Appendix H

Conversion Factors

Dimension	Metric	English
Acceleration	$1\,\text{m/s}^2 = 100\,\text{cm/s}^2$	$1\,\text{m/s}^2 = 3.2808\,\text{ft/s}^2$ $1\,\text{ft/s}^2 = 0.3048\,\text{m/s}^2$
Area	$1\,\text{m}^2 = 104\,\text{cm}^2 = 10^6\,\text{mm}^2 = 10^{-6}\,\text{km}^2$	$1\,\text{m}^2 = 1550\,\text{in.}^2 = 10.764\,\text{ft}^2$ $1\,\text{ft}^2 = 144\,\text{in.}^2 = 0.0929034\,\text{m}^2$
Density	$1\,\text{g/cm}^3 = 1\,\text{kg/L} = 1000\,\text{kg/m}^3$	$1\,\text{g/cm}^3 = 62.428\,\text{lbm/ft}^3 = 0.036127\,\text{lbm/in.}^3$ $1\,\text{lbm/in.}^3 = 1728\,\text{lbm/ft}^3$ $1\,\text{kg/m}^3 = 0.062428\,\text{lbm/ft}^3$
Energy, Heat, Work, Internal Energy, Enthalpy	$1\,\text{kJ} = 1000\,\text{J} = 1000\,\text{N·m} = 1\,\text{kPa·m}^3$ $1\,\text{kJ/kg} = 1000\,\text{m}^2/\text{s}^2$ $1\,\text{kWh} = 3600\,\text{kJ}$ $1\,\text{Wh} = 3600\,\text{J}$ $1\,\text{cal} = 4.1868\,\text{J}$ $1\,\text{Cal} = 4.1868\,\text{kJ}$	$1\,\text{kJ} = 0.94782\,\text{Btu}$ $1\,\text{Btu} = 1.055056\,\text{kJ}$ $= 5.40395\,\text{psia·ft}^3$ $= 778.169\,\text{lbf·ft}$ $1\,\text{Btu/lbm} = 25.037\,\text{ft}^2/\text{s}^2$ $= 2.326\,\text{kJ/kg}$ $1\,\text{kJ/kg} = 0.430\,\text{Btu/lbm}$ $1\,\text{kWh} = 3412.14\,\text{Btu}$ $1\,\text{therm} = 10^5\,\text{Btu} = 1.055 \times 10^5\,\text{kJ}$ (natural gas)
Force	$1\,\text{N} = 1\,\text{kg·m/s}^2 = 10^5\,\text{dyne}$ $1\,\text{kgf} = 9.80665\,\text{N}$	$1\,\text{N} = 0.22481\,\text{lbf}$ $1\,\text{lbf} = 32.174\,\text{lbm·ft/s}^2 = 4.44822\,\text{N}$
Heat flux	$1\,\text{W/cm}^2 = 10^4\,\text{W/m}^2$	$1\,\text{W/m}^2 = 0.3171\,\text{Btu/h·ft}^2$
Heat Transfer Coefficient	$1\,\text{W/m}^2\text{·°C} = 1\,\text{W/m}^2\text{·K}$	$1\,\text{W/m}^2\text{·°C} = 0.17612\,\text{Btu/h·ft}^2\text{·°F}$
Length	$1\,\text{m} = 100\,\text{cm} = 1000\,\text{mm} = 10\,\mu\text{m}$ $1\,\text{km} = 1000\,\text{m}$	$1\,\text{m} = 39.370\,\text{in.} = 3.2808\,\text{ft} = 1.0926\,\text{yd}$ $1\,\text{ft} = 12\,\text{in.} = 0.3048\,\text{m}$ $1\,\text{mile} = 5280\,\text{ft} = 1.6093\,\text{km}$ $1\,\text{in.} = 2.54\,\text{cm} = 25.4\,\text{mm}$ $1\,\text{yard} = 0.9144\,\text{m}$

