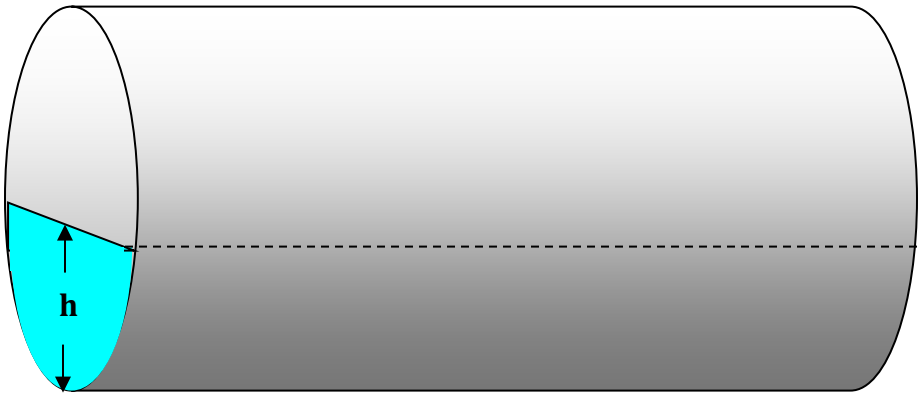
Conversion Factors

1 Acre	=	43560 Square feet (ft^2)
1 Acre	=	4046.8 Square meters (m^2)
1 Atmosphere (atm)	=	14.691 Pounds per square inch (lbs/in^2)
1 Atmosphere (atm)	=	29.92 inches of mercury (inHg)
1 Atmosphere (atm)	=	101325 Pascals (Pa)
1Barrel (bbl)	=	42 Gallons (gal)
1Barrel (bbl)	=	34.9726 Imperial Gallons (gal UK)
1Barrel (bbl)	=	158.984 Liters (l)
1Barrel (bbl)	=	0.158984 cubic meters (m^3)
1Barrel (bbl)	=	5.6146 cubic feet (ft^3)
1 Bar (bar)	=	14.5038 Pounds per square inch (lbs/in^2) or (psi)
1 Bar (bar)	=	100 Kilopascals (kPa)
1 Centimeter (cm)	=	0.3937 Inches (in)
1 Centipoise (cP)	=	0.001 Pascal-seconds (Pa-s)
1 Decanewton (daN)	=	1.02 Kilograms (kg)
1 Decanewton (daN)	=	2.2482 Pounds (lbs)
1 Fathom (fth)	=	6 Feet (ft)
1 Foot (ft)	=	0.3048 Meters (m)
1 Foot (ft)	=	12 Inches (in)
1 Cubic foot (ft^3)	=	28.302 Liters (l)
1 Cubic foot (ft^3)	=	7.4805 Gallons (gal)
1 Cubic foot (ft^3)	=	0.17811 Barrels (bbl)
1 Gallon imperial	=	1.200912 Gallons U.S. (gal)
1 Gallon U.S (gal)	=	128 Ounces (oz)
1 Gallon U.S (gal)	=	4 Quarts (qt)
1 Gallon U.S (gal)	=	8 Pints
1 Gallon U.S (gal)	=	231 Cubic inches (in^3)
1 Gallon U.S (gal)	=	3.7854 Liters (l)
1 Gram (g)	=	15.4324 Grains (gr)
1 Gram (g)	=	0.035274 ounces (oz)
1 Hectares (ha)	=	10000 Square meters (m^2)
1 Hectares (ha)	=	2.47105 Acres
1 Horsepower (hp)	=	0.7457 Kilowatts (KW)
1 Horsepower (hp)	=	745.701 Watts (W)
1 Horsepower (hp)	=	550 foot-pounds per second (ft-lbs/sec)
1 Inch (in)	=	2.54 Centimeters (cm)
1 Cubic inch (in^3)	=	0.5541 Ounces (oz)
1 Joule (J)	=	0.737561 Foot-pounds (ft-lbs)
1 Kilogram (Kg)	=	2.204586 Pounds (lbs)
1 Kilogram (Kg)	=	9.81 Newtons (N)
1 Kilogram/cubic meter	=	0.3505 Pounds per barrel (lbs/bbl)
1 Kilogram/cubic meter	=	.062427 Pounds per cubic foot (lbs/ft^3)
1 Kilometer (km)	=	0.621373 Miles (mile)
1 Kilometer (km)	=	0.539957 Nautical miles
1 Kilopascal (kPa)	=	0.145038 Pounds per square inch (lbs/in^2)
1 Kilowatt (kW)	=	1.34102 Horsepower

