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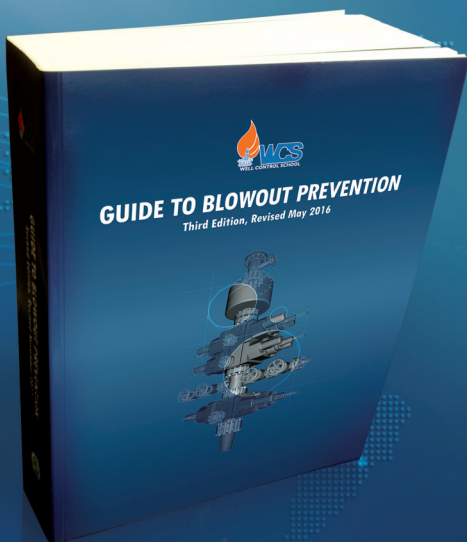


**International
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Forum**



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CAPACITY OF OPEN HOLE

Hole Size		Hole Size	
Inches	BBLS/FT	Inches	BBLS/FT
3 3/4	0.01366	9 5/8	0.08999
3 7/8	0.01458	9 7/8	0.09473
4 1/8	0.01652	10 5/8	0.10966
4 1/4	0.01754	11	0.11754
4 1/2	0.01967	12	0.13988
4 5/8	0.02077	12 1/4	0.14577
4 3/4	0.02191	14 3/4	0.21134
5 7/8	0.03352	15	0.21857
6	0.03497	17 1/2	0.29750
6 1/8	0.03644	18	0.31474
6 1/4	0.03794	18 1/2	0.33247
6 1/2	0.04104	19	0.35082
6 5/8	0.04263	19 1/2	0.36938
6 3/4	0.04426	20	0.38857
7 7/8	0.06024	20 1/2	0.40824
8 3/8	0.06813	21	0.42840
8 1/2	0.07018	21 1/2	0.44904
8 5/8	0.07226	22	0.47017
8 3/4	0.07437	22 1/2	0.49179

$$(\text{Hole Size In}^2) \div 1029.4 = \text{bbls/ft}$$

Pipe Size		Nom. Wt.	Wall Thick.	Pipe Dia.	Plain End Wt.	Upset Wt.	Pipe End Dia.		API Designation	Tool Joint			Joint Weight	*With Tool Joint		Without Tool Joint	
In	Lb/Ft	T		ID	Lb/Ft	Lb	ID	Dia.		OD	In	Length	Weight	Capacity	Displ.	Capacity	Displ.
													Lb/Jt	Bbls/Ft	Bbls/Ft	Bbls/Ft	Bbls/Ft
EXTERNAL UPSET - GRADE E																	
2 7/8	10.40	0.362		2.151	9.72	2.40	2.151	3.219	OH	3.875	2.156	1.29	34.99	0.00451	0.00389	0.00449	0.00353
3 1/2	13.30	0.368		2.764	12.31	4.00	2.602	3.824	NC38(IF)	4.750	2.688	1.54	61.10	0.00741	0.00515	0.00742	0.00448
3 1/2	15.50	0.449		2.602	14.63	2.80	2.602	3.824	NC38(IF)	5.000	2.563	1.59	74.82	0.00658	0.00606	0.00658	0.00532
INTERNAL EXTERNAL UPSET - GRADE X																	
5	19.50	0.362		4.276	17.93	16.80	3.653	5.188	NC50(EH)	6.375	3.500	1.65	120.23	0.01745	0.00784	0.01776	0.00652
EXTERNAL UPSET - GRADE G																	
4	14.00	0.330		3.340	12.93	14.40	3.063	4.625	NC46(IF)	6.000	3.250	1.70	108.76	0.01082	0.00587	0.01084	0.00471
4 1/2	16.60	0.337		3.826	14.98	17.20	3.563	5.188	NC50(IF)	6.375	3.750	1.67	113.10	0.01421	0.00663	0.01422	0.00545
INTERNAL EXTERNAL UPSET - GRADE G																	
4 1/2	20.00	0.430		3.640	18.69	17.60	2.813	4.250	NC46(EH)	6.250	2.500	1.71	142.46	0.01252	0.00830	0.01287	0.00680
5	19.50	0.362		4.276	17.93	16.80	3.563	5.188	NC50(IF)	6.625	2.750	1.70	157.37	0.01719	0.00827	0.01776	0.00652
5	25.60	0.500		4.000	24.03	15.40	3.313	5.188	5 1/2FH	7.250	3.250	1.82	188.17	0.01523	0.01075	0.01554	0.00874
5	25.60	0.500		4.000	24.03	15.40	3.313	5.188	5 1/2FH	7.250	3.500	1.82	179.97	0.01535	0.01066	0.01554	0.00874
5 1/2	21.90	0.361		4.778	19.81	21.00	3.813	5.563	5 1/2FH	7.250	3.500	1.79	184.41	0.02162	0.00925	0.02218	0.00721
INTERNAL EXTERNAL UPSET - GRADE S																	
5 1/2	21.90	0.361		4.778	19.81	21.00	3.813	5.563	HT 55	7.000	4.000	2.33	199.19	0.02172	0.00925	0.02218	0.00721
5 1/2	24.70	0.415		4.670	22.54	18.40	3.813	5.563	HT 55	7.000	3.750	2.31	210.15	0.02067	0.01042	0.02119	0.00820
6 5/8	25.20	0.330		5.965	22.19	25.87	5.315	6.929	HT 65	8.000	5.000	2.35	240.81	0.03385	0.01078	0.03456	0.00807
6 5/8	27.70	0.362		5.901	24.21	24.00	5.315	6.929	HT 65	8.000	4.750	2.39	284.15	0.03297	0.01194	0.03383	0.00881
* Note: Displ. & Capacities based on 29.4' pipe plus tool joint length - calculated by Grant Prideco																	

Nominal Size	TUBE		TOOL JOINT				APPROX. WEIGHT		Makeup Torque (FT-LB)	CAPACITY			DISPLACEMENT	
	Nominal Tube Dimension				TUBE & JOINTS (lb)					BBL per Joint	BBL per FT	BBL per Joint	BBL per FT	
	Inside Diameter	Wall Thickness	Connection Size	Outside Diameter	Inside Diameter	Weight/ Joint	30 FT							
								IN						IN
3 1/2	2 1/16	0.719	NC 38 (3 1/2 IF)	4 3/4	2 3/16	25.3	760	9,900	0.126	0.0042	0.276	0.0092		
3 1/2	2 1/4	0.625	NC 38 (3 1/2 IF)	4 3/4	2 3/8	23.2	695	9,900	0.150	0.0050	0.253	0.0084		
4	2 9/16	0.719	NC 40 (4 FH)	5 1/4	2 11/16	27.2	815	13,250	0.219	0.0073	0.300	0.0100		
4 1/2	2 3/4	0.875	NC 46 (4 IF)	6 1/4	2 7/8	41.0	1,230	21,800	0.223	0.0074	0.448	0.0149		
5	3	1.000	NC 50 (4 1/2 IF)	6 5/8	3 1/16	49.3	1,480	29,400	0.265	0.0088	0.539	0.0179		
5 1/2	3 3/8	1.063	5 1/2 FH	7	3 1/2	57.0	1,880	33,200	0.335	0.0111	0.630	0.0210		
6 5/8	4 1/2	1.063	6 5/8 FH	8	4 1/2	70.8	2,290	46,900	0.590	0.0196	0.780	0.0260		

* FIGURES ARE BASED ON 30' JOINTS

OD	ID	Capacity	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"	3 1/4"	3 1/2"	3 3/4"	4"	4 1/4"
4"	Wt Lb/Ft		36.7	34.5	32.0	29.2	-	-	-	-	-	-	-	-
	Disp Bbl/Ft		0.0133	0.0125	0.0116	0.0106	-	-	-	-	-	-	-	-
4 1/4"	Wt Lb/Ft		42.2	40.0	37.5	34.7	-	-	-	-	-	-	-	-
	Disp Bbl/Ft		0.0153	0.0145	0.0136	0.0126	-	-	-	-	-	-	-	-
4 1/2"	Wt Lb/Ft		48.1	45.9	43.4	40.6	-	-	-	-	-	-	-	-
	Disp Bbl/Ft		0.0175	0.0167	0.0158	0.0148	-	-	-	-	-	-	-	-
4 3/4"	Wt Lb/Ft		54.3	52.1	49.6	46.8	43.6	-	-	-	-	-	-	-
	Disp Bbl/Ft		0.0197	0.0189	0.0181	0.0170	0.0159	-	-	-	-	-	-	-
5"	Wt Lb/Ft		60.8	58.6	56.1	53.3	50.1	-	-	-	-	-	-	-
	Disp Bbl/Ft		0.0221	0.0213	0.0204	0.0194	0.0182	-	-	-	-	-	-	-
5 1/4"	Wt Lb/Ft		67.6	65.4	62.9	60.1	56.9	53.4	-	-	-	-	-	-
	Disp Bbl/Ft		0.0246	0.0238	0.0229	0.0219	0.0207	0.0194	-	-	-	-	-	-
5 1/2"	Wt Lb/Ft		74.8	72.6	70.1	67.3	64.1	60.6	56.8	-	-	-	-	-
	Disp Bbl/Ft		0.0272	0.0264	0.0255	0.0245	0.0233	0.0221	0.0207	-	-	-	-	-
5 3/4"	Wt Lb/Ft		82.3	80.1	77.6	74.8	71.6	68.1	64.3	-	-	-	-	-
	Disp Bbl/Ft		0.0299	0.0291	0.0282	0.0272	0.0261	0.0248	0.0234	-	-	-	-	-
6"	Wt Lb/Ft		90.1	87.9	85.4	82.6	79.4	75.9	72.1	67.9	63.4	-	-	-
	Disp Bbl/Ft		0.0328	0.0320	0.0311	0.0301	0.0289	0.0276	0.0262	0.0247	0.0231	-	-	-
6 1/4"	Wt Lb/Ft		98.0	95.8	93.3	90.5	87.3	83.8	80.0	75.8	71.3	-	-	-
	Disp Bbl/Ft		0.0356	0.0349	0.0339	0.0329	0.0318	0.0305	0.0291	0.0276	0.0259	-	-	-
6 1/2"	Wt Lb/Ft		107.0	104.8	102.3	99.5	96.3	92.8	89.0	84.8	80.3	-	-	-
	Disp Bbl/Ft		0.0389	0.0381	0.0372	0.0362	0.0350	0.0338	0.0324	0.0308	0.0292	-	-	-

Spiral Drill Collars

Approx. Displacement of
Spiral Drill Collar in
BBLs/FT
$$((OD^2 - ID^2) \times 2.56) \div 2747$$

OD	ID Capacity	1 1/2"	1 3/4"	2"	2 1/4"	2 1/2"	2 3/4"	3"	3 1/4"	3 1/2"	3 3/4"	4"	4 1/4"
6 3/4"	WT Lb/Ft Disp Bbl/Ft	116.0 0.0422	113.8 0.0414	111.3 0.0405	108.5 0.0395	105.3 0.0383	101.8 0.0370	98.0 0.0356	93.8 0.0341	89.3 0.0325	- -	- -	- -
7"	WT Lb/Ft Disp Bbl/Ft	125.0 0.0455	122.8 0.0447	120.3 0.0438	117.5 0.0427	114.3 0.0416	110.8 0.0403	107.0 0.0389	102.8 0.0374	98.3 0.0358	93.4 0.0340	88.3 0.0321	- -
7 1/4"	WT Lb/Ft Disp Bbl/Ft	134.0 0.0487	131.8 0.0479	129.3 0.0470	126.5 0.0460	123.3 0.0449	119.8 0.0436	116.0 0.0422	111.8 0.0407	107.3 0.0390	102.4 0.0372	97.3 0.0354	- -
7 1/2"	WT Lb/Ft Disp Bbl/Ft	144.0 0.0524	141.8 0.0516	139.3 0.0507	136.5 0.0497	133.3 0.0485	129.8 0.0472	126.0 0.0458	121.8 0.0443	117.3 0.0427	112.4 0.0409	107.3 0.0390	- -
7 3/4"	WT Lb/Ft Disp Bbl/Ft	154.0 0.0560	151.8 0.0552	149.3 0.0543	146.5 0.0533	143.3 0.0521	139.8 0.0509	136.0 0.0495	131.8 0.0479	127.3 0.0463	122.4 0.0445	117.3 0.0427	- -
8"	WT Lb/Ft Disp Bbl/Ft	165.0 0.0600	162.8 0.0592	160.3 0.0583	157.5 0.0573	154.3 0.0561	150.8 0.0549	147.0 0.0535	142.8 0.0520	138.3 0.0503	133.4 0.0485	123.3 0.0467	122.8 0.0447
8 1/4"	WT Lb/Ft Disp Bbl/Ft	176.0 0.0640	173.8 0.0632	171.3 0.0623	168.5 0.0613	165.3 0.0601	161.8 0.0589	158.0 0.0575	153.8 0.0560	149.3 0.0543	144.4 0.0525	139.3 0.0507	133.8 0.0487
8 1/2"	WT Lb/Ft Disp Bbl/Ft	187.0 0.0680	184.8 0.0672	182.3 0.0663	179.5 0.0653	176.3 0.0641	172.8 0.0629	169.0 0.0615	164.8 0.0600	160.3 0.0583	155.4 0.0565	150.3 0.0547	144.8 0.0527
8 3/4"	WT Lb/Ft Disp Bbl/Ft	199.0 0.0724	196.8 0.0716	194.3 0.0707	191.5 0.0697	188.3 0.0685	184.8 0.0672	181.0 0.0658	176.8 0.0643	172.3 0.0627	167.4 0.0609	162.3 0.0590	156.8 0.0570
9"	WT Lb/Ft Disp Bbl/Ft	210.2 0.0765	208.0 0.0757	205.6 0.0748	202.7 0.0738	199.6 0.0726	196.0 0.0714	192.2 0.0700	188.0 0.0685	183.5 0.0668	178.7 0.0651	173.5 0.0632	168.0 0.0612
10"	WT Lb/Ft Disp Bbl/Ft	260.9 0.0950	258.8 0.0942	256.3 0.0933	253.4 0.0923	250.3 0.0911	246.8 0.0898	242.9 0.0884	238.8 0.0869	234.3 0.0853	229.4 0.0835	224.2 0.0816	218.7 0.0796

