

Council Directive of 20 December 1979 on the approximation of  
the laws of the Member States relating to units of measurement  
and on the repeal of Directive 71/354/EEC (80/181/EEC)

COUNCIL DIRECTIVE

of 20 December 1979

on the approximation of the laws of the Member States relating to  
units of measurement and on the repeal of Directive 71/354/EEC

(80/181/EEC)

THE COUNCIL OF THE EUROPEAN COMMUNITIES,

Having regard to the Treaty establishing the European Economic Community, and in particular Article 100 thereof,

Having regard to Council Directive 71/354/EEC of 18 October 1971 on the approximation of the laws of the Member States relating to units of measurement<sup>(1)</sup>, as last amended by Council Directive 76/770/EEC<sup>(2)</sup>,

Having regard to the proposal from the Commission<sup>(3)</sup>,

Having regard to the opinion of the European Parliament<sup>(4)</sup>,

Having regard to the opinion of the Economic and Social Committee<sup>(5)</sup>,

Whereas units of measurement are essential in the use of all measuring instruments, to express measurements or any indication of quantity; whereas units of measurement are used in most fields of human activity; whereas it is necessary to ensure the greatest possible clarity in their use; whereas it is therefore necessary to make rules for their use within the Community for economic, public health, public safety or administrative purposes;

Whereas, however, there exist international conventions or agreements in the field of international transport which bind the Community or the Member States; whereas these conventions or agreements have to be respected;

Whereas the laws which regulate the use of units of measurement in the Member States differ from one Member State to another and as a result hinder trade; whereas, in these circumstances, it is necessary to harmonize laws, regulations and administrative provisions in order to overcome such obstacles;

Whereas units of measurement are the subject of international resolutions adopted by the General Conference of Weights and Measures (CGPM) set up by the Metre Convention signed in Paris on 20 May 1875, to which all the Member States adhere; whereas the 'International System of Units'(SI) was drawn up as a result of these resolutions;

Whereas the Council on 18 October 1971 adopted Directive 71/354/EEC on the approximation of the laws of the Member States in order to eliminate obstacles to trade by adopting the

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international system of units at Community level; whereas Directive 71/354/EEC was amended by the Act of Accession and by Directive 76/770/EEC;

Whereas these Community provisions have not overcome all the obstacles in this field; whereas Directive 76/770/EEC provides for the review before 31 December 1979 of the situation regarding units of measurement, names and symbols listed in Chapter D of the Annex thereto; whereas it has also proved necessary to review the situation regarding certain other units of measurement;

Whereas it is necessary, in order to avoid serious difficulties, to provide for a transitional period during which units of measurement which are not compatible with the international system can be phased out; whereas it is nevertheless essential to allow the Member States wishing to do so to bring into force as quickly as possible, on their territory, the provisions of Chapter I of the Annex; whereas it is therefore necessary to limit the duration of this transitional period at Community level while, at the same time, leaving the Member States free to curtail that period;

Whereas, during the transitional period, it is essential, particularly in order to protect the consumer, to maintain a clear position on the use of units of measurement in trade between the Member States; whereas the obligation on the Member States to allow use of supplementary indications on products and equipment imported from other Member States during this transitional period seems to serve this purpose well;

Whereas the systematic adoption of a solution of this kind for all measuring instruments, including medical instruments, is however not necessarily desirable; whereas the Member States should therefore be able to require that, on their territory, measuring instruments bear indications of quantity in a single legal unit of measurement;

Whereas this Directive does not affect the continued manufacture of products already on the market; whereas it does, however, affect the placing on the market and use of products and equipment bearing indications of quantity in units of measurement which are no longer legal units of measurement, when such products and equipment are necessary to supplement or replace components or parts of such products, equipment and instruments already on the market; whereas it is therefore necessary for Member States to authorize the placing on the market and the use of such products and equipment to complete and replace components, even when they bear indications of quantity in units of measurement which are no longer legal units of measurement, so that products, equipment or instruments already on the market may continue to be used;