Conversion Factors

1 Liter (l)	=	61.025844 Cubic inches (in^3)
1 Liter (l)	=	0.264178 gallon (gal)
1 Liter (l)	=	0.219976 Imperial gallons (gal UK)
1 Liter (l)	=	1000 Cubic centimeters (cm^3)
1 Liter (l)	=	1.0567 Quarts (qt)
1 Liter (l)	=	0.001 Cubic Meters (m^3)
1 Megapascal (Mpa)	=	10 Bars (bar)
1 Megapascal (Mpa)	=	145.038 Pounds per square inch (lbs/in^2)
1 Meter	=	3.28084 (ft)
1 Cubic meter (m^3)	=	6.28994 Barrels (bbl)
1 Cubic meter (m^3)	=	1000 Liters (l)
1 Cubic meter (m^3)	=	264.17 Gallons (gal)
1 Mile (mile)	=	5280 feet (ft)
1 Mile (mile)	=	1760 Yards (yd)
1 Mile (mile)	=	1609.3 meters (m)
1 Mile (mile)	=	0.8684 Nautical miles
1 Square mile (sq mile)	=	641.025 Acres
1 Newton (N)	=	0.102 Kilograms (kg)
1 Newton (N)	=	0.224809 Pounds (lbs)
1 Ounce (oz)	=	1.804728 Cubic Inches (in^3)
1 Pound (lb)	=	4.44822 Newtons (N)
1 Pound/$inch^2$ (lbs/in^2)	=	0.06894745 Bars (bar)
1 Pound/$inch^2$ (lbs/in^2)	=	6.894745 Kilopascals (kPa)
1 Pound/$inch^2$ (lbs/in^2)	=	2.03583 Inches of mercury (inHg)
1 Pounds/$foot^3$ (lbs/ft^3)	=	7.4805 Pounds/gallon (lbs/gal)
1 Pounds/$foot^3$ (lbs/ft^3)	=	0.0160185 Kilogram/liter (kg/l)
1 Pound/gallon (lb/gal)	=	0.1336809 Pounds/$foot^3$ (lbs/ft^3)
1 Pound/gallon (lb/gal)	=	0.1198 Kilogram/liter (kg/l)
1 Pound/gallon (lb/gal)	=	119.8288 Kilogram/$meter^3$ (kg/m^3)
1 Quart (qt)	=	0.94634239 Liters (l)
1 Short ton	=	2000 Pounds (lbs)
1 Long ton	=	2240 Pounds (lbs)
1 Long ton	=	1000 Kilograms (kg)
1 Yard (yd)	=	3 Feet (ft)
1 Cubic Yard (yd^3)	=	764.6 Liters (l)
1 Watt-hour (Wh)	=	3600 Joules (J)

Volume of fluid in a horizontal tank



$$\text{Vol. (ft}^3\text{)} = \text{Length} \left[\frac{\pi r^2 (180 - 2h) \sin\left(\frac{r - h}{r}\right) - r^2 \sin(180 - 2h) \sin\left(\frac{r - h}{r}\right)}{360 \qquad\qquad 2} \right]$$

Where:

Vol. = Volume of fluid in the tank in cubic feet

Length = Length of the tank in feet

h = Height of fluid in the tank in feet

r = Radius of the tank in feet

or

$$\text{Vol. (bbls)} = \frac{\text{Length}}{5.6146} \left[\frac{\pi r^2 (180 - 2h) \sin\left(\frac{r - h}{r}\right) - r^2 \sin(180 - 2h) \sin\left(\frac{r - h}{r}\right)}{360 \qquad\qquad 2} \right]$$

Where:

Vol. = Volume of fluid in the tank in barrels.

Length = Length of the tank in feet

h = Height of fluid in the tank in feet

r = Radius of the tank in feet

Pipe Stretch or Free Point Formula (English units)

$$L = \frac{E \cdot \triangle L \cdot w}{40.8 \cdot \triangle P} \qquad \text{eq. B.2}$$

Where:
L = Length of free pipe in feet
E = 29,000,000 lbs/in^2 (Modulus of elasticity)
$\triangle$L = Pipe stretch in inches
w = Weight of pipe in lbs/ft
$\triangle$P = Differential pull on pipe in pounds

Pipe Stretch or Free Point Formula (metric units)

$$L = \frac{127.5 \cdot E \cdot \triangle L \cdot w}{\triangle P}$$

Where:
L = Length of free pipe in meters
E = 20390 kg/mm^2
$\triangle$L = Pipe stretch in millimeters
w = Weight of pipe in kg/m
$\triangle$P = Differential pull on pipe in kg

Combined Tension and Torsion Loading (English)

$$T_{max} = \left(\frac{0.096167 \bullet J}{OD} \right) \sqrt{Y_m^2 - \frac{P^2}{A^2}} \qquad \text{eq. B.4}$$

where:

T_{max} = Maximum torque at a given tension P (ft-lbs)
J = Polar moment of inertia = $(D^4 - d^4)/10.19$ (in^4)
D = Outside diameter in inches
D = Inside diameter in inches
Y_m = Minimum yield stress in lbs/in^2
P = Total tension load in pounds
A = Cross sectional area (in^2)

Combined Tension and Torsion Loading (Metric)

$$N_{max} = \left(\frac{100 \bullet L \bullet S}{\pi \bullet D \bullet G} \right) \sqrt{1 - \frac{100\ T^2}{3 \bullet A^2 \bullet S^2}}$$

where:

N_{max} = Maximum number of turns at a given tension T
L = Length of drill pipe (m)
D = Outside diameter of drill pipe (cm)
S = Maximum shear stress: 57.7% of minimum yield stress
G = Modulus of elasticity: 84,000 MPa
T = Total tension load (daN)
A = Cross sectional area (mm^2)