OD Inches	Wt/Ft w/ Couplings	ID (Inches)	Capacity	Disp.	Capacity plus Disp.
			Bbl/Ft	Bbl/Ft	
4 1/2	9.50	4.090	0.01625	0.00346	0.01971
4 1/2	10.50	4.052	0.01595	0.00382	0.01977
4 1/2	11.60	4.000	0.01554	0.00422	0.01976
4 1/2	13.50	3.920	0.01493	0.00491	0.01984
4 1/2	15.10	3.826	0.01422	0.00549	0.01971
5	11.50	4.560	0.02020	0.00418	0.02438
5	13.00	4.494	0.01962	0.00473	0.02435
5	15.00	4.408	0.01888	0.00546	0.02434
5	18.00	4.276	0.01776	0.00655	0.02431
5 1/2	14.00	5.012	0.02440	0.00509	0.02949
5 1/2	15.50	4.950	0.02380	0.00564	0.02944
5 1/2	17.00	4.892	0.02325	0.00619	0.02944
5 1/2	20.00	4.778	0.02218	0.00728	0.02946
5 1/2	23.00	4.670	0.02119	0.00837	0.02956
6	18.00	5.424	0.02858	0.00655	0.03513
6 5/8	24.00	5.921	0.03406	0.00873	0.04279
6 5/8	28.00	5.791	0.03258	0.01019	0.04277
6 5/8	32.00	5.675	0.03129	0.01164	0.04293
7	17.00	6.538	0.04152	0.00619	0.04771
7	20.00	6.456	0.04049	0.00728	0.04777
7	23.00	6.366	0.03937	0.00837	0.04774
7	26.00	6.276	0.03826	0.00946	0.04772
7	29.00	6.184	0.03715	0.01055	0.04770
7	32.00	6.094	0.03608	0.01164	0.04772
7	35.00	6.004	0.03502	0.01273	0.04775
7	38.00	5.920	0.03405	0.01383	0.04788
7 5/8	24.00	7.025	0.04794	0.00873	0.05667
7 5/8	26.40	6.969	0.04718	0.00960	0.05678
7 5/8	29.70	6.875	0.04592	0.01081	0.05673
7 5/8	33.70	6.765	0.04446	0.01226	0.05672
7 5/8	39.00	6.624	0.04262	0.01419	0.05681
8	26.00	7.386	0.05299	0.00946	0.06245
8 1/8	35.00	7.285	0.05156	0.01273	0.06429
8 5/8	28.00	8.017	0.06244	0.01019	0.07263

OD Inches	Wt/Ft w/ Couplings	ID (Inches)	Capacity	Disp.	Capacity plus Disp.
			Bbl/Ft	Bbl/Ft	
8 5/8	32.00	7.921	0.06095	0.01164	0.07259
8 5/8	36.00	7.825	0.05948	0.01310	0.07258
8 5/8	40.00	7.725	0.05797	0.01455	0.07252
8 5/8	44.00	7.625	0.05648	0.01601	0.07249
8 5/8	49.00	7.511	0.05480	0.01783	0.07263
9	40.00	8.150	0.06453	0.01455	0.07908
9 5/8	32.30	9.001	0.07870	0.01175	0.09045
9 5/8	36.00	8.921	0.07731	0.01310	0.09041
9 5/8	40.00	8.835	0.07583	0.01455	0.09038
9 5/8	43.50	8.755	0.07446	0.01583	0.09029
9 5/8	47.00	8.681	0.07321	0.01710	0.09031
9 5/8	53.50	8.535	0.07077	0.01946	0.09023
10	33.00	9.384	0.08554	0.01201	0.09755
10 3/4	32.75	10.192	0.10091	0.01192	0.11283
10 3/4	40.50	10.050	0.09812	0.01473	0.11285
10 3/4	45.50	9.950	0.09617	0.01655	0.11272
10 3/4	51.00	9.850	0.09425	0.01856	0.11281
10 3/4	55.50	9.760	0.09254	0.02019	0.11273
11 3/4	42.00	11.084	0.11935	0.01528	0.13463
11 3/4	47.00	11.000	0.11754	0.01710	0.13464
11 3/4	54.00	10.880	0.11499	0.01965	0.13464
11 3/4	60.00	10.772	0.11272	0.02183	0.13455
12	40.00	11.384	0.12589	0.01455	0.14044
13	45.00	12.360	0.14841	0.01637	0.16478
13 3/8	48.00	12.715	0.15705	0.01746	0.17451
13 3/8	54.50	12.615	0.15459	0.01983	0.17442
13 3/8	61.00	12.515	0.15215	0.02219	0.17434
13 3/8	68.00	12.415	0.14973	0.02474	0.17447
13 3/8	72.00	12.347	0.14809	0.02620	0.17429
16	65.00	15.250	0.22592	0.02365	0.24957
16	75.00	15.124	0.22220	0.02729	0.24949
16	84.00	15.010	0.21887	0.03056	0.24943
20	94.00	19.124	0.35528	0.03420	0.38948
20	106.50	19.000	0.35069	0.03875	0.38944
20	133.00	18.730	0.34079	0.04839	0.38918

MUD WEIGHT ADJUSTMENTS

Initial Mud Wt (PPG)	Desired Mud Weight (PPG)																	
	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0
9	29	59	90	123	156	192	229	268	308	350	395	442	490	542	596	653	714	778
9.5		29	60	92	125	160	196	234	273	315	359	405	452	503	557	612	672	735
10	43		30	61	93	128	164	201	239	280	323	368	414	464	516	571	630	691
10.5	85	30		31	62	96	131	167	205	245	287	331	376	426	479	531	588	648
11	128	60	23		31	64	98	134	171	210	251	294	339	387	437	490	546	605
11.5	171	90	46	19		32	66	101	137	175	215	258	301	348	397	449	504	562
12	214	120	69	37	16		33	67	103	140	179	221	263	310	357	408	462	518
12.5	256	150	92	56	32	14		34	68	105	144	184	226	271	318	367	420	475
13	299	180	115	75	48	27	12		34	70	108	147	188	232	278	327	378	432
13.5	342	210	138	94	63	41	24	11		35	72	111	150	194	238	286	336	389
14	385	240	161	112	76	54	36	21	10		36	74	113	155	199	245	294	345
14.5	427	270	185	131	95	68	48	32	19	9		37	75	116	159	204	252	302
15	470	300	208	150	110	82	60	43	29	18	8		37	77	119	163	210	259
15.5	513	330	231	169	126	95	72	54	39	26	16	8		39	79	122	168	216
16	556	360	254	187	142	109	84	64	48	35	24	15	7		40	81	126	172
16.5	598	390	277	206	158	123	96	75	58	44	32	23	14	7		41	84	129
17	641	420	300	225	174	136	108	86	68	53	40	30	21	13	6		42	86
17.5	684	450	323	244	189	150	120	96	77	62	49	38	28	20	12	6		43
18	726	480	346	262	205	163	132	107	87	71	57	45	35	26	18	12	5	
Dilution or Cut Back:		Mud Weight Increase:																
The lower blue section of the chart shows the number of barrels of water which must be added to 100 barrels of mud to produce desired weight REDUCTIONS.		The upper orange section of the chart shows the number of (100lb) sacks of barite which must be added to 100 barrels of mud to produce desired weight INCREASES.																

Liner Dia.	Stroke	8"	10"	12"	14"	14"	14"	15"	16"	16"	16"	16"	16"	16"	16"	16"	16"	18"	18"	18"	18"	20"
Rod Dia.		1 3/4"	1 3/4"	2"	2"	2"	2"	2 1/4"	2 1/4"	2 1/4"	2 3/4"	3 1/8"	3 1/4"	3 2/5"	3 9/10"	2 1/2"	3 1/4"	3 3/4"	4 1/4"	5"	5"	2 1/2"
4"	Bbls/Stk	0.0375	0.0469	0.0544	0.0635	0.0463	0.0654	0.0698	0.0633	0.0576	0.0555	0.0529	0.0435	0.0750	0.0625	0.0523	0.0406	0.0204	0.0834	0.0834	0.0834	0.0834
4 1/4"	Bbls/Stk	0.0428	0.0535	0.0624	0.0728	0.0557	0.0754	0.0805	0.0740	0.0683	0.0662	0.0636	0.0542	0.0871	0.0745	0.0643	0.0526	0.0324	0.0967	0.0967	0.0967	0.0967
4 1/2"	Bbls/Stk	0.0485	0.0606	0.0709	0.0827	0.0656	0.0861	0.0918	0.0853	0.0796	0.0776	0.0750	0.0655	0.0998	0.0872	0.0770	0.0654	0.0452	0.1109	0.1109	0.1109	0.1109
4 3/4"	Bbls/Stk	0.0545	0.0681	0.0799	0.0932	0.0761	0.0973	0.1038	0.0973	0.0916	0.0895	0.0870	0.0775	0.1133	0.1007	0.0905	0.0789	0.0587	0.1259	0.1259	0.1259	0.1259
5"	Bbls/Stk	0.0608	0.0760	0.0894	0.1043	0.0871	0.1091	0.1164	0.1099	0.1042	0.1022	0.0996	0.0901	0.1275	0.1149	0.1047	0.0931	0.0729	0.1417	0.1417	0.1417	0.1417
5 1/4"	Bbls/Stk	0.0674	0.0843	0.0993	0.1159	0.0987	0.1216	0.1297	0.1232	0.1175	0.1154	0.1129	0.1034	0.1424	0.1299	0.1197	0.1080	0.0878	0.1583	0.1583	0.1583	0.1583
5 1/2"	Bbls/Stk	0.0744	0.0930	0.1098	0.1281	0.1109	0.1346	0.1436	0.1371	0.1314	0.1294	0.1268	0.1173	0.1581	0.1455	0.1353	0.1237	0.1035	0.1757	0.1757	0.1757	0.1757
5 3/4"	Bbls/Stk	0.0817	0.1021	0.1207	0.1408	0.1237	0.1483	0.1582	0.1517	0.1460	0.1439	0.1414	0.1319	0.1745	0.1619	0.1517	0.1401	0.1199	0.1939	0.1939	0.1939	0.1939
6"	Bbls/Stk	0.0893	0.1116	0.1321	0.1541	0.1370	0.1626	0.1734	0.1669	0.1612	0.1592	0.1566	0.1471	0.1916	0.1790	0.1688	0.1572	0.1370	0.2129	0.2129	0.2129	0.2129
6 1/4"	Bbls/Stk	0.0972	0.1215	0.1440	0.1680	0.1509	0.1774	0.1893	0.1828	0.1771	0.1750	0.1724	0.1630	0.2095	0.1969	0.1867	0.1750	0.1548	0.2327	0.2327	0.2327	0.2327
6 1/2"	Bbls/Stk	0.1055	0.1319	0.1564	0.1825	0.1653	0.1929	0.2058	0.1993	0.1936	0.1915	0.1890	0.1795	0.2280	0.2155	0.2053	0.1936	0.1734	0.2534	0.2534	0.2534	0.2534
6 3/4"	Bbls/Stk	0.1141	0.1426	0.1693	0.1975	0.1803	0.2090	0.2229	0.2165	0.2108	0.2087	0.2061	0.1967	0.2474	0.2348	0.2246	0.2129	0.1927	0.2748	0.2748	0.2748	0.2748
7"	Bbls/Stk	0.1230	0.1537	0.1826	0.2131	0.1959	0.2257	0.2408	0.2343	0.2286	0.2265	0.2239	0.2145	0.2674	0.2548	0.2446	0.2330	0.2127	0.2971	0.2971	0.2971	0.2971
7 1/4"	Bbls/Stk	0.1322	0.1652	0.1965	0.2292	0.2121	0.2430	0.2592	0.2527	0.2470	0.2450	0.2424	0.2329	0.2882	0.2756	0.2654	0.2537	0.2335	0.3202	0.3202	0.3202	0.3202
7 1/2"	Bbls/Stk	0.1417	0.1772	0.2108	0.2459	0.2288	0.2609	0.2783	0.2718	0.2661	0.2641	0.2615	0.2520	0.3096	0.2971	0.2869	0.2752	0.2550	0.3441	0.3441	0.3441	0.3441
7 3/4"	Bbls/Stk	0.1516	0.1895	0.2256	0.2632	0.2461	0.2794	0.2981	0.2916	0.2859	0.2838	0.2812	0.2718	0.3319	0.3193	0.3091	0.2974	0.2772	0.3687	0.3687	0.3687	0.3687

