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BSI Standards Publication

# Identification of units of measurement for computer-based processing

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# TECHNICAL SPECIFICATION

# SPÉCIFICATION TECHNIQUE

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**Identification des unités de mesure pour le traitement assisté par ordinateur**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**IDENTIFICATION OF UNITS OF MEASUREMENT FOR  
COMPUTER-BASED PROCESSING**

## FOREWORD

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- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62720, which is a technical specification, has been prepared by subcommittee 3D, Product properties and classes and their identification, of IEC technical committee 3: Information structures, documentation and graphical symbols.

The text of this technical specification is based on the following documents:

|               |                  |
|---------------|------------------|
| Enquiry draft | Report on voting |
| 3D/201/DTS    | 3D/209/RVC       |

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International Standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

## INTRODUCTION

For the interpretation of documents such as data sheets, catalogues, or other product related documentation units of measure play an inconspicuous but important role. All quantitative data may be prone to misinterpretation if its unit of measure is unclear or wrong. Thus, there is a strong requirement to unambiguously identify units of measure and ensuring that each unit of measure and its underlying quantity is clearly specified.

As a consequence there is a need to provide computer interpretable identifiers for units of measure. This document assigns identifiers to many standard or non-standard units of measure currently in use.

To ensure timely and fast maintenance of the collection, the content of the document is planned to be uploaded to IEC Common Data Dictionary, thus making possible easy maintenance and fast introduction of eventually missing units of measure or quantities.

## IDENTIFICATION OF UNITS OF MEASUREMENT FOR COMPUTER-BASED PROCESSING

### 1 Scope

This Technical Specification specifies identifiers for units to support computer-based processing of product data. It provides a survey of quantities with associated collections of internationally standardized as well as non-standardized units used in business and science.

In scope are any standard or non-standard units of measure currently in use, in two or more distinct ethno-linguistic groups or nations, at least in one domain of industry, for which an explicit method of conversion to a known standard unit of measure or its equivalent is well documented or evident from external references.

NOTE 1 The document collects units commonly used in business data. It does not purport to be complete. The standardization of units or parts thereof is out of scope.

NOTE 2 Having assigned an identifier by being mentioned in IEC 62720 does not imply that the unit of measure in question or parts thereof may be considered to be standardized.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary* (available from <http://www.electropedia.org>)

ISO/IEC 11179–1:2004, *Information technology – Metadata registries (MDR) – Framework – Part 1: Framework*

ISO/IEC 11179–3:2003, *Information technology – Metadata registries (MDR) – Framework – Part 3: Registry metamodel and basic attributes*

ISO/IEC 11179–5:2005, *Information technology – Metadata registries (MDR) – Framework – Part 5: Naming and identification principles*

ISO/IEC 11179–6:2005, *Information technology – Metadata registries (MDR) – Framework – Part 6: Registration*

ISO 80000 (all parts), *Quantities and units*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

#### 3.1

##### **quantity**

property of a phenomenon, body, or substance, where the property has a magnitude that can be expressed by means of a number and a reference

Note 1 to entry: The generic concept “quantity” can be divided into several levels of specific concepts, as shown in Table 1. The left hand side of the table shows specific concepts under “quantity”. These are generic concepts for the individual quantities in the right hand column.

**Table 1 – Concepts for quantities**

|                                                      |                       |                                                                                   |
|------------------------------------------------------|-----------------------|-----------------------------------------------------------------------------------|
| length, $l$                                          | radius, $r$           | radius of circle A, $r_A$ or $r(A)$                                               |
|                                                      | wavelength, $\lambda$ | wavelength of the sodium D radiation, $\lambda_D$ or $\lambda(D; Na)$             |
| energy, $E$                                          | kinetic energy, $T$   | kinetic energy of particle $i$ in a given system, $T_i$                           |
|                                                      | heat, $Q$             | heat of vaporization of sample $i$ of water, $Q_i$                                |
| electric charge, $Q$                                 |                       | electric charge of the proton, $e$                                                |
| electric resistance, $R$                             |                       | electric resistance of resistor $i$ in a given circuit, $R_i$                     |
| amount-of-substance concentration of entity B, $c_B$ |                       | amount-of-substance concentration of ethanol in wine sample $i$ , $c_i(C_2H_5OH)$ |
| number concentration of entity B, $C_B$              |                       | number concentration of erythrocytes in blood sample $i$ , $C(Erys; B_i)$         |
| Rockwell C hardness (150 kg load), HRC(150 kg)       |                       | Rockwell C hardness of steel sample $i$ , HRC <sub>i</sub> (150 kg)               |

Note 2 to entry: A reference can be a measurement unit, a measurement procedure, a reference material, or a combination of them. For magnitude of a quantity.

Note 3 to entry: Symbols for quantities are given in the International Standard ISO/IEC 80000, *Quantities and units*. The symbols for quantities are written in italics. A given symbol can indicate different quantities.

Note 4 to entry: A quantity as defined here is a scalar. However, a vector or a tensor, the components of which are quantities, is also considered to be a quantity.

Note 5 to entry: The concept “quantity” may be generically divided into, e.g. “physical quantity”, “chemical quantity”, and “biological quantity”, or “base quantity” and “derived quantity”.

[SOURCE: ISO 80000-1:2009, 3.1 modified – Note 6 has been deleted.]

### 3.2

#### system of quantities

set of quantities together with a set of non-contradictory equations relating those quantities

Note 1 to entry: Ordinal quantities such as Rockwell C hardness, and nominal properties such as colour of light, are usually not considered to be part of a system of quantities because they are related to other quantities through empirical relations only.

[SOURCE: ISO 80000-1:2009, 3.3 modified – Note 3 has been deleted.]

### 3.3

#### International System of Quantities

##### ISQ

system of quantities based on the seven base quantities length: mass, time, electric current, thermodynamic temperature, amount of substance, and luminous intensity

Note 1 to entry: This system of quantities is published in the International Standard ISO/IEC 80000, *Quantities and units*, Parts 3 to 14.

