APPENDIX

FACTORS FOR CONVERSION TO THE METRIC SYSTEM (SI) OF UNITS

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Congress committed the United States to conversion to the metric system of units when it passed the Metric Conversion Act of 1975. This Act states that it shall be the policy of the United States to change to the metric system in a coordinated manner and that the purpose of this coordination shall be to reduce the total cost of the conversion. While conversion has already taken place in some industries and in some engineering disciplines, conversion is taking place in short steps at long time intervals in building design and construction. Consequently, conventional units are used throughout the preceding portion of this handbook. The metric system is explained and factors for conversion to it are presented in this Appendix, to guide and assist those who have need to apply metric units in design or construction.

The system of units that is being adopted in the United States is known as the International System of units, or SI, an abbreviation of the French *Le Système International d'Unités.* This system, intended as a basis for worldwide standardization of measurement units, was developed and is being maintained by the General Conference on Weights and Measures (CGPM).

For engineering, the SI has the advantages over conventional units of being completely decimal and of distinguishing between units of mass and units of force. With conventional units, there sometimes is confusion between use of the two types of units. For example, lb or ton may represent either mass or force.

SI units are classified as base, supplementary, or derived units. There are seven base units (Table A.1), which are dimensionally independent, and two supplementary units (Table A.2), which may be regarded as either base or derived units.

Derived units are formed by combining base units, supplementary units, and other derived units in accordance with algebraic relations linking the corresponding quantities. Symbols for derived units represent the mathematical relationships between the component units. For example, the SI unit for velocity, metre per second, is represented by m/s; that for acceleration, metres per second per second, by m/s^2, and that for bending moment, newton-metres, by $N \cdot m$. Figure A.1 indicates how units may be combined to form derived units.

TABLE A.1 SI Base Units

Quantity	Unit	Symbol
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Amount of substance	mole	mol
Luminous intensity	candela	cd

TABLE A.2 Supplementary SI Units

Quantity	Unit	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

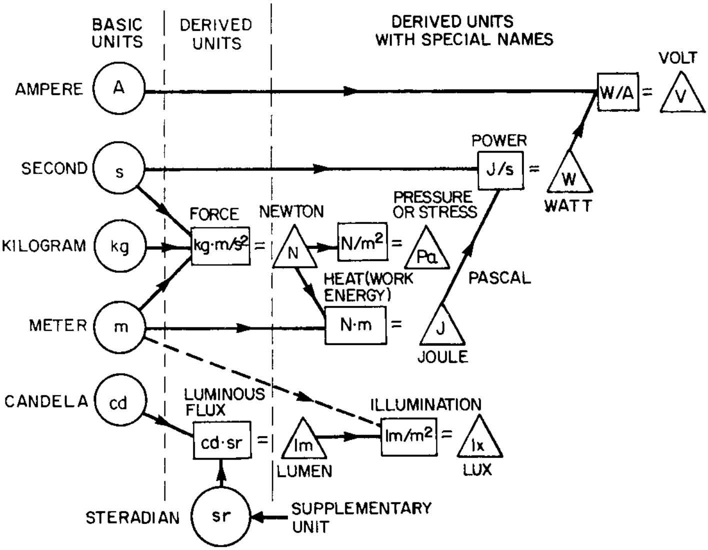

FIGURE A.1 How SI units of measurement may be combined to form derived units.

As indicated in Fig. A.1, some of the derived units have been given special names; for example, the unit of energy, N · m is called joule and the unit of pressure or stress, N/m^2, is called pascal. Table A.3 defines derived SI units that have special names and symbols approved by CGPM. Some such units used in building design and construction are given in Table A.4; others are listed with the conversion factors in Table A.6.