TRIPLEX PUMPS AT 100% EFFICIENCY

Liner Diameter	STROKE LENGTH INCHES															Units
	2	2 1/2	3	4	5	6	7	7 1/2	8	8 1/2	9	9 1/2	10	11	12	
1"	0.0005	0.0006	0.0007	0.0010	0.0012	0.0015	0.0017	0.0018	0.0019	0.0021	0.0022	0.0023	0.0024	0.0027	0.0029	BBLs/STK
	0.0204	0.0255	0.0306	0.0408	0.0510	0.0612	0.0714	0.0765	0.0816	0.0868	0.0919	0.0970	0.1021	0.1123	0.1225	Gal/STK
1 3/8"	0.0009	0.0011	0.0014	0.0018	0.0023	0.0028	0.0032	0.0034	0.0037	0.0039	0.0041	0.0044	0.0046	0.0051	0.0055	BBLs/STK
	0.0386	0.0482	0.0579	0.0772	0.0965	0.1158	0.1351	0.1447	0.1544	0.1640	0.1737	0.1833	0.1930	0.2123	0.2315	Gal/STK
1 1/2"	0.0011	0.0014	0.0016	0.0022	0.0027	0.0033	0.0038	0.0041	0.0044	0.0046	0.0049	0.0052	0.0055	0.0060	0.0066	BBLs/STK
	0.0459	0.0574	0.0689	0.0919	0.1148	0.1378	0.1607	0.1722	0.1837	0.1952	0.2067	0.2182	0.2296	0.2526	0.2756	Gal/STK
1 5/8"	0.0013	0.0016	0.0019	0.0026	0.0032	0.0039	0.0045	0.0048	0.0051	0.0055	0.0058	0.0061	0.0064	0.0071	0.0077	BBLs/STK
	0.0539	0.0674	0.0809	0.1078	0.1348	0.1617	0.1887	0.2021	0.2156	0.2291	0.2426	0.2560	0.2695	0.2965	0.3234	Gal/STK
1 3/4"	0.0015	0.0019	0.0022	0.0030	0.0037	0.0045	0.0052	0.0056	0.0060	0.0063	0.0067	0.0071	0.0074	0.0082	0.0089	BBLs/STK
	0.0625	0.0781	0.0938	0.1250	0.1563	0.1875	0.2188	0.2344	0.2500	0.2657	0.2813	0.2969	0.3126	0.3438	0.3751	Gal/STK
2"	0.0019	0.0024	0.0029	0.0039	0.0049	0.0058	0.0068	0.0073	0.0078	0.0083	0.0087	0.0092	0.0097	0.0107	0.0117	BBLs/STK
	0.0816	0.1021	0.1225	0.1633	0.2041	0.2449	0.2858	0.3062	0.3266	0.3470	0.3674	0.3878	0.4082	0.4491	0.4899	Gal/STK
2 1/4"	0.0025	0.0031	0.0037	0.0049	0.0062	0.0074	0.0086	0.0092	0.0098	0.0105	0.0111	0.0117	0.0123	0.0135	0.0148	BBLs/STK
	0.1033	0.1292	0.1550	0.2067	0.2583	0.3100	0.3617	0.3875	0.4133	0.4392	0.4650	0.4908	0.5167	0.5683	0.6200	Gal/STK
2 1/2"	0.0030	0.0038	0.0046	0.0061	0.0076	0.0091	0.0106	0.0114	0.0122	0.0129	0.0137	0.0144	0.0152	0.0167	0.0182	BBLs/STK
	0.1276	0.1595	0.1914	0.2552	0.3189	0.3827	0.4465	0.4784	0.5103	0.5422	0.5741	0.6060	0.6379	0.7017	0.7655	Gal/STK
2 3/4"	0.0037	0.0046	0.0055	0.0074	0.0092	0.0110	0.0129	0.0138	0.0147	0.0156	0.0165	0.0175	0.0184	0.0202	0.0221	BBLs/STK
	0.1544	0.1930	0.2315	0.3087	0.3859	0.4631	0.5403	0.5789	0.6175	0.6561	0.6946	0.7332	0.7718	0.8490	0.9262	Gal/STK
3"	0.0044	0.0055	0.0066	0.0087	0.0109	0.0131	0.0153	0.0164	0.0175	0.0186	0.0197	0.0208	0.0219	0.0241	0.0262	BBLs/STK
	0.1837	0.2296	0.2756	0.3674	0.4593	0.5511	0.6430	0.6889	0.7348	0.7808	0.8267	0.8726	0.9185	1.0104	1.1022	Gal/STK
3 1/4"	0.0051	0.0064	0.0077	0.0103	0.0128	0.0154	0.0180	0.0193	0.0205	0.0218	0.0231	0.0244	0.0257	0.0282	0.0308	BBLs/STK
	0.2156	0.2695	0.3234	0.4312	0.5390	0.6468	0.7546	0.8085	0.8624	0.9163	0.9702	1.0241	1.0780	1.1858	1.2936	Gal/STK
3 1/2"	0.0060	0.0074	0.0089	0.0119	0.0149	0.0179	0.0208	0.0223	0.0238	0.0253	0.0268	0.0283	0.0298	0.0327	0.0357	BBLs/STK
	0.2500	0.3126	0.3751	0.5001	0.6251	0.7501	0.8752	0.9377	1.0002	1.0627	1.1252	1.1877	1.2502	1.3753	1.5003	Gal/STK
3 3/4"	0.0068	0.0085	0.0103	0.0137	0.0171	0.0205	0.0239	0.0256	0.0273	0.0290	0.0308	0.0325	0.0342	0.0376	0.0410	BBLs/STK
	0.2870	0.3588	0.4306	0.5741	0.7176	0.8611	1.0047	1.0764	1.1482	1.2199	1.2917	1.3635	1.4352	1.5787	1.7223	Gal/STK

Liner Diameter	STROKE LENGTH INCHES															Units
	2	2 1/2	3	4	5	6	7	7 1/2	8	8 1/2	9	9 1/2	10	11	12	
4"	0.0078	0.0097	0.0117	0.0156	0.0194	0.0233	0.0272	0.0292	0.0311	0.0330	0.0350	0.0369	0.0389	0.0428	0.0467	BBLs/STK
	0.3266	0.4082	0.4899	0.6532	0.8165	0.9798	1.1431	1.2247	1.3064	1.3880	1.4697	1.5513	1.6330	1.7963	1.9596	Gal/STK
4 1/4"	0.0088	0.0110	0.0132	0.0176	0.0219	0.0263	0.0307	0.0329	0.0351	0.0373	0.0395	0.0417	0.0439	0.0483	0.0527	BBLs/STK
	0.3687	0.4609	0.5530	0.7374	0.9217	1.1061	1.2904	1.3826	1.4748	1.5669	1.6591	1.7513	1.8435	2.0278	2.2122	Gal/STK
4 1/2"	0.0098	0.0123	0.0148	0.0197	0.0246	0.0295	0.0344	0.0369	0.0394	0.0418	0.0443	0.0467	0.0492	0.0541	0.0590	BBLs/STK
	0.4133	0.5167	0.6200	0.8267	1.0334	1.2400	1.4467	1.5500	1.6534	1.7567	1.8600	1.9634	2.0667	2.2734	2.4801	Gal/STK
4 3/4"	0.0110	0.0137	0.0164	0.0219	0.0274	0.0329	0.0384	0.0411	0.0439	0.0466	0.0493	0.0521	0.0548	0.0603	0.0658	BBLs/STK
	0.4605	0.5757	0.6908	0.9211	1.1514	1.3816	1.6119	1.7270	1.8422	1.9573	2.0725	2.1876	2.3027	2.5330	2.7633	Gal/STK
5"	0.0122	0.0152	0.0182	0.0243	0.0304	0.0365	0.0425	0.0456	0.0486	0.0516	0.0547	0.0577	0.0608	0.0668	0.0729	BBLs/STK
	0.5103	0.6379	0.7655	1.0206	1.2758	1.5309	1.7861	1.9136	2.0412	2.1688	2.2964	2.4239	2.5515	2.8067	3.0618	Gal/STK
5 1/4"	0.0134	0.0167	0.0201	0.0268	0.0335	0.0402	0.0469	0.0502	0.0536	0.0569	0.0603	0.0636	0.0670	0.0737	0.0804	BBLs/STK
	0.5626	0.7033	0.8439	1.1252	1.4065	1.6878	1.9691	2.1098	2.2504	2.3911	2.5317	2.6724	2.8130	3.0943	3.3756	Gal/STK
5 1/2"	0.0147	0.0184	0.0221	0.0294	0.0368	0.0441	0.0515	0.0551	0.0588	0.0625	0.0662	0.0698	0.0735	0.0809	0.0882	BBLs/STK
	0.6175	0.7718	0.9262	1.2349	1.5437	1.8524	2.1611	2.3155	2.4699	2.6242	2.7786	2.9329	3.0873	3.3960	3.7048	Gal/STK
5 3/4"	0.0161	0.0201	0.0241	0.0321	0.0402	0.0482	0.0562	0.0603	0.0643	0.0683	0.0723	0.0763	0.0803	0.0884	0.0964	BBLs/STK
	0.6749	0.8436	1.0123	1.3497	1.6872	2.0246	2.3621	2.5308	2.6995	2.8682	3.0369	3.2056	3.3744	3.7118	4.0492	Gal/STK
6"	0.0175	0.0219	0.0262	0.0350	0.0437	0.0525	0.0612	0.0656	0.0700	0.0744	0.0787	0.0831	0.0875	0.0962	0.1050	BBLs/STK
	0.7348	0.9185	1.1022	1.4697	1.8371	2.2045	2.5719	2.7556	2.9393	3.1230	3.3067	3.4905	3.6742	4.0416	4.4090	Gal/STK
6 1/4"	0.0190	0.0237	0.0285	0.0380	0.0475	0.0570	0.0664	0.0712	0.0759	0.0807	0.0854	0.0902	0.0949	0.1044	0.1139	BBLs/STK
	0.7973	0.9967	1.1960	1.5947	1.9934	2.3920	2.7907	2.9900	3.1894	3.3887	3.5880	3.7874	3.9867	4.3854	4.7841	Gal/STK
6 1/2"	0.0205	0.0257	0.0308	0.0411	0.0513	0.0616	0.0719	0.0770	0.0821	0.0873	0.0924	0.0975	0.1027	0.1129	0.1232	BBLs/STK
	0.8624	1.0780	1.2936	1.7248	2.1560	2.5872	3.0184	3.2340	3.4496	3.6652	3.8808	4.0964	4.3120	4.7432	5.1744	Gal/STK
6 3/4"	0.0221	0.0277	0.0332	0.0443	0.0554	0.0664	0.0775	0.0830	0.0886	0.0941	0.0996	0.1052	0.1107	0.1218	0.1329	BBLs/STK
	0.9300	1.1625	1.3950	1.8600	2.3251	2.7901	3.2551	3.4876	3.7201	3.9526	4.1851	4.4176	4.6501	5.1151	5.5801	Gal/STK
7"	0.0238	0.0298	0.0357	0.0476	0.0595	0.0714	0.0833	0.0893	0.0953	0.1012	0.1072	0.1131	0.1191	0.1310	0.1429	BBLs/STK
	1.0002	1.2502	1.5003	2.0004	2.5005	3.0006	3.5007	3.7507	4.0008	4.2508	4.5008	4.7509	5.0009	5.5010	6.0011	Gal/STK

Tubing Size		Normal Weight		Wall thickness In	Inside Dia. In	Threaded Coupling			Collapse Resistance PSI	Internal Yield Pressure PSI	Joint Yield Strength		Capacity	Displacement	
Nominal In	OD In	T & C Non-upset Lb/Ft	T & C Upset Lb/Ft			Drift Dia. In	Non-upset In	Upset Reg. In	Upset Spec. In		T & C Non-upset Lb	T & C Upset Lb	Bbl/Ft	T & C Non-upset Bbl/Ft	T & C Upset Bbl/Ft
3/4	1.050	1.14	1.20	H-40	.824	.730	1.313	1.660		7.200	6.360	13.300	0.00066	0.00041	0.00044
	1.050	1.14	1.20	J-55	.824	.730	1.313	1.660		9.370	8.740	18.290	0.00066	0.00041	0.00044
	1.050	1.14	1.20	C-75	.824	.730	1.313	1.660		12.250	11.920	24.940	0.00066	0.00041	0.00044
	1.050	1.14	1.20	N-80	.824	.730	1.313	1.660		12.970	12.710	26.610	0.00066	0.00041	0.00044
1	1.315	1.70	1.80	H-40	1.049	.955	1.660	1.900		6.820	10.960	19.760	0.00107	0.00062	0.00065
	1.315	1.70	1.80	J-55	1.049	.955	1.660	1.900		8.860	15.060	27.160	0.00107	0.00062	0.00065
	1.315	1.70	1.80	C-75	1.049	.955	1.660	1.900		11.590	20.540	37.040	0.00107	0.00062	0.00065
	1.315	1.70	1.80	N-80	1.049	.955	1.660	1.900		12.270	21.910	39.510	0.00107	0.00062	0.00065
1 1/4	1.660			H-40	1.410					5.220			0.00193		
	1.660	2.30	2.40	H-40	1.380	1.286	2.054	2.200		5.790	15.530	26.740	0.00185	0.00084	0.00087
	1.660			J-55	1.410					6.790			0.00193		
	1.660	2.30	2.40	J-55	1.380	1.286	2.054	2.200		7.530	21.360	36.770	0.00185	0.00084	0.00087
1 1/2	1.660	2.30	2.40	C-75	1.380	1.286	2.054	2.200		9.840	29.120	50.140	0.00185	0.00084	0.00087
	1.660	2.30	2.40	N-80	1.380	1.286	2.054	2.200		10.420	31.060	53.480	0.00185	0.00084	0.00087
	1.900			H-40	1.850					4.450			0.00332		
	1.900	2.75	2.90	H-40	1.610	1.516	2.200	2.500		5.290	19.090	31.980	0.00252	0.00100	0.00106
2 1/16	1.900			J-55	1.650					5.790			0.00264		
	1.900	2.75	2.90	J-55	1.610	1.516	2.200	2.500		6.870	26.250	43.970	0.00252	0.00100	0.00106
	1.900	2.75	2.90	C-75	1.610	1.516	2.200	2.500		8.990	35.800	59.960	0.00252	0.00100	0.00106
	1.900	2.75	2.90	N-80	1.610	1.516	2.200	2.500		9.520	38.130	63.950	0.00252	0.00100	0.00106
2 1/16	2.063			H-40	1.751					5.240			0.00298		
	2.063			J-55	1.751					6.820			0.00298		
	2.063			C-75	1.751					8.910			0.00298		
	2.063			N-80	1.751					9.440			0.00298		