Note 2 to entry: The International System of Units is based on the International System of Quantities.

[SOURCE: ISO 80000-1:2009, 3.6]

### 3.4

#### International System of Units

##### SI

system of units based on the International System of Quantities, their names and symbols, including a series of prefixes and their names and symbols, together with rules for their use, adopted by the General Conference on Weights and Measures (CGPM)

Note 1 to entry: The SI is founded on the seven base quantities of the International System of Quantities and the names and symbols of the corresponding base units that are contained in Table 2:

**Table 2 – Base quantity and base unit**

| Base quantity             | Base unit |        |
|---------------------------|-----------|--------|
| Name                      | Name      | Symbol |
| length                    | metre     | m      |
| mass                      | kilogram  | kg     |
| time, duration            | second    | s      |
| electric current          | ampere    | A      |
| thermodynamic temperature | kelvin    | K      |
| amount of substance       | mole      | mol    |
| luminous intensity        | candela   | cd     |

Note 2 to entry: The base units and the coherent derived units of the SI form a coherent set, designated the “set of coherent SI units”.

Note 3 to entry: For a full description and explanation of the International System of Units, see the current edition of the SI brochure published by the International Bureau of Weights and Measures (BIPM) and available on the BIPM website.

Note 4 to entry: In quantity calculus, the quantity “number of entities” is often considered to be a base quantity, with the base unit one, symbol 1.

Note 5 to entry: The SI prefixes for multiples and submultiples of units are given.

[SOURCE: IEC 60050-112:2010, 112-02-02]

### 3.5

#### **base quantity**

quantity in a conventionally chosen subset of a given system of quantities, where no quantity in the subset can be expressed in terms of the other quantities within that subset

EXAMPLE The set of base quantities in the International System of Quantities is given in Table 2.

Note 1 to entry: The subset mentioned in the definition is termed the “set of base quantities”.

Note 2 to entry: Base quantities are referred to as being mutually independent since a base quantity cannot be expressed as a product of powers of the other base quantities.

Note 3 to entry: “Number of entities” can be regarded as a base quantity in any system of quantities.

[SOURCE: ISO 80000-1:2009, 3.4 modified – Note 4 has been deleted.]

### 3.6

#### **derived quantity**

quantity, in a system of quantities, defined in terms of the base quantities of that system

EXAMPLE In a system of quantities having the base quantities length and mass, mass density is a derived quantity defined as the quotient of mass and volume (length to the power three).

[SOURCE: ISO 80000-1:2009, 3.5 modified – the Note has been deleted.]

### 3.7

#### **value of a quantity**

#### **quantity value**

#### **value**

number and reference together expressing magnitude of a quantity

EXAMPLE 1 Force acting on a given particle, for example, in Cartesian components

$(F_x; F_y; F_z) = (31,5; 43,2; 17,0) \text{ N}$ ,

where  $(31,5; 43,2; 17,0)$  is a numerical-value vector and “N” (newton) is the unit,

or  $(F_x; F_y; F_z) = (31,5 \text{ N}; 43,2 \text{ N}; 17,0 \text{ N})$  where each component is a quantity.

EXAMPLE 2 length of a given rod

5,34 m or 534 cm

EXAMPLE 3 mass of a given body

0,152 kg or 152 g

EXAMPLE 4 curvature of a given arc

112 m<sup>-1</sup>

EXAMPLE 5 Celsius temperature of a given sample

-5 °C



|            |                                                                                                               |                                              |
|------------|---------------------------------------------------------------------------------------------------------------|----------------------------------------------|
| EXAMPLE 6  | electric impedance of a given circuit element at a given frequency, where “j” is the imaginary unit           | $(7 + 3j) \Omega$                            |
| EXAMPLE 7  | refractive index of a given sample of glass                                                                   | 1,32                                         |
| EXAMPLE 8  | Rockwell C hardness of a given sample (150 kg load)                                                           | 43,5 HRC(150 kg)                             |
| EXAMPLE 9  | mass fraction of cadmium in a given sample of copper                                                          | $3 \mu\text{g/kg}$ or $3 \cdot 10^{-9}$      |
| EXAMPLE 10 | molality of $\text{Pb}^{2+}$ in a given sample of water                                                       | $1,76 \mu\text{mol/kg}$                      |
| EXAMPLE 11 | amount-of-substance concentration of lutropin in a given sample of plasma (WHO International Standard 80/552) | 5,0 IU/l (WHO International Units per litre) |

Note 1 to entry: According to the type of reference, a quantity value is either a product of a number and a measurement unit (see EXAMPLE 2, 3, 4, 5, 6, 9, and 10); the measurement unit one is generally not indicated for quantities of dimension one (see EXAMPLE 7, and 9), or a number and a reference to a measurement procedure (see example 8), or a number and a reference material (see example 11).

Note 2 to entry: The number can be complex (see EXAMPLE 6).

Note 3 to entry: A quantity value can be presented in more than one way (see EXAMPLE 2, 3, and 9).

Note 4 to entry: In the case of vector or tensor quantities, each component has a quantity value.

[SOURCE: ISO 80000-1:2009, 3.19]

### 3.8

#### dimension of a quantity

#### quantity dimension

#### dimension

expression of the dependence of a quantity on the base quantities of a system of quantities as a product of powers of factors corresponding to the base quantities, omitting any numerical factor

EXAMPLE 1 In the International System of Quantities, the quantity dimension of force is denoted by  $\dim F = \text{LMT}^{-2}$ .

EXAMPLE 2 In the same system of quantities,  $\dim \rho_B = \text{ML}^{-3}$  is the quantity dimension of mass concentration of component B, and  $\text{ML}^{-3}$  is also the quantity dimension of mass density,  $\rho$ .