Whereas the International Organization for Standardization (ISO) on 1 March 1974 adopted an international standard on the representation of SI and other units for use in systems with limited sets of characters; whereas it is advisable for the Community to adopt the solutions which have already been approved on a wider international level by ISO Standard 2955 of 1 March 1974;

Whereas Community provisions relating to units of measurement are to be found in several Community texts; whereas the question of units of measurement is so important that it is essential that reference may be made to a single Community text; whereas this Directive thereby consolidates all the Community provisions on the subject and repeals Directive 71/354/EEC,

HAS ADOPTED THIS DIRECTIVE:

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### Article 1

The legal units of measurement within the meaning of this Directive which must be used for expressing quantities shall be:

- (a) those listed in Chapter I of the Annex;
- (b) [<sup>F1</sup>those listed in Chapter II of the Annex only in those Member States where they were authorised on 21 April 1973;]
- (c) [<sup>F2</sup>those listed in Chapter III of the Annex only in those Member States where they were authorized on 21 April 1973 and until a date to be fixed by those States. This date may not be later than 31 December 1994;
- (d) those listed in Chapter IV of the Annex only in those Member States where they were authorized on 21 April 1973 and until a date to be fixed by those States. This date may not be later than 31 December 1999.]

#### Textual Amendments

- F1** Substituted by [Directive 2009/3/EC of the European Parliament and of the Council of 11 March 2009 amending Council Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement \(Text with EEA relevance\)](#).
- F2** Substituted by [Council Directive of 27 November 1989 amending Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement \(89/617/EEC\)](#).

### Article 2

- (a) [<sup>F1</sup>The obligations arising under Article 1 relate to measuring instruments used, measurements made and indications of quantity expressed in units of measurement.]
- (b) This Directive shall not affect the use in the field of air and sea transport and rail traffic of units, other than those made compulsory by the Directive, which have been laid down in international conventions or agreements binding the Community or the Member States.

#### Textual Amendments

- F1** Substituted by [Directive 2009/3/EC of the European Parliament and of the Council of 11 March 2009 amending Council Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement \(Text with EEA relevance\)](#).

### Article 3

1 For the purposes of this Directive ‘supplementary indication’ means one or more indications of quantity expressed in units of measurement not contained in Chapter I of the Annex accompanying an indication of quantity expressed in a unit contained in that Chapter.

[<sup>F12</sup> The use of supplementary indications shall be authorised.]

3 However, Member States may require that measuring instruments bear indications of quantity in a single legal unit of measurement.

4 The indication expressed in a unit of measurement listed in Chapter I shall predominate. In particular, the indications expressed in units of measurement not listed in

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Chapter I shall be expressed in characters no larger than those of the corresponding indication in units listed in Chapter I.

<sup>F3</sup>5 .....

**Textual Amendments**

- F1** Substituted by [Directive 2009/3/EC of the European Parliament and of the Council of 11 March 2009 amending Council Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement \(Text with EEA relevance\)](#).
- F3** Deleted by [Council Directive of 27 November 1989 amending Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement \(89/617/EEC\)](#).

*Article 4*

The use of units of measurement which are not or are no longer legal shall be authorized for:

- products and equipment already on the market and/or in service on the date on which this Directive is adopted,
- components and parts of products and of equipment necessary to supplement or replace components or parts of the above products and equipment.

However, the use of legal units of measurement may be required for the indicators of measuring instruments.

*Article 5*

International standard ISO 2955 of [<sup>F2</sup>15 May 1983], ‘Information processing — Representations of SI and other units for use in systems with limited character sets’ shall apply in the field covered by paragraph 1 thereof.

**Textual Amendments**

- F2** Substituted by [Council Directive of 27 November 1989 amending Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement \(89/617/EEC\)](#).

