ME 201
Thermodynamics

Dimension and Units

Physical Quantity	SI Unit	USCS Unit	Other
mass	kilogram (kg) 1 kg = 2.20 lb_m	pound-mass (lb_m) 1 lb_m = 0.45 kg	1 gm = 0.001 kg = 0.0022 lb_m 1 slug = 14.59 kg = 32.17 lb_m 1 ton = 907.18 kg = 2000 lb_m
length	meter (m) 1 m = 3.28 ft	foot(ft) 1 ft = 0.305 m	1 km = 1000 m = 3280 ft 1 cm = 0.01 m = 0.0328 ft 1 in = 0.0254 m = 0.083 ft 1 mile = 1609.3 m = 5280 ft
time	second(s)	second(s)	1 min = 60 s 1 hr = 3600 s
temperature	Kelvins (K) T(K) = 0.56·T(R)	Rankine (R) T(R) = 1.8·T(K)	T(°C) = T(K) - 273.15 = 0.56·T(R) -273.15 T(°F) = 1.8·T(K) - 459.67 = T(R) - 459.67
temperature change	$\Delta T(K) = 0.56 \cdot \Delta T(R)$	$\Delta T(K) = 1.8 \cdot \Delta T(R)$	$\Delta T(^oC) = \Delta T(K)$ $= 0.56 \cdot \Delta T(R)$ $\Delta T(^oF) = 1.8 \cdot \Delta T(K)$ $= \Delta T(R)$
force	Newton (N) 1 N = 0.2248 lb_f	pound-force (lb_f) 1 lb_f = 4.448 N	1 dyne = 10^{-5} N = 2.248 x 10^{-6} lb_f
work, energy, heat	Joule (J) 1 J = 0.737 $lb_f \cdot ft$	foot-pound ($lb_f \cdot ft$) 1 $lb_f \cdot ft$ = 1.357 J	1 Btu = 1055 J = 778.169 $lb_f \cdot ft$ 1 cal = 4.184 J = 0.00397 Btu 1 kJ = 1000 J = 0.9478 Btu 1 kW·hr = 3600 kJ = 3412 Btu
specific energy	1 J/kg = 1.62 $lb_f \cdot ft/lb_m$	1 lb_f ft/lb_m = 0.617 J/kg	1 Btu/lb_m = 2.326 kJ/kg
specific kinetic energy	1 m^2/s^2 = 10.76 ft^2/s^2	1 ft^2/s^2 = 0.093 m^2/s^2	1 Btu/lb_m = 25057 ft^2/s^2 1 kJ/kg = 1000 m^2/s^2

pressure	Pascal (Pa) 1 Pa = 1.45 x 10^{-4} psia	1 psia = 6.895 kPa	1 atm = 101.33 kPa = 14.696 psia 1 in of Hg = 3.387 kPa = 0.49 psia 1 bar = 100 kPa = 14.50 psia 1 mm of Hg = 0.133 kPa = 0.019 psia
power	Watt (W) 1 W = 0.737 $lb_f \cdot ft/s$	1 lb_f ft/s = 1.357 W	1 kW = 1000 W = 3412.4 Btu/hr 1 Btu/hr = 0.293 W 1 hp = 0.7457 kW = 2544.5 Btu/hr
volume	1 m^3 = 35.315 ft^3	1 ft^3 = 0.0283 m^3	1 liter = 10^{-3} m^3 = 0.0353 ft^3 1 gallon = 0.00379 m^3 = 0.134 ft^3
velocity	1 m/s = 3.2808 ft/s	1 ft/s = 0.3048 m/s	1 km/hr = 0.278 m/s = 0.911 ft/s 1 mph = 0.447 m/s = 1.467 ft/s
specific volume	1 m^3/kg = 16.02 ft^3/lb_m	1 ft^3/lb_m = 0.062 m^3/kg	1 cm^3/gm = 0.001 m^3/kg = 0.016 ft^3/lb_m
density	1 kg/m^3 = 0.062 lb_m/ft^3	1 lb_m/ft^3 = 16.02 kg/m^3	