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Dimension	Metric	English
Mass	1 kg = 1000 g 1 metric ton = 1000 kg	1 kg = 2.2046226 lbm 1 lbm = 0.45359237 kg 1 ounce = 28.3495 g 1 slug = 32.174 lbm = 14.5939 kg 1 short ton = 2000 lbm = 907.1847 kg
Power, Heat Transfer Rate	1 W = 1 J/s 1 kW = 1000 W = 1.341 hp 1 hp = 745.7 W	1 kW = 3412.14 Btu/h = 737.56 lbf·ft/s 1 hp = 550 lbf·ft/s = 0.7068 Btu/s = 42.41 Btu/min = 2544.5 Btu/h = 0.74570 kW 1 boiler hp = 33,475 Btu/h 1 Btu/h = 1.055056 kJ/h 1 ton of refrigeration = 200 Btu/min = 3.516 kW
Pressure	$1\,Pa = 1\,N/m^2$ $1\,kPa = 10^3\,Pa = 10^{-3}\,Mpa$ $1\,bar = 10^5\,Pa$ 1 atm = 101.325 kPa = 1.01325 bars = 760 mm Hg at 0°C = 1.03323 kgf/cm^2 1 mm Hg = 0.1333 kPa 1 torr = 133.322 Pa $1\,dyne/cm^2 = 10\,Pa$	$1\,Pa = 1.4504 \times 10^{-4}\,psia$ $= 0.020886\,lbf/ft^2$ $1\,psi = 144\,lbf/ft^2 = 6.894757\,kPa$ 1 in. Hg = 3.387 kPa 1 atm = 14.696178 psia 1 in. H_2O (60°F) = 248.84 Pa
Specific Heat	1 kJ/kg·°C = 1 kJ/kg·K = 1 J/g·°C	1 Btu/lbm·°F = 4.1868 kJ/kg·°C 1 Btu/lbmol·R = 4.1868 kJ/kmol·K 1 kJ/kg·°C = 0.23885 Btu/lbm·°F = 0.23885 Btu/lbm·R
Specific Volume	$1\,m^3/kg = 1000\,L/kg = 1000\,cm^3/g$	$1\,m^3/kg = 16.02\,ft^3/lbm$ $1\,ft^3/lbm = 0.062428\,m^3/kg$
Temperature	T(K) = T(°C) + 273.15 ΔT(K) = ΔT(°C)	T(R) = T(°F) + 459.67 = 1.8 T(K) T(°F) = 1.8T(°C) + 32 ΔT°F) = ΔT(R) = 1.8 ΔT(K)
Thermal Conductivity	1 W/m·°C = 1 W/m·K	1 W/m·°C = 0.57782 Btu/h·/ft·°F
Velocity	1 m/s = 3.60 km/h	1 m/s = 3.2808 ft/s = 2.237 mi/h 1 mi/h = 1.46667 ft/s 1 mi/h = 1.6093 km/h
Absolute Viscosity	$1\,centipoise\,(cP) = 10^{-3}\,N·s/m^2$ 1 Poise (P) = 100 centipoise	$1\,N·s/m^2 = 2.088543\,lbf·s/ft^2$ = 0.671969 lbm/ft·s
Kinematic Viscosity	$1\,centistoke = 10^6\,m^2/s$ 1 Stoke = 100 centistoke	$1\,m^2/s = 10.7639104\,ft^2/s$

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Dimension	Metric	English
Volume	$1 \text{ m}^3 = 1000 \text{ L} = 10^6 \text{ cm}^3$ (cc)	$1 \text{ m}^3 = 6.1024 \times 10^4 \text{ in.}^3 =$ $35.315 \text{ ft}^3 = 264.17 \text{ gal (U.S)}$ $1 \text{ U.S. gallon} = 231 \text{ in.}^3 = 3.7854 \text{ L}$ $= 0.1336805 \text{ ft}^3$ $1 \text{ fl ounce} = 29.5735 \text{ cm}^3 = 0.0295735 \text{ L}$ $1 \text{ U.S. gallon} = 128 \text{ fl ounces}$
Volume Flow Rate	$1 \text{ m}^3/\text{s} = 60{,}000 \text{ L/min} = 10^6 \text{ cm}^3/\text{s}$	$1 \text{ m}^3/\text{s} = 15{,}850 \text{ gal/min (gpm)} =$ $35.315 \text{ ft}^3/\text{s} = 2118.9 \text{ ft}^3/\text{min (cfm)}$