Tubing Size		Normal Weight		Grade	Wall thickness In	Inside Dia. In	Threaded Coupling				Collapse Resistance PSI	Internal Yield Pressure PSI	Joint Yield Strength		Capacity Bbl/Ft	Displacement	
Nominal In	OD In	T & C Non-upset Lb/Ft	T & C Upset Lb/Ft				Drift Dia. In	Non-upset In	Upset Reg. In	Upset Spec. In			T & C Non-upset Lb	T & C Upset Lb		T & C Non-upset Bbl/Ft	T & C Upset Bbl/Ft
	2.375	4.00	4.70	H-40	.167	2.041	1.947	2.875	3.063	2.910	4.880	4.920	30.130		0.00405	0.00146	
	2.375	4.60	4.70	H-40	.190	1.995	1.901	2.875	3.063	2.910	5.520	5.600	35.960	52.170	0.00387	0.00167	0.00171
	2.375	4.00		J-55	.167	2.041	1.947	2.875			6.340	6.770	41.430		0.00405	0.00146	
	2.375	4.60	4.70	J-55	.190	1.995	1.901	2.875	3.063	2.910	7.180	7.700	49.450	71.730	0.00387	0.00167	0.00171
	2.375	4.00		C-75	.167	2.041	1.947	2.875			8.150	9.230	56.500		0.00405	0.00146	
	2.375	4.60	4.70	C-75	.190	1.995	1.901	2.875	3.063	2.910	9.380	10.500	67.430	97.820	0.00387	0.00167	0.00171
2 3/8	2.375	5.80	5.95	C-75	.254	1.867	1.773	2.875	3.063	2.910	12.180	14.040	96.560	126.940	0.00339	0.00211	0.00216
	2.375	4.00		N-80	.167	2.041	1.947	2.875			8.660	9.840	50.260		0.00405	0.00146	
	2.375	4.60	4.70	N-80	.190	1.995	1.901	2.875	3.063	2.910	9.940	11.200	71.930	104.340	0.00387	0.00167	0.00171
	2.375	5.80	5.95	N-80	.254	1.867	1.773	2.875	3.063	2.910	12.890	14.970	102.990	135.400	0.00339	0.00211	0.00216
	2.375	4.60	4.70	P-105	.190	1.995	1.901	2.875	3.063	2.910	13.250	14.700	94.410	136.940	0.00387	0.00167	0.00171
	2.375	5.80	5.95	P-105	.254	1.867	1.773	2.875	3.063	2.910	17.190	19.650	135.180	177.710	0.00339	0.00211	0.00216
	2.875	6.40	6.50	H-40	.217	2.441	2.347	3.500	3.668	3.460	5.230	5.280	52.780	720.480	0.00579	0.00233	0.00236
	2.875	6.40	6.50	J-55	.217	2.441	2.347	3.500	3.668	3.460	6.800	7.260	72.580	99.660	0.00579	0.00233	0.00236
	2.875	6.40	6.50	C-75	.217	2.441	2.347	3.500	3.668	3.460	8.900	9.910	98.970	135.900	0.00579	0.00233	0.00236
2 7/8	2.875	8.60	8.70	C-75	.308	2.259	2.165	3.500	3.668	3.460	12.200	14.060	149.360	185.290	0.00496	0.00313	0.00317
	2.875	6.40	6.50	N-80	.217	2.441	2.347	3.500	3.668	3.460	9.420	10.570	105.570	144.960	0.00579	0.00233	0.00236
	2.875	8.60	8.70	N-80	.308	2.259	2.165	3.500	3.668	3.460	12.920	15.000	159.310	198.710	0.00496	0.00313	0.00317
	2.875	6.40	6.50	P-105	.217	2.441	2.347	3.500	3.668	3.460	12.560	13.870	138.560	190.260	0.00579	0.00233	0.00236
	2.875	8.60	8.70	P-105	.308	2.259	2.165	3.500	3.668	3.460	17.220	19.690	209.100	260.810	0.00496	0.00313	0.00317
	3.500	7.70		H-40	.216	3.068	2.943	4.250			4.070	4.320	65.070		0.00914	0.00280	
3 1/2	3.500	9.20	9.30	H-40	.254	2.992	2.867	4.250	4.500	4.180	5.050	5.080	79.540	103.810	0.00870	0.00335	0.00338
	3.500	10.20		H-40	.289	2.922	2.797	4.250			5.680	5.780	92.550		0.00829	0.00371	
	3.500	7.20		J-55	.215	3.068	2.943	4.250			5.290	5.940	89.470		0.00914	0.00262	

Tubing Size		Normal Weight		Wall thick- ness In	Inside Dia. In	Threaded Coupling				Collapse Resistance PSI	Internal Yield Pressure PSI	Joint Yield Strength		Capacity	Displacement	
Nominal In	OD In	Coupling Outside Dia.				T & C Non-upset Lb/Ft	T & C Upset Lb/Ft	T & C Non-upset Lb	T & C Upset Lb			T & C Non-upset Bbl/Ft	T & C Upset Bbl/Ft			
		Drift Dia. In	Non- upset In												Upset Req. In	Upset Spec. In
3 1/2	3.500	9.20	9.30	.254	2.992	2.867	4.250	4.500	4.180	6.560	6.980	109.370	142.460	0.00870	0.00335	0.00338
	3.500	10.20		.289	2.922	2.797	4.250			7.390	7.950	127.250		0.00829	0.00371	
	3.500	7.70		.216	3.068	2.943	4.250			6.690	8.100	122.010		0.00914	0.00280	
	3.500	9.20	9.30	.254	2.992	2.867	4.250	4.500	4.180	8.530	9.520	149.140	194.260	0.00870	0.00335	0.00338
	3.500	10.20		.289	2.922	2.797	4.250			9.660	10.840	173.530		0.00829	0.00371	
	3.500	12.70	12.95	.375	2.750	2.625	4.250	4.500	4.180	12.200	14.060	230.990	276.120	0.00735	0.00462	0.00471
	3.500	7.70		.216	3.068	2.943	4.250			7.080	8.640	130.140		0.00914	0.00280	
	3.500	9.20	9.30	.254	2.992	2.867	4.250	4.500	4.180	9.080	10.160	159.090	207.220	0.00870	0.00335	0.00338
	3.500	10.20		.289	2.922	2.797	4.250			10.230	11.560	185.100		0.00829	0.00371	
	3.500	12.70	12.95	.375	2.750	2.625	4.250	4.500	4.180	12.920	15.000	246.390	294.530	0.00735	0.00462	0.00471
4	3.500	9.20	9.30	.254	2.992	2.867	4.250	4.500	4.180	12.110	13.330	208.800	271.970	0.00870	0.00335	0.00338
	3.500	12.70	12.95	.375	2.750	2.625	4.250	4.500	4.180	17.200	19.690	323.390	386.570	0.00735	0.00462	0.00471
	4.000	9.50		.226	3.548	3.423	4.750			3.580	3.960	72.000		0.01223	0.00346	
	4.000		11.00	.262	3.476	3.351		5.000		4.420	4.580		123.070	0.01174		0.00400
	4.000	9.50		.226	3.548	3.423	4.750			4.650	5.440	99.010		0.01223	0.00346	
	4.000		11.00	.262	3.476	3.351		5.000		5.750	6.300		169.220	0.01174		0.00400
	4.000	9.50		.226	3.548	3.423	4.750			5.800	7.420	135.010		0.01223	0.00346	
	4.000		11.00	.262	3.476	3.351		5.000		7.330	8.600		230.750	0.01174		0.00400
	4.000	9.50		.226	3.548	3.423	4.750			6.120	7.910	144.010		0.01223	0.00346	
	4.000		11.00	.262	3.476	3.351		5.000		7.780	9.170		246.140	0.01174		0.00400
4 1/2	4.500	12.60	12.75	.271	3.958	3.833	5.200	5.563		3.930	4.220	104.360	144.020	0.01522	0.00458	0.00464
	4.500	12.60	12.75	.271	3.958	3.833	5.200	5.563		5.100	5.800	143.500	198.030	0.01522	0.00458	0.00464
	4.500	12.60	12.75	.271	3.958	3.833	5.200	5.563		6.430	7.900	195.680	270.040	0.01522	0.00458	0.00464
	4.500	12.60	12.75	.271	3.958	3.833	5.200	5.563		6.810	8.430	208.730	288.040	0.01522	0.00458	0.00464

Connection Data										Tube Data								
Tubing Size	Outer Dia."	Inner Dia. "	Make-up Torque	Grade	Outer Dia. "	Inner Dia. "	Drift	Wall Thick.	Cross Section	100% Yield	Ult. Strength	Depth 100%	Pull 100%	PSI Burst 100%	Collapse 100%	Capacity		Disp.
																Gals / 1000 ft.	BBLs / FT	
3/4" CS HYDRIL 1.5# P-110	1.327	0.687	300	P-110	1.050	0.742	0.648	0.154	0.433	110,000	125,000	31,700	47,600	32,200	26,200	22.5	0.00054	0.00036
1" CS HYDRIL 2.25# C-75	1.600	0.864	400	C-75	1.315	0.957	0.848	0.179	0.639	75,000	95,000	21,300	48,000	20,400	17,600	37.4	0.00089	0.00082
1" CS HYDRIL 2.25# N-80/L-80	1.600	0.864	400	N-L-80	1.315	0.957	0.848	0.179	0.639	80,000	100,000	22,600	51,000	21,800	18,800	37.4	0.00089	0.00082
1" CS HYDRIL 2.25# T-95	1.600	0.864	400	T-95	1.315	0.957	0.848	0.179	0.639	95,000	105,000	27,000	60,700	25,900	22,300	37.4	0.00089	0.00082
1" CS HYDRIL 2.25# P-110	1.600	0.864	400	P-110	1.315	0.957	0.848	0.179	0.639	110,000	125,000	31,200	70,300	29,900	25,900	37.4	0.00089	0.00082
1" CS HYDRIL 2.25# S-135	1.600	0.864	500	S-135	1.315	0.957	0.848	0.179	0.639	135,000	145,000	38,300	86,200	36,700	31,700	37.4	0.00089	0.00082
1-1/4" CS HYDRIL 3.02# C-75	1.927	1.218	600	C-75	1.660	1.278	1.184	0.191	0.881	75,000	95,000	21,800	66,000	17,200	15,200	66.6	0.00159	0.00110
1-1/4" CS HYDRIL 3.02# N-80/L-80	1.927	1.218	600	N-L-80	1.660	1.278	1.184	0.191	0.881	80,000	100,000	23,500	71,000	18,400	16,200	66.6	0.00159	0.00110
1-1/4" CS HYDRIL 3.02# T-95	1.927	1.218	600	T-95	1.660	1.278	1.184	0.191	0.881	95,000	105,000	27,700	83,700	21,900	19,300	66.6	0.00159	0.00110
1-1/4" CS HYDRIL 3.02# P-110	1.927	1.218	600	P-110	1.660	1.278	1.184	0.191	0.881	110,000	125,000	32,000	96,600	25,300	22,400	66.6	0.00159	0.00110

Connection Data					Tube Data														
Tubing Size	Outer Dia. "	Inner Dia. "	Make-up Torque	Grade	Outer Dia. "	Inner Dia. "	Drift	Wall Thick.	Cross Section	100% Yield	Ult. Strength	Depth 100%	Pull 100%	PSI Burst 100%	Collapse 100%	Capacity	Disp.	Capacity	Disp.
																Gals / 1000 ft.	BBLs / FT		
1-1/4" CS HYDRIL 3.02# S-135	1.927	1.218	600	S-135	1.660	1.278	1.184	0.191	0.881	135,000	145,000	39,400	119,000	31,000	27,500	66.6	46.2	0.00159	0.00110
1-1/2" CS HYDRIL 3.64# N-80/L-80	2.162	1.440	800	N-L-80	1.900	1.500	1.406	0.200	1.068	80,000	100,000	23,300	85,000	16,800	15,000	91.8	55.7	0.00219	0.00133
1-1/2" CS HYDRIL 3.64# P-110	2.162	1.440	800	P-110	1.900	1.500	1.406	0.200	1.068	110,000	125,000	32,300	117,500	23,000	20,700	91.8	55.7	0.00219	0.00133
1-1/2" CS HYDRIL 3.64# S-135	2.162	1.440	800	S-135	1.900	1.500	1.406	0.200	1.068	135,000	145,000	39,600	144,199	28,421	25,429	91.8	55.7	0.00219	0.00133
2-1/16" CS HYDRIL 3.25# N-80/L-80	2.330	1.700	900	N-L-80	2.063	1.751	1.657	0.156	0.935	80,000	100,000	23,000	75,000	12,100	11,200	125.0	49.7	0.00298	0.00118
2-3/8" EUE 8RD 4.7# N-80/L-80	3.063	1.995	1,500	N-L-80	2.375	1.995	1.901	0.190	1.304	80,000	100,000	22,200	104,300	12,800	11,770	162.3	71.9	0.00386	0.00171
2-3/8" PH-6 HYDRIL 5.95# N-80/L-80	2.906	1.805	2,200	N-L-80	2.375	1.867	1.773	0.254	1.692	80,000	100,000	22,700	135,000	17,100	15,300	142.2	91.0	0.00339	0.00217
2-3/8" PH-6 HYDRIL 5.95# RY-85	2.906	1.805	2,200	RY-85	2.375	1.867	1.773	0.254	1.692	85,000	100,000	24,100	143,800	18,200	16,240	142.2	91.0	0.00339	0.00217
2-3/8" PH-6 HYDRIL 5.95# T-95	2.906	1.805	2,200	T-95	2.375	1.867	1.773	0.254	1.692	95,000	110,000	27,000	160,740	19,665	17,595	142.2	91.0	0.00339	0.00217
2-3/8" PH-6 HYDRIL 5.95# P-110	2.906	1.805	2,700	P-110	2.375	1.867	1.773	0.254	1.692	105,000	120,000	29,900	178,000	22,500	20,060	142.2	91.0	0.00339	0.00217

