16.9579
1/4	.3436	2.9103	2.5704	.3890	.0612	16.3397
3/8	.3563	2.8066	2.6654	.3752	.0635	15.7574
1/2	.3692	2.7088	2.7617	.3621	.0658	15.2081
5/8	.3822	2.6164	2.8592	.3498	.0681	14.6893
3/4	.3954	2.5290	2.9580	.3381	.0704	14.1986
7/8	.4088	2.4462	3.0581	.3270	.0728	13.7339
10	.4223	2.3677	3.1595	.3165	.0752	13.2933
1/8	.4361	2.2932	3.2621	.3066	.0777	12.8750
1/4	.4500	2.2224	3.3660	.2971	.0801	12.4776
3/8	.4640	2.1551	3.4712	.2881	.0826	12.0995
1/2	.4782	2.0909	3.5777	.2795	.0852	11.7394
5/8	.4926	2.0298	3.6854	.2713	.0877	11.3962
3/4	.5072	1.9715	3.7944	.2635	.0903	11.0688
7/8	.5220	1.9158	3.9047	.2561	.0930	10.7562
11	.5369	1.8626	4.0163	.2490	.0956	10.4574
1/8	.5520	1.8117	4.1291	.2422	.0983	10.1716
1/4	.5672	1.7630	4.2432	.2357	.1010	9.8981
3/8	.5826	1.7163	4.3586	.2294	.1038	9.6360
1/2	.5982	1.6716	4.4753	.2235	.1066	9.3848
5/8	.6140	1.6286	4.5932	.2177	.1094	9.1439
3/4	.6299	1.5874	4.7124	.2122	.1122	8.9126
7/8	.6460	1.5479	4.8329	.2069	.1151	8.6904
12	.6623	1.5098	4.9547	.2018	.1180	8.4768
1/8	.6788	1.4732	5.0777	.1969	.1209	8.2714
1/4	.6954	1.4380	5.2020	.1922	.1239	8.0737
3/8	.7122	1.4041	5.3276	.1877	.1268	7.8834
1/2	.7291	1.3715	5.4545	.1833	.1299	7.7000
5/8	.7463	1.3400	5.5826	.1791	.1329	7.5233

2 1/2" Tubing
OD (2.875")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
6	.1062	9.4177	.7943	1.2589	.0189	52.8745
1/2	.1403	7.1290	1.0493	.9530	.0250	40.0253
5/8	.1492	6.7015	1.1163	.8959	.0266	37.6251
3/4	.1583	6.3156	1.1845	.8443	.0282	35.4583
7/8	.1676	5.9656	1.2540	.7975	.0299	33.4934
7	.1771	5.6470	1.3247	.7549	.0315	31.7043
1/8	.1867	5.3557	1.3968	.7159	.0333	30.0692
1/4	.1965	5.0886	1.4701	.6802	.0350	28.5696
3/8	.2065	4.8429	1.5447	.6474	.0368	27.1901
1/2	.2166	4.6162	1.6205	.6171	.0386	25.9172
5/8	.2269	4.4065	1.6977	.5890	.0404	24.7396
3/4	.2374	4.2119	1.7761	.5630	.0423	23.6474
7/8	.2481	4.0311	1.8558	.5389	.0442	22.6319
8	.2589	3.8625	1.9367	.5163	.0461	21.6858
1/8	.2699	3.7052	2.0190	.4953	.0481	20.8025
1/4	.2811	3.5580	2.1025	.4756	.0501	19.9762
3/8	.2924	3.4201	2.1873	.4572	.0521	19.2019
1/2	.3039	3.2906	2.2733	.4399	.0541	18.4749
5/8	.3156	3.1689	2.3607	.4236	.0562	17.7914
3/4	.3274	3.0542	2.4493	.4083	.0583	17.1477
7/8	.3394	2.9461	2.5392	.3938	.0605	16.5407
9	.3516	2.8440	2.6303	.3802	.0626	15.9674
1/8	.3640	2.7475	2.7228	.3673	.0648	15.4253
1/4	.3765	2.6560	2.8165	.3551	.0671	14.9121
3/8	.3892	2.5694	2.9115	.3435	.0693	14.4256
1/2	.4021	2.4872	3.0077	.3325	.0716	13.9639
5/8	.4151	2.4090	3.1053	.3220	.0739	13.5253
3/4	.4283	2.3347	3.2041	.3121	.0763	13.1082
7/8	.4417	2.2640	3.3042	.3027	.0787	12.7111
10	.4552	2.1966	3.4055	.2936	.0811	12.3328
1/8	.4690	2.1324	3.5082	.2851	.0835	11.9719
1/4	.4828	2.0710	3.6121	.2769	.0860	11.6275
3/8	.4969	2.0124	3.7173	.2690	.0885	11.2985
1/2	.5111	1.9564	3.8237	.2615	.0910	10.9839
5/8	.5255	1.9028	3.9315	.2544	.0936	10.6829
3/4	.5401	1.8514	4.0405	.2475	.0962	10.3947
7/8	.5549	1.8022	4.1508	.2409	.0988	10.1185
11	.5698	1.7551	4.2623	.2346	.1015	9.8537
1/8	.5849	1.7098	4.3752	.2286	.1042	9.5995
1/4	.6001	1.6663	4.4893	.2228	.1069	9.3555
3/8	.6155	1.6246	4.6047	.2172	.1096	9.1211
1/2	.6311	1.5844	4.7213	.2118	.1124	8.8957
5/8	.6469	1.5458	4.8393	.2066	.1152	8.6789
3/4	.6628	1.5087	4.9585	.2017	.1181	8.4702
7/8	.6789	1.4729	5.0790	.1969	.1209	8.2693
12	.6952	1.4384	5.2007	.1923	.1238	8.0757
1/8	.7117	1.4051	5.3238	.1878	.1268	7.8891
1/4	.7283	1.3731	5.4481	.1836	.1297	7.7091
3/8	.7451	1.3421	5.5737	.1794	.1327	7.5354
1/2	.7620	1.3123	5.7005	.1754	.1357	7.3677
5/8	.7792	1.2834	5.8287	.1716	.1388	7.2057

2 1/2" Tubing
OD (2.875")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
7	.1320	7.5755	.9875	1.0127	.0235	42.5317
1/8	.1416	7.0604	1.0595	.9438	.0252	39.6400
1/4	.1514	6.6035	1.1328	.8827	.0270	37.0746
3/8	.1614	6.1956	1.2074	.8282	.0287	34.7844
1/2	.1715	5.8293	1.2833	.7793	.0306	32.7281
5/8	.1819	5.4988	1.3604	.7351	.0324	30.8724
3/4	.1923	5.1991	1.4388	.6950	.0343	29.1899
7/8	.2030	4.9263	1.5185	.6585	.0362	27.6581
8	.2138	4.6769	1.5995	.6252	.0381	26.2581
1/8	.2248	4.4482	1.6817	.5946	.0400	24.9741
1/4	.2360	4.2378	1.7652	.5665	.0420	23.7926
3/8	.2473	4.0436	1.8500	.5405	.0440	22.7021
1/2	.2588	3.8638	1.9361	.5165	.0461	21.6930
5/8	.2705	3.6970	2.0234	.4942	.0482	20.7566
3/4	.2823	3.5419	2.1120	.4735	.0503	19.8858
7/8	.2943	3.3973	2.2019	.4542	.0524	19.0740
9	.3065	3.2623	2.2931	.4361	.0546	18.3157
1/8	.3189	3.1359	2.3855	.4192	.0568	17.6060
1/4	.3314	3.0173	2.4792	.4034	.0590	16.9405
3/8	.3441	2.9060	2.5742	.3885	.0613	16.3154
1/2	.3570	2.8012	2.6705	.3745	.0636	15.7273
5/8	.3700	2.7025	2.7680	.3613	.0659	15.1731
3/4	.3832	2.6094	2.8668	.3488	.0683	14.6501
7/8	.3966	2.5214	2.9669	.3371	.0706	14.1559
10	.4102	2.4381	3.0683	.3259	.0731	13.6883
1/8	.4239	2.3591	3.1709	.3154	.0755	13.2452
1/4	.4378	2.2843	3.2748	.3054	.0780	12.8249
3/8	.4518	2.2132	3.3800	.2959	.0805	12.4258
1/2	.4661	2.1456	3.4865	.2868	.0830	12.0464
5/8	.4805	2.0813	3.5942	.2782	.0856	11.6853
3/4	.4950	2.0200	3.7032	.2700	.0882	11.3413
7/8	.5098	1.9616	3.8135	.2622	.0908	11.0133
11	.5247	1.9059	3.9251	.2548	.0935	10.7003
1/8	.5398	1.8526	4.0379	.2477	.0961	10.4013
1/4	.5550	1.8017	4.1520	.2408	.0989	10.1154
3/8	.5705	1.7530	4.2674	.2343	.1016	9.8419
1/2	.5860	1.7063	4.3841	.2281	.1044	9.5800
5/8	.6018	1.6616	4.5020	.2221	.1072	9.3290
3/4	.6178	1.6188	4.6212	.2164	.1100	9.0884
7/8	.6339	1.5776	4.7417	.2109	.1129	8.8574
12	.6501	1.5381	4.8635	.2056	.1158	8.6357
1/8	.6666	1.5002	4.9865	.2005	.1187	8.4226
1/4	.6832	1.4637	5.1108	.1957	.1217	8.2177
3/8	.7000	1.4286	5.2364	.1910	.1247	8.0206
1/2	.7169	1.3948	5.3633	.1865	.1277	7.8309
5/8	.7341	1.3622	5.4914	.1821	.1307	7.6482
3/4	.7514	1.3309	5.6208	.1779	.1338	7.4721
7/8	.7688	1.3006	5.7515	.1739	.1369	7.3023
13	.7865	1.2715	5.8835	.1700	.1401	7.1385
1/8	.8043	1.2433	6.0167	.1662	.1433	6.9805

2 1/2" Tubing
OD (2.875")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
7	.0869	11.5043	.6503	1.5379	.0155	64.5898
3/4	.1473	6.7907	1.1016	.9078	.0262	38.1259
7/8	.1579	6.3326	1.1813	.8465	.0281	35.5540
8	.1687	5.9265	1.2623	.7922	.0301	33.2735
1/8	.1797	5.5640	1.3445	.7438	.0320	31.2383
1/4	.1909	5.2386	1.4280	.7003	.0340	29.4114
3/8	.2022	4.9450	1.5128	.6610	.0360	27.7630
1/2	.2137	4.6788	1.5989	.6255	.0381	26.2686
5/8	.2254	4.4364	1.6862	.5931	.0401	24.9080
3/4	.2372	4.2149	1.7748	.5634	.0423	23.6644
7/8	.2493	4.0118	1.8647	.5363	.0444	22.5236
9	.2615	3.8248	1.9559	.5113	.0466	21.4738
1/8	.2738	3.6522	2.0483	.4882	.0488	20.5047
1/4	.2863	3.4924	2.1420	.4669	.0510	19.6076
3/8	.2990	3.3441	2.2370	.4470	.0533	18.7750
1/2	.3119	3.2061	2.3333	.4286	.0556	18.0004
5/8	.3249	3.0775	2.4308	.4114	.0579	17.2782
3/4	.3381	2.9573	2.5296	.3953	.0602	16.6032
7/8	.3515	2.8447	2.6297	.3803	.0626	15.9713
10	.3651	2.7391	2.7311	.3662	.0650	15.3785
1/8	.3788	2.6399	2.8337	.3529	.0675	14.8215
1/4	.3927	2.5465	2.9376	.3404	.0699	14.2972
3/8	.4067	2.4585	3.0428	.3286	.0724	13.8030
1/2	.4210	2.3754	3.1493	.3175	.0750	13.3364
5/8	.4354	2.2968	3.2570	.3070	.0775	12.8952
3/4	.4500	2.2224	3.3660	.2971	.0801	12.4776
7/8	.4647	2.1519	3.4763	.2877	.0828	12.0817
11	.4796	2.0850	3.5879	.2787	.0854	11.7060
1/8	.4947	2.0214	3.7007	.2702	.0881	11.3491
1/4	.5099	1.9610	3.8148	.2621	.0908	11.0096
3/8	.5254	1.9034	3.9302	.2544	.0936	10.6864
1/2	.5410	1.8485	4.0469	.2471	.0964	10.3783
5/8	.5567	1.7962	4.1648	.2401	.0992	10.0844
3/4	.5727	1.7462	4.2840	.2334	.1020	9.8038
7/8	.5888	1.6984	4.4045	.2270	.1049	9.5356
12	.6051	1.6527	4.5263	.2209	.1078	9.2791
1/8	.6215	1.6090	4.6493	.2151	.1107	9.0335
1/4	.6381	1.5671	4.7736	.2095	.1137	8.7983
3/8	.6549	1.5269	4.8992	.2041	.1166	8.5728
1/2	.6719	1.4884	5.0261	.1990	.1197	8.3564
5/8	.6890	1.4514	5.1542	.1940	.1227	8.1486
3/4	.7063	1.4158	5.2836	.1893	.1258	7.9490
7/8	.7238	1.3817	5.4143	.1847	.1289	7.7572
13	.7414	1.3488	5.5463	.1803	.1320	7.5726
1/8	.7592	1.3171	5.6795	.1761	.1352	7.3949
1/4	.7772	1.2867	5.8140	.1720	.1384	7.2239
3/8	.7953	1.2573	5.9498	.1681	.1417	7.0590
1/2	.8137	1.2290	6.0869	.1643	.1449	6.9000
5/8	.8322	1.2017	6.2252	.1606	.1482	6.7467
3/4	.8508	1.1753	6.3648	.1571	.1515	6.5987
7/8	.8697	1.1499	6.5057	.1537	.1549	6.4558

3" Tubing
OD (3.500")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
7	.1336	7.4837	.9996	1.0004	.0238	42.0163
3/4	.1940	5.1557	1.4510	.6892	.0345	28.9462
7/8	.2046	4.8873	1.5306	.6533	.0364	27.4392
8	.2154	4.6418	1.6116	.6205	.0384	26.0608
1/8	.2264	4.4164	1.6938	.5904	.0403	24.7955
1/4	.2376	4.2089	1.7774	.5626	.0423	23.6304
3/8	.2489	4.0173	1.8621	.5370	.0443	22.5545
1/2	.2604	3.8398	1.9482	.5133	.0464	21.5581
5/8	.2721	3.6750	2.0355	.4913	.0485	20.6331
3/4	.2839	3.5217	2.1242	.4708	.0506	19.7724
7/8	.2960	3.3788	2.2140	.4517	.0527	18.9697
9	.3082	3.2451	2.3052	.4338	.0549	18.2195
1/8	.3205	3.1200	2.3976	.4171	.0571	17.5170
1/4	.3330	3.0027	2.4914	.4014	.0593	16.8581
3/8	.3457	2.8924	2.5863	.3867	.0616	16.2390
1/2	.3586	2.7886	2.6826	.3728	.0639	15.6563
5/8	.3716	2.6908	2.7801	.3597	.0662	15.1070
3/4	.3848	2.5984	2.8790	.3474	.0685	14.5885
7/8	.3982	2.5111	2.9790	.3357	.0709	14.0984
10	.4118	2.4285	3.0804	.3246	.0733	13.6344
1/8	.4255	2.3502	3.1830	.3142	.0758	13.1948
1/4	.4394	2.2759	3.2870	.3042	.0783	12.7777
3/8	.4534	2.2053	3.3921	.2948	.0808	12.3814
1/2	.4677	2.1382	3.4986	.2858	.0833	12.0047
5/8	.4821	2.0743	3.6063	.2773	.0859	11.6460
3/4	.4967	2.0135	3.7154	.2692	.0885	11.3043
7/8	.5114	1.9554	3.8256	.2614	.0911	10.9784
11	.5263	1.9000	3.9372	.2540	.0937	10.6674
1/8	.5414	1.8471	4.0500	.2469	.0964	10.3702
1/4	.5566	1.7964	4.1642	.2401	.0991	10.0860
3/8	.5721	1.7480	4.2795	.2337	.1019	9.8140
1/2	.5877	1.7016	4.3962	.2275	.1047	9.5536
5/8	.6034	1.6572	4.5141	.2215	.1075	9.3040
3/4	.6194	1.6145	4.6334	.2158	.1103	9.0646
7/8	.6355	1.5736	4.7538	.2104	.1132	8.8349
12	.6518	1.5343	4.8756	.2051	.1161	8.6142
1/8	.6682	1.4965	4.9986	.2001	.1190	8.4022
1/4	.6848	1.4602	5.1230	.1952	.1220	8.1983
3/8	.7016	1.4253	5.2485	.1905	.1250	8.0021
1/2	.7186	1.3917	5.3754	.1860	.1280	7.8133
5/8	.7357	1.3592	5.5035	.1817	.1310	7.6314
3/4	.7530	1.3280	5.6330	.1775	.1341	7.4560
7/8	.7705	1.2979	5.7636	.1735	.1372	7.2870
13	.7881	1.2689	5.8956	.1696	.1404	7.1239
1/8	.8059	1.2408	6.0288	.1659	.1435	6.9664
1/4	.8239	1.2137	6.1634	.1623	.1467	6.8144
3/8	.8420	1.1876	6.2991	.1588	.1500	6.6675
1/2	.8604	1.1623	6.4362	.1554	.1532	6.5255
5/8	.8789	1.1378	6.5745	.1521	.1565	6.3882
3/4	.8975	1.1142	6.7142	.1489	.1599	6.2554
7/8	.9164	1.0913	6.8550	.1459	.1632	6.1268

3" Tubing
OD (3.500")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
8 1/4	.1708	5.8555	1.2776	.7828	.0304	32.8750
3/8	.1821	5.4911	1.3623	.7340	.0324	30.8290
1/2	.1936	5.1648	1.4484	.6904	.0345	28.9972
5/8	.2053	4.8711	1.5357	.6512	.0366	27.3481
3/4	.2171	4.6053	1.6244	.6156	.0387	25.8562
7/8	.2292	4.3639	1.7142	.5834	.0408	24.5004
9	.2413	4.1435	1.8054	.5539	.0430	23.2633
1/8	.2537	3.9417	1.8978	.5269	.0452	22.1302
1/4	.2662	3.7562	1.9916	.5021	.0474	21.0889
3/8	.2789	3.5852	2.0865	.4793	.0497	20.1288
1/2	.2918	3.4271	2.1828	.4581	.0520	19.2411
5/8	.3048	3.2805	2.2803	.4385	.0543	18.4181
3/4	.3180	3.1443	2.3792	.4203	.0566	17.6532
7/8	.3314	3.0173	2.4792	.4034	.0590	16.9405
10	.3450	2.8988	2.5806	.3875	.0614	16.2751
1/8	.3587	2.7879	2.6832	.3727	.0639	15.6526
1/4	.3726	2.6840	2.7872	.3588	.0664	15.0690
3/8	.3866	2.5864	2.8923	.3457	.0689	14.5210
1/2	.4009	2.4946	2.9988	.3335	.0714	14.0054
5/8	.4153	2.4080	3.1065	.3219	.0740	13.5197
3/4	.4298	2.3264	3.2156	.3110	.0766	13.0614
7/8	.4446	2.2493	3.3258	.3007	.0792	12.6283
11	.4595	2.1763	3.4374	.2909	.0818	12.2184
1/8	.4746	2.1071	3.5502	.2817	.0845	11.8301
1/4	.4898	2.0415	3.6644	.2729	.0872	11.4617
3/8	.5053	1.9792	3.7797	.2646	.0900	11.1118
1/2	.5209	1.9199	3.8964	.2566	.0928	10.7791
5/8	.5366	1.8635	4.0143	.2491	.0956	10.4624
3/4	.5526	1.8097	4.1336	.2419	.0984	10.1606
7/8	.5687	1.7585	4.2540	.2351	.1013	9.8729
12	.5849	1.7096	4.3758	.2285	.1042	9.5981
1/8	.6014	1.6628	4.4988	.2223	.1071	9.3356
1/4	.6180	1.6181	4.6232	.2163	.1101	9.0846
3/8	.6348	1.5753	4.7487	.2106	.1131	8.8444
1/2	.6518	1.5343	4.8756	.2051	.1161	8.6142
5/8	.6689	1.4950	5.0037	.1999	.1191	8.3936
3/4	.6862	1.4573	5.1332	.1948	.1222	8.1820
7/8	.7037	1.4211	5.2638	.1900	.1253	7.9789
13	.7213	1.3864	5.3958	.1853	.1285	7.7837
1/8	.7391	1.3530	5.5290	.1809	.1316	7.5962
1/4	.7571	1.3208	5.6636	.1766	.1348	7.4158
3/8	.7752	1.2899	5.7993	.1724	.1381	7.2421
1/2	.7936	1.2601	5.9364	.1685	.1413	7.0749
5/8	.8120	1.2314	6.0747	.1646	.1446	6.9138
3/4	.8307	1.2038	6.2144	.1609	.1480	6.7585
7/8	.8495	1.1771	6.3552	.1574	.1513	6.6086
14	.8685	1.1513	6.4974	.1539	.1547	6.4641
1/8	.8877	1.1265	6.6408	.1506	.1581	6.3244
1/4	.9071	1.1024	6.7856	.1474	.1616	6.1896
3/8	.9266	1.0792	6.9315	.1443	.1650	6.0592
1/2	.9463	1.0568	7.0788	.1413	.1685	5.9331
5/8	.9661	1.0351	7.2273	.1384	.1721	5.8112

3" Tubing
OD (3.500")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & HOLE

Diameter of Hole In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
9 1/4	.1994	5.0147	1.4918	.6704	.0355	28.1545
3/8	.2121	4.7145	1.5867	.6302	.0378	26.4691
1/2	.2250	4.4448	1.6830	.5942	.0401	24.9552
5/8	.2380	4.2014	1.7805	.5616	.0424	23.5881
3/4	.2512	3.9805	1.8794	.5321	.0447	22.3479
7/8	.2646	3.7792	1.9794	.5052	.0471	21.2179
10	.2782	3.5951	2.0808	.4806	.0495	20.1843
1/8	.2919	3.4261	2.1834	.4580	.0520	19.2355
1/4	.3058	3.2705	2.2874	.4372	.0545	18.3616
3/8	.3198	3.1267	2.3925	.4180	.0570	17.5544
1/2	.3341	2.9935	2.4990	.4002	.0595	16.8065
5/8	.3485	2.8697	2.6067	.3836	.0621	16.1119
3/4	.3630	2.7546	2.7158	.3682	.0647	15.4652
7/8	.3778	2.6471	2.8260	.3539	.0673	14.8616
11	.3927	2.5465	2.9376	.3404	.0699	14.2972
1/8	.4078	2.4523	3.0504	.3278	.0726	13.7684
1/4	.4230	2.3639	3.1646	.3160	.0753	13.2719
3/8	.4385	2.2807	3.2799	.3049	.0781	12.8050
1/2	.4540	2.2024	3.3966	.2944	.0809	12.3652
5/8	.4698	2.1285	3.5145	.2845	.0837	11.9502
3/4	.4857	2.0587	3.6338	.2752	.0865	11.5582
7/8	.5019	1.9926	3.7542	.2664	.0894	11.1872
12	.5181	1.9300	3.8760	.2580	.0923	10.8358
1/8	.5346	1.8706	3.9990	.2501	.0952	10.5024
1/4	.5512	1.8142	4.1234	.2425	.0982	10.1858
3/8	.5680	1.7606	4.2489	.2354	.1012	9.8847
1/2	.5849	1.7096	4.3758	.2285	.1042	9.5981
5/8	.6021	1.6609	4.5039	.2220	.1072	9.3251
3/4	.6194	1.6145	4.6334	.2158	.1103	9.0646
7/8	.6368	1.5702	4.7640	.2099	.1134	8.8160
13	.6545	1.5279	4.8960	.2043	.1166	8.5783
1/8	.6723	1.4874	5.0292	.1988	.1197	8.3511
1/4	.6903	1.4487	5.1638	.1937	.1229	8.1335
3/8	.7084	1.4116	5.2995	.1887	.1262	7.9251
1/2	.7267	1.3760	5.4366	.1839	.1294	7.7253
5/8	.7452	1.3418	5.5749	.1794	.1327	7.5336
3/4	.7639	1.3091	5.7146	.1750	.1361	7.3496
7/8	.7827	1.2776	5.8554	.1708	.1394	7.1727
14	.8017	1.2473	5.9976	.1667	.1428	7.0027
1/8	.8209	1.2181	6.1410	.1628	.1462	6.8392
1/4	.8403	1.1901	6.2858	.1591	.1497	6.6817
3/8	.8598	1.1631	6.4317	.1555	.1531	6.5300
1/2	.8795	1.1371	6.5790	.1520	.1566	6.3839
5/8	.8993	1.1119	6.7275	.1486	.1602	6.2429
3/4	.9193	1.0877	6.8774	.1454	.1637	6.1069
7/8	.9395	1.0643	7.0284	.1423	.1673	5.9757
15	.9599	1.0418	7.1808	.1393	.1710	5.8489
1/8	.9804	1.0199	7.3344	.1363	.1746	5.7263
1/4	1.0011	.9988	7.4894	.1335	.1783	5.6079
3/8	1.0220	.9784	7.6455	.1308	.1820	5.4933

3/4" Tubing
OD (1.050")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4 1/2	9.50	4.090	.0792	12.625	.5925	1.6877	.0141	70.88
	11.60	4.000	.0752	13.291	.5628	1.7767	.0134	74.62
	13.50	3.920	.0718	13.931	.5370	1.8623	.0128	78.21
	15.10	3.826	.0678	14.747	.5073	1.9713	.0121	82.79
4 3/4	16.00	4.082	.0789	12.682	.5899	1.6953	.0140	71.20
5	11.50	4.560	.1014	9.864	.7584	1.3186	.0181	55.38
	13.00	4.494	.0981	10.191	.7340	1.3623	.0175	57.22
	15.00	4.408	.0939	10.644	.7028	1.4229	.0167	59.76
	18.00	4.276	.0877	11.403	.6560	1.5243	.0156	64.02
	21.00	4.154	.0821	12.182	.6141	1.6285	.0146	68.40
5 1/2	13.00	5.044	.1267	7.890	.9481	1.0548	.0226	44.30
	14.00	5.012	.1250	8.001	.9349	1.0696	.0223	44.92
	15.00	4.974	.1229	8.136	.9195	1.0876	.0219	45.68
	15.50	4.950	.1216	8.223	.9097	1.0992	.0217	46.17
	17.00	4.892	.1185	8.439	.8864	1.1281	.0211	47.38
	20.00	4.778	.1125	8.890	.8415	1.1884	.0200	49.91
	23.00	4.670	.1069	9.353	.7998	1.2503	.0190	52.51
5 3/4	14.00	5.290	.1406	7.112	1.0518	.9508	.0250	39.93
	17.00	5.190	.1349	7.414	1.0090	.9911	.0240	41.62
	19.50	5.090	.1293	7.735	.9671	1.0340	.0230	43.43
	22.50	4.990	.1238	8.079	.9260	1.0800	.0220	45.36
6	15.00	5.524	.1544	6.477	1.1550	.8658	.0275	36.36
	16.00	5.500	.1530	6.538	1.1442	.8740	.0272	36.71
	17.00	5.450	.1500	6.668	1.1219	.8914	.0267	37.44
	18.00	5.424	.1484	6.737	1.1104	.9006	.0264	37.83
	20.00	5.352	.1442	6.935	1.0787	.9270	.0257	38.94
	24.00	5.240	.1377	7.261	1.0303	.9706	.0245	40.76
	26.00	5.132	.1316	7.598	.9846	1.0156	.0234	42.66
6 5/8	17.00	6.135	.1933	5.175	1.4457	.6917	.0344	29.05
	20.00	6.049	.1875	5.332	1.4029	.7128	.0334	29.94
	22.00	5.989	.1836	5.447	1.3735	.7281	.0327	30.58
	24.00	5.921	.1792	5.581	1.3404	.7460	.0319	31.33
	26.00	5.855	.1749	5.716	1.3087	.7641	.0312	32.09
	28.00	5.791	.1709	5.852	1.2783	.7823	.0304	32.86
	29.00	5.761	.1690	5.918	1.2642	.7911	.0301	33.22
	32.00	5.675	.1636	6.112	1.2240	.8170	.0291	34.31
7	17.00	6.538	.2211	4.523	1.6541	.6046	.0394	25.39
	20.00	6.456	.2153	4.645	1.6106	.6209	.0383	26.08
	22.00	6.398	.2112	4.734	1.5802	.6329	.0376	26.58
	23.00	6.366	.2090	4.785	1.5635	.6396	.0372	26.86
	24.00	6.336	.2069	4.833	1.5479	.6460	.0369	27.13
	26.00	6.276	.2028	4.931	1.5171	.6592	.0361	27.68
	28.00	6.214	.1986	5.036	1.4855	.6732	.0354	28.27
	29.00	6.184	.1965	5.088	1.4703	.6801	.0350	28.57
	30.00	6.154	.1945	5.141	1.4552	.6872	.0346	28.86
	32.00	6.094	.1905	5.249	1.4252	.7017	.0339	29.47
	34.00	6.040	.1869	5.349	1.3985	.7151	.0333	30.03
	35.00	6.004	.1846	5.418	1.3808	.7242	.0329	30.42
	38.00	5.920	.1791	5.583	1.3399	.7463	.0319	31.34
	40.00	5.836	.1737	5.756	1.2996	.7695	.0309	32.32
7 5/8	20.00	7.125	.2648	3.776	1.9813	.5047	.0472	21.20
	24.00	7.025	.2571	3.889	1.9235	.5199	.0458	21.83
	26.40	6.969	.2529	3.955	1.8916	.5287	.0450	22.20
	29.70	6.875	.2458	4.069	1.8385	.5439	.0438	22.84
	33.70	6.765	.2376	4.209	1.7773	.5627	.0423	23.63
	39.00	6.625	.2274	4.398	1.7008	.5880	.0405	24.69

3/4" Tubing
OD (1.050")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4 1/2	9.50	4.090	.0732	13.662	.5476	1.8263	.0130	76.70
	11.60	4.000	.0692	14.446	.5179	1.9311	.0123	81.10
	13.50	3.920	.0658	15.205	.4920	2.0325	.0117	85.36
	15.10	3.826	.0618	16.182	.4623	2.1631	.0110	90.85
4 3/4	16.00	4.082	.0728	13.729	.5449	1.8352	.0130	77.08
5	11.50	4.560	.0954	10.485	.7134	1.4017	.0170	58.87
	13.00	4.494	.0921	10.856	.6891	1.4513	.0164	60.95
	15.00	4.408	.0879	11.372	.6578	1.5202	.0157	63.85
	18.00	4.276	.0817	12.242	.6110	1.6365	.0145	68.73
	21.00	4.154	.0761	13.145	.5691	1.7572	.0135	73.80
5 1/2	13.00	5.044	.1207	08.283	.9031	1.1073	.0215	46.51
	14.00	5.012	.1190	08.406	.8900	1.1237	.0212	47.19
	15.00	4.974	.1169	08.554	.8745	1.1436	.0208	48.03
	15.50	4.950	.1156	08.651	.8648	1.1564	.0206	48.57
	17.00	4.892	.1125	08.890	.8415	1.1884	.0200	49.91
	20.00	4.778	.1065	09.392	.7965	1.2555	.0190	52.73
	23.00	4.670	.1009	09.910	.7549	1.3248	.0180	55.64
5 3/4	14.00	5.290	.1346	07.430	1.0068	.9932	.0240	41.72
	17.00	5.190	.1289	07.760	.9640	1.0373	.0230	43.57
	19.50	5.090	.1233	08.113	.9221	1.0845	.0220	45.55
	22.50	4.990	.1178	08.491	.8810	1.1351	.0210	47.67
6	15.00	5.524	.1484	06.739	1.1100	.9009	.0264	37.84
	16.00	5.500	.1469	06.805	1.0993	.9097	.0262	38.21
	17.00	5.450	.1440	06.946	1.0769	.9286	.0256	39.00
	18.00	5.424	.1424	07.022	1.0654	.9386	.0254	39.42
	20.00	5.352	.1382	07.237	1.0337	.9674	.0246	40.63
	24.00	5.240	.1317	07.592	.9853	1.0149	.0235	42.63
	26.00	5.132	.1256	07.961	.9396	1.0643	.0224	44.70
6 5/8	17.00	6.135	.1872	05.341	1.4007	.7139	.0333	29.98
	20.00	6.049	.1815	05.509	1.3579	.7364	.0323	30.93
	22.00	5.989	.1776	05.631	1.3285	.7527	.0316	31.61
	24.00	5.921	.1732	05.775	1.2954	.7720	.0308	32.42
	26.00	5.855	.1689	05.920	1.2637	.7913	.0301	33.23
	28.00	5.791	.1649	06.066	1.2333	.8108	.0294	34.05
	29.00	5.761	.1630	06.136	1.2192	.8202	.0290	34.45
	32.00	5.675	.1576	06.345	1.1790	.8482	.0281	35.62
7	17.00	6.538	.2151	04.649	1.6091	.6215	.0383	26.10
	20.00	6.456	.2093	04.778	1.5656	.6387	.0373	26.83
	22.00	6.398	.2052	04.873	1.5352	.6514	.0366	27.36
	23.00	6.366	.2030	04.926	1.5185	.6585	.0362	27.66
	24.00	6.336	.2009	04.977	1.5030	.6654	.0358	27.94
	26.00	6.276	.1968	05.082	1.4721	.6793	.0350	28.53
	28.00	6.214	.1926	05.193	1.4405	.6942	.0343	29.16
	29.00	6.184	.1905	05.248	1.4253	.7016	.0339	29.47
	30.00	6.154	.1885	05.305	1.4102	.7091	.0336	29.78
	32.00	6.094	.1845	05.420	1.3802	.7245	.0329	30.43
	34.00	6.040	.1809	05.527	1.3535	.7388	.0322	31.03
	35.00	6.004	.1786	05.600	1.3358	.7486	.0318	31.44
	38.00	5.920	.1731	05.777	1.2949	.7722	.0308	32.43
	40.00	5.836	.1677	05.962	1.2547	.7970	.0299	33.47
7 5/8	20.00	7.125	.2588	03.863	1.9363	.5165	.0461	21.69
	24.00	7.025	.2511	03.982	1.8786	.5323	.0447	22.36
	26.40	6.969	.2468	04.051	1.8466	.5415	.0440	22.74
	29.70	6.875	.2397	04.171	1.7935	.5576	.0427	23.42
	33.70	6.765	.2316	04.318	1.7323	.5773	.0412	24.25
	39.00	6.625	.2213	04.518	1.6558	.6039	.0394	25.37

3/4" Tubing
OD (1.050")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4 1/2	9.50	4.090	.0672	14.885	.5026	1.9898	.0120	83.57
	11.60	4.000	.0632	15.820	.4729	2.1148	.0113	88.82
	13.50	3.920	.0598	16.735	.4470	2.2370	.0106	93.95
	15.10	3.826	.0558	17.926	.4173	2.3963	.0099	100.64
4 3/4	16.00	4.082	.0668	14.964	.4999	2.0004	.0119	84.01
5	11.50	4.560	.0894	11.191	.6685	1.4960	.0159	62.83
	13.00	4.494	.0861	11.615	.6441	1.5526	.0153	65.21
	15.00	4.408	.0819	12.207	.6128	1.6318	.0146	68.53
	18.00	4.276	.0757	13.215	.5661	1.7666	.0135	74.20
	21.00	4.154	.0701	14.273	.5241	1.9080	.0125	80.14
5 1/2	13.00	5.044	.1147	8.718	.8581	1.1654	.0204	48.94
	14.00	5.012	.1130	8.853	.8450	1.1835	.0201	49.71
	15.00	4.974	.1109	9.018	.8295	1.2056	.0197	50.63
	15.50	4.950	.1096	9.125	.8198	1.2199	.0195	51.23
	17.00	4.892	.1065	9.392	.7965	1.2555	.0190	52.73
	20.00	4.778	.1005	9.954	.7515	1.3307	.0179	55.89
	23.00	4.670	.0949	10.538	.7099	1.4087	.0169	59.16
5 3/4	14.00	5.290	.1286	7.778	.9618	1.0397	.0229	43.67
	17.00	5.190	.1229	8.139	.9191	1.0881	.0219	45.70
	19.50	5.090	.1173	8.529	.8771	1.1401	.0209	47.88
	22.50	4.990	.1118	8.948	.8360	1.1962	.0199	50.24
6	15.00	5.524	.1424	7.024	1.0651	.9389	.0254	39.43
	16.00	5.500	.1409	7.096	1.0543	.9485	.0251	39.84
	17.00	5.450	.1379	7.249	1.0319	.9691	.0246	40.70
	18.00	5.424	.1364	7.331	1.0204	.9800	.0243	41.16
	20.00	5.352	.1322	7.566	.9887	1.0114	.0235	42.48
	24.00	5.240	.1257	7.955	.9403	1.0635	.0224	44.66
	26.00	5.132	.1196	8.362	.8946	1.1178	.0213	46.95
6 5/8	17.00	6.135	.1812	5.518	1.3557	.7376	.0323	30.98
	20.00	6.049	.1755	5.698	1.3130	.7616	.0313	31.99
	22.00	5.989	.1716	5.828	1.2835	.7791	.0306	32.72
	24.00	5.921	.1672	5.982	1.2504	.7997	.0298	33.59
	26.00	5.855	.1629	6.138	1.2187	.8205	.0290	34.46
	28.00	5.791	.1589	6.295	1.1883	.8415	.0283	35.34
	29.00	5.761	.1570	6.371	1.1742	.8517	.0280	35.77
	32.00	5.675	.1516	6.596	1.1341	.8818	.0270	37.03
7	17.00	6.538	.2091	4.783	1.5641	.6394	.0372	26.85
	20.00	6.456	.2033	4.920	1.5206	.6576	.0362	27.62
	22.00	6.398	.1992	5.020	1.4902	.6711	.0355	28.18
	23.00	6.366	.1970	5.077	1.4735	.6786	.0351	28.50
	24.00	6.336	.1949	5.131	1.4580	.6859	.0347	28.81
	26.00	6.276	.1908	5.242	1.4271	.7007	.0340	29.43
	28.00	6.214	.1865	5.361	1.3955	.7166	.0332	30.10
	29.00	6.184	.1845	5.419	1.3803	.7245	.0329	30.43
	30.00	6.154	.1825	5.479	1.3652	.7325	.0325	30.76
	32.00	6.094	.1785	5.602	1.3353	.7489	.0318	31.45
	34.00	6.040	.1749	5.717	1.3085	.7642	.0312	32.10
	35.00	6.004	.1726	5.795	1.2908	.7747	.0307	32.54
	38.00	5.920	.1671	5.985	1.2500	.8000	.0298	33.60
	40.00	5.836	.1617	6.184	1.2097	.8267	.0288	34.72
7 5/8	20.00	7.125	.2528	3.955	1.8913	.5287	.0450	22.21
	24.00	7.025	.2451	4.080	1.8336	.5454	.0437	22.91
	26.40	6.969	.2408	4.152	1.8016	.5551	.0429	23.31
	29.70	6.875	.2337	4.278	1.7485	.5719	.0416	24.02
	33.70	6.765	.2256	4.434	1.6873	.5927	.0402	24.89
	39.00	6.625	.2153	4.644	1.6108	.6208	.0384	26.07

1" Tubing
OD (1.315")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4 1/2	9.50	4.090	.0724	13.817	.5414	1.8471	.0129	77.58
	11.60	4.000	.0684	14.619	.5117	1.9543	.0122	82.08
	13.50	3.920	.0649	15.397	.4858	2.0583	.0116	86.45
	15.10	3.826	.0610	16.400	.4561	2.1923	.0109	92.08
4 3/4	16.00	4.082	.0720	13.886	.5387	1.8562	.0128	77.96
5	11.50	4.560	.0945	10.577	.7073	1.4139	.0168	59.38
	13.00	4.494	.0913	10.954	.6829	1.4644	.0163	61.50
	15.00	4.408	.0871	11.479	.6517	1.5346	.0155	64.45
	18.00	4.276	.0809	12.367	.6049	1.6532	.0144	69.43
	21.00	4.154	.0753	13.289	.5629	1.7764	.0134	74.61
5 1/2	13.00	5.044	.1199	8.340	.8969	1.1149	.0214	46.83
	14.00	5.012	.1181	8.464	.8838	1.1315	.0210	47.52
	15.00	4.974	.1161	8.615	.8683	1.1517	.0207	48.37
	15.50	4.950	.1148	8.713	.8586	1.1647	.0204	48.92
	17.00	4.892	.1117	8.956	.8353	1.1972	.0199	50.28
	20.00	4.778	.1056	9.465	.7903	1.2653	.0188	53.14
	23.00	4.670	.1001	9.992	.7487	1.3357	.0178	56.10
5 3/4	14.00	5.290	.1338	7.476	1.0006	.9994	.0238	41.97
	17.00	5.190	.1280	7.810	.9579	1.0440	.0228	43.85
	19.50	5.090	.1224	8.167	.9159	1.0918	.0218	45.85
	22.50	4.990	.1169	8.551	.8748	1.1431	.0208	48.01
6	15.00	5.524	.1476	6.777	1.1039	.9059	.0263	38.05
	16.00	5.500	.1461	6.844	1.0931	.9148	.0260	38.42
	17.00	5.450	.1431	6.986	1.0708	.9339	.0255	39.22
	18.00	5.424	.1416	7.062	1.0592	.9441	.0252	39.65
	20.00	5.352	.1374	7.280	1.0276	.9732	.0245	40.87
	23.00	5.240	.1309	7.640	.9792	1.0213	.0233	42.89
	26.00	5.132	.1248	8.014	.9335	1.0713	.0222	44.99
6 5/8	17.00	6.135	.1864	5.364	1.3945	.7171	.0332	30.12
	20.00	6.049	.1807	5.534	1.3518	.7398	.0322	31.07
	22.00	5.989	.1768	5.657	1.3223	.7563	.0315	31.76
	24.00	5.921	.1723	5.802	1.2893	.7756	.0307	32.58
	26.00	5.855	.1681	5.949	1.2576	.7952	.0299	33.40
	28.00	5.791	.1640	6.096	1.2272	.8149	.0292	34.23
	29.00	5.761	.1622	6.167	1.2130	.8244	.0289	34.62
	32.00	5.675	.1568	6.378	1.1729	.8526	.0279	35.81
7	17.00	6.538	.2143	4.667	1.6029	.6239	.0382	26.20
	20.00	6.456	.2085	4.797	1.5594	.6413	.0371	26.93
	22.00	6.398	.2044	4.892	1.5290	.6540	.0364	27.47
	23.00	6.366	.2022	4.946	1.5124	.6612	.0360	27.77
	24.00	6.336	.2001	4.998	1.4968	.6681	.0356	28.06
	26.00	6.276	.1960	5.103	1.4659	.6822	.0349	28.65
	28.00	6.214	.1917	5.215	1.4343	.6972	.0341	29.28
	29.00	6.184	.1897	5.271	1.4192	.7046	.0338	29.59
	30.00	6.154	.1877	5.328	1.4041	.7122	.0334	29.91
	32.00	6.094	.1837	5.444	1.3741	.7278	.0327	30.57
	34.00	6.040	.1801	5.552	1.3473	.7422	.0321	31.17
	35.00	6.004	.1777	5.626	1.3297	.7521	.0317	31.59
	38.00	5.920	.1723	5.804	1.2888	.7759	.0307	32.59
	40.00	5.836	.1669	5.992	1.2485	.8010	.0297	33.64
7 5/8	20.00	7.125	.2580	3.876	1.9301	.5181	.0460	21.76
	24.00	7.025	.2503	3.995	1.8724	.5341	.0446	22.43
	26.40	6.969	.2460	4.065	1.8404	.5434	.0438	22.82
	29.70	6.875	.2389	4.185	1.7873	.5595	.0426	23.50
	33.70	6.765	.2307	4.334	1.7261	.5793	.0411	24.33
	39.00	6.625	.2205	4.535	1.6496	.6062	.0393	25.46

1" Tubing
OD (1.315")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4 1/2	9.50	4.090	.0629	15.888	.4708	2.1238	.0112	89.20
	11.60	4.000	.0590	16.957	.4411	2.2669	.0105	95.21
	13.50	3.920	.0555	18.013	.4153	2.4080	.0099	101.13
	15.10	3.826	.0515	19.401	.3856	2.5935	.0092	108.92
4 3/4	16.00	4.082	.0626	15.978	.4682	2.1359	.0111	89.71
5	11.50	4.560	.0851	11.749	.6367	1.5706	.0152	65.96
	13.00	4.494	.0819	12.217	.6123	1.6331	.0146	68.59
	15.00	4.408	.0777	12.873	.5811	1.7209	.0138	72.28
	18.00	4.276	.0714	14.000	.5343	1.8715	.0127	78.60
	21.00	4.154	.0658	15.193	.4924	2.0310	.0117	85.30
5 1/2	13.00	5.044	.1105	9.052	.8264	1.2101	.0197	50.82
	14.00	5.012	.1087	9.199	.8132	1.2297	.0194	51.64
	15.00	4.974	.1066	9.377	.7978	1.2535	.0190	52.65
	15.50	4.950	.1053	9.493	.7880	1.2690	.0188	53.30
	17.00	4.892	.1022	9.782	.7648	1.3076	.0182	54.92
	20.00	4.778	.0962	10.393	.7198	1.3893	.0171	58.35
	23.00	4.670	.0907	11.031	.6781	1.4746	.0161	61.93
5 3/4	14.00	5.290	.1243	8.043	.9301	1.0752	.0221	45.16
	17.00	5.190	.1186	8.430	.8873	1.1270	.0211	47.33
	19.50	5.090	.1130	8.849	.8454	1.1829	.0201	49.68
	22.50	4.990	.1075	9.301	.8043	1.2434	.0191	52.22
6	15.00	5.524	.1381	7.239	1.0333	.9677	.0246	40.64
	16.00	5.500	.1367	7.316	1.0225	.9780	.0243	41.07
	17.00	5.450	.1337	7.479	1.0002	.9998	.0238	41.99
	18.00	5.424	.1322	7.566	.9887	1.0115	.0235	42.48
	20.00	5.352	.1279	7.817	.9570	1.0449	.0228	43.89
	23.00	5.240	.1215	8.233	.9086	1.1006	.0216	46.22
	26.00	5.132	.1154	8.669	.8629	1.1589	.0205	48.67
6 5/8	17.00	6.135	.1770	5.650	1.3240	.7553	.0315	31.72
	20.00	6.049	.1713	5.839	1.2812	.7805	.0305	32.78
	22.00	5.989	.1673	5.976	1.2518	.7989	.0298	33.55
	24.00	5.921	.1629	6.138	1.2187	.8205	.0290	34.46
	26.00	5.855	.1587	6.302	1.1870	.8425	.0283	35.38
	28.00	5.791	.1546	6.468	1.1566	.8646	.0275	36.31
	29.00	5.761	.1527	6.548	1.1425	.8753	.0272	36.76
	32.00	5.675	.1474	6.786	1.1023	.9072	.0262	38.10
7	17.00	6.538	.2048	4.882	1.5324	.6526	.0365	27.41
	20.00	6.456	.1990	5.024	1.4889	.6716	.0354	28.21
	22.00	6.398	.1950	5.129	1.4585	.6857	.0347	28.80
	23.00	6.366	.1927	5.188	1.4418	.6936	.0343	29.13
	24.00	6.336	.1907	5.245	1.4263	.7011	.0340	29.45
	26.00	6.276	.1865	5.361	1.3954	.7167	.0332	30.10
	28.00	6.214	.1823	5.485	1.3638	.7333	.0325	30.80
	29.00	6.184	.1803	5.547	1.3486	.7415	.0321	31.14
	30.00	6.154	.1783	5.610	1.3335	.7499	.0317	31.50
	32.00	6.094	.1743	5.739	1.3035	.7672	.0310	32.22
	34.00	6.040	.1707	5.859	1.2768	.7832	.0304	32.89
	35.00	6.004	.1683	5.941	1.2591	.7942	.0300	33.36
	38.00	5.920	.1628	6.141	1.2182	.8209	.0290	34.48
	40.00	5.836	.1575	6.351	1.1779	.8489	.0280	35.65
7 5/8	20.00	7.125	.2486	4.023	1.8596	.5378	.0443	22.59
	24.00	7.025	.2409	4.152	1.8018	.5550	.0429	23.31
	26.40	6.969	.2366	4.227	1.7699	.5650	.0421	23.73
	29.70	6.875	.2295	4.357	1.7168	.5825	.0409	24.46
	33.70	6.765	.2213	4.519	1.6556	.6040	.0394	25.37
	39.00	6.625	.2111	4.737	1.5791	.6333	.0376	26.60