EXAMPLE 3 The period  $T$  of a particle pendulum of length  $l$  at a place with the local acceleration of free fall  $g$  is

$$T = 2\pi \sqrt{\frac{l}{g}} \quad \text{or} \quad T = C(g)\sqrt{l} \quad \text{where} \quad C(g) = \frac{2\pi}{\sqrt{g}}$$

Hence  $\dim C(g) = T \cdot L^{-1/2}$ .

Note 1 to entry: A power of a factor is the factor raised to an exponent. Each factor is the dimension of a base quantity.

Note 2 to entry: The conventional symbolic representation of the dimension of a base quantity is a single upper case letter in roman (upright) type. The conventional symbolic representation of the dimension of a derived quantity is the product of powers of the dimensions of the base quantities according to the definition of the derived quantity. The dimension of a quantity  $Q$  is denoted by  $\dim Q$ .

Note 3 to entry: In deriving the dimension of a quantity, no account is taken of its scalar, vector, or tensor character.

Note 4 to entry: In a given system of quantities,

- quantities of the same kind have the same quantity dimension,
- quantities of different quantity dimensions are always of different kinds, and
- quantities having the same quantity dimension are not necessarily of the same kind.

Note 5 to entry: Symbols representing the dimensions of the base quantities in the International System of Quantities are found in Table 3:

**Table 3 – Base quantities**

| Base quantity             | Symbol for dimension |
|---------------------------|----------------------|
| length                    | L                    |
| mass                      | M                    |
| time                      | T                    |
| electric current          | I                    |
| thermodynamic temperature | Θ                    |
| amount of substance       | N                    |
| luminous intensity        | J                    |

Thus, the dimension of a quantity  $Q$  is denoted by  $\dim Q = L^a M^b T^c I^d \Theta^e N^f J^g$  where the exponents, named dimensional exponents, are positive, negative, or zero. Factors with exponent zero or the exponent 1 are usually omitted.

Note 6 to entry: Adapted from ISO/IEC Guide 99:2007, 1.7, in which Note 5 and Examples 2 and 3 are different and in which “dimension of a quantity” and “dimension” are given as admitted terms.

[SOURCE: ISO 80000-1:2009, 3.7]

### 3.9

#### **dimensional exponent**

exponent of the dimension of a base quantity in the dimension of a quantity

[SOURCE: IEC 60050-112:2010, 112-01-12]

### 3.10

#### **unit of measurement**

#### **measurement unit**

#### **unit**

real scalar quantity, defined and adopted by convention, with which any other quantity of the same kind can be compared to express the ratio of the second quantity to the first one as a number

Note 1 to entry: Measurement units are designated by conventionally assigned names and symbols.

Note 2 to entry: Measurement units of quantities of the same quantity dimension may be designated by the same name and symbol even when the quantities are not of the same kind. For example joule per kelvin and J/K are respectively the name and symbol of both a measurement unit of heat capacity and a measurement unit of entropy, which are generally not considered to be quantities of the same kind. However, in some cases special measurement unit names are restricted to be used with quantities of specific kind only. For example, the measurement unit “second to the power minus one” (1/s) is called hertz (Hz) when used for frequencies and becquerel (Bq) when used for activities of radionuclides. As another example, the joule (J) is used as a unit of energy, but never as a unit of moment of force, i.e., the newton metre (N · m).

Note 3 to entry: Measurement units of quantities of dimension one are numbers. In some cases these measurement units are given special names, e.g., radian, steradian, and decibel, or are expressed by quotients such as millimole per mole equal to  $10^{-3}$  and microgram per kilogram equal to  $10^{-9}$ .

Note 4 to entry: For a given quantity, the short term “unit” is often combined with the quantity name, such as “mass unit” or “unit of mass”.

[SOURCE: ISO 80000-1:2009, 3.9]

### 3.11

#### **unit name**

#### **name of unit**

term designating a unit of measurement

Note 1 to entry: Names of derived units are special or compound. Rules for the formation of compound names are given in ISO 80000-1 and IEC 60027-1 [2]. For example, the derived unit of resistivity is the ohm metre (Ωm), the derived unit of speed is the metre per second.

Note 2 to entry: Unit names are given in the various parts of ISO/IEC 80000, ISO 31, and IEC 60027 [1], and also in the brochure *The International System of Units*, published by the BIPM.

[SOURCE: IEC 60050-112:2010, 112-01-15]

**3.12****special unit name**

name of a derived unit not comprising other unit names

Note 1 to entry: A special unit name may be restricted to a unit for quantities of a specific kind, for example hertz for frequency and becquerel for activity.

[SOURCE: IEC 60050-112:2010, 112-01-16]

**3.13****unit symbol****symbol of a unit**

character or combination of characters denoting a unit of measurement

Note 1 to entry: Most unit symbols are one or more letters of the Latin or Greek alphabets and are always printed in roman (upright) type and in the same font as the main text. Products of powers of such symbols are used to form the symbols for compound units according to the laws of algebra. In values of quantities, there is a space between the numerical value and the unit symbol, including the degree Celsius (°C) and the percent (%); exceptions are the units degree (°), minute ('), and second (") for plane angles.

Note 2 to entry: Internationally adopted unit symbols are given in [34], in ISO/IEC 80000, and in IEC 60027 [1].

[SOURCE: IEC 60050-112:2010, 112-01-17]

**3.14****multiple of a unit**

unit of measurement obtained by multiplying a given unit of measurement by a number greater than one

Note 1 to entry: The kilometre (km) is a decimal multiple of the metre (m). The hour (h) is a non-decimal integer multiple of the second (s). The light year is a non-integer multiple of the metre (in the VIM, only integer multiples are considered).

Note 2 to entry: Multiples of a unit are often named by adding a unit prefix to the name of the unit.

[SOURCE: ISO 80000-1:2009, 3.17 modified – The notes and examples have been replaced by new Note 1 and 2 to entry.]

