Engineering Information

Unit Equivalents

Power in Direct Current Circuits

Volts $V = V \times 10^2$ electrostatic units.

Coulombs $Q = Q \times 10^{-2}$

b.h.p. $= V \times I \times_n \div 746 \times 100$

Specific Resistance : $R \times I \times V$

Work done $= V \times 10^8 \times Q \times 10^{-1} = VQ \times 10^7$ ergs

Work done $= VIt \times 10^7$ ergs $= VIt$ joulus $= W.$ Joules.

Work done $= V^2t/R$ Joules.

The mechanical-equivalent of heat is 4.18×10^7 ergs per calorie, or 4.18 Joules per calorie.

Heat developed in a conductor $= .2391/I^2$ Rt calories

A meter is made to register a combination of Watt-minutes.

$$x \text{ Watts for z minutes} = \frac{X \times Z}{1000 \times 60} \text{ units}$$

In the case of a water or liquid heater——

M grammes x Sq. ht. x T° C x I^2 Rt/4.18 = time in secs.

Efficiency of heater (kettle or radiator) = 4.18 MST/I2 Rt Power in Alternating Current VI = Capicity (farads.

V = applied voltage I = current (amps) L = Inductace (henries); R = resistance (ohms)

f = (frequency of supply); Capacity and inductance send to neutralise each other.

$$\text{Capacity reactance} = \frac{1}{2p\,fc}$$

$$\text{impedence} = \sqrt{R^2 + (2pfL - \frac{1}{2pfc})}$$

$$\text{Current} = \sqrt{R^2 + (2pfL - \frac{1}{2pfc})}$$

If 2pfc = 1/2pfc there is resonance and I - V/R

Power (Watts) = Volts x amps. is termed the power factor.

Power (Watts) in single phase A.C. ciruit = volts x amps x power factor x volts x amps. x consine of angle of phase defferencia,

B.H.P. = V x Z x n x pf ÷ 746 x 100.

In a 3 Phase A.C. circuit -

Power (Watts) = $\sqrt{3}$ x volts - amps. x power factor.

- 1.732 x volts x amps. x power factor.

Power in 3 phase circuit measured by two wattmeters = $W_1 + W_2$ B.H.P. = VZ npf x 1.732 ÷ 746 x 100

Power factor is obtained from tan $\phi = \sqrt{3}\ W_1 - W_2 W_1 + W_2$

British Standards 168 : 1936. 741; 1937, 170 : 1939, 480 : 1942.

UNIT EQUIVALENTS

1 Watt is equal to :-
1 joule/Sec.
0.001 34 Horse power
0.001 Kilowatt
3.43 heat units/hour
0.74 ft. lbs./sec.
0.0032 lb of water evaporated/hour
44.23 ft. lb/min.

1 Kilowatt is equal to :-
1000 watts
1.341 Horse power
26,56400 ft. lb/hour
44.240 ft. lb./min.
737,562 ft. lb./sec.
3411 heat units/hour
5686 heat units/min.
0.947 heat units/sec.
3 lb water evaporated/hour at 212 °F

Kilowatt hour is equal to :-
1000 watt hours
1.34 Horse power hour
26,56.400 ft. lbs
36,00.000 jouses.
3,411 heat units.
3,56,848 K gm.
3 lb water evaporated/hour at 212 °F
22.9 lbs water raised from 69°F to 212°F

1 Horse power is equal to :-
746 watt
0.746 Kilowatt
33,000 ft. lb/min.
550 ft.lb./sec.
2.545 heat units/min.
0.707 heat units. sec.
2.25 lb water evaporated/hour at 2128 F

1 heat unit is equal to :-
778 ft. lb.
0.24 Calorie
1048 watt seconds
0.00293 Kilowatt hour
108 Kilogramme meters.
0.0000666 lb. coal oxidised
0.00039 Horse power hour
0.00087 lb. water evaporated at 212 °F

1 K. gm. is equal to
7.237 ft. lb.
366 x 10-8 Horse power hour
273 x 10-8Hourse power hour
0.0092 heat units.

1 Joule is equal to :-
1 Watt second
278 x 10-8 Kilowatt hour
0.102 K. gm.
0.00094 heat units
0.7376 ft. lb.

1 Heat unit/sq. ft/mtn. equals to:-
0.121 watt/square inch
0.0174 Kilowatt hour
0.0232 Horse power

1 Foot pound is equal to :-
1,3558 joule
0.1383 K gm.
377 x 10-9 Kilowatt hour
129 x 10-5 heat units
49 x 10-7 horse power hour

1 lb water evaporated at 2120Fis equal to :-
0.34 Kilowatt hour
0.44 Horse power hour
1148 Heat units
1,24,200 Kilogramme meters
12,19000 joules
8,87,800 ft. lb.