Connection Data				Tube Data													
Tubing Size	Outer Dia. "	Inner Dia. "	Make-up Torque	Grade	Outer Dia. "	Inner Dia. "	Drift	Wall Thick.	Cross Section	100% Yield	Ult. Strength	Depth 100%	Pull 100%	PSI/Burst 100%	Collapse 100%	Capacity Gals / 1000 ft.	Disp. BBLs / Ft.
0.50	4.00																
6.5# N-80/L-80	3.668	2.441	2,300	N-L-80	2.875	2.441	2.347	0.217	1.812	80,000	100,000	22,300	145,000	12,100	11,160	243.0	0.00579
2-7/8" PH-6 HYDRIL																	
8.7# N-80/L-80	3.500	2.200	3,000	N-L-80	2.875	2.259	2.165	0.308	2.484	80,000	100,000	22,800	198,700	17,140	15,300	208.1	0.00495
2-7/8" PH-6 HYDRIL																	
7.9# N-80/L-80	3.437	2.265	3,000	N-L-80	2.875	2.323	2.229	0.276	2.254	80,000	100,000	22,800	180,000	15,300	13,900	220.0	0.00524
2-7/8" PH-6 HYDRIL																	
7.9# T-95	3.437	2.265	3,200	T-95	2.875	2.323	2.229	0.276	2.254	95,000	110,000	27,098	214,082	18,000	16,000	220.0	0.00524
2-7/8" PH-6 HYDRIL																	
7.9# P-110	3.437	2.265	3,500	P-110	2.875	2.323	2.229	0.276	2.254	105,000	120,000	29,900	236,000	20,100	18,200	220.0	0.00524
3-1/2" EUE 8RD																	
9.3# N-80/L-80	4.500	2.992	2,400-3,200	N-L-80	3.500	2.992	2.867	0.254	2.590	80,000	100,000	22,200	207,200	11,600	10,700	365.2	0.00870
3-1/2" EUE 8RD																	
9.3# P-110	4.500	2.992	3,000-4,000	P-110	3.500	2.992	2.867	0.254	2.590	110,000	125,000	30,600	284,900	15,900	14,800	365.2	0.00870
3-1/2" PH-6 HYDRIL																	
12.95# N-80/L-80	4.312	2.687	5,500	N-L-80	3.500	2.750	2.625	0.375	3.682	80,000	100,000	22,700	294,500	17,100	15,310	308.4	0.00734
3-1/2" PH-6 HYDRIL																	
12.95# T-95	4.313	2.687	6,000	T-95	3.500	2.750	1.609	0.375	3.682	95,000	105,000	27,000	386,600	20,300	18,100	308.4	0.00734
3-1/2" PH-6 HYDRIL																	
12.95# P-110	4.312	2.687	7,000	P-110	3.500	2.750	2.625	0.375	3.682	105,000	120,000	29,800	386,600	22,500	20,090	308.4	0.00734
4-1/2" PH-6 HYDRIL																	
15.50# P-110	5.125	3.765	8,500	P-110	4.500	3.826	3.701	0.337	4.407	110,000	125,000	31,300	485,000	16,480	14,340	598.0	0.01424
																	0.00546

COILED TUBING

COILED TUBING DATA				Per Ft.				Per 1000 Ft			
OD Specified	Wall Specified	ID Calculated	Nom. Wt LBS/FT	Internal Capacity Gallons	Displacement of Steel Gallons	External Displacement Gallons	BBLs	Internal Capacity Gallons	Displacement of Steel Gallons	External Displacement Gallons	BBLs
1.000	0.080	0.840	0.788	0.02879	0.000685	0.01201	0.00029	28.78848	12.01152	40.80000	0.97143
1.000	0.087	0.826	0.850	0.02784	0.000663	0.01296	0.00031	27.83686	12.96314	40.80000	0.97143
1.000	0.095	0.810	0.920	0.02677	0.000637	0.01403	0.00033	26.76888	14.03112	40.80000	0.97143
1.000	0.102	0.796	0.981	0.02585	0.000616	0.01495	0.00036	25.85153	14.94847	40.80000	0.97143
1.000	0.109	0.782	1.040	0.02495	0.000594	0.01585	0.00038	24.95018	15.84982	40.80000	0.97143
1.250	0.080	1.090	1.002	0.04847	0.001154	0.01528	0.00036	48.47448	15.27552	63.75000	1.51786
1.250	0.087	1.076	1.083	0.04724	0.001125	0.01651	0.00039	47.23726	16.51274	63.75000	1.51786
1.250	0.095	1.060	1.175	0.04584	0.001091	0.01791	0.00043	45.84288	17.90712	63.75000	1.51786
1.250	0.102	1.046	1.254	0.04464	0.001063	0.01911	0.00046	44.63994	19.11007	63.75000	1.51786
1.250	0.109	1.032	1.332	0.04345	0.001035	0.02030	0.00048	43.45298	20.29702	63.75000	1.51786
1.250	0.116	1.018	1.408	0.04228	0.001007	0.02147	0.00051	42.28202	21.46798	63.75000	1.51786
1.250	0.125	1.000	1.506	0.04080	0.000971	0.02295	0.00055	40.80000	22.95000	63.75000	1.51786
1.250	0.134	0.982	1.601	0.03934	0.000937	0.02441	0.00058	39.34442	24.40558	63.75000	1.51786
1.250	0.145	0.960	1.715	0.03760	0.000895	0.02615	0.00062	37.60128	26.14872	63.75000	1.51786
1.250	0.156	0.938	1.827	0.03590	0.000855	0.02785	0.00066	35.89764	27.85237	63.75000	1.51786
1.250	0.175	0.900	2.014	0.03305	0.000787	0.03070	0.00073	33.04800	30.70200	63.75000	1.51786
1.500	0.095	1.310	1.429	0.07002	0.001667	0.02178	0.00052	70.01688	21.78312	91.80001	2.18571
1.500	0.102	1.296	1.527	0.06853	0.001632	0.02327	0.00055	68.52834	23.27167	91.80001	2.18571
1.500	0.109	1.282	1.623	0.06706	0.001597	0.02474	0.00059	67.05578	24.74422	91.80001	2.18571

COILED TUBING DATA				Per Ft.				Per 1000 Ft							
OD Specified	Wall Specified	ID Calculated	Nom. Wt LBS/FT	Internal Capacity Gallons	BBLs	Displacement of Steel Gallons	BBLs	External Displacement Gallons	BBLs	Internal Capacity Gallons	BBLs	Displacement of Steel Gallons	BBLs	External Displacement Gallons	BBLs
2.000	0.134	1.732	2.677	0.12239	0.002914	0.04081	0.00097	0.16320	0.00389	122.39283	2.91411	40.80718	0.97160	163.20001	3.88571
2.000	0.145	1.710	2.880	0.11930	0.002841	0.04390	0.00105	0.16320	0.00389	119.30329	2.84055	43.89672	1.04516	163.20001	3.88571
2.000	0.156	1.688	3.080	0.11625	0.002768	0.04695	0.00112	0.16320	0.00389	116.25324	2.76793	46.94677	1.11778	163.20001	3.88571
2.000	0.175	1.650	3.419	0.11108	0.002645	0.05212	0.00124	0.16320	0.00389	111.07801	2.64471	52.12200	1.24100	163.20001	3.88571
2.000	0.188	1.624	3.640	0.10760	0.002562	0.05560	0.00132	0.16320	0.00389	107.60495	2.56202	55.59506	1.32369	163.20001	3.88571
2.000	0.190	1.620	3.682	0.10708	0.002549	0.05612	0.00134	0.16320	0.00389	107.07553	2.54942	56.12448	1.33630	163.20001	3.88571
2.000	0.203	1.594	3.900	0.10367	0.002468	0.05953	0.00142	0.16320	0.00389	103.66612	2.46824	59.53389	1.41747	163.20001	3.88571
2.000	0.204	1.592	3.923	0.10341	0.002462	0.05979	0.00142	0.16320	0.00389	103.40614	2.46205	59.79387	1.42366	163.20001	3.88571
2.375	0.125	2.125	3.011	0.18424	0.004387	0.04590	0.00109	0.23014	0.00548	184.23751	4.38661	45.90000	1.09286	230.13751	5.47946
2.375	0.134	2.107	3.215	0.18113	0.004313	0.04901	0.00117	0.23014	0.00548	181.12953	4.31261	49.00798	1.16686	230.13751	5.47946
2.375	0.145	2.085	3.462	0.17737	0.004223	0.05277	0.00126	0.23014	0.00548	177.36679	4.22302	52.77072	1.25645	230.13751	5.47946
2.375	0.156	2.063	3.706	0.17364	0.004134	0.05649	0.00135	0.23014	0.00548	173.64355	4.13437	56.49397	1.34509	230.13751	5.47946
2.375	0.175	2.025	4.122	0.16731	0.003983	0.06283	0.00150	0.23014	0.00548	167.30551	3.98346	62.83200	1.49600	230.13751	5.47946
2.375	0.188	1.999	4.390	0.16304	0.003882	0.06710	0.00160	0.23014	0.00548	163.03685	3.88183	67.10066	1.59763	230.13751	5.47946
2.375	0.190	1.995	4.445	0.16239	0.003866	0.06775	0.00161	0.23014	0.00548	162.38503	3.86631	67.75248	1.61315	230.13751	5.47946
2.375	0.203	1.969	4.710	0.15818	0.003766	0.07196	0.00171	0.23014	0.00548	158.18002	3.76619	71.95750	1.71327	230.13751	5.47946
2.375	0.204	1.967	4.742	0.15786	0.003759	0.07228	0.00172	0.23014	0.00548	157.85884	3.75854	72.27867	1.72092	230.13751	5.47946
2.875	0.125	2.625	3.670	0.28114	0.006694	0.05610	0.00134	0.33724	0.00803	281.13752	6.69375	56.10000	1.33571	337.23752	8.02946
2.875	0.156	2.563	4.541	0.26801	0.006381	0.06922	0.00165	0.33724	0.00803	268.01395	6.38128	69.22357	1.64818	337.23752	8.02946

COILED TUBING DATA				Per Ft.						Per 1000 Ft					
OD Specified	Wall Specified	ID Calculated	Nom. Wt LBS/FT	Internal Capacity Gallons	BBLs	Displacement of Steel Gallons	BBLs	External Displacement Gallons	BBLs	Internal Capacity Gallons	BBLs	Displacement of Steel Gallons	BBLs	External Displacement Gallons	BBLs
2.875	0.175	2.525	5.059	0.26013	0.006193	0.07711	0.00184	0.33724	0.00803	260.12552	6.19346	77.11200	1.83600	337.23752	8.02946
2.875	0.188	2.499	5.400	0.25480	0.006067	0.08244	0.00196	0.33724	0.00803	254.79606	6.06657	82.44146	1.96289	337.23752	8.02946
2.875	0.190	2.495	5.462	0.25398	0.006047	0.08326	0.00198	0.33724	0.00803	253.98104	6.04717	83.25649	1.98230	337.23752	8.02946
2.875	0.203	2.469	5.790	0.24872	0.005922	0.08852	0.00211	0.33724	0.00803	248.71522	5.92179	88.52230	2.10767	337.23752	8.02946
2.875	0.204	2.467	5.834	0.24831	0.005912	0.08893	0.00212	0.33724	0.00803	248.31245	5.91220	88.92507	2.11726	337.23752	8.02946
3.500	0.134	3.232	4.820	0.42619	0.010147	0.07361	0.00175	0.49980	0.01190	426.18965	10.14737	73.61039	1.75263	499.80003	11.90000
3.500	0.156	3.188	5.570	0.41466	0.009873	0.08514	0.00203	0.49980	0.01190	414.66446	9.87296	85.13557	2.02704	499.80003	11.90000
3.500	0.175	3.150	6.230	0.40484	0.009639	0.09496	0.00226	0.49980	0.01190	404.83803	9.63900	94.96201	2.26100	499.80003	11.90000
3.500	0.188	3.124	6.650	0.39818	0.009481	0.10162	0.00242	0.49980	0.01190	398.18257	9.48054	101.61747	2.41946	499.80003	11.90000
3.500	0.190	3.120	6.733	0.39716	0.009456	0.10264	0.00244	0.49980	0.01190	397.16354	9.45627	102.63649	2.44373	499.80003	11.90000
3.500	0.203	3.094	7.150	0.39057	0.009299	0.10923	0.00260	0.49980	0.01190	390.57173	9.29933	109.22830	2.60067	499.80003	11.90000
3.500	0.204	3.092	7.199	0.39007	0.009287	0.10973	0.00261	0.49980	0.01190	390.06696	9.28731	109.73308	2.61269	499.80003	11.90000
3.500	0.224	3.052	7.857	0.38004	0.009049	0.11976	0.00285	0.49980	0.01190	380.03995	9.04857	119.76008	2.85143	499.80003	11.90000
3.500	0.250	3.000	8.699	0.36720	0.008743	0.13260	0.00316	0.49980	0.01190	367.20002	8.74286	132.60001	3.15714	499.80003	11.90000
4.500	0.204	4.092	9.383	0.68317	0.016266	0.14303	0.00341	0.82620	0.01967	683.17417	16.26605	143.02588	3.40538	826.20005	19.67143

FREE POINT CALCULATION

From Hook's law, if tubing is under a tension force F , then the elastic elongation is given by

$$\Delta L = \frac{F L \times 12}{E A_n} \quad (1)$$

where ΔL = tubing stretch (in); F = axial force on tubing (lbs); L = free length of tubing (ft); A_n = nominal cross sectional area of tube (in²); E = Young's modulus of elasticity (30,000,000 psi for steel).