**3.15****submultiple of a unit**

measurement unit obtained by dividing a given measurement unit by an integer greater than one

EXAMPLE 1 The millimetre is a decimal sub-multiple of the metre.

EXAMPLE 2 For plane angle, the second is a non-decimal sub-multiple of the minute.

Note 1 to entry: SI prefixes for decimal submultiples of SI base units and SI derived units are given in Table 6 and Table 7.

[SOURCE: ISO 80000-1:2009, 3.18 modified – The cross-reference to SI base units and SI derived units has been changed to Table 6 and Table 7 of this technical specification.]

**3.16****unit prefix**

prefix used together with a unit of measurement to form a multiple or a submultiple of this unit

EXAMPLE kilohm, kΩ.

Note 1 to entry: Lists of prefixes together with their symbols are given in 112-02-03 for SI prefixes and in 112-01-27 for binary prefixes.

Note 2 to entry: A prefix or its symbol is attached to the unit name or symbol, respectively, without any space or other sign.

[SOURCE: IEC 60050-112:2010, 112-01-26]

**3.17****base unit**

measurement unit that is adopted by convention for a base quantity

EXAMPLE In the SI, the metre is the base unit of length. In the CGS systems, the centimetre is the base unit of length.

EXAMPLE The derived quantity rainfall, when defined as areic volume (volume per area), has the metre as a coherent derived unit in the SI.

Note 1 to entry: In each coherent system of units, there is only one base unit for each base quantity.

Note 2 to entry: A base unit may also serve for a derived quantity of the same quantity dimension.

Note 3 to entry: For number of entities, the number one, symbol 1, can be regarded as a base unit in any system of units. Compare Note 3 in 3.4.

Note 4 to entry: Adapted from ISO/IEC Guide 99:2007, 1.10, in which the example in Note 2 is slightly different. The last sentence in Note 3 has been added.

[SOURCE: ISO 80000-1:2009, 3.10]

### 3.18

#### **derived unit**

measurement unit for a derived quantity

EXAMPLE The metre per second, symbol m/s, and the centimetre per second, symbol cm/s, are derived units of speed in the SI. The kilometre per hour, symbol km/h, is a measurement unit of speed outside the SI but accepted for use with the SI. The knot, equal to one nautical mile per hour, is a measurement unit of speed outside the SI.

[SOURCE: ISO 80000-1:2009, 3.11]

### 3.19

#### **system of units**

set of base units and derived units, together with their multiples and submultiples, defined in accordance with given rules, for a given system of quantities

[SOURCE: ISO 80000-1:2009, 3.13]

### 3.20

#### **coherent system of units**

system of units, based on a given system of quantities, in which the measurement unit for each derived quantity is a coherent derived unit

EXAMPLE Set of coherent SI units and relations between them.

Note 1 to entry: A system of units can be coherent only with respect to a system of quantities and the adopted base units.

Note 2 to entry: For a coherent system of units, numerical value equations have the same form, including numerical factors, as the corresponding quantity equations.

Note 3 to entry: Adapted from ISO/IEC Guide 99:2007, 1.14, in which Note 2 is different.

[SOURCE: ISO 80000-1:2009, 3.14]

## **4 Relations between quantities, units and their systems**

### **4.1 General**

Clause 4 provides background information on the concepts used to identify units and the methodology for combining units.

### **4.2 The International System of Quantities and the International System of Units**

The International System of Quantities contains the set of base quantities and all the derived quantities which are defined by a given set of equations on the basis of the base quantities.

The International System of Quantities and the International System of Units are used for the systematic classification of physical quantities. The International System of Quantities is determined by the definition of a multitude of base quantities (see Table 4). By definition, a base quantity cannot be expressed through other base quantities. However, according to agreed calculation rules, any number of quantities from the International System of Quantities can be derived from the base quantities. Every base quantity in the International System of Quantities is assigned precisely to one SI base unit (see Table 4). The International System of Units is formed by the set of base units and their derived units.

**Table 4 – Base quantities and base units in the International System of Units**

| Base quantity              | Base unit       |            | Definition                                                                                                                                                                                                                                                                                                                                       | Source        |
|----------------------------|-----------------|------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
|                            | Name            | Symbol     |                                                                                                                                                                                                                                                                                                                                                  |               |
| length                     | <b>metre</b>    | <b>m</b>   | 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.                                                                                                                                                                                                                        | [34], 2.1.1.1 |
| mass                       | <b>kilogram</b> | <b>kg</b>  | The kilogram is the unit of mass; it is equal to the mass of the international prototype of the kilogram.                                                                                                                                                                                                                                        | [34], 2.1.1.2 |
| time, duration             | <b>second</b>   | <b>s</b>   | 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.                                                                                                                                                               | [34], 2.1.1.3 |
| electric current           | <b>ampere</b>   | <b>A</b>   | 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 vacuum, would produce between these conductors a force equal to $2 \cdot 10^{-7}$ Newton per metre of length.                                                 | [34], 2.1.1.4 |
| thermo-dynamic temperature | <b>kelvin</b>   | <b>K</b>   | The kelvin, unit of thermodynamic temperature, is the fraction $1/273.16$ of the thermodynamic temperature of the triple point of water.                                                                                                                                                                                                         | [34], 2.1.1.5 |
| amount of substance        | <b>mole</b>     | <b>mol</b> | 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; its symbol is "mol".<br><br>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. | [34], 2.1.1.6 |
| luminous intensity         | <b>candela</b>  | <b>cd</b>  | The candela is the luminous intensity, in a given direction, of a source that emits monochromatic radiation of frequency $540 \cdot 10^{12}$ hertz and that has a radiant intensity in that direction of $1/683$ watt per steradian.                                                                                                             | [34], 2.1.1.7 |

