HorsePower

Where:

Mechanical: $HP = \frac{TS}{5252}$

Hydraulic: $HP = \frac{PQ}{1714}$

HP=horsepower (hp)
T=torque (ft-lb)
S=speed (rpm)
P=pressure drop (psi)
Q=flow rate (gpm)

Pressure

Where:

Across Bit: $P = \frac{Q^2 W}{10858\ A^2}$

Expected: $P_x = \frac{P_y W_y}{W_x}$

Hydrostatic: $P = 0{,}052(TVD)W$

P=pressure (psi)
Q=flow rate (gpm)
W=fluid weight (ppg)
A=nozzle area (in2)
Px=expected pressure drop, new mud (psi)
TVD=total vert. depth,(ft.)
Py=pressure drop, original mud (psi)
Wx=original mudweight, (ppg)
Wy=new mud weight, (ppg)

Velocity

Where:

Annular: $V = \frac{0.4085Q}{D_h^2 - D_s^2}$

Jet: $V = \frac{0.3209Q}{A}$

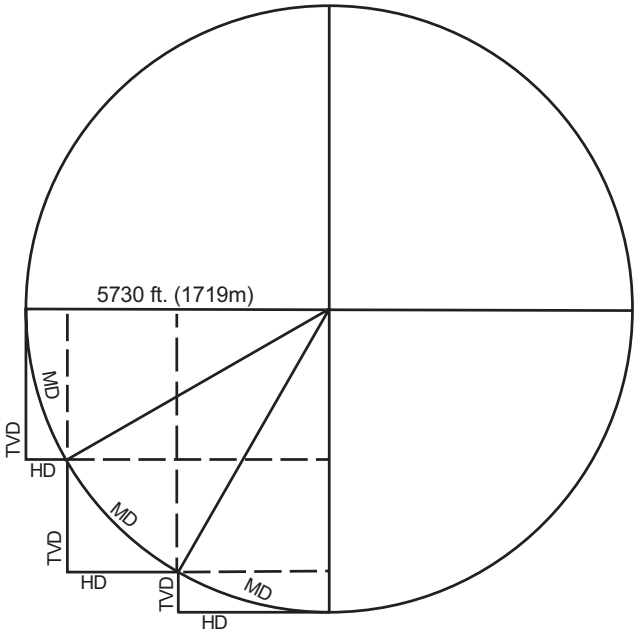
Pump: $AV = \frac{SP}{C}$

V=velocity (ft/s)
Q=flow rate (gpm)
Dh=hole OD (in)
Ds=drillstring OD (in)
A=nozzle area (in2)
S=pump speed (spm)
AV=annular velocity, (ft/min)
C=annular capacity,(gal/ft)
P=pump output,(gal/stroke)

Motor Efficency	Where:
$\% = \frac{32.64TS}{QP}$	P=pressure (psi) T=torque (ft-lb) Q=flow rate (gpm) S=speed (rpm)

Buoyancy	Where:
$BF=\frac{65.5-W}{65.5}$	BF=buoyancy factor W=mud weight (ppg)

Note: In order to calculate the correct drill collar string weight, the buoyancy factor must be taken into account. Using the table found on Section 12. 29 , take the mud weight value you are using and insert it in the above formula. Multiply the resulting buoyancy factor to the weight of the string in air. This will give you the weight of the string in the mud you are using.



Standard Equations:

SIN 0° = 0 COS 0° = 1

SIN 90° = 1 COS 90° = 0

360° CIRCUMFERENCE = 2p R

90° CIRCUMFERENCE = 2p R/4 = p R/2

Derivation:

IF BUR = 1°/100 ft. (30m)

THEN 0-90° = 9000 ft. (2700m) = p R/2

R = 9000 ft. (2700m) x 2/p = 5729.58 ft. (1718.87m)

TVD = 5730 ft. (1719m) (sin A_2 - sin A1)/BUR

HD = 5730 ft. (1719m) (cos A_1 - cos A2)/BUR

(A1 = Initial Angle)

(A2 = Final Angle)