*Article 6*

Directive 71/354/EEC shall be repealed on 1 October 1981.

[<sup>F3</sup>.....

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<sup>F3</sup>]

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**Textual Amendments**

- F3** Deleted by [Council Directive of 27 November 1989 amending Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement \(89/617/EEC\)](#).

*[<sup>F4</sup> Article 6a*

Issues concerning the implementation of this Directive and, in particular, the matter of supplementary indications shall be further examined, and if necessary the appropriate

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measures adopted in accordance with the procedure referred to in Article 18 of Council Directive 71/316/EEC<sup>(6)</sup>.]

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**Textual Amendments**

- F4** Inserted by [Directive 1999/103/EC of the European Parliament and of the Council of 24 January 2000 amending Council Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement.](#)

*[<sup>F5</sup>Article 6b*

The Commission shall monitor market developments relating to this Directive and its implementation with regard to the smooth functioning of the internal market and international trade and shall submit a report on those developments, accompanied by proposals where appropriate, to the European Parliament and to the Council by 31 December 2019.]

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**Textual Amendments**

- F5** Inserted by [Directive 2009/3/EC of the European Parliament and of the Council of 11 March 2009 amending Council Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement \(Text with EEA relevance\).](#)

*Article 7*

- (a) Member States shall adopt and publish before 1 July 1981 the laws, regulations and administrative provisions necessary to comply with this Directive and shall inform the Commission thereof.

They shall apply these provisions from 1 October 1981.

- (b) As from the date of notification of this Directive, Member States shall also ensure that the Commission is informed, in sufficient time to enable it to submit its comments, of any draft laws, regulations or administrative provisions which they intend to adopt in the field covered by this Directive.

*Article 8*

This Directive is addressed to the Member States.

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## [<sup>XI</sup>ANNEX

### Editorial Information

**XI** Substituted by [Corrigendum to Council Directive 80/181/EEC of 20 December 1979 on the approximation of the laws of the Member States relating to units of measurement and on the repeal of Directive 71/354/EEC \(Official Journal of the European Communities No L 39 of 15 February 1980\)](#).

## CHAPTER I

### LEGAL UNITS OF MEASUREMENT REFERRED TO IN ARTICLE 1 (a)

#### 1. SI UNITS AND THEIR DECIMAL MULTIPLES AND SUBMULTIPLES

##### [<sup>F6</sup>1.1. SI base units

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

Definitions of SI base units:

#### *Unit of time*

The second, symbol s, is the SI unit of time. It is defined by taking the fixed numerical value of the caesium frequency  $\Delta\nu_{\text{Cs}}$ , the unperturbed ground-state hyperfine transition frequency of the caesium 133 atom, to be 9 192 631 770 when expressed in the unit Hz, which is equal to  $\text{s}^{-1}$ .

#### *Unit of length*

The metre, symbol m, is the SI unit of length. It is defined by taking the fixed numerical value of the speed of light in vacuum  $c$  to be 299 792 458 when expressed in the unit m/s, where the second is defined in terms of  $\Delta\nu_{\text{Cs}}$ .

#### *Unit of mass*

The kilogram, symbol kg, is the SI unit of mass. It is defined by taking the fixed numerical value of the Planck constant  $h$  to be  $6,626\,070\,15 \times 10^{-34}$  when expressed in the unit J s, which is equal to  $\text{kg m}^2 \text{s}^{-1}$ , where the metre and the second are defined in terms of  $c$  and  $\Delta\nu_{\text{Cs}}$ .

#### *Unit of electric current*

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The ampere, symbol A, is the SI unit of electric current. It is defined by taking the fixed numerical value of the elementary charge  $e$  to be  $1,602\ 176\ 634 \times 10^{-19}$  when expressed in the unit C, which is equal to A s, where the second is defined in terms of  $\Delta\nu_{\text{Cs}}$ .

