

Trenches and Trench Covers

1. Furnished by whom.
2. Material, size, etc.
3. Provision for drainage.

Railings, Machinery Guards, Bird Screens, Etc.

1. Material.
2. Method of fastening.

Painting

1. What is to be painted.
2. Materials and workmanship.
3. Painting of insulation.

CHAPTER 33

PHYSICAL UNITS, WEIGHTS, MEASURES
AND TABLES

MODERN engineering practice depends upon the correct application of basic principles already developed. This chapter contains definitions of fundamental units and tables of physical constants used by the heating and ventilating engineer.

UNITS, WEIGHTS AND MEASURES

One British thermal unit (B.t.u.) = $\frac{1}{180}$ of the heat required to raise the temperature of 1 lb. of water from 32 deg. to 212 deg. fahr. This is substantially equal to the quantity of heat required to raise 1 lb. of water from 63 deg. to 64 deg. fahr.

One mean calorie = $\frac{1}{100}$ of the heat required to raise 1 gram of water from 0 deg. to 100 deg. cent. This is substantially equal to the quantity of heat required to raise one gram of water from 17 deg. to 18 deg. cent.

One mean calorie = 0.003968 B.t.u. = 3.085 ft. lb. = 0.0011626 w.hr.

Power, Work, Etc.

1 ton refrigeration	= 199,038 B.t.u. per minute (approx.)
Latent heat of ice	= 143.33 B.t.u. per pound.
1 B.t.u. (British thermal unit)	= { 777.5 ft. lb. = 0.293 watt hours. 252.02 mean calories.
1 watt hour (w.hr.)	= 2,655.4 ft. lb. = 3.415 B.t.u.
1 kilowatt (1,000 watts) (kw)	= { 1.3405 horsepower = 56.89 B.t.u. per minute 44,236.5 ft. lb. per minute.
1 horsepower (hp.)	= 0.746 kilowatt
1 mech. horsepower	= { 42.44 B.t.u. per minute. 33,000 ft. lb. per minute.
1 boiler horsepower	= { 33,523.7 B.t.u. per hour or evaporation of 34.5 lb. of water per hour from and at 212 deg. fahr.

Weights and Volume

1 gal. (U. S.)	= 231 cu. in. = 0.13368 cu. ft.
1 British or Imperial gallon	= 277.274 cu. in.
1 cu. ft.	= 7.4805 gal. = 1,728 cu. in.
1 cu. ft. water at 60 deg. fahr.	= 62.37 lb.
1 cu. ft. water at 212 deg. fahr.	= 59.76 lb.
1 gal. water at 60 deg. fahr.	= 8.34 lb.
1 gal. water at 212 deg. fahr.	= 7.99 lb.