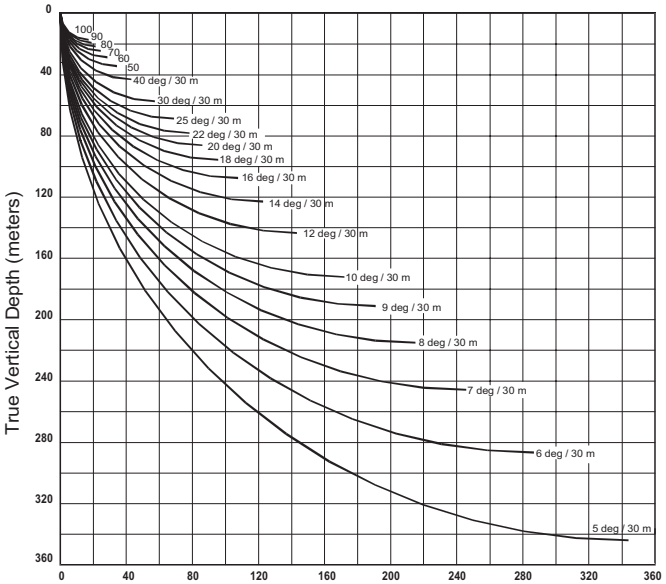
BUR = 5730 ft. (1719m)/R

MD = ΔDrift x 100 ft. (30m)/BUR

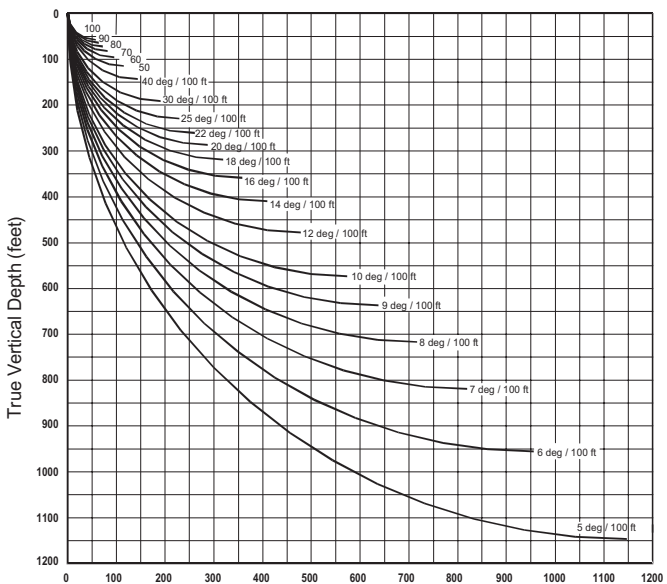
DLS (°/100 ft.) x 0.984 = DLS (°/30m)

RADIUS OF CURVATURE

Displacement Build Chart in Meters



Displacement Build Chart in Feet



FLUID BYPASS CALCULATION

Flow thru a jet @ Known psi

$$TFA = \sqrt{\frac{Q^2 \times W}{\Delta P \times 10858}}$$

$$\text{Nozzle Size} = 64\sqrt{\frac{TFA}{\pi}}$$

Q = gpm to be bypassed

ΔP = diff across DHM

W = Weight in ppg

TFA = Total Flow Area in^{2}n

Multiplying Factor	Prefix	Symbol
1 000 000 = ^{6}	mega	M
1 000 = 10^{3}	kilo	k
100 = 10^{2}	hecto	h
10 = 10^{1}	deca	da
0.1 = 10^{-1}	deci	d
0.01 = 10^{-2}	centi	c
0.001 = 10^{-3}	milli	m
0.000 001 = $^{-6}$	micro	µ

OILFIELD QUICK REFERENCE

1 Cubic Meter	1000 Liters
1 Cubic Meter	264.2 US Gallons
1 Cubic Meter	220 Imperial Gallons
1 Cubic Meter	6.28 US Barrels
1 Cubic Meter	5.0 Imperial Barrels
PSI x 6.89	= KPA
100 PSI X6.89	=6890 KPA