#### *Unit of thermodynamic temperature*

The kelvin, symbol K, is the SI unit of thermodynamic temperature. It is defined by taking the fixed numerical value of the Boltzmann constant  $k$  to be  $1,380\ 649 \times 10^{-23}$  when expressed in the unit  $\text{J K}^{-1}$ , which is equal to  $\text{kg m}^2 \text{s}^{-2} \text{K}^{-1}$ , where the kilogram, metre and second are defined in terms of  $h$ ,  $c$  and  $\Delta\nu_{\text{Cs}}$ .

#### *Unit of amount of substance*

The mole, symbol mol, is the SI unit of amount of substance. One mole contains exactly  $6,022\ 140\ 76 \times 10^{23}$  elementary entities. This number is the fixed numerical value of the Avogadro constant,  $N_{\text{A}}$ , when expressed in the unit  $\text{mol}^{-1}$  and is called the Avogadro number.

The amount of substance, symbol  $n$ , of a system is a measure of the number of specified elementary entities. An elementary entity may be an atom, a molecule, an ion, an electron, any other particle or specified group of particles.

#### *Unit of luminous intensity*

The candela, symbol cd, is the SI unit of luminous intensity in a given direction. It is defined by taking the fixed numerical value of the luminous efficacy of monochromatic radiation of frequency  $540 \times 10^{12}$  Hz,  $K_{\text{cd}}$ , to be 683 when expressed in the unit  $\text{lm W}^{-1}$ , which is equal to  $\text{cd sr W}^{-1}$ , or  $\text{cd sr kg}^{-1} \text{m}^{-2} \text{s}^3$ , where the kilogram, metre and second are defined in terms of  $h$ ,  $c$  and  $\Delta\nu_{\text{Cs}}$ .

### 1.1.1. Special name and symbol of the SI derived 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  $T_0 = 273,15$  K. An interval or difference of temperature may be expressed either in kelvins or in degrees Celsius. The unit ‘degree Celsius’ is equal to the unit ‘kelvin’.]

#### **Textual Amendments**

**F6** Substituted by [Commission Directive \(EU\) 2019/1258 of 23 July 2019 amending, for the purpose of its adaptation to technical progress, the Annex to Council Directive 80/181/EEC as regards the definitions of SI base units \(Text with EEA relevance\).](#)

[<sup>F1</sup>1.2. SI derived units]

<sup>F7</sup>1.2.1. SI supplementary units

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[<sup>F7</sup>

<sup>F7</sup> .....]  
 Definitions of SI supplementary units:  
 Unit of plane angle

.....  
 Unit of solid angle  
 .....

#### Textual Amendments

**F7** Deleted by Directive 2009/3/EC of the European Parliament and of the Council of 11 March 2009 amending Council Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement (Text with EEA relevance).

[<sup>F1</sup>1.2.2. General rule for SI derived units

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

1.2.3. SI derived units with special names and symbols

| Quantity                                           | Unit      |        | Expression                     |                                                                      |
|----------------------------------------------------|-----------|--------|--------------------------------|----------------------------------------------------------------------|
|                                                    | Name      | Symbol | In terms of other SI units     | In terms of SI base units                                            |
| Plane angle                                        | radian    | rad    |                                | $\text{m} \cdot \text{m}^{-1}$                                       |
| Solid angle                                        | steradian | sr     |                                | $\text{m}^2 \cdot \text{m}^{-2}$                                     |
| Frequency                                          | hertz     | Hz     |                                | $\text{s}^{-1}$                                                      |
| Force                                              | newton    | N      |                                | $\text{m} \cdot \text{kg} \cdot \text{s}^{-2}$                       |
| Pressure, stress                                   | pascal    | Pa     | $\text{N} \cdot \text{m}^{-2}$ | $\text{m}^{-1} \cdot \text{kg} \cdot \text{s}^{-2}$                  |
| Energy, work;<br>quantity of heat                  | joule     | J      | $\text{N} \cdot \text{m}$      | $\text{m}^2 \cdot \text{kg} \cdot \text{s}^{-2}$                     |
| Power <sup>a</sup> , radiant<br>flux               | watt      | W      | $\text{J} \cdot \text{s}^{-1}$ | $\text{m}^2 \cdot \text{kg} \cdot \text{s}^{-3}$                     |
| Quantity of<br>electricity,<br>electric charge     | coulomb   | C      |                                | $\text{s} \cdot \text{A}$                                            |
| Electric<br>potential,<br>potential<br>difference, | volt      | V      | $\text{W} \cdot \text{A}^{-1}$ | $\text{m}^2 \cdot \text{kg} \cdot \text{s}^{-3} \cdot \text{A}^{-1}$ |