**Table 5 – Representation of base quantities in the International System of Units [34]**

| Name                      | Symbol for quantity    | Symbol for dimension |
|---------------------------|------------------------|----------------------|
| length                    | $l, x, z, \text{etc.}$ | L                    |
| mass                      | $m$                    | M                    |
| time, duration            | $t$                    | T                    |
| electric current          | $I, i$                 | I                    |
| thermodynamic temperature | $T$                    | $\Theta$             |
| amount of substance       | $n$                    | N                    |
| luminous intensity        | $I_V$                  | J                    |

The dimension of each quantity in the International System of Quantities is represented as a product of powers of the base dimensions assigned to the base quantities. In the International System of Quantities, whose base quantities are length, mass, time, electric current, thermodynamic temperature, amount of substance, and luminous intensity, their dimensions are characterized by the symbols L, M, T, I,  $\Theta$ , N and J (see Table 5). Thus every unit in the International System of Units can be represented by the combination of SI base units.

EXAMPLE 1 In the International System of Quantities,  $LMT^{-2}$  is the dimension for force; with the canonical formulation:  $L^1 M^1 T^{-2} I^0 \Theta^0 N^0 J^0$ .

EXAMPLE 2 In the International System of Quantities,  $ML^{-3}$  is both the dimension for mass concentration and the dimension for density.

A one-to-one assignment exists between the base quantities of the International System of Quantities and the base units of the International System of Units, and an n to m relationship exists between derived quantities of the International System of Quantities and derived SI units of the International System of Units.

### 4.3 Other systems of quantities and units

In addition to the International System of Quantities other domain specific systems exist. In these systems the number of base units may differ from the system described in 4.2.

EXAMPLE 1 In the CGS-ESU system (Centimetre Gram Second- ElectroStatic Unit system) the electric constant  $\epsilon_0$  (the permittivity of vacuum) is defined as being equal to 1, i.e., of dimension one.

EXAMPLE 2 Quantities can be associated by defining so-called coherent units. Depending on the context, the unit 1/s (reciprocal second) is represented in the International System of Units as Hz (Hertz) or Bq (Becquerel).

Units that are based on the Anglo-American and/or Imperial System of units are linked to SI units by a fixed relationship (conversion formula or conversion factor). The corresponding data is made available by NIST and UN ECE, in particular in the following documents:

- NIST. *Guide for the Use of the International System of Units (SI)*. NIST Special Publication 811. Gaithersburg: NIST (National Institute of Standards and Technology), United States Department of Commerce, 2008.
- UNECE. *Codes for units of measure used in international trade*. Recommendation 20, Revision 7. Geneva: UNECE (United Nations Economic Commission for Europe), 2010.

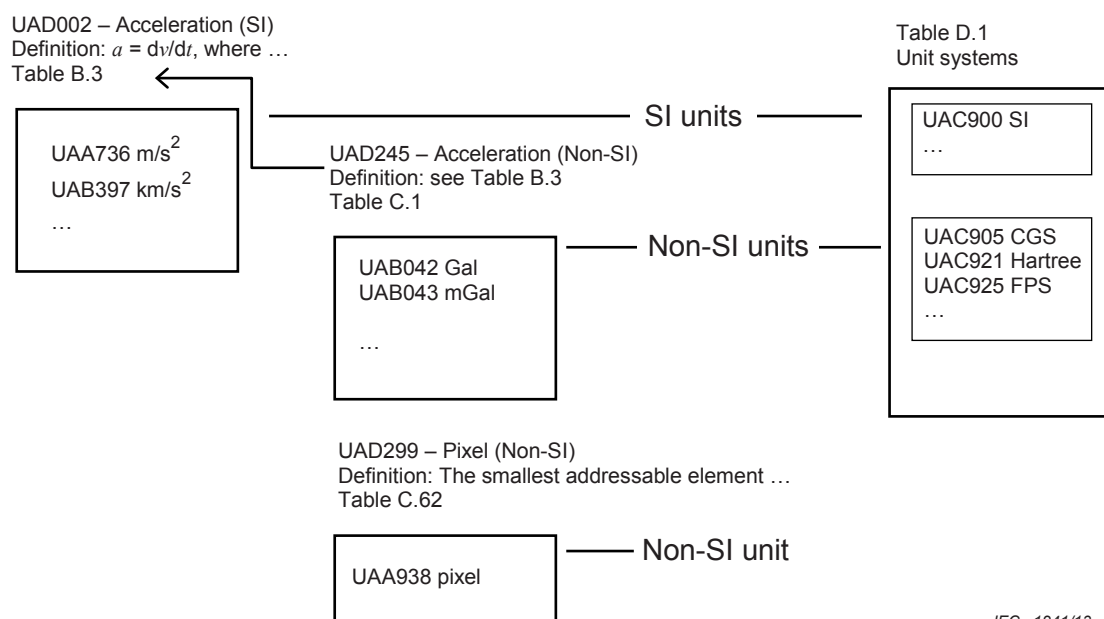
### 4.4 Context of units, quantities, and systems of units

This document specifies individual identifiers for units and quantities (see Annex B and C), as well as for systems of units (see Annex D). The units are grouped in lists of units, shown here as tables in Annex B and C. Each list of units contains lists either SI or non-SI units applicable for the quantity given in the table header, i.e. for the specified physical phenomenon. The identifiers listed in Annex D may be used to further describe a unit by denominating the system of units which a specific unit is a part of.

NOTE It is out of the scope of this document to specify or list the units contained in a specific system of units.

EXAMPLE The unit 'Galileo' (Gal), UAB042, is defined in the CGS unit system (UAC905).

Figure 1 gives a pictorial overview about the relationships between the tables contained in the annexes.