TABLE A.3 Derived SI Units with Special Names

Quantity	Unit	Symbol	Formula	Definition
Celsius temperature	degree Celsius	℃	K − 273.15	The *degree Celsius* is equal to the kelvin and is used in place of the kelvin for expressing Celsius temperature (symbol t) defined by the equation $t = T - T_0$ where T is the thermodynamic temperature and $T_0 = 273.15$ K by definition.
Electric capacitance	farad	F	C/V	The *farad* is the capacitance of a capacitor between the plates of which there appears a difference of potential of one volt when it is charged by a quantity of electricity equal to one coulomb.
Electric conductance	siemens	S	A/V	The *siemens* is the electric conductance of a conductor in which a current of one ampere is produced by an electric potential difference of one volt.
Electric inductance	henry	H	Wb/A	The *henry* is the inductance of a closed circuit in which an electromotive force of one volt is produced when the electric current in the circuit varies uniformly at a rate of one ampere per second.
Electric potential difference, electromotive force	volt	V	W/A	The *volt* (unit of electric potential difference and electromotive force) is the difference of electric potential between two points of a conductor carrying a constant current of one ampere, when the power dissipated between these points is equal to one watt.
Electric resistance	ohm	Ω	V/A	The *ohm* is the electric resistance between two points of a conductor when a constant difference of potential of one volt, applied between these two points, produces in this conductor a current of one ampere, this conductor not being the source of any electromotive force.
Energy	joule	J	N · m	The *joule* is the work done when the point of application of a force of one newton is displaced a distance of one metre in the direction of the force.

TABLE A.3 Derived SI Units with Special Names (*Continued*)

Quantity	Unit	Symbol	Formula	Definition
Force	newton	N	$kg \cdot m/s^2$	The *newton* is that force which, when applied to a body having a mass of one kilogram, gives it an acceleration of one metre per second squared.
Frequency	hertz	Hz	$1/s$	The *hertz* is the frequency of a periodic phenomenon of which the period is one second.
Illuminance	lux	lx	lm/m^2	The *lux* is the illuminance produced by a luminous flux of one lumen uniformly distributed over a surface of one metre.
Luminous flux	lumen	lm	$cd \cdot sr$	The *lumen* is the luminous flux emitted in a solid angle of one steradian by a point source having a uniform intensity of one candela.
Magnetic flux	weber	Wb	$V \cdot s$	The *weber* is the magnetic flux which, linking a circuit of one turn, produces in it an electromotive force of one volt as it is reduced to zero at a uniform rate in one second.
Magnetic flux density	tesla	T	Wb/m^2	The *tesla* is the magnetic flux density given by a magnetic flux of one weber per square metre.
Power	watt	W	J/s	The *watt* is the power which gives rise to the production of energy at the rate of one joule per second.
Pressure or stress	pascal	Pa	N/m^2	The *pascal* is the pressure or stress of one newton per square metre.
Quantity of electricity	coulomb	C	$A \cdot s$	The *coulomb* is the quantity of electricity transported in one second by a current of one ampere.

Prefixes. Except for the unit of mass, the kilogram (kg), names and symbols of multiples of SI units by powers of 10, positive or negative, are formed by adding a prefix to base, supplementary, and derived units. Table A.5 lists prefixes approved by CGPM. For historical reasons, kilogram has been retained as a base unit. Nevertheless, for units of mass, prefixes are attached to gram, 10^{-3} kg. Thus, from Table A.5, $1\ \text{Mg} = 10^3\ \text{kg} = 10^6\ \text{g}$.

The prefixes should be used to indicate orders of magnitude without including insignificant digits in whole numbers or leading zeros in decimals. Preferably, a prefix should be chosen so that the numerical value associated with a unit lies

TABLE A.4 Some Common Derived Units of SI

Quantity	Unit	Symbol
Acceleration	metre per second squared	m/s^2
Angular acceleration	radian per second squared	rad/s^2
Angular velocity	radian per second	rad/s
Area	square metre	m^2
Density, mass	kilogram per cubic metre	kg/m^3
Energy density	joule per cubic metre	J/m^3
Entropy	joule per kelvin	J/K
Heat capacity	joule per kelvin	J/K
Heat flux density	watt per square metre	W/m^2
Irradiance	watt per square metre	W/m^2
Luminance	candela per square metre	cd/m^2
Magnetic field strength	ampere per metre	A/m
Moment of force	newton-metre	$N \cdot m$
Power density	watt per square metre	W/m^2
Radiant intensity	watt per steradian	W/sr
Specific heat capacity	joule per kilogram kelvin	$J/(kg \cdot K)$
Specific energy	joule per kilogram	J/kg
Specific entropy	joule per kilogram kelvin	$J/(kg \cdot K)$
Specific volume	cubic metre per kilogram	m^3/kg
Surface tension	newton per metre	N/m
Thermal conductivity	watt per metre kelvin	$W/(m \cdot K)$
Velocity	metre per second	m/s
Viscosity, dymanic	pascal second	$Pa \cdot s$
Viscosity, kinematic	square metre per second	m^2/s
Volume	cubic metre	m^3