<sup>a</sup> 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. The 'var' is not included in GCPM resolutions.



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|                                                                     |           |          |                   |                                            |
|---------------------------------------------------------------------|-----------|----------|-------------------|--------------------------------------------|
| electromotive force                                                 |           |          |                   |                                            |
| Electric resistance                                                 | ohm       | $\Omega$ | $V \cdot A^{-1}$  | $m^2 \cdot kg \cdot s^{-3} \cdot A^{-2}$   |
| Conductance                                                         | siemens   | S        | $A \cdot V^{-1}$  | $m^{-2} \cdot kg^{-1} \cdot s^3 \cdot A^2$ |
| Capacitance                                                         | farad     | F        | $C \cdot V^{-1}$  | $m^{-2} \cdot kg^{-1} \cdot s^4 \cdot A^2$ |
| Magnetic flux                                                       | weber     | Wb       | $V \cdot s$       | $m^2 \cdot kg \cdot s^{-2} \cdot A^{-1}$   |
| Magnetic flux density                                               | tesla     | T        | $Wb \cdot m^{-2}$ | $kg \cdot s^{-2} \cdot A^{-1}$             |
| Inductance                                                          | henry     | H        | $Wb \cdot A^{-1}$ | $m^2 \cdot kg \cdot s^{-2} \cdot A^{-2}$   |
| Luminous flux                                                       | lumen     | lm       | $cd \cdot sr$     | cd                                         |
| Illuminance                                                         | lux       | lx       | $lm \cdot m^{-2}$ | $m^{-2} \cdot cd$                          |
| Activity (of a radionuclide)                                        | becquerel | Bq       |                   | $s^{-1}$                                   |
| Absorbed dose, specific energy imparted, kerma, absorbed dose index | gray      | Gy       | $J \cdot kg^{-1}$ | $m^2 \cdot s^{-2}$                         |
| Dose equivalent                                                     | sievert   | Sv       | $J \cdot kg^{-1}$ | $m^2 \cdot s^{-2}$                         |
| Catalytic activity                                                  | katal     | kat      |                   | $mol \cdot s^{-1}$                         |

**a** 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. The 'var' is not included in GCPM resolutions.

Units derived from SI base units may be expressed in terms of the units listed in Chapter I.

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  $m^{-1} \cdot kg \cdot s^{-1}$  or  $N \cdot s \cdot m^{-2}$  or  $Pa \cdot s$ .]

1.3. Prefixes and their symbols used to designate certain decimal multiples and submultiples

| [ <sup>F8</sup> Factor | Prefix | Symbol |
|------------------------|--------|--------|
| $10^{24}$              | yotta  | Y      |
| $10^{21}$              | zetta  | Z      |

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|            |       |                    |
|------------|-------|--------------------|
| $10^{18}$  | exa   | E                  |
| $10^{15}$  | peta  | P                  |
| $10^{12}$  | tera  | T                  |
| $10^9$     | giga  | G                  |
| $10^6$     | mega  | M                  |
| $10^3$     | kilo  | [ <sup>x2</sup> k] |
| $10^2$     | hecto | [ <sup>x2</sup> h] |
| $10^1$     | deca  | da                 |
| $10^{-1}$  | deci  | d                  |
| $10^{-2}$  | centi | c                  |
| $10^{-3}$  | milli | m                  |
| $10^{-6}$  | micro | μ                  |
| $10^{-9}$  | nano  | n                  |
| $10^{-12}$ | pico  | p                  |
| $10^{-15}$ | femto | f                  |
| $10^{-18}$ | atto  | a                  |
| $10^{-21}$ | zepto | z                  |
| $10^{-24}$ | yocto | y]                 |

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.