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Figure 1 – Overview about the relationships between the tables contained in the annexes

## 5 SI prefixes and SI prefix symbols

### 5.1 General

The SI prefixes and prefix symbols are specified in ISO 80000-1:2009 and IEC 80000-13:2008. They are repeated here for the convenience of the reader

### 5.2 Formation of multiples and factors to the base of 10

Decimal multiples or fractions of a unit may be created by using SI-Prefixes. Such prefixes may be put in front of the concerned part(s) of a unit to keep the numeric value of the unit in a convenient size. Adding a prefix corresponds to the multiplication of the unit with the factor related to the prefix.

**Table 6 – Formation of multiples and factors of units to the base of 10**

| Factor                              |            | Prefix |        |
|-------------------------------------|------------|--------|--------|
|                                     |            | Name   | Symbol |
| 0,000 000 000 000 000 000 000 001 = | $10^{-24}$ | yocto  | y      |
| 0,000 000 000 000 000 000 001 =     | $10^{-21}$ | zepto  | z      |
| 0,000 000 000 000 000 001 =         | $10^{-18}$ | atto   | a      |
| 0,000 000 000 000 001 =             | $10^{-15}$ | femto  | f      |
| 0,000 000 000 001 =                 | $10^{-12}$ | pico   | p      |
| 0,000 000 001 =                     | $10^{-9}$  | nano   | n      |
| 0,000 001 =                         | $10^{-6}$  | micro  | μ      |
| 0,001 =                             | $10^{-3}$  | milli  | m      |
| 0,01 =                              | $10^{-2}$  | centi  | c      |
| 0,1 =                               | $10^{-1}$  | deci   | d      |
| 1 =                                 | $10^0$     | —      | —      |
| 10 =                                | $10^1$     | deca   | da     |
| 100 =                               | $10^2$     | hecto  | h      |
| 1 000 =                             | $10^3$     | kilo   | k      |
| 1 000 000 =                         | $10^6$     | mega   | M      |
| 1 000 000 000 =                     | $10^9$     | giga   | G      |
| 1 000 000 000 000 =                 | $10^{12}$  | tera   | T      |
| 1 000 000 000 000 000 =             | $10^{15}$  | peta   | P      |
| 1 000 000 000 000 000 000 =         | $10^{18}$  | exa    | E      |
| 1 000 000 000 000 000 000 000 =     | $10^{21}$  | zetta  | Z      |
| 1 000 000 000 000 000 000 000 000 = | $10^{24}$  | yotta  | Y      |

### 5.3 Formation of multiples to the base of 2

**Table 7 – Formation of multiples of units to the base of 2**

| Factor                              |          | Prefix                    |      |        |
|-------------------------------------|----------|---------------------------|------|--------|
|                                     |          | Root                      | Name | Symbol |
| 1 024 =                             | $2^{10}$ | kilobinary: $(2^{10})^1$  | Kibi | Ki     |
| 1 048 576 =                         | $2^{20}$ | megabinary: $(2^{10})^2$  | Mebi | Mi     |
| 1 073 741 824 =                     | $2^{30}$ | gigabinary: $(2^{10})^3$  | Gibi | Gi     |
| 1 099 511 627 776 =                 | $2^{40}$ | terabinary: $(2^{10})^4$  | Tebi | Ti     |
| 1 125 899 906 842 624 =             | $2^{50}$ | petabinary: $(2^{10})^5$  | Pebi | Pi     |
| 1 152 921 504 606 846 976 =         | $2^{60}$ | exabinary: $(2^{10})^6$   | Exbi | Ei     |
| 1 180 591 620 717 411 303 424 =     | $2^{70}$ | zettabinary: $(2^{10})^7$ | Zebi | Zi     |
| 1 208 925 819 614 629 174 706 176 = | $2^{80}$ | yottabinary: $(2^{10})^8$ | Yobi | Yi     |

### 5.4 Usage of SI prefixes and SI prefix symbols

#### 5.4.1 General

For the convenience of the reader the following clauses collect the rules related to the use of prefixes and prefix symbols (see ISO/IEC Guide 99, ISO 80000–1 and International System of Units (SI)).

#### 5.4.2 Combination of SI prefixes, SI prefix symbols, names of units and symbols for units

Prefix names may only be used in conjunction with names of units. Prefix symbols are to be used together with symbols for units. Only SI prefixes and SI prefix symbols may be combined.

A combination of names (of the prefix or unit) with symbols (for prefix or unit) is not permitted.

EXAMPLE 1 “mC” or “millicoulomb”, but neither “mCoulomb”, nor “milliC”

The prefix name shall be placed in front of the unit name without any intermediate sign.

EXAMPLE 2 “kilograms”, but neither “kilo grams”, nor “kilo-grams”

The prefix symbol shall be placed in front of the unit symbol without any intermediate sign.

EXAMPLE 3 “kg”, but neither “k g”, nor “k.g”, nor “k · g”.

Prefixes shall not be strung together in sequence.

NOTE The designation of the decimal multiples and parts of the mass unit are formed by appending the prefix name in front of the name “gram” or the prefix symbol in front of the symbol “g”.

EXAMPLE 4 “milligram”, or “mg”, but neither “microkilogram”, nor “μkg”

Compound prefix names or compound symbols, i.e., prefix names or symbols formed by the juxtaposition of two or more prefix names or symbols, are not permitted. This rule also applies to compound prefix names. 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, i.e., to the word “one”.

EXAMPLE 5 “nm” (nanometre), but not: “mμm” (millimicrometre)

Prefixes may be used in the numerator and in the denominator. To designate decimal multiples and parts of derived units that consist of a quotient, a prefix may be used in the numerator, in the denominator or in both parts of the quotient.

EXAMPLE 6 “kA/cm”

### 5.4.3 Use of power exponentials in conjunction with SI prefixes, SI prefix symbols, names of units or symbols for units.

An exponent always applies to the entire combination of symbols.