TABLE A.5 SI Prefixes

Multiplication factor	Prefix	Symbol
1 000 000 000 000 000 000 = 10^{18}	exa	E
1 000 000 000 000 000 = 10^{15}	peta	P
1 000 000 000 000 = 10^{12}	tera	T
1 000 000 000 = 10^{9}	giga	G
1 000 000 = 10^{6}	mega	M
1 000 = 10^{3}	kilo	k
100 = 10^{2}	hecto*	h
10 = 10^{1}	deka*	da
0.1 = 10^{-1}	deci*	d
0.01 = 10^{-2}	centi*	c
0.001 = 10^{-3}	milli	m
0.000 001 = 10^{-6}	micro	μ
0.000 000 001 = 10^{-9}	nano	n
0.000000000001 = 10^{-12}	pico	p
0.000000000000001 = 10^{-15}	femto	f
0.000 000 000 000 000 001 = 10^{-18}	atto	a

*To be avoided where practical.

between 0.1 and 1000. Preferably also, prefixes representing powers of 1000 should be used. Thus, for building construction, units of length should be millimetres, mm; metres, m; and kilometres, km. Units of mass should be milligrams, mg; gram, g; kilogram, kg; and megagram, Mg.

When values of a quantity are listed in a table or when such values are being compared, it is desirable that the same multiple of a unit be used throughout.

In the formation of a multiple of a compound unit, such as of velocity, m/s, only one prefix should be used, and, except when kilogram occurs in the denominator, the prefix should be attached to a unit in the numerator. Examples are kg/m and MJ/kg; do not use g/mm or kJ/g, respectively. Also, do not form a compound prefix by juxtaposing two or more prefixes; for example, instead of Mkm, use Gm. If values outside the range of approved prefixes should be required, use a base unit multiplied by a power of 10.

To indicate that a unit with its prefix is to be raised to a power indicated by a specific exponent, the exponent should be applied after the unit; for example, the unit of volume, $mm^3 = (10^{-3}\ m)^3 = 10^{-9}\ m^3$.

Units in Use with SI. Where it is customary to use units from different systems of measurement with SI units, it is permissible to continue the practice, but such uses should be minimized. For example, for time, while the SI unit is the second, it is customary to use minutes (min), hours (h), days (d), etc. Thus, velocities of vehicles may continue to be given as kilometres per hour (km/h). Similarly, for angles, while the SI unit for plane angle is the radian, it is permissible to use degrees and decimals of a degree. As another example, for volume, the cubic metre is the SI unit, but liter (L), mL, or μL may be used for measurements of liquids and gases. Also, for mass, while Mg is the appropriate SI unit for large quantities, short ton, long ton, or metric ton may be used for commercial applications.

For temperature, the SI unit is the kelvin, K, whereas degree Celsius, °C (formerly centigrade) is widely used. A temperature interval of 1°C is the same as 1 K, and $°C = K - 273.15$, by definition.

SI Units Preferred for Construction. Preferred units for measurement of length for relatively small structures, such as buildings and bridges, are millimetres and metres. Depending on the size of the structure, a drawing may conveniently note: "All dimensions shown are in millimetres" or "All dimensions shown are in metres." By convention, the unit for numbers with three digits after the decimal point, for example, 26.375 or 0.425 or 0.063, is metres, and the unit for whole numbers, for example, 2638 or 425 or 63, is millimetres. Hence, it may not be necessary to show unit symbols. For large-size construction, such as highways, metres and kilometres may be used for length measurements and millimetres for width and thickness.

For area measurements, square metres, m^2, are preferred, but mm^2 are acceptable for small areas. $1\ m^2 = 106\ mm^2$. For very large areas, square kilometres, km^2, or hectares, ha, may be used. $1\ ha = 10^4\ m^2 = 10^{-2}\ km^2$.