1" Tubing
OD (1.315")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4 1/2	9.50	4.090	.0535	18.688	.4003	2.4982	.0095	104.92
	11.60	4.000	.0495	20.186	.3706	2.6984	.0088	113.33
	13.50	3.920	.0461	21.700	.3447	2.9008	.0082	121.83
	15.10	3.826	.0421	23.746	.3150	3.1743	.0075	133.32
4 3/4	16.00	4.082	.0532	18.813	.3976	2.5149	.0095	105.62
5	11.50	4.560	.0757	13.213	.5662	1.7663	.0135	74.18
	13.00	4.494	.0724	13.807	.5418	1.8458	.0129	77.52
	15.00	4.408	.0682	14.652	.5106	1.9587	.0122	82.26
	18.00	4.276	.0620	16.130	.4638	2.1562	.0110	90.56
	21.00	4.154	.0564	17.734	.4218	2.3707	.0100	99.57
5 1/2	13.00	5.044	.1010	9.897	.7558	1.3231	.0180	55.57
	14.00	5.012	.0993	10.072	.7427	1.3465	.0177	56.55
	15.00	4.974	.0972	10.287	.7272	1.3751	.0173	57.75
	15.50	4.950	.0959	10.426	.7175	1.3938	.0171	58.54
	17.00	4.892	.0928	10.776	.6942	1.4405	.0165	60.50
	20.00	4.778	.0868	11.522	.6492	1.5403	.0155	64.69
	23.00	4.670	.0812	12.312	.6076	1.6459	.0145	69.12
5 3/4	14.00	5.290	.1149	8.703	.8595	1.1634	.0205	48.86
	17.00	5.190	.1092	9.159	.8168	1.2243	.0194	51.42
	19.50	5.090	.1036	9.654	.7748	1.2906	.0184	54.20
	22.50	4.990	.0981	10.196	.7337	1.3629	.0175	57.24
6	15.00	5.524	.1287	7.770	.9628	1.0387	.0229	43.62
	16.00	5.500	.1273	7.858	.9520	1.0504	.0227	44.12
	17.00	5.450	.1243	8.047	.9297	1.0757	.0221	45.18
	18.00	5.424	.1227	8.148	.9181	1.0892	.0219	45.75
	20.00	5.352	.1185	8.439	.8865	1.1281	.0211	47.38
	23.00	5.240	.1120	8.926	.8381	1.1932	.0200	50.12
	26.00	5.132	.1059	9.441	.7924	1.2621	.0189	53.01
6 5/8	17.00	6.135	.1676	5.968	1.2534	.7978	.0298	33.51
	20.00	6.049	.1618	6.179	1.2107	.8260	.0288	34.69
	22.00	5.989	.1579	6.333	1.1812	.8466	.0281	35.56
	24.00	5.921	.1535	6.515	1.1482	.8710	.0273	36.58
	26.00	5.855	.1492	6.700	1.1165	.8957	.0266	37.62
	28.00	5.791	.1452	6.888	1.0860	.9208	.0259	38.67
	29.00	5.761	.1433	6.979	1.0719	.9329	.0255	39.18
	32.00	5.675	.1379	7.250	1.0318	.9692	.0246	40.71
7	17.00	6.538	.1954	5.117	1.4618	.6841	.0348	28.73
	20.00	6.456	.1896	5.274	1.4183	.7051	.0338	29.61
	22.00	6.398	.1855	5.390	1.3879	.7205	.0330	30.26
	23.00	6.366	.1833	5.455	1.3712	.7293	.0326	30.63
	24.00	6.336	.1812	5.518	1.3557	.7376	.0323	30.98
	26.00	6.276	.1771	5.647	1.3248	.7548	.0315	31.70
	28.00	6.214	.1729	5.784	1.2932	.7733	.0308	32.48
	29.00	6.184	.1708	5.853	1.2781	.7824	.0304	32.86
	30.00	6.154	.1688	5.923	1.2630	.7918	.0301	33.25
	32.00	6.094	.1648	6.067	1.2330	.8111	.0294	34.06
	34.00	6.040	.1612	6.202	1.2062	.8290	.0287	34.82
	35.00	6.004	.1589	6.294	1.1885	.8414	.0283	35.34
	38.00	5.920	.1534	6.518	1.1477	.8713	.0273	36.60
	40.00	5.836	.1480	6.755	1.1074	.9030	.0264	37.93
7 5/8	20.00	7.125	.2392	4.181	1.7890	.5590	.0426	23.48
	24.00	7.025	.2314	4.321	1.7313	.5776	.0412	24.26
	26.40	6.969	.2272	4.402	1.6993	.5885	.0405	24.72
	29.70	6.875	.2201	4.544	1.6462	.6075	.0392	25.51
	33.70	6.765	.2119	4.720	1.5850	.6309	.0377	26.50
	39.00	6.625	.2017	4.959	1.5085	.6629	.0359	27.84

1 1/4" Tubing
OD (1.660")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
4 1/2	9.50	4.090	.0612	16.346	.4576	2.1851	.0109	91.77
	11.60	4.000	.0572	17.481	.4279	2.3368	.0102	98.14
	13.50	3.920	.0538	18.604	.4021	2.4870	.0096	104.45
	15.10	3.826	.0498	20.089	.3724	2.6854	.0089	112.79
4 3/4	16.00	4.082	.0608	16.442	.4550	2.1979	.0108	92.31
5	11.50	4.560	.0834	11.997	.6235	1.6038	.0148	67.36
	13.00	4.494	.0801	12.486	.5991	1.6691	.0143	70.10
	15.00	4.408	.0759	13.172	.5679	1.7609	.0135	73.96
	18.00	4.276	.0697	14.355	.5211	1.9189	.0124	80.59
	21.00	4.154	.0641	15.612	.4792	2.0869	.0114	87.65
5 1/2	13.00	5.044	.1087	9.199	.8132	1.2298	.0194	51.65
	14.00	5.012	.1069	9.350	.8000	1.2499	.0190	52.50
	15.00	4.974	.1049	9.535	.7846	1.2746	.0187	53.53
	15.50	4.950	.1036	9.654	.7748	1.2906	.0184	54.20
	17.00	4.892	.1005	9.954	.7516	1.3306	.0179	55.88
	20.00	4.778	.0945	10.587	.7066	1.4153	.0168	59.44
	23.00	4.670	.0889	11.250	.6649	1.5039	.0158	63.16
5 3/4	14.00	5.290	.1226	8.159	.9169	1.0906	.0218	45.81
	17.00	5.190	.1169	8.558	.8741	1.1440	.0208	48.05
	19.50	5.090	.1112	8.989	.8322	1.2017	.0198	50.47
	22.50	4.990	.1057	9.456	.7911	1.2641	.0188	53.09
6	15.00	5.524	.1364	7.333	1.0201	.9803	.0243	41.17
	16.00	5.500	.1349	7.411	1.0093	.9908	.0240	41.61
	17.00	5.450	.1319	7.579	.9870	1.0132	.0235	42.55
	18.00	5.424	.1304	7.669	.9755	1.0252	.0232	43.06
	20.00	5.352	.1262	7.926	.9438	1.0595	.0225	44.50
	23.00	5.240	.1197	8.354	.8954	1.1168	.0213	46.91
	26.00	5.132	.1136	8.804	.8497	1.1769	.0202	49.43
6 5/8	17.00	6.135	.1752	5.707	1.3108	.7629	.0312	32.04
	20.00	6.049	.1695	5.899	1.2680	.7886	.0302	33.12
	22.00	5.989	.1656	6.040	1.2386	.8074	.0295	33.91
	24.00	5.921	.1611	6.205	1.2055	.8295	.0287	34.84
	26.00	5.855	.1569	6.373	1.1738	.8519	.0279	35.78
	28.00	5.791	.1528	6.542	1.1434	.8746	.0272	36.73
	29.00	5.761	.1510	6.624	1.1293	.8855	.0269	37.19
	32.00	5.675	.1456	6.868	1.0891	.9182	.0259	38.56
7	17.00	6.538	.2031	4.924	1.5192	.6583	.0362	27.65
	20.00	6.456	.1973	5.069	1.4757	.6777	.0351	28.46
	22.00	6.398	.1932	5.176	1.4453	.6919	.0344	29.06
	23.00	6.366	.1910	5.236	1.4286	.7000	.0340	29.40
	24.00	6.336	.1889	5.294	1.4131	.7077	.0336	29.72
	26.00	6.276	.1848	5.412	1.3822	.7235	.0329	30.39
	28.00	6.214	.1805	5.539	1.3506	.7404	.0322	31.10
	29.00	6.184	.1785	5.602	1.3354	.7488	.0318	31.45
	30.00	6.154	.1765	5.666	1.3203	.7574	.0314	31.81
	32.00	6.094	.1725	5.798	1.2903	.7750	.0307	32.55
	34.00	6.040	.1689	5.920	1.2636	.7914	.0301	33.24
	35.00	6.004	.1665	6.004	1.2459	.8026	.0297	33.71
	38.00	5.920	.1611	6.208	1.2050	.8299	.0287	34.85
	40.00	5.836	.1557	6.423	1.1647	.8586	.0277	36.06
7 5/8	20.00	7.125	.2468	4.052	1.8464	.5416	.0440	22.75
	24.00	7.025	.2391	4.182	1.7886	.5591	.0426	23.48
	26.40	6.969	.2348	4.258	1.7567	.5693	.0418	23.91
	29.70	6.875	.2277	4.391	1.7036	.5870	.0406	24.65
	33.70	6.765	.2195	4.555	1.6424	.6089	.0391	25.57
	39.00	6.625	.2093	4.777	1.5659	.6386	.0373	26.82

1 1/4" Tubing
OD (1.660")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
5	11.50	4.560	.0683	14.637	.5111	1.9566	.0122	82.18
	13.00	4.494	.0651	15.370	.4867	2.0546	.0116	86.29
	15.00	4.408	.0609	16.424	.4555	2.1955	.0108	92.21
	18.00	4.276	.0546	18.303	.4087	2.4467	.0097	102.76
	21.00	4.154	.0490	20.397	.3667	2.7267	.0087	114.52
5 1/2	13.00	5.044	.0937	10.675	.7007	1.4271	.0167	59.94
	14.00	5.012	.0919	10.879	.6876	1.4543	.0164	61.08
	15.00	4.974	.0898	11.130	.6721	1.4878	.0160	62.49
	15.50	4.950	.0885	11.293	.6624	1.5096	.0158	63.40
	17.00	4.892	.0854	11.705	.6391	1.5646	.0152	65.71
	20.00	4.778	.0794	12.591	.5941	1.6831	.0141	70.69
	23.00	4.670	.0739	13.539	.5525	1.8099	.0132	76.01
5 3/4	14.00	5.290	.1075	9.299	.8045	1.2431	.0192	52.21
	17.00	5.190	.1018	9.821	.7617	1.3129	.0181	55.14
	19.50	5.090	.0962	10.393	.7198	1.3894	.0171	58.35
	22.50	4.990	.0907	11.023	.6786	1.4736	.0162	61.89
6	15.00	5.524	.1213	8.241	.9077	1.1017	.0216	46.27
	16.00	5.500	.1199	8.340	.8969	1.1149	.0214	46.83
	17.00	5.450	.1169	8.553	.8746	1.1434	.0208	48.02
	18.00	5.424	.1154	8.668	.8630	1.1587	.0205	48.66
	20.00	5.352	.1111	8.998	.8314	1.2028	.0198	50.52
	23.00	5.240	.1047	9.554	.7830	1.2772	.0186	53.64
	26.00	5.132	.0986	10.146	.7373	1.3563	.0176	56.97
6 5/8	17.00	6.135	.1602	6.242	1.1984	.8345	.0285	35.05
	20.00	6.049	.1545	6.473	1.1556	.8654	.0275	36.34
	22.00	5.989	.1505	6.643	1.1261	.8880	.0268	37.30
	24.00	5.921	.1461	6.844	1.0931	.9148	.0260	38.42
	26.00	5.855	.1419	7.048	1.0614	.9422	.0253	39.57
	28.00	5.791	.1378	7.256	1.0310	.9700	.0245	40.74
	29.00	5.761	.1359	7.357	1.0168	.9835	.0242	41.30
	32.00	5.675	.1306	7.659	.9767	1.0239	.0233	43.00
7	17.00	6.538	.1880	5.318	1.4067	.7109	.0335	29.86
	20.00	6.456	.1822	5.487	1.3633	.7335	.0325	30.81
	22.00	6.398	.1782	5.613	1.3328	.7503	.0317	31.51
	23.00	6.366	.1759	5.684	1.3162	.7598	.0313	31.91
	24.00	6.336	.1739	5.752	1.3006	.7689	.0310	32.29
	26.00	6.276	.1697	5.891	1.2698	.7876	.0302	33.08
	28.00	6.214	.1655	6.042	1.2382	.8077	.0295	33.92
	29.00	6.184	.1635	6.117	1.2230	.8177	.0291	34.34
	30.00	6.154	.1615	6.193	1.2079	.8279	.0288	34.77
	32.00	6.094	.1575	6.351	1.1779	.8490	.0280	35.66
	34.00	6.040	.1539	6.498	1.1512	.8687	.0274	36.48
	35.00	6.004	.1515	6.600	1.1335	.8823	.0270	37.05
	38.00	5.920	.1461	6.847	1.0926	.9152	.0260	38.44
	40.00	5.836	.1407	7.109	1.0523	.9503	.0251	39.91
7 5/8	20.00	7.125	.2318	4.314	1.7340	.5767	.0413	24.22
	24.00	7.025	.2241	4.463	1.6762	.5966	.0399	25.06
	26.40	6.969	.2198	4.550	1.6442	.6082	.0391	25.54
	29.70	6.875	.2127	4.701	1.5912	.6285	.0379	26.40
	33.70	6.765	.2045	4.890	1.5299	.6536	.0364	27.45
	39.00	6.625	.1943	5.147	1.4535	.6880	.0346	28.90
8	26.00	7.386	.2524	3.961	1.8885	.5295	.0450	22.24
8 1/8	28.00	7.485	.2605	3.839	1.9485	.5132	.0464	21.55
	32.00	7.385	.2524	3.962	1.8879	.5297	.0449	22.25
	35.50	7.285	.2444	4.092	1.8280	.5470	.0435	22.98
	39.50	7.185	.2365	4.229	1.7690	.5653	.0421	23.74

1 1/4" Tubing
OD (1.660")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
	13.00	5.044	.0786	12.715	.5883	1.6998	.0140	71.39
	14.00	5.012	.0769	13.006	.5752	1.7386	.0137	73.02
	15.00	4.974	.0748	13.365	.5597	1.7867	.0133	75.04
5 1/2	15.50	4.950	.0735	13.602	.5500	1.8182	.0131	76.36
	17.00	4.892	.0704	14.203	.5267	1.8986	.0125	79.74
	20.00	4.778	.0644	15.529	.4817	2.0759	.0115	87.19
	23.00	4.670	.0588	16.998	.4401	2.2723	.0105	95.43
	14.00	5.290	.0925	10.810	.6920	1.4450	.0165	60.69
5 3/4	17.00	5.190	.0868	11.522	.6493	1.5402	.0155	64.69
	19.50	5.090	.0812	12.317	.6073	1.6465	.0145	69.15
	22.50	4.990	.0757	13.212	.5662	1.7661	.0135	74.18
	15.00	5.524	.1063	9.406	.7953	1.2574	.0189	52.81
	16.00	5.500	.1049	9.536	.7845	1.2747	.0187	53.54
	17.00	5.450	.1019	9.815	.7621	1.3121	.0181	55.11
6	18.00	5.424	.1003	9.966	.7506	1.3323	.0179	55.95
	20.00	5.352	.0961	10.405	.7190	1.3909	.0171	58.42
	23.00	5.240	.0896	11.156	.6706	1.4913	.0160	62.63
	26.00	5.132	.0835	11.972	.6249	1.6004	.0149	67.22
	17.00	6.135	.1452	6.889	1.0859	.9209	.0259	38.68
	20.00	6.049	.1394	7.171	1.0432	.9586	.0248	40.26
	22.00	5.989	.1355	7.380	1.0137	.9865	.0241	41.43
	24.00	5.921	.1311	7.628	.9807	1.0197	.0233	42.83
6 5/8	26.00	5.855	.1269	7.883	.9490	1.0538	.0226	44.26
	28.00	5.791	.1228	8.144	.9185	1.0887	.0219	45.72
	29.00	5.761	.1209	8.271	.9044	1.1057	.0215	46.44
	32.00	5.675	.1155	8.655	.8643	1.1570	.0206	48.60
	17.00	6.538	.1730	5.780	1.2943	.7726	.0308	32.45
	20.00	6.456	.1672	5.981	1.2508	.7995	.0298	33.58
	22.00	6.398	.1631	6.130	1.2204	.8194	.0291	34.41
	23.00	6.366	.1609	6.215	1.2037	.8307	.0287	34.89
	24.00	6.336	.1588	6.296	1.1882	.8416	.0283	35.35
	26.00	6.276	.1547	6.464	1.1573	.8641	.0276	36.29
7	28.00	6.214	.1505	6.645	1.1257	.8883	.0268	37.31
	29.00	6.184	.1485	6.736	1.1106	.9005	.0264	37.82
	30.00	6.154	.1464	6.829	1.0955	.9129	.0261	38.34
	32.00	6.094	.1424	7.021	1.0655	.9386	.0254	39.42
	34.00	6.040	.1389	7.202	1.0387	.9627	.0247	40.43
	35.00	6.004	.1365	7.326	1.0210	.9794	.0243	41.13
	38.00	5.920	.1310	7.632	.9802	1.0202	.0233	42.85
	40.00	5.836	.1256	7.959	.9399	1.0640	.0224	44.69
	20.00	7.125	.2168	4.613	1.6215	.6167	.0386	25.90
	24.00	7.025	.2090	4.784	1.5638	.6395	.0372	26.86
7 5/8	26.40	6.969	.2048	4.884	1.5318	.6528	.0365	27.42
	29.70	6.875	.1977	5.059	1.4787	.6763	.0352	28.40
	33.70	6.765	.1895	5.277	1.4175	.7055	.0337	29.63
	39.00	6.625	.1793	5.578	1.3410	.7457	.0319	31.32
8	26.00	7.386	.2374	4.212	1.7760	.5631	.0423	23.65
	28.00	7.485	.2454	4.074	1.8361	.5446	.0437	22.87
8 1/8	32.00	7.385	.2373	4.213	1.7754	.5632	.0423	23.66
	35.50	7.285	.2293	4.360	1.7156	.5829	.0408	24.48
	39.50	7.185	.2214	4.516	1.6566	.6037	.0394	25.35

1 1/4" Tubing
OD (1.660")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
8 5/8	24.00	8.097	.2975	3.362	2.2252	.4494	.0530	18.87
	28.00	8.017	.2904	3.443	2.1726	.4603	.0517	19.33
	32.00	7.921	.2821	3.545	2.1102	.4739	.0502	19.90
	36.00	7.825	.2738	3.652	2.0485	.4882	.0488	20.50
	38.00	7.775	.2696	3.709	2.0167	.4959	.0480	20.83
	40.00	7.725	.2654	3.769	1.9851	.5038	.0473	21.16
	43.00	7.651	.2591	3.859	1.9386	.5158	.0462	21.66
	44.00	7.625	.2570	3.891	1.9224	.5202	.0458	21.85
	49.00	7.511	.2476	4.039	1.8520	.5400	.0441	22.68
9	34.00	8.290	.3147	3.178	2.3542	.4248	.0561	17.84
	38.00	8.196	.3063	3.265	2.2910	.4365	.0545	18.33
	40.00	8.150	.3022	3.310	2.2603	.4424	.0538	18.58
	45.00	8.032	.2917	3.428	2.1824	.4582	.0520	19.24
	55.00	7.812	.2727	3.667	2.0402	.4902	.0486	20.59
9 5/8	29.30	9.063	.3879	2.578	2.9015	.3447	.0691	14.48
	32.30	9.001	.3818	2.619	2.8558	.3502	.0680	14.71
	36.00	8.921	.3739	2.674	2.7973	.3575	.0666	15.01
	38.00	8.877	.3697	2.705	2.7654	.3616	.0658	15.19
	40.00	8.835	.3656	2.735	2.7350	.3656	.0651	15.36
	43.50	8.755	.3579	2.794	2.6776	.3735	.0638	15.69
	47.00	8.681	.3509	2.850	2.6250	.3810	.0625	16.00
	53.50	8.535	.3372	2.966	2.5224	.3964	.0601	16.65
10	33.00	9.384	.4202	2.380	3.1431	.3182	.0748	13.36
10 3/4	32.75	10.192	.5064	1.975	3.7885	.2640	.0902	11.09
	35.75	10.136	.5002	1.999	3.7420	.2672	.0891	11.22
	40.50	10.050	.4908	2.038	3.6712	.2724	.0874	11.44
	45.50	9.950	.4798	2.084	3.5896	.2786	.0855	11.70
	51.00	9.850	.4690	2.132	3.5088	.2850	.0835	11.97
	54.00	9.784	.4620	2.165	3.4559	.2894	.0823	12.15
	55.50	9.760	.4594	2.177	3.4368	.2910	.0818	12.22
	60.70	9.660	.4488	2.228	3.3576	.2978	.0799	12.51
	65.70	9.560	.4383	2.281	3.2791	.3050	.0781	12.81
11 3/4	38.00	11.150	.6179	1.618	4.6226	.2163	.1101	9.09
	42.00	11.084	.6099	1.640	4.5628	.2192	.1086	9.20
	47.00	11.000	.5998	1.667	4.4871	.2229	.1068	9.36
	54.00	10.880	.5855	1.708	4.3800	.2283	.1043	9.59
	60.00	10.772	.5727	1.746	4.2846	.2334	.1020	9.80
12	40.00	11.384	.6467	1.546	4.8378	.2067	.1152	8.68
13	40.00	12.438	.7836	1.276	5.8622	.1706	.1396	7.16
	45.00	12.360	.7731	1.293	5.7833	.1729	.1377	7.26
	50.00	12.282	.7626	1.311	5.7049	.1753	.1358	7.36
	54.00	12.220	.7543	1.326	5.6429	.1772	.1344	7.44
13 3/8	48.00	12.715	.8216	1.217	6.1465	.1627	.1463	6.83
	54.50	12.615	.8078	1.238	6.0431	.1655	.1439	6.95
	61.00	12.515	.7941	1.259	5.9406	.1683	.1414	7.07
	68.00	12.415	.7805	1.281	5.8389	.1713	.1390	7.19
	72.00	12.347	.7713	1.296	5.7702	.1733	.1374	7.28
	83.00	12.175	.7483	1.336	5.5981	.1786	.1333	7.50

1 1/2" Tubing
OD (1.900")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
5	11.50	4.560	.0740	13.508	.5538	1.8057	.0132	75.84
	13.00	4.494	.0708	14.130	.5294	1.8889	.0126	79.33
	15.00	4.408	.0666	15.016	.4982	2.0073	.0119	84.30
	18.00	4.276	.0603	16.572	.4514	2.2153	.0107	93.04
	21.00	4.154	.0547	18.270	.4095	2.4423	.0097	102.57
5 1/2	13.00	5.044	.0994	10.062	.7435	1.3451	.0177	56.49
	14.00	5.012	.0976	10.243	.7303	1.3693	.0174	57.51
	15.00	4.974	.0956	10.465	.7148	1.3989	.0170	58.75
	15.50	4.950	.0943	10.609	.7051	1.4182	.0168	59.56
	17.00	4.892	.0911	10.971	.6818	1.4666	.0162	61.60
	20.00	4.778	.0851	11.746	.6369	1.5702	.0152	65.95
	23.00	4.670	.0796	12.568	.5952	1.6800	.0142	70.56
5 3/4	14.00	5.290	.1132	8.830	.8472	1.1804	.0202	49.58
	17.00	5.190	.1075	9.300	.8044	1.2431	.0192	52.21
	19.50	5.090	.1019	9.811	.7625	1.3115	.0182	55.08
	22.50	4.990	.0964	10.370	.7213	1.3863	.0172	58.22
6	15.00	5.524	.1270	7.871	.9504	1.0522	.0226	44.19
	16.00	5.500	.1256	7.961	.9396	1.0643	.0224	44.70
	17.00	5.450	.1226	8.155	.9173	1.0902	.0218	45.79
	18.00	5.424	.1211	8.259	.9058	1.1041	.0216	46.37
	20.00	5.352	.1168	8.558	.8741	1.1440	.0208	48.05
	23.00	5.240	.1104	9.060	.8257	1.2111	.0197	50.87
	26.00	5.132	.1043	9.591	.7800	1.2821	.0186	53.85
6 5/8	17.00	6.135	.1659	6.028	1.2411	.8058	.0295	33.84
	20.00	6.049	.1602	6.243	1.1983	.8345	.0285	35.05
	22.00	5.989	.1562	6.400	1.1688	.8556	.0278	35.93
	24.00	5.921	.1518	6.586	1.1358	.8804	.0270	36.98
	26.00	5.855	.1476	6.775	1.1041	.9057	.0263	38.04
	28.00	5.791	.1435	6.967	1.0737	.9314	.0256	39.12
	29.00	5.761	.1416	7.060	1.0595	.9438	.0252	39.64
	32.00	5.675	.1363	7.338	1.0194	.9810	.0243	41.20
7	17.00	6.538	.1938	5.161	1.4494	.6899	.0345	28.98
	20.00	6.456	.1879	5.321	1.4060	.7113	.0335	29.87
	22.00	6.398	.1839	5.438	1.3755	.7270	.0328	30.53
	23.00	6.366	.1817	5.505	1.3589	.7359	.0324	30.91
	24.00	6.336	.1796	5.569	1.3433	.7444	.0320	31.27
	26.00	6.276	.1754	5.700	1.3125	.7619	.0312	32.00
	28.00	6.214	.1712	5.840	1.2809	.7807	.0305	32.79
	29.00	6.184	.1692	5.910	1.2657	.7901	.0301	33.18
	30.00	6.154	.1672	5.982	1.2506	.7996	.0298	33.58
	32.00	6.094	.1632	6.129	1.2206	.8193	.0291	34.41
	34.00	6.040	.1596	6.266	1.1939	.8376	.0284	35.18
	35.00	6.004	.1572	6.360	1.1762	.8502	.0280	35.71
	38.00	5.920	.1518	6.589	1.1353	.8808	.0270	36.99
	40.00	5.836	.1464	6.832	1.0950	.9132	.0261	38.35
7 5/8	20.00	7.125	.2375	4.211	1.7767	.5629	.0423	23.64
	24.00	7.025	.2298	4.352	1.7189	.5818	.0409	24.43
	26.40	6.969	.2255	4.434	1.6870	.5928	.0402	24.90
	29.70	6.875	.2184	4.579	1.6339	.6121	.0389	25.71
	33.70	6.765	.2102	4.757	1.5726	.6359	.0374	26.71
	39.00	6.625	.2000	5.000	1.4962	.6684	.0356	28.07
8	26.00	7.386	.2582	3.874	1.9312	.5178	.0460	21.75
8 1/8	28.00	7.485	.2662	3.757	1.9913	.5022	.0474	21.09
	32.00	7.385	.2581	3.875	1.9306	.5180	.0460	21.75
	35.50	7.285	.2501	3.999	1.8707	.5346	.0445	22.45
	39.50	7.185	.2422	4.129	1.8117	.5520	.0431	23.18

1 1/2" Tubing
OD (1.900")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
	13.00	5.044	.0797	12.548	.5962	1.6774	.0142	70.45
	14.00	5.012	.0779	12.831	.5830	1.7152	.0139	72.04
	15.00	4.974	.0759	13.181	.5676	1.7620	.0135	74.00
5 1/2	15.50	4.950	.0746	13.410	.5578	1.7926	.0133	75.29
	17.00	4.892	.0715	13.994	.5345	1.8708	.0127	78.57
	20.00	4.778	.0654	15.280	.4896	2.0426	.0117	85.79
	23.00	4.670	.0599	16.700	.4479	2.2325	.0107	93.76
	14.00	5.290	.0936	10.688	.6999	1.4288	.0167	60.01
5 3/4	17.00	5.190	.0878	11.384	.6571	1.5218	.0156	63.91
	19.50	5.090	.0822	12.160	.6152	1.6255	.0146	68.27
	22.50	4.990	.0767	13.031	.5741	1.7420	.0137	73.16
	15.00	5.524	.1074	09.314	.8031	1.2451	.0191	52.29
	16.00	5.500	.1059	09.441	.7923	1.2621	.0189	53.01
	17.00	5.450	.1029	09.715	.7700	1.2987	.0183	54.54
6	18.00	5.424	.1014	09.863	.7585	1.3185	.0181	55.37
	20.00	5.352	.0972	10.293	.7268	1.3759	.0173	57.79
	23.00	5.240	.0907	11.027	.6784	1.4741	.0162	61.91
	26.00	5.132	.0846	11.823	.6327	1.5805	.0151	66.38
	17.00	6.135	.1462	06.839	1.0938	.9143	.0260	38.40
	20.00	6.049	.1405	07.118	1.0510	.9515	.0250	39.96
	22.00	5.989	.1366	07.323	1.0216	.9789	.0243	41.11
6 5/8	24.00	5.921	.1321	07.568	.9885	1.0116	.0235	42.49
	26.00	5.855	.1279	07.818	.9568	1.0452	.0228	43.90
	28.00	5.791	.1238	08.075	.9264	1.0795	.0221	45.34
	29.00	5.761	.1219	08.200	.9123	1.0962	.0217	46.04
	32.00	5.675	.1166	08.578	.8721	1.1466	.0208	48.16
	17.00	6.538	.1741	05.745	1.3022	.7680	.0310	32.25
	20.00	6.456	.1683	05.943	1.2587	.7945	.0300	33.37
	22.00	6.398	.1642	06.090	1.2283	.8142	.0292	34.19
	23.00	6.366	.1620	06.174	1.2116	.8254	.0288	34.66
	24.00	6.336	.1599	06.254	1.1960	.8361	.0285	35.12
	26.00	6.276	.1558	06.420	1.1652	.8582	.0277	36.05
7	28.00	6.214	.1515	06.599	1.1336	.8822	.0270	37.05
	29.00	6.184	.1495	06.689	1.1184	.8941	.0266	37.55
	30.00	6.154	.1475	06.780	1.1033	.9064	.0263	38.07
	32.00	6.094	.1435	06.970	1.0733	.9317	.0256	39.13
	34.00	6.040	.1399	07.148	1.0466	.9555	.0249	40.13
	35.00	6.004	.1375	07.271	1.0289	.9719	.0245	40.82
	38.00	5.920	.1321	07.571	.9880	1.0121	.0235	42.51
	40.00	5.836	.1267	07.893	.9477	1.0552	.0226	44.32
	20.00	7.125	.2178	04.591	1.6294	.6137	.0388	25.78
	24.00	7.025	.2101	04.760	1.5716	.6363	.0374	26.72
7 5/8	26.40	6.969	.2058	04.859	1.5397	.6495	.0367	27.28
	29.70	6.875	.1987	05.032	1.4866	.6727	.0354	28.25
	33.70	6.765	.1905	05.248	1.4254	.7016	.0339	29.47
	39.00	6.625	.1803	05.546	1.3489	.7414	.0321	31.14
8	26.00	7.386	.2385	04.193	1.7839	.5606	.0425	23.54
	28.00	7.485	.2465	04.057	1.8440	.5423	.0439	22.78
8 1/8	32.00	7.385	.2384	04.195	1.7833	.5608	.0425	23.55
	35.50	7.285	.2304	04.341	1.7234	.5802	.0410	24.37
	39.50	7.185	.2225	04.495	1.6644	.6008	.0396	25.23

1 1/2" Tubing
OD (1.900")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
8 5/8	24.00	8.097	.2985	3.350	2.2330	.4478	.0532	18.81
	28.00	8.017	.2915	3.431	2.1804	.4586	.0519	19.26
	32.00	7.921	.2831	3.532	2.1180	.4721	.0504	19.83
	36.00	7.825	.2749	3.638	2.0563	.4863	.0490	20.42
	38.00	7.775	.2706	3.695	2.0245	.4939	.0482	20.75
	40.00	7.725	.2664	3.754	1.9929	.5018	.0474	21.07
	43.00	7.651	.2602	3.843	1.9465	.5138	.0463	21.58
	44.00	7.625	.2580	3.875	1.9303	.5181	.0460	21.76
	49.00	7.511	.2486	4.022	1.8599	.5377	.0443	22.58
9	34.00	8.290	.3158	3.167	2.3621	.4234	.0562	17.78
	38.00	8.196	.3073	3.254	2.2989	.4350	.0547	18.27
	40.00	8.150	.3032	3.298	2.2682	.4409	.0540	18.52
	45.00	8.032	.2928	3.415	2.1903	.4566	.0521	19.18
	55.00	7.812	.2738	3.653	2.0481	.4883	.0488	20.51
9 5/8	29.30	9.063	.3889	2.571	2.9094	.3437	.0693	14.44
	32.30	9.001	.3828	2.612	2.8637	.3492	.0682	14.67
	36.00	8.921	.3750	2.667	2.8052	.3565	.0668	14.97
	38.00	8.877	.3707	2.697	2.7732	.3606	.0660	15.14
	40.00	8.835	.3667	2.727	2.7429	.3646	.0653	15.31
	43.50	8.755	.3590	2.786	2.6855	.3724	.0639	15.64
	47.00	8.681	.3519	2.841	2.6328	.3798	.0627	15.95
	53.50	8.535	.3382	2.956	2.5303	.3952	.0602	16.60
10	33.00	9.384	.4212	2.374	3.1510	.3174	.0750	13.33
10 3/4	32.75	10.192	.5075	1.971	3.7963	.2634	.0904	11.06
	35.75	10.136	.5013	1.995	3.7499	.2667	.0893	11.20
	40.50	10.050	.4918	2.033	3.6790	.2718	.0876	11.42
	45.50	9.950	.4809	2.079	3.5974	.2780	.0857	11.67
	51.00	9.850	.4701	2.127	3.5167	.2844	.0837	11.94
	54.00	9.784	.4630	2.160	3.4638	.2887	.0825	12.13
	55.50	9.760	.4605	2.172	3.4446	.2903	.0820	12.19
	60.70	9.660	.4499	2.223	3.3654	.2971	.0801	12.48
	65.70	9.560	.4394	2.276	3.2870	.3042	.0783	12.78
11 3/4	38.00	11.150	.6190	1.616	4.6305	.2160	.1102	9.07
	42.00	11.084	.6110	1.637	4.5706	.2188	.1088	9.19
	47.00	11.000	.6009	1.664	4.4949	.2225	.1070	9.34
	54.00	10.880	.5865	1.705	4.3878	.2279	.1045	9.57
	60.00	10.772	.5738	1.743	4.2924	.2330	.1022	9.78
12	40.00	11.384	.6477	1.544	4.8456	.2064	.1154	8.67
13	40.00	12.438	.7847	1.274	5.8701	.1704	.1398	7.15
	45.00	12.360	.7741	1.292	5.7911	.1727	.1379	7.25
	50.00	12.282	.7637	1.309	5.7127	.1750	.1360	7.35
	54.00	12.220	.7554	1.324	5.6507	.1770	.1345	7.43
13 3/8	48.00	12.715	.8227	1.216	6.1543	.1625	.1465	6.82
	54.50	12.615	.8089	1.236	6.0510	.1653	.1441	6.94
	61.00	12.515	.7952	1.258	5.9484	.1681	.1416	7.06
	68.00	12.415	.7816	1.279	5.8467	.1710	.1392	7.18
	72.00	12.347	.7724	1.295	5.7780	.1731	.1376	7.27
	83.00	12.175	.7494	1.334	5.6059	.1784	.1335	7.49

1 1/2" Tubing
OD (1.900")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
	15.00	5.524	.0877	11.406	.6558	1.5248	.0156	64.04
	16.00	5.500	.0862	11.597	.6450	1.5503	.0154	65.11
	17.00	5.450	.0832	12.013	.6227	1.6059	.0148	67.45
6	18.00	5.424	.0817	12.240	.6112	1.6362	.0146	68.72
	20.00	5.352	.0775	12.908	.5795	1.7256	.0138	72.47
	23.00	5.240	.0710	14.085	.5311	1.8828	.0126	79.08
	26.00	5.132	.0649	15.411	.4854	2.0601	.0116	86.52
	17.00	6.135	.1265	7.904	.9465	1.0565	.0225	44.37
	20.00	6.049	.1208	8.278	.9037	1.1065	.0215	46.47
	22.00	5.989	.1169	8.557	.8743	1.1438	.0208	48.04
6 5/8	24.00	5.921	.1125	8.893	.8412	1.1888	.0200	49.93
	26.00	5.855	.1082	9.241	.8095	1.2353	.0193	51.88
	28.00	5.791	.1041	9.602	.7791	1.2835	.0185	53.91
	29.00	5.761	.1023	9.779	.7650	1.3073	.0182	54.90
	32.00	5.675	.0969	10.320	.7248	1.3796	.0173	57.94
	17.00	6.538	.1544	6.478	1.1549	.8659	.0275	36.37
	20.00	6.456	.1486	6.731	1.1114	.8998	.0265	37.79
	22.00	6.398	.1445	6.920	1.0810	.9251	.0257	38.85
	23.00	6.366	.1423	7.029	1.0643	.9396	.0253	39.46
	24.00	6.336	.1402	7.133	1.0488	.9535	.0250	40.05
	26.00	6.276	.1361	7.349	1.0179	.9824	.0242	41.26
7	28.00	6.214	.1318	7.585	.9863	1.0139	.0235	42.58
	29.00	6.184	.1298	7.703	.9711	1.0298	.0231	43.25
	30.00	6.154	.1278	7.825	.9560	1.0460	.0228	43.93
	32.00	6.094	.1238	8.078	.9260	1.0799	.0220	45.35
	34.00	6.040	.1202	8.318	.8993	1.1120	.0214	46.70
	35.00	6.004	.1179	8.485	.8816	1.1343	.0210	47.64
	38.00	5.920	.1124	8.898	.8407	1.1894	.0200	49.96
	40.00	5.836	.1070	9.346	.8005	1.2493	.0191	52.47
	20.00	7.125	.1981	5.047	1.4821	.6747	.0353	28.34
	24.00	7.025	.1904	5.252	1.4244	.7021	.0339	29.49
7 5/8	26.40	6.969	.1861	5.373	1.3924	.7182	.0332	30.16
	29.70	6.875	.1790	5.586	1.3393	.7467	.0319	31.36
	33.70	6.765	.1708	5.853	1.2781	.7824	.0304	32.86
	39.00	6.625	.1606	6.226	1.2016	.8322	.0286	34.95
8	26.00	7.386	.2188	4.571	1.6366	.6110	.0390	25.66
	28.00	7.485	.2268	4.409	1.6967	.5894	.0404	24.75
8 1/8	32.00	7.385	.2187	4.573	1.6360	.6112	.0390	25.67
	35.50	7.285	.2107	4.746	1.5762	.6345	.0375	26.65
	39.50	7.185	.2028	4.931	1.5171	.6592	.0361	27.68
	24.00	8.097	.2788	3.587	2.0858	.4794	.0497	20.14
	28.00	8.017	.2718	3.679	2.0332	.4918	.0484	20.66
	32.00	7.921	.2634	3.796	1.9707	.5074	.0469	21.31
	36.00	7.825	.2552	3.919	1.9091	.5238	.0455	22.00
8 5/8	38.00	7.775	.2509	3.985	1.8772	.5327	.0447	22.37
	40.00	7.725	.2467	4.053	1.8456	.5418	.0439	22.76
	43.00	7.651	.2405	4.158	1.7992	.5558	.0428	23.34
	44.00	7.625	.2383	4.196	1.7830	.5609	.0425	23.56
	49.00	7.511	.2289	4.368	1.7126	.5839	.0408	24.52

1 1/2" Tubing
OD (1.900")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
9	34.00	8.290	.2961	3.378	2.2148	.4515	.0527	18.96
	38.00	8.196	.2876	3.477	2.1516	.4648	.0512	19.52
	40.00	8.150	.2835	3.527	2.1209	.4715	.0505	19.80
	45.00	8.032	.2731	3.662	2.0430	.4895	.0486	20.56
	55.00	7.812	.2541	3.936	1.9008	.5261	.0453	22.10
9 5/8	29.30	9.063	.3692	2.708	2.7621	.3620	.0658	15.21
	32.30	9.001	.3631	2.754	2.7164	.3681	.0647	15.46
	36.00	8.921	.3553	2.815	2.6579	.3762	.0633	15.80
	38.00	8.877	.3510	2.849	2.6259	.3808	.0625	15.99
	40.00	8.835	.3470	2.882	2.5956	.3853	.0618	16.18
	43.50	8.755	.3393	2.947	2.5382	.3940	.0604	16.55
	47.00	8.681	.3323	3.010	2.4855	.4023	.0592	16.90
	53.50	8.535	.3185	3.139	2.3830	.4196	.0567	17.62
10	33.00	9.384	.4015	2.491	3.0037	.3329	.0715	13.98
10 3/4	32.75	10.192	.4878	2.050	3.6490	.2740	.0869	11.51
	35.75	10.136	.4816	2.076	3.6026	.2776	.0858	11.66
	40.50	10.050	.4721	2.118	3.5318	.2831	.0841	11.89
	45.50	9.950	.4612	2.168	3.4502	.2898	.0821	12.17
	51.00	9.850	.4504	2.220	3.3694	.2968	.0802	12.47
	54.00	9.784	.4433	2.256	3.3165	.3015	.0790	12.66
	55.50	9.760	.4408	2.269	3.2974	.3033	.0785	12.74
	60.70	9.660	.4302	2.325	3.2181	.3107	.0766	13.05
	65.70	9.560	.4197	2.383	3.1397	.3185	.0748	13.38
11 3/4	38.00	11.150	.5993	1.669	4.4832	.2231	.1067	9.37
	42.00	11.084	.5913	1.691	4.4233	.2261	.1053	9.49
	47.00	11.000	.5812	1.721	4.3476	.2300	.1035	9.66
	54.00	10.880	.5669	1.764	4.2405	.2358	.1010	9.90
	60.00	10.772	.5541	1.805	4.1451	.2412	.0987	10.13
12	40.00	11.384	.6281	1.592	4.6983	.2128	.1119	8.94
13	40.00	12.438	.7650	1.307	5.7228	.1747	.1363	7.34
	45.00	12.360	.7544	1.325	5.6438	.1772	.1344	7.44
	50.00	12.282	.7440	1.344	5.5654	.1797	.1325	7.55
	54.00	12.220	.7357	1.359	5.5034	.1817	.1310	7.63
13 3/8	48.00	12.715	.8030	1.245	6.0070	.1665	.1430	6.99
	54.50	12.615	.7892	1.267	5.9037	.1694	.1406	7.11
	61.00	12.515	.7755	1.290	5.8012	.1724	.1381	7.24
	68.00	12.415	.7619	1.313	5.6994	.1755	.1357	7.37
	72.00	12.347	.7527	1.329	5.6307	.1776	.1341	7.46
	83.00	12.175	.7297	1.370	5.4587	.1832	.1300	7.69
16	55.00	15.376	1.2107	.826	9.0568	.1104	.2156	4.64
	65.00	15.250	1.1896	.841	8.8994	.1124	.2119	4.72
	75.00	15.124	1.1688	.856	8.7433	.1144	.2082	4.80
	84.00	15.010	1.1500	.870	8.6031	.1162	.2048	4.88
20	94.00	19.124	1.9159	.522	14.3325	.0698	.3412	2.93

2 1/16" Tubing
OD (2.063")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
5 1/2	13.00	5.044	.0923	10.830	.6907	1.4477	.0164	60.80
	14.00	5.012	.0906	11.040	.6776	1.4758	.0161	61.98
	15.00	4.974	.0885	11.298	.6621	1.5103	.0158	63.43
	15.50	4.950	.0872	11.466	.6524	1.5328	.0155	64.38
	17.00	4.892	.0841	11.891	.6291	1.5895	.0150	66.76
	20.00	4.778	.0781	12.806	.5841	1.7119	.0139	71.90
	23.00	4.670	.0725	13.789	.5425	1.8433	.0129	77.42
5 3/4	14.00	5.290	.1062	9.416	.7945	1.2587	.0189	52.87
	17.00	5.190	.1005	9.952	.7517	1.3303	.0179	55.87
	19.50	5.090	.0949	10.540	.7098	1.4089	.0169	59.17
	22.50	4.990	.0894	11.188	.6686	1.4956	.0159	62.81
6	15.00	5.524	.1200	8.333	.8977	1.1140	.0214	46.79
	16.00	5.500	.1186	8.435	.8869	1.1275	.0211	47.35
	17.00	5.450	.1156	8.652	.8646	1.1566	.0206	48.58
	18.00	5.424	.1140	8.769	.8530	1.1723	.0203	49.24
	20.00	5.352	.1098	9.107	.8214	1.2175	.0196	51.13
	23.00	5.240	.1033	9.678	.7730	1.2937	.0184	54.33
	26.00	5.132	.0972	10.286	.7273	1.3750	.0173	57.75
6 5/8	17.00	6.135	.1589	6.295	1.1884	.8415	.0283	35.34
	20.00	6.049	.1531	6.530	1.1456	.8729	.0273	36.66
	22.00	5.989	.1492	6.702	1.1161	.8960	.0266	37.63
	24.00	5.921	.1448	6.907	1.0831	.9233	.0258	38.78
	26.00	5.855	.1405	7.115	1.0514	.9511	.0250	39.95
	28.00	5.791	.1365	7.327	1.0210	.9795	.0243	41.14
	29.00	5.761	.1346	7.430	1.0068	.9932	.0240	41.71
	32.00	5.675	.1292	7.738	.9667	1.0345	.0230	43.45
7	17.00	6.538	.1867	5.356	1.3967	.7160	.0333	30.07
	20.00	6.456	.1809	5.528	1.3533	.7390	.0322	31.04
	22.00	6.398	.1768	5.655	1.3228	.7560	.0315	31.75
	23.00	6.366	.1746	5.727	1.3062	.7656	.0311	32.15
	24.00	6.336	.1725	5.796	1.2906	.7748	.0307	32.54
	26.00	6.276	.1684	5.938	1.2598	.7938	.0300	33.34
	28.00	6.214	.1642	6.091	1.2282	.8142	.0292	34.20
	29.00	6.184	.1621	6.167	1.2130	.8244	.0289	34.63
	30.00	6.154	.1601	6.245	1.1979	.8348	.0285	35.06
	32.00	6.094	.1561	6.405	1.1679	.8562	.0278	35.96
	34.00	6.040	.1525	6.555	1.1412	.8763	.0272	36.80
	35.00	6.004	.1502	6.659	1.1235	.8901	.0267	37.38
	38.00	5.920	.1447	6.910	1.0826	.9237	.0258	38.79
	40.00	5.836	.1393	7.177	1.0423	.9594	.0248	40.29
7 5/8	20.00	7.125	.2305	4.339	1.7240	.5801	.0410	24.36
	24.00	7.025	.2227	4.490	1.6662	.6002	.0397	25.21
	26.40	6.969	.2185	4.577	1.6342	.6119	.0389	25.70
	29.70	6.875	.2114	4.731	1.5812	.6325	.0376	26.56
	33.70	6.765	.2032	4.922	1.5199	.6579	.0362	27.63
	39.00	6.625	.1930	5.182	1.4435	.6928	.0344	29.10
8	26.00	7.386	.2511	3.982	1.8785	.5324	.0447	22.36
8 1/8	28.00	7.485	.2591	3.859	1.9385	.5159	.0462	21.67
	32.00	7.385	.2510	3.984	1.8779	.5325	.0447	22.37
	35.50	7.285	.2430	4.115	1.8180	.5501	.0433	23.10
	39.50	7.185	.2351	4.253	1.7590	.5685	.0419	23.88

2 1/16" Tubing
OD (2.063")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
8 5/8	24.00	8.097	.3111	3.214	2.3276	.4296	.0554	18.04
	28.00	8.017	.3041	3.288	2.2750	.4396	.0542	18.46
	32.00	7.921	.2958	3.381	2.2126	.4520	.0527	18.98
	36.00	7.825	.2875	3.478	2.1509	.4649	.0512	19.53
	38.00	7.775	.2833	3.530	2.1191	.4719	.0505	19.82
	40.00	7.725	.2790	3.584	2.0875	.4791	.0497	20.12
	43.00	7.651	.2728	3.665	2.0411	.4899	.0486	20.58
	44.00	7.625	.2707	3.694	2.0249	.4939	.0482	20.74
	49.00	7.511	.2613	3.828	1.9544	.5117	.0465	21.49
9	34.00	8.290	.3284	3.045	2.4567	.4071	.0585	17.10
	38.00	8.196	.3199	3.126	2.3934	.4178	.0570	17.55
	40.00	8.150	.3158	3.166	2.3628	.4232	.0563	17.78
	45.00	8.032	.3054	3.274	2.2848	.4377	.0544	18.38
	55.00	7.812	.2864	3.491	2.1426	.4667	.0510	19.60
9 5/8	29.30	9.063	.4016	2.490	3.0039	.3329	.0715	13.98
	32.30	9.001	.3954	2.529	2.9582	.3380	.0704	14.20
	36.00	8.921	.3876	2.580	2.8997	.3449	.0690	14.48
	38.00	8.877	.3834	2.609	2.8678	.3487	.0683	14.65
	40.00	8.835	.3793	2.636	2.8374	.3524	.0676	14.80
	43.50	8.755	.3716	2.691	2.7800	.3597	.0662	15.11
	47.00	8.681	.3646	2.743	2.7274	.3667	.0649	15.40
	53.50	8.535	.3509	2.850	2.6248	.3810	.0625	16.00
10	33.00	9.384	.4339	2.305	3.2455	.3081	.0773	12.94
10 3/4	32.75	10.192	.5201	1.923	3.8909	.2570	.0926	10.79
	35.75	10.136	.5139	1.946	3.8444	.2601	.0915	10.92
	40.50	10.050	.5044	1.982	3.7736	.2650	.0898	11.13
	45.50	9.950	.4935	2.026	3.6920	.2709	.0879	11.38
	51.00	9.850	.4827	2.072	3.6112	.2769	.0860	11.63
	54.00	9.784	.4757	2.102	3.5584	.2810	.0847	11.80
	55.50	9.760	.4731	2.114	3.5392	.2826	.0843	11.87
	60.70	9.660	.4625	2.162	3.4600	.2890	.0824	12.14
	65.70	9.560	.4520	2.212	3.3816	.2957	.0805	12.42
11 3/4	38.00	11.150	.6316	1.583	4.7251	.2116	.1125	8.89
	42.00	11.084	.6236	1.604	4.6652	.2144	.1111	9.00
	47.00	11.000	.6135	1.630	4.5895	.2179	.1093	9.15
	54.00	10.880	.5992	1.669	4.4824	.2231	.1067	9.37
	60.00	10.772	.5864	1.705	4.3870	.2279	.1044	9.57
12	40.00	11.384	.6604	1.514	4.9402	.2024	.1176	8.50
13	40.00	12.438	.7973	1.254	5.9646	.1677	.1420	7.04
	45.00	12.360	.7868	1.271	5.8857	.1699	.1401	7.14
	50.00	12.282	.7763	1.288	5.8073	.1722	.1383	7.23
	54.00	12.220	.7680	1.302	5.7453	.1741	.1368	7.31
13 3/8	48.00	12.715	.8353	1.197	6.2489	.1600	.1488	6.72
	54.50	12.615	.8215	1.217	6.1456	.1627	.1463	6.83
	61.00	12.515	.8078	1.238	6.0430	.1655	.1439	6.95
	68.00	12.415	.7942	1.259	5.9413	.1683	.1415	7.07
	72.00	12.347	.7850	1.274	5.8726	.1703	.1398	7.15
	83.00	12.175	.7620	1.312	5.7005	.1754	.1357	7.37

