

## 5. Power and work

### British:

$$1 \text{ horsepower (h. p.)} = 33,000 \text{ foot-pounds per minute (ft-lb./min)}$$

$$= 550 \text{ foot-pounds per second (ft-lb./sec)}$$

$$1 \text{ British Thermal Unit (B. Th. U.)} = 778 \text{ foot-pounds (ft-lb.)}$$

$$1 \text{ horsepower-hour (h. p.-hr.)} = 1,980,000 \text{ foot-pounds} = 2,545 \text{ B. Th. U.}$$

### Metric:

$$1 \text{ metric horsepower (PS)} = 75 \text{ kilogram-metres/second} = 75 \text{ kgm/s}$$

$$1 \text{ kilowatt (kW)} = 1000 \text{ watts (W)} = 102 \text{ kgm/s}$$

$$1 \text{ kW} = 1.36 \text{ PS}$$

$$1 \text{ kilowatt-hour (kWh)} = 3,600,000 \text{ watt-seconds (Ws)}$$

### Relationship between various units

1 h. p.	= 746	W = 0.746 kW = 1.014 PS
1 h. p.	= 76.065	kgm/s
1 h. p.-hr.	= 0.746	kWh = 1.014 PSh
1 B. Th. U.	= 0.000292	kWh = 0.252 kcal
1 ft-lb.	= 0.1383	kgm

$$1 \text{ PS} = 0.986 \text{ h.p.}$$

$$1 \text{ kgm} = 7.231 \text{ ft-lb.}$$

$$1 \text{ kcal} = 3.968 \text{ B.Th.U.}$$

$$1 \text{ kW} = 1.34 \text{ h. p.} = 44,220 \text{ ft-lb./min} = 3,415 \text{ B. Th. U. per hour}$$

$$1 \text{ W} = 0.00134 \text{ h. p.} = 44.22 \text{ ft-lb./min} = 3.42 \text{ B. Th. U. per hour}$$

### Conversion Table. Conversion of h. p. into kW and vice versa

h. p.	kW	h. p.	kW	kW	h. p.	kW	h. p.
1.0	0.7	8.0	6.0	1.0	1.3	8.0	10.7
2.0	1.5	9.0	6.7	2.0	2.7	9.0	12.1
3.0	2.2	10.0	7.5	3.0	4.0	10.0	13.4
4.0	3.0	100.0	74.6	4.0	5.4	100.0	134.1
5.0	3.7	1,000.0	745.7	5.0	6.7	1,000.0	1,341.0
6.0	4.5	10,000.0	7,457.0	6.0	8.0	10,000.0	13,410.0
7.0	5.2			7.0	9.4		

## 6. Speeds

$$100 \text{ feet per minute (ft/min)} = 30.5 \text{ metres per minute (m/min)}$$

$$= 0.508 \text{ metres per second (m/sec)}$$

$$1 \text{ mile per hour (m. p. h.)} = 1.609 \text{ km/h}$$

The speed of shafts (e. g. of a motor) is expressed in terms of revolutions per minute (r. p. m.).