#### 1.4. Special authorized names and symbols of decimal multiples and submultiples of SI units

| Quantity | Unit  |                     |                                                           |
|----------|-------|---------------------|-----------------------------------------------------------|
|          | Name  | Symbol              | Value                                                     |
| Volume   | litre | l or L <sup>a</sup> | 1 l = 1 dm <sup>3</sup> = 10 <sup>-3</sup> m <sup>3</sup> |

**a** The two symbols 'l' and 'L' may be used for the litre unit. (Sixteenth CGPM (1979), resolution 6).

**b** Unit listed in the International Bureau of Weights and Measures booklet as among the units to be permitted temporarily.

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|                  |       |                  |                                 |
|------------------|-------|------------------|---------------------------------|
| Mass             | tonne | t                | 1 t = 1 Mg = 10 <sup>3</sup> kg |
| Pressure, stress | bar   | bar <sup>b</sup> | 1 bar = 10 <sup>5</sup> Pa      |

**a** The two symbols 'l' and 'L' may be used for the litre unit. (Sixteenth CGPM (1979), resolution 6).

**b** Unit listed in the International Bureau of Weights and Measures booklet as among the units to be permitted temporarily.

Note:

The prefixes and their symbols listed in 1.3 may be used in conjunction with the units and symbols contained in Table 1.4.

## 2. 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 <sup>*ab</sup> |        | 1 revolution = 2 $\pi$ rad    |
|             | grade* or gon*            | gon*   | 1 gon = $\frac{\pi}{200}$ rad |
|             | degree                    | °      | 1° = $\frac{\pi}{180}$ rad    |
|             | minute of angle           | '      | 1' = $\frac{\pi}{10800}$ rad  |
|             | second of angle           | "      | 1" = $\frac{\pi}{648000}$ rad |
| Time        | minute                    | min    | 1 min = 60 s                  |
|             | hour                      | h      | 1 h = 3 600 s                 |
|             | day                       | d      | 1 d = 86 400 s                |

**a** The character (\*) after a unit name or symbol indicates that it does not appear in the lists drawn up by the CGPM, CIPM or BIPM. This applies to the whole of this Annex.

**b** No international symbol exists.

Note:

The prefixes listed in 1.3 may only be used in conjunction with the names 'grade' or 'gon' and the symbol 'gon'.

## [F83. UNITS USED WITH THE SI, WHOSE VALUES IN SI ARE OBTAINED EXPERIMENTALLY

| Quantity | Unit         |        |                                                                                                                               |
|----------|--------------|--------|-------------------------------------------------------------------------------------------------------------------------------|
|          | Name         | Symbol | Definition                                                                                                                    |
| Energy   | Electronvolt | eV     | The electron volt is the kinetic energy acquired by an electron in passing through a potential difference of 1 volt in vacuum |

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|             |                          |   |                                                                                                       |
|-------------|--------------------------|---|-------------------------------------------------------------------------------------------------------|
| <b>Mass</b> | Unified atomic mass unit | u | The unified atomic mass units is equal to 1/12 of the mass of an atom of the nuclide <sup>12</sup> C. |
|-------------|--------------------------|---|-------------------------------------------------------------------------------------------------------|

Note:

The prefixes and their symbols listed in 1.3 may be used in conjunction with these two units and with their symbols.]

