

1976 No. 1674

WEIGHTS AND MEASURES

The Units of Measurement Regulations 1976

Made - - - 10th October 1976

Laid before Parliament 11th October 1976

Coming into Operation 1st November 1976

The Secretary of State, being a Minister designated(a) for the purposes of section 2(2) of the European Communities Act 1972(b) in relation to units of measurement to be used for economic, health, safety or administrative purposes, in exercise of the powers conferred by that section, hereby makes the following Regulations:—

1. These Regulations may be cited as the Units of Measurement Regulations 1976 and shall come into operation on 1st November 1976.

2.—(1) The circumstances specified in Article 2 of Council Directive No. 71/354/EEC(c) as limited by the provisions of Article 3 of that Directive are hereinafter called “the specified circumstances”.

(2) The Weights and Measures (International Definitions) Order 1963(d) is hereby revoked.

(3) The Interpretation Act 1889(e) shall apply for the interpretation of these Regulations as it applies for the interpretation of an Act of Parliament and as if these Regulations and the Order hereby revoked were Acts of Parliament.

3. The units of measurement specified in Schedule 1 hereto are authorised for use in the specified circumstances.

4. When in the specified circumstances a quantity is expressed by reference to the name or symbol of a unit of measurement specified in Schedule 1 hereto that reference is a reference to that unit of measurement as defined in, or expressed in terms of other units in, or having a value expressed in, that Schedule, as the case may be.

5. The prefixes and their symbols set out in Schedule 2 hereto may be used in the specified circumstances in conjunction—

(a) with a name or symbol of a unit of measurement specified in paragraph 1, 2, 4 or 5 of Schedule 1 hereto;

(b) in the case of prefixes, with the name “grade” or “gon” and, in the case of symbols, with the symbol “gon”,

to indicate the multiple or sub-multiple as set out in Schedule 2 hereto of that unit of measurement.

(a) S.I. 1976/897 (1976 II, p. 2330).

(c) O.J. No. L243, 29.10.1971, p. 29 (O.J./S.E. 1971 (III) p.878).

(d) S.I. 1963/1354 (1963 II, p. 2352).

(b) 1972 c. 68.

(e) 1889 c. 63.

6. Notes in Schedules 1 and 2 shall apply for the interpretation or explanation thereof.

7.—(1) Subject to the following provisions of this Regulation, nothing in these Regulations shall be taken as adding to or subtracting from or otherwise affecting the units of measurement or the symbols therefor, that are lawful for use for trade by or under the Weights and Measures Act 1963(a) or by or under the Weights and Measures Act (Northern Ireland) 1967(b).

(2) For the purposes of the said Act of 1963—

(a) the metre, the kilogram and the ampere shall have the meanings respectively assigned to them in paragraph 1(1) of Schedule 1 hereto; and

(b) the ohm, the volt and the watt are the quantities (expressed in Schedule 3 hereto in words) represented by the respective algebraic expressions set out in column 5 of the Table in paragraph 2(3) of the said Schedule 1;

and accordingly Schedule 1 to the said Act of 1963 shall be amended in the manner indicated in Schedule 3 hereto.

(3) There shall be added to paragraph 2 of Part III of Schedule 1 to the said Act of 1963 the following definitions:—

“Hectolitre	=	100 litres
LITRE	=	a cubic decimetre
Decilitre	=	1/10 litre
Centilitre	=	1/100 litre
Millilitre	=	1/1000 litre.”.

(4) For the definitions of “Gallon” and “Litre” in Part IV of Schedule 1 to the said Act of 1963 there shall be substituted the following definitions:—

“GALLON	=	4.546 09 cubic decimetres”.
“LITRE	=	a cubic decimetre”.

(5) Paragraph (4) of this Regulation shall not affect any contract or agreement entered into before the date on which these Regulations come into operation notwithstanding that it relates to the delivery of goods on or after that date.

10th October 1976.

John Fraser,
Minister of State,
Department of Prices and Consumer Protection.

SCHEDULE 1

Regulation 3

INTERNATIONAL SYSTEM (SI) UNITS

1.—(1) SI Base units

Quantity	Unit	
	Name	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

Definitions of SI base units:

Unit of length

The metre is the length equal to 1 650 763.73 wavelengths in vacuum of the radiation corresponding to the transition between the levels $2p_{10}$ and $5d_5$ of the krypton 86 atom.

Unit of mass

The kilogram is the unit of mass; it is equal to the mass of the international prototype of the kilogram.

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.

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 metre apart in a vacuum, would produce between these conductors a force equal to 2×10^{-7} newton per metre of length.

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.

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.

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.

Unit of luminous intensity

The candela is the luminous intensity, in the perpendicular direction, of a surface of $1/600\,000$ square metre of a black body at the temperature of freezing platinum under a pressure of 101 325 newtons per square metre.

(2) Special name and symbol of the SI unit of temperature for expressing Celsius temperature

Quantity	Unit	
	Name	Symbol
Celsius temperature	degree Celsius	°C

Celsius temperature t is defined as the difference $t = T - T_0$ between the two thermodynamic temperatures T and T_0 where $T_0 = 273.15$ kelvins. An interval of or difference in temperature may be expressed either in kelvins or in degrees Celsius. The unit of "degree Celsius" is equal to the unit "kelvin".

