Product Information Bulletin

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Units and Conversions

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Units of Measure and Conversion Factors

The **International System of Units** (abbreviated **SI** = ***S****ystème* ***I****nternationale*) is accepted as the metric system and is generally a system devised around the convenience of the number ten. It is the most commonly used system of measurement, both in everyday commerce and in science.

Although the SI system is nearly universally employed, one principal exception is the United States which uses US Customary units. Another system of measurement used in Canada and most Commonwealth countries prior to adoption of SI was Imperial units.

While Imperial and US customary systems are closely related inch-pound units of measure, there are a number of differences between them. Units of length and area (the inch, foot, yard, mile etc.) are identical except for surveying purposes. Where these two systems differ most notably is in their units of volume. A U.S. fluid ounce (fl. oz.) converts to 29.6 millilitres (ml) and is slightly larger than the Imperial fluid ounce (28.4 ml). However, as there are 16 U.S. fl. oz. to a U.S. pint and 20 Imperial fl. oz. per Imperial pint, the Imperial pint is about 20% larger. The same is true of quarts, gallons, etc. Six U.S. gallons are a little less than five Imperial gallons.

The attached charts provide conversion factors provide some commonly used SI, Imperial and US Customary units. Additional conversion factors can be found from various more extensive sources such as the NRC publication Manual on Metric Building Drawing Practice and NIST Special Publication 1038 (The International System of Units (SI) – Conversion Factors for General Use).

Measurement	To Convert from Inch-Pound Units	Multiply by	To Obtain Metric (SI) Units
Length	1 inch (in)	25.4	millimeter (mm)
	1 foot (ft)	0.3048	meter (m)
Area	1 square foot (ft^2)	0.0929	square meter (m^2)
	1 square (100 ft^2)	9.29	m^2
Volume	1 cubic foot (ft^3)	0.02832	cubic meter (m^3)
	1000 board feet (MBF)	2.36	m^3
	1 Gallon (Imperial)	4.546	l (Liters)
	1 Gallon (US)	3.785	l (Liters)
Mass	1 pound (lb)	0.4536	kg (kilogram)
Temperature	1 degree Fahrenheit (°F)	5/9 x (°F-32)	degree Celsius (°C)
Force (or thrust)	1 pound-force (lb_f)	4.448	N (Newton)
Force per unit length	1 lb_f/ft	0.0146	kN/m
		1.49	kg/m
Force per unit area (strength properties)	1 psi	6.895	kPa (1 kPa = 1 kN/m^2 = 0.001 N/mm^2)
	1 psf	0.0479	kPa
Modulus of subgrade reaction	1 pci	0.0728	MN/mm^3
Density	1 pcf	16.026	kg/m^3
Thermal Conductivity (k)	1 $\frac{Btu \cdot in}{ft^2 \cdot hr \cdot °F}$	0.1442	$\frac{W}{m \cdot °C}$ (1 m thickness)
Thermal Transmittance (U)	1 $\frac{Btu}{ft^2 \cdot hr \cdot °F}$	5.678	$\frac{W}{m^2 \cdot °C}$ (overall coefficient of heat transfer)
Thermal Resistance (R-value)	1 $\frac{ft^2 \cdot hr \cdot °F}{Btu \cdot in}$	0.173	$\frac{m^2 \cdot °C}{W}$ (for 25-mm thickness)
Thermal Resistance (R)	$\frac{ft^2 \cdot hr \cdot °F}{Btu}$	0.176	$\frac{m^2 \cdot °C}{W}$
Specific Heat	1 $\frac{Btu}{lb \cdot °F}$	4.186	$\frac{kJ}{kg \cdot °C}$
Heat of Fusion	1 $\frac{Btu}{lb}$	2.326	$\frac{kJ}{kg}$
Heat Quantity	1 Btu	1.055	kJ
Heat Flow	1 $\frac{Btu}{Hr}$	0.293	W
Permeability (unit of thickness specified)	1 perm-in	1.459	$\frac{ng}{Pa \cdot s \cdot m}$ (1 m thickness)
		58.36	$\frac{ng}{Pa \cdot s \cdot m}$ (25-mm thickness)
Permeance	1 perm	57.453	$\frac{ng}{Pa \cdot s \cdot m^2}$
Vapour Flow	1 $\frac{grain}{hr \cdot ft^2}$	0.697	$\frac{g}{h \cdot m^2}$

Measurement	To Convert Metric (SI) Units	Multiply by	To Obtain Inch-Pound Units
Length	1 mm	0.0394	inch
	1 m	3.281	foot
Area	1 m^2	10.764	$feet^2$
	1 m^2	0.1076	square
Volume	1 m^3	35.31	$feet^3$
	1 m^3	0.424	MBF (1000 Board Feet)
	1 Liter	0.220	gallon (Imperial)
	1 Liter	0.264	gallon (US)
Mass	1 kg	2.205	Pound (lb)
Temperature	1 Degree Celsius (°C)	1.8 °C +32	Degree Fahrenheit (°F)
Force (or thrust)	1 N	0.225	Pound-force (lb_f)
Force per unit of length	1 kN/m	68.493	lb_f/ft
	1 kg/m	0.671	
Force per unit of area (strength properties)	1 kPa	0.145	psi
	1 kPa	20.88	psf
Modulus of subgrade reaction	1 MN/mm^3	13.730	pci
Density	1 kg/m^3	0.0624	pcf
Thermal Conductivity (k) at 1 m thickness	1 $\frac{W}{m•°C}$	6.935	$\frac{Btu•in}{ft^2•hr•°F}$
Overall Thermal Transmittance (U)	1 $\frac{W}{m^2•°C}$	0.176	$\frac{Btu}{ft^2•hr•°F}$
Thermal Resistance (RSI for 25-mm thickness)	1 $\frac{m^2•°C}{W}$	5.769	$\frac{ft^2•hr•°F}{Btu•in}$
Thermal Resistance (R)	1 $\frac{m^2•°C}{W}$	5.678	$\frac{ft^2•hr•°F}{Btu}$
Specific Heat	1 $\frac{kJ}{kg•°C}$	0.239	$\frac{Btu}{lb•°F}$
Heat of Fusion	1 $\frac{kJ}{kg}$	0.430	$\frac{Btu}{lb}$
Heat Quantity	1 kJ	0.948	Btu
Heat Flow	1 W	3.413	$\frac{Btu}{Hr}$
Permeability (unit of thickness specified)	1 $\frac{ng}{Pa•s•m}$ (1 m thickness)	0.685	perm-in
	1 $\frac{ng}{Pa•s•m}$ for 25-mm thickness	0.0171	perm-in
Permeance	1 $\frac{ng}{Pa•s•m^2}$	0.0174	perm
Vapour Flow	1 $\frac{g}{h•m^2}$	1.435	$\frac{grains}{hr•ft^2}$