2 1/16" Tubing
OD (2.063")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
5 1/2	13.00	5.044	.0691	14.467	.5171	1.9339	.0123	81.22
	14.00	5.012	.0674	14.843	.5040	1.9843	.0120	83.34
	15.00	4.974	.0653	15.314	.4885	2.0471	.0116	85.98
	15.50	4.950	.0640	15.625	.4788	2.0887	.0114	87.72
	17.00	4.892	.0609	16.424	.4555	2.1955	.0108	92.21
	20.00	4.778	.0549	18.223	.4105	2.4360	.0098	102.31
	23.00	4.670	.0493	20.280	.3689	2.7110	.0088	113.86
5 3/4	14.00	5.290	.0830	12.050	.6208	1.6108	.0148	67.65
	17.00	5.190	.0773	12.941	.5781	1.7299	.0138	72.66
	19.50	5.090	.0717	13.953	.5361	1.8653	.0128	78.34
	22.50	4.990	.0662	15.113	.4950	2.0202	.0118	84.85
6	15.00	5.524	.0968	10.332	.7241	1.3811	.0172	58.01
	16.00	5.500	.0953	10.488	.7133	1.4020	.0170	58.88
	17.00	5.450	.0924	10.827	.6909	1.4473	.0165	60.79
	18.00	5.424	.0908	11.011	.6794	1.4719	.0162	61.82
	20.00	5.352	.0866	11.549	.6477	1.5438	.0154	64.84
	23.00	5.240	.0801	12.482	.5993	1.6685	.0143	70.08
	26.00	5.132	.0740	13.512	.5536	1.8063	.0132	75.86
6 5/8	17.00	6.135	.1356	7.372	1.0147	.9855	.0242	41.39
	20.00	6.049	.1299	7.697	.9720	1.0289	.0231	43.21
	22.00	5.989	.1260	7.937	.9425	1.0610	.0224	44.56
	24.00	5.921	.1216	8.226	.9094	1.0996	.0217	46.18
	26.00	5.855	.1173	8.523	.8777	1.1393	.0209	47.85
	28.00	5.791	.1133	8.829	.8473	1.1802	.0202	49.57
	29.00	5.761	.1114	8.978	.8332	1.2002	.0198	50.41
	32.00	5.675	.1060	9.433	.7931	1.2610	.0189	52.96
7	17.00	6.538	.1635	6.116	1.2231	.8176	.0291	34.34
	20.00	6.456	.1577	6.342	1.1796	.8477	.0281	35.60
	22.00	6.398	.1536	6.510	1.1492	.8702	.0274	36.55
	23.00	6.366	.1514	6.605	1.1325	.8830	.0270	37.08
	24.00	6.336	.1493	6.697	1.1170	.8953	.0266	37.60
	26.00	6.276	.1452	6.888	1.0861	.9207	.0259	38.67
	28.00	6.214	.1410	7.094	1.0545	.9483	.0251	39.83
	29.00	6.184	.1389	7.198	1.0393	.9622	.0247	40.41
	30.00	6.154	.1369	7.304	1.0242	.9763	.0244	41.01
	32.00	6.094	.1329	7.524	.9943	1.0058	.0237	42.24
	34.00	6.040	.1293	7.732	.9675	1.0336	.0230	43.41
	35.00	6.004	.1270	7.876	.9498	1.0528	.0226	44.22
	38.00	5.920	.1215	8.230	.9090	1.1002	.0216	46.21
	40.00	5.836	.1161	8.612	.8687	1.1512	.0207	48.35
7 5/8	20.00	7.125	.2072	4.825	1.5503	.6450	.0369	27.09
	24.00	7.025	.1995	5.012	1.4926	.6700	.0355	28.14
	26.40	6.969	.1952	5.122	1.4606	.6847	.0348	28.75
	29.70	6.875	.1882	5.315	1.4075	.7105	.0335	29.84
	33.70	6.765	.1800	5.557	1.3463	.7428	.0321	31.20
	39.00	6.625	.1697	5.891	1.2698	.7875	.0302	33.08
8	26.00	7.386	.2279	4.388	1.7048	.5866	.0406	24.64
8 1/8	28.00	7.485	.2359	4.239	1.7649	.5666	.0420	23.80
	32.00	7.385	.2278	4.389	1.7042	.5868	.0406	24.64
	35.50	7.285	.2198	4.549	1.6444	.6081	.0392	25.54
	39.50	7.185	.2119	4.719	1.5853	.6308	.0377	26.49

2 1/16" Tubing
OD (2.063")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
8 5/8	24.00	8.097	.2879	3.473	2.1540	.4643	.0513	19.50
	28.00	8.017	.2809	3.560	2.1014	.4759	.0500	19.99
	32.00	7.921	.2726	3.669	2.0390	.4905	.0485	20.60
	36.00	7.825	.2643	3.783	1.9773	.5057	.0471	21.24
	38.00	7.775	.2601	3.845	1.9455	.5140	.0463	21.59
	40.00	7.725	.2558	3.909	1.9138	.5225	.0456	21.95
	43.00	7.651	.2496	4.006	1.8674	.5355	.0445	22.49
	44.00	7.625	.2475	4.041	1.8512	.5402	.0441	22.69
	49.00	7.511	.2381	4.201	1.7808	.5615	.0424	23.58
9	34.00	8.290	.3052	3.277	2.2830	.4380	.0544	18.40
	38.00	8.196	.2967	3.370	2.2198	.4505	.0529	18.92
	40.00	8.150	.2926	3.417	2.1891	.4568	.0521	19.19
	45.00	8.032	.2822	3.543	2.1112	.4737	.0503	19.89
	55.00	7.812	.2632	3.799	1.9690	.5079	.0469	21.33
9 5/8	29.30	9.063	.3783	2.643	2.8303	.3533	.0674	14.84
	32.30	9.001	.3722	2.686	2.7846	.3591	.0663	15.08
	36.00	8.921	.3644	2.744	2.7261	.3668	.0649	15.41
	38.00	8.877	.3601	2.777	2.6942	.3712	.0641	15.59
	40.00	8.835	.3561	2.808	2.6638	.3754	.0634	15.77
	43.50	8.755	.3484	2.870	2.6064	.3837	.0621	16.11
	47.00	8.681	.3414	2.929	2.5537	.3916	.0608	16.45
	53.50	8.535	.3277	3.052	2.4512	.4080	.0584	17.13
10	33.00	9.384	.4106	2.435	3.0719	.3255	.0731	13.67
10 3/4	32.75	10.192	.4969	2.012	3.7172	.2690	.0885	11.30
	35.75	10.136	.4907	2.038	3.6708	.2724	.0874	11.44
	40.50	10.050	.4812	2.078	3.6000	.2778	.0857	11.67
	45.50	9.950	.4703	2.126	3.5184	.2842	.0838	11.94
	51.00	9.850	.4595	2.176	3.4376	.2909	.0818	12.22
	54.00	9.784	.4525	2.210	3.3847	.2954	.0806	12.41
	55.50	9.760	.4499	2.223	3.3656	.2971	.0801	12.48
	60.70	9.660	.4393	2.276	3.2863	.3043	.0782	12.78
	65.70	9.560	.4288	2.332	3.2079	.3117	.0764	13.09
11 3/4	38.00	11.150	.6084	1.644	4.5514	.2197	.1084	9.23
	42.00	11.084	.6004	1.665	4.4916	.2226	.1069	9.35
	47.00	11.000	.5903	1.694	4.4159	.2265	.1051	9.51
	54.00	10.880	.5760	1.736	4.3087	.2321	.1026	9.75
	60.00	10.772	.5632	1.775	4.2133	.2373	.1003	9.97
12	40.00	11.384	.6372	1.569	4.7666	.2098	.1135	8.81
13	40.00	12.438	.7741	1.292	5.7910	.1727	.1379	7.25
	45.00	12.360	.7636	1.310	5.7121	.1751	.1360	7.35
	50.00	12.282	.7531	1.328	5.6336	.1775	.1341	7.46
	54.00	12.220	.7448	1.343	5.5717	.1795	.1327	7.54
13 3/8	48.00	12.715	.8121	1.231	6.0753	.1646	.1446	6.91
	54.50	12.615	.7983	1.253	5.9719	.1675	.1422	7.03
	61.00	12.515	.7846	1.275	5.8694	.1704	.1397	7.16
	68.00	12.415	.7710	1.297	5.7677	.1734	.1373	7.28
	72.00	12.347	.7618	1.313	5.6990	.1755	.1357	7.37
	83.00	12.175	.7388	1.354	5.5269	.1809	.1316	7.60

2 1/16" Tubing
OD (2.063")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
6 5/8	17.00	6.135	.1124	8.894	.8411	1.1890	.0200	49.94
	20.00	6.049	.1067	9.371	.7983	1.2526	.0190	52.61
	22.00	5.989	.1028	9.730	.7688	1.3007	.0183	54.63
	24.00	5.921	.0984	10.167	.7358	1.3591	.0175	57.08
	26.00	5.855	.0941	10.625	.7041	1.4203	.0168	59.65
	28.00	5.791	.0901	11.104	.6737	1.4844	.0160	62.34
	29.00	5.761	.0882	11.342	.6595	1.5162	.0157	63.68
	32.00	5.675	.0828	12.077	.6194	1.6144	.0147	67.81
7	17.00	6.538	.1403	7.128	1.0494	.9529	.0250	40.02
	20.00	6.456	.1345	7.436	1.0060	.9941	.0240	41.75
	22.00	6.398	.1304	7.668	.9755	1.0251	.0232	43.05
	23.00	6.366	.1282	7.801	.9589	1.0429	.0228	43.80
	24.00	6.336	.1261	7.930	.9433	1.0601	.0225	44.52
	26.00	6.276	.1220	8.198	.9125	1.0959	.0217	46.03
	28.00	6.214	.1178	8.492	.8809	1.1353	.0210	47.68
	29.00	6.184	.1157	8.641	.8657	1.1552	.0206	48.52
	30.00	6.154	.1137	8.795	.8506	1.1757	.0203	49.38
	32.00	6.094	.1097	9.116	.8206	1.2186	.0195	51.18
	34.00	6.040	.1061	9.423	.7939	1.2597	.0189	52.90
	35.00	6.004	.1038	9.638	.7762	1.2884	.0185	54.11
	38.00	5.920	.0983	10.173	.7353	1.3600	.0175	57.12
	40.00	5.836	.0929	10.763	.6950	1.4388	.0165	60.43
7 5/8	20.00	7.125	.1840	5.434	1.3767	.7264	.0328	30.51
	24.00	7.025	.1763	5.672	1.3189	.7582	.0314	31.84
	26.40	6.969	.1720	5.813	1.2870	.7770	.0306	32.63
	29.70	6.875	.1649	6.063	1.2339	.8105	.0294	34.04
	33.70	6.765	.1568	6.379	1.1726	.8528	.0279	35.82
	39.00	6.625	.1465	6.824	1.0962	.9123	.0261	38.32
8	26.00	7.386	.2047	4.886	1.5312	.6531	.0365	27.43
8 1/8	28.00	7.485	.2127	4.701	1.5913	.6284	.0379	26.39
	32.00	7.385	.2046	4.887	1.5306	.6534	.0364	27.44
	35.50	7.285	.1966	5.086	1.4707	.6799	.0350	28.56
	39.50	7.185	.1887	5.299	1.4117	.7084	.0336	29.75
8 5/8	24.00	8.097	.2647	3.777	1.9803	.5050	.0471	21.21
	28.00	8.017	.2577	3.881	1.9277	.5187	.0459	21.79
	32.00	7.921	.2493	4.010	1.8653	.5361	.0444	22.52
	36.00	7.825	.2411	4.148	1.8036	.5544	.0429	23.29
	38.00	7.775	.2368	4.222	1.7718	.5644	.0422	23.70
	40.00	7.725	.2326	4.299	1.7402	.5747	.0414	24.14
	43.00	7.651	.2264	4.417	1.6938	.5904	.0403	24.80
	44.00	7.625	.2243	4.459	1.6776	.5961	.0399	25.04
	49.00	7.511	.2148	4.655	1.6072	.6222	.0383	26.13

2 1/16" Tubing
OD (2.063")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
9	34.00	8.290	.2820	3.546	2.1094	.4741	.0502	19.91
	38.00	8.196	.2735	3.656	2.0461	.4887	.0487	20.53
	40.00	8.150	.2694	3.712	2.0155	.4962	.0480	20.84
	45.00	8.032	.2590	3.861	1.9376	.5161	.0461	21.68
	55.00	7.812	.2400	4.167	1.7953	.5570	.0427	23.39
9 5/8	29.30	9.063	.3551	2.816	2.6567	.3764	.0633	15.81
	32.30	9.001	.3490	2.865	2.6110	.3830	.0622	16.09
	36.00	8.921	.3412	2.931	2.5525	.3918	.0608	16.45
	38.00	8.877	.3369	2.968	2.5205	.3967	.0600	16.66
	40.00	8.835	.3329	3.004	2.4902	.4016	.0593	16.87
	43.50	8.755	.3252	3.075	2.4327	.4111	.0579	17.26
	47.00	8.681	.3182	3.143	2.3801	.4202	.0567	17.65
	53.50	8.535	.3045	3.285	2.2776	.4391	.0542	18.44
10	33.00	9.384	.3874	2.581	2.8983	.3450	.0690	14.49
10 3/4	32.75	10.192	.4737	2.111	3.5436	.2822	.0844	11.85
	35.75	10.136	.4675	2.139	3.4972	.2859	.0833	12.01
	40.50	10.050	.4580	2.183	3.4263	.2919	.0816	12.26
	45.50	9.950	.4471	2.237	3.3447	.2990	.0796	12.56
	51.00	9.850	.4363	2.292	3.2639	.3064	.0777	12.87
	54.00	9.784	.4292	2.330	3.2111	.3114	.0765	13.08
	55.50	9.760	.4267	2.344	3.1919	.3133	.0760	13.16
	60.70	9.660	.4161	2.403	3.1127	.3213	.0741	13.49
	65.70	9.560	.4056	2.465	3.0343	.3296	.0722	13.84
11 3/4	38.00	11.150	.5852	1.709	4.3778	.2284	.1042	9.59
	42.00	11.084	.5772	1.732	4.3179	.2316	.1028	9.73
	47.00	11.000	.5671	1.763	4.2422	.2357	.1010	9.90
	54.00	10.880	.5528	1.809	4.1351	.2418	.0985	10.16
	60.00	10.772	.5400	1.852	4.0397	.2475	.0962	10.40
12	40.00	11.384	.6140	1.629	4.5929	.2177	.1094	9.14
13	40.00	12.438	.7509	1.332	5.6173	.1780	.1337	7.48
	45.00	12.360	.7404	1.351	5.5384	.1806	.1319	7.58
	50.00	12.282	.7299	1.370	5.4600	.1832	.1300	7.69
	54.00	12.220	.7216	1.386	5.3980	.1853	.1285	7.78
13 3/8	48.00	12.715	.7889	1.268	5.9016	.1694	.1405	7.12
	54.50	12.615	.7751	1.290	5.7983	.1725	.1380	7.24
	61.00	12.515	.7614	1.313	5.6957	.1756	.1356	7.37
	68.00	12.415	.7478	1.337	5.5940	.1788	.1332	7.51
	72.00	12.347	.7386	1.354	5.5253	.1810	.1316	7.60
	83.00	12.175	.7156	1.397	5.3532	.1868	.1275	7.85
16	55.00	15.376	1.1966	.836	8.9514	.1117	.2131	4.69
	65.00	15.250	1.1755	.851	8.7940	.1137	.2094	4.78
	75.00	15.124	1.1547	.866	8.6378	.1158	.2057	4.86
	84.00	15.010	1.1359	.880	8.4977	.1177	.2023	4.94
20	94.00	19.124	1.9018	.526	14.2271	.0703	.3387	2.95

2" Tubing
OD (2.375")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
6	15.00	5.524	.1049	9.533	.7847	1.2744	.0187	53.52
	16.00	5.500	.1035	9.666	.7739	1.2921	.0184	54.27
	17.00	5.450	.1005	9.953	.7516	1.3305	.0179	55.88
	18.00	5.424	.0989	10.108	.7401	1.3513	.0176	56.75
	20.00	5.352	.0947	10.560	.7084	1.4117	.0169	59.29
	23.00	5.240	.0882	11.334	.6600	1.5152	.0157	63.64
	26.00	5.132	.0821	12.178	.6143	1.6279	.0146	68.37
6 5/8	17.00	6.135	.1438	6.956	1.0754	.9299	.0256	39.06
	20.00	6.049	.1380	7.244	1.0326	.9684	.0246	40.67
	22.00	5.989	.1341	7.457	1.0031	.9969	.0239	41.87
	24.00	5.921	.1297	7.711	.9701	1.0308	.0231	43.29
	26.00	5.855	.1254	7.972	.9384	1.0657	.0223	44.76
	28.00	5.791	.1214	8.239	.9080	1.1014	.0216	46.26
	29.00	5.761	.1195	8.369	.8938	1.1188	.0213	46.99
	32.00	5.675	.1141	8.763	.8537	1.1714	.0203	49.20
7	17.00	6.538	.1716	5.827	1.2837	.7790	.0306	32.72
	20.00	6.456	.1658	6.032	1.2403	.8063	.0295	33.86
	22.00	6.398	.1617	6.183	1.2098	.8266	.0288	34.71
	23.00	6.366	.1595	6.270	1.1932	.8381	.0284	35.20
	24.00	6.336	.1574	6.352	1.1776	.8492	.0280	35.66
	26.00	6.276	.1533	6.523	1.1468	.8720	.0273	36.62
	28.00	6.214	.1491	6.708	1.1152	.8967	.0266	37.66
	29.00	6.184	.1470	6.801	1.1000	.9091	.0262	38.18
	30.00	6.154	.1450	6.895	1.0849	.9218	.0258	38.71
	32.00	6.094	.1410	7.091	1.0549	.9480	.0251	39.81
	34.00	6.040	.1374	7.276	1.0282	.9726	.0245	40.85
	35.00	6.004	.1351	7.403	1.0105	.9896	.0241	41.56
	38.00	5.920	.1296	7.715	.9696	1.0313	.0231	43.32
	40.00	5.836	.1242	8.050	.9293	1.0761	.0221	45.19
7 5/8	20.00	7.125	.2153	4.644	1.6110	.6208	.0384	26.07
	24.00	7.025	.2076	4.816	1.5532	.6438	.0370	27.04
	26.40	6.969	.2034	4.917	1.5213	.6574	.0362	27.61
	29.70	6.875	.1963	5.095	1.4682	.6811	.0350	28.61
	33.70	6.765	.1881	5.317	1.4069	.7108	.0335	29.85
	39.00	6.625	.1779	5.623	1.3305	.7516	.0317	31.57
8	26.00	7.386	.2360	4.237	1.7655	.5664	.0420	23.79
8 1/8	28.00	7.485	.2440	4.098	1.8256	.5478	.0435	23.01
	32.00	7.385	.2359	4.239	1.7649	.5666	.0420	23.80
	35.50	7.285	.2279	4.387	1.7050	.5865	.0406	24.63
	39.50	7.185	.2200	4.545	1.6460	.6075	.0392	25.52
8 5/8	24.00	8.097	.2960	3.378	2.2146	.4515	.0527	18.96
	28.00	8.017	.2890	3.460	2.1620	.4625	.0515	19.43
	32.00	7.921	.2807	3.563	2.0996	.4763	.0500	20.00
	36.00	7.825	.2724	3.671	2.0379	.4907	.0485	20.61
	38.00	7.775	.2682	3.729	2.0061	.4985	.0478	20.94
	40.00	7.725	.2639	3.789	1.9745	.5065	.0470	21.27
	43.00	7.651	.2577	3.880	1.9281	.5187	.0459	21.78
	44.00	7.625	.2556	3.913	1.9119	.5231	.0455	21.97
	49.00	7.511	.2462	4.062	1.8415	.5431	.0438	22.81

2" Tubing
OD (2.375")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
9	34.00	8.290	.3133	3.192	2.3437	.4267	.0558	17.92
	38.00	8.196	.3048	3.280	2.2804	.4385	.0543	18.42
	40.00	8.150	.3007	3.325	2.2498	.4445	.0536	18.67
	45.00	8.032	.2903	3.444	2.1719	.4604	.0517	19.34
	55.00	7.812	.2713	3.686	2.0296	.4927	.0483	20.69
9 5/8	29.30	9.063	.3865	2.588	2.8910	.3459	.0688	14.53
	32.30	9.001	.3803	2.629	2.8453	.3515	.0677	14.76
	36.00	8.921	.3725	2.684	2.7868	.3588	.0663	15.07
	38.00	8.877	.3683	2.715	2.7548	.3630	.0656	15.25
	40.00	8.835	.3642	2.746	2.7245	.3670	.0649	15.42
	43.50	8.755	.3565	2.805	2.6670	.3749	.0635	15.75
	47.00	8.681	.3495	2.861	2.6144	.3825	.0622	16.06
	53.50	8.535	.3358	2.978	2.5119	.3981	.0598	16.72
10	33.00	9.384	.4187	2.388	3.1326	.3192	.0746	13.41
10 3/4	32.75	10.192	.5050	1.980	3.7779	.2647	.0899	11.12
	35.75	10.136	.4988	2.005	3.7315	.2680	.0888	11.26
	40.50	10.050	.4893	2.044	3.6606	.2732	.0872	11.47
	45.50	9.950	.4784	2.090	3.5790	.2794	.0852	11.73
	51.00	9.850	.4676	2.138	3.4982	.2859	.0833	12.01
	54.00	9.784	.4606	2.171	3.4454	.2902	.0820	12.19
	55.50	9.760	.4580	2.183	3.4262	.2919	.0816	12.26
	60.70	9.660	.4474	2.235	3.3470	.2988	.0797	12.55
	65.70	9.560	.4369	2.289	3.2686	.3059	.0778	12.85
11 3/4	38.00	11.150	.6165	1.622	4.6121	.2168	.1098	9.11
	42.00	11.084	.6085	1.643	4.5522	.2197	.1084	9.23
	47.00	11.000	.5984	1.671	4.4765	.2234	.1066	9.38
	54.00	10.880	.5841	1.712	4.3694	.2289	.1040	9.61
	60.00	10.772	.5713	1.750	4.2740	.2340	.1018	9.83
12	40.00	11.384	.6453	1.550	4.8272	.2072	.1149	8.70
13	40.00	12.438	.7822	1.278	5.8516	.1709	.1393	7.18
	45.00	12.360	.7717	1.296	5.7727	.1732	.1374	7.28
	50.00	12.282	.7612	1.314	5.6943	.1756	.1356	7.38
	54.00	12.220	.7529	1.328	5.6323	.1775	.1341	7.46
13 3/8	48.00	12.715	.8202	1.219	6.1359	.1630	.1461	6.84
	54.50	12.615	.8064	1.240	6.0326	.1658	.1436	6.96
	61.00	12.515	.7927	1.261	5.9300	.1686	.1412	7.08
	68.00	12.415	.7791	1.284	5.8283	.1716	.1388	7.21
	72.00	12.347	.7699	1.299	5.7596	.1736	.1371	7.29
	83.00	12.175	.7469	1.339	5.5875	.1790	.1330	7.52
16	55.00	15.376	1.2279	0.814	9.1857	.1089	.2187	4.57
	65.00	15.250	1.2069	0.829	9.0283	.1108	.2150	4.65
	75.00	15.124	1.1860	0.843	8.8721	.1127	.2112	4.73
	84.00	15.010	1.1673	0.857	8.7320	.1145	.2079	4.81
20	94.00	19.124	1.9331	0.517	14.4614	.0692	.3443	2.90

2" Tubing
OD (2.375")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
6 5/8	17.00	6.135	.1130	8.850	.8452	1.1831	.0201	49.69
	20.00	6.049	.1073	9.322	.8025	1.2462	.0191	52.34
	22.00	5.989	.1033	9.677	.7730	1.2937	.0184	54.33
	24.00	5.921	.0989	10.110	.7400	1.3514	.0176	56.76
	26.00	5.855	.0947	10.562	.7083	1.4119	.0169	59.30
	28.00	5.791	.0906	11.036	.6778	1.4753	.0161	61.96
	29.00	5.761	.0887	11.271	.6637	1.5067	.0158	63.28
	32.00	5.675	.0834	11.996	.6236	1.6037	.0148	67.35
7	17.00	6.538	.1408	7.100	1.0536	.9491	.0251	39.86
	20.00	6.456	.1350	7.406	1.0101	.9900	.0240	41.58
	22.00	6.398	.1310	7.636	.9797	1.0207	.0233	42.87
	23.00	6.366	.1287	7.768	.9630	1.0384	.0229	43.61
	24.00	6.336	.1267	7.895	.9475	1.0554	.0226	44.33
	26.00	6.276	.1225	8.161	.9166	1.0910	.0218	45.82
	28.00	6.214	.1183	8.452	.8850	1.1299	.0211	47.46
	29.00	6.184	.1163	8.600	.8699	1.1496	.0207	48.28
	30.00	6.154	.1143	8.752	.8548	1.1699	.0204	49.14
	32.00	6.094	.1103	9.070	.8248	1.2125	.0196	50.92
	34.00	6.040	.1067	9.374	.7980	1.2531	.0190	52.63
	35.00	6.004	.1043	9.586	.7803	1.2815	.0186	53.82
	38.00	5.920	.0989	10.116	.7395	1.3523	.0176	56.80
	40.00	5.836	.0935	10.699	.6992	1.4302	.0166	60.07
7 5/8	20.00	7.125	.1846	5.418	1.3808	.7242	.0329	30.42
	24.00	7.025	.1769	5.654	1.3231	.7558	.0315	31.74
	26.40	6.969	.1726	5.794	1.2911	.7745	.0307	32.53
	29.70	6.875	.1655	6.042	1.2380	.8077	.0295	33.92
	33.70	6.765	.1573	6.357	1.1768	.8498	.0280	35.69
	39.00	6.625	.1471	6.799	1.1003	.9088	.0262	38.17
8	26.00	7.386	.2052	4.872	1.5353	.6513	.0366	27.36
8 1/8	28.00	7.485	.2133	4.689	1.5954	.6268	.0380	26.33
	32.00	7.385	.2052	4.874	1.5347	.6516	.0365	27.37
	35.50	7.285	.1972	5.072	1.4749	.6780	.0351	28.48
	39.50	7.185	.1893	5.284	1.4159	.7063	.0337	29.66
8 5/8	24.00	8.097	.2653	3.770	1.9845	.5039	.0472	21.16
	28.00	8.017	.2582	3.872	1.9319	.5176	.0460	21.74
	32.00	7.921	.2499	4.001	1.8695	.5349	.0445	22.47
	36.00	7.825	.2417	4.138	1.8078	.5532	.0430	23.23
	38.00	7.775	.2374	4.212	1.7760	.5631	.0423	23.65
	40.00	7.725	.2332	4.289	1.7444	.5733	.0415	24.08
	43.00	7.651	.2270	4.406	1.6979	.5890	.0404	24.74
	44.00	7.625	.2248	4.448	1.6817	.5946	.0400	24.97
	49.00	7.511	.2154	4.643	1.6113	.6206	.0384	26.07
9	34.00	8.290	.2825	3.539	2.1135	.4731	.0503	19.87
	38.00	8.196	.2741	3.649	2.0503	.4877	.0488	20.48
	40.00	8.150	.2700	3.704	2.0196	.4951	.0481	20.80
	45.00	8.032	.2596	3.853	1.9417	.5150	.0462	21.63
	55.00	7.812	.2406	4.157	1.7995	.5557	.0428	23.34

2” Tubing
OD (2.375”)
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
9 5/8	29.30	9.063	.3557	2.811	2.6608	.3758	.0634	15.78
	32.30	9.001	.3496	2.861	2.6151	.3824	.0623	16.06
	36.00	8.921	.3418	2.926	2.5566	.3911	.0609	16.43
	38.00	8.877	.3375	2.963	2.5247	.3961	.0601	16.64
	40.00	8.835	.3334	2.999	2.4943	.4009	.0594	16.84
	43.50	8.755	.3258	3.070	2.4369	.4104	.0580	17.23
	47.00	8.681	.3187	3.138	2.3843	.4194	.0568	17.62
	53.50	8.535	.3050	3.279	2.2817	.4383	.0543	18.41
10	33.00	9.384	.3880	2.577	2.9024	.3445	.0691	14.47
10 3/4	32.75	10.192	.4743	2.109	3.5478	.2819	.0845	11.84
	35.75	10.136	.4680	2.137	3.5013	.2856	.0834	12.00
	40.50	10.050	.4586	2.181	3.4305	.2915	.0817	12.24
	45.50	9.950	.4477	2.234	3.3489	.2986	.0797	12.54
	51.00	9.850	.4369	2.289	3.2681	.3060	.0778	12.85
	54.00	9.784	.4298	2.327	3.2152	.3110	.0766	13.06
	55.50	9.760	.4272	2.341	3.1961	.3129	.0761	13.14
	60.70	9.660	.4167	2.400	3.1169	.3208	.0742	13.47
	65.70	9.560	.4062	2.462	3.0384	.3291	.0723	13.82
11 3/4	38.00	11.150	.5858	1.707	4.3819	.2282	.1043	9.58
	42.00	11.084	.5778	1.731	4.3221	.2314	.1029	9.72
	47.00	11.000	.5676	1.762	4.2464	.2355	.1011	9.89
	54.00	10.880	.5533	1.807	4.1393	.2416	.0986	10.15
	60.00	10.772	.5406	1.850	4.0439	.2473	.0963	10.39
12	40.00	11.384	.6145	1.627	4.5971	.2175	.1095	9.14
13	40.00	12.438	.7515	1.331	5.6215	.1779	.1338	7.47
	45.00	12.360	.7409	1.350	5.5426	.1804	.1320	7.58
	50.00	12.282	.7304	1.369	5.4642	.1830	.1301	7.69
	54.00	12.220	.7221	1.385	5.4022	.1851	.1286	7.77
13 3/8	48.00	12.715	.7895	1.267	5.9058	.1693	.1406	7.11
	54.50	12.615	.7756	1.289	5.8024	.1723	.1381	7.24
	61.00	12.515	.7619	1.312	5.6999	.1754	.1357	7.37
	68.00	12.415	.7483	1.336	5.5982	.1786	.1333	7.50
	72.00	12.347	.7392	1.353	5.5295	.1809	.1317	7.60
	83.00	12.175	.7162	1.396	5.3574	.1867	.1276	7.84
16	55.00	15.376	1.1972	0.835	8.9556	.1117	.2132	4.69
	65.00	15.250	1.1761	0.850	8.7981	.1137	.2095	4.77
	75.00	15.124	1.1552	0.866	8.6420	.1157	.2058	4.86
	84.00	15.010	1.1365	0.880	8.5018	.1176	.2024	4.94
20	94.00	19.124	1.9024	0.526	14.2313	.0703	.3388	2.95

2” Tubing
OD (2.375”)
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
7	17.00	6.538	.1101	9.084	.8235	1.2144	.0196	51.00
	20.00	6.456	.1043	9.591	.7800	1.2821	.0186	53.85
	22.00	6.398	.1002	9.980	.7496	1.3341	.0178	56.03
	23.00	6.366	.0980	10.207	.7329	1.3644	.0174	57.31
	24.00	6.336	.0959	10.428	.7174	1.3940	.0171	58.55
	26.00	6.276	.0918	10.897	.6865	1.4567	.0163	61.18
	28.00	6.214	.0875	11.423	.6549	1.5270	.0156	64.13
	29.00	6.184	.0855	11.694	.6397	1.5632	.0152	65.65
	30.00	6.154	.0835	11.976	.6246	1.6010	.0149	67.24
	32.00	6.094	.0795	12.580	.5946	1.6817	.0142	70.63
	34.00	6.040	.0759	13.173	.5679	1.7609	.0135	73.96
	35.00	6.004	.0736	13.596	.5502	1.8175	.0131	76.33
	38.00	5.920	.0681	14.687	.5093	1.9633	.0121	82.46
	40.00	5.836	.0627	15.948	.4691	2.1320	.0112	89.54
7 5/8	20.00	7.125	.1538	6.501	1.1507	.8691	.0274	36.50
	24.00	7.025	.1461	6.844	1.0930	.9150	.0260	38.43
	26.40	6.969	.1418	7.051	1.0610	.9425	.0253	39.59
	29.70	6.875	.1347	7.422	1.0079	.9922	.0240	41.67
	33.70	6.765	.1265	7.902	.9467	1.0563	.0225	44.37
	39.00	6.625	.1163	8.597	.8702	1.1492	.0207	48.26
8	26.00	7.386	.1745	5.731	1.3052	.7662	.0311	32.18
8 1/8	28.00	7.485	.1825	5.479	1.3653	.7325	.0325	30.76
	32.00	7.385	.1744	5.734	1.3046	.7665	.0311	32.19
	35.50	7.285	.1664	6.010	1.2448	.8034	.0296	33.74
	39.50	7.185	.1585	6.309	1.1857	.8434	.0282	35.42
8 5/8	24.00	8.097	.2345	4.264	1.7544	.5700	.0418	23.94
	28.00	8.017	.2275	4.396	1.7018	.5876	.0405	24.68
	32.00	7.921	.2191	4.563	1.6393	.6100	.0390	25.62
	36.00	7.825	.2109	4.742	1.5777	.6339	.0376	26.62
	38.00	7.775	.2066	4.839	1.5458	.6469	.0368	27.17
	40.00	7.725	.2024	4.940	1.5142	.6604	.0361	27.74
	43.00	7.651	.1962	5.097	1.4678	.6813	.0349	28.61
	44.00	7.625	.1940	5.153	1.4516	.6889	.0346	28.93
	49.00	7.511	.1846	5.416	1.3812	.7240	.0329	30.41
9	34.00	8.290	.2518	3.972	1.8834	.5310	.0448	22.30
	38.00	8.196	.2433	4.110	1.8202	.5494	.0433	23.07
	40.00	8.150	.2392	4.180	1.7895	.5588	.0426	23.47
	45.00	8.032	.2288	4.371	1.7116	.5843	.0408	24.54
	55.00	7.812	.2098	4.767	1.5694	.6372	.0374	26.76
9 5/8	29.30	9.063	.3249	3.078	2.4307	.4114	.0579	17.28
	32.30	9.001	.3188	3.137	2.3850	.4193	.0568	17.61
	36.00	8.921	.3110	3.215	2.3265	.4298	.0554	18.05
	38.00	8.877	.3067	3.260	2.2945	.4358	.0546	18.30
	40.00	8.835	.3027	3.304	2.2642	.4417	.0539	18.55
	43.50	8.755	.2950	3.390	2.2068	.4532	.0525	19.03
	47.00	8.681	.2880	3.473	2.1541	.4642	.0513	19.50
	53.50	8.535	.2742	3.646	2.0516	.4874	.0488	20.47

2” Tubing
OD (2.375”)
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
10	33.00	9.384	.3572	2.799	2.6723	.3742	.0636	15.72
10 3/4	32.75	10.192	.4435	2.255	3.3176	.3014	.0790	12.66
	35.75	10.136	.4373	2.287	3.2712	.3057	.0779	12.84
	40.50	10.050	.4278	2.337	3.2004	.3125	.0762	13.12
	45.50	9.950	.4169	2.399	3.1188	.3206	.0743	13.47
	51.00	9.850	.4061	2.462	3.0380	.3292	.0723	13.82
	54.00	9.784	.3990	2.506	2.9851	.3350	.0711	14.07
	55.50	9.760	.3965	2.522	2.9660	.3372	.0706	14.16
	60.70	9.660	.3859	2.591	2.8867	.3464	.0687	14.55
	65.70	9.560	.3754	2.664	2.8083	.3561	.0669	14.96
11 3/4	38.00	11.150	.5550	1.802	4.1518	.2409	.0988	10.12
	42.00	11.084	.5470	1.828	4.0919	.2444	.0974	10.26
	47.00	11.000	.5369	1.863	4.0163	.2490	.0956	10.46
	54.00	10.880	.5226	1.914	3.9091	.2558	.0931	10.74
	60.00	10.772	.5098	1.962	3.8137	.2622	.0908	11.01
12	40.00	11.384	.5838	1.713	4.3669	.2290	.1040	9.62
13	40.00	12.438	.7207	1.388	5.3914	.1855	.1284	7.79
	45.00	12.360	.7101	1.408	5.3124	.1882	.1265	7.91
	50.00	12.282	.6997	1.429	5.2340	.1911	.1246	8.02
	54.00	12.220	.6914	1.446	5.1720	.1933	.1231	8.12
13 3/8	48.00	12.715	.7587	1.318	5.6756	.1762	.1351	7.40
	54.50	12.615	.7449	1.342	5.5723	.1795	.1327	7.54
	61.00	12.515	.7312	1.368	5.4698	.1828	.1302	7.68
	68.00	12.415	.7176	1.394	5.3680	.1863	.1278	7.82
	72.00	12.347	.7084	1.412	5.2993	.1887	.1262	7.93
	83.00	12.175	.6854	1.459	5.1273	.1950	.1221	8.19
16	55.00	15.376	1.1664	0.857	8.7254	.1146	.2077	4.81
	65.00	15.250	1.1453	0.873	8.5680	.1167	.2040	4.90
	75.00	15.124	1.1245	0.889	8.4119	.1189	.2003	4.99
	84.00	15.010	1.1057	0.904	8.2717	.1209	.1969	5.08
20	94.00	19.124	1.8716	0.534	14.0011	.0714	.3334	3.00

2 1/2" Tubing
OD (2.875")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
7	17.00	6.538	.1430	6.994	1.0695	.9350	.0255	39.27
	20.00	6.456	.1372	7.291	1.0261	.9746	.0244	40.93
	22.00	6.398	.1331	7.513	.9956	1.0044	.0237	42.18
	23.00	6.366	.1309	7.641	.9790	1.0215	.0233	42.90
	24.00	6.336	.1288	7.765	.9634	1.0380	.0229	43.59
	26.00	6.276	.1247	8.022	.9326	1.0723	.0222	45.04
	28.00	6.214	.1204	8.303	.9010	1.1099	.0215	46.62
	29.00	6.184	.1184	8.445	.8858	1.1289	.0211	47.41
	30.00	6.154	.1164	8.592	.8707	1.1485	.0207	48.24
	32.00	6.094	.1124	8.898	.8407	1.1895	.0200	49.96
	34.00	6.040	.1088	9.190	.8140	1.2285	.0194	51.60
	35.00	6.004	.1064	9.394	.7963	1.2558	.0190	52.74
	38.00	5.920	.1010	9.903	.7554	1.3238	.0180	55.60
	40.00	5.836	.0956	10.461	.7151	1.3984	.0170	58.73
7 5/8	20.00	7.125	.1867	5.356	1.3968	.7159	.0333	30.07
	24.00	7.025	.1790	5.587	1.3390	.7468	.0319	31.37
	26.40	6.969	.1747	5.723	1.3071	.7651	.0311	32.13
	29.70	6.875	.1676	5.966	1.2540	.7975	.0299	33.49
	33.70	6.765	.1594	6.272	1.1927	.8384	.0284	35.21
	39.00	6.625	.1492	6.702	1.1163	.8959	.0266	37.63
8	26.00	7.386	.2074	4.822	1.5513	.6446	.0369	27.07
8 1/8	28.00	7.485	.2154	4.642	1.6114	.6206	.0384	26.06
	32.00	7.385	.2073	4.824	1.5507	.6449	.0369	27.08
	35.50	7.285	.1993	5.018	1.4908	.6708	.0355	28.17
	39.50	7.185	.1914	5.225	1.4318	.6984	.0341	29.33
8 5/8	24.00	8.097	.2674	3.740	2.0004	.4999	.0476	21.00
	28.00	8.017	.2604	3.841	1.9478	.5134	.0464	21.56
	32.00	7.921	.2520	3.968	1.8854	.5304	.0449	22.28
	36.00	7.825	.2438	4.102	1.8237	.5483	.0434	23.03
	38.00	7.775	.2395	4.175	1.7919	.5581	.0427	23.44
	40.00	7.725	.2353	4.250	1.7603	.5681	.0419	23.86
	43.00	7.651	.2291	4.365	1.7139	.5835	.0408	24.51
	44.00	7.625	.2269	4.406	1.6977	.5890	.0404	24.74
	49.00	7.511	.2175	4.597	1.6273	.6145	.0387	25.81
9	34.00	8.290	.2847	3.513	2.1295	.4696	.0507	19.72
	38.00	8.196	.2762	3.620	2.0662	.4840	.0492	20.33
	40.00	8.150	.2721	3.675	2.0356	.4913	.0485	20.63
	45.00	8.032	.2617	3.821	1.9577	.5108	.0466	21.45
	55.00	7.812	.2427	4.121	1.8154	.5508	.0432	23.13
9 5/8	29.30	9.063	.3578	2.795	2.6768	.3736	.0637	15.69
	32.30	9.001	.3517	2.843	2.6311	.3801	.0626	15.96
	36.00	8.921	.3439	2.908	2.5726	.3887	.0612	16.33
	38.00	8.877	.3396	2.944	2.5406	.3936	.0605	16.53
	40.00	8.835	.3356	2.980	2.5103	.3984	.0598	16.73
	43.50	8.755	.3279	3.050	2.4528	.4077	.0584	17.12
	47.00	8.681	.3209	3.117	2.4002	.4166	.0571	17.50
	53.50	8.535	.3071	3.256	2.2977	.4352	.0547	18.28

2 1/2" Tubing
OD (2.875")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
10	33.00	9.384	.3901	2.563	2.9184	.3427	.0695	14.39
10 3/4	32.75	10.192	.4764	2.099	3.5637	.2806	.0848	11.79
	35.75	10.136	.4702	2.127	3.5173	.2843	.0837	11.94
	40.50	10.050	.4607	2.171	3.4464	.2902	.0821	12.19
	45.50	9.950	.4498	2.223	3.3648	.2972	.0801	12.48
	51.00	9.850	.4390	2.278	3.2840	.3045	.0782	12.79
	54.00	9.784	.4319	2.315	3.2312	.3095	.0769	13.00
	55.50	9.760	.4294	2.329	3.2120	.3113	.0765	13.08
	60.70	9.660	.4188	2.388	3.1328	.3192	.0746	13.41
	65.70	9.560	.4083	2.449	3.0544	.3274	.0727	13.75
11 3/4	38.00	11.150	.5879	1.701	4.3979	.2274	.1047	9.55
	42.00	11.084	.5799	1.724	4.3380	.2305	.1033	9.68
	47.00	11.000	.5698	1.755	4.2623	.2346	.1015	9.85
	54.00	10.880	.5555	1.800	4.1552	.2407	.0989	10.11
	60.00	10.772	.5427	1.843	4.0598	.2463	.0967	10.35
12	40.00	11.384	.6167	1.622	4.6130	.2168	.1098	9.10
13	40.00	12.438	.7536	1.327	5.6374	.1774	.1342	7.45
	45.00	12.360	.7430	1.346	5.5585	.1799	.1323	7.56
	50.00	12.282	.7326	1.365	5.4801	.1825	.1305	7.66
	54.00	12.220	.7243	1.381	5.4181	.1846	.1290	7.75
13 3/8	48.00	12.715	.7916	1.263	5.9217	.1689	.1410	7.09
	54.50	12.615	.7778	1.286	5.8184	.1719	.1385	7.22
	61.00	12.515	.7641	1.309	5.7158	.1750	.1361	7.35
	68.00	12.415	.7505	1.332	5.6141	.1781	.1337	7.48
	72.00	12.347	.7413	1.349	5.5454	.1803	.1320	7.57
	83.00	12.175	.7183	1.392	5.3733	.1861	.1279	7.82
16	55.00	15.376	1.1993	0.834	8.9715	.1115	.2136	4.68
	65.00	15.250	1.1782	0.849	8.8141	.1135	.2099	4.77
	75.00	15.124	1.1574	0.864	8.6579	.1155	.2061	4.85
	84.00	15.010	1.1386	0.878	8.5178	.1174	.2028	4.93
20	94.00	19.124	1.9045	0.525	14.2472	.0702	.3392	2.95

2 1/2" Tubing
OD (2.875")
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
8	26.00	7.386	.1623	6.162	1.2140	.8237	.0289	34.59
8 1/8	28.00	7.485	.1703	5.871	1.2741	.7849	.0303	32.96
	32.00	7.385	.1622	6.165	1.2134	.8241	.0289	34.61
	35.50	7.285	.1542	6.485	1.1536	.8669	.0275	36.41
	39.50	7.185	.1463	6.834	1.0946	.9136	.0261	38.37
8 5/8	24.00	8.097	.2223	4.498	1.6632	.6013	.0396	25.25
	28.00	8.017	.2153	4.645	1.6106	.6209	.0383	26.08
	32.00	7.921	.2070	4.832	1.5482	.6459	.0369	27.13
	36.00	7.825	.1987	5.032	1.4865	.6727	.0354	28.25
	38.00	7.775	.1945	5.143	1.4547	.6874	.0346	28.87
	40.00	7.725	.1902	5.257	1.4231	.7027	.0339	29.51
	43.00	7.651	.1840	5.434	1.3766	.7264	.0328	30.51
	44.00	7.625	.1819	5.499	1.3604	.7351	.0324	30.87
	49.00	7.511	.1724	5.799	1.2900	.7752	.0307	32.56
9	34.00	8.290	.2396	4.174	1.7922	.5580	.0427	23.43
	38.00	8.196	.2311	4.327	1.7290	.5784	.0412	24.29
	40.00	8.150	.2270	4.405	1.6983	.5888	.0404	24.73
	45.00	8.032	.2166	4.617	1.6204	.6171	.0386	25.92
	55.00	7.812	.1976	5.061	1.4782	.6765	.0352	28.41
9 5/8	29.30	9.063	.3127	3.198	2.3395	.4274	.0557	17.95
	32.30	9.001	.3066	3.261	2.2938	.4360	.0546	18.31
	36.00	8.921	.2988	3.347	2.2353	.4474	.0532	18.79
	38.00	8.877	.2945	3.395	2.2034	.4539	.0525	19.06
	40.00	8.835	.2905	3.443	2.1730	.4602	.0517	19.33
	43.50	8.755	.2828	3.536	2.1156	.4727	.0504	19.85
	47.00	8.681	.2758	3.626	2.0630	.4847	.0491	20.36
	53.50	8.535	.2621	3.816	1.9604	.5101	.0467	21.42
10	33.00	9.384	.3450	2.898	2.5811	.3874	.0615	16.27
10 3/4	32.75	10.192	.4313	2.319	3.2265	.3099	.0768	13.02
	35.75	10.136	.4251	2.352	3.1800	.3145	.0757	13.21
	40.50	10.050	.4156	2.406	3.1092	.3216	.0740	13.51
	45.50	9.950	.4047	2.471	3.0276	.3303	.0721	13.87
	51.00	9.850	.3939	2.539	2.9468	.3394	.0702	14.25
	54.00	9.784	.3869	2.585	2.8939	.3456	.0689	14.51
	55.50	9.760	.3843	2.602	2.8748	.3479	.0684	14.61
	60.70	9.660	.3737	2.676	2.7956	.3577	.0666	15.02
	65.70	9.560	.3632	2.753	2.7171	.3680	.0647	15.46
11 3/4	38.00	11.150	.5428	1.842	4.0606	.2463	.0967	10.34
	42.00	11.084	.5348	1.870	4.0008	.2500	.0953	10.50
	47.00	11.000	.5247	1.906	3.9251	.2548	.0935	10.70
	54.00	10.880	.5104	1.959	3.8180	.2619	.0909	11.00
	60.00	10.772	.4976	2.010	3.7226	.2686	.0886	11.28
12	40.00	11.384	.5716	1.750	4.2758	.2339	.1018	9.82
13	40.00	12.438	.7085	1.411	5.3002	.1887	.1262	7.92
	45.00	12.360	.6980	1.433	5.2213	.1915	.1243	8.04
	50.00	12.282	.6875	1.455	5.1429	.1944	.1224	8.17
	54.00	12.220	.6792	1.472	5.0809	.1968	.1210	8.27
13 3/8	48.00	12.715	.7465	1.340	5.5845	.1791	.1330	7.52
	54.50	12.615	.7327	1.365	5.4811	.1824	.1305	7.66
	61.00	12.515	.7190	1.391	5.3786	.1859	.1281	7.81
	68.00	12.415	.7054	1.418	5.2769	.1895	.1256	7.96
	72.00	12.347	.6962	1.436	5.2082	.1920	.1240	8.06
	83.00	12.175	.6732	1.485	5.0361	.1986	.1199	8.34
16	55.00	15.376	1.1542	.866	8.6343	.1158	.2056	4.86
	65.00	15.250	1.1332	.882	8.4768	.1180	.2018	4.95
	75.00	15.124	1.1123	.899	8.3207	.1202	.1981	5.05
	84.00	15.010	1.0935	.914	8.1805	.1222	.1948	5.13
20	94.00	19.124	1.8594	.538	13.9100	.0719	.3312	3.02

2 1/2" Tubing
OD (2.875")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
8 5/8	43.00	7.651	.1389	7.197	1.0394	.9621	.0247	40.41
	44.00	7.625	.1368	7.311	1.0232	.9773	.0244	41.05
	49.00	7.511	.1274	7.851	.9528	1.0496	.0227	44.08
9	34.00	8.290	.1945	5.141	1.4550	.6873	.0346	28.87
	38.00	8.196	.1860	5.375	1.3918	.7185	.0331	30.18
	40.00	8.150	.1819	5.496	1.3611	.7347	.0324	30.86
	45.00	8.032	.1715	5.830	1.2832	.7793	.0306	32.73
	55.00	7.812	.1525	6.556	1.1410	.8765	.0272	36.81
9 5/8	29.30	9.063	.2677	3.736	2.0023	.4994	.0477	20.98
	32.30	9.001	.2615	3.823	1.9566	.5111	.0466	21.47
	36.00	8.921	.2537	3.941	1.8981	.5269	.0452	22.13
	38.00	8.877	.2495	4.009	1.8661	.5359	.0444	22.51
	40.00	8.835	.2454	4.075	1.8358	.5447	.0437	22.88
	43.50	8.755	.2377	4.206	1.7784	.5623	.0423	23.62
	47.00	8.681	.2307	4.335	1.7257	.5795	.0411	24.34
	53.50	8.535	.2170	4.609	1.6232	.6161	.0386	25.87
10	33.00	9.384	.3000	3.334	2.2439	.4457	.0534	18.72
10 3/4	32.75	10.192	.3862	2.589	2.8892	.3461	.0688	14.54
	35.75	10.136	.3800	2.631	2.8428	.3518	.0677	14.77
	40.50	10.050	.3705	2.699	2.7720	.3608	.0660	15.15
	45.50	9.950	.3596	2.781	2.6904	.3717	.0641	15.61
	51.00	9.850	.3488	2.867	2.6096	.3832	.0621	16.09
	54.00	9.784	.3418	2.926	2.5567	.3911	.0609	16.43
	55.50	9.760	.3392	2.948	2.5376	.3941	.0604	16.55
	60.70	9.660	.3286	3.043	2.4583	.4068	.0585	17.08
	65.70	9.560	.3181	3.143	2.3799	.4202	.0567	17.65
11 3/4	38.00	11.150	.4977	2.009	3.7234	.2686	.0886	11.28
	42.00	11.084	.4897	2.042	3.6635	.2730	.0872	11.46
	47.00	11.000	.4796	2.085	3.5879	.2787	.0854	11.71
	54.00	10.880	.4653	2.149	3.4807	.2873	.0829	12.07
	60.00	10.772	.4525	2.210	3.3853	.2954	.0806	12.41
12	40.00	11.384	.5265	1.899	3.9385	.2539	.0938	10.66
13	40.00	12.438	.6634	1.507	4.9630	.2015	.1182	8.46
	45.00	12.360	.6529	1.532	4.8840	.2047	.1163	8.60
	50.00	12.282	.6424	1.557	4.8056	.2081	.1144	8.74
	54.00	12.220	.6341	1.577	4.7436	.2108	.1129	8.85
13 3/8	48.00	12.715	.7014	1.426	5.2472	.1906	.1249	8.00
	54.50	12.615	.6876	1.454	5.1439	.1944	.1225	8.16
	61.00	12.515	.6739	1.484	5.0414	.1984	.1200	8.33
	68.00	12.415	.6603	1.514	4.9396	.2024	.1176	8.50
	72.00	12.347	.6511	1.536	4.8709	.2053	.1160	8.62
	83.00	12.175	.6281	1.592	4.6989	.2128	.1119	8.94
16	55.00	15.376	1.1091	.902	8.2970	.1205	.1975	5.06
	65.00	15.250	1.0881	.919	8.1396	.1229	.1938	5.16
	75.00	15.124	1.0672	.937	7.9835	.1253	.1901	5.26
	84.00	15.010	1.0485	.954	7.8433	.1275	.1867	5.35
20	94.00	19.124	1.8144	.551	13.5727	.0737	.3232	3.09

