DEPARTMENT OF TRADE AND INDUSTRY

NO. 813 **08 JULY 2016**

NOTICE IN TERMS OF THE MEASUREMENT UNITS AND MEASUREMENT STANDARDS ACT OF 2006

(ACT NO. 18 OF 2006)

1. By virtue of the powers vested in me in terms of the Measurement Units and Measurement Standards Act, 2006 (Act No. 18 of 2006), I, Dr Rob Davies, Minister of Trade and Industry, hereby –

(a) amend Government notice no. R1144 of 5 July 1974 as amended by Government notices no. R1232 of 8 July 1977, R2210 of 10 November 1978, R525 of 21 March 1980 and R1806 of 27 August 1982, by the substitution of the schedules thereto with the schedules hereto, and;

(b) determine that the measurement units in the Republic, the Symbols thereof and the Rules in connection with the use thereof, are as set out in the attached Schedules 1, 2 and 3 with effect from **the date of publication**.

Dr. Rob Davies, MP

Minister of Trade and Industry

Date: ....

SCHEDULES OF NATIONAL MEASUREMENT UNITS

NATIONAL MEASUREMENT UNITS

1. Measurement Units, Symbols and Rules
2. Units Outside the SI
3. Equivalents of Measurement units

In terms of sections 2 and 3 of the Measurement Units and Measurement Standards Act, No. 18 of 2006, I hereby determine, with effect from the date of publication hereof, that the measurement units in the Republic, the symbols therefor and the rules in connection with the use thereof, are-

(a) the International System of Units (SI) and their appropriate symbols and rules as set out in the First Schedule hereto; and
(b) the other units, symbols of these units and rules therefor as set out in the Second Schedule hereto.

In terms of section 4 of the Measurement Units and Measurement Standards Act, No. 18 of 2006, I further determine that;

(c) the equivalents of units mentioned in the first column of the Third Schedule hereto are the equivalents appearing opposite them in the second column of said Schedule;
(d) any equivalent which can be derived from the equivalents referred to in paragraph (c) is also an equivalent of the units concerned; and
(e) in the conversion of data referred to in paragraph (c), only such number of digits of the applicable equivalent need to be used as are necessary for reproducing the converted value to an accuracy corresponding to the accuracy of the original data.

1. *General prohibitions,*

(1) Subject to the provisions of paragraph 2, no unit other than a unit mentioned or implied in the First and Second Schedules attached hereto shall be used in any circumstances or for any purpose or in connection with any matter or in respect of any goods or things, subject to any appropriate rules as set out in the said Schedules.
(2) Subject to the provisions of paragraph 2, no multiple or submultiple of a unit other than a multiple or submultiple specified in the Schedules attached hereto shall be used as a unit in any circumstances of for any purpose or in connection with any matter or in respect of any goods or things.
(3) Subject to the provision of paragraph 2, an SI unit or multiple or submultiple thereof, formed as set out in the First Schedule attached hereto, or a unit, multiple or submultiple specified in the Second Schedule thereto shall not in any circumstances for any purpose be designated by any other symbol or abbreviation, subject to any appropriate rules in the said Schedules or tables.

2. *General exemptions*

(1) No prohibition or stipulation in this regulation contained shall apply to-

(a) Writing originating in other countries or writings originating in the Republic and intended for distribution exclusively in other countries but excluding writings which are subject to provision contained in any other law;

(b) Conversion tables for units

(c) Articles of a historical or an artistic nature;

(d) Basic scientific research;

(e) The use of units by a private household or where such units are used privately by an artisan or a professional person or where they are used internally in a business, factory or organisation in any circumstances or for any purpose except where such use is subject to a contrary provision in any other law;

(f) The use of units which are laid down in international agreements for use in aviation, shipping and rail traffic;

(g) The use of units on machine tools on, or in connection with, arms and ammunition;

(h) Telex and computer printouts or printouts from other machines capable of printing only upper case or only lower case letters, or in units other than those specified in the First and Second schedules hereto, except where otherwise provided in any other law;

(i) Non-metric spanners whose size designations indicate the non-metric fastener on which they are meant to be used, fasteners with non-metric screw threads and non-metric screw thread cutting equipment; and

(j) Cases where permission for a deviation from the provisions of this regulation has been granted in writing to the person or organisation concerned by the CEO of the NMISA appointed under section 6.18(1) of Act No. 18 of 2006.

SCHEDULE 1

The INTERNATIONAL SYSTEM OF UNITS (SI)

The Système International d'Unités (known in English as the International System of Units), the SI, is a system of units, recommended by the International Committee of Weights and Measures (CIPM) and adopted by the General Conference on Weights and Measures (CGPM), which provides the internationally agreed reference in terms of which all other units are now defined.

The SI for use in the Republic is based on the 8th edition of the publication of the SI Brochure. The Supplement 2014: *Updates to the 8th edition (2006) of the SI Brochure* has been incorporated.

1. THE SI UNITS AND THEIR DECIMAL MULTIPLES AMD SUBMULTIPLES

(1) The SI units consist of –

(a) The base units; and

(b) The coherent derived units

Which together form the coherent system of SI units.

In addition the SI contains the decimal multiples and submultiples of SI units formed by using the SI prefixes.

(2) The SI base units, their symbols, the quantities whose magnitudes are expressed in terms of these base units, definitions and rules in connection with their use are set out and defined in table 1 of this Schedule.

(3) The coherent derived units in the SI expressed in terms of the base units, the quantities whose magnitudes are expressed in terms of these coherent derived units and definitions in connection with their use are set out and defined in table 2 of this Schedule.

(4) The coherent derived units in the SI with special names and symbols, the quantities whose magnitudes are expressed in terms of other SI units and the base units and definitions in connection with their use are set out in Table 3 of this Schedule

(5) SI coherent derived units whose names and symbols include SI coherent derived units which special names and symbols, the quantities whose magnitudes are expressed in terms of the base units, definitions and rules in connection with their use are set out in Table 4 of this Schedule.

(6) The SI prefixes and their symbols for forming multiples or submultiples of SI units, their factors, definitions and rules in connection with their use are set out in Table 5 of this Schedule.

(7) The SI units and SI prefixes are subject to any applicable rule in this Schedule.

2. TABLES

TABLE 1

SI BASE UNITS

Base quantity		SI base unit	
Name	**Symbol**	**Name**	**Symbol**
length	*L, x, r, etc.*	metre	m
mass	*m*	kilogram	kg
time	*t*	second	s
electric current	*I, i*	ampere	A
thermodynamic temperature	*T*	kelvin	K
amount of substance	*n*	mole	mol
luminous intensity	I_v	candela	cd

DEFINITIONS:

(a) The base unit of length: The metre is the length of the path travelled by light in vacuum during a time interval of 1/299 792 458 of a second.

(b) The base unit of mass: The kilogram is the unit of mass; it is equal to the mass of the international prototype of the kilogram.

(c) The base unit of time: The second is the duration of 9 192 631 770 periods of the radiation corresponding to the transition between the two hyperfine levels of the ground state of the caesium 133 atom.

(d) The base unit of electric current: The ampere is that constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section, and placed 1 m apart in vacuum, would produce between these conductors a force equal to 2 x 10^{-7} newton per metre of length.

