

## TOTAL DIFFERENTIAL HEAD (THD)

**System Head** = total discharge head – total suction head

$$H = h_d - h_s$$

$$h_d = h_{sd} + h_{pd} + h_{fd}$$

$$h_s = h_{ss} + h_{ps} + h_{fs}$$

*where:*

$h_d$  = total discharge head

$h_s$  = total suction head

$h_{sd}$  = discharge static head

$h_{ss}$  = suction static head

$h_{pd}$  = discharge surface pressure

$h_{ps}$  = suction surface pressure

$h_{fd}$  = discharge friction head

$h_{fs}$  = suction friction head

## AVAILABLE NPSH

Available NPSH is "the difference between the total suction head and the vapor pressure of the liquid, in feet of liquid, at the suction flange."

$$h_{sv} = h_{sa} - h_{ypa}$$

*where:*

$h_{sv}$  = available net position suction head, in feet of liquid

$h_{sa}$  = total suction head, in feet of liquid, absolute

$h_{ypa}$  = vapor pressure of liquid at suction nozzle, in feet of liquid, absolute

## PRESSURE *Conversion:*

**Head (ft.)** = psi x 2.31 / sp. gr.

**PSI** = head (ft.) x sp. gr. / 2.31

**Lbs./sq. in.** = In. of Mercury x .491  
= Atmospheres x 14.7

**mm hg.** = Atmospheres x 760

## VISCOSITY

Centistokes x 4.64 = SSU<sub>(approx.)</sub>

Centipoise Sp. Gr. = Centistokes

## FLOW

Gallons per minute (GPM) x 3.785 = Liters per minute

## TEMPERATURE *Conversion:*

$$^{\circ}\text{C} = 5/9 (^{\circ}\text{F} - 32)$$

$$^{\circ}\text{F} = 9/5^{\circ}\text{C} + 32$$

## SPECIFIC GRAVITY

sp. gr. =  $\frac{\text{weight of liquid}}{\text{weight of water}}$

weight of water = 62.4 Lb./cu.  
8.3 Lb./gal.

## AFFINITY LAWS

$$\frac{D}{D_1} = \frac{\text{GPM}}{\text{GPM}_1} = \frac{\text{RPM}}{\text{RPM}_1} = \sqrt[2]{\frac{H}{H_1}} = \sqrt[3]{\frac{\text{BHP}}{\text{BHP}_1}}$$

## POWER

$$\text{BHP} = \frac{\text{GPM} \times \text{TDH} \times \text{sp. gr.}}{3960 \times \text{Eff.}}$$

$$\text{BHP} = \frac{\text{GPM} \times \text{PSI}}{1715 \times \text{Eff.}}$$

$$\text{KW} = 0.746 \times \text{H.P.}$$

$$\text{Torque} = (\text{Ft. Lb.}) = \frac{\text{HP} \times 5260}{\text{RPM}}$$

$$\text{HP} = \frac{\text{E(volts)} \times \text{I(Amps)} \times \text{Eff.} \times \text{P.F.} \times 1.732}{746}$$

$$\text{I(amps)} = \frac{\text{HP} \times 746}{\text{E(volts)} \times \text{Eff.} \times \text{P.F.} \times 1.732}$$

**PROPERTIES OF WATER**

<b>Temp</b>	<b>Specific</b>	<b>Vapor Pressure</b>		
<b>Degrees °F</b>	<b>Gravity</b>	<b>Ft. of H2O</b>	<b>In. Hg</b>	<b>In. Hg Vac</b>
60	1.000	0.6	0.53	29.39
100	0.994	2.2	1.94	27.98
150	0.982	8.8	7.76	22.16
200	0.965	27.6	24.36	5.56
210	0.961	33.9	29.92	0.00
212	0.959	35.4	31.33	