2. Other SI units

(1) Supplementary SI units

Quantity	Unit	
	Name	Symbol
Plane angle	radian	rad
Solid angle	steradian	sr

Definitions of supplementary SI units:

Plane angle unit

The radian is the plane angle between two radii which, on the circumference of a circle, cut an arc equal in length to the radius.

Solid angle unit

The steradian is the solid angle which has its apex at the centre of a sphere and which describes on the surface of the sphere an area equal to that of a square having as its side the radius of the sphere.

(2) Derived SI units

Units derived coherently from SI base units and supplementary SI units are given as algebraic expressions in the form of products of powers of the SI base units and/or supplementary SI units with a numerical factor equal to 1.

(3) Derived SI units having special names and symbols

Quantity	Unit		Expression	
	Name	Symbol	In other SI units	In terms of base or supplementary SI units
Frequency	hertz	Hz		s^{-1}
Force	newton	N		$m.kg.s^{-2}$
Pressure, stress ...	pascal	Pa	$N.m^{-2}$	$m^{-1}.kg.s^{-2}$
Energy, work, quantity of heat	joule	J	$N.m$	$m^2.kg.s^{-2}$
Power ⁽¹⁾	watt	W	$J.s^{-1}$	$m^2.kg.s^{-3}$
Quantity of electricity, electric charge ...	coulomb	C		$s.A$
Electric tension, electric potential, electromotive force	volt	V	$W.A^{-1}$	$m^2.kg.s^{-3}.A^{-1}$
Electric resistance ...	ohm	Ω	$V.A^{-1}$	$m^2.kg.s^{-3}.A^{-2}$
Electric conductance ...	siemens	S	$A.V^{-1}$	$m^{-2}.kg^{-1}.s^3.A^2$
Electric capacitance ...	farad	F	$C.V^{-1}$	$m^{-2}.kg^{-1}.s^4.A^2$
Magnetic flux	weber	Wb	$V.s$	$m^2.kg.s^{-2}.A^{-1}$
Magnetic flux density ...	tesla	T	$Wb.m^{-2}$	$kg.s^{-2}.A^{-1}$
Electric inductance ...	henry	H	$Wb.A^{-1}$	$m^2.kg.s^{-2}.A^{-2}$
Luminous flux	lumen	lm		$cd.sr$
Illuminance	lux	lx	$lm.m^{-2}$	$m^{-2}.cd.sr$
Activity	becquerel	Bq		s^{-1}
Absorbed dose ⁽²⁾ ...	gray	Gy	$J.kg^{-1}$	$m^2.s^{-2}$

Notes:

Units derived from SI base units may be expressed in terms of the units listed in this Schedule.

In particular, derived SI units may be expressed by the special names and symbols given in the above table; for example, the SI unit of dynamic viscosity may be expressed as $m^{-1}.kg.s^{-1}$ or $N.s.m^{-2}$ or $Pa.s$.

⁽¹⁾ Special names for the unit of power: the name volt-ampere (symbol "VA") when it is used to express the apparent power of alternating electric current, and var (symbol "var") when it is used to express reactive electric power.

⁽²⁾ And other quantities of ionizing radiations of the same dimensions.

(4) Special authorised names and symbols

Special names and symbols of decimal multiples and submultiples of SI units.

Quantity	Unit		
	Name	Symbol	Value
Volume	litre	l	1 l = 1 dm ³ = 10 ⁻³ m ³
Mass	tonne	t	1 t = 1 Mg = 10 ³ kg
Pressure, stress	bar	bar	1 bar = 10 ⁵ Pa

Special names and symbols of decimal multiples and submultiples of SI units which may be used only in specialised fields:

Quantity	Unit		
	Name	Symbol	Value
Area of farm-land and building land	are	a	1 a = 10 ² m ²
Mass per unit length of textile yarns and threads	tex	tex	1 tex = 10 ⁻⁶ kg. m ⁻¹

Note: The multiple 10²a is called a 'hectare'.

3. Units which are defined on the basis of SI units but are not decimal multiples or submultiples thereof

Quantity	Unit		
	Name	Symbol	Value
Plane angle	revolution(a)		1 revolution = 2πrad
	grade or gon	gon	1 gon = $\frac{\pi}{200}$ rad
	degree	°	1° = $\frac{\pi}{180}$ rad
	minute of angle	'	1' = $\frac{\pi}{10\,800}$ rad
	second of angle	"	1" = $\frac{\pi}{648\,000}$ rad
Time	minute	min	1 min = 60 s
	hour	h	1 h = 3 600 s
	day	d	1 d = 86 400 s

Note: (a) No international symbol exists.

4. Units defined independently of the seven SI base units

The unified atomic mass unit is 1/12 of the mass of an atom of the nuclide ^{12}C .

The electronvolt is the kinetic energy acquired by an electron passing in a vacuum from one point to another whose potential is 1 volt higher.

