

CAPACITIES AND DISPLACEMENTS

DRILL PIPE - Grade E, Range 2, with Tool Joints

Size OD (Inches)	Weight (#/Ft)	I.D. (In)	Capacity (Bbls/ft)	Displacement (Bbls/ft)
2 7/8	10.4	2.151	.0045	.0040
3 1/2	13.3	2.764	.0074	.0051
3 1/2	15.5	2.602	.0066	.0060
4	14.0	3.340	.0108	.0054
4 1/2	16.6	3.826	.0142	.0064
5	19.5	4.276	.0178	.0075
5	25.6	4.000	.0155	.0098
5 1/2	21.9	4.778	.0222	.0084
5 1/2	24.7	4.670	.0212	.0095

DRILL COLLARS

	#/Feet	Capacity	Displacement
4 3/4 x 1 3/4	52	.0030	.0189
6 x 2	85	.0039	.0311
6 1/4 x 2 1/4	91	.0049	.0330
6 1/2 x 2 1/4	99	.0049	.0361
7 x 2 1/2	114	.0061	.0415
7 x 2 13/16	110	.0077	.0399
8 x 2 1/2	154	.0061	.0561
8 x 2 13/16	150	.0077	.0545

EXAMPLE CASING BURST VALUES

Size (inches)	Grade	Weight (lbs/ft)	Burst (psi)	I.D.	Capacity (Bbls/ft)
7"	J55	20.0	3,740	6.456	.0404
	N80	26.0	7,240	6.276	.0382
	P110	35.0	13,700	6.004	.0350
7 5/8"	J55	26.4	4,140	6.969	.0471
	N80	33.7	7,900	6.765	.0444
	P110	39.0	12,620	6.625	.0426
8 5/8"	J55	32	3,930	7.921	.0609
	N80	40	7,300	7.725	.0579
	P110	44	11,160	7.625	.0564
9 5/8"	J55	36	3,520	8.921	.0773
	N80	47	6,870	8.681	.0732
	P110	53.5	10,900	8.535	.0707
10 3/4"	J55	45.5	3,580	9.950	.0961
	N80	55.5	6,450	9.760	.0925
	P110	60.7	9,760	9.660	.0906
13 3/8"	J55	61	3,090	12.515	.1521
	N80	72	5,380	12.347	.1480
	P110	72	7,400	12.347	.1480

Hydrostatic Pressure (HSP) = .052 x MW x TVD

Gradient (psi/ft) = .052 x MW

Mud Weight (ppg) = Gradient ÷ .052

Bottom Hole Pressure (BHP) = HSP + SIP + Friction + Surge - Swab

EMW (Equiv. Mud Weight) (ppg) = Shoe Test

EMW at shoe (ppg) = (Surf. Press. ÷ .052 ÷ TVDshoe) + MW

Press. Req. To Test Shoe = (EMWtest - MW) x .052 x TVDshoe

Max Casing Press. without Fracturing shoe (psi) = (EMWtest - MW) x .052 x TVDshoe

Max PPG kick to shut-in without Frac (ppg) = (EMWtest - MW) x TVDshoe ÷ TVDwell

Height of Kick (ft) = Pit Gain ÷ Annular Capacity in Bbls/ft

Density of Kick Fluids (ppg) = MW - [(SICP - SIDPP) ÷ Height of Kick ÷ .052]

Approximate Typical Fluid Densities: Gas - 2 ppg, Oil - 7 ppg, Water - 9 ppg

Capacity (bbls/ft) = ID² ÷ 1029

Annular Capacity (bbls/ft) = (ID²hole - OD²pipe) ÷ 1029

Displacement of steel Drill Pipe (Reg. Strength) (bbls/ft) = Weight per foot ÷ 2600

Displacement of steel Drill Pipe (High Strength) (bbls/ft) = Weight per foot ÷ 2500

Displacement of Drill Collars, Tubing, Etc. (bbls/ft) = Weight per foot ÷ 2750

Triplex Pump Output (bbls/stk @ 100%) = .000243 x Stroke Length x (Liner Dia)²

Duplex Pump Output (bbls/stk @ 100%) = .000162 x Stroke x [(2 x Liner Dia²) - Rod Dia²]

Gas Volume at New Pressure = Pit Gain x Form Pressure ÷ New Pressure

New Press. = Form. Press. - (.052 x MW x Distance the Bubble Rises)

Boyles Law for Gas: $P_1 \times V_1 = P_2 \times V_2$ where P is Pressure and V is Volume

Lag Time Rule of Thumb: Pressure changes from choke movement will take about 2 seconds per 1000' of depth to travel down the annulus and up the drill pipe to the DP gauge.

Sacks of Barite needed to Weight-Up Mud = Bbls Mud x 14.9 x (KWM - OWM) ÷ (35.4-KWM)

Volume Increase in Bbls from adding Barite = Sacks Added ÷ 14.9

Volume Increase in Bbls from adding Bentonite (Gel) = Sacks Added ÷ 8.75

Buoyancy Factor on String Weight = (65.4 - MW) ÷ 65.4

Hanging Weight considering Buoyancy Effects = Air Weight of String x Buoyancy Factor

CAPACITY OF TRIPLEX MUD PUMPS

at 100% Efficiency
(in Bbls/stroke)

Liner Dia. (inches)	Stroke Length			
	9"	10"	11"	12"
5	.055	.061	.067	.073
5 1/2	.066	.074	.081	.088
6	.079	.087	.096	.105
6 1/2	.092	.103	.113	.123
7	.107	.119	.131	.143
7 1/2	.123	.137	.150	.164

CAPACITY OF DUPLEX MUD PUMPS

at 100% Efficiency
(in Bbls/stroke)

Liner Dia. (inches)	Stroke Length			
	12"	14"	16"	18"
4 1/2	.071	.083	—	—
5	.089	.104	.113	.128
5 1/2	.110	.128	.141	.158
6	—	.154	.170	.192
6 1/2	—	.183	.203	.228
7	—	.213	.238	.268
7 1/2	—	.246	.275	.310
	2	2	2 1/2	2 1/2
		Rod Diameter (inches)		