(e) The base unit of thermodynamic temperature: The kelvin, unit of thermodynamic temperature, is the fraction 1/273,16 of the thermodynamic temperature of the triple point of water.

(f) The base unit of amount of substance: The mole is the amount of substance of a system which contains as many elementary entities as there are atoms in 0,012 kilogram of carbon 12.

(g) The base unit of luminous intensity: The candela is the luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency 540 x 10^{12} hertz and that has a radiant intensity in that direction of 1/683 watt per steradian.

RULES:

(1) The symbols for quantities are generally single letters of the Latin or Greek alphabets, printed in an italic font, and are *recommendations*.

(2) The symbols for units are *mandatory*.

(3) In addition to the thermodynamic temperature (symbol : T) expressed in kelvin, use is also made of Celsius temperature (symbol : t) which is defined by the quantity equation:

$$t = T - T_0.$$

The unit of Celsius temperature is the degree Celsius, symbol °C, which is by definition equal in magnitude to the kelvin. A difference or interval of temperature may be expressed in kelvins or in degrees Celsius. However the numerical value of a Celsius temperature expressed in degrees Celsius is related to the numerical value of the thermodynamic temperature expressed in kelvins by the relation

$$t/°\mathrm{C} = T/\mathrm{K} - 273{,}15.$$

(4) When the mole is used, the elementary entities must be specified and may be atoms, molecules, ions, electrons, other particles, or specified groups of such particles.

TABLE 2

COHERENT DERIVED UNITS IN THE SI EXPRESSED IN TERM OF BASE UNITS*

Derived quantity		SI coherent derived unit	
Name	**Symbol**	**Name**	**Symbol**
area	A	square metre	m^2
volume	V	cubic metre	m^3
speed, velocity	v	metre per second	m/s
acceleration	a	metre per second squared	m/s^2
wavenumber	$\sigma, \tilde{\nu}$	reciprocal metre	m^{-1}
density, mass density	ρ	kilogram per cubic metre	kg/m^3
surface density	ρ_A	kilogram per square metre	kg/m^2
specific volume	v	cubic metre per kilogram	m^3/kg
current density	j	ampere per square metre	A/m^2
magnetic field strength	H	ampere per metre	A/m
amount concentration [(a)], concentration	c	mole per cubic metre	mol/m^3
mass concentration	ρ, γ	kilogram per cubic metre	kg/m^3
luminance	L_v	candela per square metre	cd/m^2
refractive index [(b)]	n	one	1
relative permeability [(b)]	μ_r	one	1

* A SI coherent derived unit is any unit given by an algebraic expression in the form of a reciprocal, or a product of powers (positive, negative or positive and negative) of base units, having a numerical factor equal only to the number 1. Derived units which have special names and symbols may themselves be used to express other derived units in a simpler way than in terms of base units.

The number of quantities in science is without limit, and it is not possible to provide a complete list of derived quantities and derived units. However, Table 2 lists some examples of derived quantities, and the corresponding coherent derived units expressed directly in terms of base units. Other derived units correctly expressed in terms of base units are also allowed.

DEFINITIONS and RULES:

a) In the field of clinical chemistry this quantity is also called *substance concentration*.

b) These are dimensionless quantities, or quantities of dimension one, and the symbol "1" for the unit (the number "one") is generally omitted in specifying the values of dimensionless quantities.

TABLE 3

COHERENT DERIVED UNITS IN THE SI WITH SPECIAL NAMES AND SYMBOLS

	SI coherent derived unit [(a)]			
Derived quantity	**Name**	**Symbol**	**Expressed in terms of other SI units**	**Expressed in terms of SI base units**
plane angle	radian [(b)]	rad	1 [(b)]	m/m
solid angle	steradian [(b)]	sr [(c)]	1 [(b)]	m^2/m^2
frequency	hertz [(d)]	Hz		s^{-1}
force	newton	N		$m\ kg\ s^{-2}$
pressure, stress	pascal	Pa	N/m^2	$m^{-1}\ kg\ s^{-2}$
energy, work, amount of heat	joule	J	N m	$m^2\ kg\ s^{-2}$
power, radiant flux	watt	W	J/s	$m^2\ kg\ s^{-3}$
electric charge, amount of electricity	coulomb	C		s A
electric potential difference,				
electromotive force	volt	V	W/A	$m^2\ kg\ s^{-3}\ A^{-1}$
capacitance				
electric resistance	farad	F	C/V	$m^{-2}\ kg^{-1}\ s^4\ A^2$
electric conductance	ohm	Ω	V/A	$m^2\ kg\ s^{-3}\ A^{-2}$
magnetic flux	siemens	S	A/V	$m^{-2}\ kg^{-1}\ s^3\ A^2$
magnetic flux density	weber	Wb	V s	$m^2\ kg\ s^{-2}\ A^{-1}$
inductance	tesla	T	Wb/m^2	$kg\ s^{-2}\ A^{-1}$
Celsius temperature	henry	H	Wb/A	$m^2\ kg\ s^{-2}\ A^{-2}$
luminous flux	degree Celsius [(e)]	°C		K
illuminance	lumen	lm	cd sr [(c)]	cd
activity referred to a radionuclide [(f)]	lux	lx	lm/m^2	$m^{-2}\ cd$
absorbed dose,	becquerel [(d)]	Bq		s^{-1}
specific energy (imparted),	gray	Gy	J/kg	$m^2\ s^{-2}$
kerma				
dose equivalent,				
ambient dose equivalent,	sievert [(g)]	Sv	J/kg	$m^2\ s^{-2}$
directional dose equivalent,				
personal dose equivalent				
catalytic activity				
	katal	kat		$s^{-1}\ mol$

DEFINITIONS and RULES:

(a) The SI prefixes may be used with any of the special names and symbols, but when this is done the resulting unit will no longer be coherent.

(b) The radian and steradian are special names for the number one that may be used to convey information about the quantity concerned. In practice the symbols rad and sr are used where appropriate, but the symbol for the derived unit one is generally omitted in specifying the values of dimensionless quantities.

(c) In photometry the name steradian and the symbol sr are usually retained in expressions for units.

(d) The hertz is used only for periodic phenomena, and the becquerel is used only for stochastic processes in activity referred to a radionuclide.

(e) The degree Celsius is the special name for the kelvin used to express Celsius temperatures. The degree Celsius and the kelvin are equal in size, so that the numerical value of a temperature difference or temperature interval is the same when expressed in either degrees Celsius or in kelvins.

(f) Activity referred to a radionuclide is sometimes incorrectly called radioactivity.

(g) On the use of the sievert: The quantity dose equivalent H is the product of the absorbed dose D of ionising radiation and the dimensionless factor Q (quality factor) defined as a function of linear energy transfer by the ICRU:

$$H = Q \cdot D$$

Thus, for a given radiation, the numerical value of H in joules per kilogram may differ from that of D in joules per kilogram depending on the value of Q.

In order to avoid any risk of confusion between the absorbed dose D and the dose equivalent H, the special names for the respective units should be used, that is, the name gray should be used instead of joules per kilogram for the unit of absorbed dose D and the name sievert instead of joules per kilogram for the unit of dose equivalent H.