EXAMPLE  $1 \text{ km}^3 = (10^3 \text{ m})^3 = 10^9 \text{ m}^3$

### 5.4.4 Restrictions on combining SI prefixes, SI prefix symbols, names of units and symbols for units

No prefixes or prefix symbols may be used for the following units (see Table 8):

**Table 8 – Units that are used without prefixes or prefix symbols**

|                                                      |                   |
|------------------------------------------------------|-------------------|
| degree                                               | °                 |
| diopetre                                             | dpt               |
| degree Celsius                                       | °C                |
| kilogram                                             | kg                |
| metric carat                                         | Kt                |
| millimetre of mercury column                         | mmHg              |
| minute                                               | min               |
| hour                                                 | h                 |
| day                                                  | d                 |
| reciprocal second (for rotational speed information) | s <sup>-1</sup>   |
| reciprocal minute (for rotational speed information) | min <sup>-1</sup> |

## 5.5 Selecting SI prefixes and SI prefix symbols

There is no general rule that specifies whether a prefix should be used and which prefix should be chosen for a unit to express the value of a quantity. The selection of a respective SI prefix may be influenced by:

- the necessity to indicate which digits of a numerical value are significant.
- the necessity to have numerical values that can be easily understood.
- conventions valid within a technical domain.

As a matter of principle, however, a unit shall have only a single SI prefix in the numerator and a single SI prefix in the denominator, even if there is a product of units on both sides of the fraction bar.

Combinations of SI prefixes and non-SI units are not allowed.

When specifying units, only the prefixes specified in the respective product standards should be used.

## 6 Data sources of units

The units listed in Annex B and Annex C are taken from the following sources

- ISO 80000 (all parts)
- NIST. *Guide for the Use of the International System of Units (SI)*. NIST Special Publication 811. Gaithersburg: NIST (National Institute of Standards and Technology), United States Department of Commerce, 2008
- UNECE. *Codes for units of measure used in international trade*. Recommendation 20, Revision 7. Geneva: UNECE (United Nations Economic Commission for Europe), 2010. Annex I
- IEC 61360-1:2009, Annex B

- STEplib: Standard Template for Electronic Publishing Library, database of ISO 15926-4:2007
- UCUM: Unified Code for Units of Measure

## 7 Identification of units

The complete identification of a unit complies with the specifications in ISO/IEC 11179-6.

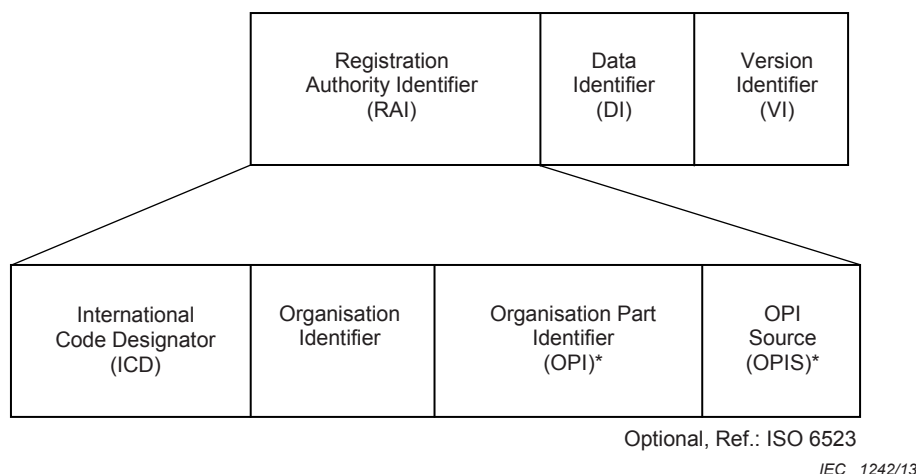


**Figure 2 – International registration data identifier (IRDI), Source: ISO 11179-6:2005**

IEC 62720 uses ISO/IEC 11179 series of standards, in particular ISO/IEC 11179-3 and ISO/IEC 11179-5, for the basic identification of units (see Figure 2). Each unit plays a role similar to “Administered Item” defined in ISO/IEC 11179-3.

The units referenced in IEC 62720 may be registered in a reference dictionary administered by a registration authority based on ISO/IEC 11179 series of standards. ISO/IEC 11179 uses the IRDI (International registration Data Identifier) mechanism to identify administered items as described in ISO/IEC 11179-5.

The identifiers used in this technical specification are called “International Concept Identifier” (ICID). For the purpose of this technical specification, the function of ICID is identical to IRDI. So it may be regarded as an extension of the IRDI.

Each ICID is unique across the boundary of organizations, and it has the following sequence:

ICID::= RAI”#”DI”##”VI

where

- “RAI” is registration authority identifier,
- “DI” is data identifier, and
- “VI” is version identifier

as described in ISO/IEC 11179-5.

**NOTE 1** In this technical specification, two consecutive pound signs, i.e., “##” are used to separate “DI” and “VI”, while “RAI” and “DI” are separated by one single “#” character. This allows a short hand notation of the identifier eliminating either “RAI” or “VI”, or both if the context for “DI” is clear.

**EXAMPLE** 0112-2#UAA163##001,  
where 0112: International code designator (ICD): International Electrotechnical Commission,  
Geneva  
2: Organization identifier  
UAA163: Data Identifier (DI): UAA163  
001: Version Identifier (VI): 001

**NOTE 2** In the tables within Annex B and Annex C only the Data Identifier (DI) is listed.

See ISO/IEC 11179-6:2005 for a detailed description of the elements.

## **Annex A** (informative)

### **Information about units**

There are many units in use that are outside of the SI system. They are either of historical interest or are used in particular domains or countries.

EXAMPLE 1 Barrel for the volume of petroleum, inch as a length measure in the Imperial System.

ISO and IEC discourage the use of such units in scientific and technical discourses. However, it is important to know the relationship between these units and the corresponding SI units. For this reason, non-SI units are listed in this document. These units are contained in Annex C.