For volume measurements, the preferred unit is the cubic metre, m^3. The volume of liquids, however, may be measured in litres, L, or millilitres, mL. $1\ L = 10^{-3}\ m^3$. For flow rates, cubic metres per second, m^3/s, cubic metres per hour, m^3/h, and litres per second, L/s, are preferred.

For concentrated gravity loads, the force units newton, N, or kilonewton, kN, should be used. For uniformly distributed wind and gravity loads, kN/m^2 is preferred. (Materials weighed on spring scales register the effect of the force of gravity, but for commercial reasons, the scales may be calibrated in kilograms, the units of mass. In such cases, the readings should be multiplied by g, the acceleration of a mass due to gravity, to obtain the load in newtons.) For dynamic calculations, the force in newtons equals the product of the mass, kg, by the acceleration a, m/s^2, of the mass. The recommended value of g for design purposes in the United States is 9.8 m/s^2. The standard international value for g is 9.806650 m/s^2, whereas it actually ranges between 9.77 and 9.83 m/s^2 over the surface of the earth.

For both pressure and stress, the SI unit is the pascal, Pa (1 Pa = 1 N/m^2). Because section properties of structural shapes are given in millimetres, it is more convenient to give stress in newtons per square millimetre (1 N/mm^2 = 1 MPa). For energy, work, and quantity of heat, the SI unit is the joule, J (1 J = 1 N · m = 1 W · s). The kilowatthour, kWh (more accurately, kW · h) is acceptable for electrical measurements. The watt, W, is the SI unit for power.

Dimensional Coordination. The basic concept of dimensional coordination is selection of the dimensions of the components of a building and installed equipment so that sizes may be standardized and the items fitted into place with a minimum of cutting in the field. One way to achieve this is to make building components and equipment to fit exactly into a basic cubic module or multiples of the module, except for the necessary allowances for joints and manufacturing tolerances. For the purpose, a basic module of 4 in is widely used in the United States. Larger modules often used include 8 in, 12 in, 16 in, 2 ft, 4 ft, and 8 ft.

For modular coordination in the SI, Technical Committee 59 of the International Standards Organization has established 100 mm (3.937 in) as the basic module. In practice, where modules of a different size would be more convenient, preferred dimensions have been established by agreements between manufacturers of building products and building designers. For example, in Great Britain, the following set of preferences have been adopted:

1st preference	300 mm (about 12 in)
2d preference	100 mm (about 4 in)
3d preference	50 mm (about 2 in)
4th preference	25 mm (about 1 in)

Accordingly, for a dimension exceeding 100 mm, the first preference would be a multimodule of 300 mm. Second choice would be the basic module of 100 mm.

The preferred multimodules for horizontal dimensioning are 300, 600 (about 2 ft), and 1200 (about 4 ft) mm, although other multiples of 300 are acceptable. Preferred modules for vertical dimensioning are 300 and 600 mm, but increments of 100 mm are acceptable up to 3000 mm. The submodules, 25 and 50 mm, are used only for thin sections.

Some commonly used dimensions, such as the 22 in used for unit of exit width, cannot be readily converted into an SI module. For example, 22 in = 558.8 mm. The nearest larger multimodule is 600 mm (23⅝ in), and the nearest smaller multimodule is 500 mm (19^{11}⁄16 in). The use of either multimodule would affect the sizes of doors, windows, stairs, etc. For conversion of SI to occur, building designers and product manufacturers will have to agree on preferred dimensions.

Conversion Factors. Table A.6 lists factors with seven-digit accuracy for conversion of conventional units of measurement to SI units. To retain accuracy in a conversion, multiply the specified quantity by the conversion factor exactly as given in Table A.6, then round the product to the appropriate number of significant digits that will neither sacrifice nor exaggerate the accuracy of the result. For the purpose, a product or quotient should contain no more significant digits than the number with the smallest number of significant digits in the multiplication or division.

In Table A.6, the conversion factors are given as a number between 1 and 10 followed by E (for exponent), a plus or minus, and two digits that indicate the power of 10 by which the number should be multiplied. For example, to convert lbf/in^2 (psi) to pascals (Pa), Table A.6 specifies multiplication by $6.894\,757 \times 10^3$. For conversion to kPa, the conversion factor is $6.894\,757 \times 10^3 \times 10^{-3} = 6.894\,757$.