TABLE 4

EXAMPLES OF SI COHERENT DERIVED UNITS WHOSE NAMES AND SYMBOLS INCLUDE SI COHERENT DERIVED UNITS WITH SPECIAL NAMES AND SYMBOLS

Derived quantity	SI coherent derived unit [(a, b)]		
	Name	**Symbol**	**Expressed in terms of SI base units**
dynamic viscosity	pascal second	Pa s	m^{-1} kg s^{-1}
moment of force	newton metre	N m	m^2 kg s^{-2}
surface tension	newton per metre	N/m	kg s^{-2}
angular velocity	radian per second	rad/s	m m^{-1} s^{-1} = s^{-1}
angular acceleration	radian per second squared	rad/s^2	m m^{-1} s^{-2} = s^{-2}
heat flux density, irradiance	watt per square metre	W/m^2	kg s^{-3}
heat capacity, entropy	joule per kelvin	J/K	m^2 kg s^{-2} K^{-1}
specific heat capacity, specific entropy	joule per kilogram kelvin	J/(kg K)	m^2 s^{-2} K^{-1}
specific energy	joule per kilogram	J/kg	m^2 s^{-2}
thermal conductivity	watt per metre kelvin	W/(m K)	m kg s^{-3} K^{-1}
energy density	joule per cubic metre	J/m^3	m^{-1} kg s^{-2}
electric field strength	volt per metre	V/m	m kg s^{-3} A^{-1}
electric charge density	coulomb per cubic metre	C/m^3	m^{-3} s A
surface charge density	coulomb per square metre	C/m^2	m^{-2} s A
electric flux density, electric displacement	coulomb per square metre	C/m^2	m^{-2} s A
permittivity	farad per metre	F/m	m^{-3} kg^{-1} s^4 A^2
permeability	henry per metre	H/m	m kg s^{-2} A^{-2}
molar energy	joule per mole	J/mol	m^2 kg s^{-2} mol^{-1}
molar entropy, molar heat capacity	joule per mole kelvin	J/(mol K)	m^2 kg s^{-2} K^{-1} mol^{-1}
exposure (x- and γ-rays)	coulomb per kilogram	C/kg	kg^{-1} s A
absorbed dose rate	gray per second	Gy/s	m^2 s^{-3}
radiant intensity	watt per steradian	W/sr	m^4 m^{-2} kg s^{-3} = m^2 kg s^{-3}
radiance	watt per square metre steradian	W/(m^2 sr)	m^2 m^{-2} kg s^{-3} = kg s^{-3}
catalytic activity concentration	katal per cubic metre	kat/m^3	m^{-3} s^{-1} mol

DEFINITIONS and RULES:

(a) In both Tables 3 and 4 the final column shows how the SI units concerned may be expressed in terms of SI base units. In this column factors such as m^0, kg^0, etc., which are all equal to 1, are not shown explicitly.

(b) The values of several different quantities may be expressed using the same name and symbol for the SI unit. Thus for the quantity heat capacity as well as the quantity entropy, the SI unit is the joule per kelvin. Similarly for the base quantity electric current as well as the derived quantity magnetomotive force, the SI unit is the ampere. It is therefore important not to use the unit alone to specify the quantity. This applies not only to scientific and technical texts, but also, for example, to measuring instruments (i.e. an instrument read-out should indicate both the unit and the quantity measured.

(c) A derived unit can often be expressed in different ways by combining base units with derived units having special names. Joule, for example, may formally be written newton metre, or kilogram metre squared per second squared.

(d) In the field of ionising radiation, the SI unit of activity is designated the becquerel rather than the reciprocal second, and the SI units of absorbed dose and dose equivalent are designated the gray and the sievert, respectively, rather than the joule per kilogram. The special names becquerel, gray, and sievert were specifically introduced because of the dangers to human health that might arise from mistakes involving the units reciprocal second and joule per kilogram, in case the latter units were incorrectly taken to identify the different quantities involved.

(e) Any unit formed in accordance with the provisions of subparagraph 1(1, 2 and 3) of this Regulation and not mentioned in Tables 2, 3 and 4 of this Schedule is also an SI derived unit.

(f) In the symbols of derived units multiplication is denoted by a space e.g. N m, a point e.g. N.m or N·m and division by an oblique stroke or horisontal line or a negative power, e.g. m/s or M_S or $m.s^{-1}$; J/kg.K or $J.kg^{-1}.K^{-1}$

(g) The letter "p" is not to be used in a symbol to denote division, e.g. r/min not rpm.

(h) Where the magnitude of a quantity is used as the decimal sign in the numerical part of the expression and the digits are separated into groups of three digits on either side of the comma by means of spaces. The decimal separatrix always has at least one digit on each side,

e.g. 25 130,12 mm = 25,130 12 x 10^3 mm = 25,130 12 m;

0,51 g; 1,61 N

TABLE 5

SI PREFIXES and SYMBOLS FOR FORMING MULTIPLES OR SUBMULTIPLES OF SI UNITS

Factor	Factor in words(c) (The Long scale is used in the Republic)		Name	Symbol(d)	Factor	Factor in words(c) (The Long scale is used in the Republic)		Name	Symbol(d)
	Long scale(a, b)	Short scale(a, b)				Long scale(a, b)	Short scale(a, b)		
10^{1}	ten	ten	deca	da	10^{-1}	tenth	tenth	deci	d
10^{2}	hundred	hundred	hecto	h	10^{-2}	hundredth	hundredth	centi	c
10^{3}	thousand	thousand	kilo	k	10^{-3}	thousandth	thousandth	milli	m
10^{6}	million	million	mega	M	10^{-6}	millionth	millionth	micro	μ
10^{9}	milliard	billion	giga	G	10^{-9}	milliardth	billionth	nano	n
10^{12}	billion	trillion	tera	T	10^{-12}	billionth	trillionth	pico	p
10^{15}	billiard	quadrillion	peta	P	10^{-15}	billiardth	quadrillionth	femto	f
10^{18}	trillion	quintillion	exa	E	10^{-18}	trillionth	quintillionth	atto	a
10^{21}	trilliard	sextillion	zetta	Z	10^{-21}	trilliardth	sextillionth	zepto	z
10^{24}	quadrillion	septillion	yotta	Y	10^{-24}	quadrillionth	septillionth	yocto	y

DEFINITIONS and RULES:

(a) The Republic of South Africa uses the Long scale numbering naming system. In international use, most English and Arabic speaking countries use the Short scale (including the UK as adopted in 1974) whilst European countries and countries in the rest of the world speaking French, Spanish, Portuguese (except Brazil), Dutch and German, use the Long scale. A small number of countries use both including Canada, Mauritius, Seychelles, Vanuatu, Namibia and Puerto Rico.

(b) The Financial world primarily uses the Short scale and for this reason it is included in Table 5. It is recommended that in Financial (English) use a billion be specified, e.g. $R \cdot 10^{12}$ or $R \cdot 10^{9}$ and that in the other official languages the correct Long scale factor in words be used for $R \cdot 10^{9}$ (e.g. in Afrikaans "miljard", Sepedi-Sesotho and Xitsonga "miliate", etc.).