3" Tubing
OD (3.500")
Two Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
8 5/8	43.00	7.651	.1856	5.387	1.3887	.7201	.0331	30.24
	44.00	7.625	.1835	5.450	1.3725	.7286	.0327	30.60
	49.00	7.511	.1741	5.745	1.3021	.7680	.0310	32.25
9	34.00	8.290	.2412	4.146	1.8043	.5542	.0430	23.28
	38.00	8.196	.2327	4.296	1.7411	.5743	.0415	24.12
	40.00	8.150	.2286	4.374	1.7104	.5847	.0407	24.55
	45.00	8.032	.2182	4.582	1.6325	.6126	.0389	25.73
	55.00	7.812	.1992	5.020	1.4903	.6710	.0355	28.18
9 5/8	29.30	9.063	.3144	3.181	2.3516	.4252	.0560	17.86
	32.30	9.001	.3082	3.244	2.3059	.4337	.0549	18.21
	36.00	8.921	.3004	3.329	2.2474	.4450	.0535	18.69
	38.00	8.877	.2962	3.377	2.2155	.4514	.0527	18.96
	40.00	8.835	.2921	3.423	2.1851	.4576	.0520	19.22
	43.50	8.755	.2844	3.516	2.1277	.4700	.0507	19.74
	47.00	8.681	.2774	3.605	2.0751	.4819	.0494	20.24
	53.50	8.535	.2637	3.792	1.9725	.5070	.0470	21.29
10	33.00	9.384	.3467	2.885	2.5932	.3856	.0617	16.20
10 3/4	32.75	10.192	.4329	2.310	3.2386	.3088	.0771	12.97
	35.75	10.136	.4267	2.343	3.1921	.3133	.0760	13.16
	40.50	10.050	.4172	2.397	3.1213	.3204	.0743	13.46
	45.50	9.950	.4063	2.461	3.0397	.3290	.0724	13.82
	51.00	9.850	.3955	2.528	2.9589	.3380	.0704	14.19
	54.00	9.784	.3885	2.574	2.9060	.3441	.0692	14.45
	55.50	9.760	.3859	2.591	2.8869	.3464	.0687	14.55
	60.70	9.660	.3753	2.664	2.8077	.3562	.0668	14.96
	65.70	9.560	.3648	2.741	2.7293	.3664	.0650	15.39
11 3/4	38.00	11.150	.5444	1.837	4.0728	.2455	.0970	10.31
	42.00	11.084	.5364	1.864	4.0129	.2492	.0955	10.47
	47.00	11.000	.5263	1.900	3.9372	.2540	.0937	10.67
	54.00	10.880	.5120	1.953	3.8301	.2611	.0912	10.97
	60.00	10.772	.4992	2.003	3.7347	.2678	.0889	11.25
12	40.00	11.384	.5732	1.745	4.2879	.2332	.1021	9.79
13	40.00	12.438	.7101	1.408	5.3123	.1882	.1265	7.91
	45.00	12.360	.6996	1.429	5.2334	.1911	.1246	8.03
	50.00	12.282	.6891	1.451	5.1550	.1940	.1227	8.15
	54.00	12.220	.6808	1.469	5.0930	.1963	.1213	8.25
13 3/8	48.00	12.715	.7481	1.337	5.5966	.1787	.1332	7.50
	54.50	12.615	.7343	1.362	5.4932	.1820	.1308	7.65
	61.00	12.515	.7206	1.388	5.3907	.1855	.1283	7.79
	68.00	12.415	.7070	1.414	5.2890	.1891	.1259	7.94
	72.00	12.347	.6978	1.433	5.2203	.1916	.1243	8.05
	83.00	12.175	.6748	1.482	5.0482	.1981	.1202	8.32
16	55.00	15.376	1.1558	0.865	8.6464	.1157	.2059	4.86
	65.00	15.250	1.1348	0.881	8.4890	.1178	.2021	4.95
	75.00	15.124	1.1139	0.898	8.3328	.1200	.1984	5.04
	84.00	15.010	1.0952	0.913	8.1926	.1221	.1951	5.13
20	94.00	19.124	1.8611	0.537	13.9221	.0718	.3315	3.02

3” Tubing
OD (3.500”)
Three Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
9 5/8	32.30	9.001	.2414	4.142	1.8061	.5537	.0430	23.25
	36.00	8.921	.2336	4.280	1.7476	.5722	.0416	24.03
	38.00	8.877	.2293	4.360	1.7157	.5829	.0408	24.48
	40.00	8.835	.2253	4.439	1.6853	.5934	.0401	24.92
	43.50	8.755	.2176	4.595	1.6279	.6143	.0388	25.80
	47.00	8.681	.2106	4.749	1.5753	.6348	.0375	26.66
	53.50	8.535	.1969	5.079	1.4727	.6790	.0351	28.52
10	33.00	9.384	.2798	3.573	2.0934	.4777	.0498	20.06
10 3/4	32.75	10.192	.3661	2.731	2.7388	.3651	.0652	15.34
	35.75	10.136	.3599	2.779	2.6923	.3714	.0641	15.60
	40.50	10.050	.3504	2.854	2.6215	.3815	.0624	16.02
	45.50	9.950	.3395	2.945	2.5399	.3937	.0605	16.54
	51.00	9.850	.3287	3.042	2.4591	.4067	.0585	17.08
	54.00	9.784	.3217	3.109	2.4062	.4156	.0573	17.45
	55.50	9.760	.3191	3.134	2.3871	.4189	.0568	17.59
	60.70	9.660	.3085	3.241	2.3079	.4333	.0549	18.20
	65.70	9.560	.2980	3.355	2.2295	.4485	.0531	18.84
11 3/4	38.00	11.150	.4776	2.094	3.5730	.2799	.0851	11.75
	42.00	11.084	.4696	2.129	3.5131	.2847	.0836	11.96
	47.00	11.000	.4595	2.176	3.4374	.2909	.0818	12.22
	54.00	10.880	.4452	2.246	3.3303	.3003	.0793	12.61
	60.00	10.772	.4324	2.313	3.2349	.3091	.0770	12.98
12	40.00	11.384	.5064	1.975	3.7881	.2640	.0902	11.09
13	40.00	12.438	.6433	1.554	4.8125	.2078	.1146	8.73
	45.00	12.360	.6328	1.580	4.7336	.2113	.1127	8.87
	50.00	12.282	.6223	1.607	4.6552	.2148	.1108	9.02
	54.00	12.220	.6140	1.629	4.5932	.2177	.1094	9.14
13 3/8	48.00	12.715	.6813	1.468	5.0968	.1962	.1213	8.24
	54.50	12.615	.6675	1.498	4.9934	.2003	.1189	8.41
	61.00	12.515	.6538	1.530	4.8909	.2045	.1164	8.59
	68.00	12.415	.6402	1.562	4.7892	.2088	.1140	8.77
	72.00	12.347	.6310	1.585	4.7205	.2118	.1124	8.90
	83.00	12.175	.6080	1.645	4.5484	.2199	.1083	9.23
16	55.00	15.376	1.0890	.918	8.1466	.1228	.1940	5.16
	65.00	15.250	1.0680	.936	7.9892	.1252	.1902	5.26
	75.00	15.124	1.0471	.955	7.8330	.1277	.1865	5.36
	84.00	15.010	1.0284	.972	7.6928	.1300	.1832	5.46
20	94.00	19.124	1.7942	.557	13.4223	.0745	.3196	3.13

3" Tubing
OD (3.500")
Four Strings

VOLUME & HEIGHT BETWEEN TUBING STRINGS & CASING

OUTSIDE CASING								
Size OD In	Wt/Ft W/ Couplings Lb	ID In	Cu Ft Per Lin Ft	Lin Ft Per Cu Ft	Gallons Per Lin Ft	Lin Ft Per Gallon	Barrels Per Lin Ft	Lin Ft Per Barrel
10 3/4	54.00	9.784	.2548	3.924	1.9064	.5245	.0454	22.03
	55.50	9.760	.2523	3.964	1.8873	.5299	.0449	22.25
	60.70	9.660	.2417	4.137	1.8081	.5531	.0430	23.23
	65.70	9.560	.2312	4.325	1.7297	.5782	.0412	24.28
11 3/4	38.00	11.150	.4108	2.434	3.0732	.3254	.0732	13.67
	42.00	11.084	.4028	2.483	3.0133	.3319	.0717	13.94
	47.00	11.000	.3927	2.547	2.9376	.3404	.0699	14.30
	54.00	10.880	.3784	2.643	2.8305	.3533	.0674	14.84
	60.00	10.772	.3656	2.735	2.7351	.3656	.0651	15.36
12	40.00	11.384	.4396	2.275	3.2883	.3041	.0783	12.77
13	40.00	12.438	.5765	1.735	4.3127	.2319	.1027	9.74
	45.00	12.360	.5660	1.767	4.2338	.2362	.1008	9.92
	50.00	12.282	.5555	1.800	4.1554	.2407	.0989	10.11
	54.00	12.220	.5472	1.827	4.0934	.2443	.0975	10.26
13 3/8	48.00	12.715	.6145	1.627	4.5970	.2175	.1094	9.14
	54.50	12.615	.6007	1.665	4.4936	.2225	.1070	9.35
	61.00	12.515	.5870	1.704	4.3911	.2277	.1045	9.56
	68.00	12.415	.5734	1.744	4.2894	.2331	.1021	9.79
	72.00	12.347	.5642	1.772	4.2207	.2369	.1005	9.95
	83.00	12.175	.5412	1.848	4.0486	.2470	.0964	10.37
16	55.00	15.376	1.0222	0.978	7.6468	.1308	.1821	5.49
	65.00	15.250	1.0011	0.999	7.4894	.1335	.1783	5.61
	75.00	15.124	.9803	1.020	7.3332	.1364	.1746	5.73
	84.00	15.010	.9615	1.040	7.1930	.1390	.1713	5.84
20	94.00	19.124	1.7274	0.579	12.9225	.0774	.3077	3.25

DIMENSIONS AND STRENGTHS OF NON-UPSET AND EXTERNAL UPSET TUBING

Size OD In	Grade	Wt per Ft w/ Cplgs, Lb Non Upset	Wt per Ft w/ Cplgs, Lb Upset	ID In	Drift Diameter In	OD of Upset In	OD of Cplgs, Inc. Non Upset	OD of Cplgs, Inc. Upset	Collapse Resistance psi	Internal Yield psi	Joint Yield Strength, lb Non Upset	Joint Yield Strength, lb Upset
	F-25		1.20	.824	.730	1.315		1.660	5,960	4,710		8,320
1.050	C-75	1.14	1.20	.824	.730	1.315	1.313	1.660	14,410	14,120	11,920	24,950
	N-80		1.20	.824	.730	1.315		1.660	15,370	15,070		26,610
	F-25		1.80	1.049	.955	1.469		1.900	5,540	4,430		12,350
1.315	H-40		1.80	1.049	.955	1.469		1.900	7,270	7,080		19,760
1	J-55		1.80	1.049	.955	1.469		1.900	10,000	9,730		27,160
(Nominal)	C-75	1.70	1.80	1.049	.955	1.469	1.660	1.900	13,640	13,270	20,540	37,040
	N-80		1.80	1.049	.955	1.469		1.900	14,650	14,160		39,510
	F-25		2.40	1.380	1.286	1.812		2.200	4,400	3,690		16,710
1.660	H-40		2.40	1.380	1.286	1.812		2.200	6,180	5,910		26,740
1 1/4	K 55		2.40	1.380	1.286	1.812		2.200	8,490	8,120		36,770
(Nominal)	C-75	2.30	2.40	1.380	1.286	1.812	2.054	2.200	11,580	11,070	29,120	50,140
	N-80		2.40	1.380	1.286	1.812		2.200	12,360	11,800		53,480
	F-25	2.75	2.90	1.610	1.516	2.094	2.200	2.500	3,920	3,340	11,930	19,900
1.900	H-40	2.75	2.90	1.610	1.516	2.094	2.200	2.500	5,640	5,350	19,090	31,980
1 1/2	J-55	2.75	2.90	1.610	1.516	2.094	2.200	2.500	7,750	7,350	26,250	43,970
(Nominal)	C-75	2.75	2.90	1.610	1.516	2.094	2.200	2.500	10,570	10,020	35,800	59,960
	N-80	2.75	2.90	1.610	1.516	2.094	2.200	2.500	11,280	10,680	38,180	63,960
	F-25	4.00		2.041	1.947		2.875		3,530	3,080	18,830	
	F-25	4.60	4.70	1.995	1.901	2.594	2.875	3.063	4,160	3,500	22,480	32,600
	H-40	4.00		2.041	1.947		2.875		5,230	4,930	30,130	
	H-40	4.60	4.70	1.995	1.901	2.594	2.875	3.063	5,890	5,600	35,960	52,170
	J-55	4.00		2.041	1.947		2.875		7,190	6,770	41,430	
2.375	J-55	4.60	4.70	1.995	1.901	2.594	2.875	3.063	8,100	7,700	49,440	71,730
2	C-75	4.00		2.041	1.947		2.875		9,520	9,230	56,500	
(Nominal)	C-75	4.60	4.70	1.995	1.901	2.594	2.875	3.063	11,040	10,500	67,430	97,820
	C-75	5.80	5.95	1.867	1.773	2.594	2.875	3.063	14,330	14,040	96,560	126,940
	N-80	4.00		2.041	1.947		2.875		9,980	9,840	60,260	
	N-80	4.60	4.70	1.995	1.901	2.594	2.875	3.063	11,780	11,200	71,920	104,340
	N-80	5.80	5.95	1.867	1.773	2.594	2.875	3.063	15,280	14,970	102,980	135,400
	P-105	4.60	4.70	1.995	1.901	2.594	2.875	3.063	15,460	14,700	94,400	136,940
	P-105	5.80	5.95	1.867	1.773	2.594	2.875	3.063	20,060	19,650	135,170	177,710

DIMENSIONS AND STRENGTHS OF NON-UPSET AND EXTERNAL UPSET TUBING

Size OD In	Grade	Wt per Ft w/ Cplgs, Lb		ID In	Drift Diameter In	OD of Upset In	OD of Cplgs, Inc.		Collapse Resistance psi	Internal Yield psi	Joint Yield Strength, lb	
		Non Upset	Upset				Non Upset	Upset			Non Upset	Upset
	F-25	6.40	6.50	2.441	2.347	3.094	3.50	3.668	3,870	3,300	32,990	45,300
	H-40	6.40	6.50	2.441	2.347	3.094	3.50	3.668	5,580	5,280	52,780	72,480
	J-55	6.40	6.50	2.441	2.347	3.094	3.50	3.668	7,680	7,260	72,570	99,660
2.875	C-75	6.40	6.50	2.441	2.347	3.094	3.50	3.668	10,470	9,910	98,970	135,900
2 1/2	C-75	8.60	8.70	2.259	2.165	3.094	3.50	3.668	14,350	14,060	149,360	186,290
(Nominal)	N-80	6.40	6.50	2.441	2.347	3.094	3.50	3.668	11,160	10,570	105,560	144,960
	N-80	8.60	8.70	2.259	2.165	3.094	3.50	3.668	15,300	15,000	159,310	198,710
	P-105	6.40	6.50	2.441	2.347	3.094	3.50	3.668	14,010	13,870	138,550	190,260
	P-105	8.60	8.70	2.259	2.165	3.094	3.50	3.668	20,090	19,690	209,100	260,810
	F-25	7.70		3.068	2.943		4.25		2,970	2,700	40,670	
	F-25	9.20	9.30	2.992	2.867	3.75	4.25	4.500	3,680	3,180	49,710	64,760
	F-25	10.20		2.922	2.797		4.25		4,330	3,610	57,840	
	H-40	7.70		3.068	2.943		4.25		4,630	4,320	65,070	
	H-40	9.20	9.30	2.992	2.867	3.75	4.25	4.500	5,380	5,080	79,540	103,610
	H-40	10.20		2.922	2.797		4.25		6,060	5,780	92,550	
	J-55	7.70		3.068	2.943		4.25		5,970	5,940	89,470	
	J-55	9.20	9.30	2.992	2.867	3.75	4.25	4.500	7,400	6,980	109,370	142,460
3.5	J-55	10.20		2.922	2.797		4.25		8,330	7,940	127,250	
3	C-75	7.70		3.068	2.943		4.25		7,540	8,100	122,010	
(Nominal)	C-75	9.20	9.30	2.992	2.867	3.75	4.25	4.500	10,040	9,520	149,140	194,260
	C-75	10.20		2.922	2.797		4.25		11,360	10,840	173,530	
	C-75	12.70	12.95	2.750	2.625	3.75	4.25	4.500	14,350	14,060	230,990	276,120
	N-80	7.70		3.068	2.943		4.25		7,870	8,640	130,140	
	N-80	9.20	9.30	2.992	2.867	3.75	4.25	4.500	10,530	10,160	159,080	207,220
	N-80	10.20		2.922	2.797		4.25		12,120	11,560	185,100	
	N-80	12.70	12.95	2.750	2.625	3.75	4.25	4.500	15,310	15,000	246,390	294,530
	P-105	9.20	9.30	2.992	2.867	3.75	4.25	4.500	13,050	13,340	208,790	271,970
	P-105	12.70	12.95	2.750	2.625	3.75	4.25	4.500	20,090	19,690	323,390	386,570

DIMENSIONS AND STRENGTHS OF NON-UPSET AND EXTERNAL UPSET TUBING

Size, OD In	Grade	Wt per Ft w/ Cplgs, Non Upset	Wt per Ft w/ Cplgs, Upset	ID In	Drift Diameter, In	OD of Upset In	OD of Cplgs, Inc. Non Upset	OD of Cplgs, Inc. Upset	Collapse Resistance psi	Internal Yield psi	Joint Yield Strength, lb Non Upset	Joint Yield Strength, lb Upset
	F-25	9.50		3.548			4.75		2,630	2,470	15,000	
	F-25		11.00	3.476	3.351	4.25		5.000	3,220	2,870		76,920
	H-40	9.50		3.548			4.75		4,060	3,960	72,000	
4.000	H-40		11.00	3.476	3.351	4.25		5.000	4,900	4,580		120,070
3 1/2	J-55	9.50		3.548			4.75		5,110	5,440	99,010	
(Nominal)	J-55		11.00	3.476	3.351	4.25		5.000	6,590	6,300		169,220
	C-75	9.50		3.548			4.75		6,350	7,420	135,010	
	C-75		11.00	3.476		4.25		5.000	8,410	8,600		230,760
	N-80	9.50		3.548			4.75		6,590	7,910	144,010	
	N-80		11.00	3.476	3.351	4.25		5.000	8,800	9,170		246,140
	F-25	12.60	12.75	3.958	3.833	4.75	5.2	5.563	2,870	2,630	65,230	99,010
4.500	H-40	12.60	12.75	3.958	3.833	4.75	5.2	5.563	4,500	4,220	104,360	144,020
4	J-55	12.60	12.75	3.958	3.833	4.75	5.2	5.563	5,720	5,790	143,500	198,030
(Nominal)	C-75	12.60	12.75	3.958	3.833	4.75	5.2	5.563	7,200	7,900	195,680	270,030
	N-80	12.60	12.75	3.958	3.833	4.75	5.2	5.563	7,500	8,440	208,730	288,040

DIMENSIONS AND STRENGTHS OF API INTERNAL UPSET DRILL PIPE

Size OD In	Wt/ Ft W/ Cplgs Lb	ID In	ID @ Full Upset In	COLLAPSE PRESSURE				INTERNAL YIELD PRESSURE				TENSILE STRENGTH			
				D Psi	E Psi	G Psi	S-135 Psi	D Psi	E Psi	G Psi	S-135 Psi	D 1000 Lb	E 1000 Lb	G 1000 Lb	S-135 1000 Lb
2 3/8	4.85	1.995	1.437	6,850	11,040	13,250	16,560	7,110	10,500	14,70	18,900	70	98	137	176
	6.65	1.815	1.125	1,400	15,600	8,720	23,400	11,350	15,470	21,66	27,850	101	138	194	249
2 7/8	6.85	2.441	1.875		10,470	12,560	15,700		9,910	13,87	17,830		136	190	245
	10.40	2.151	1.187		12,110	16,510	19,810	24,760	12,120	16,53	23,140	157	214	300	386
3 1/2	9.50	2.992	2.250		10,040	12,110	15,140		9,520	13,34	17,140		194	272	350
	13.30	2.764	1.875	10,35	14,110	16,940	21,170	10,120	3,800	19,32	24,840	199	272	380	489
	15.50	2.602	1.750	12,30	16,770	20,130	25,160	12,350	6,840	23,57	30,310	237	323	452	581
4	11.85	3.476	2.937		8,410	10,310	12,820		8,600	12,04	15,470		231	323	415
	14.00	3.340	2.375	8,330	11,350	14,630	17,030	7,940	10,830	15,16	19,500	209	285	400	514
4 1/2	13.75	3.958	3.156		7,200	8,920	10,910		7,900	11,07	14,230		270	378	486
	16.60	3.826	2.812	7,620	10,390	12,470	15,590	7,210	9,830	13,76	17,690	242	331	463	595
	20.00	3.640	2.812	9,510	12,960	15,560	19,450	9,200	12,540	17,56	22,580	302	412	577	742
5	16.25	4.408	3.750		6,970	8,640	10,550		7,770	10,88	13,980		328	459	591
	19.50	4.276	3.687	7,390	10,000	12,090	15,110	6,970	9,500	13,30	17,100	290	396	554	712
5 1/2	21.90	4.778	3.812	6,610	8,440	10,350	12,870	6,320	8,610	12,06	15,500	321	437	612	787
	24.70	4.670	3.500	7,670	10,460	12,560	15,700	7,260	9,900	13,86	17,820	365	497	696	895
5 9/16	19.00	4.975	4.125	4,580	5,640			5,090	6,950			267	365		
	22.20	4.859	3.812	5,480	6,740			6,090	8,300			317	432		
	25.25	4.733	3.500	6,730	8,290			7,180	9,790			369	503		
6 5/8	22.20	6.065	5.187	3,260	4,020			4,160	5,530			307	418		
	25.20	5.965	5.000	4,010	4,810	6,160	6,430	4,790	5,540	9,150	11,770	359	489	685	881
	31.90	5.761	4.625	5,020	6,170			6,275	8,540			463	631		

DIMENSIONS AND STRENGTHS OF CASING

Size OD In	Grade	Wt/Ft W/Cplgs, Lb	ID In	Drift Diameter In	OD of Coupling In	Collapse Psi	Internal Yield Psi	Joint Strength X 1000	
								Short Thds	Long Thds
4 1/2	F-25	9.50	4.090	3.965	5.000	1,920	1,990	71	
	H-40	9.50	4.090	3.965	5.000	2,770	3,190	77	
	J-55	9.50	4.090	3.965	5.000	3,310	4,380	101	
	J-55	10.50	4.052	3.927	5.000	4,010	4,790	132	
	K-55	11.60	4.000	3.875	5.000	4,960	5,350	154	162
	L-55	9.50	4.090	3.965	5.000	3,310	4,380	112	
	L-55	10.50	4.052	3.927	5.000	4,010	4,790	146	
	L-55	11.60	4.000	3.875	5.000	4,960	5,350	170	180
	C-75	11.60	4.000	3.875	5.000	6,130	7,290		212
	C-75	13.50	3.920	3.795	5.000	8,170	8,460		257
	N-80	11.60	4.000	3.875	5.000	7,010	7,780		223
	N-80	13.50	3.920	3.795	5.000	9,650	9,020		270
	C-95	11.60	4.000	3.875	5.000	7,010	9,240		234
	C-95	13.50	3.920	3.975	5.000	9,650	10,710		284
	P -110	11.60	4.000	3.875	5.000	7,560	10,690		279
	P -110	13.50	3.920	3.795	5.000	10,670	12,410		338
	P -110	15.10	3.826	3.701	5.000	14,320	14,420		406
5	F-25	11.50	4.560	4.435	5.563	1,820	1,930	84	
	J-55	11.50	4.560	4.435	5.563	3,060	4,240	133	
	J-55	13.00	4.494	4.369	5.563	4,140	4,870	169	182
	K-55	11.50	4.560	4.435	5.563	3,060	4,240	147	
	K-55	13.00	4.494	4.369	5.563	4,140	4,870	186	201
	K-55	15.00	4.408	4.283	5.563	5,550	5,700	228	246
	C-75	15.00	4.408	4.283	5.563	6,970	7,770		295
	C-75	18.00	4.276	4.151	5.563	10,000	9,500		376
	N-80	15.00	4.408	4.283	5.563	7,250	8,290		311
	N-80	18.00	4.276	4.151	5.563	10,490	10,140		396
	C-95	15.00	4.408	4.283	5.563	8,090	9,840		326
	C-95	18.00	4.276	4.151	5.563	12,010	12,040		416
	P-110	15.00	4.408	4.283	5.563	8,830	11,390		388
	P-110	18.00	4.276	4.151	5.563	13,450	13,940		495
5 1/2	F-25	13.00	5.044	4.919	6.050	1,660	1,810	95	
	H-40	14.00	5.012	4.887	6.050	2,630	3,110	130	
	J-55	14.00	5.012	4.887	6.050	3,120	4,270	172	
	J-55	15.50	4.950	4.825	6.050	4,040	4,810	202	217
	J-55	17.00	4.892	4.767	6.050	4,910	5,320	229	247
	K-55	14.00	5.012	4.887	6.050	3,120	4,270	189	
	K-55	15.50	4.950	4.825	6.050	4,040	4,810	222	239
	K-55	17.00	4.892	4.767	6.050	4,910	5,320	252	272
	C-75	17.00	4.892	4.767	6.050	6,070	7,250		327

DIMENSIONS AND STRENGTHS OF CASING

Size OD In	Grade	Wt/Ft W/Cplgs, Lb	ID In	Drift Diameter In	OD of Coupling In	Collapse Psi	Internal Yield P,si	Joint Strength x 1000	
								Short Thds	Long Thds
5 1/2	C-75	20.00	4.778	4.653	6.050	8,440	8,610		403
	C-75	23.00	4.670	4.545	6.050	10,460	9,260		473
	N-80	17.00	4.892	4.767	6.050	6,280	7,740		348
	N-80	20.00	4.778	4.653	6.050	8,830	9,190		428
	N-80	23.00	4.670	4.545	6.050	11,160	9,880		502
	C-95	17.00	4.892	4.767	6.050	6,930	9,190		374
	C-95	20.00	4.778	4.653	6.050	10,000	10,910		460
	C-95	23.00	4.670	4.545	6.050	12,920	11,730		540
	P-110	17.00	4.892	4.767	6.050	7,460	10,640		445
	P-110	20.00	4.778	4.653	6.050	11,080	12,640		548
	P-110	23.00	4.670	4.545	6.050	14,520	13,580		643
6	F-25	15.00	5.524	5.399	6.625	1,540	1,740	108	
	H-40	18.00	5.424	5.299	6.625	2,780	3,360	179	
	J-55	18.00	5.424	5.299	6.625	3,620	4,620	239	279
	N-80	18.00	5.524	5.299	6.625	4,740	6,720		323
	N-80	20.00	5.352	5.227	6.625	5,690	7,560		366
	N-80	23.00	5.240	5.115	6.625	7,180	8,870		432
	P-110	23.00	5.240	5.115	6.625	10,380	12,190		565
	P-110	26.00	5.132	5.007	6.625	12,380	13,920		646
6 5/8	F-25	17.00	6.135	6.010	7.390	1,370	1,620	121	
	H-40	20.00	6.049	5.924	7.390	4,250	3,040	184	
	J-55	20.00	6.049	5.924	7.390	2,970	4,180	245	266
	J-55	24.00	5.921	5.796	7.390	4,560	5,110	314	340
	K-55	20.00	6.049	5.924	7.390	2,970	4,180	267	290
	K-55	24.00	5.921	5.796	7.390	4,560	5,110	342	372
	C-75	24.00	5.921	5.796	7.390	5,570	6,970		453
	C-75	28.00	5.791	5.666	7.390	7,830	8,260		552
	C-75	32.00	5.675	5.550	7.390	9,830	8,410		638
	N-80	24.00	5.921	5.796	7.390	5,760	7,440		481
	N-80	28.00	5.791	5.666	7.390	8,170	8,810		586
	N-80	32.00	5.675	5.550	7.390	10,320	10,040		677
	C-95	24.00	5.921	5.796	7.390	6,290	8,820		546
	C-95	28.00	5.791	5.666	7.390	9,200	10,460		665
	C-95	32.00	5.675	5.550	7.390	11,800	11,920		769
	P-110	24.00	5.921	5.796	7.390	6,710	10,230		641
	P-110	28.00	5.791	5.666	7.390	10,140	12,120		781
	P-110	32.00	5.676	5.550	7.390	13,200	13,800		904

DIMENSIONS AND STRENGTHS OF CASING

Size OD In	Grade	Wt/Ft W/Cplgs Lb	ID In	Drift Diameter In	OD of Coupling In	Collapse Psi	Internal Yield Psi	Joint Strength x 1000	
								Short Thds	Long Thds
7	F-25	17.00	6.538	6.413	7.656	1,100	1,440	118	
	H-40	17.00	6.538	6.413	7.656	1,450	2,310	122	
	H-40	20.00	6.456	6.331	7.656	1,980	2,720	176	
	J-55	20.00	6.456	6.331	7.656	2,270	3,740	234	
	J-55	23.00	6.366	6.241	7.656	3,270	4,360	284	313
	J-55	26.00	6.276	6.151	7.656	4,320	4,980	334	367
	K-55	20.00	6.456	6.331	7.656	2,270	3,740	254	
	K-55	23.00	6.366	6.241	7.656	3,270	4,360	309	341
	K-55	26.00	6.276	6.151	7.656	4320	4,980	364	401
	C-75	23.00	6.366	6.241	7.656	3,770	5,940		416
	C-75	26.00	6.276	6.151	7.656	5,250	6,790		489
	C-75	29.00	6.184	6.059	7.656	6,760	7,650		562
	C-75	32.00	6.094	5.969	7.656	8,230	8,490		633
	C-75	35.00	6.004	5.879	7.656	9,710	8,660		703
	C-75	38.00	5.920	5.795	7.656	10,680	8,660		767
	N-80	23.00	6.366	6.241	7.656	3,830	6,340		442
	N-80	26.00	6.276	6.151	7.656	5,410	7,240		519
	N-80	29.00	6.184	6.059	7.656	7,020	8,160		597
	N-80	32.00	6.094	5.969	7.656	8,600	9,060		672
	N-80	35.00	6.004	5.879	7.656	10,180	9,240		746
	N-80	38.00	5.920	5.795	7.656	11,390	9,240		814
	C-95	23.00	6.366	6.241	7.656	4,150	7,530		505
	C-95	26.00	6.276	6.151	7.656	5,870	8,600		593
	C-95	29.00	6.184	6.059	7.656	7,820	9,690		683
	C-95	32.00	6.094	5.969	7.656	9,730	10,760		768
	C-95	35.00	6.004	5.879	7.656	11,640	10,970		853
	C-95	38.00	5.920	5.795	7.656	13,420	10,970		931
	P-110	26.00	6.276	6.151	7.656	6,210	9,960		693
	P-110	29.00	6.784	6.059	7.656	8,510	11,220		797
	P-110	32.00	6.094	5.969	7.656	10,760	12,460		897
	P-110	35.00	6.004	5.879	7.656	13,010	12,700		996
	P-110	38.00	5.290	5.795	7.656	15,110	12,700		1087
7 5/8	F-25	20.00	7.125	7.000	8.500	1,100	1,430	138	
	H-40	24.00	7.025	6.900	8.500	2,040	2,750	212	
	J-55	26.40	6.969	6.844	8.500	2,890	4,140	315	346
	K-55	26.40	6.969	6.844	8.500	2,890	4,140	342	377
	C-75	26.40	6.969	6.844	8.500	3,280	5,650		461
	C-75	29.70	6.875	6.750	8.500	4,670	6,450		542
	C-75	33.70	6.765	6.640	8.500	6,320	7,400		635

DIMENSIONS AND STRENGTHS OF CASING

Size OD In	Grade	Wt/Ft W/Cplgs Lb	ID In	Drift Diameter In	OD of Coupling In	Collapse Psi	Internal Yield Psi	Joint Strength x 1000	
								Short Thds	Long Thds
7 5/8	C-75	39.00	6.625	6.500	8.500	8,430	8,610		751
	N-80	26.40	6.969	6.844	8.500	3,400	6,020		490
	N-80	29.70	6.875	6.750	8.500	4,790	6,890		575
	N-80	33.70	6.765	6.640	8.500	6,560	7,890		674
	N-80	39.00	6.625	6.500	8.500	8,810	9,180		798
	C-95	26.40	6.969	6.844	8.500	3,710	7,150		560
	C-95	29.70	6.875	6.750	8.500	5,120	8,180		659
	C-95	33.70	6.765	6.640	8.500	7,260	9,380		772
	C-95	39.00	6.625	6.500	8.500	9,980	10,900		914
	P-110	29.70	6.875	6.750	8.500	5,340	9,470		769
	P-110	33.70	6.765	6.640	8.500	7,850	10,860		901
	P-110	39.00	6.625	6.500	8.500	11,060	12,630		1066
8 5/8	F-25	24.00	8.097	7.972	9.625	,950	1,340	161	
	H-40	28.00	8.017	7.892	9.625	1,640	2,470	233	
	H-40	32.00	7.921	7.796	9.625	2,210	2,860	279	
	J-55	24.00	8.097	7.972	9.625	1,370	2,950	244	
	J-55	32.00	7.921	7.796	9.625	2,530	3,930	372	417
	J-55	36.00	7.825	7.700	9.625	3,450	4,460	434	486
	K-55	24.00	8.097	7.972	9.625	1,370	2,950	263	
	K-55	32.00	7.921	7.796	9.625	2,530	3,930	402	452
	K-55	36.00	7.825	7.700	9.625	3,450	4,460	468	526
	C-75	36.00	7.825	7.700	9.625	4,020	6,090		648
	C-75	40.00	7.725	7.600	9.625	5,350	6,850		742
	C-75	44.00	7.625	7.500	9.625	6,680	7,610		834
	C-75	49.00	7.511	7.386	9.625	8,200	8,480		939
	N-80	36.00	7.825	7.700	9.625	4,100	6,490		688
	N-80	40.00	7.725	7.600	9.625	5,520	7,300		788
	N-80	44.00	7.625	7.500	9.625	6,950	8,120		887
	N-80	49.00	7.511	7.386	9.625	8,570	9,040		997
	C-95	36.00	7.825	7.700	9.625	4,360	7,710		789
	C-95	40.00	7.725	7.600	9.625	6,010	8,670		904
	C-95	44.00	7.625	7.500	9.625	7,730	9,640		1017
	C-95	49.00	7.511	7.386	9.625	9,690	10,740		1144
	P-110	40.00	7.725	7.600	9.625	6,380	10,040		1055
	P-110	44.00	7.625	7.500	9.625	8,400	11,160		1186
	P-110	49.00	7.511	7.386	9.625	10,720	12,430		1335

DIMENSIONS AND STRENGTHS OF CASING

Size OD In	Grade	Wt/Ft W/Cplgs Lb	ID In	Drift Diameter In	OD of Coupling In	Collapse Psi	Internal Yield Psi	Joint Strength x 1000 Short Thds	Joint Strength x 1000 Long Thds
9 5/8	F-25	29.30	9.063	8.907	10.625	860	1,280	185	
	H-40	32.30	9.001	8.845	10.625	1,400	2,270	254	
	H-40	36.00	8.921	8.765	10.625	1,740	2,560	294	
	J-55	36.00	8.921	8.765	10.625	2,020	3,520	394	453
	J-55	40.00	8.835	8.679	10.625	2,570	3,950	452	520
	K-55	36.00	8.921	8.765	10.625	2,020	3,520	423	489
	K-55	40.00	8.835	8.679	10.625	2,570	3,950	486	561
	C-75	40.00	8.835	8.679	10.625	2,980	5,390		694
	C-75	43.50	8.755	8.599	10.625	3,750	5,930		776
	C-75	47.00	8.681	8.525	10.625	4,630	6,440		852
	C-75	53.50	8.535	8.379	10.625	6,380	7,430		999
	N-80	40.00	8.835	8.679	10.625	3,090	5,750		737
	N-80	43.50	8.755	8.599	10.625	3,810	6,330		825
	N-80	47.00	8.681	8.525	10.625	4,750	6,870		905
	N-80	53.50	8.535	8.379	10.625	6,620	7,930		1,062
	C-95	40.00	8.835	8.679	10.625	3,330	6,820		847
	C-95	43.50	8.755	8.599	10.625	4,130	7,510		948
	C-95	47.00	8.681	8.525	10.625	5,080	8,150		1,040
	C-95	53.50	8.535	8.379	10.625	7,330	9,410		1,220
	P-110	43.50	8.755	8.599	10.625	4,430	8,700		1,106
	P-110	47.00	8.681	8.525	10.625	5,310	9,440		1,213
	P-110	53.50	8.535	8.379	10.625	7,930	10,900		1,422
10 3/4	F-25	32.75	10.192	10.036	11.750	650	1,140	196	
	H-40	32.75	10.192	10.036	11.750	880	1,820	205	
	H-40	40.50	10.050	9.894	11.750	1,420	2,280	314	
	J-55	40.50	10.050	9.894	11.750	1,580	3,130	420	
	J-55	45.50	9.950	9.794	11.750	2,090	3,580	493	
	J-55	51.00	9.850	9.694	11.750	2,700	4,030	565	
	K-55	40.50	10.050	9.894	11.750	1,580	3,130	450	
	K-55	45.50	9.950	9.794	11.750	2,090	3,580	528	
	K-55	51.00	9.850	9.694	11.750	2,700	4,030	606	
	C-75	51.00	9.850	9.694	11.750	3,100	5,490	756	
	C-75	55.50	9.760	9.604	11.750	3,950	6,040	843	
	N-80	51.00	9.850	9.694	11.750	3,220	5,860	804	
	N-80	55.50	9.760	9.604	11.750	4,020	6,450	895	
	C-95	51.00	9.850	9.694	11.750	3,490	6,960	927	
	C-95	55.50	9.760	9.604	11.750	4,300	7,660	1,032	
	P-110	51.00	9.850	9.694	11.750	3,670	8,060	1,080	
	P-110	55.50	9.760	9.604	11.750	4,630	8,860	1,203	
	P-110	60.70	9.660	9.504	11.750	5,860	9,760	1,338	
	P-110	65.70	9.560	9.404	11.750	7,490	10,660	1,472	

DIMENSIONS AND STRENGTHS OF CASING

Size OD In	Grade	Wt/Ft W/Cplgs Lb	ID In	Drift Diameter In	OD of Coupling In	Collapse Psi	Internal Yield Psi	Joint Strength x 1000	
								Short Thds	Long Thds
11 3/4	F-25	38.00	11.150	10.994	12.750	620	1,120	222	
	H-40	42.00	11.084	10.928	12.750	1,070	1,980	307	
	J-55	47.00	11.000	10.844	12.750	1,510	3,070	477	
	J-55	54.00	10.880	10.724	12.750	2,070	3,560	568	
	J-55	60.00	10.772	10.616	12.750	2,660	4,010	649	
	K-55	47.00	11.000	10.844	12.750	1,510	3,070	509	
	K-55	54.00	10.880	10.724	12.750	2,070	3,560	606	
	K-55	60.00	10.772	10.616	12.750	2,660	4,010	693	
	C-75	60.00	10.772	10.616	12.750	3,070	5,460	869	
	N-80	60.00	10.772	10.616	12.750	3,180	5,830	924	
	C-95	60.00	10.772	10.616	12.750	3,440	6,920	1,066	
13 3/8	F-25	48.00	12.715	12.559	14.375	560	1,080	260	
	H-40	48.00	12.715	12.559	14.375	770	1,730	322	
	J-55	54.50	12.615	12.459	14.375	1,130	2,730	514	
	J-55	61.00	12.515	12.359	14.375	1,540	3,090	595	
	J-55	68.00	12.415	12.259	14.375	1,950	3,450	675	
	K-55	54.50	12.615	12.459	14.375	1,130	2,730	547	
	K-55	61.00	12.515	12.359	14.375	1,540	3,090	633	
	K-55	68.00	12.415	12.259	14.375	1,950	3,450	718	
	C-75	72.00	12.347	12.191	14.375	2,590	5,040	978	
	N-80	72.00	12.347	12.191	14.375	2,670	5,380	1,040	
	C-95	72.00	12.347	12.191	14.375	2,820	6,390	1,204	
16	F-25	55.00	15.376	15.188	17.000	290	850	258	
	H-40	65.00	15.250	15.062	17.000	670	1,640	439	
	J-55	75.00	15.125	14.938	17.000	1,020	2,630	710	
	J-55	84.00	15.010	14.822	17.000	1,410	2,980	817	
	K-55	75.00	15.124	14.936	17.000	1,020	2,630	752	
	K-55	84.00	15.010	14.822	17.000	1,410	2,980	865	
18 5/8	H-40	87.50	17.755	17.567	19.625	630	1,630	559	
	J-55	87.50	17.755	17.567	19.625	630	2,250	754	
	K-55	87.50	17.755	17.567	19.625	630	2,250	794	
20	F-25	94.00	19.312	18.936	21.000	410	960	359	
	H-40	94.00	19.124	18.936	21.000	520	1,530	581	
	J-55	94.00	19.124	18.936	21.000	520	2,110	784	907
	J-55	106.50	19.000	18.812	21.000	770	2,410	913	1,057
	J-55	133.00	18.730	18.542	21.000	1,500	3,060	1,192	1,380
	K-55	94.00	19.124	18.936	21.000	520	2,110	824	955
	K-55	106.50	19.000	18.812	21.000	770	2,410	960	1,113
	K-55	133.00	18.730	180542	21.000	1,500	3,060	1,253	1,453

SECTION 4

DIMENSIONS AND STRENGTHS



CAPACITY FORMULAS 1
NON-UPSET AND EXTERNAL UPSET TUBING 2
API INTERNAL UPSET DRILL PIPE 5
CASING 6

DIMENSIONS AND STRENGTHS
(CAPACITY FORMULAS)

The tables in this section contain information that is sufficient for normal conditions. If it is necessary to calculate capacity data for conditions not covered by the tables, the following formulas may be used:

Barrels per Lin Ft = $0.0009714 (D^2)$

Lin Ft per Barrel = $\frac{1029.4}{D^2}$

Cu Ft per Lin Ft = $0.005454 (D^2)$

Lin Ft per Cu Ft = $\frac{183.35}{D^2}$

Gallons per Lin Ft = $0.0408 (D^2)$

Lin Ft per Gallon = $\frac{24.51}{D^2}$

WHERE:

D = diameter in inches

PLEASE NOTE:

Collapse, Internal Yield and Joint Strength are minimum values with no safety factor, reproduced by permission from API Bul 5C2, Bulletin on Performance Properties of Casing and Tubing.

SECTION 5

CEMENT



API CEMENTS, DESCRIPTIONS 1
CEMENTS AND ADDITIVES, PHYSICAL PROPERTIES 2
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CLASS G, SEA WATER 9
CLASS H, SEA WATER 9
BENTONITE (Gel) 10
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MULTIDENSE 14
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LW-7-2, LW-7-4 15
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KOL-SEAL 17
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API CEMENTS

CLASS A

Intended for use from surface to 6,000 feet when special properties are not required. May be tailored with additives to meet special requirements beyond basic performance. It is a Portland cement similar to the ordinary construction Type I, ASTM C 150.

CLASS B

Intended for use from surface to 6,000 feet when conditions require moderate to high sulfate-resistance. Available in both moderate (similar to ASTM C 150, Type II) and high sulfate-resistance types.

CLASS C

Intended for use from surface to 6,000 feet when conditions required high early strength. Available in ordinary and moderate (similar to ASTMC 150, Type III) and high sulfate-resistance types.

CLASS G

Intended for use from surface to 8,000 feet as a basic cement, as manufactured, or can be used with accelerators and retarders to cover a wide range of well depths and temperatures. No additions other than calcium sulfate or water, or both, shall be interground or blended with the clinker during manufacture of Class G Cement. Available in moderate and high sulfate-resistance types.

CLASS H

Intended for use from surface to 8,000 feet as a basic cement, as manufactured, or can be used with accelerators and retarders to cover a range of well depths and temperatures. No additions other than calcium sulfate or water, or both, shall be interground or blended with the clinker during manufacture of Class H cement. Available only in moderate sulfate-resistance type.

PHYSICAL PROPERTIES of CEMENTS and ADDITIVES

MATERIAL	Bulk Wt Lb/Cu Ft	Specific Gravity	Absolute Volume Gal/Lb	Absolute Volume Cu Ft/Lb
API Cements, Classes A, B, C, G, & H	94	3.14	.0382	.0051
Multidense, 1-1	84.5	2.97	.0406	.0054
Multidense, 1-2	87.7	3.03	.0398	.0053
Multidense, 2-1	81.3	2.92	.0413	.0055
Trinity Lite Wate (TLW)* Cement	75	2.78	.0432	.0058
Calcium Chloride ($CaCl_2$)(dry)	56.4	1.96	.0612	.0082
Calcium Chloride (liquid)	82.18	1.317	.0910	.0122
Potassium Chloride (KCl) (dry)		1.984	.0604	.0081
Potassium Chloride, 68° F fresh water solutions				
3%		1.019	.0443	.0059
5%		1.031	.0450	.0060
Sodium Chloride (NaCl) (dry)	71.0	2.17	.0553	.0074
Attapulgite	40.0	2.89	.0415	.0053
Bentonite (gel)	60.0	2.65	.0453	.0060
Diacel D	66.7	2.1	.0572	.0076
Fly Ash	74.0	2.46	.0487	.0065
LW-6 (10% collapse @ 1500 PSI)	25	.70	.1712	.0229
LW-7-2 (10% collapse @ 2000 PSI)	15	.37	.3240	.0433
LW-7-4 (10% collapse @ 4000 PSI)	15	.38	.3155	.0422
Sodium Metasilicate (dry)	75	2.08	.0550	.0074
Sodium Silicate (liquid)	87.6	1.4	.0856	.0114
Cellophane Flake	15	1.42	.0844	.0113
Flex Seal	50	1.15	.1043	.0139
Gilsonite	50	1.07	.1122	.0150
Gypsum	75.0	2.7	.0444	.0059
Kol-Seal	50	1.30	.0925	.0124
Nut Plug	48	1.28	.0938	.0125
Perlite	8			
0 PSI		.53	.2274	.0304
1,000 PSI		.81	.1474	.0197
3,000 PSI		.94	.1279	.0171
Sure Seal	35-40	1.22	.0983	.0131
FP-6L	61.65	.988	.1213	.0162
FP-11	65.79	2.60	.0461	.0062
FP-12L	60.52	.97	.1237	.0165
CD-31	41.6	1.35	.0284	.0038
CD-31L	73.0	1.17	.0889	.0118
CD-32	35.0	1.25	.0959	.0128
CD-32L	72.37	1.16	.1034	.0138
Hematite	193	5.02	.0239	.0032
Manganese Oxide	62	4.80	.0250	.033
Silica Flour	70	2.63	.0456	.0061
Silica Sand, 100 Mesh	100	2.63	.0456	.0061
Sand	100	2.63	.0456	.0061
Water (Fresh)	62.4	1.00	.1199	.0160
Water (Sea)	63.96	1.025	.1169	.0153

*This manufactured light weight cement is manufactured by Texas Industries and marketed by Trinity as TLW.

PHYSICAL PROPERTIES of CEMENTS and ADDITIVES

MATERIAL	Bulk Wt Lb/Cu Ft	Specific Gravity	Absolute Volume Gal/Lb	Absolute Volume Cu Ft/Lb
R-1	35.0	1.30	.0922	.0123
R-3	35.1	1.36	.0882	.0118
R-3L	73.62	1.18	.1017	.0136
R-6 (Diacel LWL)	29	1.36	.0882	.0118
R-7		1.86	.0645	.0086
R-8	35	1.20	.0999	.0133
R-8L	76	1.22	.0983	.0133
R-9	51	1.73	.0693	.0093
R-11	49	1.05	.1142	.0153
R-12L	79.25	1.27	.0944	.0126
R-15L	80.81	1.295	.0926	.0124
R-21	35.0	1.35	.0889	.0119
R-21L	72.38	1.16	.1034	.0138
FL-25	33.4	1.31	.0888	.0119
FL-32	15.6	1.26	.0952	.0127
FL-32L	66.14	1.06	.0881	.0151
FL-33	15.6	1.26	.0952	.0127
FL-33L	67.38	1.08	.1111	.0148
FL-52	31.0	1.40	.0856	.0114
FL-62	37.8	1.28	.0937	.0125
FL-63	19.0	1.25	.0959	.0128
FL-63L	69.25	1.11	.1081	.0144
FL-64	50.0	1.57	.0764	.0102
FL-64LT	52.5	1.63	.0736	.0098
BA-10	40.0	1.3	.0922	.0123
BA-10L	57.40	.92	.0895	.0120
B6	39.0	1.34	.0888	.0119
B8	37.50	2.20	.0545	.0073
B8L	84.54	1.35	.0888	.0119
B9		2.70	.0444	.0059
BA-61		.51	.0871	.0314
BA-86L	62.36	1.00	.1199	.0160
BA-90	16.00	2.20	.0545	.0073
BA-91	32.00	2.33	.0515	.0069
ASA-301	63.84	2.23	.0538	.0072
ASA-301L	56.77	.91	.1318	.0176
Barite	135	4.23	.0284	.0038
Diesel Oil, No. 1	51.1	.82	.1457	.0195
Diesel Oil, No. 2	53.0	.85	.1411	.0189
EC-1	50.0	2.60	.0161	.0062
FA-20	63.64	1.02	.1175	.0157
FS-1	39.0	1.34	.0895	.0120
Hydrated Lime	31.	2.2	.0545	.0073
LS-1L	66.13	1.06	.1132	.0151
LS-2L	72.37	1.16	.1034	.0138
LS-3L	64.88	1.04	.1153	.0154
MCS-AG	63.95	1.025	.1169	.0156

ABSOLUTE VOLUME NaCl (DISSOLVED)

% NaCl	Gal/Lb
2%	.0371
3%	.03745
4%	.0378
5%	.0381
6%	.0384
7%	.0387
8%	.0390
9%	.0392
10%	.0394
11%	.03965
12%	.0399
13%	.0401
14%	.0403
15%	.0405
16%	.0407
17%	.04095
18%	.0412
19%	.0414
20%	.0416
21%	.0418
22%	.0420
23%	.0422
24%	.0424
25%	.0426
26%	.0428
27%	.0429
28%	.0430
29%	.04315
30%	.0433
31%	.04345
32%	.0436
33%	.04375
34%	.0439
35%	.0440
36%	.0441
37%	.0442

SALT* CEMENT

Sodium chloride, added to the mixing water or to the dry cement mix, reduces the damage to fresh water-sensitive formations by cement filtrate. In addition, the use of salt provides a better degree of bonding to water-sensitive shales. For cementing through salt beds, a salt-saturated cement slurry is recommended. Salt causes cements to expand after setting–the higher the concentration of salt, (up to saturation) the more the expansion. The amount of salt used is expressed as "% by weight of fresh water."