[''Standard for Metric Practice,'' E 380, and ''Practice for Use of Metric (SI) Units in Building Design and Construction,'' E 621, ASTM, 1916 Race St., Philadelphia, PA 19103; ''NBS Guidelines for Use of the Metric System,'' NBS LC 1056, Nov. 1977, and ''The International System of Units (SI),'' NBS Specification Publication 330, 1977, Superintendent of Documents, Government Printing Office, Washington, DC 20402.]

TABLE A.6 Factors for Conversion to SI Units of Measurement

To convert from	to	multiply by
acre	square metre, m^2	4.046 873 E + 03
angstrom	metre, m	1.000 000*E − 10
atmosphere (standard)	pascal, Pa	1.013 250*E + 05
bar	pascal, Pa	1.000 000*E + 05
barrel (for petroleum, 42 gal)	cubic metre, m^3	1.589 873 E − 01
board-foot	cubic metre, m^3	2.359 737 E − 03
British thermal unit (mean)	joule, J	1.055 87 E + 03
Btu (International Table) · in/(h)(ft^2)(°F) (*k*, thermal conductivity)	watt per metre kelvin, W/(m · K)	1.442 279 E − 01
Btu (International Table)/h	watt, W	2.930 711 E − 01
Btu (International Table)/(h)(ft^2)(°F) (*C*, thermal conductance)	watt per square metre kelvin, W/(m^2 · K)	5.678 263 E + 00
Btu (International Table)/lb	joule per kilogram, J/kg	2.326 000*E + 03
Btu (International Table)/(lb)(°F) (*c*, heat capacity)	joule per kilogram kelvin, J/(kg · K)	4.186 800*E + 03
Btu (International Table)/ft^3	joule per cubic metre, J/m^3	3.725 895 E + 04
bushel (U.S.)	cubic metre, m^3	3.523 907 E − 02
calorie (mean)	joule, J	4.190 02 E + 00
cd/in^2	candela per square metre, cd/m^2	1.550 003 E + 03
chain	metre, m	2.011 684 E + 01
circular mil	square metre, m^2	5.067 075 E − 10
day	second, s	8.640 000*E + 04
day (sidereal)	second, s	8.616 409 E + 04
degree (angle)	radian, rad	1.745 329 E − 02
degree Celsius	kelvin, K	$T_K = t_c + 273.15$
degree Fahrenheit	degree Celsius	$t_C = (t_F - 32)/1.8$
degree Fahrenheit	kelvin, K	$T_K = (t_F + 459.67)/1.8$
degree Rankine	kelvin, K	$T_K = T_R/1.8$
(°F)(h)(ft^2) Btu (International Table) (*R*, thermal resistance)	kelvin square metre per watt, K · m^2/W	1.761 102 E − 01
(°F)(h)(ft^2)/(Btu (International Table) · in) (thermal resistivity)	kelvin metre per watt, K · m/W	6.933 471 E + 00
dyne	newton, N	1.000 000*E − 05
fluid ounce (U.S.)	cubic metre, m^3	2.957 353 E − 05
foot	metre, m	3.048 000*E − 01
foot (U.S. survey)	metre, m	3.048 006 E − 01
foot of water (39.2°F) (pressure)	pascal, Pa	2.988 98 E + 03
ft^2	square metre, m^2	9.290 304*E − 02
ft^2/h (thermal diffusivity)	square metre per second, m^2/s	2.580 640*E − 05
ft^2/s	square metre per second, m^2/s	9.290 304*E − 02

TABLE A.6 Factors for Conversion to SI Units of Measurement (*Continued*)

