

# Conversion Factors

Acceleration	1 m/s <sup>2</sup>	= 4.2520 × 10 <sup>7</sup> ft/h <sup>2</sup>
Area	1 m <sup>2</sup>	= 1550.0 in. <sup>2</sup>
		= 10.764 ft <sup>2</sup>
Density	1 kg/m <sup>3</sup>	= 0.062428 lb/ft <sup>3</sup>
		= 1.94 × 10 <sup>-3</sup> slug/ft <sup>3</sup>
Energy	1 J	= 1 N · m
		= 0.2390 cal
		= 9.4787 × 10 <sup>-4</sup> Btu
Force	1 BTU	= 778.17 ft · lbf
	1 N	= 1 kg · m/s <sup>2</sup>
		= 0.22481 lbf
	1 lbf	= 1 slug · ft/s <sup>2</sup>
		= 32.174 lb · ft/s <sup>2</sup>
Energy transfer rate	1 W	= 3.412 Btu/h
Heat flux	1 W/m <sup>2</sup>	= 0.3171 Btu/h · ft <sup>2</sup>
Heat generation rate	1 W/m <sup>3</sup>	= 0.09665 Btu/h · ft <sup>3</sup>
Heat transfer coefficient	1 W/m <sup>2</sup> · K	= 0.17612 Btu/h · ft <sup>2</sup> · °F
Kinematic viscosity and diffusivities	1 m <sup>2</sup> /s	= 3.875 × 10 <sup>4</sup> ft <sup>2</sup> /h
		= 10.76 ft <sup>2</sup> /s
Length	1 m	= 39.370 in.
		= 3.2808 ft
	1 km	= 0.62137 mile
Mass	1 kg	= 2.2046 lb
		= 6.852 × 10 <sup>-2</sup> slug
Mass flow rate	1 kg/s	= 2.2046 lb/s
Power	1 W	= 1 N · m/s
	1 kW	= 1.341 hp
	1 hp	= 550 ft · lbf/s
		= 2545 Btu/h
Pressure and stress	1 N/m <sup>2</sup>	= 1 Pa
		= 1.4504 × 10 <sup>-4</sup> lbf/in. <sup>2</sup>
		= 4.015 × 10 <sup>-3</sup> in. water
		= 2.953 × 10 <sup>-4</sup> in. Hg
		= 1 standard atmosphere
	1.0133 × 10 <sup>5</sup> N/m <sup>2</sup>	= 1 bar
	1 × 10 <sup>5</sup> N/m <sup>2</sup>	= 1 bar
Specific energy	1 kJ/kg	= 0.42992 Btu/lb
Specific heat	1 J/kg · K	= 2.3886 × 10 <sup>-4</sup> Btu/lb · °R
Temperature	K	= (5/9)°R
		= (5/9)(°F + 459.67)
		= °C + 273.15
Temperature difference	1 K	= 1°C
		= (9/5)°R = (9/5)°F
Thermal conductivity	1 W/m · K	= 0.57782 Btu/h · ft · °F

Thermal resistance	1 K/W	= 0.52750 °F/h · Btu
Viscosity (dynamic)	1 N · s/m <sup>2</sup>	= 1 kg/s · m = 2419.1 lb/ft · h = 5.8016 × 10 <sup>-6</sup> lbf · h/ft <sup>2</sup> = 2.089 × 10 <sup>-2</sup> lbf · s/ft <sup>2</sup>
Volume	1 m <sup>3</sup>	= 6.1023 × 10 <sup>4</sup> in. <sup>3</sup> = 35.314 ft <sup>3</sup> = 264.17 gal = 10 <sup>3</sup> L
Volume flow rate	1 gal 1 m <sup>3</sup> /s	= 0.13368 ft <sup>3</sup> = 2.1188 × 10 <sup>3</sup> ft <sup>3</sup> /min = 1.5850 × 10 <sup>4</sup> gal/min

## *Physical Constants*

Universal Gas Constant:

$$\begin{aligned}\bar{R} &= 8.314 \text{ kJ/kmol} \cdot \text{K} \\ &= 8314 \text{ N} \cdot \text{m/kmol} \cdot \text{K} \\ &= 1545 \text{ ft} \cdot \text{lbf/lbmol} \cdot ^\circ\text{R} \\ &= 1.986 \text{ Btu/lbmol} \cdot ^\circ\text{R}\end{aligned}$$

Stefan-Boltzmann Constant:

$$\begin{aligned}\sigma &= 5.670 \times 10^{-8} \text{ W/m}^2 \cdot \text{K}^4 \\ &= 0.1714 \times 10^{-8} \text{ Btu/h} \cdot \text{ft}^2 \cdot ^\circ\text{R}^4\end{aligned}$$

Blackbody Radiation Constants:

$$\begin{aligned}C_1 &= 3.7420 \times 10^8 \text{ W} \cdot \mu\text{m}^4/\text{m}^2 \\ &= 1.187 \times 10^8 \text{ Btu} \cdot \mu\text{m}^4/\text{h} \cdot \text{ft}^2 \\ C_2 &= 1.4388 \times 10^4 \mu\text{m} \cdot \text{K} \\ &= 2.5897 \times 10^4 \mu\text{m} \cdot ^\circ\text{R} \\ C_3 &= 2897.8 \mu\text{m} \cdot \text{K} \\ &= 5215.6 \mu\text{m} \cdot ^\circ\text{R}\end{aligned}$$

Gravitational Acceleration (Sea Level):

$$g = 9.807 \text{ m/s}^2 = 32.174 \text{ ft/s}^2$$

Standard Atmospheric Pressure:

$$p = 1.01325 \text{ bar} = 101,325 \text{ N/m}^2 = 14.696 \text{ lbf/in.}^2$$