FORMULAS AND EQUATIONS

3-Phase Formula

1. Voltage drop = 1.72 x 1 x R
   Where 1 = Line current per phase
   R = Resistance of one core only
   NB: For large 3-core cables carrying high alternating currents, the increased AC resistance due to skin effect must be allowed for.

2. $kW = kVA \times Power\ Factor$

   $$kW = \frac{Line\ Amps \times Line\ Volts \times 1.73 \times Power\ Factor}{1\,000}$$

   $$kW = \frac{Horse\ Power \times 746}{1\,000 \times Efficiency}$$

3. $$kVA = \frac{kW}{Power\ Factor\ \theta}$$

   $$kVA = \frac{Line\ Amps \times Line\ Volts \times 1.732}{1\,000}$$

   $$kVA = \frac{Horse\ Power \times 746}{1\,000 \times Efficiency \times Power\ Factor}$$

4. $$Line\ Amps = \frac{kW \times 1\,000}{Line\ Volts \times 1.72 \times Power\ Factor}$$

   $$Line\ Amps = \frac{kVA \times 1\,000}{Line\ Volts \times 1.732}$$

   $$Line\ Amps = \frac{kW \times 1\,000}{Line\ Volts \times 172 \times Power\ Factor \times Efficiency}$$

kW = KiloWatt kVA = KiloVolt Amps Power Factor = Cos θ

Physical Constants

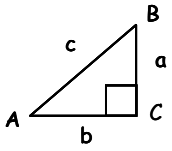
Acceleration of gravity	=	32.2ft/sec^2
	=	9.8m/sec^2
Atmospheric pressure	=	14.7psi
	=	760mm Hg = 101.3 kilopascal
Avogadro's number	=	6.024 x 10^{23}/gm mol
British thermal unit	=	1 054.8 joules
Curie	=	3.7 x 10^{10} disintegrations/sec
Faraday	=	9.65 x 10^4 coulombs
Gas Constant (air)	=	8.32 x 10^7 ergs/°C gm mol
Gram-calorie	=	4.19 joules
Gram-mole of gas	=	22.4 litres @ 0°C and 1 atm
	=	24.45 litres @ 25°C and 1 atm
Planck's constant	=	6.626 x 10^{-27} erg sec
Velocity of light	=	2.9978 x 10^{10}cm/sec

Geometric Formula

Circle	Sphere
$C = \pi D$	$S = 4\pi r^2$
$A = \pi r^2$	$V = (4/3)\,\pi r^3$

Trigonometric Functions

sin A	=	a/c
cos A	=	b/c
tan A	=	a/b
cot A	=	b/a



Mechanics

F	=	μN
F_1d_1	=	F_2d_2
v	=	$v_o + at$
s	=	$v_ot + (at^2)/2$
v^2	=	$v_0^2 + 2as$
KE	=	$(mv^2)/2$
PE	=	$mgh = (kx^2)/2$
p	=	mv
F	=	ma
W	=	mg

Gas Law

PV = nRT

TWA's

TWA = $[T_1C_1 + T_2C_2 + \ldots + T_nC_n]/T_{total}$

Electricity

E	=	IR
P	=	EI
R_{series}	=	$R_1 + R_2 + \ldots + R_n$
$1/R_{parrallel}$	=	$1R_1 + 1/R_2 + \ldots + 1/R_n$

Ventilation

Q	=	AV
V	=	$4005\,(VP)^{1/2}$
V	=	$4005C_e\,(SP_h)^{1/2}$
TP	=	SP + VP

Radiation

S=6CE

$I_2 = I_1 \times [(d_1)^2/(d_2)^2]$

Noise

L_I	=	10 log (I/I_0) dB
L_p	=	20 log (p/p_0) dB
T	=	$8/\,(2^{[L-90)/5]})$

Heat Stress

WBGT	=	0.7WB + 0.3 GT
WBGT	=	0.7WB + 0.2 GT + 0.1 DB

Unit Conversions

Temperature			Angles		
t_k	=	$t_c + 273.16$	1 radian	=	$180°/\pi$
t_c	=	$(t_f - 32)/1.8$			
			Concentrations of Vapours and Gases		
Density of Water			ppm	=	$mg/m^3 \times 24.45/MW$
$1gm/cm^3$	=	$1.94\ slugs/ft^3$			
(weight density = $62.4lbs/ft^3$)			Light		
			1 lumen	=	1 candela
Radiation			1 footcandle	=	$10.76\ candela/m^2$
1 Curie	=	3.7×10^{10} Becquerel		=	10.76 lux
1 Rad	=	10^{-2} Gray			
1 Rem	=	10^{-2} Sievert	Magnetic Fields		
			1 Teasla	=	10, 000 Gauss