To determine the free point, pull the pipe into tension with at least 500 pounds of load over the hanging weight of the tubing in the hole. Make a visible reference mark on the pipe. Increase the pull on the pipe in increments of 1000 pounds over original tubing weight. Measure the amount of pipe stretch (ΔL). Subtract the original weight reading from the final pull weight (F_D). Read the correct Free Point Constant (C_{FPC}) from the following table for the coiled tubing involved and use the following equation:

$$L = \frac{\Delta L C_{FPC}}{F_D} \quad (2)$$

where L = minimum length of free pipe (ft); ΔL = Stretch (in); C_{FPC} = Free Point Constant; F_D = pull force difference (1,000 pounds).

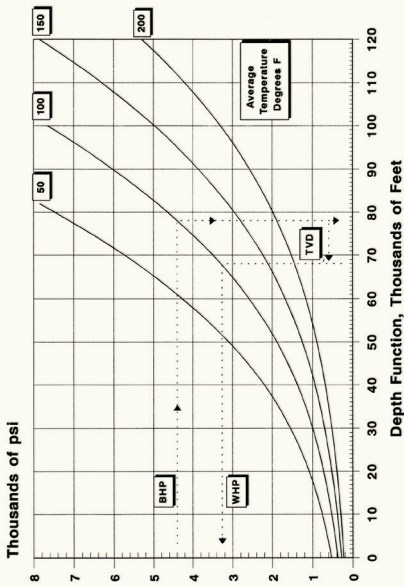
Example: Determine the minimum length of free coiled tubing being stretched when a 10,000 foot string of 1.25" OD, 0.087" wall tubing stretches 39 inches with an applied pull of 5,000 pounds over tubing weight.

$$\begin{aligned} L &= \frac{\Delta L C_{FPC}}{F_D} \\ &= \frac{39 \times 760}{5} \\ L &= 5,928 \text{ feet} \end{aligned}$$

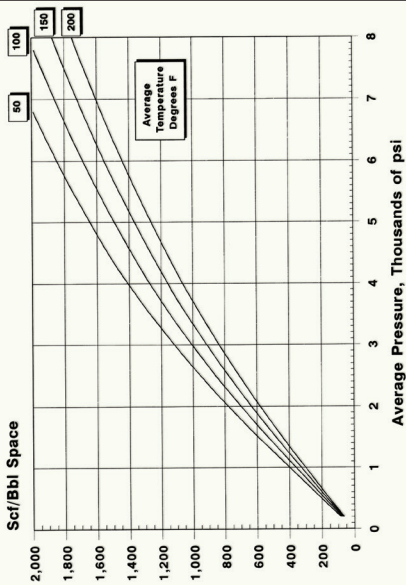
COILED TUBING STRETCH TABLE

Size (Inches)	Cross Sectional	Free Point
OD x Wall Thickness	Area (Sq In)	Constant
1.250 x 0.087	0.304	760.0
x 0.095	0.328	820.0
x 0.102	0.351	877.5
x 0.109	0.374	935.0
x 0.125	0.420	1050.0
x 0.134	0.451	1127.5
x 0.156	0.512	1280.0
x 0.095	0.399	997.5
x 0.102	0.428	1070.0
x 0.109	0.456	1140.0
x 0.125	0.512	1280.0
x 0.134	0.552	1380.0
x 0.156	0.629	1572.5
1.750 x 0.109	0.538	1345.0
x 0.125	0.605	1512.5
x 0.134	0.652	1630.0
x 0.156	0.745	1862.5
x 0.175	0.831	2077.5
2.000 x 0.109	0.619	1547.5
x 0.125	0.698	1745.0
x 0.134	0.753	1882.5
x 0.156	0.861	2152.5
x 0.175	0.962	2405.0
2.375 x 0.125	0.837	2092.5
x 0.134	0.904	2260.0
x 0.156	1.035	2587.5
x 0.175	1.158	2895.5
x 0.190	1.241	3102.5

PRESSURE DUE TO A COLUMN OF NITROGEN



NITROGEN VOLUME FACTORS



NITROGEN VOLUME FACTORS

Calculate the average pressure
(WHP + BHP $\div$ 2).

Calculate the average temperature
(surface temp. + bottomhole temp. $\div$ 2).
From average pressure on chart, read up to average
temperature, then across to SCF/BBL of space.

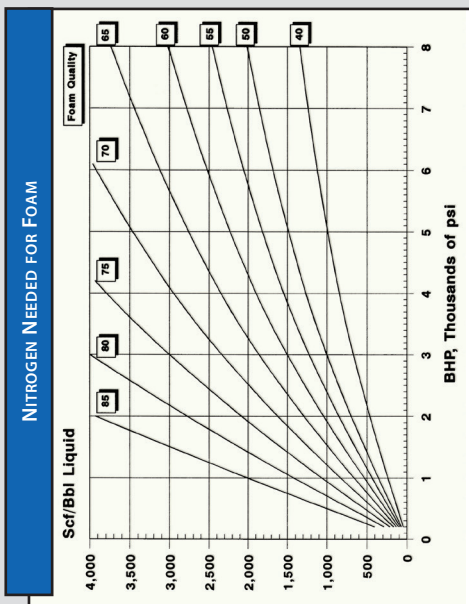
PRESSURE DUE TO A COLUMN OF NITROGEN

To find BHP if WHP is known:
locate WHP on left side of chart and cross to average
temp. Read down to depth function and Add TVD and
read up to average temp line then left to obtain BHP.

To find WHP if BHP is known:
locate BHP on left side of chart and cross to average
temp. Read down to depth function and SUBTRACT
TVD and read up to average temp line then left to
obtain WHP.

NITROGEN NEEDED FOR FOAM

Find BHP on chart and reference to desired foam
quality. Read across to SCF/BBL. This SCF/BBL must be
pumped for every BBL of liquid.

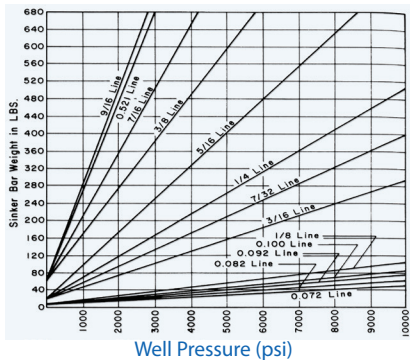


ELECTRIC LINE – CABLE SPECIFICATIONS								
Cable Type	Size	Diameter Inches	Breaking Strength (Lbs)	Weight (Lbs) 1000 ft	Armor Wires (Out/In)	Wire BS-Lbs (Out/In)	CDR Resistance (Ohms/Mft)	Maximum Temp. (Deg. F)
1-H-100-A	1/10"	0.101"	1,000	19	18/12	41/41	25.2	300
1-H-125-A	1/8"	0.123"	1,500	27	18/12	60/60	25.2	300
1-H-125-K	1/8"	0.123"	1,500	28	18/12	60/60	25.2	500
1-H-181-A	3/16"	0.185"	3,900	63	15/12	198/127	9.8	300
1-H-181-D	3/16"	0.185"	3,900	65	15/12	198/127	9.8	420
1-H-181-K	3/16"	0.185"	3,900	65	15/12	198/127	9.8	500
1-H-181-M	3/16"	0.187"	3,600	68	15/12	198/132	12.5	600
4-H-181-A	3/16"	0.186"	3,300	60	18/18	143/76	26.0	300
1-H-203-A	13/64"	0.203"	4,500	79	16/10	212/212	6.9	300
1-H-203-D	13/64"	0.203"	4,500	79	16/10	212/212	6.9	420
1-H-203-K	13/64"	0.203"	4,500	80	16/10	212/212	6.9	500
1-H-220-A	7/32"	0.223"	5,500	92	18/12	212/212	4.5	300
1-H-220-D	7/32"	0.223"	5,500	95	18/12	212/212	4.5	420
1-H-220-K	7/32"	0.223"	5,500	95	18/12	212/212	4.5	500
1-H-226-K	7/32"	0.222"	5,000	99	18/12	196/196	7.7	500
MP-35-N-Alloy								
1-H-281-A	9/32"	0.288"	10,000	153	18/12	352/352	2.8	300
1-H-281-K	9/32"	0.288"	10,000	158	18/12	352/352	2.8	500
1-H-314-A	5/16"	0.316"	11,200	183	18/12	426/426	2.8	300
1-H-314-D	5/16"	0.316"	11,200	187	18/12	426/426	2.8	420
1-H-314-K	5/16"	0.316"	11,200	190	18/12	426/426	2.8	500
7-H-314-A	5/16"	0.323"	9,600	180	18/18	426/225	16.6	300

ELECTRIC LINE - CABLE SPECIFICATIONS

Cable Type	Size	Diameter Inches	Breaking Strength (Lbs)	Weight (Lbs) 1000 ft	Armor Wires (Out/In)	Wire BS-Lbs (Out/In)	CDR Resistance (Ohms/Mft)	Maximum Temp. (Deg. F)
1-H-375-A	3/8"	0.375"	14,600	253	18/12	595/595	2.9	300
1-H-375-D	3/8"	0.375"	14,600	260	18/12	595/595	2.9	420
1-H-375-K	3/8"	0.375"	14,600	261	18/12	595/595	2.9	500
3-H-375-A	3/8"	0.372"	13,500	235	20/16	486/397	7.1	300
4-H-375-A	3/8"	0.372"	13,500	239	20/16	572/301	10.5	300
7-H-375-A	3/8"	0.372"	12,800	243	18/18	572/301	10.5	300
1-H-422-A	7/16"	0.414"	17,800	307	18/12	727/727	2.9	300
1-H-422-D	7/16"	0.414"	17,800	316	18/12	727/727	2.9	420
1-H-422-K	7/16"	0.414"	17,800	317	18/12	727/727	2.9	500
7-H-422-A	7/16"	0.426"	18,300	314	18/18	766/397	10.9	300
7-H-422-D	7/16"	0.426"	18,300	324	18/18	766/397	10.0	420
7-H-422-K	7/16"	0.426"	18,300	326	18/18	766/397	10.0	500
7-H-464-A	15/32"	0.462"	18,300	326	24/24	539/335	10.0	300
7-H-464-D	15/32"	0.462"	18,300	333	24/24	539/335	10.0	420
7-H-464-K	15/32"	0.462"	18,300	347	24/24	539/335	10.0	500
7-H-520-A	17/32"	0.522"	26,000	462	20/16	958/778	10.5	300
7-H-520-D	17/32"	0.522"	26,000	467	20/16	958/778	10.5	420
7-H-472-A	Slammer	0.472"	22,200	379	18/18	929/486	10.0	300
7-H-472-D	Slammer	0.472"	22,200	386	18/18	929/486	10.0	420
7-H-472-K	Slammer	0.472"	22,200	394	18/18	929/486	10.0	500

Sinker Bar Weight Needed



Carbon Steel – API 9A Breaking Strengths						
Material	0.072 In	0.082 In	0.092 In	0.105 In	0.108 In	0.125 In
Br. Steel API level 3 or improved plow	961 Lbs	1239 Lbs	1547 Lbs	1966 Lbs	2109 Lbs	2794 Lbs
API Ex. Impr. Plow, Hi-Str. or Mon. AA	1150 Lbs	1460 Lbs	1830 Lbs	2360 Lbs	2490 Lbs	3300 Lbs
Austenitic Stainless Steel – Breaking Strengths						
Material	0.082 In	0.092 In	0.105 In	0.108 In	0.125 In	
316 Stainless	1083 Lbs	1363 Lbs	1732 Lbs	1786 Lbs	2270 Lbs	
Super Austenitic Stainless Steel – Breaking Strengths						
Material	0.092 In	0.105 In	0.108 In	0.125 In		
Sandvik Sanicro 28	1445 Lbs	1885 Lbs	1995 Lbs	2675 Lbs		
6 Moly Stainless Steel – Breaking Strengths						
Material	0.092 In	0.105 In	0.108 In	0.125 In		
Avesta 254 SMO	1462 Lbs	1818 Lbs	1924 Lbs	2454 Lbs		
Bridon Supa 75	1550 Lbs	2030 Lbs	2030 Lbs	2560 Lbs		
25-6MO	1475 Lbs	N/A	2050 Lbs	2550 Lbs		
Colbalt Based Alloy – Breaking Strengths						
Material	0.092 In	0.105 In	0.108 In	0.125 In		
MP35N	1582 Lbs	2009 Lbs	2080 Lbs	2724 Lbs		
Braided Line – Breaking Strengths						
Size	3/16 In	7/32 In	7/32 In	7/32 In	All "lbs." are breaking strength. These vary with the manufacturer.	
Construction	1 X 16	1 X 16	1 X 16	1X19 (Dycan/Dyform)		
Galv. Carbon Steel	4500 Lbs	6170 Lbs	6000 Lbs	8370 Lbs		
25-6Mo (Supa 75)	4320 Lbs	4960 Lbs	5842 Lbs	5990 Lbs		

For wireline to fall against well pressure, find desired line versus well pressure and extrapolate total sinker bar weight needed.