(c) The Pan South African Language Board (PANSALB) has started a process to obtain the correct wording for the Long scale numbering system in the South African official languages. This will be updated in the revised Schedule of 2017.

(d) Prefix symbols are printed in roman (upright) type, as are unit symbols, regardless of the type used in the surrounding text, and are attached to unit symbols without a space between the prefix symbol and the unit symbol. With the exception of da (deca), h (hecto), and k (kilo), all multiple prefix symbols are capital (upper case) letters, and all submultiple prefix symbols are lower case letters. All prefix names are printed in lower case letters, except at the beginning of a sentence.

(e) The grouping formed by a prefix symbol attached to a unit symbol constitutes a new inseparable unit symbol (forming a multiple or submultiple of the unit concerned) that can be raised to a positive or negative power and that can be combined with other unit symbols to form compound unit symbols.

Examples: $2,3\ \text{cm}^3 = 2,3\ (\text{cm})^3 = 2,3\ (10^{-2}\ \text{m})^3 = 2,3 \times 10^{-6}\ \text{m}^3$

$1\ \text{cm}^{-1} = 1\ (\text{cm})^{-1} = 1\ (10^{-2}\ \text{m})^{-1} = 10^2\ \text{m}^{-1} = 100\ \text{m}^{-1}$

$1\ \text{V/cm} = (1\ \text{V})/(10^{-2}\ \text{m}) = 10^2\ \text{V/m} = 100\ \text{V/m}$

$5000\ \mu\text{s}^{-1} = 5000\ (\mu\text{s})^{-1} = 5000\ (10^{-6}\ \text{s})^{-1} = 5 \times 10^9\ \text{s}^{-1}$

(f) Similarly prefix names are also inseparable from the unit names to which they are attached. Thus, for example, millimetre, micropascal, and meganewton are single words.

(g) Compound prefix symbols, that is, prefix symbols formed by the juxtaposition of two or more prefix symbols, are not permitted. This rule also applies to compound prefix names.

(h) Prefix symbols can neither stand-alone nor be attached to the number 1, the symbol for the unit one. Similarly, prefix names cannot be attached to the name of the unit one, that is, to the word "one."

(i) Prefix names and symbols are used with a number of non-SI units (see Schedule 2), but they are never used with the units of time: minute, min; hour, h; day, d. However astronomers use milliarcsecond, which they denote mas, and microarcsecond, µas, which they use as units for measuring very small angles.

(j) These SI prefixes refer strictly to powers of 10. They should not be used to indicate powers of 2 (for example, one kilobit represents 1000 bits and not 1024 bits).

(k) The IEC has adopted prefixes for binary powers in the international standard IEC 60027-2: 2005, third edition, Letter symbols to be used in electrical technology – Part 2: Telecommunications and electronics. The names and symbols for the prefixes corresponding to 210, 220, 230, 240, 250, and 260 are, respectively: kibi, Ki; mebi, Mi; gibi, Gi; tebi, Ti; pebi, Pi; and exbi, Ei. Thus, for example, one kibibyte would be written: 1 KiB = 210 B = 1024 B, where B denotes a byte. Although these prefixes are not part of the SI, they should be used in the field of information technology to avoid the incorrect usage of the SI prefixes.

Examples of the use of prefixes:

pm (picometre)
mmol (millimole)
G (gigaohm)
THz (terahertz)
nm (nanometre),
but not mµm (millimicrometre)

The number of lead atoms in the sample is $N(\text{Pb}) = 5 \times 10^6$, but not $N(\text{Pb}) = 5\ \text{M}$, where M is intended to be the prefix mega standing on its own.

SCHEDULE 2

UNITS OUTSIDE THE SI APPROVED FOR USE

It is recognised that some non-SI units still appear in the scientific, technical and commercial literature, and will continue to be used for many years. Some non-SI units are of historical importance in the established literature. For this reason, and in accordance with 1 (1) in this Regulation, the following may be used in the Republic, taking into account that:

"the inclusion of non-SI units in this text does not imply that the use of non-SI units is to be encouraged. For the reasons already stated SI units are generally to be preferred. It is also desirable to avoid combining non-SI units with units of the SI; in particular, the combination of non-SI units with the SI to form compound units should be restricted to special cases in order not to compromise the advantages of the SI"

(1) Units for use in addition to the SI units, the quantities whose magnitudes are expressed in terms of these units, their symbols and values, and rules in connection with their use are set out in Table 6 of this Schedule.

(2) Units for use in addition to the SI units in specialised fields whose values are obtained experimentally, the quantities whose magnitudes are expressed in terms of these units, their symbols and values, and rules in connection with their use are set out in Table 7 of this Schedule.

(3) Units for use in addition to the SI for a limited time, the quantities whose magnitudes are expressed in terms of these units, their symbols and values, and rules in connection with their use are set out in Table 8 of this Schedule.

(4) Units for use in addition to the SI units associated with the CGS and the CGS-Gaussian System of Units, the quantities whose magnitudes are expressed in terms of these units, their symbols and values, and rules in connection with their use are set out in Table 9 of this Schedule.

TABLE 6

NON-SI UNITS ACCEPTED FOR USE WITH THE INTERNATIONAL SYSTEM OF UNITS

Quantity	Name of unit	Symbol for unit	Value in SI units
time	minute	min	1 min = 60 s
	hour [(a)]	h	1 h = 60 min = 3600 s
	day	d	1 d = 24 h = 86 400 s
plane angle	degree [(b,c)]	°	$1° = (\pi/180)$ rad
	minute	'	$1' = (1/60)° = (\pi/10\ 800)$ rad
	second [(d)]	''	$1'' = (1/60)' = (\pi/648\ 000)$ rad
area	hectare [(e)]	ha	$1\ ha = 1\ hm^2 = 10^4\ m^2$
volume	litre [(f)]	L, l	$1\ L = 1\ l = 1\ dm^3 = 10^3\ cm^3 = 10^{-3}\ m^3$
mass	tonne [(g)]	t	$1\ t = 10^3\ kg$

DEFINITIONS and RULES:

(a) The symbol of this unit is included in Resolution 7 of the 9th CGPM (1948).

(b) ISO 80 000 recommends that the degree be divided decimally rather than using the minute and the second. For navigation and surveying, however, the minute has the advantage that one minute of latitude on the surface of the Earth corresponds (approximately) to one nautical mile.

(c) The gon (or grad, where grad is an alternative name for the gon) is an alternative unit of plane angle to the degree, defined as (π/200) rad. Thus there are 100 gon in a right angle. The potential value of the gon in navigation is that because the distance from the pole to the equator of the Earth is approximately 10 000 km, 1 km on the surface of the Earth subtends an angle of one centigon at the centre of the Earth. However the gon is rarely used.

(d) For applications in astronomy, small angles are measured in arcseconds (i.e. seconds of plane angle), denoted as or ", milliarcseconds, microarcseconds, and picoarcseconds, denoted mas, µas, and pas, respectively, where arcsecond is an alternative name for second of plane angle.