Salt added to mixing water for Salt Slurry			Density of Salt Water	
%	Lbs of NaCl/gal	Lbs of NaCl/cu ft	Lb/gal	Lb/cu ft
0			8.34	62.4
3	.25	1.87	8.50	63.6
5	.41	3.14	8.60	64.3
10	.83	6.21	8.89	66.5
15	1.25	9.35	9.10	68.1
16	1.33	9.95	9.18	68.7
18	1.50	11.22	9.27	69.3
20	1.67	12.49	9.36	70.0
25	2.09	15.63	9.56	71.5
(saturated) 37.2	3.10	23.19	10.08	75.4

***** The terms "Salt", "Sodium Chloride" and "NaCl" are used interchangeably.

SLURRY PROPERTIES of API CEMENTS with SALT						
Cement	Salt % by	Density		Mix Water		Yield
Class	wt of water	lb/gal	lb/cu ft	%	gal/sk	cu ft/sk
A, H *	0	15.7	117.2	46	5.18	1.17
	11	15.8	118.4	46	5.18	1.20
	15	15.9	119.0	46	5.18	1.21
	18	16.0	119.3	46	5.18	1.22
	20	16.0	119.5	46	5.18	1.22
	25	16.1	120.1	46	5.18	1.23
	(saturated) 37.2	16.2	121.4	46	5.18	1.26
C	0	14.8	111.0	56	6.31	1.32
	11	15.0	112.4	56	6.31	1.35
	15	15.1	113.1	56	6.31	1.37
	18	15.2	113.5	56	6.31	1.38
	20	15.2	113.7	56	6.31	1.38
	25	15.3	114.4	56	6.31	1.40
	(saturated) 37.2	15.5	115.9	56	6.31	1.43
H *	0	16.5	123.5	38	4.28	1.05
	11	16.6	124.5	38	4.28	1.07
	15	16.7	124.9	38	4.28	1.08
	18	16.7	125.2	38	4.28	1.09
	20	16.8	125.4	38	4.28	1.09
	25	16.8	125.8	38	4.28	1.10
	(saturated) 37.2	17.0	126.9	38	4.28	1.13
G	0	15.9	118.7	44	4.96	1.14
	11	16.0	119.8	44	4.96	1.17
	15	16.1	120.3	44	4.96	1.18
	18	16.1	120.7	44	4.96	1.18
	20	16.2	120.9	44	4.96	1.19
	25	16.2	121.4	44	4.96	1.20
	(saturated) 37.2	16.4	122.6	44	4.96	1.23

*See note on p. 5-8 concerning densities of Class H cement.

CALCULATION OF SLURRY PROPERTIES

Working from a known or design density, and the absolute volume factors (ppg 5-2 thru 5-4) of the materials used, mixing water and yield can be calculated for any slurry. Two examples are shown on this and the following page.

ABSOLUTE VOLUME
Slurry Calculation Work Sheet
(Basic Slurry Design)

CEMENT BLEND ***Class G, 8%*** **Gel**

TOTAL SK OF CEMENT FOR JOB _____ DESIRED DENSITY ***13.3*** LB/GAL

COMPANY _____ WELL _____ DATE _____

CEMENT	LB/SACK	X	GAL/LB	=	GAL/SACK
G	***94.0***	X	***.0382***	=	***3.5908***
		X		=	
Subtotal cement	***94.0***				***3.5908***
Additives ≥ 2%					
Gel (8%)	***7.52***	X	***.0453***	=	***.3407***
		X		=	
		X		=	
		X		=	
		X		=	
Subtotal H_20 unknown	***101.52***				***3.9315***
H_20: FRESH or	***82.6023***	X	.1200	=	***9.9123***
SEA		X	.1169		
SALT: pg 5-4		X		=	
KCl: pg 5-2		X		=	
Subtotal H_20 known					
GRAND TOTAL	***184.1223***				***13.8438***

$$\frac{\text{Subtotal, lb/sk} - (\text{Desired Density, lb/gal} \times \text{subtotal, gal/sk})}{\text{Desired density, lb/gal} \left[(\text{gal/lb of salt} \times \text{\% salt}) + \text{gal/lb of unknown}\right] - 1 - \text{\% salt}} = \text{lb/sk of unknown}$$

$$\frac{\textbf{101.52}\ \text{lb/sk} - (\textbf{13.3}\ \text{lb/gal} \times \textbf{3.9315}\ \text{gal/sk})}{\textbf{13.3}\ \text{lb/gal} \left[(\textbf{0}\ \text{gal/lb} \times \textbf{0.0}) + \textbf{.12}\ \text{gal/lb}\right] - 1 - \textbf{0.0}} = \textbf{82.6023}\ \text{lb/sk of unknown}$$

$$\frac{\text{Grand Total, gal sk}}{\text{gal/cu ft}} = \text{Yield, cu ft/sk} \qquad \frac{\textbf{13.8438}\ \text{gal/sk}}{7.4805\ \text{gal/cu ft}} = \textbf{1.85}\ \text{cu ft /sk}$$

ABSOLUTE VOLUME
Slurry Calculation Work Sheet
(Basic Slurry Design)

CEMENT BLEND ***35:65:4 (Class H) with 5% SALT***

TOTAL SK OF CEMENT FOR JOB _____ DESIRED DENSITY ***12.8*** LB/GAL

COMPANY _____ WELL _____ DATE _____

CEMENT	LB/SACK	X	GAL/LB	=	GAL/SACK
Fly Ash, 35%	***25.9***	X	***.0487***	=	***1.2613***
H, 65%	***61.1***	X	***.0382***	=	***2.3340***
Subtotal cement	***87.0***				***3.5953***
Additives ≥ 2%					
Gel (4% of 87)	***3.48***	X	***.0453***	=	***0.1576***
		X		=	
		X		=	
		X		=	
		X		=	
Subtotal H_20 unknown	***90.48***				***3.7529***
H_20: FRESH or	***83.1724***	X	.1200	=	***9.9807***
SEA		X	.1169		
SALT: pg 5-4	***4.1586***	X	***.0381***	=	***.1584***
KCl: pg 5-2		X		=	
Subtotal H_20 known					
GRAND TOTAL	***177.811***				***13.892***

Subtotal, lb/sk – (Desired Density, lb/gal X subtotal, gal/sk) = lb/sk of
Desired density, lb/gal [(gal/lb of salt X % salt) + gal/lb of unknown] - 1 - % salt unknown

90.48 lb/sk – (***12.8*** lb/gal X ***3.7529*** gal/sk) = ***83.1724*** lb/sk of unknown
12.8 lb/gal [(***.0381*** gal/lb X 0.***05***) +.***1200*** gal/lb] – 1 – 0.***05***

Grand Total, gal sk = Yield, ***13.892*** gal/sk = ***1.86*** cu ft /sk
gal/cu ft cu ft/sk 7.4805 gal/cu ft

SLURRY PROPERTIES OF NEAT API CEMENTS FRESH WATER RATIOS

The density and yield of *neat* API cement slurries depend only on the amount of mixing water used. If too much mixing water is used, the slurry will be thin and have excessive free water, or else completely separate into water and solids. If too little mixing water is used, the slurry will be too thick to pump. The "normal" amount of mixing water for each slurry is shown in bold face type. This usually corresponds to the official API recommendations.

Cement	Slurry Density		Mixing Water			Slurry Yield
Class	Lb/gal	Lb/cu ft	%	Gal/sk	Cu Ft/sk	Cu Ft/sk
C	14.0	104.7	68.9	7.76	1.03	1.52
	14.2	106.2	65.5	7.38	.986	1.46
	14.4	107.7	62.2	7.02	.938	1.42
	14.6	109.2	59.2	6.68	.892	1.37
	14.8	**111.0**	**56.0**	**6.31**	**.844**	**1.32**
A, H *	15.0	112.2	53.8	6.06	.810	1.29
	15.2	113.7	51.3	5.78	.773	1.25
	15.4	115.2	48.9	5.52	.737	1.22
	15.6	116.7	46.7	5.24	.704	1.18
	15.7	**117.2**	**46.0**	**5.18**	**.693**	**1.17**
	15.8	118.2	44.6	5.03	.681	1.15
G, H	**15.9**	**118.7**	**44.0**	**4.96**	**.663**	**1.14**
	16.0	119.7	42.6	4.80	.642	1.12
	16.2	121.2	40.7	4.59	.613	1.09
	16.4	122.7	38.9	4.39	.586	1.06
H *	**16.5**	**123.5**	**38.0**	**4.28**	**.572**	**1.05**
	16.6	124.2	37.2	4.19	.561	1.04
	16.8	125.7	35.6	4.01	.536	1.01
	17.0	127.2	34.0	3.84	.513	.99

* Class H is typically mixed with 38% water when a high slurry density is required and with 46% water when a lower density is appropriate. However, the official API recommendation is 38% water, resulting in 16.5 ppg slurry.

API CLASS G CEMENT WITH SEA WATER

Density	Mix Water		Yield
Lb/gal	%	Gal/sk	Cu Ft/sk
16.0	45.1	4.96	1.197

API CLASS H CEMENT WITH VARIOUS SEA WATER RATIOS

Density	Mix Water		Yield
Lb/gal	%	Gal/sk	Cu Ft/sk
16.69	38	4.18	1.04
16.47	40	4.40	1.07
16.26	42	4.62	1.10
16.06	44	4.84	1.13
15.87	46	5.06	1.16

CEMENTS WITH BENTONITE (Gel)

Bentonite percentages are by weight of cement

WITH VARIOUS FRESH WATER RATIOS						
Cement Class	Gel %	Density Lb/gal	Mix Water			Yield Cu Ft/sk
			%	Gal/sk	Cu Ft/sk	
A, H	0	15.6	46.0	5.18	.693	1.17
	4	14.2	67.2	7.57	1.012	1.51
	8	13.3	88.1	9.93	1.332	1.85
	12	12.6	111.6	12.6	1.684	2.23
	16	12.2	130.8	14.7	1.970	2.54
C	0	14.8	56.0	6.31	.844	1.32
	4	13.7	76.5	8.63	1.153	1.66
	8	12.9	98.9	11.1	1.482	2.01
	12	12.4	118.9	13.4	1.792	2.34
	16	11.9	145.1	16.4	2.192	2.76
G	0	15.8	44.0	4.96	.633	1.14
	4	14.3	65.5	7.38	.987	1.49
	8	13.3	88.1	9.94	1.329	1.85
	12	12.7	108.2	12.2	1.631	2.18
	16	12.2	130.8	14.8	1.979	2.54

FLY ASH CEMENT BLEND 15:85:8 with SALT & CLASS A CEMENT

MIXED WITH FRESH WATER				
Density	Mix Water		Yield	Salt, % by Wt
Lb/gal	%	Gal/sk	Cu Ft/sk	of Water
12.7	104	11.3	2.06	3.0
12.4	115	12.56	2.23	5.0
12.2	124	13.52	2.35	3.0

FLY ASH CEMENT BLEND 35:65:6

MIXED WITH FRESH WATER				
Cement	Density	Mix Water		Yield
Class	Lb/gal	%	Gal/sk	Cu Ft/sk
C	12.80	93	9.65	1.80
G	12.70	95	9.90	1.84
	13.60	74	7.70	1.54
H	12.70	95	9.90	1.84
	13.60	74	7.70	1.54
WITH 5% SALT AND CLASS A CEMENT				
A	12.40	112	11.64	2.09
	12.40	114	11.84	2.13

FLY ASH CEMENT BLEND 40:60:8

MIXED WITH FRESH WATER			
Density	Mix Water		Yield
Lb/gal	%	Gal/sk	Cu Ft/sk
13.88	65	6.76	1.40
13.40	75	7.78	1.54
13.00	85	8.81	1.69
12.60	95	9.85	1.83
12.40	105	10.88	1.98
12.10	115	11.92	2.11
WITH 5% SALT BY WEIGHT OF WATER			
12.40	112	11.56	2.90

FLY ASH CEMENT BLEND 50:50

MIXED WITH FRESH WATER				
Cement	Fly Ash	Density	Mix Water	Yield
Class	Cement Mix	Lb/gal	Gal/sk	Cu Ft/sk
G	50:50:2	14.4	5.43	1.21
H	50:50:2	14.4	5.43	1.21
	50:50:0	15.2	4.37	1.06
C	50:50:2	14.1	6.0	1.29
	50:50:0	14.7	4.93	1.14
	50:50:10	12.5	10.29	1.91

SODIUM METASILICATE SLURRIES

BJ Services' Sodium Metasilicate cement systems are low density, high yield, economical slurries that have relatively high strength. These properties can be varied, depending on the amount of Sodium Metasilicate additive used and the amount of mixing water. Sodium Metasilicate is usually used with the unretarded cements, API Classes A, C, G and H.

WITH FRESH WATER					
Cement Class	Thrifty Mix %	Density Lb/gal	Mix Water		Yield Cu Ft/sk
			%	Gal/sk	
A, G, H	1	14.2	65	7.33	1.46
	2	12.5	105	11.8	2.06
	3	11.4	155	17.5	2.81
C	1	13.9	70	7.89	1.53
	2	12.4	110	12.4	2.14
	3	11.4	155	17.5	2.81

SODIUM METASILICATE SLURRIES

WITH CLASS H and SEA WATER RATIOS				
Thrifty Mix %	Density Lb/gal	Mix Water		Yield Cu Ft/sk
		%	Gal/sk	
1	14.35	66	7.33	1.46
2	12.65	108	11.85	2.06
3	11.56	159	16.93	2.74

SODIUM SILICATE L

Sodium Silicate L additive is added to the cement mixing water, resulting in slurries having the following properties:

Low Density: Densities as low as 11.0 Lb/gallon

Relatively High Strength: Higher than other "filler" slurries having the same density.

Variable Water Ratio: Amount of mixing water can be varied as much as 5 Gallons per sack for some formulations.

Low Cost: Considering equivalent strength and density, Sodium Silicate L is economical.

Minimum Cement Storage: The higher yield of Sodium Silicate L results in the most cubic feet of slurry from the least cubic feet of dry cement storage.

SODIUM SILICATE (LIQUID) SLURRIES

WITH FRESH WATER				
Cement Class	Sodium Silicate L System	Density Lb/gal	Mix Water Gal/sk	Yield Cu Ft/sk
G, H	I	14.2	7.33	1.46
*TLW	I	12.0	9.89	1.75
G, H	II	12.5	11.8	2.06
*TLW	II	11.3	13.0	2.17
G, H	III	11.4	17.5	2.81
*TLW	III	11.2	13.9	2.29

* TLW is Trinity Lite Wate

TRINITY LITE-WATE (TLW)*

WITH VARIOUS FRESH WATER RATIOS			
Density	Mix Water		Yield
Lb/gal	%	Gal/sk	Cu Ft/sk
14.2	54.6	4.92	1.09
13.5	67.0	6.02	1.24
13.0	78.0	7.02	1.37
12.5	91.5	8.24	1.54
12.0	109.0	9.81	1.75

*This manufactured light weight cement is manufactured by Texas Industries and marketed by Trinity as TLW.

MULTIDENSE 1:1 (MANUFACTURED LIGHT: API)

WITH VARIOUS FRESH WATER PERCENTS			
Density	Mix Water		Yield
Lb/gal	%	Gal/sk	Cu Ft/sk
14.26	60	6.09	1.27
13.93	65	6.60	1.34
13.68	70	7.10	1.40
13.45	75	7.61	1.47
13.21	80	8.12	1.54
12.98	85	8.62	1.61

MULTIDENSE 1:2 (MANUFACTURED LIGHT: API)

WITH VARIOUS FRESH WATER RATIOS			
Density	Mix Water		Yield
Lb/gal	%	Gal/sk	Cu Ft/sk
15.08	50	5.26	1.17
14.70	55	5.78	1.24
14.37	60	6.32	1.31
14.05	65	6.83	1.37
13.75	70	7.36	1.45
13.52	75	7.88	1.52

MULTIDENSE 2:1 (MANUFACTURED LIGHT: API)

WITH VARIOUS FRESH WATER RATIOS			
Density	Mix Water		Yield
Lb/gal	%	Gal/sk	Cu Ft/sk
13.87	65	6.34	1.29
13.60	70	6.83	1.38
13.35	75	7.32	1.43
13.12	80	7.81	1.49
12.89	85	8.29	1.56
12.74	90	8.78	1.62

LW-6 LITE-SET CEMENTING SYSTEMS

BJ Services' Lite-Set cementing system has been designed to produce cements having very low densities and very good compressive strengths. The Lite-Set cements are made possible by BJ Services' LW-6 extender. LW-6 extender is a light gray, low density powder which is blended with Portland cement, or any other cementitious material. Lite-Set slurries can be mixed as light as 8 ½ pounds per gallon. The compressive strength of a Lite-Set slurry is superior to a slurry prepared with a conventional extender at the same density. Lite-Set systems are identified by their density in pounds per gallon times ten. Thus, an 8 ½ ppg slurry is "Lite-Set 85" and a 12.5 ppg slurry is " Lite-Set 125."

WITH CLASS H CEMENT			
Lite-Set	Mix Water Gal/sk	Yield Cu Ft/sk	R-5 %
85	18.6	6.09	.4
100	10.0	3.18	.4
120	6.8	1.98	.4
140	5.3	1.43	.4

See mixing manual and bulletin for additional information.

LW-7-2, LW-7-4

BJ Services' LW-7-2 and LW-7-4 are products consisting primarily of unicellular silicate microspheres with an average density of 0.37—0.38 gm/cc. Like LW-6, LW-7-2 and LW-7-4 lower the slurry density due to their own lower density. By placing extra solid material in the slurry, as opposed to extra water, the cement crystal structure can build up around the particles resulting in a stronger set product. As opposed to LW-6, however, LW-7-2 and LW-7-4 are silicate in nature instead of pozzolanic. This in turn leads to higher compressive strength as the materials react with cement.

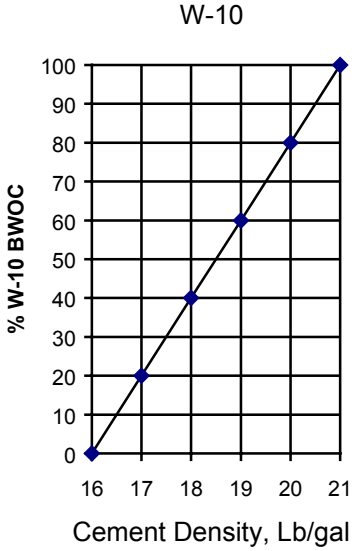
1. Both products are white in color.
2. LW-7-2 has a specific gravity of 0.37 and a crush resistance of no more than 10% at 2000 psi.
3. LW-7-4 has a specific gravity of 0.38 gm/cc and a crush resistance of no more than 10% at 4000 psi.
4. Both LW-7-2 and LW-7-4 will exhibit a non-elastic increase in crush with an increase in pressure. Since the density of the slurry is directly dependent upon the amount of LW-7-2 /LW-7-4 intact in the slurry, the slurry density will increase as it is pumped down the casing due to product crushing, yet it will not "elastically" decrease back to its original density as the pressure decreases due to its circulating up the annulus. This must be considered during job design.

WEIGHTED SLURRIES

A weighted cement slurry is one that is made heavier by the addition of a weighting agent. BJ Services reccommends two additives, (Hematite and W-10*), to increase slurry density. The table indicates the amount of Hematite needed to attain the desired slurry density. The chart shows the percent of W-10 needed to obtain a desired cement density. As with many other additives, it is recommended that specific tests be conducted when weighting materials are to be used under critical cementing conditions.

* W-10 is Manganese oxide

Hematite			
Cement Class	Density Lb/gal	%	Lb/sk
G	15.8	0	0
	17.0	19.3	18.2
	17.5	28.6	26.9
G	18.0	38.5	36.2
	18.5	48.9	46.0
	19.0	60.1	56.5
G	19.5	71.9	67.6
	20.0	84.6	79.5
H	16.5	0	0
	17.0	7.7	7.2
	17.5	15.9	15.0
H	18.0	24.7	23.2
	18.5	34.0	32.0
	19.0	43.9	41.3
H	19.5	54.4	51.2
	20.0	65.7	61.8



CEMENTS with GILSONITE

Gilsonite is a low density, granular solid having a graded particle size. It is used in cement slurries to both lower the density of the slurry and to act as a bridging agent.

CEMENTS WITH GILSONITE AND GEL					
Cement Class	Density Lb/gal	Mix Water Gal/sk	Yield Cu Ft/sk	Gilsonite %	Gel %
A, H	15.0	5.49	1.30	6.0	0
	14.0	6.09	1.54	17.8	0
A, H	14.0	6.90	1.56	10.2	2
	13.0	7.79	1.92	27.8	2
A, H	14.0	7.71	1.57	2.6	4
	13.0	8.60	1.94	20.3	4
C	14.0	6.82	1.53	10.1	0
	13.0	7.70	1.89	27.3	0
C	14.0	7.63	1.55	2.5	2
	13.0	8.51	1.91	19.9	2
C	13.0	9.33	1.93	12.4	4
G	15.0	5.34	1.30	7.6	0
	14.0	5.94	1.55	19.4	0
G	14.0	6.75	1.56	11.8	2
	13.0	7.64	1.93	29.4	2
G	14.0	7.56	1.57	4.2	4
	13.0	8.46	1.94	21.9	4

KOL-SEAL

Kol-Seal is a low-density additive that can provide lost circulation control and excellent scouring action. It can be used as an extender to provide a light-weight, high-yield slurry with higher compressive strengths than slurries of the same weight using Gilsonite.

Blend	Density Lb/gal	Mix Water Gal/ sk	Yield Cu Ft/sk	Gilsonite %	Kol-Seal %	$CaCl_2$ %
35:65:6	13.45	7.93	.57			
	13.14	8.24	1.69	5.75		
	13.27	8.13	1.66		5.75	
	12.87	8.55	1.8	11.49		
	13.11	8.33	1.75		11.49	
	13.14	8.24	1.69	5.75		2.0
	13.27	8.13	1.66		5.75	2.0

*The 35:65:6 mix refers to 35% fly ash, 65% cement, and 6% gel.

Cement Class	Density Lb/gal	Mix Water Gal/sk	Yield Cu Ft/sk	Gilsonite %	Kol-Seal %	$CaCl_2$ %
C	14.8	6.31	1.32			
	14.37	6.58		5.32		
	14.55	6.51	1.41			5.32
	13.97	6.85	1.54	10.64		
H	13.61	9.06	1.74		8	
	13.32	9.33	1.85	5.32	8	
	13.44	9.26	1.83		8	5.32
	13.07	9.60	1.96	10.64	8	
	13.29	9.46	1.96		8	10.64
	13.29	9.36	1.96	10.64	8	

FLOW-GUARD & FLOW-GUARD L (LIQUID)

These water-based systems are designed to reduce the permeability of thief zones. When brine or cement slurries accelerated with calcium chloride contact Flow-Guard, they will gel and create impermeable skin damage to the zone.

Three treatment applications are:

1) Preflush followed by a calcium chloride accelerated cement slurry,
2) Calcium chloride solution followed by the preflush system,
3) Calcium chloride solution, the preflush system and then a calcium chloride accelerated cement.

"P" TANK BULK CEMENT CAPACITIES

*NUMBER SACKS — NEAT CEMENTS				
"P" Tank Size	Class A	Class H		Trinity Lite-Wate
		Neat	with 15% Sand	
120 cu ft	105	111	102	90
220 cu ft	192	202	185	165
1000 cu ft	875	925	849	750
1230 cu ft	1075	1140	1046	925
1730 cu ft	1515	1600	1468	1300

*NUMBER SACKS — BLENDED CEMENTS							
"P" Tank Size	Sodium Metasilicate			Bentonite (Gel)			
	I	II	III	4 %	8 %	12 %	16 %
Class "A"							
120 cu ft	104	102	101	98	91	85	77
220 cu ft	190	188	175	180	167	155	142
1000 cu ft	865	855	845	820	760	705	645
1230 cu ft	1065	1055	1040	1010	940	870	795
1730 cu ft	1500	1480	1465	1420	1315	1220	1120
Class "H"							
120 cu ft	110	109	107	104	97	91	83
220 cu ft	201	199	197	191	178	166	153
1000 cu ft	915	905	895	870	810	755	695
1230 cu ft	1125	1113	1100	1070	996	929	855
1730 cu ft	1583	1566	1548	1505	1401	1306	1202

*Average number of sacks on filling without overflowing.

PLEASE NOTE:
Some tanks vary ± 2.5% of table volumes due to difference in vent systems.

SECTION 6

ACID



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HYDROCHLORIC ACID SOLUTIONS, RELATIVE TO USE IN OIL WELL ACIDIZING, BASIS 1000 GALLONS OF ACID

	7½%	15%	20%	25%
Gallons of water in acid	959	914	879	845
Gallons of water formed by reaction	19	40	54	70
Total gallons of water (not including dissolved salts)	978	954	933	915
Pounds of Hydrogen Chloride in solution	648	1,345	1,833	2,345
Specific Gravity of acid at 60^{o} F	1.037	1. 075	1.1	1.127
Weight in pounds per gallon	8.64	8.96	9.17	9.38
Pounds of Limestone dissolved	889	1,843	2,515	3,215
Cubic feet of Limestone dissolved	5.18	10.72	14.64	18.72
Pounds of Dolomite dissolved	826	1,705	2,320	2,345
Cubic feet of Dolomite dissolved	4.61	9.51	12.94	16.57
Cubic feet of Co_2 (gas) formed at 70^{o} F & 1 Atm.	3,440	7,140	9,740	12,435
Approximate gallons of spent acid water	1,024	1,046	1,062	1,079
Viscosity of acid (Relative to water as 1.00)	1.127	1.266	1.371	1.493
Viscosity of spent acid (Relative to water as 1.00)	1.35	1.94	2.69	3.40

USE OF BAUME´ HYDROMETER

The baume´ hydrometer is normally used to determine the strength of hydrochloric acid. In order to determine the strength of acid using this method, place a baume´ hydrometer in the solution and read the specific gravity in baume´ units, and the temperature. Using page 6-3, the reading is corrected to 60° F. The corrected reading is used with the acid tables to determine the strong acid requirement for diluted acid. The acid tables are on page 6-5 to 6-7.

In measuring the strength of acid with the hydrometer, care must be taken to see that the instrument is clean before it is placed in the acid. The acid must also be free of oil or other foreign material that may adhere to the hydrometer spindle. The proper procedure for using the hydrometer is as follows:

1. Pour acid into a glass container, preferably a glass cylinder.
2. Place the cylinder of acid upon a level table.
3. Place the hydrometer in the liquid and give a light spin to the instrument.
4. Arrange the hydrometer in the cylinder so that it does not touch the side of the container, and press down slightly. Allow the hydrometer to become stable and then record the reading.

In reading a hydrometer, the eye should be placed slightly below the plane of the surface and then raised slowly until the level of the liquid forms a straight line across the cylinder. Read the hydrometer at the point where the line cuts the hydrometer scale. The surface tension of the acid will cause the liquid to be higher upon the side of the hydrometer than the bottom level of the liquid (meniscus) in the cylinder. However, this rise is to be omitted when reading the hydrometer scale.

Where the atmospheric temperature is subject to considerable variations it is necessary that the temperature of the acid be considered each time the baume´ (or specific gravity) is measured. Hydrochloric acid, like all other liquids, expands and contracts with an increase and decrease in temperature. Unfortunately, the amount of expansion or contraction per degree change in temperature will also vary with the concentration of hydrogen chloride in the solution. Page 6-3, shows a quick method for correction the observed baume´ reading to the equivalent reading at 60° F. This correction can also be calculated from the following factors:

Allowance For Temperature

1° - 10° Be´. - 1/50° Be´. or .00015 Sp Gr for 1° F.
10° - 15° Be´. - 1/40° Be´. or .0002 Sp Gr for 1° F.
15° - 22° Be´. - 1/30° Be´. or .0003 Sp Gr for 1° F.
22° - 25° Be´. - 1/28° Be´. or .00035 Sp Gr for 1° F.

The correction should be added to the hydrometer reading if the temperature of the acid is above 60° F and subtracted from the hydrometer reading if the temperature is below 60° F.

ACID FORMULAS

CONVERTING STRONG ACID TO WEAKER ACID

The volume of strong acid required to make a given volume of dilute acid can be calculated by the following formula:

$$\text{Volume of strong} = \frac{(\text{Vol dilute})\,(\%\ \text{Acid in dilute})\,(\text{Sp Gr dilute})}{(\%\ \text{Acid in strong})\,(\text{Sp Gr strong})}$$

The volume of dilute acid that can be made from a given volume of strong acid can be calculated by the following formula:

$$\text{Volume of dilute} = \frac{(\text{Vol strong})\,(\%\ \text{Acid in strong})\,(\text{Sp Gr strong})}{(\text{Acid in dilute})\,(\text{Sp Gr dilute})}$$

DILUTION OF HYDROCHLORIC ACID

To determine the volume of water necessary to dilute acid to a definite volume of lesser strength, use the following formula:

Volume of water necessary =

$$(\text{Vol. desired}) - \frac{(\text{Vol desired})\,(\text{desired }\%)\,(\text{Sp Gr desired})}{(\text{Orig acid }\%)\,(\text{Sp Gr orig acid})}$$

INCREASING CONCENTRATION OF ACID

To determine the volume of strong acid necessary to increase the concentration of acid to a definite volume of acid of higher concentration, use the following formula:

Volume of strong acid necessary =

$$\frac{(\text{Vol. desired})(\text{desired }\%)(\text{Sp Gr desired})}{(\text{Strong }\%)(\text{Sp Gr strong})} - \frac{(\text{Vol orig})(\text{Orig }\%)(\text{Sp Gr orig})}{(\text{Strong }\%)(\text{Sp Gr orig})}$$

HYDROCHLORIC ACID AT 60° F

Be° 60° F	Per Cent HCl	Sp Gr 60° F	Gallons Strong Acid Required to Make 1000 Gallons of							
			28 %	25 %	20 %	15 %	10 %	7 ½ %	5 %	3 %
1.00	1.40	1.0069								
2.00	2.82	1.0140								
2.13	3.00	1.0149								1000
3.00	4.25	1.0211								702
3.52	5.00	1.0249							1000	594
4.00	5.69	1.0284							876	520
5.00	7.15	1.0357							692	411
5.24	7.50	1.0374						1000	659	391
5.25	7.52	1.0375						997	657	390
5.50	7.89	1.0394						949	625	371
5.75	8.26	1.0413						905	596	354
6.00	8.61	1.0432						863	569	338
6.25	9.02	1.0450						825	544	323
6.50	9.40	1.0469						791	521	309
6.75	9.78	1.0488						759	500	297
6.89	10.00	1.0499					1000	741	488	290
7.00	10.17	1.0507					983	728	480	285
7.25	10.55	1.0526					945	701	461	274
7.50	10.94	1.0545					910	674	444	264
7.75	11.32	1.0564					878	651	429	255
8.00	11.71	1.0584					847	625	413	246
8.25	12.09	1.0603					819	607	400	238
8.50	12.48	1.0623					792	587	387	230
8.75	12.87	1.0642					767	568	347	222
9.00	13.26	1.0662					743	550	362	215
9.25	13.65	1.0681					720	534	351	209
9.50	14.01	1.0701					699	518	341	203
9.75	14.43	1.0721					679	503	331	197
10.00	14.83	1.0741					659	488	322	191
10.12	15.00	1.0750				1000	651	483	318	189
10.25	15.22	1.0761				985	641	475	313	186
10.50	15.62	1.0781				958	623	462	304	181
10.75	16.01	1.0801				932	607	450	296	176
11.00	16.41	1.0821				908	591	438	289	171
11.25	16.81	1.0841				885	576	427	281	167
11.50	17.21	1.0861				863	562	416	274	163
11.75	17.61	1.0881				842	548	406	267	159
12.00	18.01	1.0902				821	535	396	261	155
12.25	18.41	1.0923				802	522	387	255	151
12.50	18.82	1.0943				783	510	378	249	148
12.75	19.22	1.0964				765	498	369	243	144
13.00	19.63	1.0985				748	487	361	238	141
13.23	20.00	1.1004			1000	733	477	354	233	138
13.25	20.04	1.1006			997	731	476	353	232	138
13.50	20.45	1.1027			976	715	466	345	227	135
13.75	20.86	1.1048			955	700	456	338	222	132
14.00	21.27	1.1069			934	685	446	330	218	129
14.25	21.68	1.1090			915	671	437	324	213	127
14.50	22.09	1.1111			896	657	428	317	209	124
14.75	22.50	1.1132			878	664	419	311	205	122

HYDROCHLORIC ACID AT 60° F

Be° 60° F	Per Cent HCl	Sp Gr 60° F	Gallons Strong Acid Required to Make 1000 Gallons of							
			28 %	25 %	20 %	15 %	10 %	7 ½ %	5 %	3 %
15.00	22.92	1.1154			861	631	411	304	200	119
15.25	23.33	1.1176			844	618	403	298	197	117
15.50	23.75	1.1197			827	606	395	293	193	114
15.75	24.16	1.1219			812	595	387	287	189	112
16.00	24.57	1.1240			797	584	380	282	186	110
16.10	24.73	1.1248			791	580	377	280	184	109
16.20	24.90	1.1256			785	575	375	278	183	109
16.30	25.06	1.1265		997	779	571	372	276	182	108
16.40	25.23	1.1274		990	773	567	369	274	180	107
16.50	25.39	1.1283		983	768	563	366	272	179	106
16.60	25.56	1.1292		975	762	559	364	270	178	105
16.70	25.72	1.1301		968	757	555	361	268	176	105
16.80	25.89	1.1310		961	751	551	359	266	175	104
16.90	26.05	1.1319		955	746	547	356	264	174	103
17.00	26.22	1.1328		948	741	543	353	262	173	103
17.10	26.39	1.1336		941	735	539	351	260	171	102
17.20	26.56	1.1345		934	730	535	348	258	170	101
17.30	26.73	1.1354		928	725	531	346	256	169	100
17.40	26.90	1.1363		921	720	528	343	255	168	100
17.50	27.07	1.1372		914	715	524	341	253	166	99
17.60	27.24	1.1381		908	710	520	339	251	165	98
17.70	27.41	1.1390		902	705	516	336	249	164	98
17.80	27.58	1.1399		895	700	513	334	247	163	97
17.90	27.75	1.1408		889	695	509	332	246	162	96
18.00	27.92	1.1417		883	690	506	329	244	161	96
18.10	28.09	1.1426	996	877	685	502	327	242	160	95
18.20	28.26	1.1435	990	871	681	499	325	241	159	94
18.30	28.44	1.1444	982	865	676	495	323	239	157	94
18.40	28.61	1.1453	976	859	671	492	320	237	156	93
18.50	28.78	1.1462	969	853	667	489	318	236	155	92
18.60	28.95	1.1471	963	848	662	486	316	234	154	92
18.70	29.13	1.1480	956	842	658	482	314	233	153	91
18.80	29.30	1.1489	950	836	654	479	312	231	152	90
18.90	29.48	1.1498	943	830	649	476	310	230	151	90
19.00	29.65	1.1508	937	825	645	473	308	228	150	89
19.10	29.83	1.1517	931	819	640	469	306	226	149	89
19.20	30.00	1.1526	925	814	636	466	304	225	148	88
19.30	30.18	1.1535	919	809	632	463	302	223	147	87
19.40	30.35	1.1544	913	803	628	460	300	222	146	87
19.50	30.53	1.1554	906	798	624	457	298	221	145	86
19.60	30.71	1.1563	900	793	620	454	296	219	144	86
19.70	30.90	1.1574	894	787	615	451	294	218	143	85
19.80	31.08	1.1581	888	782	611	448	292	216	142	85
19.90	31.27	1.1590	882	777	607	445	290	215	141	84
20.00	31.45	1.1600	876	772	603	442	288	213	140	83
20.10	31.64	1.1609	871	766	599	439	286	212	140	83
20.20	31.82	1.1619	865	761	595	436	284	210	139	82

HYDROCHLORIC ACID AT 60° F

Be° 60° F	Per Cent HCl	Sp Gr 60° F	Gallons Strong Acid Required to Make 1000 Gallons of							
			28 %	25 %	20 %	15 %	10 %	7 ½ %	5 %	3 %
20.30	32.01	1.1628	859	756	591	433	282	209	138	82
20.40	32.19	1.1637	854	751	587	430	280	208	137	81
20.50	32.38	1.1647	848	746	583	428	278	206	136	81
20.60	32.56	1.1656	843	742	580	425	277	205	135	80
20.70	32.75	1.1666	837	737	576	422	275	204	134	80
20.80	32.93	1.1675	832	732	572	419	273	202	133	79
20.90	33.12	1.1684	826	727	569	417	271	201	132	79
21.00	33.31	1.1694	821	723	565	414	270	200	132	78
21.10	33.50	1.1703	816	718	561	411	268	198	131	78
21.20	33.69	1.1713	810	713	558	409	266	197	130	77
21.30	33.88	1.1722	805	709	554	406	264	196	129	77
21.40	34.07	1.1732	800	704	550	403	263	195	128	76
21.50	34.26	1.1741	795	700	547	401	261	193	127	76
21.60	34.45	1.1751	790	695	543	398	259	192	127	75
21.70	34.64	1.1760	785	691	540	396	258	191	126	75
21.80	34.83	1.1770	780	687	537	393	256	190	125	74
21.90	35.02	1.1779	775	682	533	391	255	189	124	74
22.00	35.21	1.1789	770	678	530	388	253	187	123	73
22.10	35.40	1.1798	766	674	527	386	251	186	123	73
22.20	35.59	1.1808	761	670	524	384	250	185	122	72
22.30	35.78	1.1817	756	666	520	381	248	184	121	72
22.40	35.97	1.1827	752	662	517	379	247	183	120	72
22.50	36.16	1.1836	747	658	514	377	245	182	120	71
22.60	36.35	1.1846	743	654	511	374	244	181	119	71
22.70	36.54	1.1856	738	650	508	372	242	180	118	70
22.80	36.73	1.1866	734	646	505	370	241	179	118	70
22.90	36.93	1.1875	729	642	502	368	239	177	117	69
23.00	37.14	1.1885	724	638	498	365	238	176	116	69
23.10	37.36	1.1895	720	633	495	363	236	175	115	69
23.20	37.58	1.1904	715	629	492	360	235	174	115	68
23.30	37.80	1.1914	710	625	489	358	233	173	114	68
23.40	38.03	1.1924	705	621	485	356	232	172	113	67
23.50	38.26	1.1935	700	616	482	353	230	170	112	67
23.60	38.49	1.1944	696	612	479	351	228	169	111	66
23.70	38.72	1.1953	691	608	475	348	227	168	111	66
23.80	38.95	1.1963	686	604	472	346	225	167	110	65
23.90	39.18	1.1973	682	600	469	344	224	166	109	65
24.00	39.41	1.1983	677	596	466	341	222	165	109	64
24.10	39.64	1.1993	673	592	463	339	221	164	108	64
24.20	39.86	1.2003	668	588	460	337	219	163	107	64
24.30	40.09	1.2013	664	585	457	335	218	162	106	63
24.40	40.32	1.2023	660	581	454	333	217	160	106	63
24.50	40.55	1.2033	655	577	451	330	215	159	105	62
24.60	40.78	1.2043	651	573	448	328	214	158	104	62
24.70	41.01	1.2053	647	569	445	326	212	157	104	62
24.80	41.24	1.2063	643	566	442	324	211	156	103	61
24.90	41.48	1.2073	639	562	439	322	210	155	102	61
25.00	41.72	1.2083	634	558	436	320	208	154	102	60

CONVERTING STRONG ACID TO 15% ACID

Baume´	Factor	Baume´	Factor	Baume´	Factor
10.25	1.0157	17.50	1.9091	21.30	2.4629
10.50	1.0443	17.60	1.9226	21.40	2.4788
10.75	1.0724	17.70	1.9361	21.50	2.4946
11.00	1.1012	17.80	1.9497	21.60	2.5105
11.25	1.1302	17.90	1.9632	21.70	2.5263
11.50	1.1592	18.00	1.9768	21.80	2.5423
11.75	1.1883	18.10	1.9904	21.90	2.5581
12.00	1.2176	18.20	2.0041	22.00	2.5742
12.25	1.2471	18.30	2.0184	22.10	2.5901
12.50	1.2772	18.40	2.0321	22.20	2.6062
12.75	1.3068	18.50	2.0457	22.30	2.6221
13.00	1.3373	18.60	2.0594	22.40	2.6382
13.23	1.3648	18.70	2.0739	22.50	2.6542
13.25	1.3678	18.80	2.0876	22.60	2.6704
13.50	1.3985	18.90	2.1021	22.70	2.6866
13.75	1.4292	19.00	2.1160	22.80	2.7029
14.00	1.4601	19.10	2.1306	22.90	2.7197
14.25	1.4655	19.20	2.1444	23.00	2.7374
14.50	1.5221	19.30	2.1589	23.10	2.7560
14.75	1.5533	19.40	2.1728	23.20	2.7743
15.00	1.5854	19.50	2.1747	23.30	2.7929
15.25	1.6170	19.60	2.2022	23.40	2.8122
15.50	1.6492	19.70	2.2179	23.50	2.8318
15.75	1.6809	19.80	2.2322	23.60	2.8510
16.00	1.7127	19.90	2.2476	23.70	2.8702
16.10	1.7250	20.00	2.2624	23.80	2.8897
16.20	1.7381	20.10	2.2779	23.90	2.9092
16.30	1.7507	20.20	2.2928	24.00	2.9287
16.40	1.7640	20.30	2.3083	24.10	2.9482
16.50	1.7766	20.40	2.3231	24.20	2.9671
16.60	1.7899	20.50	2.3388	24.30	2.9867
16.70	1.8026	20.60	2.3536	24.40	3.0063
16.80	1.8159	20.70	2.3694	24.50	3.0260
16.90	1.8286	20.80	2.3842	24.60	3.0457
17.00	1.8420	20.90	2.3998	24.70	3.0654
17.10	1.8554	21.00	2.4157	24.80	3.0821
17.20	1.8687	21.10	2.4313	24.90	3.1057
17.30	1.8821	21.20	2.4472	25.00	3.1262
17.40	1.8956				

This table can be used to determine the volume of 15% acid that can be made from a specified volume of strong acid. To use table – determine the volume and baume´ specific gravity (corrected to 60^{o} F) of the strong acid. From the table obtain the factor corresponding to the baume´ specific gravity. Multiply the volume of strong acid by this factor to obtain the volume of 15% acid that it will make.

HYDROCHLORIC ACID TABLE

Per Cent HCl	Specific Gravity	Degrees Baume´	Lb Per Gal	Lb Per Cu Ft	psi Per Ft Depth
1.00	1.0048	.7	8.337	62.66	.4351
2.00	1.0097	1.4	8.418	62.97	.4372
3.00	1.0147	2.1	8.460	63.28	.4392
4.00	1.0197	2.8	8.501	63.59	.4415
5.00	1.0248	3.5	8.544	63.91	.4437
6.00	1.0299	4.2	8.586	64.22	.4459
7.00	1.0350	4.9	8.629	64.54	.4482
8.00	1.0402	5.6	8.672	64.87	.4504
9.00	1.0447	6.2	8.710	65.15	.4524
10.00	1.0500	6.9	8.754	65.48	.4547
11.00	1.0550	7.6	8.796	65.79	.4586
12.00	1.0600	8.2	8.837	66.10	.4590
13.00	1.0646	8.8	8.876	66.39	.4610
14.00	1.0702	9.5	8.922	66.74	.4634
15.00	1.0749	10.1	8.962	67.04	.4654
16.00	1.0801	10.8	9.006	67.36	.4677
17.00	1.0849	11.4	9.045	67.66	.4698
18.00	1.0902	12.0	9.089	67.99	.4721
19.00	1.0952	12.6	9.132	68.31	.4743
20.00	1.1002	13.2	9.171	68.60	.4764
21.00	1.1057	13.9	9.218	68.95	.4788
22.00	1.1108	14.5	9.261	69.27	.4810
23.00	1.1159	15.1	9.303	69.59	.4832
24.00	1.1214	15.7	9.349	69.93	.4855
25.00	1.1261	16.3	9.385	70.20	.4876
26.00	1.1310	16.9	9.433	70.56	.4899
27.00	1.1368	17.5	9.465	70.80	.4922
28.00	1.1422	18.0	9.523	71.23	.4936
29.00	1.1471	18.6	9.560	71.51	.4967
30.00	1.1526	19.2	9.609	71.88	.4991
31.00	1.1577	19.8	9.650	72.18	.5012
32.00	1.1628	20.3	9.694	72.51	.5035
33.00	1.1680	20.9	9.738	72.84	.5057
34.00	1.1727	21.4	9.777	73.13	.5078
35.00	1.1779	21.9	9.810	73.38	.5100
36.00	1.1827	22.4	9.860	73.75	.5121
37.00	1.1880	22.9	9.902	74.07	.5144
38.00	1.1924	23.4	9.941	74.36	.5163
39.00	1.1963	23.8	9.974	74.61	.5180
40.00	1.2008	24.3	10.011	74.88	.5199
41.00	1.2053	24.7	10.049	75.17	.5219

$$\text{Baume´} = 145 - \frac{145}{\text{Sp Gr}}$$

$$\text{Sp Gr} = \frac{145}{145 - \text{Be}^{o}}$$

Obs. Temp in °F	BAUME HYDROMETER INDICATIONS																				
	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
0	3.80	4.80	5.80	6.80	7.80	8.65	9.50	10.50	11.50	12.50	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	20.86	21.86	22.86
5	3.90	4.90	5.90	6.90	7.90	8.76	9.63	10.63	11.63	12.63	13.17	14.17	15.17	16.17	17.17	18.17	19.17	20.17	21.04	22.04	23.04
10	4.00	5.00	6.00	7.00	8.00	8.88	9.75	10.75	11.75	12.75	13.33	14.33	15.33	16.33	17.33	18.33	19.33	20.33	21.21	22.21	23.21
15	4.10	5.10	6.10	7.10	8.10	8.90	9.88	10.88	11.88	12.88	13.50	14.50	15.50	16.50	17.50	18.50	19.50	20.50	21.39	22.39	23.39
20	4.20	5.20	6.20	7.20	8.20	9.10	10.00	11.00	12.00	13.00	13.67	14.67	15.67	16.67	17.67	18.67	19.67	20.67	21.57	22.57	23.57
25	4.30	5.30	6.30	7.30	8.30	9.21	10.12	11.12	12.12	13.12	13.80	14.83	15.83	16.83	17.83	18.83	19.83	20.83	21.75	22.75	23.75
30	4.40	5.40	6.40	7.40	8.40	9.32	10.25	11.25	12.25	13.25	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	21.93	22.93	23.93
35	4.50	5.50	6.50	7.50	8.50	9.44	10.38	11.38	12.38	13.38	14.17	15.17	16.17	17.17	18.17	19.17	20.17	21.17	22.11	23.11	24.11
40	4.60	5.60	6.60	7.60	8.60	9.55	10.50	11.50	12.50	13.50	14.33	15.33	16.33	17.33	18.33	19.33	20.33	21.33	22.29	23.29	24.29
45	4.70	5.70	6.70	7.70	8.70	9.66	10.62	11.62	12.62	13.62	14.50	15.50	16.50	17.50	18.50	19.50	20.50	21.50	22.46	23.46	24.46
50	4.80	5.80	6.80	7.80	8.80	9.77	10.75	11.75	12.75	13.75	14.67	15.67	16.67	17.67	18.67	19.67	20.67	21.67	22.64	23.64	24.64
55	4.90	5.90	6.90	7.90	8.90	9.89	10.87	11.87	12.87	13.87	14.83	15.83	16.83	17.83	18.83	19.83	20.83	21.83	22.82	23.82	24.82
60	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00	25.00
65	5.10	6.10	7.10	8.10	9.10	10.11	11.13	12.13	13.13	14.13	15.17	16.17	17.17	18.17	19.17	20.17	21.17	22.17	23.18	24.18	25.18
70	5.20	6.20	7.20	8.20	9.20	10.23	11.25	12.25	13.25	14.25	15.33	16.33	17.33	18.33	19.33	20.33	21.33	22.33	23.36	24.36	25.36
75	5.30	6.30	7.30	8.30	9.30	10.34	11.38	12.38	13.38	14.38	15.50	16.50	17.50	18.50	19.50	20.50	21.50	22.50	23.54	24.54	25.54
80	5.40	6.40	7.40	8.40	9.40	10.45	11.50	12.50	13.50	14.50	15.67	16.67	17.67	18.67	19.67	20.67	21.67	22.67	23.71	24.71	25.71
85	5.50	6.50	7.50	8.50	9.50	10.56	11.63	12.63	13.63	14.63	15.83	16.83	17.83	18.83	19.83	20.83	21.83	22.83	23.89	24.89	25.89
90	5.60	6.60	7.60	8.60	9.60	10.68	11.75	12.75	13.75	14.75	16.00	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.07	25.07	26.07
95	5.70	6.70	7.70	8.70	9.70	10.79	11.87	12.87	13.87	14.87	16.17	17.17	18.17	19.17	20.17	21.17	22.17	23.17	24.25	25.25	26.25
100	5.80	6.80	7.80	8.80	9.80	10.90	12.00	13.00	14.00	15.00	16.33	17.33	18.33	19.33	20.33	21.33	22.33	23.33	24.43	25.43	26.43
105	5.90	6.90	7.90	8.90	9.90	11.12	12.13	13.13	14.13	15.13	16.50	17.50	18.50	19.50	20.50	21.50	22.50	23.50	24.61	25.61	26.61
110	6.00	7.00	8.00	9.00	10.00	11.25	12.25	13.25	14.25	15.25	16.67	17.67	18.67	19.67	20.67	21.67	22.67	23.67	24.79	25.79	26.79
115	6.10	7.10	8.10	9.10	10.10	11.38	12.38	13.38	14.38	15.38	16.83	17.83	18.83	19.83	20.83	21.83	22.83	23.83	24.96	25.96	26.96
120	6.20	7.20	8.20	9.20	10.20	11.50	12.50	13.50	14.50	15.50	17.00	18.00	19.00	20.00	21.00	22.00	23.00	24.00	25.14	26.14	27.14

SECTION 7

PROPPANTS



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PROPPANT / SAND TABLES

The following tables contain information related to the use of propping agents used in hydraulic fracturing operations.

