Conversion Factors And Formulas

UNITS OF LENGTH					
UNIT	**INCH**	**FOOT**	**YARD**	**CENTIMETER**	**METER**
INCH	1	.0833	.0278	2.54	.0254
FOOT	12	1	.333	30.48	.3048
YARD	36	3	1	91.44	.9144
CENTIMETER	.3937	.0328	.0109	1	.01
METER	39.37	3.281	1.094	100	1

UNITS OF AREA					
UNIT	**SQ. INCH**	**SQ. FOOT**	**SQ. YARD**	**SQ. CM**	**SQ. METER**
SQ. INCH	1.00	0.00694	0.000772	6.452	0.000645
SQ. FOOT	144.00	1.00	0.1111	929.00	0.0929
SQ. YARD	1296.00	9.00	1.00	8360.00	0.836
SQ. CM	0.1550	0.001076	.00012	1.00	0.0001
SQ. METER	1550.00	10.76	1.196	10,000.00	1.00

UNITS OF VOLUME							
UNIT	**U.S. GAL.**	**IMP. GAL.**	**CU. FT.**	**LB. WATER AT 60°F**	**CU. METER**	**QUART**	**LITER**
U.S. GAL.	1.0	.833	.1337	8.33	.003785	4.0	3.785
IMP. GAL.	1.2	1.0	.1605	10.0	.004546	4.8	4.546
CUBIC FT.	7.481	6.232	1.0	62.37	.0283	29.92	28.32
LB. WATER	.120	.10	0160	1.0	----	.48	.454
CU. METER	264.2	220.0	35.31	2204.0	1.0	1057.0	1000.0
QUART	.25	.208	.0334	2.086	----	1.0	.9464
LITER	.2642	.220	.0353	2.204	.001	1.057	1.0

Useful Formulas:

Liquid HP or useful work done by pump—

$$WHP = \frac{(GPM) \times (TDH) \times (S.G.)}{3960}$$

Brake HP required to drive the pump—

$$BHP = \frac{(GPM) \times (TDH) \times (S.G.)}{3960 \times \text{Pump Eff.}}$$

$$\text{Pump efficiency} = \frac{\text{OUTPUT}}{\text{INPUT}} = \frac{\text{WHP}}{\text{BHP}}$$

$$\text{Electrical HP input to motor} = \frac{\text{BHP}}{\text{Motor Eff.}}$$

$$\text{kw input to motor} = \frac{\text{BHP} \times 0.746}{\text{Motor Eff.}}$$

Overall efficiency = Pump Eff. X Motor Eff.

Velocity formula:

$$V = \frac{.409 \times GPM}{(d_1^2 - d_2^2)}$$

Where: GPM = flow rate in gallons per minute
TDH = total dynamic head in feet
S.G. = fluid specific gravity (water S.G. = 1)
V = velocity in feet per second
d_1 = fluid passage major diameter in inch
d_2 = flow passage minor diameter in inch (if applicable)

Conversion Factors And Formulas

Capacity		
1 Cubic Foot Per Second	449.0	GPM
1 Acre Foot Per Da	227.0	GPM
1 Acre Inch Per Hour	454.0	GPM
1 Cubic Meter Per Minute	264.2	GPM
1,000,000 Gal. Per Day	694.4	GPM

To Find Capacity of a Tank or a Cistern:

D x D x h x 5.875 = Capacity in U.S. Gallons

Where: D = Diameter of Tank in Feet
h = Height of Tank in Feet

Head	
1 Pound Per Square Inch (PSI)	2.31 ft. of water 2.04 in. mercury 0.07 kg. per sq. cm
1 Foot of Water	0.433 PSI 0.885 in. mercury
1 Inch of Mercury (or vacuum)	1.132 ft. of water
1 Kilogram Per Square cm.	14.22 lb. PSI
1 Atmosphere (at sea level)	14.7 PSI 34.0 ft. of water 10.35 meters of water
1 Meter of Water	3.28 ft. of water

Volume	
1 Acre Foot	43,560 cu. ft. 325,829 U.S. gal.
1 Acre Inch	3,630 cu. ft. 27,100 U.S. gal.

Horsepower
1 HP is equivalent to: 0.746
kilowatts
746 watts
33,000 ft.-lbs. per minute
550 ft.-lbs. per second

Electric Power
AC = Alternating current power
DC = Direct current
E = Volts = Electrical pressure (similar to head)
I = Amperes = Electrical current (similar to rate of flow)
W = Watts = Electrical power (similar to head capacity)
KW = Kilowatts = 1000 watts
Apparent Power = Volts x amperes = Voltamperes
Apparent Power = EI
Useful Power = W = EI x P.F.
Power factor = ratio of useful power to apparent power
Power factor = PF = W/EI
KW Hr. = Kilowatt hour
Single phase power W = E x I x PF
3 Phase Power W = 1.73 x I x PF Where E = Average voltage between phases I = Average current in each phase