(e) The unit hectare, and its symbol ha, were adopted by the CIPM in 1879 (PV, 1879, 41). The hectare is used to express land area.

(f) The litre, and the symbol lower-case l, were adopted by the CIPM in 1879 (PV, 1879, 41). The alternative symbol, capital L, was adopted by the 16th CGPM (1979, Resolution 6) in order to avoid the risk of confusion between the letter l (el) and the numeral 1 (one).

(g) The tonne, and its symbol t, were adopted by the CIPM in 1879 (PV, 1879, 41). In English speaking countries this unit is usually called "metric ton".

TABLE 7

NON-SI UNITS WHOSE VALUES IN SI UNITS MUST BE OBTAINED EXPERIMENTALLY

Quantity	Name of unit	Symbol for unit	Value in SI units[(a)]
Units accepted for use with the SI			
energy	electronvolt [(b)]	eV	1 eV = 1,602 176 53 (14) x 10^{-19} J
mass	dalton, [(c)]	Da	1 Da = 1,660 538 86 (28) x 10^{-27} kg
	unified atomic mass unit	u	1 u = 1 Da
length	astronomical unit [(d)]	ua	1 ua = 1,495 978 706 91 (6) x 10^{11} m
Natural units (n.u.)			
speed	n.u. of speed (speed of light in vacuum)	c_0	299 792 458 m/s (exact)
action	n.u. of action (reduced Planck constant)	$\hbar$	1.054 571 68 (18) x 10^{-34} J s
mass	n.u. of mass (electron mass)	m_e	9,109 3826 (16) x 10^{-31} kg
time	n.u. of time	$\hbar/(m_e c_0^2)$	1,288 088 6677 (86) x 10^{-21} s
Atomic units (a.u.)			
charge	a.u. of charge (elementary charge)	e	1,602 176 53 (14) x 10^{-19} C
mass	a.u. of mass (electron mass)	m_e	9,109 3826 (16) x 10^{-31} kg
action	a.u. of action (reduced Planck constant)	$\hbar$	1,054 571 68 (18) x 10^{-34} J s
length	a.u. of length, bohr (Bohr radius)	a_0	0,529 177 2108 (18) x 10^{-10} m
energy	a.u. of energy, hartree (Hartree energy)	E_h	4,359 744 17 (75) x 10^{-18} J
time	a.u. of time	$\hbar/E_h$	2,.418 884 326 505 (16) x 10^{-17} s

DEFINITIONS and RULES:

(a) The values in SI units of all units in this table, except the astronomical unit, are taken from the 2002 CODATA set of recommended values of the fundamental physical constants, P.J. Mohr and B.N. Taylor, *Rev. Mod. Phys.*, 2005, **77**, 1-107. The standard uncertainty in the last two digits is given in parenthesis (see section 5.3.5).

(b) The electronvolt is the kinetic energy acquired by an electron in passing through a potential difference of one volt in vacuum. The electronvolt is often combined with the SI prefixes.

(c) The dalton (Da) and the unified atomic mass unit (u) are alternative names (and symbols) for the same unit, equal to 1/12 times the mass of a free carbon 12 atom, at rest and in its ground state. The dalton is often combined with SI prefixes, for example to express the masses of large molecules in kilodaltons, kDa, or megadaltons, MDa, or to express the values of small mass differences of atoms or molecules in nanodaltons, nDa, or even picodaltons, pDa.

(d) The astronomical unit is approximately equal to the mean Earth-Sun distance. It is the radius of an unperturbed circular Newtonian orbit about the Sun of a particle having infinitesimal mass, moving with a mean motion of 0,017 202 098 95 radians per day (known as the Gaussian constant). The value given for the astronomical unit is quoted from the IERS Conventions 2003 (D.D. McCarthy and G. Petit eds., *IERS Technical Note* 32, Frankfurt am Main: Verlag des Bundesamts für Kartographie und Geodäsie, 2004, 12). The value of the astronomical unit in metres comes from the JPL ephemerides DE403 (Standish E.M., Report of the IAU WGAS Sub-Group on Numerical Standards, *Highlights of Astronomy*, Appenzeller ed., Dordrecht: Kluwer Academic Publishers, 1995, 180-184).

TABLE 8

OTHER NON-SI UNITS

Quantity	Name of unit	Symbol for unit	Value in SI units
pressure	bar [a]	bar	1 bar = 0,1 MPa = 100 kPa = 10^5 Pa
	millimetre of mercury [b]	mmHg	1 mmHg ≈ 133,322 Pa
length	ångström [c]	Å	1 Å = 0.1 nm = 100 pm = 10^{-10} m
distance	nautical mile [d]	M	1 M = 1852 m
area	barn [e]	b	1 b = 100 fm^2 = $(10^{-12}$ cm$)^2$ = 10^{-28} m^2
speed	knot [f]	kn	1 kn = (1852/3600) m/s
logarithmic ratio quantities	neper [g,i]</< td>	Np	[see footnote (j) regarding the numerical value of the neper, the bel and the decibel]
	bel [h,i]</< td>	B	
	decibel [h,i]</< td>	dB	

DEFINITIONS and RULES:

(a) The bar and its symbol are included in Resolution 7 of the 9th CGPM (1948). Since 1982 one bar has been used as the standard pressure for tabulating all thermodynamic data. Prior to 1982 the standard pressure used to be the standard atmosphere, equal to 1,013 25 bar, or 101 325 Pa.

(b) The millimetre of mercury is a legal unit for the measurement of blood pressure in some countries.

(c) The ångström is widely used by x-ray crystallographers and structural chemists because all chemical bonds lie in the range 1 to 3 ångströms. However it has no official sanction from the CIPM or the CGPM.

(d) The nautical mile is a special unit employed for marine and aerial navigation to express distance. The conventional value given here was adopted by the First International Extraordinary Hydrographic Conference, Monaco 1929, under the name "International nautical mile". As yet there is no internationally agreed symbol, but the symbols M, NM, Nm, and nmi are all used; in the table the symbol M is used. The unit was originally chosen, and continues to be used, because one nautical mile on the surface of the Earth subtends approximately one minute of angle at the centre of the Earth, which is convenient when latitude and longitude are measured in degrees and minutes of angle.

(e) The barn is a unit of area employed to express cross sections in nuclear physics.

(f) The knot is defined as one nautical mile per hour. There is no internationally agreed symbol, but the symbol kn is commonly used.

(g) The statement $L_A = n$ Np (where n is a number) is interpreted to mean that $\ln(A_2/A_1) = n$. Thus when L_A = 1 Np, A_2/A_1 = e. The symbol A is used here to denote the amplitude of a sinusoidal signal, and L_A is then called the neperian logarithmic amplitude ratio, or the neperian amplitude level difference.

(h) The statement $L_X = m$ dB = $(m/10)$ B (where m is a number) is interpreted to mean that $\lg(X/X_0) = m/10$. Thus when L_X = 1 B, $X/X_0 = 10$, and when L_X = 1 dB, $X/X_0 = 10^{1/10}$. If X denotes a mean square signal or power-like quantity, L_X is called a power level referred to X_0.

(i) In using these units it is important that the nature of the quantity be specified, and that any reference value used be specified. These units are not SI units, but they have been accepted by the CIPM for use with the SI.