1. Area of circle = Diameter squared x .7854
2. Circumference of a circle = π x diameter
3. Diameter of a circle = Circumference $\div$ π
4. Force per square inch of weight it takes for a tool string to fall, neglecting friction
Force = Area in square inches x pressure
5. Weight per foot of round bar stock or stem =
Diameter squared x 8 $\div$ 3
6. To find fill-up volume of pipe: inside diameter squared equals barrels per 1,000 feet
(ID² inches = bbls/1000 feet)
7. To convert API gravity to specific gravity:

$$\frac{141.5}{131.5 + \text{degrees API}} = \text{S.G.}$$

8. To convert specific gravity to gradient (psi/ft):
S.G. x 0.433
9. Wireline will fall back approximately one foot for every 100 feet of wireline in hole.
10. Area of wireline:
(0.072 = 0.0040) (0.082 = 0.0052)
(0.092 = 0.0066) (0.105 = 0.0087)
(0.108 = 0.0092) (0.125 = 0.0123)
11. Twice the strokes is approximately 4 times the pressure
12. Adjusted pipe weight in lbs/ft x .03638 =
bbls/100 ft displacement
13. Steel weighs 490 lbs/cu ft.
14. Pipe weight x 0.002 x depth $\div$ 5.6 = bbls to fill hole
15. Volume increase when weighting up:
100 sacks of barite mixed $\div$ 15 = bbls increase
16. In 10-12 ppg mud, 60 sacks of barite increases
100 bbls by 1 ppg

UNITS OF MEASURE

1. Fluid Density or Mud Weight - pounds per gallon (ppg)
2. Pressure - pounds per square inch (psi)
3. A = area (inch^2)
4. D = diameter (inches)
5. OD = outside diameter (inches)
6. ID = inside diameter (inches)
7. F = force (lbf)
8. BF = buoyancy factor
9. Length and Depth - feet (ft)
10. Volume - oilfield barrels e.g. 42 US gallons (bbls)
11. Capacity - barrels per foot (bbls/ft)
12. Pump Output - barrels per stroke (bbls/stk)
13. Tubular Displacement - barrels per foot (bbls/ft)
14. Fluid Gradient - pressure per vertical foot (psi/ft)
15. HP = hydrostatic pressure (psi)
16. FP = formation pressure (psi)
17. G = gradient (psi/ft)

18. G_i = gradient of the influx (psi/ft)

19. MD = measured depth (ft)

20. TVD = true vertical depth (ft)

21. KRP = kill rate pressure (psi)

22. KMW = kill mud weight (ppg)

23. OMW = original mud weight (ppg)

24. ICP = initial circulating pressure (psi)

25. FCP = final circulating pressure (psi)

26. MASP = maximum allowable surface pressure (psi)

27. MAASP = maximum allowable annular surface pressure (psi)

28. ECD = equivalent circulating density (ppg)
equivalent mud weight

29. APL = annular pressure loss (psi)

30. Q = pump rate (gallons per minute)

31. SIDPP = shut-in drill-pipe pressure (psi)

32. SICP = shut-in casing pressure (psi)

33. MAMW = maximum allowable mud weight (ppg)

PIPE/HOLE CAPACITY

$$\frac{ID^2}{1029.4}$$

ANNULAR CAPACITY

$$\frac{ID^2 - OD^2}{1029.4}$$

RECTANGULAR TANK CAPACITY

$$\frac{\text{Length} \times \text{Width}}{5.61}$$

FLUID GRADIENT

$$MW \times 0.052$$

HYDROSTATIC PRESSURE

$$MW \times 0.052 \times \text{TVD}$$

MAXIMUM ALLOWABLE MUD WEIGHT (MAMW)

$$P(\text{shoe}) \div 0.052 \div \text{Shoe TVD}$$

MAXIMUM ALLOWABLE ANNULAR SURFACE PRESSURE

$$(MAMW - MW) \times 0.052 \times \text{Shoe TVD}$$

KILL MUD WEIGHT

$$\frac{SIDPP}{0.052 \times \text{TVD}} + OMW$$

INITIAL CIRCULATING PRESSURE

$$SCR_{\text{psi}} + SIDPP$$

FINAL CIRCULATING PRESSURE

$$SCR_{\text{psi}} \times \frac{KMW}{OMW}$$

HEIGHT OF INFLUX (VERTICAL WELL)

$$\frac{\text{Influx Volume}}{\text{Annular Capacity}}$$

GRADIENT OF INFLUX

$$OMW \times 0.052 - \left[\frac{SICP - SIDPP}{\text{Influx height (vertical)}} \right]$$

BOYLE'S GAS LAW

$$P_1 V_1 = P_2 V_2$$

TRIPLEX PUMP OUTPUT

$$\text{liner ID}^2 \times \text{stroke length} \times 0.000243 \times \% \text{ efficiency}$$

DUPLEX PUMP OUTPUT

$$\text{liner ID}^2 + (\text{liner ID}^2 - \text{rod OD}^2) \times 0.000162 \times \% \text{ efficiency}$$

PUMP STROKES TO DISPLACE A GIVEN VOLUME

$$\frac{\text{bbls}}{\text{Pump Output bbls/stk}}$$

PUMP PRESSURE CORRECTION FOR DIFFERENT DENSITY

$$\text{psi}_1 \times \frac{\text{MW}_2}{\text{MW}_1}$$

PUMP PRESSURE CORRECTION FOR DIFFERENT PUMP RATE

$$\text{psi \#1} \times \left[\frac{\text{rate \#2}}{\text{rate \#1}} \right]^2$$

ESTIMATION OF STRIPPING FORCE

$$(0.7854 \times \text{pipe OD}^2 \times \text{annular pressure}) + \text{lbs friction}$$

TRIP MARGIN

$$\frac{\text{annular pressure loss}}{\text{TVD} \times 0.052}$$

DENSITY OF DRY PIPE SLUG

$$\left[\frac{\text{OMW} \times \text{desired dry pipe length} \times \text{pipe capacity}}{\text{slug volume}} \right] + \text{OMW}$$

DISTANCE DROP IN DRILL PIPE WHEN SLUG IS PUMPED

$$\frac{\text{slug volume} \times (\text{slug density} - \text{current mud weight})}{\text{current mud weight} \times \text{pipe capacity}}$$

BARRELS TO FILL WHEN PULLING DRY PIPE

$$\text{pipe displacement (w/tooljoints)} \times \text{length pulled}$$

or

$$\frac{\text{adjusted weight}}{2748 \times \text{pipe length}}$$

PRESSURE DROP PER FOOT TRIPPING DRY PIPE

$$\frac{\text{G} \times \text{metal displacement}}{\text{casing capacity} - \text{metal displacement}}$$

PRESSURE DROP PER FOOT TRIPPING WET PIPE

$$\frac{\text{G} \times (\text{metal displacement} + \text{pipe capacity})}{\text{annular capacity}}$$

LEVEL DROP FOR PULLING COLLARS OUT OF HOLE

$$\frac{\text{length of collars} \times \text{metal displacement}}{\text{casing capacity}}$$

BARITE REQUIREMENT (100 LB SACKS)

$$\frac{(\text{KMW} - \text{OMW}) \times 14.7 \times \text{pit volume}}{(35.5 - \text{KMW})}$$

VOLUME INCREASE DUE TO BARITE ADDITION (100 LB SACKS)

$$\frac{\text{sacks of barite added}}{14.7}$$

AVERAGE DENSITY WHEN MIXING TWO DIFFERENT DENSITIES

$$\frac{(\text{volume}_1 \times \text{density}_1) + (\text{volume}_2 \times \text{density}_2)}{V_1 + V_2}$$

TEMPERATURE EFFECT ON DENSITY OF SODIUM CHLORIDE BRINES**CALCIUM/**

$$0.003 \times (T_1 - T_2)$$

Note: Volume increases as temperature increases resulting in a decrease in density. T_1 = existing temperature °F, T_2 = desired temperature, °F

ANNULAR VELOCITY (FT/MIN)

$$\frac{24.51 \times Q}{ID^2 - OD^2}$$

ECD

$$\left[\frac{\text{APL}}{0.052 \times \text{TVD}} \right] + \text{OMW}$$

SUBSEA FORMULAS & CALCULATIONS**HP LOSS DUE TO RISER DISCONNECT (ΔPL)**

$$(\text{OMW riser} - \text{density seawater}) \times \text{water depth} \times 0.052 + (\text{OMW riser} \times \text{air gap} \times 0.052)$$

RISER MARGIN

$$\frac{\Delta PL}{(\text{TVD} - \text{water depth} - \text{air gap}) \times 0.052}$$

FLOW CHECK WHILE DRILLING

1. Alert crew.
2. Stop rotary.
3. Pick up kelly or clear uppermost tool joint above the rig floor.
4. Shut off pump.
5. Observe well for flow.

FLOW CHECK WHILE TRIPPING

1. Alert crew.
2. Set slips so last tool joint is at normal working level above rig floor.
3. Install fill opening safety valve in open position.
4. Observe well for flow.

Note: Make flow check prior to pulling BHA.

SOFT SHUT-IN WHEN DRILLING

1. Open the choke line valve near the BOP stack.
2. Close designated BOP.
3. Close the pre-selected choke.
4. Notify company personnel.
5. Read and record SIDPP & SICP each minute until pressures stabilize.

SOFT SHUT-IN WHEN TRIPPING

1. Close full opening safety valve or hydraulic valve on topdrive.
2. Open the choke line valve near the BOP stack.
3. Close designated BOP.
4. Close choke while watching casing pressure to ensure pressure limitations are not exceeded or pressure trapped.
5. Notify company personnel.
6. Pick up kelly and open FOSV or open valve on topdrive.
7. Read and record SIDPP, SICP each minute until pressures stabilize.

HARD SHUT-IN WHEN DRILLING

1. Close designated BOP.
2. Open the choke line valve (HCR) near the BOP stack.
3. Read and record the pit gain and the SIDPP, and SICP each minute until the pressures stabilize.
4. Notify company personnel.

HARD SHUT-IN WHEN TRIPPING

1. Close full opening safety valve (FOSV).
2. Close designated BOP.
3. Open the choke line valve (HCR) near the BOP stack.
4. Make up kelly or top drive and open (FOSV).
5. Read and record the pit gain and the SIDPP and SICP each minute until the pressures stabilize.
6. Notify company personnel.

WAIT & WEIGHT METHOD KILL REVIEW

1. Shut in well and record SIDPP & SICP every 60 seconds until stabilized.
2. Calculate kill fluid density & weight up pits.
3. Fill in and complete worksheet & pressure chart.
4. Bring pump to kill rate speed slowly while holding a constant casing pressure at shut in value.
5. Maintain circulating pressure according to chart. This is accomplished by adjusting the backpressure (casing) with the use of the choke. Do not adjust pump speed to maintain pressure.
6. When kill mud reaches bit, maintain FCP, final circulating pressure for the remainder of the kill operation.
7. When influx is circulated from well and kill mud is consistent throughout the system, the well may be shut in to determine if dead. If not, continue circulating.

DRILLER'S METHOD KILL REVIEW

1. Shut in well and record SIDPP & SICP every 60 seconds.
2. Bring pump to kill rate speed while holding a constant casing pressure at the stabilized shut in value.
3. Maintain circulating pressure (SIDPP+KRP) until influx has been removed from the well.
4. Induced/swabbed kick: Shut the well back in and determine if dead.
5. Under-balance kick: Calculate the kill weight density required to control the well.
6. Prepare pressure chart and circulate the new heavier fluid through the well.
7. Maintain circulating pressure according to chart. This is accomplished by adjusting the back pressure (casing) with the use of the choke. Do not adjust pump speed to maintain pressure.
8. When kill mud is consistent throughout the system, the well may be shut in to determine if dead. If not, continue circulating.

REVERSE CIRCULATING KILL REVIEW

1. Assure proper standpipe and manifold line-up.
2. Bring pump to kill rate speed while holding a constant (SITP) backpressure on the tubing.
3. When pump is at desired speed, circulating pressure on the casing is held constant until the tubing is displaced if both the packer fluid and kill fluid are of the same and sufficient density to kill the well.
4. If the annulus fluid (or packer fluid) is not of sufficient density then it is necessary to pump kill weight fluid:
 - a. Hold constant circulating pressure (casing pressure) until the tubing is displaced.
 - b. Switch to the Tubing pressure and hold tubing pressure constant until the annulus has been displaced.
 - c. Switch to the Casing pressure and hold casing pressure constant until kill weight fluid has been circulated throughout the well system.
5. The well may be shut in at this time and checked for pressure build-up. If no pressure build-up the well may be opened up and checked for flow. If no flow then the operations may continue.
6. If pressure build-up or flow occurs the well may be circulated a second time.

BULLHEAD KILL REVIEW

1. With the well shut in, determine tubing pressure. If bullheading down the casing, determine casing pressure.
2. Prepare bullhead worksheet and pressure chart.
3. When going down the tubing, some pressure may be applied to the casing to prevent burst.
4. If bullheading the casing, pressure may be applied to the tubing to prevent collapse.
5. Bring pump online with enough pressure to overcome surface pressure.
6. Do not exceed maximum allowables during bullhead process.
7. Record any pump rate changes as well as pressure changes at the predetermined stroke/volume check points.

8. When the required volume has been pumped, or when a pressure increase indicates bullhead fluid entering the formation, turn off the pump.
9. Slowly bleed surface pressures to zero.
10. Shut in the well and monitor for pressure.

DIVERTING WHILE DRILLING

1. 1. Do not shut pump down! (This will result in a lowering of bottomhole pressure allowing well to unload at a higher rate.)
2. Chain down the brake.
3. Open downwind diverter line.
4. Close the diverter packer. Note: Many rigs have the diverter lines and diverter packer tied together to minimize confusion at a critical time.
5. Pump at maximum rate with drilling mud, seawater or heavy mud.
6. Set a watch observing diverter system for signs of failure.
7. Set a watch for signs of broaching.