Quantity	Unit		
	Name	Symbol	Value
Mass	unified atomic mass unit	u	$1\text{ u} \approx 1.660\,565\,5 \times 10^{-27}\text{ kg}$
Energy	electronvolt	eV	$1\text{ eV} \approx 1.602\,189\,2 \times 10^{-19}\text{ J}$

Note: The value of these units, expressed in SI units, is not exactly known. The above values are taken from CODATA Bulletin No. 11 of December 1973 of the International Council of Scientific Unions.

5. Units and names of units permitted in specialised fields only

Quantity	Unit	
	Name	Value
Vergency of optical systems	dioptre	$1\text{ dioptre} = 1\text{ m}^{-1}$
Mass of precious stones	metric carat	$1\text{ metric carat} = 2 \times 10^{-4}\text{ kg}$

6. Compound units

Compound units are formed by combining the units mentioned in this Schedule.

SCHEDULE 2*Regulation 5***PREFIXES AND THEIR SYMBOLS USED TO DESIGNATE CERTAIN DECIMAL MULTIPLES AND SUBMULTIPLES**

Factor	Prefix	Symbol	Factor	Prefix	Symbol
10^{18}	exa	E	10^{-1}	deci	d
10^{15}	peta	P	10^{-2}	centi	c
10^{12}	tera	T	10^{-3}	milli	m
10^9	giga	G	10^{-6}	micro	μ
10^6	mega	M	10^{-9}	nano	n
10^3	kilo	k	10^{-12}	pico	p
10^2	hecto	h	10^{-15}	femto	f
10^1	deca	da	10^{-18}	atto	a

The names and symbols of the decimal multiples and submultiples of the unit of mass are formed by attaching prefixes to the word “gram” and their symbols to the symbol “g”.

Where a derived unit is expressed as a fraction, its decimal multiples and submultiples may be designated by attaching a prefix to units in the numerator or the denominator, or in both these parts.

Compound prefixes, that is to say prefixes formed by the juxtaposition of several of the above prefixes, may not be used.

SCHEDULE 3

Regulation 7

AMENDMENTS OF SCHEDULE 1 TO THE WEIGHTS AND MEASURES ACT 1963

1. In Part I, for the definition of “Metre” there shall be substituted the following definition:—

“METRE is the length equal to 1 650 763.73 wavelengths in vacuum of the radiation corresponding to the transition between the levels $2p_{10}$ and $5d_5$ of the krypton 86 atom.”.

2. In Part V, for the definition of “Kilogramme” there shall be substituted the following definition:—

“KILOGRAMME is the unit of mass; it is equal to the mass of the international prototype of the kilogramme.”.

3. For Part VI there shall be substituted the following:—

PART VI

Measurement of Electricity

- | | |
|-------------|--|
| 1(a) AMPERE | is the constant current which, if maintained in two straight parallel conductors of infinite length, of negligible circular cross-section and placed 1 metre apart in a vacuum, would produce between these conductors a force equal to 2×10^{-7} newton per metre of length. |
| (b) OHM | is the electric resistance between two points of a conductor when a constant potential difference of 1 volt, applied between the two points, produces in the conductor a current of 1 ampere, the conductor not being the seat of any electromotive force. |
| (c) VOLT | is the difference of electric potential between two points of a conducting wire carrying a constant current of 1 ampere when the power dissipated between these points is equal to 1 watt. |
| (d) WATT | is the power which in one second gives rise to energy of 1 joule. |
| 2. Kilowatt | = 1000 watts. |
| Megawatt | = one million watts. |

EXPLANATORY NOTE

(This Note is not part of the Regulations.)

These Regulations partially implement Council Directive No. 71/354/EEC (O.J. No. L243, 29.10.1971, p. 29) (O.J./S.E. 1971 (III) p. 878), as amended by Council Directive No. 76/770/EEC (O.J. No. L262, 27.9.1976, p. 204) relating to units of measurement.

The Regulations define and authorise, in the circumstances specified in Article 2 of the Directive, the use of the units of measurement set out in Schedule 1, and the prefixes and symbols for use in conjunction with those units. The authorisation does not affect the units which may lawfully be used for trade by virtue of the Weights and Measures Act 1963, or the Weights and Measures Act (Northern Ireland) 1967 (see Regulation 7(1)). Regulation 7(4) amends the Weights and Measures Acts 1963 by redefining the gallon and the litre. The definition of the litre is as a result the same as that of the international (SI) litre which is 28 parts per million smaller than the litre as at present defined. The alteration in the size of the litre would have a consequential effect on the size of the gallon which is at present defined in terms of the millilitre; the definition of the gallon is therefore also altered so that the gallon will be the same size as at present.

Certain other units of measurement which were previously defined by Order under the 1963 Act are now included in Schedule 1 to that Act (see Regulation 7(2) and Schedule 3), but the quantities have not been altered.

Regulation 7(3) adds the litre as a unit of measurement of volume in Part III of Schedule 1 to the 1963 Act, and also the hectolitre, decilitre, centilitre and the millilitre.

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