(j) The numerical values of the neper, bel, and decibel (and hence the relation of the bel and the decibel to the neper) are rarely required. They depend on the way in which the logarithmic quantities are defined.

TABLE 9

NON-SI UNITS ASSOCIATED WITH THE CGS AND THE CGS-GAUSSIAN SYSTEM OF UNITS

Quantity	Name of unit	Symbol for unit	Value in SI units[(a)]
energy	erg [(a)]	erg	1 erg = 10^{-7} J
force	dyne [(a)]	dyn	1 dyn = 10^{-5} N
dynamic viscosity	poise [(a)]	P	1 P = 1 dyn s cm^{-2} = 0,1 Pa s
kinematic viscosity	stokes	St	1 St = 1 cm^2 s^{-1} = 10^{-4} m^2 s^{-1}
luminance	stilb [(a)]	sb	1 sb = 1 cd cm^{-2} = 10^4 cd m^{-2}
illuminance	phot	ph	1 ph = 1 cd sr cm^{-2} = 10^4 lx
acceleration	gal [(b)]	Gal	1 Gal = 1 cm s^{-2} = 10^{-2} m s^{-2}
magnetic flux	maxwell [(c)]	Mx	1 Mx = 1 G cm^2 = 10^{-8} Wb
magnetic flux density	gauss [(c)]	G	1 G = 1 Mx cm^{-2} = 10^{-4} T
magnetic field	œrsted [(c)]	Oe	1 Oe $\triangleq$($10^3/4\pi$) A m^{-1}

DEFINITIONS and RULES:

(a) This unit and its symbol were included in Resolution 7 of the 9th CGPM (1948).

(b) The gal is a special unit of acceleration employed in geodesy and geophysics to express acceleration due to gravity.

(c) These units are part of the so-called "electromagnetic" three-dimensional CGS system based on unrationalised quantity equations, and must be compared with care to the corresponding unit of the International System which is based on rationalized equations involving four dimensions and four quantities for electromagnetic theory. The magnetic flux, Φ, and the magnetic flux density, B, are defined by similar equations in the CGS system and the SI, so that the corresponding units can be related as in the table. However, the unrationalised magnetic field, H (unrationalised) = 4 π x H (rationalised). The equivalence symbol $\triangleq$is used to indicate that when H (unrationalised) = 1 Oe, H (rationalised) = ($10^3/4\pi$) A m^{-1}.

SCHEDULE 3

EQUIVALENTS OF UNITS

(EQUIVALENTS PRECEDED BY AN ASTERISK ARE EXACT)

UNIT	EQUIVALENT
abampere	*10 A
abcoulomb	*10 C
abfarad	*1 GF
abhenry	*1 nH
abmho	*1 GS
abohm	*1 nΩ
abvolt	*10 nV
acre	*4 046,873 m^2
acre foot (based on U.S. survey foot)	1 233,489 m^3
ampere (international of 1948)	0,999 835 A
ampere-hour	*3,6 kC
ångström	*0,1 nm
apothecaries' ounce	31,103 48 g
are	*100 m^2
astronomical unit	149,597 87 Gm
atmosphere (standard)	*101,325 kPa
atmosphere (technical = 1 kgf/cm^2)	*98,066 5 kPa
atomic mass unit	1,660 538 921(73) x 10^{-27} kg
bar	*100 kPa
barn	*100 fm^2
barrel (petroleum = 42 U.S. gallons)	158,987 3 l
biot	*10 A
British thermal unit (mean)	1,055 87 kJ
British thermal unit (39 °F)	1,059 67 kJ
British thermal unit (59 °F)	1,054 80 kJ
British thermal unit (60 °F)	1,054 68 kJ
British thermal unit (International table)	1,055 056 kJ
British thermal unit (thermochemical)	1,054 35 kJ
British thermal unit (International Table) inch per square foot second degree Fahrenheit	519,220 4 W/m.K
British thermal unit (International Table) per cubic foot	37,258 95 kJ/m^3
British thermal unit (International Table) per cubic foot degree Fahrenheit	67,066 1 kJ/m^3.K
British thermal unit (International Table) per pound	*2,326 kJ/kg
British thermal unit (International Table) per pound degree Fahrenheit	*4,186 8 kJ/kg.K
British thermal unit (International Table) per square foot hour degree Fahrenheit	5,678 26 W/m^2.K
bushel (U.K.)	36,368 7 l
bushel (U.S.)	35,239 07 l
calorie	
calorie (15 °C)	4,185 8 J
calorie (20 °C)	4,181 9 J
calorie (mean)	4,190 02 J
calorie (International Table)	*4,186 8 J

UNIT	EQUIVALENT
calorie (thermochemical)	*4,184 J
calorie (International Table) per hour	*1,163 mW
candela per square foot	10,763 91 cd/m^2
candela per square inch	1,550 kcd/m^2
carat (metric)	*200 mg
cental (100 pounds)	45,359 24 kg
centimetre of mercury (0 °C)	1,333 22 kPa
centimetre of mercury, conventional (cmHg)	1,333 224 kPa
centimetre of water (4 °C)	98,063 8 Pa
centimetre of water, conventional (cmH_2O)	98,066 5 Pa
centipoise	*1 mPa.s
centistokes	*1 mm^2/s
chain (Gunter's or surveyor's, based on U.S. survey foot)	*20,116 84 m
chain (Ramden's or engineer's)	*30,48 m
circular mil	506,707 5 μm^2
clo (UK)	0,200 371 2 $K.m^2/W$
clo (US)	0,154 820 2 $K.m^2/W$
coulomb (international of 1948)	0,999 835 C
cubic foot	28,316 847 dm^3
cubic foot per minute	471,947 443 cm^3/s
cubic foot per pound	62,427 96 dm^3/kg
cubic foot per second	28,316 847 dm^3/s
cubic foot per ton (2 240 pounds)	0,027 869 62 m^3/t
cubic inch	*16,387 064 cm^3
cubic inch per minute	273,117 73 mm^3/s
cubic inch per pound	36,127 29 cm^3/kg
cubic yard	0,764 554 858 m^3
cubic yard per minute	12,742 581 dm^3/s
cup (U.K.)	284,130 6 ml
cup (U.S.A.)	236,588 2 ml
curie	*37 GBq
cusec (cubic foot per second)	0,028 316 847 m^3/s
cusec-hour	101,940 65 m^3
cycle per second	*1 Hz
day (mean solar)	86,4 ks
day (sidereal)	86,164 09 ks
decibar	*10 kPa
degree (angular)	17,453 29 mrad (*π/180 rad)
degree Fahrenheit (temperature)	$\underline{t}_K = (\underline{t}_F + 459{,}67)/1{,}8$ $(\underline{t}_K = kelvin\ temperature)$
degree Fahrenheit (temperature interval)	0,555 556 K (*1/1,8 K)
degree Fahrenheit (temperature)	$\underline{t}_C = (\underline{t}_F - 32)/1{,}8$ $(\underline{t}_C = Celcius\ temperature)$
degree Fahrenheit (temperature interval)	0,555 555 6 °C (*1/1,8 °C)
degree Rankine (temperature and temperature interval)	*$\underline{t}_K = \underline{t}_R /1{,}8$ $(\underline{t}_K = kelvin\ temperature)$
dioptre	*1 m^{-1}
drachm (60 grains) (apothecaries')	3,887 93 g
dram (1/256 pound) (avoirdupois)	1,771 85 g
dyne	*10 µN
dyne centimetre	*100 nN.m