#### 4. UNITS AND NAMES OF UNITS PERMITTED IN SPECIALIZED FIELDS ONLY

| Quantity                                                         | Unit                  |          |                                               |
|------------------------------------------------------------------|-----------------------|----------|-----------------------------------------------|
|                                                                  | Name                  | Symbol   | Value                                         |
| Vergency of optical systems                                      | dioptre*              |          | 1 dioptre = 1 m <sup>-1</sup>                 |
| Mass of precious stones                                          | metric carat          |          | 1 metric carat = 2 × 10 <sup>-4</sup> kg      |
| Area of farmland and building land                               | are                   | a        | 1 a = 10 <sup>2</sup> m <sup>2</sup>          |
| Mass per unit length of textile yarns and threads                | tex*                  | tex*     | 1 tex = 10 <sup>-6</sup> kg · m <sup>-1</sup> |
| [ <sup>F9</sup> Blood pressure and pressure of other body fluids | Millimetre of mercury | mm Hg(*) | 1 mm Hg = 133,322 Pa                          |
| Effective cross-sectional area                                   | Barn                  | b        | 1 b = 10 <sup>-28</sup> m <sup>2</sup>        |

Note:

[<sup>F10</sup>The prefixes and their symbols listed in 1.3 may be used in conjunction with the above units and symbols, with the exception of the millimetre of mercury and its symbol. The multiple of 10<sup>2</sup>a is, however, called a 'hectare'.]

#### 5. COMPOUND UNITS

Combinations of the units listed in Chapter I form compound units.

## [<sup>F2</sup>CHAPTER II

### LEGAL UNITS OF MEASUREMENT REFERRED TO IN ARTICLE 1 (b), PERMITTED FOR SPECIFIC USES ONLY

| Field of application | Unit |                   |        |
|----------------------|------|-------------------|--------|
|                      | Name | Approximate value | Symbol |

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|                                                                   |            |           |                                        |       |
|-------------------------------------------------------------------|------------|-----------|----------------------------------------|-------|
| Road traffic signs, distance and speed measurement                | mile       | 1 mile =  | 1 609 m                                | mile  |
|                                                                   | yard       | 1 yd =    | 0,9144 m                               | yd    |
|                                                                   | foot       | 1 ft =    | 0,3048 m                               | ft    |
|                                                                   | inch       | 1 in =    | $2,54 \times 10^{-2}$ m                | in    |
| Dispense of draught beer and cider; milk in returnable containers | pint       | 1 pt =    | $0,5683 \times 10^{-3}$ m <sup>3</sup> | pt    |
| [ <sup>F7</sup> ]                                                 |            |           |                                        |       |
| Transaction in precious metals                                    | troy ounce | 1 oz tr = | $31,10 \times 10^{-3}$ kg              | oz tr |

[<sup>F1</sup>The units listed in this Chapter may be combined with each other or with those in Chapter I to form compound units.]]

### CHAPTER III

#### LEGAL UNITS OF MEASUREMENT REFERRED TO IN ARTICLE 1 (c)

##### QUANTITIES, NAMES OF UNITS, SYMBOLS AND APPROXIMATE VALUES

|                   |                   |                                          |
|-------------------|-------------------|------------------------------------------|
| <b>Length</b>     |                   |                                          |
| inch              | 1 in              | = $2.54 \times 10^{-2}$ m                |
| foot              | 1 ft              | = 0.3048 m                               |
| [ <sup>F3</sup> ] |                   |                                          |
| mile              | 1 mile            | = 1 609 m                                |
| yard              | 1 yard            | = 0.9144 m                               |
| <b>Area</b>       |                   |                                          |
| square foot       | 1 sq ft           | = $0.929 \times 10^{-1}$ m <sup>2</sup>  |
| acre              | 1 ac              | = 4 047 m <sup>2</sup>                   |
| square yard       | 1 sq yd           | = 0.8361 m <sup>2</sup>                  |
| <b>Volume</b>     |                   |                                          |
| fluid ounce       | 1 fl oz           | = $28.41 \times 10^{-6}$ m <sup>3</sup>  |
| gill              | 1 gill            | = $0.1421 \times 10^{-3}$ m <sup>3</sup> |
| pint              | 1 pt              | = $0.5683 \times 10^{-3}$ m <sup>3</sup> |
| quart             | 1 qt              | = $1.137 \times 10^{-3}$ m <sup>3</sup>  |
| a                 | [ <sup>F3</sup> ] |                                          |