To convert from	to	multiply by
ft^3 (volume or section modulus)	cubic metre, m^2	2.831 685 E − 02
ft^3/min	cubic metre per second, m^3/s	4.719 474 E − 04
ft^3/s	cubic metre per second, m^3/s	2.831 685 E − 02
ft^4 (area moment of inertia)	metre to the fourth power, m^4	8.630 975 E − 03
ft/min	metre per second, m/s	5.080 000*E − 03
ft/s	metre per second, m/s	3.048 000*E − 01
ft/s^2	metre per second squared, m/s^2	3.048 000*E − 01
foot candle	lux, lx	1.076 391 E + 01
footlambert	candela per square metre, cd/m^2	3.426 259 E + 00
ft · lbf	joule, J	1.355 818 E + 000
ft · lbf/min	watt, W	2.259 697 E − 02
ft · lbf/s	watt, W	1.355 818 E + 00
ft-poundal	joule, J	4.214 011 E − 02
free fall, standard *g*	metre per second squared, m/s^2	9.806 650*E + 00
Gallon (Canadian liquid)	cubic metre, m^3	4.546 090 E − 03
gallon (U.K. liquid)	cubic metre, m^3	4.546 092 E − 03
gallon (U.S. dry)	cubic metre, m^3	4.404 884 E − 03
gallon (U.S. liquid)	cubic metre, m^3	3.785 412 E − 03
gallon (U.S. liquid) per day	cubic metre per second, m^3/s	4.381 264 E − 08
gallon (U.S. liquid) per minute	cubic metre per second, m^3/s	6.309 020 E − 05
grad	degree (angular)	9.000 000*E − 01
grad	radian, rad	1.570 796 E − 02
grain	kilogram, kg	6.479 891 E − 05
gram	kilogram, kg	1.000 000*E − 03
hectare	square metre, m^2	1.000 000*E + 04
horsepower (550 ft · lbf/s)	watt, W	7.456 999 E + 02
horsepower (boiler)	watt, W	9.809 50 E + 03
horsepower (electric)	watt, W	7.460 000*E + 02
horsepower (water)	watt, W	7.460 43 E + 02
horsepower (U.K.)	watt, W	7.457 0 E + 02
hour	second, s	3.600 000*E + 03
hour (sidereal)	second, s	3.590 170 E + 03
inch	metre, m	2.540 000*E − 02
inch of mercury (32°F) (pressure)	pascal, Pa	3.386 38 E + 03
inch of mercury (60°F) (pressure)	pascal, Pa	3.376 85 E + 03
inch of water (60°F) (pressure)	pascal, Pa	2.488 4 E + 02
in^2	square metre, m^2	6.451 600*E − 04
in^3 (volume or section modulus)	cubic metre, m^3	1.638 706 E − 05
in^4 (area moment of inertia)	metre to the fourth power, m^4	4.162 314 E − 07

TABLE A.6 Factors for Conversion to SI Units of Measurement (*Continued*)

To convert from	to	Multiply by
in/s	metre per second, m/s	2.540 000*E − 02
kelvin	degree Celsius	$t_c = T_K - 273.15$
kilogram-force (kgf)	newton, N	9.806 650*E + 00
kgf · m	newton metre, N · m	9.806 650*E + 00
kgf · s^2/m (mass)	kilogram, kg	9.806 650*E + 00
km/h	metre per second, m/s	2.777 778 E − 01
kWh	joule, J	3.600 000*E + 06
kip (1000 lbf)	newton, N	4.448 222 E + 03
kip/in^2 (ksi)	pascal, Pa	6.894 757 E + 06
lambert	candela per square metre, cd/m	3.183 099 E + 03
liter	cubic metre, m^3	1.000 000*E − 03
maxwell	weber, Wb	1.000 000*E − 08
mho	siemens, S	1.000 000*E + 00
microinch	metre, m	2.540 000*E − 08
micron	metre, m	1.000 000*E − 06
mil	metre, m	2.540 000*E − 05
mile	metre, m	1.609 347 E + 03
mile (U.S. nautical)	metre, m	1.852 000*E + 03
mi^2 (U.S. statute)	square metre, m^2	2.589 998 E + 06
mi/h	metre per second, m/s	4.470 400*E − 01
mi/h	kilometre per hour, km/h	1.609 344*E + 00
millibar	pascal, Pa	1.000 000*E + 02
millimeter of mercury (0°C)	pascal, Pa	1.333 22 E + 02
minute (angle)	radian, rad	2.908 882 E − 04
minute	second, s	6.000 000*E + 01
minute (sidereal)	second, s	5.983 617 E + 01
ounce (avoirdupois)	kilogram, kg	2.834 952 E − 02
once (troy or apothecary)	kilogram, kg	3.110 348 E − 02
ounce (U.K. fluid)	cubic metre, m^3	2.841 307 E − 05
ounce (U.S. fluid)	cubic metre, m^3	2.957 353 E − 05
oz (avoirdupois)/ft^2	kilogram per square metre, kg/m^2	3.051 517 E − 01