UNIT	EQUIVALENT
dyne per square centimetre	*100 mPa
electromagnetic unit of capacitance	*1 GF
electromagnetic unit of charge	*10 C
electromagnetic unit of current	*10 A
electromagnetic unit of inductance	*1 nH
electromagnetic unit of potential	*10 nV
electromagnetic unit of resistance	*1 nΩ
electronvolt	1.602 176 53 (14) x 10^{-19} J
electrostatic unit of capacitance	1,112 65 pF
electrostatic unit of charge	333,564 1 pC
electrostatic unit of current	333,564 1 pA
electrostatic unit of inductance	898,755 2 GH
electrostatic unit of potential	299,792 5 V
electrostatic unit of resistance	898,755 2 GΩ
erg	*100 nJ
farad (international of 1948)	0,999 505 F
faraday (based on carbon 12)	96,485 336 5 kC/mol
faraday (conventional electric current)	96,485 332 1 kC/mol
fathom	*1,828 8m
fermi	*1 fm
fluid drachm	3,551 63 ml
fluid ounce (U.K.)	28,413 06 ml
fluid ounce (U.S.)	29,573 53 ml
foot	*304,8 mm
foot (Cape)	*314,858 1 mm
foot (Cape geodetic)	*314,855 575 16 mm
foot (South African geodetic) ("English foot")	*304,797 265 4 mm
foot (U.S. survey)	304,800 6 mm
foot-candle	10,763 91 1x
foot-lambert	3,426 259 cd/m^2
foot of water (39,2 °F)	2,988 98 kPa
foot per minute	*5,08 mm/s
foot per second	*0,304 8 m/s
foot per second squared	*0,304 8 m/s^2
foot-poundal (energy)	42,140 11 mJ
foot-poundal (torque)	42,140 11 mN.m
foot-pound-force (energy)	1,355 818 J
foot-pound-force (torque)	1,355 818 N.m
foot-pound-force per second	1,355 818 W
foot to the power four (second moment of area)	8,630 975 x 10^{-3} m^4
foot to the power three (section modulus)	28,316 847 10^{-3} m^4
franklin	333,564 1 pC
frigorie	1,162 639 W
furlong	*201,168 m
gal	*10 mm/s^2
gallon (Canadian; liquid)	4,546 122 l
gallon (Canadian and U.K.)	*4,546 09 l
gallon (U.S.; dry)	4,404 884 l
gallon (U.S.; liquid)	3,785 412 l
gallon per pound	10,022 4 l/kg
gamma (magnetic induction)	*1 nT

UNIT	EQUIVALENT
gamma (mass)	*1 µg
gauss	*100 µT
gill (Canadian and U.K.)	142,065 3 ml
gill (U.S.)	118,294 1 ml
gon	15,707 96 mrad (*π/200 rad)
grade	15,707 96 mrad (*π/200 rad)
grain	*64,798 91 mg
grain per gallon (U.K.)	14,253 8 mg/l
grain per gallon (U.S.; liquid)	17,118 06 mg/l
hectare	*10 000 m^2
hectopieze	*100 kPa
henry (international of 1948)	1,000 495 H
horsepower (boiler)	9,809 5 kW
horsepower (electrical)	*746 W
horsepower (550 foot-pound-force per second)	745,699 9 W
horsepower (metric)	735,498 8 W
horsepower (U.K.)	745,7 W
horsepower (water)	746,043 W
horsepower-hour (U.K.)	2,684 52 MJ
hour (mean solar)	3,6 ks
hour (sidereal)	3,590 17 ks
hundredweight (long) (112 pounds)	50,802 35 kg
hundredweight (long) per acre	125,535 kg/ha
hundredweight (short) (100 pounds)	45,359 24 kg
inch	*25,4 mm
inch of mercury (32 °F)	3,386 38 kPa
inch of mercury (60 °F)	3,376 85 kPa
inch of water (39,2 °F)	249,082 Pa
inch of water (60 °F)	248,84 Pa
inch of water, conventional (inH_20)	249,089 Pa
inch per minute	423,333 µm/s
inch per second	*25,4 mm/s
inch per second squared	*25,4 mm/s^2
inch to the power four (second moment of area)	416,231 4 x 10^{-9} m^4
inch to the power three (section modulus)	16,387 064 10^{-6} m^3
iron (shoes and boots)	0,530 mm
joule (international of 1948)	1,000 165 J
kayser	*100 m^{-1}
kilobar	*100 MPa
kilocalorie (International Table)	*4,186 8 kJ
kilocalorie (mean)	4,190 02 kJ
kilocalorie (thermochemical)	*4,184 kJ
kilocycle per second	*1 kHz
kilogram-force	*9,806 65 N
kilogram-force-metre (energy)	*9,806 65 J
kilogram-force-metre (torque)	*9,806 65 N.m
kilogram-force per square centimetre	*98,066 5 kPa
kilopond	*9,806 65 N
kilopond-metre (energy)	*9,806 65 J
kilopond-metre (torque)	*9,806 65 N.m
kilopond per square centimetre	*98,066 5 kPa

UNIT	EQUIVALENT
kilowatt-hour	*3,6 MJ
kilowatt-hour (international of 1948)	*3,600 59 MJ
kip	4,448 222 kN
kip per square inch	6,894 757 MPa
knot (international)	*1,852 km/h
knot (U.K.)	*1,853 184 km/h
lambert	3,183 099 kcd/m^2 (*$10^4/\pi$ cd/m^2)
langley	*41,84 kJ/m^2
leaguer	577,353 43 l
light year	9 460,55 Pm
ligne	*0,635 mm
litre	*1 dm^3
litre atmosphere	101,328 J
lumen per square foot	10,763 91 lx
maxwell	*10 nWb
megabar	*100 GPa
megacycle per second	*1 MHz
metre of water	9,806 38 kPa
metric carat	*200 mg
microbar	*100 mPa
microinch	*25,4 nm
micron	*1 µm
mil (circular)	506,707 5 μm^2
mil (milli-inch) (thou)	*25,4 µm
mile	*1,609 344 km
mile per gallon (see z miles per gallon)	
mile per hour	*1,609 344 km/h
millibar	*100 Pa
milligal	*10 $\mu m/s^2$
milli-inch (thou) (mil)	*25,4 µm
millimetre of mercury, conventional (mmHg)	133,322 4 Pa
millimetre of water, conventional (mmH_2O)	9,806 65 Pa
millitorr	133,322 4 mPa
minim	59,193 9 µl
minute (mean solar)	60 s
minute (sidereal time)	59,836 17 s
minute (plane angle)	290,888 2 µrad (*π/10 800 rad)
month (mean calendar)	2,628 Ms
morgen	*0,856 532 ha
morgen-foot	2 610,71 m^3
nautical mile (international)	*1,852 km
nautical mile (U.K.)	*1,853 184 km
nautical mile (U.S.)	1,852 km
oersted	79,577 47 A/m (*1 000/4π A/m)
ohm (international of 1948)	1, 000 495 Ω
ohm centimetre	*10 mΩ.m
ounce (avoirdupois)	28,349 52 g
ounce (apothecaries' or troy)	31,103 48 g
ounce-force	278,013 9 mN
ounce-force-inch (torque)	7,061 552 mN.m