One of the major problems which has been encountered in proppant calculations is caused by confusing the terms “true volume” and “bulk volume.” The true volume of a granular material is the actual volume occupied by the grains. The bulk volume is the true volume plus the void space between the grains. The bulk volume, therefore, is always greater than the true volume.

The density of a substance is its weight per unit volume. True density, then, is the weight per unit of true volume. Bulk density is the weight per unit of bulk volume. The bulk density is always less than the true density.

In proppant/sand-fluid slurry calculations the true density of the proppant/sand must be used. In sand fill-up calculations the bulk density of the sand must be used.

NOTE: For sizes not included in the following tables, fill-up can be calculated as follows for sand:

sand/linear foot = 14.3 X gallons/linear foot*

also:

linear ft/# sand = 0.07 X linear ft/gallon*

*gallons/linear ft. and linear ft./gallon determined from tables in sections “Volume & Height” and “Capacities”.

PROPPANT TABLES

SAND

2.65 SPECIFIC GRAVITY					
LBS/GAL 22.1 TRUE DENSITY		LBS/ BBL 928 TRUE DENSITY		GAL/LB .04525 TRUE DENSITY	
PROPPANT CONCENTRATION (#PROP/GAL FLUID)	SLURRY/ FLUID RATIO (GAL SLURRY/ GAL FLUID)	FLUID PERCENTAGE	PROPPANT PERCENTAGE	PROPPANT/ SLURRY RATIO (#PROP/1GAL OF SLURRY)	PROPPANT VOLUME (POUNDS/BBL OF SLURRY)
.5	1.0226	.9779	.0221	.489	20.5
1.0	1.0452	.9567	.0433	.957	40.2
1.5	1.0679	.9365	.0635	1.405	59.0
2.0	1.0905	.9170	.0830	1.834	77.0
2.5	1.1131	.8984	.1016	2.246	94.3
3.0	1.1357	.8805	.1195	2.641	110.9
3.5	1.1583	.8633	.1367	3.022	126.9
4.0	1.1810	.8468	.1532	3.387	142.3
4.5	1.2036	.8309	.1691	3.739	157.0
5.0	1.2262	.8155	.1845	4.078	171.3
5.5	1.2488	.8008	.1992	4.404	185.0
6.0	1.2714	.7865	.2135	4.719	198.2
6.5	1.2941	.7728	.2272	5.023	211.0
7.0	1.3167	.7595	.2405	5.316	223.3
7.5	1.3393	.7467	.2533	5.600	235.2
8.0	1.3619	.7343	.2657	5.874	246.7
8.5	1.3845	.7223	.2777	6.139	257.8
9.0	1.4072	.7107	.2893	6.396	268.6
9.5	1.4298	.6994	.3006	6.644	279.1
10.0	1.4524	.6885	.3115	6.885	289.2
10.5	1.4750	.6780	.3220	7.119	299.0
11.0	1.4976	.6677	.3323	7.345	308.5
11.5	1.5203	.6578	.3422	7.564	317.7
12.0	1.5429	.6481	.3519	7.778	326.7
12.5	1.5655	.6388	.3612	7.985	335.4
13.0	1.5881	.6297	.3703	8.186	343.8
13.5	1.6107	.6208	.3792	8.380	352.0
14.0	1.6334	.6122	.3878	8.571	360.0
14.5	1.6560	.6039	.3961	8.756	367.3
15.0	1.6786	.5957	.4043	8.936	375.3
15.5	1.7012	.5878	.4122	9.111	382.7
16.0	1.7238	.5801	.4199	8.282	389.8
16.5	1.7465	.5726	.4274	9.448	396.8
17.0	1.7691	.5653	.4347	9.610	403.6
17.5	1.7917	.5581	.4419	9.767	410.2
18.0	1.8143	.5512	.4488	9.921	416.7
18.5	1.8369	.5444	.4556	10.071	423.0
19.0	1.8596	.5378	.4622	10.217	429.1
19.5	1.8822	.5313	.4687	10.360	435.1
20.0	1.9048	.5250	.4750	10.500	441.0

PROPPANT TABLES

RESIN COATED SAND

2.55 SPECIFIC GRAVITY					
LBS/GAL 21.267 TRUE DENSITY		LBS/BBL 893 TRUE DENSITY		GAL/LB .0470 TRUE DENSITY	
PROPPANT CONCENTRATION (#PROP/GAL FLUID)	SLURRY/ FLUID RATIO (GAL SLURRY/ GAL FLUID)	FLUID PERCENTAGE	PROPPANT PERCENTAGE	PROPPANT/ SLURRY RATIO (#PROP/1GAL OF SLURRY)	PROPPANT VOLUME (#PROP/1BBL OF SLURRY)
.5	1.0235	.9770	.0230	.489	20.5
1.0	1.0470	.9551	.0449	.955	40.1
1.5	1.0705	.9341	.0659	1.401	58.9
2.0	1.0940	.9141	.0859	1.828	76.8
2.5	1.1175	.8949	.1051	2.237	94.0
3.0	1.1410	.8764	.1236	2.629	110.4
3.5	1.1645	.8587	.1413	3.006	126.2
4.0	1.1882	.8418	.1582	3.367	141.4
4.5	1.2115	.8254	.1746	3.714	156.0
5.0	1.2350	.8097	.1903	4.049	170.0
5.5	1.2585	.7946	.2054	4.370	183.6
6.0	1.2820	.7800	.2200	4.680	196.6
6.5	1.3055	.7660	.2340	4.979	209.1
7.0	1.3290	.7524	.2476	5.267	221.2
7.5	1.3525	.7394	.2606	5.545	232.9
8.0	1.3760	.7267	.2733	5.814	244.2
8.5	1.3996	.7145	.2855	6.074	255.1
9.0	1.4230	.7027	.2973	6.325	265.6
9.5	1.4465	.6913	.3087	6.568	275.8
10.0	1.4700	.6803	.3197	6.803	285.7
10.5	1.4935	.6696	.3304	7.030	295.3
11.0	1.5170	.6592	.3408	7.251	304.5
11.5	1.5405	.6491	.3509	7.465	313.5
12.0	1.5640	.6394	.3606	7.673	322.3
12.5	1.5875	.6299	.3701	7.847	330.7
13.0	1.6110	.6207	.3793	8.070	338.9
13.5	1.6345	.6118	.3882	8.259	346.9
14.0	1.6580	.6031	.3969	8.444	354.6
14.5	1.6815	.5947	.4053	8.623	362.2
15.0	1.7050	.5865	.4135	8.798	369.5
15.5	1.7285	.5785	.4215	8.967	376.6
16.0	1.7520	.5708	.4292	9.132	383.6
16.5	1.7755	.5632	.4368	9.293	390.3
17.0	1.7990	.5559	.4441	9.450	396.9
17.5	1.8225	.5487	.4513	9.602	403.3
18.0	1.8460	.5417	.4583	9.751	409.5
18.5	1.8695	.5349	.4651	9.896	415.6
19.0	1.8930	.5283	.4717	10.037	421.6
19.5	1.9165	.5218	.4782	10.175	427.3
20.0	1.9400	.5155	.4845	10.309	433.0

PROPPANT TABLES

TEMPERED LC

2.6 SPECIFIC GRAVITY					
LBS/GAL 21.68 TRUE DENSITY		LBS/BBL 911 TRUE DENSITY		GAL/LB .0461 TRUE DENSITY	
PROPPANT CONCENTRATION (#PROP/GAL FLUID)	SLURRY/ FLUID RATIO (GAL SLURRY/ GAL FLUID)	FLUID PERCENTAGE	PROPPANT PERCENTAGE	PROPPANT/ SLURRY RATIO (#PROP/1GAL OF SLURRY)	PROPPANT VOLUME (#PROP/1BBL OF SLURRY)
.5	1.0230	.9775	.0225	.498	20.5
1.0	1.0461	.9559	.0441	.956	40.1
1.5	1.0691	.9353	.0647	1.403	58.9
2.0	1.0922	.9456	.0844	4.831	76.9
2.5	1.1153	.8967	.1033	2.242	94.1
3.0	1.1383	.8758	.1215	2.636	110.7
3.5	1.1613	.8611	.1389	3.014	126.6
4.0	1.1844	.8443	.1557	3.377	141.8
4.5	1.2074	.8282	.1718	3.727	156.5
5.0	1.2305	.8127	.1873	4.063	170.7
5.5	1.2535	.7977	.2023	4.388	187.3
6.0	1.2766	.7833	.2167	4.700	198.4
6.5	1.2997	.7694	.2306	5.001	210.1
7.0	1.3227	.7560	.2440	5.292	222.3
7.5	1.3458	.7431	.2569	5.573	234.1
8.0	1.3688	.7306	.2694	5.845	245.5
8.5	1.3918	.7185	.2815	6.107	256.5
9.0	1.4149	.7068	.2932	6.361	267.2
9.5	1.4379	.6954	.3046	6.607	277.5
10.0	1.4610	.6845	.3155	6.845	287.5
10.5	1.4841	.6738	.3262	7.075	297.2
11.0	1.5071	.6635	.3365	7.299	306.5
11.5	1.5301	.6535	.3465	7.516	315.7
12.0	1.5532	.6438	.3562	7.726	324.5
12.5	1.5762	.6344	.3656	7.930	333.1
13.0	1.5993	.6253	.3747	8.129	341.4
13.5	1.6223	.6164	.3836	8.321	349.5
14.0	1.6554	.6078	.3922	8.509	357.0
14.5	1.6684	.5997	.4006	8.691	365.0
15.0	1.6915	.5912	.4088	8.868	372.5
15.5	1.7145	.5832	.4168	9.040	379.7
16.0	1.7376	.5755	.4245	9.208	386.7
16.5	1.7606	.5680	.4320	9.372	393.6
17.0	1.7837	.5606	.4394	9.531	400.3
17.5	1.8067	.5535	.4465	9.686	406.8
18.0	1.8298	.5465	.4535	9.837	413.2
18.5	1.8529	.5397	.4603	9.985	419.4
19.0	1.8759	.5331	.4669	10.128	425.4
19.5	1.8989	.5266	.4734	10.269	431.3
20.0	1.9220	.5203	.4797	10.406	437.0

PROPPANT TABLES

CARBOLITE

2.70 SPECIFIC GRAVITY					
LBS/GAL 22.52 TRUE DENSITY		LBS/BBL 946 TRUE DENSITY		GAL/LB .0444 TRUE DENSITY	
PROPPANT CONCENTRATION (#PROP/GAL FLUID)	SLURRY/ FLUID RATIO (GAL SLURRY/ GAL FLUID)	FLUID PERCENTAGE	PROPPANT PERCENTAGE	PROPPANT/ SLURRY RATIO (#PROP/1GAL OF SLURRY)	PROPPANT VOLUME (#PROP/1BBL OF SLURRY)
.5	1.0222	.9783	.0217	.489	20.5
1.0	1.0444	.9575	.0425	.957	40.2
1.5	1.0666	.9376	.0624	1.406	59.1
2.0	1.0888	.9184	.0816	1.837	77.1
2.5	1.1110	.9001	.0999	2.250	94.5
3.0	1.1332	.8825	.1175	2.647	111.2
3.5	1.1554	.8655	.1345	3.029	127.2
4.0	1.1776	.8492	.1508	3.397	142.7
4.5	1.1998	.8335	.1665	3.751	157.5
5.0	1.2220	.8183	.1817	4.092	171.8
5.5	1.2442	.8037	.1963	4.421	185.7
6.0	1.2664	.7896	.2104	4.738	199.0
6.5	1.2886	.7760	.2240	5.044	211.9
7.0	1.3108	.7629	.2371	5.340	224.3
7.5	1.3330	.7502	.2498	5.626	236.3
8.0	1.3552	.7379	.2621	5.903	247.9
8.5	1.3774	.7260	.2740	6.171	259.2
9.0	1.3996	.7145	.2855	6.430	270.1
9.5	1.4218	.7033	.2967	6.682	280.6
10.0	1.4440	.6925	.3075	6.925	290.9
10.5	1.4662	.6820	.3180	7.161	300.8
11.0	1.4884	.6719	.3281	7.390	310.4
11.5	1.5106	.6620	.3380	7.613	319.7
12.0	1.5328	.6524	.3476	7.829	328.8
12.5	1.5550	.6431	.3569	8.039	337.6
13.0	1.5772	.6340	.3660	8.242	346.2
13.5	1.5994	.6252	.3748	8.441	354.5
14.0	1.6216	.6167	.3833	8.633	362.6
14.5	1.6438	.6083	.3917	8.821	370.5
15.0	1.6660	.6002	.3998	9.004	378.2
15.5	1.6882	.5923	.4077	9.181	385.6
16.0	1.7104	.5847	.4153	9.355	392.9
16.5	1.7326	.5772	.4228	9.523	400.0
17.0	1.7548	.5699	.4301	9.688	406.9
17.5	1.7770	.5627	.4373	9.848	413.6
18.0	1.7992	.5558	.4442	10.004	420.2
18.5	1.8214	.5490	.4510	10.157	426.6
19.0	1.8436	.5424	.4576	10.306	432.8
19.5	1.8658	.5360	.4640	10.451	439.0
20.0	1.8880	.5297	.4703	10.593	444.9

PROPPANT TABLES

INTERPROP

3.1 SPECIFIC GRAVITY					
LBS/GAL 25.854 TRUE DENSITY		LBS/BBL 1086 TRUE DENSITY		GAL/LB .03868 TRUE DENSITY	
PROPPANT CONCENTRATION (#PROP/GAL FLUID)	SLURRY/ FLUID RATIO (GAL SLURRY/ GAL FLUID)	FLUID PERCENTAGE	PROPPANT PERCENTAGE	PROPPANT/ SLURRY RATIO (#PROP/1GAL OF SLURRY)	PROPPANT VOLUME (#PROP/1BBL OF SLURRY)
.5	1.0193	.9810	.0190	.491	20.6
1.0	1.0387	.9628	.0372	.963	40.4
1.5	1.0580	.9452	.0548	1.418	59.5
2.0	1.0774	.9282	.0718	1.856	78.0
2.5	1.0967	.9118	.0882	2.280	95.7
3.0	1.1160	.8960	.1040	2.688	112.9
3.5	1.1354	.8808	.1192	3.083	129.5
4.0	1.1547	.8660	.1340	3.464	145.5
4.5	1.1741	.8517	.1483	3.833	161.0
5.0	1.1934	.8379	.1621	4.190	176.0
5.5	1.2127	.8246	.1754	4.535	190.5
6.0	1.2321	.8116	.1884	4.870	204.5
6.5	1.2514	.7991	.2009	5.194	218.2
7.0	1.2708	.7869	.2131	5.509	231.4
7.5	1.2901	.7751	.2249	5.814	244.2
8.0	1.3094	.7637	.2363	6.109	256.6
8.5	1.3288	.7526	.2474	6.397	268.7
9.0	1.3481	.7418	.2582	6.676	280.4
9.5	1.3675	.7313	.2687	6.947	291.8
10.0	1.3868	.7211	.2789	7.211	302.9
10.5	1.4061	.7112	.2888	7.467	313.6
11.0	1.4255	.7015	.2985	7.717	324.1
11.5	1.4448	.6921	.3079	7.959	334.3
12.0	1.4642	.6830	.3170	8.196	344.2
12.5	1.4835	.6741	.3259	8.426	353.9
13.0	1.5028	.6654	.3346	8.650	363.3
13.5	1.5222	.6570	.3430	8.869	372.5
14.0	1.5415	.6487	.3513	9.082	381.4
14.5	1.5609	.6407	.3593	9.290	390.2
15.0	1.5802	.6328	.3672	9.492	398.7
15.5	1.5995	.6252	.3748	9.690	407.0
16.0	1.6189	.6177	.3823	9.883	415.1
16.5	1.6382	.6104	.3896	10.072	423.0
17.0	1.6576	.6033	.3967	10.256	430.8
17.5	1.6769	.5963	.4037	40.436	438.3
18.0	1.6962	.5895	.4105	10.612	445.7
18.5	1.7156	.5829	.4171	10.784	452.9
19.0	1.7349	.5764	.4236	10.952	460.0
19.5	1.3754	.5700	.4300	11.116	466.9
20.0	1.7736	.5638	.4362	11.276	473.6

PROPPANT TABLES

BAUXITE

3.55 SPECIFIC GRAVITY					
LBS/GAL 29.607 TRUE DENSITY		LBS/BBL 1243 TRUE DENSITY		GAL/LB .03378 TRUE DENSITY	
PROPPANT CONCENTRATION (#PROP/GAL FLUID)	SLURRY/ FLUID RATIO (GAL SLURRY/ GAL FLUID)	FLUID PERCENTAGE	PROPPANT PERCENTAGE	PROPPANT/ SLURRY RATIO (#PROP/1GAL OF SLURRY)	PROPPANT VOLUME (#PROP/1BBL OF SLURRY)
.5	1.0169	.9834	.0166	.492	20.7
1.0	1.0338	.9673	.0327	.967	40.6
1.5	1.0507	.9518	.0482	1.428	60.0
2.0	1.0676	.9367	.0633	1.873	78.7
2.5	1.0845	.9221	.0779	2.305	96.8
3.0	1.1013	.9080	.0920	2.724	114.4
3.5	1.1182	.8943	.1057	3.130	131.5
4.0	1.1351	.8810	.1190	3.527	148.0
4.5	1.1520	.8680	.1320	3.906	164.1
5.0	1.1689	.8555	.1445	4.278	179.7
5.5	1.1858	.8433	.1567	4.638	194.8
6.0	1.2027	.8315	.1685	4.989	209.5
6.5	1.2196	.8200	.1800	5.330	223.8
7.0	1.2365	.8088	.1912	5.661	237.8
7.5	1.2534	.7979	.2021	5.984	251.3
8.0	1.2702	.7973	.2127	6.298	264.5
8.5	1.2871	.7769	.2231	6.604	277.4
9.0	1.3040	.7669	.2331	6.902	289.9
9.5	1.3209	.7571	.2429	7.192	302.1
10.0	1.3378	.7475	.2525	7.475	313.9
10.5	1.3547	.7382	.2618	7.751	325.5
11.0	1.3716	.7291	.2709	8.020	336.8
11.5	1.3885	.7202	.2798	8.282	347.9
12.0	1.4054	.7116	.2881	8.539	358.6
12.5	1.4223	.7031	.2969	8.789	369.1
13.0	1.4391	.6949	.3051	9.033	379.4
13.5	1.4560	.6868	.3132	9.272	389.4
14.0	1.4729	.6789	.3211	9.505	399.2
14.5	1.4898	.6712	.3288	9.733	408.8
15.0	1.5067	.6637	.3363	9.956	418.1
15.5	1.5236	.6563	.3437	10.173	427.3
16.0	1.5405	.6491	.3509	10.386	436.2
16.5	1.5574	.6421	.3579	10.595	445.0
17.0	1.5743	.6352	.3648	10.799	453.5
17.5	1.5911	.6285	.3715	10.996	461.9
18.0	1.6080	.6219	.3781	11.194	471.1
18.5	1.6249	.6154	.3846	11.385	478.2
19.0	1.6418	.6091	.3909	11.573	486.0
19.5	1.6587	.6029	.3971	11.756	493.8
20.0	1.6756	.5968	.4032	11.936	501.3

SAND (20 - 40 MESH) FILL-UP IN HOLE*

Diameter of Hole Inches	#Sand/Linear Ft	Linear Ft/#Sand
3 3/4	8.2053	.1220
4 3/4	13.1646	.0760
6 1/8	21.8876	.0457
7 7/8	36.1819	.0277

*Based on sand having bulk density of 14.3#/gal.
(s.g. --1.72)

SAND (20-40 MESH) FILL-UP IN CASING*

CASING			#Sand/ Linear Ft	Linear Ft./ #Sand
Size O D In	Wt. Per Ft Lbs	I D In		
4 1/2	9.50	4.090	9.7598	.1026
	10.50	4.052	9.5796	.1044
	11.60	4.000	9.3350	.1072
	13.50	3.920	8.9647	.1117
5	11.50	4.560	12.1211	.0825
	13.00	4.494	11.7832	.0849
	15.00	4.408	11.3370	.0883
	18.00	4.276	10.6678	.0938
	21.00	4.154	10.0672	.0994
5 1/2	13.00	5.044	14.8434	.0674
	14.00	5.012	14.6561	.0682
	15.00	4.974	14.4344	.0693
	15.50	4.950	14.2957	.0700
	17.00	4.892	13.9625	.0717
	20.00	4.778	13.3190	.0752
	23.00	4.670	13.0988	.0764
7	17.00	6.538	25.3682	.0401
	20.00	6.456	24.3171	.0412
	22.00	6.398	23.8824	.0419
	23.00	6.366	23.6450	.0423
	24.00	6.336	23.4220	.0427
	26.00	6.276	22.9801	.0436
	28.00	6.214	22.5282	.0444
	29.00	6.184	22.3123	.0449
	30.00	6.154	22.0964	.0453
	32.00	6.094	21.6674	.0462
	34.00	6.040	21.2841	.0470
	35.00	6.004	21.0324	.0476
	38.00	5.920	20.4476	.0490
	40.00	5.836	19.8713	.0504
8 5/8	24.00	8.097	38.2511	.0262
	28.00	8.017	37.4989	.0267
	32.00	7.921	36.6066	.0273
	36.00	7.825	35.7243	.0280
	38.00	7.775	35.2695	.0284
	40.00	7.725	34.8176	.0287
	43.00	7.651	34.1527	.0293
	44.00	7.625	33.9210	.0295
	49.00	7.511	32.9143	.0304

*Based on sand having bulk density of 14.3#/gal.
(s.g. --1.72)

SAND (20-40 MESH) FILL-UP IN TUBING--EXTERNAL UPSET *

TUBING – EXTERNAL UPSET				#Sand/ Linear Ft	Linear Ft/ #Sand
Nom Size In	Wt Per Ft Lbs	OD In	ID In		
1 1/4	2.40	1.660	1.380	1.1111	.9009
1 1/2	2.90	1.900	1.610	1.5129	.6619
2	4.70	2.375	1.995	2.3223	.4311
2 1/2	6.50	2.875	2.441	3.4763	.2879
3	9.30	3.500	2.992	5.2224	.1916
3 1/2	11.00	4.000	3.476	7.0499	.1420
4	12.75	4.500	3.958	9.1406	.1095

*Based on sand having bulk density of 14.3#/gal.
(s.g. -- 1.72)

SAND (20-40 MESH) FILL-UP BETWEEN TUBING AND HOLE*

Nominal Tubing In	Diameter of Hole In	#Sand/ Linear Ft	Linear Ft/ #Sand
2	3 3/4	4.9135	.2037
	4 3/4	9.8727	.1014
	6 1/8	18.5743	.5380
	7 7/8	32.8514	.0304
2 1/2	3 3/4	3.3819	.2959
	4 3/4	8.3412	.1200
	6 1/8	17.4420	.0587
	7 7/8	31.4214	.0318
3	4 3/4	6.0174	.1664
	6 1/8	14.7233	.0679
	7 7/8	28.9990	.0345
3 1/2	4 3/4	3.8295	.2614
	6 1/8	12.5382	.0797
	7 7/8	26.8139	.0373
4	6 1/8	10.0615	.0994
	7 7/8	24.3372	.0411

*Based on sand having bulk density of 14.3#/gal.
(s.g. -- 1.72)

SAND (20-40 MESH) FILL-UP BETWEEN TUBING AND CASING*

Nominal Tubing Size -- 1 1/2 inch

CASING			#Sand/ Linear Ft	Linear Ft/ #Sand
Size OD In	Wt Per Ft Lbs	ID In		
4 1/2	9.50	4.090	7.6534	.1308
	10.50	4.052	7.4731	.1338
	11.60	4.000	7.2286	.1385
	13.50	3.920	6.8600	.1459
5	11.50	4.560	10.0257	.0998
	13.00	4.494	9.6768	.1034
	15.00	4.408	9.2306	.1084
	18.00	4.276	8.5614	.1169
	21.00	4.154	7.9608	.1257
5 1/2	13.00	5.044	12.7370	.0786
	14.00	5.012	12.5497	.0798
	15.00	4.974	12.3280	.0812
	15.50	4.950	12.1893	.0821
	17.00	4.892	11.8561	.0844
	20.00	4.778	11.2023	.0890
	23.00	4.670	10.6177	.0943
7	17.00	6.538	22.8328	.0438
	20.00	6.456	22.2122	.0451
	22.00	6.398	21.7760	.0460
	23.00	6.366	21.5387	.0465
	24.00	6.336	21.3456	.0470
	26.00	6.276	20.8737	.0479
	28.00	6.214	20.4233	.0490
	29.00	6.184	20.2059	.0495
	30.00	6.154	19.9900	.0501
	32.00	6.094	19.5610	.0512
	34.00	6.040	19.1792	.0522
	35.00	6.004	18.9260	.0529
	38.00	5.920	18.3412	.0546
	40.00	5.836	17.7650	.0563

*Based on sand having bulk density of 14.3 #gal.
(s.g. --1.72)

SAND (20-40 MESH) FILL-UP BETWEEN TUBING AND CASING*

Nominal Tubing Size -- 2-inch

CASING				
Size OD In	Wt Per Ft Lbs	ID In	#Sand/ Linear Ft	Linear Ft/ #Sand
4 1/2	9.50	4.090	6.4693	.1547
	10.50	4.052	6.2883	.1590
	11.60	4.000	6.0432	.1650
	13.50	3.920	5.6742	.1764
5	11.50	4.560	8.8403	.1132
	13.00	4.494	8.4913	.1179
	15.00	4.408	8.0452	.1244
	18.00	4.276	7.3759	.1357
	21.00	4.154	6.7768	.1477
5 1/2	13.00	5.044	11.5530	.0866
	14.00	5.012	11.3642	.0881
	15.00	4.974	11.1440	.0898
	15.50	4.950	11.0038	.0910
	17.00	4.892	10.6721	.0938
	20.00	4.778	10.0286	.0998
	23.00	4.670	9.4337	.1061
7	17.00	6.538	21.6488	.0462
	20.00	6.456	21.0267	.0476
	22.00	6.398	20.5248	.0488
	23.00	6.366	20.3532	.0492
	24.00	6.336	20.1315	.0497
	26.00	6.276	19.6897	.0508
	28.00	6.214	19.2378	.0520
	29.00	6.184	19.0204	.0526
	30.00	6.154	18.8045	.0533
	32.00	6.094	18.3755	.0545
	34.00	6.040	17.9937	.0556
	35.00	6.004	17.7406	.0564
	38.00	5.920	17.1557	.0583
	40.00	5.836	16.5808	.0604
8 5/8	24.00	8.097	34.9606	.0286
	28.00	8.017	34.2085	.0293
	32.00	7.921	33.3147	.0300
	36.00	7.825	32.4338	.0309
	38.00	7.775	31.9777	.0313
	40.00	7.725	31.5258	.0317
	43.00	7.651	30.8623	.0324
	44.00	7.625	30.6306	.0327
	49.00	7.511	29.6239	.0338

*Based on sand having bulk density of 14.3 #gal.
(s.g. --1.72)

SAND (20-40 MESH) FILL-UP BETWEEN TUBING AND CASING*

Nominal Tubing Size -- 2 1/2-inch

CASING			#Sand/ Linear Ft	Linear Ft/ #Sand
Size OD In	Wt Per Ft Lbs	ID In		
4 1/2	9.50	4.090	4.9378	.2027
	10.50	4.052	4.7568	.2102
	11.60	4.000	4.5131	.2218
	13.50	3.920	4.1427	.2416
5	11.50	4.560	7.3087	.1369
	13.00	4.494	6.9612	.1438
	15.00	4.408	5.6136	.1537
	18.00	4.276	5.8458	.1712
	21.00	4.154	5.2452	.1908
5 1/2	13.00	5.044	10.0214	.0999
	14.00	5.012	9.8341	.1018
	15.00	4.974	9.6125	.1041
	15.50	4.950	9.4737	.1057
	17.00	4.892	9.1406	.1095
	20.00	4.778	8.4971	.1178
	23.00	4.670	7.9022	.1267
7	17.00	6.538	20.1172	.0498
	20.00	6.456	19.4952	.0513
	22.00	6.398	19.0605	.0525
	23.00	6.366	18.8217	.0532
	24.00	6.336	18.6000	.0538
	26.00	6.276	18.1581	.0551
	28.00	6.214	17.7063	.0565
	29.00	6.184	17.4890	.0572
	30.00	6.154	17.2730	.0579
	32.00	6.094	16.8440	.0594
	34.00	6.040	16.4564	.0608
	35.00	6.004	16.2090	.0617
	38.00	5.920	15.6256	.0641
	40.00	5.836	15.0493	.0665
8 5/8	24.00	8.097	33.4291	.0299
	28.00	8.017	32.6769	.0306
	32.00	7.921	31.7832	.0315
	36.00	7.825	30.9023	.0324
	38.00	7.775	30.4461	.0329
	40.00	7.725	29.9942	.0334
	43.00	7.651	29.3307	.0341
	44.00	7.625	29.0991	.0344
	49.00	7.511	28.0923	.0356

*Based on sand having bulk density of 14.3 #gal.
(s.g. --1.72)

SAND (20-40 MESH) FILL-UP BETWEEN TUBING AND CASING*

Nominal Tubing Size -- 3-inch

CASING				
Size OD In	Wt Per Ft Lbs	ID In	#Sand/ Linear Ft	Linear Ft/ #Sand
5 1/2	13.00	5.044	7.6963	.1300
	14.00	5.012	7.5089	.1333
	15.00	4.974	7.2873	.1373
	15.50	4.950	7.1486	.1400
	17.00	4.892	6.8154	.1469
	20.00	4.778	6.1719	.1622
	23.00	4.670	5.5770	.1795
7	17.00	6.538	17.7921	.0263
	20.00	6.456	17.1700	.0583
	22.00	6.398	16.7353	.0598
	23.00	6.366	16.4979	.0607
	24.00	6.336	16.2748	.0615
	26.00	6.276	15.8330	.0632
	28.00	6.214	15.3711	.0651
	29.00	6.184	15.1651	.0660
	30.00	6.154	14.9492	.0670
	32.00	6.094	14.5202	.0690
	34.00	6.040	14.1370	.0708
	35.00	6.004	13.8853	.0721
	38.00	5.920	13.3004	.0753
	40.00	5.836	12.7241	.0787
8 5/8	24.00	8.097	31.1039	.0322
	28.00	8.017	30.3517	.0330
	32.00	7.921	29.4594	.0340
	36.00	7.825	28.5771	.0350
	38.00	7.775	28.1224	.0356
	40.00	7.725	27.6705	.0362
	43.00	7.651	27.0055	.0371
	44.00	7.625	26.7739	.0374
	49.00	7.511	25.7672	.0388

*Based on sand having bulk density of 14.3 #gal.
(s.g. --1.72)

SAND (20-40 MESH) FILL-UP BETWEEN TUBING AND CASING*

Nominal Tubing Size -- 3 1/2-inch

CASING				
Size OD In	Wt Per Ft Lbs	ID In	#Sand/ Linear Ft	Linear Ft/ #Sand
5 1/2	13.00	5.044	5.5084	.1817
	14.00	5.012	5.3210	.1882
	15.00	4.974	5.0994	.1963
	15.50	4.950	4.9607	.2018
	17.00	4.892	4.6275	.2163
	20.00	4.778	3.9840	.2512
	23.00	4.670	3.3891	.2954
7	17.00	6.538	15.6042	.0641
	20.00	6.456	14.9821	.0668
	22.00	6.398	14.5474	.0688
	23.00	6.366	14.3100	.0699
	24.00	6.336	14.0869	.0710
	26.00	6.276	13.6451	.0734
	28.00	6.214	13.1932	.0759
	29.00	6.184	12.9772	.0771
	30.00	6.154	12.7613	.0784
	32.00	6.094	12.3323	.0812
	34.00	6.040	11.9491	.0836
	35.00	6.004	11.6974	.0856
	38.00	5.920	11.1125	.0901
	40.00	5.836	10.5362	.0950
8 5/8	24.00	8.097	28.9160	.0346
	28.00	8.017	28.1638	.0355
	32.00	7.921	27.2715	.0367
	36.00	7.825	26.3892	.0379
	38.00	7.775	25.9345	.0386
	40.00	7.725	25.4826	.0393
	43.00	7.651	24.8176	.0403
	44.00	7.625	24.5860	.0407
	49.00	7.511	23.5793	.0424

*Based on sand having bulk density of 14.3 #gal.
(s.g. --1.72)

STANDARD SIEVE OPENINGS (1)

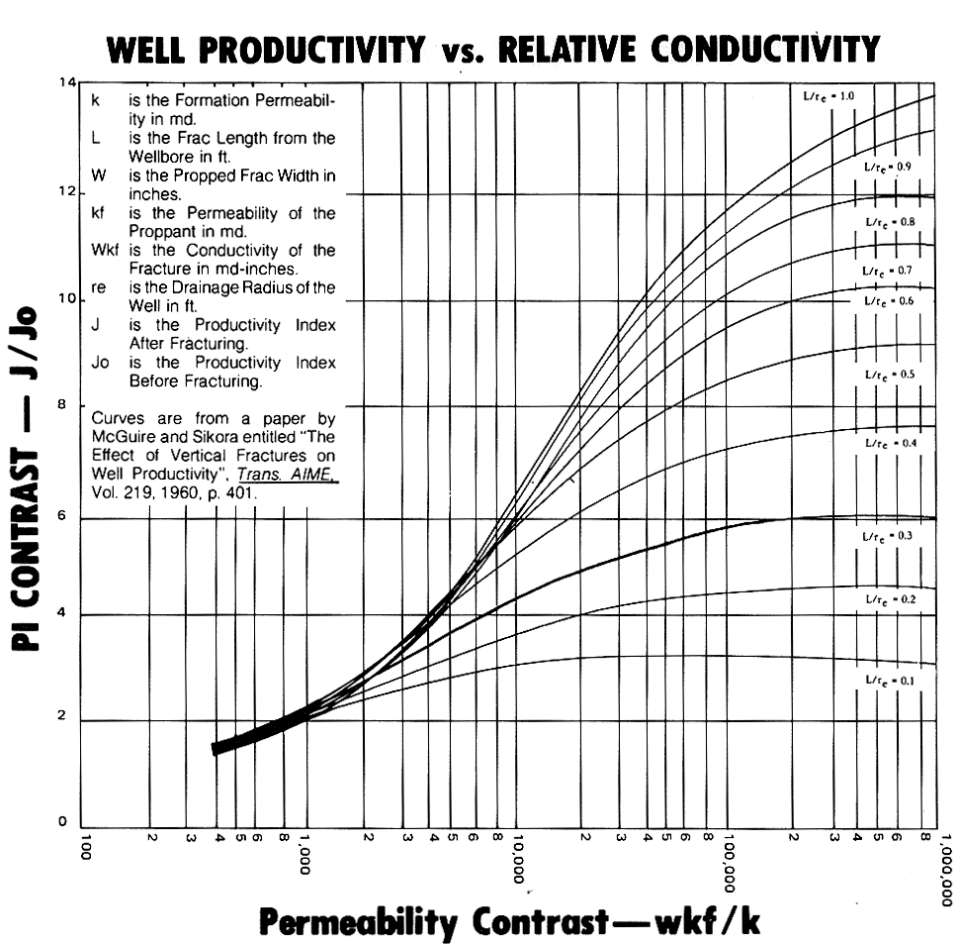
MESH		SIEVE OPENING		MESH		SIEVE OPENING	
US Series	Tyler Series	Inches	Millimeters	US Series	Tyler Series	Inches	Millimeters
2 1/2		.3150	8.000	25		.0280	.710
	2 1/2	.3120	7.925		24	.0276	.701
3		.2650	6.730	30	28	.0232	.589
	3	.2630	6.680	35		.1970	.500
3 1/2		.2230	5.660		32	.1095	.495
	3 1/2	.2210	5.613	40		.0165	.420
4		.1870	4.760		35	.0164	.417
	4	.1850	4.699	45	42	.0138	.351
5		.1570	4.000	50		.0117	.297
	5	.1560	3.962		48	.0116	.295
6		.1320	3.360	60		.0098	.250
	6	.1310	3.327		60	.0097	.246
7		.1110	2.830	70		.0083	.210
	7	.1100	2.794		65	.0082	.208
8		.0937	2.380	80		.0070	.177
	8	.0930	2.362		80	.0069	.175
10		.0787	2.000	100		.0059	.149
	9	.0780	1.981		100	.0058	.147
12		.0661	1.680	120	115	.0049	.124
	10	.0650	1.651	140	150	.0041	.104
14		.0555	1.410	170	170	.0035	.088
	12	.0555	1.397	200	200	.0029	.074
16		.0469	1.190	230	250	.0024	.062
	14	.0460	1.168	270	270	.0021	.053
18		.0394	1.000	325	325	.0017	.044
	16	.0390	.991	400	400	.0015	.037

PERMEABILITY and POROSITY of GRADED SANDS (2)

MESH	8-12 Angular	10-20 Angular	10-20 Round	10-30 Round	20-40 Round	40-60 Round
Permeability, Darcies	1745	881	325	191	121	45
Porosity, Percent (Approx.)	36	36	32	33	35	32

(1) Chemical Engineers' Handbook, 3rd Edition, McGraw-Hill

(2) Van Poollen, Tinsley, Saunders, SPE, AIME, TP 890-G, Dallas, Oct. 1957.

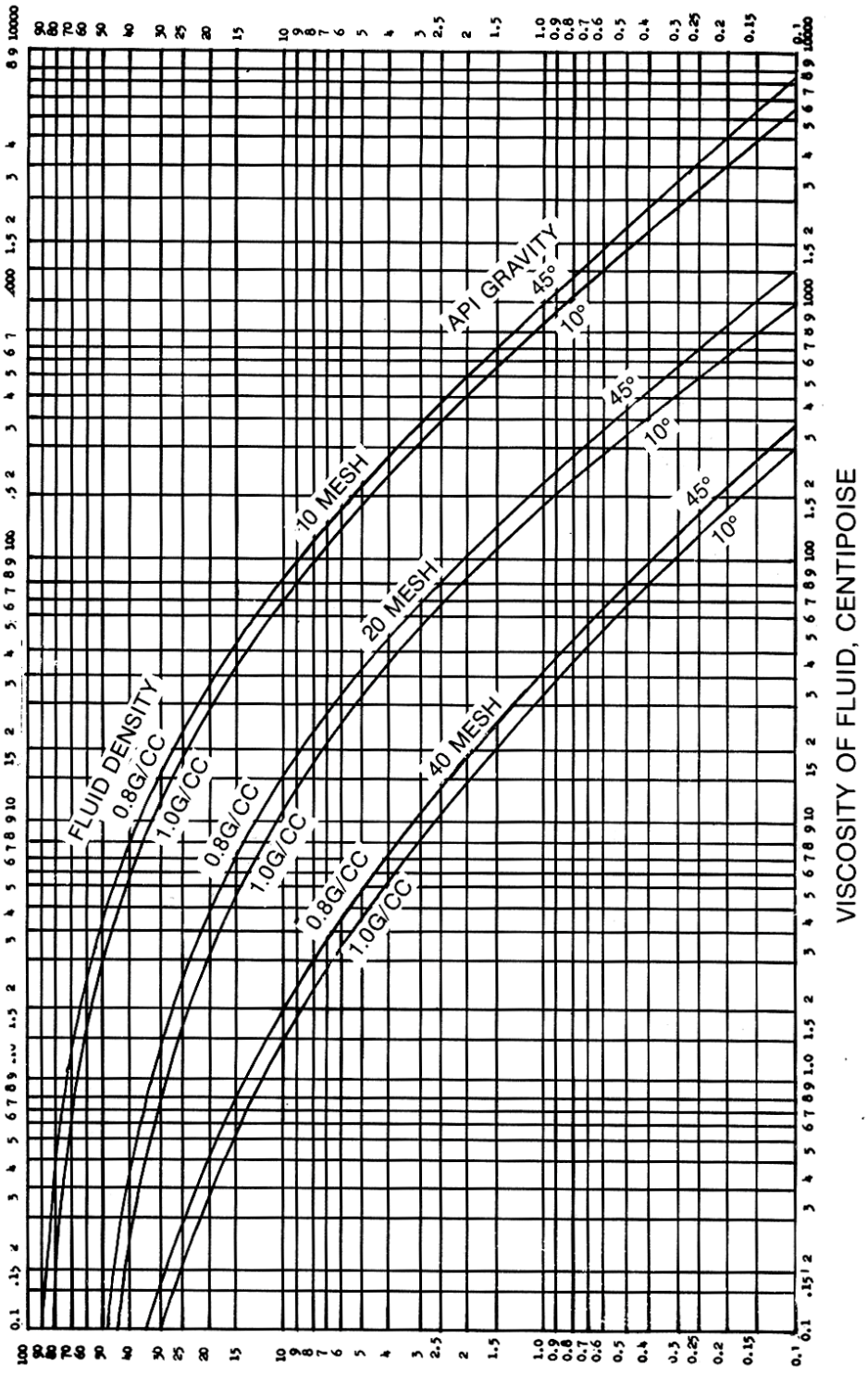


INCREASES in PRODUCTION from VERTICAL FRACTURES

Note: This graph is based on a well spacing (A) of 40 acres and a wellbore radius (rw) of 3 inches. It can be converted to other well spacing and wellbore radii by use of the following scaling factors:

Well Spacing	Drainage Radii	Scaling Factors for	
		Abscissa (wkf/k)	Ordinate (J/Jo)
For spacing shown and 3–inch wellbore radius.			
10 Acres	330 ft	2.00	1.11
20 Acres	467 ft`	1.42	1.05
40 Acres	660 ft	1.00	1.00
80 Acres	933 ft	.71	.95
160 Acres	1320 ft	.50	.91
320 Acres	1867 ft	.35	.87
640 Acres	2640 ft	.25	.84
For other spacing (A) and wellbore radii (rw).			
A	$104\sqrt{A}$	$\sqrt{40/A}$	$\frac{3.095}{\log(.472)(re/rw)}$

SAND SETTLING RATE CHART



SECTION 8

TANK AND PIT CALCULATIONS



CAPACITIES OF VERTICAL CYLINDRICAL TANKS 1
CAPACITIES OF BOLTED & WELDED TANKS 3
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CAPACITIES OF VERTICAL CYLINDRICAL TANKS
IN UNITED STATES GALLONS
FOR EACH FOOT IN DEPTH

Inside Diameter		United States gallons per foot	Inside Diameter		United States gallons per foot	Inside Diameter		United States gallons per foot
Ft	Ins	depth	Ft	Ins	depth	Ft	Ins	depth
1	0	5.875	4	2	102.000	12	0	846.027
1	1	6.859	4	3	106.121	12	3	881.645
1	2	7.997	4	4	110.323	12	6	917.998
1	3	9.180	4	5	114.607	12	9	955.085
1	4	10.445	4	6	118.973	13	0	992.903
1	5	11.791	4	7	123.420	13	3	1031.460
1	6	13.219	4	8	127.948	13	6	1070.750
1	7	14.729	4	9	132.559	13	9	1110.780
1	8	16.320	4	10	135.251	14	0	1151.540
1	9	17.993	4	11	142.024	14	3	1193.030
1	10	19.747	5	0	146.880	14	6	1235.260
1	11	21.583	5	3	161.935	14	9	1278.220
2	0	23.501	5	6	177.724	15	0	1321.920
2	1	25.500	5	9	194.248	15	6	1411.510
2	2	27.581	6	0	211.507	16	0	1504.050
2	3	29.743	6	3	229.499	16	6	1599.520
2	4	31.987	6	6	248.227	17	0	1697.930
2	5	34.313	6	9	267.688	17	6	1799.280
2	6	36.720	7	0	287.884	18	0	1903.560
2	7	39.209	7	3	308.814	18	6	2010.780
2	8	41.779	7	6	330.479	19	0	2120.940
2	9	44.431	7	9	352.878	19	6	2234.040
2	10	47.165	8	0	376.012	20	0	2650.070
2	11	49.980	8	3	399.880	20	6	2469.050
3	0	52.877	8	6	424.482	21	0	2590.960
3	1	55.855	8	9	449.819	21	6	2715.800
3	2	58.915	9	0	475.890	22	0	2843.590
3	3	62.057	9	3	502.696	22	6	2974.310
3	4	65.280	9	6	530.236	23	0	3107.970
3	5	68.585	9	9	558.510	23	6	3244.570
3	6	71.971	10	0	587.519	24	0	3384.110
3	7	75.439	10	3	617.262	24	6	3526.580
3	8	78.989	10	6	647.739	25	0	3671.990
3	9	82.620	10	9	678.951	25	6	3820.340
3	10	86.333	11	0	710.898	26	0	3971.630
3	11	90.127	11	3	743.578	26	6	4125.850
4	0	94.003	11	6	776.993	27	0	4283.010
4	1	97.961	11	9	811.143	27	6	4443.110

CAPACITIES OF VERTICAL CYLINDRICAL TANKS
IN UNITED STATES GALLONS
FOR EACH FOOT IN DEPTH

Inside Diameter		United States gallons per foot	Inside Diameter		United States gallons per foot	Inside Diameter		United States gallons per foot
Ft	Ins	depth	Ft	Ins	depth	Ft	Ins	depth
28	0	4606.15	46	6	12703.6	80	0	37601.2
28	6	4772.12	47	0	12978.3	81	0	38547.1
29	0	4941.03	47	6	13255.9	82	0	39504.8
29	6	5112.88	48	0	13536.4	83	0	40474.2
30	0	5287.67	48	6	13819.9	84	0	41455.3
30	6	5465.39	49	0	14106.3	85	0	42448.2
31	0	5646.05	49	6	14395.7	86	0	43452.9
31	6	5829.65	50	0	14688.0	87	0	44469.3
32	0	6016.19	51	0	15281.4	88	0	45497.4
32	6	6205.67	52	0	15886.5	89	0	46537.3
33	0	6398.08	53	0	16503.4	90	0	47589.0
33	6	6593.43	54	0	17132.0	91	0	48652.4
34	0	6791.72	55	0	17772.4	92	0	49727.6
34	6	6992.94	56	0	18424.6	93	0	50814.5
35	0	7197.10	57	0	19088.5	94	0	51913.1
35	6	7404.20	58	0	19764.1	95	0	53023.6
36	0	7614.24	59	0	20451.5	96	0	54145.7
36	6	7827.22	60	0	21150.7	97	0	55279.6
37	0	8043.13	61	0	21861.6	98	0	56425.3
37	6	8261.98	62	0	22584.2	99	0	57582.7
38	0	8483.77	63	0	23318.6	100	0	58751.9
38	6	8708.49	64	0	24064.8	101	0	59032.8
39	0	8936.16	65	0	24822.7	102	0	61125.4
39	6	9166.76	66	0	25592.3	103	0	62329.9
40	0	9400.30	67	0	26373.7	104	0	63546.0
40	6	9636.77	68	0	27166.9	105	0	64773.9
41	0	9876.19	69	0	27971.8	106	0	66013.6
41	6	10118.5	70	0	28788.4	107	0	67265.0
42	0	10363.8	71	0	29616.8	108	0	68528.2
42	6	10612.1	72	0	30457.0	109	0	69803.1
43	0	10863.2	73	0	31308.9	110	0	71089.8
43	6	11117.3	74	0	32172.5	111	0	72388.2
44	0	11374.4	75	0	33047.9	112	0	73698.3
44	6	11634.3	76	0	33935.1	113	0	75020.3
45	0	11897.3	77	0	34834.0	114	0	76353.9
45	6	12163.1	78	0	35744.6	115	0	77699.3
46	0	12431.9	79	0	36667.0	116	0	79056.5

CAPACITIES OF STANDARD BOLTED AND WELDED OIL FIELD TANKS

Capacity (Barrels)		Inside Diameter		Bbls Ft Depth of Fluid	Bbls/In Depth of Fluid	Gals/In Depth of Fluid
Nominal	Actual	Feet	Inches			
BOLTED TANKS						
100	95.80	9	2 3/4	11.92	.99	41.70
200	191.64	9	2 3/4	11.92	.99	41.70
250	266.28	15	4 5/8	33.11	2.76	115.88
500H	532.56	15	4 5/8	33.11	2.76	115.88
500L	522.01	21	6 1/2	64.91	5.41	227.20
750	798.84	15	4 5/8	33.11	2.76	115.88
800	804.57	26	8 15/16	100.06	8.36	350.20
1000H	1044.02	21	6 1/2	64.91	5.41	227.20
1000L	993.53	29	5 5/8	123.55	10.30	432.42
1500	1566.03	21	6 1/2	64.91	5.41	227.20

Capacity (Barrels)		Inside Diameter		Bbls Ft Depth of Fluid	Bbls/In Depth of Fluid	Gals/In Depth of Fluid
Nominal	Actual	Feet	Inches			
WELDED TANKS						
65		8	0	8.95	.75	31.33
90		8	0	8.95	.75	31.33
100		8	0	8.95	.75	31.33
100		9	6	12.62	1.05	44.19
110		10	0	13.99	1.17	48.96
150		9	6	12.62	1.05	44.19
200		10	0	13.99	1.17	48.96
224		10	0	13.99	1.17	48.96
250		11	0	16.93	1.41	59.24
280		10	0	13.99	1.17	48.96
295		11	0	16.93	1.41	59.24
300		12	0	20.14	1.68	70.50
350		12	0	20.14	1.68	70.50
400		12	0	20.14	1.68	70.50
436		14	0	27.42	2.28	95.96
545		14	0	27.42	2.28	95.96

TANK FORMULAS

The following formulas have been selected to facilitate the rapid calculation of capacities of various types of storage tanks in gallons and barrels.

Uniform Notations:

- B = Capacity of each dished head in united States gallons.
- B^2 = Total capacity of both dished heads in United States gallons.
- CB = Total capacity of tank in barrels (of 42 United States gallons).
- CG = Total capacity of tank in United States gallons.
- CGF = Capacity of cylindrical portion of tank in United States gallons per foot length (Flat heads).
- D = Inside diameter of tank in feet.
- G = Liquid contents of partially filled tank in United States gallons.
- L = Length of cylindrical portion of tank in feet.
- b = Dish of head, bead line to inside of plate (height of arc) in inches.
- d = Inside diameter of tank in inches.
- l = Length of cylindrical portion of tank in inches.
- r = Radius of dished head (where different from tank diameter) in inches.
- k = Per cent of total capacity of horizontal tanks.

Capacity of Vertical Cylindrical Tanks with Flat Heads

- R = Inside radius of tank in feet.
- H = Height of liquid in feet.
- CGF = Capacity in United States gallons, per foot depth = $23.501*R^2$.
- CG = Total capacity in United States gallons = $23.501 (R^2)(H)$.
- CB = Total capacity in barrels (of 42 United States gallons) = $0.56(R^2)(H)$.