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#### QUANTITIES, NAMES OF UNITS, SYMBOLS AND APPROXIMATE VALUES

|                     |         |                                      |
|---------------------|---------|--------------------------------------|
| gallon              | 1 gal   | = $4.546 \times 10^{-3} \text{ m}^3$ |
| <b>Mass</b>         |         |                                      |
| ounce (avoirdupois) | 1 oz    | = $28.35 \times 10^{-3} \text{ kg}$  |
| troy ounce          | 1 oz tr | = $31.10 \times 10^{-3} \text{ kg}$  |
| pound               | 1 lb    | = $0.4536 \text{ kg}$                |
| <b>Energy</b>       |         |                                      |
| therm               | 1 therm | = $105.506 \times 10^6 \text{ J}$    |
| a [F3]              |         |                                      |

Until the date to be fixed under Article 1 (c), the units listed in Chapter III may be combined with each other or with those in Chapter I to form compound units.]

#### [F11] CHAPTER IV

#### LEGAL UNITS OF MEASUREMENT REFERRED TO IN ARTICLE I (d), PERMITTED IN SPECIALIZED FIELDS ONLY

| Field of application                                                     | Unit                 |                                              | Symbol |
|--------------------------------------------------------------------------|----------------------|----------------------------------------------|--------|
|                                                                          | Name                 | Approximate value                            |        |
| Marine navigation                                                        | fathom               | 1 fm = 1,829 m                               | fm     |
| Beer, cider, waters, lemonades and fruit juices in returnable containers | pint                 | 1 pt = $0,5683 \times 10^{-3} \text{ m}^3$   | pt     |
|                                                                          | fluid ounce          | 1 fl oz = $28,41 \times 10^{-6} \text{ m}^3$ | fl. oz |
| Spirit drinks                                                            | gill                 | 1 gill = $0,142 \times 10^{-3} \text{ m}^3$  | gill   |
| Goods sold loose in bulk                                                 | ounce (avoir dupois) | 1 oz = $28,35 \times 10^{-3} \text{ kg}$     | oz     |
|                                                                          | pound                | 1 lb = $0,4536 \text{ kg}$                   | lb     |
| Gas supply                                                               | therm                | 1 therm = $105,506 \times 10^6 \text{ J}$    | therm  |

Until the date to be fixed under Article 1 (d), the units listed in this Chapter may be combined with each other or with those in Chapter I to form compound units.]

#### Textual Amendments

**F11** Inserted by Council Directive of 27 November 1989 amending Directive 80/181/EEC on the approximation of the laws of the Member States relating to units of measurement (89/617/EEC).

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- (1) [OJ No L 243, 29.10.1971, p. 29.](#)
- (2) [OJ No L 262, 27.9.1976, p. 204.](#)
- (3) [OJ No C 81, 28.3.1979, p. 6.](#)
- (4) [OJ No C 127, 21.5.1979, p. 80.](#)
- (5) Opinion delivered on 24/25 October 1979 (not yet published in the Official Journal).
- (6) [<sup>F4</sup>[OJ L 202, 6.9.1971, p. 1.](#)]

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#### **Textual Amendments**

- F4** Inserted by [Directive 1999/103/EC](#) of the European Parliament and of the Council of 24 January 2000 amending [Council Directive 80/181/EEC](#) on the approximation of the laws of the Member States relating to units of measurement.