UNIT	EQUIVALENT
ounce per inch	1,116 12 kg/m
ounce (avoirdupois) per gallon (U.K.)	6,236 023 g/l
ounce (avoirdupois) per gallon (U.S.; liquid)	7,489 152 g/l
ounce per square yard	33,905 75 g/m^2
ounce per square foot	305,151 7 g/m
parsec	30 857 Pm
peck (U.K.)	*9,092 18 l
peck (U.S.)	8,809 768 l
pennyweight	1,555 174 g
perm (0 °C)	57,213 5 ng/N.s
perm (23 °C)	57,452 5 ng/N.s
perm-inch (0 °C)	1,453 22 ng.m/N.s
perm-inch (23 °C)	1,459 29 ng.m/N.s
phot	*10 klx
pica (printer's)	4,217 518 mm
pieze	*1 kPa
pint	568,261 ml
pint (U.K.; reputed)	378,841 ml
pint (U.S.A.; dry)	550,610 5 ml
pint (U.S.; liquid)	473,176 5 ml
pint (U.S.; reputed)	315,451 ml
point (printer's)	*351,459 8 µm
poise	*100 mPa.s
pound	*0,453 592 37 kg
poundal	138,255 mN
poundal per square foot	1,488 164 Pa
poundal per square inch	214,296 Pa
poundal second per square foot	1,488 164 Pa.s
pound-foot squared (moment of inertia)	42,140 12 g.m^2
pound-force	4,448 222 N
pound-force-foot (torque)	1,355 818 N.m
pound-force-inch (torque)	112,984 8 mN.m
pound-force per foot	14,593 9 N/m
pound-force per inch	175,126 8 N/m
pound-force per square foot	47,880 26 Pa
pound-force per square inch	6,894 757 kPa
pound-force-hour per square foot	172,369 kPa.s
pound-force-second per square foot	47,880 26 Pa.s
pound-inch squared (moment of inertia)	292,639 65 mg.m^2
pound per cubic foot	16,018 46 kg/m^3
pound per cubic inch	27,679 9 g/cm^3
pound per foot	1,488 16 kg/m
pound per foot second	1,488 16 Pa.s
pound per gallon (U.K.)	99,776 37 g/l
pound per gallon (U.S.A.; liquid)	119,826 4 g/l
pound per square foot (massload)	4,882 428 kg/m^2
pound per 1 000 square feet (massload)	4,882 428 g/m2
pound per yard	496,055 g/m
quart (U.K.)	1,136 523 l
quart (U.K.; reputed)	757,682 ml
quart (U.S.; dry)	1,101 221 l

UNIT	EQUIVALENT
quart (U.S.; liquid)	946,352 9 ml
quart (U.S.; reputed)	630,902 ml
quarter (2 stone)	12,700 586 kg
quintal	*100 kg
rad	*10 mGy
register ton	2,831 685 m^3
revolution per minute	0,016 667 s^{-1}
rhe	*10 $Pa^{-1}.s^{-1}$
rod (U.K. and U.S.)	*5,029 2 m
roentgen	*258 μC/kg
rood (Cape geodetic)	3,778 266 9 m
rood (Cape)	*3,778 297 2 m
rood (U.K.)	*1 011,715 m^2
scruple	1,295 98 g
second (plane angle)	4,848 137 μrad (*π/648 00 rad)
second (sidereal time)	0,997 269 6 s
shake	*10 ns
slug	14,593 9 kg
slug per cubic foot	515,378 8 kg/m^3
slug per foot second	47,880 26 Pa.s
square foot	*0,092 903 04 m^2
square foot per hour	*25,806 4 mm^2/s
square foot per second	*0,092 903 04 m^2/s
square inch	*645,16 mm^2
square inch per second	*645,16 mm^2/s
square mile	2,589 988 km^2
square mile per long ton	2,549 08 km^2/t
square yard	*0,836 127 36 m^2
square yard per long ton	0,822 922 m^2/t
statampere	333,564 pA
statcoulomb	333,564 pC
statfarad	1,112 65 pF
stathenry	898,755 431 GH
statmho	1,112 65 pS
statohm	898,755 431 GΩ
statvolt	299,792 5 V
stere	*1 m^3
sthène	*1 kN
stilb	*10 kcd/m^2
stokes	*100 mm^2/s
stone	6,350 293 kg
tablespoon (U.K.)	14,206 53 ml
tablespoon (U.S.)	14,786 76 ml
teaspoon (U.K.)	4,735 51 ml
teaspoon (U. S.)	4,928 922 ml
tex	*1 mg/m
therm	105,506 MJ
thermie	4,185 5 MJ
therm per gallon (U.K.)	23,208 MJ/l
thou (mil) (milli-inch)	*25,4 πm
ton (long) (2 240 pounds)	1,016 046 9 t

UNIT	**EQUIVALENT**
ton (long) – mile	1,635 17 t.km
ton (long) per acre	2,510 71 t/ha
ton (long) per cubic yard	1,328 939 t/m^3
ton (long) per mile	0,631 342 t/km
ton (long) per square mile	0,392 298 t/km^2
ton (long) per 1 000 yards	1,111 16 kg/m
ton (metric) *also called tonne*	*1 Mg
ton (nuclear equivalent of TNT)	4,2 GJ
ton (refrigeration) (13 440 Btu/h)	3,938 88 kW
ton (refrigeration) (12 000 Btu/h)	3,516 85 kW
ton (short) (2 000 pounds)	0,907 184 74 t
ton (short) per acre	2,241 70 t/ha
ton (short) per cubic yard	1,186 55 t/m^3
ton (short) per mile	0,563 698 t/km
ton (short) per morgen	1,059 14 t/ha
ton (short) per 1 000 yards	0,992 109 kg/m
ton-force (metric)	*9,806 65 kN
ton-force (2 240 pounds-force)	9,964 02 kN
ton-force (2 000 pounds-force)	8,896 44 kN
ton-force (2 240 pounds-force) per foot	32,690 3 kN/m
ton-force (2 240 pounds-force) per square foot	107,252 kPa
ton-force (2 240 pounds-force) per square inch	15,444 3MPa
ton-force (2 240 pounds-force) per square inch	13,789 5 MPa
torr	133,322 4 Pa
unit pole	125,663 7 nWb
volt (international of 1948)	1,000 33 V
watt (international of 1948)	1,000 165 W
watt-second	*1 J
watt-hour	*3,6 kJ
week	604,8 ks
yard	*0,914 4 m
yard per pound	2,015 91 m/kg
year (calendar)	31,536 Ms
year (sidereal)	31,558 15 Ms
year (tropical)	31,556 93 Ms
z miles per gallon	282,480 7/z l/100 km