Capacity of Horizontal Cylindrical Tanks with Flat Heads

- CGF = Capacity in United States gallons per foot length = $0.0408d^{2.}$
- CG = Total capacity in United States gallons = $0.0034d^2l$.
- CG = Total capacity in United States gallons = $5.875D^2L$.
- CB = Total capacity in barrels (of 42 United States gallons) = $0.14\ D^2L$.

Capacity of Horizontal Cylindrical Tanks with Dished Heads

(where radius of dished head equals diameter of tank)

- CG = Total capacity in United States gallons = $0.0034d^2l + 0.0004664d^3$.
- CG = Total capacity in United States gallons = $5.875D^2L + 0.806D^3$.
- CB = Total capacity in barrels (of 42 United States gallons) = $0.14\ D^2L + 0.019D^3$.

Capacity of Dished Head of any Radius

- B = Capacity of each dished head in United States gallons = $0.0045333b^2$ (3r–b).

Capacity of Spherical Tanks

CG = Total capacity in United States gallons = $0.0022666d^3$.
CG = Total capacity in United States gallons = $3.9168D^3$.
CB = Total capacity in barrels (of 42 United States gallons) = $0.093257D^3$.

Liquid Contents of partially filled Tanks

Horizontal Cylindrical Tanks with Flat Heads:

G = Liquid contents in United States gallons.

$$= \frac{1}{231}\ 0.004363\ d^2\ \ \text{Cos}^{-1}\ \frac{d-2h}{d} - \frac{d-2h}{2}\ \sqrt{h(d-h)}$$

The notation $\text{Cos}^{1}\ \frac{d-2h}{d}$ (read inverse cosine of $\frac{d-2h,}{d}$ or arc cosine $\frac{d-2h}{d}$) means the angle (in degrees) whose cosine is equal to $\frac{d-2h.}{d}$.

The use of this inverse function can be illustrated by an example:

Find the number of gallons contained in a horizontal cylindrical tank with flat heads, if the tank inside diameter is 144 inches, the length 96 inches, and the tank is filled with liquid to a depth of 20 inches. Substituting in the above formula.

$$G = \frac{96}{231}\ [\ 0.004363\ (144)^2 \text{Cos}^{-1}\ \frac{144-40}{144} - \frac{144-40}{2}\ \sqrt{20(144-20)}\ ]$$

$$G = 0.41558\ \left[90.47\text{Cos}^{-1}0.72 - 52\sqrt{2480}\right]$$

$$G = 0.41558\ (90.47\ \text{X}\ 43.95 - 2590)$$

$$G = 0.41558\ \text{X}\ 1386$$

$$G = 576 \text{ gallons.}$$

PLEASE NOTE: In calculating liquid contents of partially filled tanks, use formula for tanks up to half full. For tanks over half full, calculate capacity of unfilled portion and subtract from capacity of full tank.

Spherical Tanks:

G = Liquid contents in United States gallons = $0.0022666h^2$ (3d–2h).

Liquid Contents of partially filled Horizontal Cylindrical Tanks

– with Flat Heads

(1) Tank less than half full:
In order to find the gallons of liquid in a horizontal cylindrical tank with flat heads when tank is less than half full:

Find the total capacity of the tank, CG, either by calculating from the formulas or by finding the capacity per length, CGF, from page 8-7 and multiplying by the length of the tank in feet. Divide the depth of liquid, **h**, by the inside diameter of the tank, **d**, and by referring to pages 8-8 to 8-10 find the **k** corresponding to the **h/d** just found.

The United States gallons of liquid in the tank are then United States gallons = $\frac{CG \times k}{100}$

EXAMPLE:

d = 72 inches
L = 25 feet
h = 20 inches

From page 8-7, CGF = 211.51 then

CG = CGF L = 211.51 X 25 = 5288 gallons $\frac{h}{d} = \frac{20}{72} = 0.278$

From page 8-8 to 8-10, k = 22.6924 therefore,

United States gallons in tank = $\frac{5288 \times 22 \cdot 6924}{100}$ = 1199.9 gallons

(2) Tank over half full:

To find the liquid contents of tank over half full, let h' = depth of **unfilled portion**. The calculation should then proceed as for a tank less than half full using **h'** instead of **h**. The result obtained will then be the capacity of the **unfilled portion** of the tank and must be subtracted from the total capacity of the tank, CG, to find the quantity of liquid in the tank.

CAPACITIES OF HORIZONTAL CYLINDRICAL TANKS IN UNITED STATES GALLONS PER FOOT LENGTH FLAT AND OF DISHED HEADS (WHERE r = d)

Inside Diameter of tank in inches	Capacity of cylindrical portion of tank per ft length	Total Capacity of both dished heads	Inside Diameter of tank in inches	Capacity of cylindrical portion of tank per ft length	Total capacity of both dished heads	Inside Diameter of tank in inches	Capacity of cylindrical portion of tank per ft length	Total capacity both dished heads
d	CGF	B_2	d	CGF	B_2	d	CGF	B_2
12	5.88	.81	48	94.00	51.58	84	287.88	276.45
13	6.90	1.02	49	97.96	54.87	85	294.78	286.44
14	8.00	1.28	50	102.00	58.30	86	301.76	296.67
15	9.18	1.57	51	106.12	61.87	87	308.82	307.14
16	10.44	1.91	52	110.32	65.58	88	315.96	317.85
17	11.79	2.29	53	114.61	69.44	89	323.18	328.81
18	13.22	2.72	54	118.97	73.44	90	330.48	340.02
19	14.73	3.20	55	123.42	77.60	91	337.86	351.48
20	16.32	3.73	56	127.95	81.91	92	345.33	363.19
21	17.99	4.32	57	132.56	86.38	93	352.88	375.16
22	19.75	4.97	58	137.25	91.00	94	360.51	387.40
23	21.58	5.67	59	142.02	95.76	95	368.22	399.89
24	23.50	6.45	60	146.88	100.75	96	376.01	413.65
25	25.50	7.29	61	151.82	105.82	97	383.89	425.68
26	27.58	8.20	62	156.84	111.16	98	391.84	438.99
27	29.74	9.18	63	161.94	116.63	99	399.88	452.56
28	31.99	10.24	64	167.12	122.27	100	408.00	466.41
29	34.31	11.38	65	172.38	128.09	101	416.20	480.55
30	36.72	12.59	66	177.72	134.09	102	424.48	494.96
31	39.21	13.89	67	183.15	140.28	103	432.85	509.66
32	41.78	15.28	68	188.66	146.66	104	441.29	524.65
33	44.43	16.76	69	194.25	153.22	105	449.82	539.93
34	47.16	18.33	70	199.92	159.98	106	458.43	555.51
35	49.98	20.00	71	205.67	166.93	107	467.12	571.38
36	52.88	21.76	72	211.51	174.09	108	475.89	587.55
37	55.86	23.63	73	217.42	181.44	109	484.74	604.02
38	58.92	25.59	74	223.42	189.00	110	493.68	620.80
39	62.06	27.67	75	229.50	196.77	111	502.70	637.88
40	65.28	29.85	76	235.66	204.74	112	511.80	655.28
41	68.58	32.15	77	241.90	212.93	113	520.98	672.99
42	71.97	34.56	78	248.23	221.34	114	530.24	691.01
43	75.44	37.08	79	254.63	229.96	115	539.58	709.36
44	78.99	39.73	80	261.12	238.80	116	549.00	728.02
45	82.62	42.50	81	267.69	247.87	117	558.51	747.01
46	86.33	45.40	82	274.34	257.17	118	568.10	766.33
47	90.13	48.42	83	281.07	266.69	119	577.77	785.98
						120	587.52	805.96

TABLE FOR GAUGING HORIZONTAL CYLINDRICAL TANKS WITH FLAT HEADS – PER CENT OF TOTAL CAPACITY – k

h/d	k	h/d	k	h/d	k	h/d	k
.001	.0053	.043	1.4940	.085	4.0980	.127	7.3836
.002	.0152	.044	1.5460	.086	4.1694	.128	7.4686
.003	.0279	.045	1.5986	.087	4.2409	.129	7.5539
.004	.0429	.046	1.6515	.088	4.3128	.130	7.6393
.005	.0600	.047	1.7052	.089	4.3852	.131	7.7251
.006	.0788	.048	1.7594	.090	4.4579	.132	7.8112
.007	.0992	.049	1.8141	.091	4.5310	.133	7.8975
.008	.1212	.050	1.8692	.092	4.6043	.134	7.9841
.009	.1445	.051	1.9250	.093	4.6781	.135	8.0709
.010	.1682	.052	1.9813	.094	4.7522	.136	8.1582
.011	.1952	.053	2.0382	.095	4.8267	.137	8.2456
.012	.2223	.054	2.0955	.096	4.9016	.138	8.3332
.013	.2507	.055	2.1533	.097	4.9767	.139	8.4212
.014	.2800	.056	2.2115	.098	5.0523	.140	8.5094
.015	.3104	.057	2.2703	.099	5.1282	.141	8.5979
.016	.3419	.058	2.3296	.100	5.2044	.142	8.6867
.017	.3743	.059	2.3894	.101	5.2810	.143	8.7757
.018	.4077	.060	2.4496	.102	5.3579	.144	8.8651
.019	.4421	.061	2.5103	.103	5.4351	.145	8.9546
.020	.4773	.062	2.5716	.104	5.5126	.146	9.0443
.021	.5134	.063	2.6332	.105	5.5905	.147	9.1343
.022	.5503	.064	2.6952	.106	5.6688	.148	9.2246
.023	.5881	.065	2.7578	.107	5.7474	.149	9.3153
.024	.6267	.066	2.8209	.108	5.8262	.150	9.4061
.025	.6660	.067	2.8843	.109	5.9054	.151	9.4971
.026	.7061	.068	2.9482	.110	5.9850	.152	9.5884
.027	.7470	.069	3.0125	.111	6.0648	.153	9.6799
.028	.7886	.070	3.0772	.112	6.1449	.154	9.7717
.029	.8310	.071	3.1424	.113	6.2254	.155	9.8638
.030	.8742	.072	3.2081	.114	6.3062	.156	9.9560
.031	.9179	.073	3.2740	.115	6.3872	.157	10.0485
.032	.9624	.074	3.3405	.116	6.4687	.158	10.1414
.033	1.0075	.075	3.4073	.117	6.5503	.159	10.2343
.034	1.0534	.076	3.4747	.118	6.6323	.160	10.3275
.035	1.0998	.077	3.5423	.119	6.7147	.161	10.4211
.036	1.1469	.078	3.6104	.120	6.7972	.162	10.5147
.037	1.1947	.079	3.6789	.121	6.8802	.163	10.6086
.038	1.2431	.080	3.7478	.122	6.9633	.164	10.7029
.039	1.2921	.081	3.8170	.123	7.0469	.165	10.7972
.040	1.3417	.082	3.8867	.124	7.1307	.166	10.8919
.041	1.3919	.083	3.9568	.125	7.2147	.167	10.9868
.042	1.4427	.084	4.0273	.126	7.2991	.168	11.0819

TABLE FOR GAUGING HORIZONTAL CYLINDRICAL TANKS WITH FLAT HEADS– PER CENT OF TOTAL CAPACITY – k

h/d	k	h/d	k	h/d	k	h/d	k
.169	11.1771	.211	15.3697	.253	19.8815	.295	24.6495
.170	11.2728	.212	15.4737	.254	19.9923	.296	24.7657
.171	11.3685	.213	15.5778	.255	20.1033	.297	24.8820
.172	11.4645	.214	15.6821	.256	20.2143	.298	24.9984
.173	11.5606	.215	15.7866	.257	20.3255	.299	25.1149
.174	11.6571	.216	15.8914	.258	20.4369	.300	25.2315
.175	11.7538	.217	15.9962	.259	20.5483	.301	25.3483
.176	11.8505	.218	16.1013	.260	20.6600	.302	25.4652
.177	11.9477	.219	16.2066	.261	20.7718	.303	25.5822
.178	12.0450	.220	16.3120	.262	20.8837	.304	25.6992
.179	12.1425	.221	16.4175	.263	20.9957	.305	25.8165
.180	12.2403	.222	16.5232	.264	21.1079	.306	25.9337
.181	12.3382	.223	16.6291	.265	21.2202	.307	26.0511
.182	12.4364	.224	16.7352	.266	21.3326	.308	26.1686
.183	12.5347	.225	16.8415	.267	21.4453	.309	26.2863
.184	12.6332	.226	16.9480	.268	21.5580	.310	26.4039
.185	12.7320	.227	17.0545	.269	21.6708	.311	26.5218
.186	12.8309	.228	17.1612	.270	21.7839	.312	26.6397
.187	12.9301	.229	17.2682	.271	21.8969	.313	26.7578
.188	13.0296	.230	17.3853	.272	22.0102	.314	26.8759
.189	13.1291	.231	17.4825	.273	22.1236	.315	26.9941
.190	13.2290	.232	17.5899	.274	22.2371	.316	27.1125
.191	13.3290	.233	17.6975	.275	22.3507	.317	27.2309
.192	13.4291	.234	17.8052	.276	22.4645	.318	27.3494
.193	13.5296	.235	17.9131	.277	22.5784	.319	27.4681
.194	13.6302	.236	18.0212	.278	22.6924	.320	27.5868
.195	13.7310	.237	18.1294	.279	22.8065	.321	27.7057
.196	13.8320	.238	18.2378	.280	22.9206	.322	27.8246
.197	13.9332	.239	18.3462	.281	23.0352	.323	27.9437
.198	14.0345	.240	18.4550	.282	23.1498	.324	28.0627
.199	14.1361	.241	18.5638	.283	23.2644	.325	28.1820
.200	14.2379	.242	18.6727	.284	23.3791	.326	28.3013
.201	14.3399	.243	18.7819	.285	23.4941	.327	28.4207
.202	14.4420	.244	18.8912	.286	23.6090	.328	28.5402
.203	14.5443	.245	19.0007	.287	23.7241	.329	28.6599
.204	14.6468	.246	19.1102	.288	23.8395	.330	28.7795
.205	14.7495	.247	19.2199	.289	23.9549	.331	28.8992
.206	14.8525	.248	19.3298	.290	24.0703	.332	29.0192
.207	14.9555	.249	19.4399	.291	24.1859	.333	29.1391
.208	15.0587	.250	19.5501	.292	24.3017	.334	29.2592
.209	15.1621	.251	19.6605	.293	24.4174	.335	29.3794
.210	15.2659	.252	19.7710	.294	24.5334	.336	29.4996

TABLE FOR GAUGING HORIZONTAL CYLINDRICAL TANKS WITH FLAT HEADS – PER CENT OF TOTAL CAPACITY – k

h/d	k	h/d	k	h/d	k	h/d	k
.337	29.6199	.378	34.6221	.419	39.7321	.460	44.9125
.338	29.7403	.379	34.7456	.420	39.8577	.461	45.0394
.339	29.8608	.380	34.8691	.421	39.9834	.462	45.1664
.340	29.9814	.381	34.9927	.422	40.1092	.463	45.2933
.341	30.1021	.382	35.1165	.423	40.2350	.464	45.4203
.342	30.2228	.383	35.2402	.424	40.3608	.465	45.5473
.343	30.3437	.384	35.3640	.425	40.4866	.466	45.6743
.344	30.4645	.385	35.4879	.426	40.6125	.467	45.8014
.345	30.5856	.386	35.6119	.427	40.7384	.468	45.9284
.346	30.7067	.387	35.7359	.428	40.8645	.469	46.0555
.347	30.8279	.388	35.8599	.429	40.9904	.470	46.1826
.348	30.9491	.389	35.9840	.430	41.1165	.471	46.3096
.349	31.0705	.390	36.1082	.431	41.2426	.472	46.4368
.350	31.1918	.391	36.2324	.432	41.3687	.473	46.5639
.351	31.3134	.392	36.3567	.433	41.4949	.474	46.6911
.352	31.4350	.393	36.4810	.434	41.6211	.475	46.8183
.353	31.5566	.394	36.6055	.435	41.7474	.476	46.9454
.354	31.6783	.395	36.7299	.436	41.8935	.477	47.0726
.355	31.8002	.396	36.8544	.437	41.9998	.478	47.1998
.356	31.9220	.397	36.9789	.438	42.1261	.479	47.3269
.357	32.0440	.398	37.1036	.439	42.2526	.480	47.4541
.358	32.1661	.399	37.2282	.440	42.3789	.481	47.5815
.359	32.2882	.400	37.3530	.441	42.5053	.482	47.7087
.360	32.4104	.401	37.4778	.442	42.6318	.483	47.8359
.361	32.5327	.402	37.6026	.443	42.7583	.484	47.9632
.362	32.6550	.403	37.7275	.444	42.8877	.485	48.0904
.363	32.7774	.404	37.8524	.445	43.0113	.486	48.2177
.364	3.2899	.405	37.9774	.446	43.1379	.487	48.3450
.365	33.0225	.406	38.1025	.447	43.2646	.488	48.4722
.366	33.1451	.407	38.2275	.448	43.3911	.489	48.5996
.367	33.2678	.408	38.3526	.449	43.5178	.490	48.7269
.368	33.3906	.409	38.4778	.450	43.6445	.491	48.8542
.369	33.5134	.410	38.6030	.451	43.7712	.492	48.9814
.370	33.6363	.411	38.7283	.452	43.8979	.493	49.1087
.371	33.7593	.412	38.8537	.453	44.0245	.494	49.2360
.372	33.8823	.413	38.9790	.454	44.1514	.495	49.3634
.373	34.0054	.414	39.1044	.466	44.2782	.496	49.4907
.374	34.1287	.415	39.2298	.456	44.4050	.497	49.6180
.375	34.2519	.416	39.3553	.457	44.5318	.498	49.7453
.376	34.3752	.417	39.4809	.458	44.6587	.499	49.8727
.377	34.4986	.418	39.6064	.459	44.7856	.500	50.0000

FORMULAS FOR CALCULATING CAPACITY OF RECTANGULAR TANK AND PITS

For small or medium size rectangular tanks or pits measure the length and width in **inches**. The following formulas can then be used for calculating volumes per inch of depth of fluid:

Cu Ft per inch of depth of fluid = 0.0005787 X L (in) X W (in)

Bbl per inch of depth of fluid = 0.0001031 X L (in) X W (in)

Gal per inch of depth of fluid = 0.004329 X L (in) X W (in)

For large tanks or pits measure length and width in **feet**. The following formulas can then be used for calculating volumes per inch of depth of fluid:

Cu Ft per inch of depth of fluid = 0.08333 X L (ft) X W (ft)

Bbl per inch of depth of fluid = 0.01484 X L (ft) X W (ft)

Gal per inch of depth of fluid = 0.6234 X L (ft) X W (ft)

STORAGE CAPACITY OF RESERVOIR IN BARRELS PER ACRE FOOT

Per Cent Porosity	Fractional Per Cent Porosity				
	0.0	0.2	0.4	0.6	0.8
5	388	403	419	435	450
6	466	481	497	512	528
7	543	559	574	590	605
8	621	636	652	667	683
9	698	714	729	745	760
10	776	791	807	822	838
11	953	869	885	900	916
12	931	947	962	928	993
13	1009	1024	1040	1055	1071
14	1086	1102	1117	1133	1148
15	1164	1179	1195	1210	1226
16	1241	1257	1272	1288	1303
17	1319	1334	1350	1365	1381
18	1397	1412	1429	1443	1459
19	1474	1490	1505	1521	1536
20	1552	1567	1583	1598	1614
21	1629	1645	1660	1676	1691
22	1707	1722	1738	1753	1769
23	1784	1800	1815	1831	1846
24	1862	1878	1893	1909	1924
25	1940	1955	1971	1986	2002
26	2017	2033	2048	2064	2079
27	2095	2110	2126	2141	2157
28	2172	2188	2203	2219	2234
29	2250	2265	2281	2296	2312
30	2328	2343	2359	2374	2390
31	2405	2421	2436	2452	2467
32	2483	2498	2514	2529	2545
33	2560	2576	2591	2607	2622
34	2638	2653	2669	2684	2700
35	2715	2731	2746	2762	2777
36	2793	2809	2824	2840	2855
37	2871	2886	2902	2917	2933
38	2948	2964	2979	2995	3010
39	2026	3041	3057	3072	3088
40	3103	3119	3134	3150	3165

SECTION 9

FORMULAS AND CONVERSIONS



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BALANCED PLUG

1. Circulate mud and condition the hole.

2. Pump water ahead of cement.

3. Mix and pump cement slurry.

4. Pump water behind cement.

5. Pump mud to finish displacing cement to balance point.

The water ahead of and the water behind the cement slurry must be the same height in order for the plug to be hydrostatically balanced.

Also, the depth of the top of the plug, with the work string still in the plug, must be calculated. This depth must be known in order to calculate accurately the exact displacement required to pump the plug to the balance point. The plug will be taller (longer) while the work string is still in the plug.

To calculate the depth of the slurry to the balance point (with work string in) is a two-step process.

STEP 1.

Using the formula, calculate the height of the plug with the work string still in.

FORMULA

$$\text{height of plug work string in (in linear feet)} = \frac{\text{total cubic feet of cement slurry}}{\left[\text{CF/LF in work string} + \text{CF/LF in annulus}\right]}$$

STEP 2.

Subtract the height (length) of the plug with the work string in from the work string pipe tally (depth of the bottom of the plug) to find the depth of the top of the plug.

BUOYANCY

The apparent weight of steel pipe suspended open-ended in fluid is the weight of the pipe in air multiplied by a buoyancy factor.

The following formula is for calculating a buoyancy factor. Casing run with a float device and/or guide shoe is calculated the same as open-ended casing.

The following formula is for calculating a buoyancy factor.

lb_L (in liquid) = lb_A (in air) X [l – (0.015 X ppg)]

EXAMPLE:

Question 1 What is the air weight of 1,000 Ft of 8-5/8" 24 Lb/Ft casing?

Answer 1 Multiply linear feet of casing string times pounds of weight per foot, to find air weight. Therefore, 1,000 ft X 24 Lb/Ft = 24,000 Lbs air weight.

Question 2 What is the apparent weight of this same string of casing if it is run in 11.2 PPG drilling mud?

Answer 2 Using the formula:

lb_L = lb_A X [1 - (0.015 X PPG)]

lb_L = 1,000 Ft X 24 Lb/Ft X (1 - (0.015 X PPG)]

lb_L = 24,000 Lb X [1 - (0.015 X 11.2)]

lb_L = 19,968

* The buoyancy discussed here is the buoyancy exhibited by a liquid, which is a tendency for the liquid to suspend or float any object placed in it.

It is important to note that this buoyancy is not directly related to the flotation provided by casing float devices.

BUOYANCY FACTORS FOR PIPE

Lb/Gal	buoyancy	Lb/Gal	buoyancy	Lb/Gal	buoyancy	Lb/Gal	buoyancy	Lb/Gal	buoyancy
6.0	.9100	8.8	.8680	11.6	.8260	14.4	.7840	17.2	.7420
6.1	.9085	8.9	.8665	11.7	.8245	14.5	.7825	17.3	.7405
6.2	.9070	9.0	.8650	11.8	.8230	14.6	.7810	17.4	.7390
6.3	.9055	9.1	.8635	11.9	.8215	14.7	.7795	17.5	.7375
6.4	.9040	9.2	.8620	12.0	.8200	14.8	.7780	17.6	.7360
6.5	.9025	9.3	.8605	12.1	.8185	14.9	.7765	17.7	.7345
6.6	.9010	9.4	.8590	12.2	.8170	15.0	.7750	17.8	.7330
6.7	.8995	9.5	.8575	12.3	.8155	15.1	.7735	17.9	.7315
6.8	.8980	9.6	.8560	12.4	.8140	15.2	.7720	18.0	.7300
6.9	.8965	9.7	.8545	12.5	.8125	15.3	.7705	18.1	.7285
7.0	.8950	9.8	.8530	12.6	.8110	15.4	.7690	18.2	.7270
7.1	.8935	9.9	.8515	12.7	.8095	15.5	.7675	18.3	.7255
7.2	.8920	10.0	.8500	12.8	.8080	15.6	.7660	18.4	.7240
7.3	.8905	10.1	.8485	12.9	.8065	15.7	.7645	18.5	.7225
7.4	.8890	10.2	.8470	13.0	.8050	15.8	.7630	18.6	.7210
7.5	.8875	10.3	.8455	13.1	.8035	15.9	.7615	18.7	.7195
7.6	.8860	10.4	.8440	13.2	.8020	16.0	.7600	18.8	.7180
7.7	.8845	10.5	.8425	13.3	.8005	16.1	.7585	18.9	.7165
7.8	.8830	10.6	.8410	13.4	.7990	16.2	.7570	19.0	.7150
7.9	.8815	10.7	.8395	13.5	.7975	16.3	.7555	19.1	.7135
8.0	.8800	10.8	.8380	13.6	.7960	16.4	.7540	19.2	.7120
8.1	.8785	10.9	.8365	13.7	.7945	16.5	.7525	19.3	.7105
8.2	.8770	11.0	.8350	13.8	.7930	16.6	.7510	19.4	.7090
8.3	.8755	11.1	.8335	13.9	.7915	16.7	.7495	19.6	.7075
8.4	.8740	11.2	.8320	14.0	.7900	16.8	.7480	19.5	.7060
8.5	.8725	11.3	.8305	14.1	.7885	16.9	.7465	19.7	.7045
8.6	.8710	11.4	.8290	14.2	.7870	17.0	.7450	19.8	.7030
8.7	.8695	11.5	.8275	14.3	.7855	17.1	.7435	19.9	.7015

FRESH WATER

8.34 .8749

FOR OPEN ENDED PIPE

Pipe Wt. (In Fluid) = Pipe Wt. (In Air) X buoyancy Factor

HYDROSTATIC HEAD AND FLUID WEIGHT

API Gravity	Specific Gravity	Lbs Per Gallon	Lbs/Sq In Per Ft
50	.78	6.50	.338
46	.797	6.65	.346
44	.806	6.73	.350
43	.811	6.76	.352
42	.816	6.80	.354
41	.820	6.84	.356
40	.825	6.88	.358
39	.830	6.92	.360
38	.835	6.96	.362
37	.840	7.00	.364
36	.845	7.05	.367
35	.850	7.09	.369
34	.855	7.13	.371
33	.860	7.18	.373
32	.865	7.22	.375
31	.871	7.26	.378
30	.876	7.31	.380
28	.887	7.40	.385
26	.898	7.49	.389
24	.910	7.59	.395
22	.922	7.69	.400
20	.934	7.79	.405
18	.946	7.90	.411
15	.966	8.06	.419
12	.986	8.23	.428
10	1.000	8.34	.434
	1.03	8.60	.447
	1.05	8.8	.458
15 % HCl	1.075	8.96	.466
	1.08	9.0	.466
	1.13	9.4	.489
	1.15	9.6	.499
	1.17	9.8	.510
	1.20	10.0	.520
	1.25	10.4	.541
	1.27	10.6	.551
	1.29	10.8	.562
	1.32	11.0	.572
	1.37	11.4	.593
	1.39	11.6	.603
	1.14	11.8	.614
	1.44	12.0	.624
	1.49	12.4	.645
	1.53	12.8	.666
	1.56	13.0	.676
	1.61	13.4	.697
	1.65	13.8	.718
	1.68	14.0	.728
	1.74	14.5	.754
	1.80	15.0	.780
	1.86	15.5	.806
	1.92	16.0	.832
	1.98	16.5	.858
	2.00	16.7	.868
	2.06	17.2	.894
	2.12	17.7	.920
	2.18	18.2	.946

CONVERSION FACTORS

MULTIPLY	BY	TO OBTAIN
Acres	43560	Square feet
Acres	160	Square rods
Acre feet	7758	Barrels
Atmospheres	33.94	Feet of water
Atmospheres	29.92	Inches of mercury
Atmospheres	14.70	Pounds per square inch
Barrels	5.6146	Cubic feet
Barrels	42.0	Gallons
Barrels per hour	.700	Gallons per minute
BTU's per minute	.02356	Horsepower
Centimeters	.3937	Inches
Cubic centimeters	.06102	Cubic inches
Cubic feet	.1781	Barrels
Cubic feet	7.4805	Gallons (US)
Cubic feet of steel	489.6	Pounds of steel
Feet	.3048	Meters
Feet of water @ 60° F	.4331	Pounds per inch
Feet per second	.68182	Miles per hour
Foot-pounds per second	.001818	Horsepower
Gallons (US)	.02381	Barrels
Gallons (US)	.1337	Cubic feet
Gallons (US)	231.0	Cubic inches
Gallons per minute	1.429	Barrels per hour
Grams	.03527	Ounces
Horsepower	33000	Foot-pounds per minute
Horsepower	550	Foot-pounds per second
Horsepower	.7457	Kilowatts
Inches of mercury	1.134	Feet of water
Inches of mercury	.4912	Pounds per square inch
Inches of water @ 60° F	.0361	Pounds per square inch
Kilowatts	1.341	Horsepower
Liters	33.814	Ounces
Liters	1.0567	Quarts
Miles	5280	Feet
Miles per hour	1.4667	Feet per second
Ounces (Avoirdupois)	28.353	Grams
Parts per million	8.337	Pounds per million gallons
Pounds	7000	Grains
Pounds	453.6	Grams
Pounds per square inch	2.309	Feet of water @ 60° F
Pounds per square inch	2.0353	Inches of mercury
Pounds per million gallons	.11982	Parts per million
Pounds per gallons	.1198	Grams per cubic centimeter
Pounds per gallons	.052	Pounds per square inch per ft of depth
Quarts	946.36	Milliliters
Square miles	640	Acres
Tons (long)	2240	Pounds
Tons (short)	2000	Pounds
Yards	.9144	Meters

VISCOSITY CONVERSION FACTORS

Saybolt Universal Seconds	Engler Degrees	Absolute Viscosity Centipoise,* also Relative Viscosity	Kinematic Viscosity Poises Per g per CC
32	1.08	1.41	.0141
34	1.14	2.19	.0219
36	1.19	2.92	.0292
38	1.25	3.63	.0363
40	1.31	4.30	.0430
42	1.37	4.95	.0495
44	1.43	5.59	.0559
46	1.48	6.21	.0621
48	1.53	6.81	.0681
50	1.58	7.40	.0740
55	1.73	88.63	.0883
60	1.88	10.20	.1020
65	2.03	11.53	.1153
70	2.17	12.83	.1283
75	2.31	14.10	.1410
80	2.46	15.35	.1535
85	2.59	16.58	.1658
90	2.74	17.80	.1780
95	2.88	19.00	.1900
100	3.02	20.20	.2020
110	3.31	22.56	.2256
120	3.60	24.90	.2490
130	3.69	27.21	.2721
140	4.19	29.51	.2951
160	4.77	34.07	.3407
180	5.35	38.60	.3860
200	5.92	43.10	.4310
225	6.64	48.70	.4870
250	7.35	54.28	.5428
300	8.79	65.40	.6540
350	10.25	76.49	.7649
400	11.68	87.55	.8755
450	13.00	98.60	.9860
500	14.00	109.6	1.096
550	16.00	120.7	1.207
600	17.00	131.7	1.317
650	19.00	142.7	1.427
700	20.00	153.7	1.537
800	23.00	175.8	1.758
900	26.00	197.8	1.978
1000	29.00	219.8	2.198
1500	43.00	329.9	3.299
2000	58.00	439.9	4.399
2500	72.00	549.9	5.499
3000	87.00	659.9	6.599
3500	101.00	769.9	7.699

*Values in this column must be multiplied by the specific gravity of the fluid at the temperature of the measurement to complete the conversion.

VISCOSITY CONVERSION

Centistokes = Centipoise ÷ Specific Gravity of Fluid.

CORROSION DATA

Mils X 0.00254 = Centimeters
Mils X 0.001 = Inches

$$\frac{\text{Pounds per Square Foot per Day X 0.274}}{\text{Density}} = \text{Inches Penetration per Year}$$

$$\frac{\text{Ounces Per Square Foot per Day X 4.39}}{\text{Density}} = \text{Inches Penetration per Year}$$

MUD PIT CALCULATIONS

0.0833 (Length, FT) (Width, FT) = Cubic feet per inch of Depth.
0.0148 (Length, FT) (Width, FT) = Barrels per inch of Depth.
0.00058 (Length, inches) (Width, inches) = Cubic feet per inch of Depth.

PIPE DISPLACEMENT (METAL ONLY w/COUP)

0.002 (Wt of Pipe per Ft with Couplings)(Depth, Ft) = Displacement of pipe in Cu Ft
0.000367 (Wt of Pipe per Ft with Couplings)(Depth, Ft) = Displacement of pipe in Bbls

COMMON EQUIVALENTS

acres X 43,560 = sq ft
acres X 40,471 = sq m
atm X 14.7 = lb/sq in

bbl oil X 42 = gal oil
bbl X 5.6146 = cu ft
bags or sacks of cement X 94 = lb cement

board ft X 144 sq in X lin = cu in
C^o X 1.8 + 32 = F
Chair X 66 = feet

cm /sec X 1.969 = ft/min
cm /sec X 0.036 = km/hr
cm /sec X 0.02237 = miles/hr
cm /sec/sec X 0.03281 = ft/sec/sec

cu ft/ min X 472.0 = cu cm/sec
cu ft/ min X 0.1247 = gal/sec
cu ft/ min X 0.4720 = 1/sec
cu ft/ min X 62.43 = lb water/min
cu ft/ sec X 0.6463 = million gal/day
cu ft/ sec X 448.83 = gal/min

cu in X 16.39 = cu cm
cu in X 0.03463 = pt (liq)
cu in X 0.01732 = qt (liq)

cu m X 35.31 = cu ft
cu m X 61.023 = cu in
cu m X 1.308 = cu yd
cu m X 264.2 = gal
cu m X 2113 = pt (liq)
cu m X 1057 = qt (liq)

cu yd X 7.646 X 10^5 = cu cm
cu yd X 27 = cu ft
cu yd X 46,656 = cu in
cu yd X 0.7646 = cu in

cu yd X 202.0 = gal
gal X 8 = pt (liq)
cu yd X 764.6 = 1
cu yd X 1616 = pt (liq)
cu yd X 807.9 = qt (liq)

cu yd/min X 0.45 = cu ft/sec
cu yd/min X 3.367 = gal/sec
cu yd/min X 12.74 = 1/sec

(F-32) 0.555 = C^o
Fathoms X 6 = ft

ft X 30.48 = cm
ft X 0.3048 = m
ft X 0.33333 = yd

ft water X 304.8 = kg/sq in
ft water X 62.43 = lb/sq ft
ft water X 0.4335 = lb/sq in

ft/min X 0.508 = cm/sec
ft/min X 0.01667 = ft/sec
ft/min X 0.01829 = km/hr
ft/min X 0.3048 = m/min
ft/min X 0.01136 = miles/hr

ft/sec X 30.48 = cm/sec
ft/sec X 1.097 = km/hr
ft/sec X 0.5921 = knots
ft/sec X 18.29 = m/min
ft/sec X 0.6818 = miles/hr
ft/sec X 0.01136 = miles/min
ft/sec/sec X 30.48 = cm/sec/sec
ft/sec/sec X 0.3048 = m/sec/sec

Furlongs X 660 = ft

gal X 3785 = cu/cm
gal X 0.1337 = cu ft
gal X 231 = cu in
gal X 3.785 X 10^{-3} = cu m
gal X 4.951 X 10^{-3} = cu yd
gal X 3.785 = liters
gal X 4 = qt (liq)

gal Imperial X 1.20095 = gal(US)
gal(US) X 0.83267 = gal Imperial
gal water (US) X 8.3453 = lb water

gal/min X 2.228 X 10^{-3} = cu ft/sec
gal/min X 0.06308 = 1/sec
gal/min X 8.0208 = cu ft/hr

gal water/min X 6.0086 = tons/day
gran (avoir) X 0.0648 = grams
hectare X 2.471 = acres

hp X 42.44 = B/min
hp X 33,000 = ft-lb/min
hp X 550 = ft-lb/sec
hp X 1.014 = hp metric
hp-hr X 1.98 X 10^{6} = ft-lb
hp-hr X 0.7457 = kw-hr

in X 2.54 = cm

in mercury X 0.0334 = atm
in mercury X 0.4912 = lb/sq ft

in water X 0.002458 = atm

in water X 0.07355 = in hr
in water X 25.4 = kg/sq m
in water X 5.202 = lb/sq ft
in water X 0.03613 = lb/sq in

kg X 980,665 = dynes
kb X 2.205 = lb avdp
kg X 1.102 X 10^{-3} = tons (short)

kg/m X 0.6720 = lb/ft
kg/sq m X 0.2048 = lb/sq ft
kg/sq m X 10^{6} = kg/sq m

km X 0.6214 = miles
km X 1094 = yd

km/hr X 27.78 = cum/sec
km/hr X 54.68 = ft/min
km/hr X 0.9113 = ft/sec
km/hr X 0.5396 = knots
km/hr X 0.6214 = miles/hr
km/hr/sec X 27.78 = cm/sec/sec
km/hr/sec X 0.9113 = ft/sec/sec
km/hr/sec X 0.2778 = m/sec/sec
kilowatt X 1.341 = hp

m X 100 = cm
m X 3.281 = ft
m X 29.37 = in

m/min X 1.667 = cm/sec
m/min X 3.281 = ft/min
m/min X 0.05468 = t/sec
m/min X 0.06 = km/hr
m/min X 0.03728 = miles/hr

m/sec X 196.8 = ft/min
m/sec X 3.281 = ft/sec
m/sec X 3.6 = km/hr
m/sec X 0.06 = km/min
m/sec X 2.237 = miles/min
m/sec X 0.03728 = miles/min

miles X 1.069 X 10^{5} = cm
miles X 5280 = ft
miles X 1.069 = km
miles X 1760 = yd

miles (naut) X 6,080.2 = ft

miles/hr X 44.70 = cm/sec
miles/hr X 88 = ft/min
miles/hr X 1.467 = ft/sec
miles/hr X 1.609 = km/hr
miles/hr X 0.8684 = knots
miles/hr X 26.82 = m/min

miles/min X 2682 = cm/sec
miles/min X 88 = ft/sec
miles/min X 1.609 = km/min
miles/min X 60 = miles/hr

million gal/day X 1.54723 = cu ft/sec

parts/million X 0.0584 = grains/US gal
parts/million X 0.07016 = grains/Imperial gal
parts/million X 8.345 = lb/million gal

lb avdp X 16 = oz avdp
lb avdp X 256 = drams
lb avdp X 7,000 = grains
lb avdp X 0.0005= tons (short)
lb avdp X 453.5924 = g
lb avdp X 1.21528 = lb troy
lb avdp X 14.5833 = oz troy

lb troy X 5760 = grains
lb troy X 240 = dwt troy
lb troy X 12 = oz troy
lb troy X 373.24177 = g
lb troy X 0.822857 = lb avdp
lb troy X 13.1657 = oz avdp

lb water X 0.01602 = cu ft
lb water X 27.68 = cu in
lb water X 0.1198 = gal US

lb/cu ft X 0.01602 =g/cu cm
lb/cu ft X 16.03 = kg/cu m
lb/cu ft X 5.787 X 10^{-4} = lb/cu in
lb/cu in X 27.68 = g/cu cm
lb/cu in X 2.768 X 10^{-4} = kg/cu m
lb/cu in X 1728 = cu ft

lb/ ft X 1.488 = kg/m
lb/in X 178.6 = g/cm

psf X 0.01602 = ft water
psf X 4.883 = kg/sq m
psf X 6.945 X 10^{-3} = psi
psi X 0.06804 = atm
psi X 2.307 = ft water
psi X 703.1 = kg/sq m

qt (dry) X 67.20 = cu in
qt (liq) X 57.75 = cu in

seconds (angle) X 4.848 X 10^{-6} = radians

sq ft X 2.296 X 10^{-5} = acres
sq ft X 929.0 = sq cm
sq ft X 144 = sq in
sq ft X 0.0929 = sq m
sq ft X 3.587 X 10^{-8} = sq miles

sq cm X 1.076 X 10^{-3} = sq ft
sq cm X 0.1550 = sq in
sq cm X 10^{-4} = sq m

sq in X 6.452 = sq cm
sq in X 6.944 X 10^{-3} = sq ft
sq in X 645.2 = sq mm

sq km X 247.1 = aces
sq km X 10.76 X 10^{6} = sq ft
sq km X 10^{6} = sq m
sq km X 0.3861 = sq mi
sq km X 1.196 X 10^{6} = sq yd

sq m X 2.471 X 10^{-4} = acres
sq m X 10.76 = sq ft
sq m X 3.861 X 10^{6} = sq ft
sq m X 1.55 X 10^{-3} = sq in

sq miles X 640 = acres
sq miles X 27.88 X 10^{6} = sq ft
sq miles X 2.59 = sq km
sq miles X 3.098 X 10^{6} = sq yd

sq mm X 0.01 = sq cm
sq mm X 1.55 X 10^{-3} = sq in

sq yd X 2.066 X 10^{-4} = acres
sq yd X 9 = sq ft
sq yd X 0.8361 = sq m

tons (long) X 1016 = kg
tons (long) X 2240 = lb avdp
tons (long) X 1.12 = tons (short)
tons (metric) X 10^{3} = kg
tons (metric) X 2205 = lb avdp
tons (short) X 2000 = lb avdp
tons (short) X 32,000 = oz avdp
tons (short) X 907.18486 = kg
tons (short) X 2430.56 = lb troy
tons (short) X 0.89287 = tons (long)
tons (short) X 29166.66 = oz troy
tons (short) X 0.90718 = tons (metric)
tons water/day X 1.3349 = cu ft/hr
tons water/day X 83.333 = lb water/hr
tons water/day X 0.16643 = gal/min

CALCULATING LENGTHS, VOLUMES, AND AREAS

1. **SQUARE OR RECTANGLE:**
   - A. **Area:** To find area of a square or rectangle multiply the length by the width.
   - B. **Volume:** To find volume of a square or rectangle multiply the length by the width and then multiply the answer by the height.

2. **CIRCLE:**
   - A. **Circumference:** To find the circumference of a circle multiply the diameter by 3.1416.
   - B. **Area:** To find the area of a circle multiply the square of the diameter by 0.7854. The radius of a circle is one-half of the diameter.

3. **CYLINDER:**
   - A. **Area :** To find the area of a cylinder multiply its circumference by its height.
   - B. **Volume:** To find the volume of a cylinder multiply the area of one end by the height.

4. **SPHERE:**
   - A. **Area:** To find the area of a sphere multiply the circumference by the diameter.
   - B. **Volume:** To find the volume of a sphere multiply the cube of its diameter by 0.5236.

5. **REGULAR PYRAMID OR CONE:**
   - A. **Volume:** To find the volume of a pyramid or cone multiply the area of the base by the height and then divide the answer by three.

BHFP = ISIP + Ph
BHFP = Bottom hole frac pressure
ISIP = Instantaneous shut-in pressure
Ph = Hydrostatic head pressure

Using Density

Ph = (Wh) W = fluid weight psi/ft
h = height of column, ft

Using lbs/gal

Ph = Wh (.052) W = Fluid weight lbs/gal

STP = BHFP – Ph + Pf + Ppf
STP = ISIP + Pf + Ppf
STP = Surface treating pressure
Pf = Pipe friction pressure
Ppf = Perforation friction pressure

$$\text{Fracture Gradient} \cong \frac{ISIP + Ph}{Depth} \text{ or } \frac{BHFP}{Depth}$$

$$\text{Viscosity} = \frac{\text{Shear Stress}}{\text{Shear Rate}}$$

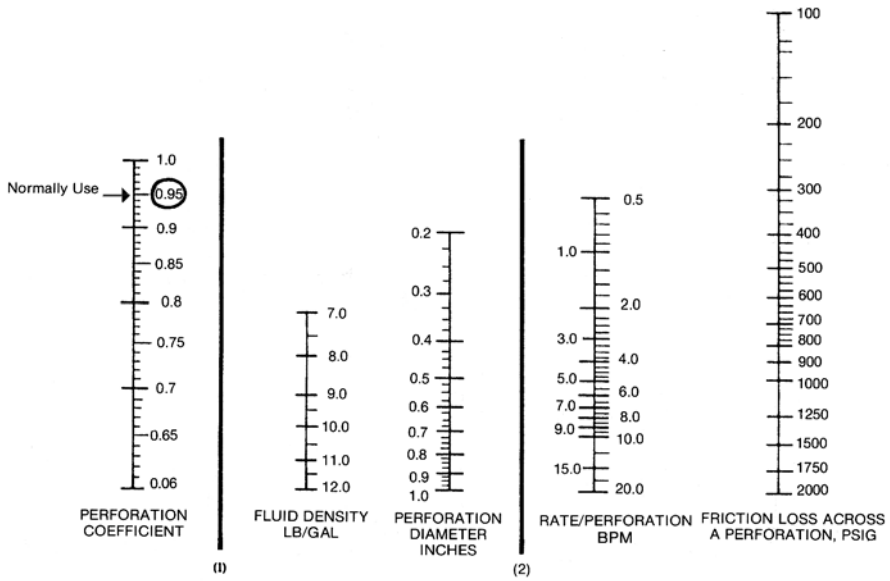
$$\text{API Gravity} = \frac{141.5}{\text{Sp Gravity}} - 131.5$$

Pf brine = Pf water (1 + .15n)
Pf brine = Friction pressure of any weighted brine or acid
Pf water = Base friction pressure of fresh water
n = Difference in density between brine or acid and 8.33 lb/gal

NOMOGRAPH FOR DETERMINING FRICTION LOSS THROUGH A PERFORATION

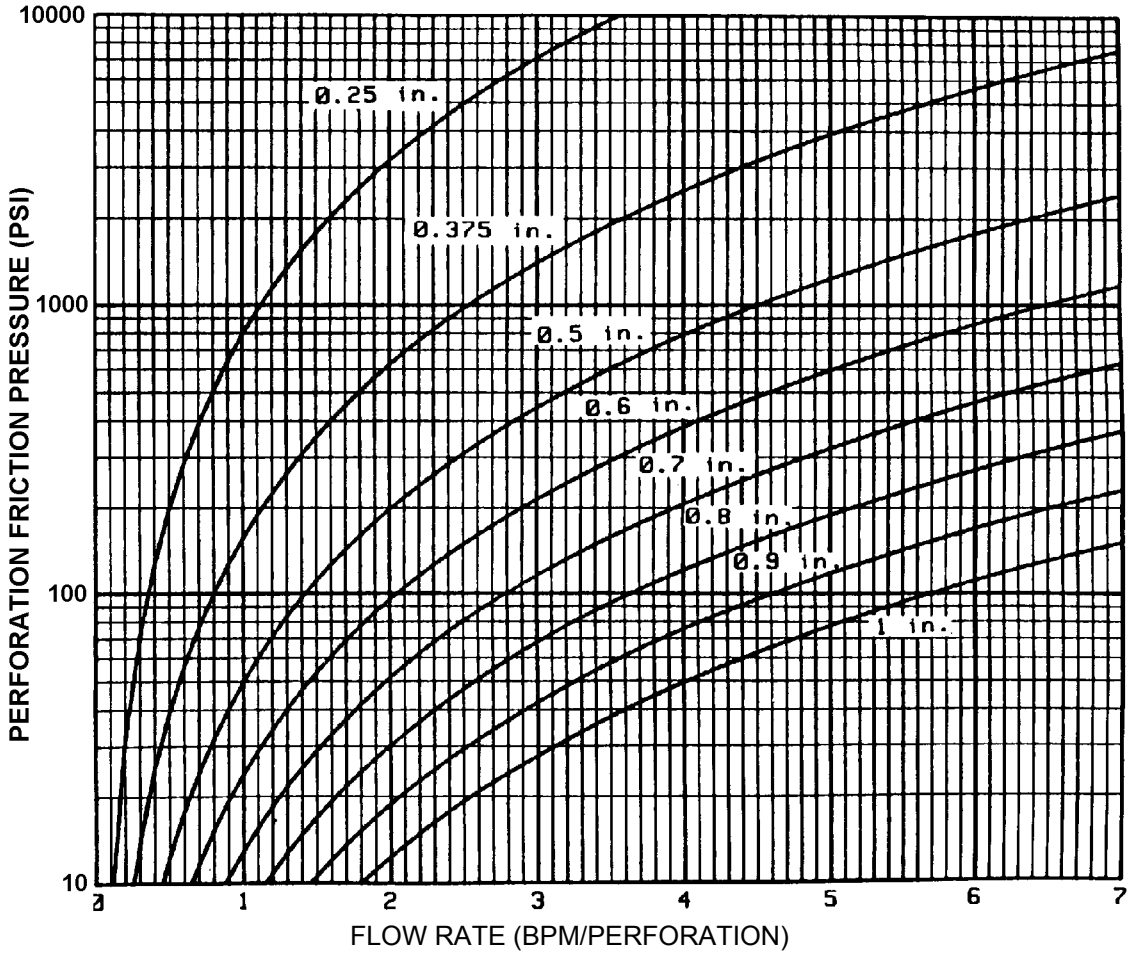
D = Diameter of perforation in inches
C = Coefficient of discharge
P = Differential pressure psi
R = Density of fluid in pounds per gallon
Q = Rate per perforation

EQUATION: $Q = \frac{D^2 C\sqrt{P/R}}{0.4867}$



PERFORATION FRICTION PRESSURE CHART

FLOW RATE VS. PERFORATION FRICTION PRESSURE



DARCY'S RADIAL FLOW FORMULA

$$Q_o = \frac{7.07\ h\ K\ (P_s - P_f)}{U\ Bo\ (\ln re / rw)}$$ for flow of oil in bbl / day.

$$Q_g = \frac{7.03 \times 10^{-4}\ h\ K\ (P_s^2 - P_f^2)}{Z\ T\ U\ (\ln re / rw)}$$

WHERE:

Q_o = Oil production rate, ST bbl/day
K = Permeability, darcies
P_s = Static reservoir pressure, psia
P_f = Bottom hole flowing pressure, psia
U = Viscosity of fluid, cps
h = Pay thickness, feet
re = Radius of drainage, feet
rw = Radius of Wellbore, feet
In = Natural logarithm
T = Reservoir Temperature, degrees Rankine, (^oF + 460)
B_o = Oil formation volume factor, res. bbl/ST bbl
Z = Gas Deviation factor
Q_g = Gas production rate, MMSCFPD

DECIMAL EQUIVALENTS OF FRACTIONS

1/64	.01563	33/64	.51563
1/32	.03125	17/32	.53125
3/64	.01688	35/64	.54688
1/16	.0625	9/16	.5625
5/64	.07813	37/64	.57813
3/32	.09375	19/32	.59375
7/64	.10938	39/64	.60938
1/8	.125	5/8	.625
9/64	.14063	41/64	.64063
5/32	.15625	21/32	.65625
11/64	.17188	43/64	.67188
3/16	.1875	11/16	.6875
13/64	.20313	45/64	.70313
7/32	.21875	23/32	.71875
15/64	.23438	47/64	.73438
1/4	.25	3/4	.75
17/64	.26563	49/64	.76563
9/32	.28125	25/32	.78125
19/64	.29688	51/64	.79688
5/16	.3125	13/16	.8125
21/64	.32813	53/64	.82813
11/32	.34375	27/32	.84375
23/64	.35938	55/64	.85938
3/8	.375	7/8	.875
25/64	.39063	57/64	.89063
13/32	.40625	29/32	.90625
27/64	.42188	59/64	.92188
7/16	.4375	15/16	.9375
29/64	.45313	61/64	.95313
15/32	.46875	31/32	.96875
31/64	.48438	63/64	.98438
1/2	.5	1	1.0000