TABLE A.6 Factors for Conversion to SI Units of Measurement (*Continued*)

To convert from	to	Multiply by
oz (avoirdupois)/yd^2	kilogram per square metre, kg/m^2	3.390 575 E −02
perm (0°C)	kilogram per pascal second metre, kg/(Pa · s · m)	5.721 35 E − 11
perm (23°C)	kilogram per pascal second metre, kg/(Pa · s · m)	5.745 25 E − 11
perm · in (0°C)	kilogram per pascal second metre, kg/(Pa · s · m)	1.453 22 E − 12
perm · in (23°C)	kilogram per pascal second metre, kg/(Pa · s · m)	1.459 29 E − 12
pint (U.S. dry)	cubic metre, m^3	5.506 105 E − 04
pint (U.S. liquid)	cubic metre, m^3	4.731 764 E − 04
poise (absolute viscosity)	pascal second, Pa · s	1.000 000*E − 01
pound (lb avoirdupois)	kilogram, kg	4.535 924 E − 01
pound (troy or apothecary)	kilogram, kg	3.732 417 E − 01
lb · in^2 (moment of inertia)	kilogram square metre, kg · m^2	2.926 397 E − 04
lb/ft · s	pascal second, Pa · s	1.488 164 E + 00
lb/ft^2	kilogram per square metre, kg/m^2	4.882 428 E + 00
lb/ft^3	kilogram per cubic metre, kg/m^3	1.601 846 E + 01
lb/gal (U.K. liquid)	kilogram per cubic metre, kg/m^3	9.977 633 E + 01
lb/gal (U.S. liquid)	kilogram per cubic metre, kg/m^3	1.198 264 E + 02
lb/h	kilogram per second, kg/s	1.259 979 E − 04
lb/in^3	kilogram per cubic metre, kg/m^3	2.767 990 E + 04
lb/min	kilogram per second, kg/s	7.559 873 E − 03
lb/s	kilogram per second, kg/s	4.535 924 E − 01
lb/yd^3	kilogram per cubic metre, kg/m^3	5.932 764 E − 01
poundal	newton, N	1.382 550 E − 01
pound-force (lbf)	newton, N	4.448 222 E + 00
lbf · ft	newton-metre, N · m	1.355 818 E + 00
lbf/ft	newton per metre, N/m	1.459 390 E + 01
lbf/ft^2	pascal, Pa	4.788 026 E + 01
lbf/in	newton per metre, N/m	1.751 268 E + 02

TABLE A.6 Factors for Conversion to SI Units of Measurement (*Continued*)

To convert from	to	Multiply by
lbf/in^2 (psi)	pascal, Pa	6.894 757 E + 03
quart (U.S. dry)	cubic metre, m^3	1.101 221 E − 03
quart (U.S. liquid)	cubic metre, m^3	9.463 529 E − 04
rod	metre, m	5.029 210 E + 00
second (angle)	radian, rad	4.848 137 E − 06
second (sidereal)	second, s	9.972 696 E − 01
square (100 ft^2)	square metre, m^2	9.290 304*E + 00
ton (long, 2240 lb)	kilogram, kg	1.016 047 E + 03
ton (metric)	kilogram, kg	1.000 000*E + 03
ton (refrigeration)	watt, W	3.516 800 E + 03
ton (register)	cubic metre, m^3	2.831 685 E + 00
ton (short 2000 lb)	kilogram, kg	9.071 847 E + 02
ton (long)/yd^3	kilogram per cubic metre, kg/m^3	1.328 939 E + 03
ton (short)/yd^3	kilogram per cubic metre, kg/m^3	1.186 553 E + 03
ton-force (2000 lbf)	newton, N	8.896 444 E + 03
tonne	kilogram, kg	1.000 000*E + 03
Wh	joule, J	3.600 000*E + 03
yard	metre, m	9.144 000*E − 01
yd^2	square metre, m^2	8.361 274 E − 01
yd^3	cubic metre, m^3	7.645 549 E − 01
year (365 days)	second, s	3.153 600*E + 07
year (sidereal)	second, s	3.155 815 E + 07

*Exact value.
From "Standard for Metric Practice," E380, ASTM.