KICK INFORMATION

TVD _____ FT MD _____ FT

SIDPP _____ PSI SICP _____ PSI

Kick _____ BBLs Original Mud Wt _____ PPG

WAIT & WEIGHT WORKSHEET

MAXIMUM ALLOWABLE MUD WEIGHT_{PPG} (MAMW) =
 INTEGRITY PRESSURE_{PSI} ÷ .052 ÷ DEPTH OF TEST_{TVD FT} + INTEGRITY
 LEAK-OFF TEST MUD WEIGHT_{PPG}

MAXIMUM ALLOWABLE ANNULAR SURFACE PRESSURE_{PSI}
(MMASP)=
 [INTEGRITY MUD WEIGHT_{PPG} – PRESENT MUD WEIGHT_{PPG}] ×
 DEPTH OF TEST_{TVD FT} × .052

ADJUSTED CASING YIELD_{PSI} =
 CASING INTERNAL YIELD_{PSI} @100% × SAFETY FACTOR
 (≤ .70) (SUBSEA SHOULD ACCOUNT FOR SEAWATER HYDROSTATIC.)

BOP TEST PRESSURE_{PSI} = _____

KILL MUD WEIGHT_{PPG} =
 SIDPP ÷ .052 ÷ TVD_{FT} + PRESENT MUD WEIGHT_{PPG}

CIRCULATING RATE/BPM =
 KILL RATE SPEED_{STKS/MIN} × PUMP OUTPUT_{BBLs/STK}

INITIAL CIRCULATING PRESSURE_{PSI} =
 SIDPP_{PSI} + KILL RATE PUMP PRESSURE_{PSI}

FINAL CIRCULATING PRESSURE_{PSI} =
 KILL RATE PUMP PRESSURE_{PSI} × KILL MUD WEIGHT_{PPG} ÷
 ORIGINAL MUD WEIGHT_{PPG}

VOLUME IN DRILLSTRING_{BBLs} =
 DRILLPIPE (DRILL COLLARS)_{FT} × CAPACITY_{BBLs/FT}

STROKES SURFACE TO BIT_{STKS} =
 DRILLPIPE VOLUME_{BBLs} + DRILLCOLLARS VOLUME_{BBLs} + SURFACE
 LINE VOLUME_{BBLs} = DRILLSTRING VOLUME_{BBLs}
 ÷ PUMP OUTPUT_{BBLs/STK}

VOLUME BETWEEN DP & CASING_{BBLs} =
 [CASING ID SQUARED – OD OF DP SQUARED] ÷ 1029.4 =
 CAPACITY_{BBLs/FT} × DP LENGTH IN CASING_{FT}

VOLUME BETWEEN DP & OH_{BBLs} =
 [HOLE SIZE SQUARED – OD OF DP SQUARED] ÷ 1029.4 =
 CAPACITY_{BBLs/FT} × DP LENGTH IN OH_{FT}

VOLUME BETWEEN DC & OH_{BBLs} =
 [HOLE SIZE SQUARED – OD OF DC SQUARED] ÷ 1029.4 =
 CAPACITY_{BBLs/FT} × DC LENGTH IN OH_{FT}

(SUBSEA ONLY) VOLUME IN CHOKE LINE_{BBLs} =
 ID OF CHOKE LINE SQUARED ÷ 1029.4 = CAPACITY_{BBLs/FT}
 × CHOKE LINE LENGTH_{FT}

TOTAL ANNULAR VOLUME_{BBLs} =
 VOL. BETWEEN DP & CASING + VOL. BETWEEN DP & OH + VOL.
 BETWEEN DC & OH + (VOLUME IN CHOKE LINE
 FOR SUBSEA ONLY)

STROKES BIT TO CASING SHOE_{STKS} =
 [VOL. BETWEEN DP & OH + VOL. BETWEEN DC & OH] ÷
 PUMP OUTPUT_{BBLs/STK}

STROKES BIT TO SURFACE_{STKS} =
 ANNULAR VOLUME_{BBLs} ÷ PUMP OUTPUT_{BBLs/STK}

TOTAL STROKES SURFACE TO SURFACE_{STKS} =
 STROKES SURFACE TO BIT_{STKS} + STROKES BIT TO SURFACE_{STKS}

WELL KILL CHECK LIST

KMW _____PPG ICP _____PSI FCP _____PSI

Surface to Bit _____BBLs _____STKS

Bit to Casing Shoe _____BBLs _____STKS

Bit to Surface _____BBLs _____STKS

Surface to Surface _____BBLs _____STKS
 (CHECK LIST INFO FROM FOLLOWING CALCULATIONS.)

PRESSURE CHART

Strokes or Volume	Target Drillpipe Pressure	Actual Drillpipe Pressure
0	ICP	
BIT	FCP	

BULLHEAD WORKSHEET

KILL FLUID DENSITY_{PPG} =

FORMATION PRESS_{PSI} ÷ .052 ÷ DEPTH (TVD) TO PERFS_{FT}

VOLUMES AND STROKES

TUBING VOL_{BBLs} = TUBING LENGTH_{FT} × CAPACITY_{BBLs/FT}

STROKES SURFACE TO EOT_{STKS} =

TUBING VOLUME_{BBLs} ÷ PUMP OUTPUT_{BBLs/STK}

CASING VOLUME EOT TO PERFS_{BBLs} =

[DEPTH PERFS_{FT} – DEPTH EOT_{FT}] × CASING CAP_{BBLs/FT}

STROKES EOT TO PERFS_{STKS} =

CASING VOL. EOT TO PERFS_{BBLs} ÷ PUMP OUTPUT_{BBLs/STK}

STROKES SURFACE TO PERFORATIONS_{STKS} =

SURFACE TO EOT_{STKS} + EOT TO PERFS_{STKS} +

(IF REQUIRED) OVERDISPLACEMENT_{STKS}

BARRELS SURFACE TO PERFORATIONS_{BBLs} =

SURFACE TO EOT_{BBLs} + EOT TO PERFS_{BBLs} +

(IF REQUIRED) OVERDISPLACEMENT_{STKS}

STROKES OR BARRELS PER STEP_{STKS/BBLs} =

SURFACE TO PERFS_{STKS} ÷ 10 (PRESSURE CHART STEPS)

SURFACE TO PERFS_{BBLs} ÷ 10 (PRESSURE CHART STEPS)

TUBULAR PRESSURE CONSIDERATIONS

ADJUSTED CASING YIELD_{PSI} =

CASING INTERNAL YIELD_{PSI} × SAFETY FACTOR (≤ .70)

ADJUSTED TUBING COLLAPSE_{PSI} =

TUBING COLLAPSE_{PSI} × SAFETY FACTOR (≤ .70)

ADJUSTED TUBING INTERNAL YIELD_{PSI} =

TUBING YIELD_{PSI} × SAFETY FACTOR (≤ .70)

(IF LESS THAN INITIAL OR FINAL EST. MAX. PRESSURE ON TUBING, DO NOT EXCEED THIS PRESSURE.)

FORMATION PRESSURE CONSIDERATIONS

EST. FORMATION INTEGRITY PRESSURE (LEAK-OFF)_{PSI} =

ESTIMATED INTEGRITY FLUID DENSITY_{PPG} × .052 × DEPTH (TVD) TO PERFS_{FT}

AVERAGE HYDROSTATIC PRESSURE IN TUBING_{PSI} =

FORMATION PRESSURE_{PSI} – INITIAL SITP_{PSI}

INITIAL EST. MAX. PRESSURE ON TUBING (STATIC)_{PSI} =

ESTIMATED FORMATION INTEGRITY PRESSURE_{PSI} –

AVERAGE HYDROSTATIC PRESSURE IN TUBING_{PSI}

$$\text{KILL FLUID HYDROSTATIC PRESSURE}_{\text{PSI}} = \text{KILL FLUID DENSITY}_{\text{PPG}} \times .052 \times \text{DEPTH (TVD) TO PERFS}_{\text{FT}}$$

$$\text{FINAL EST. MAX. PRESSURE ON TUBING (STATIC)}_{\text{PSI}} = \text{ESTIMATED FORMATION INTEGRITY PRESSURE}_{\text{PSI}} - \text{KILL FLUID HYDROSTATIC PRESSURE}_{\text{PSI}}$$

$$\text{PSI PER STEP}_{\text{PSI}} = \frac{\text{INITIAL MAXIMUM PRESSURE}^1_{\text{PSI}} - \text{FINAL MAXIMUM PRESSURE}^2_{\text{PSI}}}{\div 10 \text{ (PRESSURE CHART STEPS)}}$$

¹LESSER OF INITIAL EST. MAX. PRESSURE OR ADJ. TUBING YIELD.

²LESSER OF FINAL EST. MAX. PRESSURE OR ADJ. TUBING YIELD.

WELL KILL CHECK LIST

SHUT-IN TUBING PRESSURE _____ PSI

SHUT-IN CASING PRESSURE _____ PSI

KILL FLUID _____ PPG

VOLUME/STROKES

SURFACE TO EOT _____ BBLs _____ STKS

EOT TO PERFORATIONS _____ BBLs _____ STKS

SURFACE TO PERFORATIONS _____ BBLs _____ STKS

TOTAL TO PUMP _____ BBLs _____ STKS

PRESSURE CONSIDERATIONS

INITIAL EST. MAX. PRESS. ON TUBING _____ PSI

FINAL EST. MAX. PRESS. ON TUBING _____ PSI

(CHECK LIST INFO FROM FOLLOWING CALCULATIONS.)

PRESSURE CHART

Strokes or Volume	Estimated Maximum Static Pressure	Actual Tubing Pressure
0	INITIAL	
KILL POINT	FINAL	
OVERDISPLACE		

FIELD UNITS TO METRIC CONVERSION

If you have:	Multiply By:	To Get:
Feet	X 0.3048	Meters (M)
Inches	X 2.54	Centimeters (cm)
Inches	X 25.4	Millimeters (mm)
Wt Indicator (Lbs)	X 0.0004536	Metric Tons
Wt Indicator (Lbs)	X 0.44482	Decanewtons (daN)
Pounds	X 0.4536	Kilograms
Weight (Lbs/Ft)	X 1.4882	Kg/M
Pounds per Barrel	X 2.85307	Kg/M ³
Barrels	X 158.987	Liters
Barrels	X 0.15898	Cubic Meters
Gallons	X 3.7854	Liters
Gallons	X 0.0037854	Cubic Meters
Barrels/Stroke	X 158.987	Liters/Stroke
Barrels/Stroke	X 0.158987	Cubic Meters/Stroke
Gallons/Minute	X 3.7854	Liters/Minute
Barrels/Minute	X 158.987	Liters/Minute
Barrels/Minute	X 0.158987	Cubic Meters/Minute
BBL/Ft Capacity	X 521.612	Liters/Meter (l/m)
BBL/Ft Capacity	X 0.521612	Cubic Meters/Meter
BBL/Ft Displacement	X 521.612	Liters/Meter (l/m)
BBL/Ft Displacement	X 0.521612	Cubic Meters/Meter
Gradient PSI/Ft	X 22.6206	KPa/M
Gradient PSI/Ft	X .226206	Bar/M
Mud Weight PPG	X 0.119826	Kilograms/Liter
Mud Weight PPG	X 119.826	Kilograms/Cubic Mtr
Mud Weight PPG	X 0.119826	Specific Gravity
Mud Weight (Lb/Ft ³)	X 1.60185	Kg/M ³
Farenheit Degrees	X .56 – 17.8	Celsius Degrees
PSI	X 6894.8	Pascals (Pa)
PSI	X 6.8948	Kilopascals (KPa)
PSI	X .06895	Bar

If you have:	Multiply By:	To Get:
Meters	X 3.2808	Feet
Centimeters (cm)	X 0.3937	Inches
Millimeters (mm)	X 0.03937	Inches
Metric Tons	X 2204.6	Pounds
Decanewtons (daN)	X .22481	Wt Indicator (Lbs)
Kilograms (Kg)	X 2.2046	Pounds
Kg/M	X 0.67196	Weight (Lb/Ft)
Kg/M ³	X 0.3505	Pounds per Barrel
Liters	X 0.00629	Barrels
Cubic Meters	X 6.2898	Barrels
Liters	X 0.2642	Gallons
Cubic Meters	X 264.173	Gallons
Liters/Stroke	X 0.00629	Barrels/Stroke
Cubic Meters/Stroke	X 6.2898	Barrels/Stroke
Liters/Minute	X 0.2642	Gallons/Minute
Liters/Minute	X 0.00629	Barrels/Minute
Cubic Meters/Minute	X 6.2898	Barrels/Minute
Liters/Meter (L/M)	X 0.0019171	BBL/Ft Capacity
Cubic Meters/Meter	X 1.917	BBL/Ft Capacity
Liters/Meter (L/M)	X 0.0019171	BBL/Displacement
Cubic Meters/Meter	X 1.9171	BBL/Displacement
KPa/M	X 0.044207	Gradient PSI/Ft
Bar/M	X 4.4207	Gradient PSI/Ft
Kilograms/Liter (Kg/L)	X 8.3454	Mud Weight PPG
Kilograms/Cubic Mtr	X 0.0083454	Mud Weight PPG
Specific Gravity (SG)	X 8.3454	Mud Weight PPG
Kg/M ³	X 6.24279	Mud Weight (Lb/Ft ³)
Celsius Degrees	X 1.8 + 32	Fahrenheit Degrees
Pascals (Pa)	X 0.000145	PSI
Kilopascals (KPa)	X 0.14504	PSI
Bar	X 14.50377	PSI

NOTES & OTHER FORMULAS

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