SECTION 10

MISCELLANEOUS



DUPLEX PUMP TABLES 1
CHLORIDE SOLUTIONS – TEMPERATURE CORRECTIONS 3
SALT TABLES (CALCIUM CHLORIDE, SODIUM CHLORIDE, POTASSIUM CHLORIDE) ... 3
PIPE STRETCH AND CONTRACTION 6
PRESSURE COMPUTATIONS WITH PACKERS 7
WELLHEAD FLANGE INFORMATION 8
RISING AND SETTLING VELOCITY OF BALL SEALERS 10
BARITE PLUG TABLES 12

DUPLEX * DOUBLE ACTING PUMP

Pump			100 % Efficiency		95 % Efficiency		90 % Efficiency		85 % Efficiency		80 % Efficiency	
Liner Size Inches	Str'k Ins	Rod Dia Ins	Cycles Per Barrel	Barrels Per Cycle	Cycles Per Barrel	Barrels Per Cycle	Cycles Per Barrel	Barrels Per Cycle	Cycles Per Barrel	Barrels Per Cycle	Cycles Per Barrel	Barrels Per Cycle
4.00	6	1.5	34.602	.0289	36.423	.0275	38.447	.0260	40.708	.0246	43.253	.0231
4.00	8	1.5	25.952	.0385	27.318	.0366	28.836	.0347	30.532	.0327	32.440	.0308
4.00	10	1.5	20.761	.0481	21.854	.0457	23.068	.0433	24.425	.0409	25.951	.0385
4.00	12	1.5	17.301	.0578	18.212	.0549	19.223	.0520	20.354	.0491	21.626	.0462
4.50	8	1.5	20.185	.0495	21.248	.0471	22.428	.0446	23.748	.0421	25.231	.0396
4.50	10	1.5	16.148	.0619	16.998	.0588	17.942	.0557	18.998	.0526	20.185	.0495
4.50	12	1.5	13.457	.0743	14.165	.0706	14.952	.0669	15.832	.0632	16.821	.0594
4.50	14	1.5	11.534	.0867	12.141	.0824	12.816	.0780	13.570	.0737	14.418	.0694
5.00	10	2.0	13.427	.0744	14.134	.0707	14.919	.0670	15.796	.0632	16.784	.0595
5.00	12	2.0	11.189	.0893	11.778	.0848	12.432	.0804	13.164	.0759	13.986	.0714
5.00	14	2.0	9.591	.1042	10.096	.0990	10.657	.0938	11.284	.0886	11.989	.0834
5.00	16	2.5	8.824	.1133	9.288	.1076	9.804	.1020	10.381	.0963	11.030	.0906
5.00	18	2.5	7.843	.1275	0.031	.1211	8.714	.1148	9.227	.1084	9.804	.1020
5.50	12	2.0	9.110	.1097	9.590	.1042	10.122	.0987	10.718	.0932	11.388	.0878
5.50	14	2.0	7.808	.1280	8.219	.1216	8.676	.1152	9.186	.1088	9.760	.1024
5.50	16	2.5	7.116	.1405	7.491	.1335	7.907	.1265	8.372	.1194	8.895	.1124
5.50	18	2.5	6.325	.1581	6.658	.1502	7.028	.1423	7.441	.1344	7.906	.1265
6.00	12	2.0	7.569	.1321	7.967	.1255	8.410	.1189	8.905	.1123	9.461	.1057
6.00	14	2.0	6.488	.1541	6.830	.1464	7.209	.1387	7.633	.1310	8.110	.1233
6.00	16	2.5	5.871	.1703	6.180	.1618	6.523	.1533	6.907	.1448	7.339	.1362
6.00	18	2.5	5.219	.1916	5.494	.1820	5.799	.1724	6.140	.1629	6.524	.1533
6.25	12	2.0	6.944	.1440	7.310	.1368	7.716	.1296	8.169	.1224	8.680	.1152
6.25	14	2.0	5.952	.1680	6.265	.1596	6.613	.1512	7.002	.1428	7.440	.1344
6.25	16	2.5	5.371	.1861	5.654	.1768	5.968	.1675	6.319	.1582	6.714	.1489
6.25	18	2.5	4.774	.2094	5.025	.1989	5.304	.1885	5.616	.1780	5.968	.1675
6.50	12	2.0	6.394	.1564	6.731	.1486	7.104	.1408	7.522	.1329	7.993	.1251
6.50	14	2.0	5.480	.1824	5.768	.1733	6.089	.1642	6.447	.1550	6.850	.1459
6.50	16	2.5	4.933	.2027	5.193	.1926	5.481	.1824	5.804	.1723	6.166	.1622
6.50	18	2.5	4.385	.2280	4.616	.2166	4.872	.2025	5.159	.1938	5.481	.1824
6.50	20	2.0	3.947	.2533	4.155	.2406	4.386	.2280	4.644	.2153	4.934	.2026
6.75	12	2.0	5.908	.1692	6.219	.1607	6.564	.1523	6.951	.1438	7.385	.1354
6.75	14	2.5	5.064	.1974	5.331	.1875	5.627	.1777	5.958	.1678	6.330	.1579
6.75	16	2.5	4.458	.2198	4.787	.2088	5.053	.1978	5.351	.1868	5.685	.1758
6.75	18	2.5	4.043	.2473	4.256	.2349	4.492	.2226	4.756	.2102	5.054	.1978
6.75	20	2.0	3.639	.2748	3.831	.2611	4.043	.2473	4.281	.2336	4.549	.2198
7.00	12	2.0	5.476	.1826	5.764	.1735	6.084	.1643	6.442	.1552	6.845	.1461
7.00	14	2.5	4.693	.2130	4.940	.2024	5.214	.1917	5.521	.1811	5.866	.1704
7.00	16	2.5	4.207	.2376	4.428	.2257	4.674	.2138	4.949	.2020	5.259	.1901
7.00	18	2.5	3.740	.2673	3.937	.2539	4.156	.2406	4.400	.2272	4.675	.2138
7.00	20	2.0	3.366	.2971	3.543	.2822	3.740	.2674	3.960	.2525	4.208	.2377
7.25	14	2.0	4.462	.2241	4.697	.2129	4.958	.2017	5.249	.1905	5.578	.1793
7.25	16	2.5	3.904	.2561	4.110	.2433	4.338	.2305	4.593	.2177	4.880	.2049
7.25	18	2.5	3.470	.2881	3.653	.2737	3.856	.2593	4.082	.2449	4.338	.2305
7.25	20	2.5	3.123	.3201	3.287	.3041	3.470	.2881	3.674	.2721	3.904	.2561
7.50	14	2.5	4.152	.2408	4.371	.2288	4.613	.2167	4.885	.2047	5.190	.1926
7.50	16	2.5	3.633	.2752	3.824	.2614	4.037	.2477	4.274	.2339	4.541	.2202
7.50	18	2.5	3.230	.3096	3.400	.2941	3.589	.2786	3.800	.2632	4.038	.2477
7.50	20	2.5	2.907	.3440	3.060	.3268	3.230	.3096	3.420	.2924	3.634	.2752
7.75	14	2.5	3.874	.2581	4.078	.2452	4.304	.2323	4.558	.2194	4.843	.2065
7.75	16	2.5	3.390	.2949	3.568	.2802	3.767	.2654	3.988	.2507	4.238	.2359
7.75	18	2.5	3.013	.3318	3.172	.3152	3.348	.2986	3.545	.2820	3.766	.2654
7.75	20	2.5	2.712	.3687	2.855	.3503	3.013	.3318	3.191	.3134	3.390	.2950
7.75	22	2.5	2.465	.4056	2.595	.3853	2.739	.3650	2.900	.3448	3.081	.3245
8.00	20	2.5	2.537	.3942	2.671	.3745	2.819	.3548	2.985	.3351	3.171	.3154

*For Triplex Double Acting pumps, the values shown in these tables should be divided by 1.5 to obtain cycles
per barrel or cu ft, and should be multiplied by 1.5 to obtain barrels or cu ft per cycle. A cycle is one revolution of the crankshaft of the pump.

DUPLEX * DOUBLE ACTING PUMP

Pump			100 % Efficiency		95 % Efficiency		90 % Efficiency		85 % Efficiency		80 % Efficiency	
Liner Size Ins	Str'k Ins	Rod Dia Ins	Cycles Per Cu Ft	Cu Ft Per Cycle	Cycles Per Cu Ft	Cu Ft Per Cycle	Cycles Per Cu Ft	Cu Ft Per Cycle	Cycles Per Cu Ft	Cu Ft Per Cycle	Cycles Per Cu Ft	Cu Ft Per Cycle
4.00	6	1.5	6.163	.1622	6.487	.1541	6.848	.1460	7.251	.1379	7.704	.1298
4.00	8	1.5	4.622	.2163	4.865	.2055	5.136	.1947	5.438	.1839	5.778	.1730
4.00	10	1.5	3.698	.2704	3.893	.2569	4.109	.2434	4.351	.2298	4.623	.2163
4.00	12	1.5	3.081	.3245	3.243	.3083	3.423	.2921	3.625	.2758	3.851	.2596
4.50	8	1.5	3.595	.2782	3.784	.2643	3.995	.2503	4.230	.2364	4.494	.2225
4.50	10	1.5	2.876	.3477	3.027	.3303	3.196	.3129	3.384	.2955	3.595	.2782
4.50	12	1.5	2.397	.4172	2.523	.3964	2.663	.3755	2.820	.3546	2.996	.3338
4.50	14	1.5	2.054	.4869	2.162	.4625	2.283	.4380	2.417	.4137	2.568	.3894
5.00	10	2.0	2.391	.4181	2.517	.3972	2.657	.3763	2.813	.3554	2.989	.3345
5.00	12	2.0	1.993	.5017	2.098	.4766	2.214	.4515	2.345	.4264	2.491	.4014
5.00	14	2.0	1.708	.5854	1.798	.5561	1.898	.5269	2.009	.4976	2.135	.4683
5.00	16	2.5	1.572	.6363	1.665	.6045	1.747	.5727	1.849	.5409	1.965	.5090
5.00	18	2.5	1.397	.7158	1.471	.6800	1.552	.6442	1.644	.6084	1.746	.5726
5.50	12	2.0	1.623	.6163	1.708	.5855	1.803	.5547	1.909	.5239	2.029	.4930
5.50	14	2.0	1.391	.7190	1.464	.6831	1.546	.6471	1.636	.6112	1.739	.5752
5.50	16	2.5	1.267	.7890	1.334	.7496	1.408	.7101	1.491	.6707	1.584	.6312
5.50	18	2.5	1.127	.8876	1.186	.8432	1.252	.7988	1.326	.7545	1.409	.7101
6.00	12	2.0	1.348	.7417	1.419	.7046	1.498	.6675	1.586	.6304	1.685	.5934
6.00	14	2.0	1.156	.8653	1.217	.8220	1.284	.7788	1.360	.7355	1.445	.6922
6.00	16	2.5	1.046	.9563	1.101	.9085	1.162	.8607	1.231	.8129	1.308	.7650
6.00	18	2.5	.930	1.0758	.979	1.0220	1.033	.9682	1.094	.9144	1.163	.8606
6.25	12	2.0	1.237	.8085	1.302	.7681	1.374	.7277	1.455	.6872	1.546	.6468
6.25	14	2.0	1.060	.9433	1.116	.8961	1.178	.8490	1.247	.8018	1.325	.7546
6.25	16	2.5	.957	1.0453	1.007	.9930	1.063	.9408	1.126	.8885	1.196	.8362
6.25	18	2.5	.850	1.1760	.895	1.1172	.944	1.0584	1.000	.0996	1.063	.9408
6.50	12	2.0	1.139	.8781	1.199	.8342	1.266	.7903	1.340	.7464	1.424	.7025
6.50	14	2.0	.976	1.0244	1.027	.9732	1.084	.9220	1.148	.8707	1.220	.8195
6.50	16	2.5	.879	1.1381	.925	1.0812	.977	1.0243	1.034	.9674	1.099	.9105
6.50	18	2.5	.781	1.2803	.822	1.2163	.868	1.1523	.919	1.088	.976	1.024
6.50	20	2.0	.703	1.4226	.740	1.3515	.781	1.2803	.827	12163	.879	1.138
6.75	12	2.0	1.052	.9503	1.107	.9028	1.169	.8553	1.238	.8078	1.315	.7602
6.75	14	2.5	.902	1.1087	.950	1.0533	1.002	.9978	1.061	.9424	1.128	.8870
6.75	16	2.5	.810	1.2344	.853	1.1727	.900	1.1110	.953	1.049	1.013	.9875
6.75	18	2.5	.720	1.3887	.758	1.3193	.800	1.2498	.847	1.180	.900	1.111
6.75	20	2.0	.648	1.5430	.682	1.4659	.720	1.3887	.762	1.311	.810	1.234
7.00	12	2.0	.975	1.0253	1.026	.9740	1.083	.9228	1.147	.8715	1.219	.8202
7.00	14	2.5	.836	1.1962	.880	1.1364	.929	1.0766	.984	1.016	1.045	.9570
7.00	16	2.5	.749	1.3344	.788	1.2677	.832	1.2010	.881	1.134	.936	1.067
7.00	18	2.5	.666	1.5012	.701	1.4261	.740	1.3511	.784	1.276	.833	1.201
7.00	20	2.0	.599	1.6680	.631	1.5846	.666	1.5012	.705	1.417	.749	1.334
7.25	14	2.0	.795	1.2583	.837	1.1954	.883	1.1325	.935	1.069	.994	1.006
7.25	16	2.5	.695	1.4380	.732	1.3661	.772	1.2942	.818	1.222	.869	1.150
7.25	18	2.5	.618	1.6178	.651	1.5369	.687	1.4560	.727	1.375	.773	1.294
7.25	20	2.5	.556	1.7976	.585	1.7077	.618	1.6178	.654	1.528	.695	1.438
7.50	14	2.5	.740	1.3521	.779	1.2845	.822	1.2169	.871	1.149	.925	1.081
7.50	16	2.5	.647	1.5453	.681	1.4680	.719	1.3908	.761	1.313	.809	1.236
7.50	18	2.5	.575	1.7385	.605	1.6516	.639	1.5647	.676	1.477	.719	1.390
7.50	20	2.5	.518	1.9316	.545	1.8350	.576	1.7384	.609	1.641	.648	1.545
7.75	14	2.5	.690	1.4492	.726	1.3767	.767	1.3043	.812	1.231	.863	1.159
7.75	16	2.5	.604	1.6562	.636	1.5734	.671	1.4906	.711	1.407	.755	1.325
7.75	18	2.5	.537	1.8632	.565	1.7700	.597	1.6769	.632	1.583	.671	1.490
7.75	20	2.5	.483	2.0703	.508	1.9668	.537	1.8633	.568	1.759	.604	1.656
7.75	22	2.5	.439	2.2773	.462	2.1634	.488	2.0496	.516	1.935	.549	1.821
8.00	20	2.5	.452	2.2134	.476	2.1027	.502	1.9921	.532	1.881	.565	1.770

* For Triplex Double Acting pumps, the values shown in these tables should be divided by 1.5 to obtain cycles per barrel or cu ft, and should be multiplied by 1.5 to obtain barrels or cu ft per cycle. A Cycle is one revolution of the crankshaft of the pump.

EFFECT OF TEMPERATURE ON DENSITIES OF CALCIUM CHLORIDE AND SODIUM CHLORIDE SOLUTIONS

As the temperature of the solution increases, the volume increases with a resultant decrease in density. The changing density of these solutions can be readily calculated by this formula: –

$$\text{Density Change, lbs/gallon} = 0.003\ (T^1 - T^2)$$

T^1 = existing temperature, ^oF.
T^2 = existing temperature, ^oF.

As an example, if the average well temperature is 200^o F., and an average solution density of 10 lbs/gallon is needed, what solution density is required at (80^o F.)

Density Change, lbs/gallon = 0.003 (200–80) = 0.36
Required Solution at 80^o F. = 10.0 + 0.36 = 10.36 lbs/gallon

PHYSICAL PROPERTIES OF CALCIUM CHLORIDE SOLUTION

Materials to Prepare one Barrel of Solution									
	Solution Weight		Using (94-97% $CaCl_2$)		Using (77-80% / $CaCl_2$)				Approximate
Sp Gr at 60^o F	Lbs Per Gal at 60^o F	Lbs Per Cu Ft at 60^o F	$CaCl_2$ (lbs)	Fresh Water Gals	$CaCl_2$ (lbs)	Fresh Water Gals	Freezing Point ^oF	PSI Per Ft Depth	% Anhydrous Calcium Chloride
1.007	8.4	62.84	3	41.9	4	41.8	+31	.436	1
1.030	8.6	64.34	13	41.7	16	41.3	+28	.446	3
1.055	8.8	65.83	24	41.5	30	40.6	+25	.457	7
1.079	9.0	67.33	35	41.1	43	39.9	+21	.467	9
1.103	9.2	68.82	46	40.8	57	39.2	+17	.477	11
1.127	9.4	70.32	58	40.4	72	38.4	+12	.488	14
1.151	9.6	71.82	70	39.9	86	37.6	+ 6	.498	16
1.175	9.8	73.31	81	39.6	100	36.9	0	.509	19
1.199	10.0	74.81	94	39.1	116	35.9	- 8	.519	21
1.223	10.2	76.31	106	38.6	131	35.0	-18	.529	23
1.247	10.4	77.80	118	38.3	146	34.3	-29	.540	26
1.271	10.6	79.30	130	37.8	160	33.4	-43	.550	28
1.295	10.8	80.79	142	37.5	175	32.7	-59	.561	30
1.319	11.0	82.29	154	36.9	190	31.7	-22	.571	32
1.343	11.2	83.79	167	36.3	206	30.6	0	.581	34
1.367	11.4	85.28	180	35.9	222	29.8	+27	.592	36
1.391	11.6	86.78	192	35.4	237	28.9	+44	.602	38
1.415*	11.8*	88.30	206	34.7	254	27.7	+60	.612	40
1.439*	12.0	89.79	221	34.0	273	26.4	+70	.623	42

*Calculated values, since at 60^o F, these will not be liquids.

PHYSICAL PROPERTIES OF SODIUM CHLORIDE SOLUTIONS

Sp Gr at 60° F	Solution Weight		Materials to Prepare one Barrel of Solution		Freezing Point °F	PSI Per Ft Depth	Approximate Per Cent NaCl
	Lbs Per Gal at 60° F	Lbs Per Cu Ft at 60° F	Salt (NaCl) Lbs	Fresh Water Gals			
1.007	8.4	62.84	3	41.9	+31	.436	1
1.019	8.5	63.59	9	41.7	+29	.441	3
1.031	8.6	64.34	16	41.4	+27	.446	4
1.043	8.7	65.08	22	41.2	+26	.452	6
1.055	8.8	65.83	28	41.0	+24	.457	7
1.067	8.9	66.58	35	40.7	+22	.462	9
1.079	9.0	67.33	41	40.4	+19	.467	11
1.091	9.1	68.08	47	40.0	+17	.472	12
1.103	9.2	68.82	54	39.8	+14	.477	14
1.115	9.3	69.57	61	39.5	+11	.483	15
1.127	9.4	70.32	68	39.2	+ 9	.488	17
1.139	9.5	71.07	74	38.9	+ 6	.493	18
1.151	9.6	71.82	81	38.6	+ 3	.498	20
1.163	9.7	72.57	88	38.2	– 1	.503	21
1.175	9.8	73.31	95	37.9	– 5	.509	23
1.187	9.9	74.06	102	37.6	+ 5	.514	24
1.199	10.0	74.81	109	37.3	+25	.519	26

COMBINATION SODIUM CHLORIDE – CALCIUM CHLORIDE SOLUTIONS

The following table gives the maximum amount of sodium chloride that can be used in preparing combination sodium chloride – calcium chloride solutions in the range of weights between 10.0 pounds per gallon and 11.1 pounds per gallon. If more sodium chloride than shown in the table is used, sodium chloride will be precipitated. If starting with a natural brine of known weight, the approximate amount of sodium chloride contained in a barrel of brine can be obtained by consulting the table on physical properties of sodium chloride solutions. By comparing that table and this table, it can be determined whether a given natural brine can be weighted with calcium chloride to a desired weight, or whether fresh water will need to be added in order to lower the concentration of sodium chloride to one that can be tolerated.

Materials to Prepare one Barrel of Solution										
	Solution Weight		Using (94-97% $CaCl_2$ and NaCl)			Using (77-80% / $CaCl_2$ and NaCl)				
Sp Gr at 60° F	Lbs Per Gal at 60° F	Lbs Per Cu. FT. at 60° F	$CaCl_2$ Lb	NaCl Lb	Fresh Water Gal	$CaCl_2$ Lb	NaCl Lb	Fresh Water Gal	PSI Per Ft Depth	Freezing Point °F
1.211	10.1	75.56	29	88	36.8	36	88	35.8	.524	- 4
1.223	10.2	76.31	52	70	36.8	64	70	35.1	.529	-10
1.235	10.3	77.05	72	54	36.8	89	54	34.3	.535	-15
1.247	10.4	77.80	89	41	36.8	110	41	33.8	.540	-21
1.259	10.5	78.55	104	32	36.7	128	32	32.8	.545	-26
1.271	10.6	79.30	116	25	36.5	143	25	32.6	.550	-32
1.283	10.7	80.05	126	20	36.4	155	20	32.2	.555	-38
1.295	10.8	80.79	135	16	36.3	167	16	31.7	.561	-42
1.307	10.9	81.54	144	13	36.2	178	13	31.3	.566	-24
1.319	11.0	82.29	151	10	36.1	186	10	31.0	.571	-12
1.331	11.1	83.04	159	8	36.0	196	8	30.6	.576	- 0

PHYSICAL PROPERTIES OF POTASSIUM CHLORIDE SOLUTION

Materials to Prepare one Barrel of Solution

Sp Gr at 60° F	Lbs Per Gal at 60° F	Lbs Per Cu Ft at 60° F	KCl Lbs	Fresh Water Gals	Freezing Point °F	PSI Per Ft Depth	Approximate % KCl
1.005	8.37	62.79	3.4	41.8	31	.435	1
1.011	8.43	63.19	7	41.6	30	.438	2
1.024	8.53	63.99	14	41.3	29	.443	4
1.037	8.64	64.81	22	40.9	27	.449	6
1.050	8.75	65.63	29	40.6	26	.455	8
1.063	8.86	66.46	37	40.2	24	.460	10
1.077	8.97	67.30	45	39.8	22	.466	12
1.091	9.09	68.16	54	39.4	20	.472	14
1.104	9.20	69.02	62	39.0	17	.478	16
1.119	9.32	69.91	71	38.5	15	.484	18
1.133	9.44	70.80	79	38.1	13	.491	20
1.147	9.56	71.71	88	37.6	34	.497	22
1.162	9.69	72.64	98	37.1	59	.503	24

PIPE STRETCH and CONTRACTION CALCULATION

Tubular goods will stretch or contract in length as the temperature in the well changes. This change is based on the difference between the bottom hole temperature and the surface temperature divided by 2. This difference is also known as differential temperature, (ΔT).The following formula can be used to calculate the change in length that will occur. The answer, C, is then multiplied by the length of the tubular goods divided by 1000. The answer, C_T, is the total amount of stretch or contraction of the tubular goods.

Step 1. $C = (0.0829)\ (\Delta T)$

Step 2. $$C_T = (C)\ \frac{\text{Length of Tubular Goods, ft}}{1000}$$

Where:

C = Change in Length, in inches per 1000 feet of tubular goods

$$\Delta T = \frac{\text{Bottom Hole Temp - Surface Temp}}{2}$$

C_T = Total Change in Length, in inches

PRESSURE COMPUTATIONS with PACKERS

Table of Equivalent Pressure Due to Tubing Weight on Packer		
	Pressure per 1000# Tubing Weight	
Casing Size OD Inches	2" EUE	2 1/2" EUE
4 1/2	106 psi	127 psi
5	82	94
5 1/2	65	72
6	52	57
6 5/8	42	45
7 (17#—26#)	34	36
7 (26#—38#)	39	42
7 5/8	30	31
8 5/8	23	23
9 5/8	17	18
10 3/4	13	14
11 3/4	11	11
13 3/8	9	9

To calculate Differential Pressure across a packer:

(1) Tubing weight in thousands of pounds times value found in table in right hand columns.
(2) Add to (1) above, the pressure due to annular fluid. (Pressure per ft height times depth of packer).
(3) Subtract from (1) + (2) above the pressure due to the tubing fluid.

Example Problem:
Packer set on 2" EUE tubing in 5 1/2 in OD, 15.5# casing at 7000 feet.
Annulus filled with 10# mud. Tubing filled with 2% KCl. 10,000# tubing weight on packer.

The Differential Pressure would be:

1.	(From table) 10X 65	650 psi
2.	0.519 X 7000 =	3633 psi
	Total Downward Pressure =	4283 psi
3.	0.438 X 7000 =	-3066 psi
	Differential Pressure =	1217 psi

Therefore to Equalize Pressure you would need 1217 psi on tubing.

PLEASE NOTE: This is not for "Upside Down" type retainers.

API FLANGES

SERIES 400
1000 PSI OIL FIELD WP
2000 PSI TEST PRESSURE

Nominal Size In	Pipe or Casing Size In	DIMENSIONS					SEAL RING	
		Flange Dia In	Flange Thickness In	No of Bolts	Bolt Sizes In	Bolt Circle Dia In	API No A	Ring Dia C to C In
2	2							
2 1/2	2 1/2							
3	3							
4	4 – 4 3/4	10	1 11/16	8	7/8 X 5 3/4	7 7/8	37	5 7/8
6	5 1/2 – 7	12 1/2	1 15/16	12	7/8 X 6 1/4	10 5/8	45	8 5/16
8	7 5/8 – 9	15	2 3/16	12	1 X 7	13	49	10 5/8
10	9 5/8 – 10 3/4	17 1/2	2 7/16	16	1 1/8 X 7 3/4	15 1/4	53	12 3/4
12	11 3/4 – 13 3/8	20 1/2	2 9/16	16	1 1/4 X 8 1/2	17 3/4	57	15

API FLANGES

SERIES 600
2000 PSI OIL FIELD WP
4000 PSI TEST PRESSURE

Nominal Size In	Pipe or Casing Size In	DIMENSIONS					SEAL RING	
		Flange Dia In	Flange Thickness In	No of Bolts	Bolt Sizes In	Bolt Circle Dia In	API No A	Ring Dia C to C In
2	2	6 1/2	1 5/16	8	5/8 X 4 1/2	5	23	3 1/4
2 1/2	2 1/2	7 1/2	1 7/16	8	3/4 X 5	5 7/8	26	4
3	3	8 1/4	1 9/16	8	3/4 X 5 1/4	6 5/8	31	4 7/8
4	4 – 4 3/4	10 3/4	1 13/16	8	7/8 X 6	8 1/2	37	5 7/8
6	5 1/2 – 7	14	2 3/16	12	1 X 7	11 1/2	45	8 5/16
8	7 5/8 – 9	16 1/2	2 1/2	12	1 1/8 X 8	13 3/4	49	10 5/8
10	9 5/8 – 10 3/4	20	2 13/16	16	1 1/4 X 8 3/4	17	53	12 3/4
12	11 3/4 – 13 3/8	22	2 15/16	20	1 1/4 X 9	19 1/4	57	15

API FLANGES

SERIES 900
3000 PSI OIL FIELD WP
6000 PSI TEST PRESSURE

Nominal Size In	Pipe or Casing Size In	DIMENSIONS					SEAL RING	
		Flange Dia In	Flange Thickness In	No of Bolts	Bolt Sizes In	Bolt Circle Dia In	API No A	Ring Dia C to C In
2	2							
2 1/2	2 1/2							
3	3	9	1 13/16	8	7/8 X 6	7 1/2	31	4 7/8
4	4 – 4 3/4	11 1/2	2 1/16	8	1 1/8 X 7	9 1/4	37	5 7/8
6	5 1/2 – 7	15	2 1/2	12	1 1/8 X 8	12 1/2	45	8 5/16
8	7 5/8 – 9	18 1/2	2 13/16	12	1 3/8 X 9	15 1/2	49	10 5/8
10	9 5/8 – 10 3/4	21 1/2	3 1/16	16	1 3/8 X 9 1/2	18 1/2	53	12 3/4
12	11 3/4 – 13 3/8	24	3 7/16	20	1 3/8 X 10 1/4	21	57	15

API FLANGES

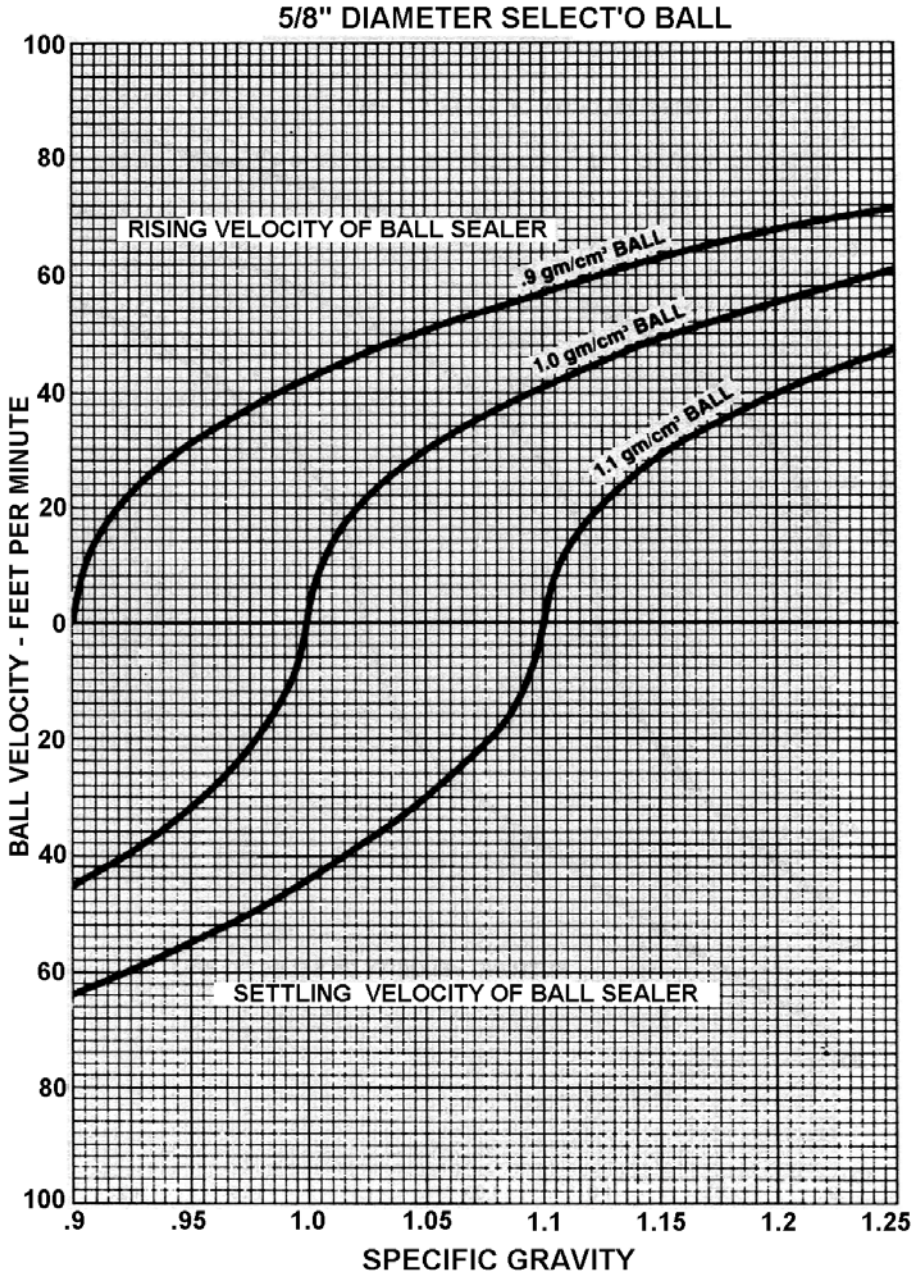
SERIES 1500
5000 PSI OIL FIELD WP
10,000 PSI TEST PRESSURE

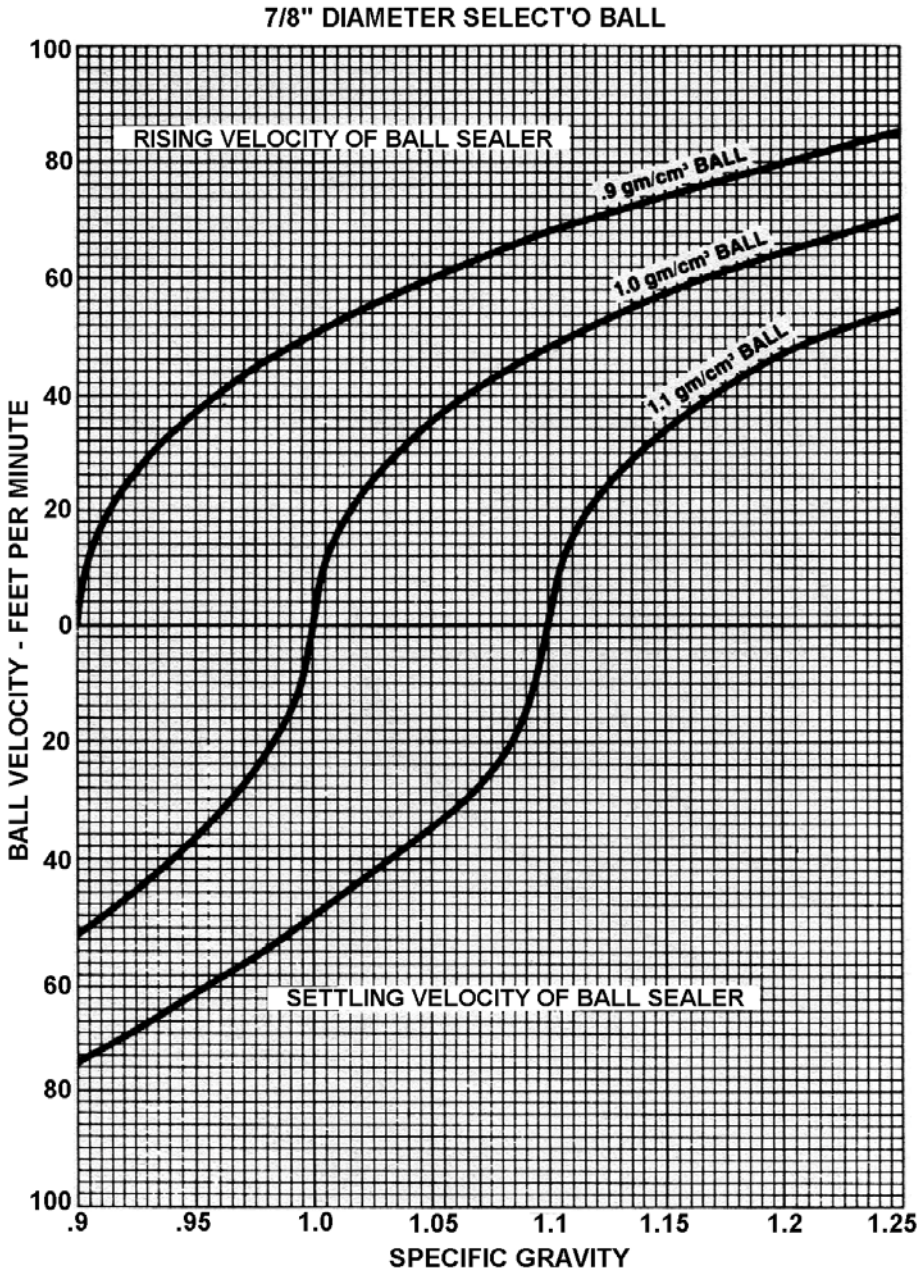
Nominal Size In	Pipe or Casing Size In	DIMENSIONS					SEAL RING	
		Flange Dia In	Flange Thickness In	No of Bolts	Bolt Sizes In	Bolt Circle Dia In	API No A	Ring Dia C to C In
2	2	8 1/2	1 13/16	8	7/8 X 6	6 1/2	24	3 3/4
2 1/2	2 1/2	9 5/8	1 15/16	8	1 X 6 1/2	7 1/2	27	4 1/4
3	3	10 1/2	2 3/16	8	1 1/8 X 7 1/4	8	35	5 3/8
4	4 – 4 3/4	12 1/4	2 7/16	8	1 1/4 X 8	9 1/2	39	6 3/8
6	5 1/2 – 7	15 1/2	3 5/8	12	1 3/8 X 10 3/4	12 1/2	46	8 5/16
8	7 5/8 – 9	19	4 1/16	12	1 5/8 X 12	15 1/2	50	10 5/8
10	9 5/8 – 10 3/4	23	4 11/16	12	1 7/8 X 13 3/4	19	54	12 3/4
12	11 3/4 – 13 3/8	26 1/2	5 7/16	20	2 X 15 3/4	22 1/2	58	15

API FLANGES

SERIES 2900
10,000 PSI OIL FIELD WP
15,000 PSI TEST PRESSURE

Nominal Size In	Pipe or Casing Size In	DIMENSIONS					SEAL RING	
		Flange Dia In	Flange Thickness In	No of Bolts	Bolt Sizes In	Bolt Circle Dia In	API No A	Ring Dia C to C In
2	2	7 3/4	2 3/8	8	7/8 X 7	5 3/4	85	3 1/8
2 1/2	2 1/2	8 7/8	2 3/4	8	1 X 8	6 5/8	86	3 9/16
3	3	10	3 1/16	8	1 1/8 X 8 3/4	7 1/2	87	3 15/16
3 1/2		11 1/2	3 3/8	8	1 1/4 X 9 3/4	8 1/2	89	4 1/2
5		14 1/4	4 3/16	8	1 5/8 X 12 1/4	11	90	6 1/8
10		20 3/4	5 11/16	12	2 X 16 1/4	16 3/4	91	10 1/4


5/8" DIAMETER SELECT'O BALL
RISING VELOCITY OF BALL SEALER
.9 gm/cm³ BALL
1.0 gm/cm³ BALL
1.1 gm/cm³ BALL
SETTLING VELOCITY OF BALL SEALER
BALL VELOCITY - FEET PER MINUTE
100
80
60
40
20
0
20
40
60
80
100
.9
.95
1.0
1.05
1.1
1.15
1.2
1.25
SPECIFIC GRAVITY


7/8" DIAMETER SELECT'O BALL
RISING VELOCITY OF BALL SEALER
.9 gm/cm³ BALL
1.0 gm/cm³ BALL
1.1 gm/cm³ BALL
SETTLING VELOCITY OF BALL SEALER
BALL VELOCITY - FEET PER MINUTE
100
80
60
40
20
0
20
40
60
80
100
.9
.95
1.0
1.05
1.1
1.15
1.2
1.25
SPECIFIC GRAVITY

BARITE PLUG TABLES

The amount of water, barite and phosphate necessary to make a one barrel pumpable slurry of the desired weight can be estimated from the following table:

Barite Plug, with Water - Based Mud			
Slurry Wt Lb/gal	Gal Water per bbl	Phosphate or other Dispersant Lb/bbl	Barite Lb/bbl
14	33.2	.2	316
15	32.0	.35	360
16	30.7	.5	407
17	29.0	.65	469
18	27.2	.8	528
19	25.8	.95	581
20	24.2	1.1	635
21	22.7	1.25	690
22	21.2	1.4	744
*If Lignosulfonates are used, concentration from 5 to 8 lbs/bbls are preferred.			

The amounts of diesel oil, MCS-A (wetting agent), and barite necessary to make one barrel pumpable slurry of the desired weight can be estimated from the following table:

Barite Plug, with Oil - Based Mud			
Slurry Wt	Diesel	MCS-A*	Barite
18.0	25.2	.61	576
18.5	24.4	.69	600
19.0	23.6	.77	626
19.5	22.8	.85	652
20.0	22.0	.93	678
20.5	21.0	1.01	704
21.0	20.3	1.09	730
21.5	19.5	1.17	756
22.0	18.7	1.25	782
22.5	17.9	1.33	808
23.0	17.0	1.41	834

*A number of other wetting agents can be used to stabilize the emulsion. After pilot testing the lab will recommend the type and quantity of emulsifier to be used.

SECTION 11

NITROGEN AND CARBON DIOXIDE



PHYSICAL PROPERTIES OF NITROGEN 1
PIPELINE DISPLACEMENT WITH NITROGEN 1
NITROGEN VOLUME FACTORS 2
PRESSURE RATIOS FOR NITROGEN COLUMN 3
CARBON DIOXIDE PHYSICAL PROPERTIES 4
CARBON DIOXIDE RATE VS. TREATING RATE 5

PHYSICAL PROPERTIES OF NITROGEN

Chemical Symbol	N_2
Molecular Weight	28.016
Normal Boiling Point	–320.45^o F
Critical Temperature	–232.87^o F
Critical Pressure	492.3 psig

CONVERSION FACTORS

1 pound (liquid)	0.1483 gallon
1 pound (liquid)	13.81 SCF
1 gallon	93.1 SCF

PIPELINE PRESSURE TESTING or PURGING with N_2 GAS

Nitrogen gas, being both non-corrosive and non-explosive is an excellent media for pipeline and pressure vessel testing aeration. It is also widely used for purging of flow lines and gas plant components to an inert gas for safety or for corrosion- protected, long term inoperative conditions.

To determine the N_2 volume for pipeline testing, it is necessary to know 3 parameters:

1. Pressure required (psi)
2. Temperature (^{o}F)
3. Volume of System (bbls)
   Volume = (0.0009714 X d^2) X Length

Where d is the inside diameter of the pipeline in (inches).

For the given pressure and temperature, enter the volume multiplier table for the corresponding value.
Total N_2 Volume = VM X Volume of System (bbls)

Where VM is volume multiplier value.

GAS VOLUME MULTIPLIERS - CONSTANT TEMPERATURE and PRESSURE
SCF of N_2 PER BBL of SPACE

PRESSURE	TEMPERATURE										
PSIA	40°	60°	80°	100°	120°	140°	160°	180°	200°	220°	240°
100	41	38	37	36	34	33	32	31	30	30	29
200	82	77	74	71	69	66	64	62	60	59	56
300	123	116	111	107	103	99	96	93	90	88	85
400	164	155	148	142	137	132	128	124	120	117	113
500	204	194	185	178	171	165	160	155	150	146	141
600	244	233	222	214	206	198	194	185	179	174	169
700	284	272	259	249	240	231	223	216	209	203	197
800	324	311	296	284	273	264	254	246	238	228	220
900	364	347	333	319	307	296	286	276	267	259	251
1000	404	387	369	355	341	328	317	306	296	287	278
1100	443	425	406	389	374	360	348	336	325	318	309
1200	482	463	442	424	408	392	378	366	354	344	334
1300	541	501	479	459	441	424	409	395	382	371	360
1400	460	539	514	493	474	456	439	424	410	398	386
1500	599	576	550	527	506	487	469	453	438	425	412
1600	638	613	586	561	539	518	499	482	466	452	439
1700	677	650	621	595	571	549	529	511	494	479	464
1800	716	687	656	628	603	580	558	539	521	503	487
1900	755	723	690	661	634	610	588	567	548	529	511
2000	794	759	725	694	666	640	617	595	575	558	541
2100	823	795	759	726	697	670	645	623	602	583	564
2200	870	831	792	758	727	699	674	650	628	610	591
2300	907	866	825	790	758	729	702	677	654	632	610
2400	944	900	858	821	788	757	730	704	680	658	636
2500	980	933	890	852	818	786	757	731	706	684	661
2600	1015	965	922	883	847	814	784	757	731	705	681
2700	1049	997	954	913	876	842	811	783	757	735	713
2800	1082	1029	985	943	905	870	838	809	781	762	742
2900	1114	1060	1015	972	933	897	864	834	806	780	755
3000	1145	1091	1046	1001	961	924	890	859	830	804	779
3100	1176	1122	1075	1030	988	950	916	884	854	827	800
3200	1207	1152	1104	1058	1015	977	941	908	878	853	828
3300	1238	1182	1133	1085	1042	1002	966	932	901	874	867
3400	1268	1211	1161	1112	1068	1028	991	956	925	898	870
3500	1298	1240	1188	1139	1094	1053	1015	980	947	920	893
3600	1327	1268	1215	1165	1119	1077	1039	1003	970	942	914
3700	1356	1296	1242	1191	1144	1102	1062	1026	992	962	932
3800	1384	1323	1268	1216	1169	1125	1085	1048	1014	985	958
3900	1412	1350	1293	1241	1193	1149	1108	1071	1036	1006	976
4000	1439	1376	1318	1266	1218	1173	1132	1094	1059	1030	1000

PRESSURE RATIOS FOR N_2 COLUMN AT VARIOUS WELL DEPTHS

Depth Feet	PR	Depth Feet	PR	Depth Feet	PR	Depth Feet	PR	Depth Feet	PR
1000	1.038								
1100	1.040	3600	1.140	6100	1.234	8600	1.313	11100	1.387
1200	1.046	3700	1.143	6200	1.237	8700	1.316	11200	1.389
1300	1.049	3800	1.147	6300	1.241	8800	1.320	11300	1.392
1400	1.053	3900	1.150	6400	1.244	8900	1.323	11400	1.394
1500	1.057	4000	1.154	6500	1.247	9000	1.326	11500	1.397
1600	1.061	4100	1.158	6600	1.250	9100	1.329	11600	1.399
1700	1.065	4200	1.162	6700	1.253	9200	1.332	11700	1.402
1800	1.069	4300	1.166	6800	1.257	9300	1.334	11800	1.404
1900	1.073	4400	1.170	6900	1.260	9400	1.337	11900	1.407
2000	1.077	4500	1.174	7000	1.263	9500	1.340	12000	1.409
2100	1.081	4600	1.178	7100	1.266	9600	1.341	12100	1.412
2200	1.085	4700	1.182	7200	1.269	9700	1.346	12200	1.414
2300	1.089	4800	1.185	7300	1.273	9800	1.348	12300	1.417
2400	1.093	4900	1.189	7400	1.276	9900	1.351	12400	1.419
2500	1.097	5000	1.193	7500	1.279	10000	1.354	12500	1.422
2600	1.101	5100	1.197	7600	1.282	10100	1.357	12600	1.425
2700	1.105	5200	1.201	7700	1.285	10200	1.360	12700	1.428
2800	1.109	5300	1.204	7800	1.288	10300	1.363	12800	1.430
2900	1.113	5400	1.208	7900	1.291	10400	1.366	12900	1.433
3000	1.117	5500	1.212	8000	1.294	10500	1.369	13000	1.436
3100	1.121	5600	1.216	8100	1.297	10600	1.372	13100	1.439
3200	1.125	5700	1.220	8200	1.300	10700	1.375	13200	1.442
3300	1.128	5800	1.223	8300	1.304	10800	1.378	13300	1.444
3400	1.132	5900	1.227	8400	1.207	10900	1.381	13400	1.447
3500	1.136	6000	1.231	8500	1.310	11000	1.384	13500	1.450
To calculate bottom hole pressure for a column of gaseous nitrogen, multiply well head pressure by the Pressure Ratio (PR) for the given well depth.								14000	1.464
								14500	1.477
								15000	1.489

PHYSICAL PROPERTIES OF CARBON DIOXIDE

Chemical Symbol	CO_2
Molecular Weight	44
Triple Point	–6.9° F & 60.43 psig
Critical Temperature	87.8° F
Critical Pressure	1070.16 psig
Column @ 20° F	0.4396 psi/ft

CONVERSION FACTORS FOR CO_2 @ 0° F & 305 psi

Liquid Measurements

1 ton	235 gallons (5.61 bbls)
1 ton	5.60 bbls
1 gallon	8.51 lbs
1 cubic foot	62.3 lbs
1 barrel	357 lbs

Gas Measurements

1 ton (liquid)	17200 SCF
1 pound (liquid)	8.61 SCF
1 gallon (liquid)	73 SCF
1 barrel (liquid)	3060 SCF
1 cubic foot (liquid)	547 SCF

CARBON DIOXIDE RATE VS. TREATING RATE

Total pump rate BPM	SCF per Barrel 100	200	300	400	500	600	700	800	900	1000	CO2 rate
1	1.4	2.8	4.2	5.6	7.0	8.4	9.8	11.2	12.6	14	gpm
	.033	.066	.1	.133	.166	.2	.233	.266	.3	.333	bpm
2	2.8	5.6	8.4	11.2	14	16.8	19.4	22.2	25	27.8	gpm
	.066	.133	.2	.266	.333	.4	.466	.528	.595	.661	bpm
3	4.2	8.4	12.6	16.8	21	25.2	29	33.2	37.4	41.6	gpm
	.1	.3	.3	.4	.364	.6	.690	.790	.890	.990	bpm
4	5.6	11.2	16.8	22.4	28	33.6	39.2	44.8	50.4	56	gpm
	.133	.266	.4	.533	.666	.8	.933	1.07	1.2	1.33	bpm
5	7	14	21	28	35	42	49	56	63	70	gpm
	.166	.333	.5	.666	.833	1	1.16	1.33	1.5	1.66	bpm
10	14	28	42	56	70	84	98	112	126	140	gpm
	.333	.666	1	1.33	1.662	2	2.33	2.66	3	3.33	bpm
15	21	42	63	84	105	126	147	168	189	210	gpm
	.5	1	1.5	2	2.5	3	3.5	4	4.5	5	bpm
20	28	56	84	112	140	168	196	224	252	280	gpm
	.666	1.33	2	2.66	3.33	4	4.66	5.33	6	6.66	bpm
25	35	70	105	140	175	210	245	280	315	350	gpm
	.833	1.66	2.5	3.33	4.16	5	5.83	6.66	7.5	8.33	bpm
30	42	84	126	168	210	252	294	336	378	420	gpm
	1	2	3	4	5	6	7	8	9	10	bpm
35	49	98	147	196	245	294	343	392	441	490	gpm
	1.16	2.33	3.5	4.66	5.83	7	8.16	9.33	10.5	11.6	bpm
40	56	112	168	224	280	336	392	448	504	560	gpm
	1.33	2.66	4	5.33	6.66	8	9.33	10.6	12	13.3	bpm
50	70	140	210	280	350	420	490	560	630	700	gpm
	1.66	3.33	5	6.66	8.33	10	11.6	13.3	15	16.6	bpm