UNITS	MULTIPLY BY	TO OBTAIN
ac	43560	ft^2
ac	4047	m^2
ac	0.001562	mi^2
atm	33.94	ft of water
atm	14.7	lb/in^2
atm	1.013×10^5	pascals
atm	1.033	kg/cm^2
bbl (British, dry)	5.78	ft^3
bbl (British, dry)	0.1637	m^3
bbl (British, dry)	36	gal (British)
bbl, cement	170.6	kg
bbl, cement	376	lb (cement)
bbl, oil	42	gal (U.S.)
bbl (U.S., liquid)	4.211	ft^3
bbl (U.S., liquid)	0.1192	m^3
bbl (U.S., liquid)	31.5	gal (U.S.)
bbl/min	42	gal/min
bbl/day	0.02917	gal/min
cm^3	3.531×10^{-5}	ft^3
daN	2.2467	lbs

UNITS	MULTIPLY BY	TO OBTAIN
deg (angle)	60	min
deg (angle)	0.01745	rad
deg (angle)	3600	s
deg/s	0.1667	rpm
deg/s	2.778×10^{-3}	rev/s
ft	12	in
ft	0.3048	m
ft	1.89394×10^{-4}	mi
ft^2	0.0929	m^2
ft^3	1728	in^3
ft^3	0.02832	m^3
ft^3	7.481	gal (U.S.)
ft^3	28.32	liters
ft^3 of water (60 deg. F)	62.37	lb
ft^3/min	4.72×10^{-4}	m^3/s
ft^3/min	0.1247	gal/s
ft^3/min	0.472	liters/s
ft^3/s	448.83	gal/min
ft^3- atm	2116.3	ft-lb
ft-lb	1.286×10^{-3}	Btu
ft-lb	0.1383	Kg-m
ft-lb	1.355818	N-m

UNITS	MULTIPLY BY	TO OBTAIN
ft/min	0.508	cm/s
ft/min	0.01667	ft/s
ft/min	0.01829	km/hr
ft/min	0.3048	m/min
ft/min	0.01136	mi/hr
ft-lb/min	0.01667	ft-lb/s
ft-lb/min	2.26×10^{-5}	KW
ft-lb/s	1.356×10^{-3}	KW
ft-lb/s	1.818×10^{-3}	hp
g	0.001	kg
gal (British)	1.20094	gal (U.S.)
gal	3785	cm^3
gal	0.1337	ft^3
gal	231	in^3
gal	3.785	liters
gal/min	2.228×10^{-3}	ft^3/s
gal/min	3.785	liters/min
g-cm^2	3.4172×10^{-4}	lb-in^2
hp	0.7457	kW
in	25.4	mm
in^2	645.2	mm^2
in^2	6.452	cm^2

UNITS	MULTIPLY BY	TO OBTAIN
in^2	6.944×10^{-3}	ft^2
in^3	1.639×10^{-5}	m^3
in^3	5.787×10^{-4}	ft^3
in^3	4.329×10^{-3}	gal
in^3	0.01639	liters
kg	2.2046	lb
kg-m	7.233	ft-lb
kg/m^3	0.06243	lb/ft^3
kg/m	0.672	lb/ft
kW	44250	ft-lb/min
kW-hr	2.655×10^6	ft-lb
lb	4.45×10^5	dynes
lb	4.448	newtons
lb	4.535×10^{-4}	tons (metric)
lb/ft^3	16.02	kg/m^3
lb/ft^3	5.787×10^{-4}	lb/in^3
lb/ft^2	4.882	kg/m^2
lb/ft^2	6.945×10^{-3}	lb/in^2
lb/gal	7.48	lb/ft^3
lb/gal	.12	specific grav.
lb/gal	.1198	g/cm^3

UNITS	MULTIPLY BY	TO OBTAIN
lb/in^2	6.894757	kPa
liter	0.03531	ft^3
liter	0.001	m^3
liter	0.2642	gal
liter	0.001	m^3
liter	0.2642	gal
m	3.2808	ft
m^2	10.764	ft^2
m^3	264.2	gal
m^3/s	15850	gal/min
m^3/s	60000	liters/min
mi^2	2.788 x 107	ft^2
mi^2	2.59	km^2
rad	57.3	deg
rad/s	0.1592	rev/s
rad/s	9.549	rpm
temp. (°C)	1.8 (°C)+32	temp. °F
temp. (°F)	(°F - 32) 5/9	temp. °C
tons (metric)	1000	kg
watts	0.7376	ft-lb/s
watts	1.341×10^{-3}	hp
yds	3	ft
yds	0.9144	m