NOTE 1 In cases where the discussion about the classification of a unit (i.e., SI unit or non-SI unit) is not yet finished, the unit is listed in both categories.

EXAMPLE 2 year, week, percent, angstrom.

Units standardized by ISO or IEC are presented in Annex B. Units specified by other organizations are listed in Annex C for information.

This document makes no reference to legal stipulations regarding units.

At national level, many countries mandate by law the use of specific units.

EXAMPLE 3 Sectors that are subject of legal stipulation concerning units include business sector, healthcare, public safety, or educational sector.

NOTE 2 The International Organization of Legal Metrology (OIML), founded in 1955, is committed to the international harmonization of this legislation.

NOTE 3 Detailed information on the historical development of the SI can be found in [34]: International Bureau Of Weights And Measures (BIPM). *The International System of Units (SI)*. 8th ed. BPIM, Organisation intergouvernementale de la convention du mètre, 2006.

## Annex B (normative)

### Identifiers for units and quantities that are derived from the SI system of units

In the following tables the units are listed in the context of the phenomena, i.e., quantities, to which the units apply.

The structure of the tables is always identical. The table headers follow the pattern shown in Figure B.1.

| Name of quantity                 |             | Description of quantity                                   |
|----------------------------------|-------------|-----------------------------------------------------------|
| Unit expression using base units |             | SI coherent derived unit expressed in terms of base units |
| Item code                        | Unit symbol | Unit name                                                 |

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**Figure B.1 – Structure of table headers**

The fields “Name of quantity” and “Description of quantity” specify the phenomenon that may be characterized using the units listed below.

Column 1 (Item code) lists the identifiers of the units, column 2 (Unit symbol) provides a simplified presentation of the unit which may be applied in systems that do not provide pictorial presentations of units. Column 3 (Unit name) lists the names of the units.

The content of the fields “Name of Quantity” and “Description of Quantity” are not normative. This information is given for the convenience of the reader to provide information about possible uses of the units. The Item code of the unit does not depend on the context, i.e., the quantity that uses the unit. There is always a 1:1 relationship between unit and associated Item code.

NOTE 1 Information about the quantity may be provided in information accompanying the property referring the unit.

NOTE 2 The fact that the Item codes of the units do neither depend on the use of the units nor limit the quantities that may be assigned, allows for the use of the units together with quantities that are not listed in this document.

NOTE 3 As stated in the scope, this Technical Specification does not standardize the units themselves. It solely assigns a normative identifier to the unit. The unit may be referenced by using this identifier.

**Table B.1 – Absorbed dose**

|              |               |                                                                                                                                                                                                                                                                                                                                   |
|--------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD000       | absorbed dose | <p>for any ionizing radiation,</p> $D = \frac{d\bar{\epsilon}}{dm}$ <p>where <math>d\bar{\epsilon}</math> is the mean energy imparted (ISO 80000-10:2009, 10-83.2) by ionizing radiation to an element of irradiated matter with the mass <math>dm</math> (ISO 80000-4:2006, 4-1)</p> <p>[SOURCE: ISO 80000-10:2009, 10-84.1]</p> |
| $m^2 s^{-2}$ |               | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                         |
| UAA163       | Gy            | gray                                                                                                                                                                                                                                                                                                                              |
| UAA788       | mGy           | milligray                                                                                                                                                                                                                                                                                                                         |
| UAB503       | cGy           | centigray                                                                                                                                                                                                                                                                                                                         |
| UAB504       | kGy           | kilogray                                                                                                                                                                                                                                                                                                                          |
| UAB505       | MGy           | megagrays                                                                                                                                                                                                                                                                                                                         |

**Table B.2 – Absorbed dose rate**

|              |                    |                                                                                                                                                                                                                                            |
|--------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD001       | absorbed dose rate | $\dot{D} = \frac{dD}{dt}$ <p>where <math>dD</math> is the increment of absorbed dose (ISO 80000-10:2009, 10-84.1) during time interval with duration <math>dt</math> (ISO 80000-3:2006, 3-7)</p> <p>[SOURCE: ISO 80000-10:2009, 10-87]</p> |
| $m^2 s^{-3}$ |                    | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                  |
| UAA164       | Gy/s               | gray per second                                                                                                                                                                                                                            |
| UAB298       | mGy/s              | milligray per second                                                                                                                                                                                                                       |
| UAB299       | $\mu$ Gy/s         | microgray per second                                                                                                                                                                                                                       |
| UAB300       | nGy/s              | nanogray per second                                                                                                                                                                                                                        |
| UAB476       | Gy/h               | gray per hour                                                                                                                                                                                                                              |
| UAB477       | mGy/h              | milligray per hour                                                                                                                                                                                                                         |
| UAB478       | $\mu$ Gy/h         | microgray per hour                                                                                                                                                                                                                         |
| UAB479       | nGy/h              | nanogray per hour                                                                                                                                                                                                                          |
| UAB472       | Gy/min             | gray per minute                                                                                                                                                                                                                            |
| UAB473       | mGy/min            | milligray per minute                                                                                                                                                                                                                       |
| UAB474       | $\mu$ Gy/min       | microgray per minute                                                                                                                                                                                                                       |
| UAB475       | nGy/min            | nanogray per minute                                                                                                                                                                                                                        |

**Table B.3 – Acceleration**

|            |              |                                                                                                                                                                                           |
|------------|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD002     | acceleration | $a = \frac{dv}{dt}$ <p>where <math>v</math> is velocity (ISO 80000-3: 2006, 3-8.1) and <math>t</math> is time (ISO 80000-3: 2006, 3-7)</p> <p>[SOURCE: IEC 60050-113:2011, 113-01-38]</p> |
| $m s^{-2}$ |              | SI coherent derived unit expressed in terms of base units                                                                                                                                 |
| UAA736     | $m/s^2$      | metre per second squared                                                                                                                                                                  |
| UAB397     | $km/s^2$     | kilometre per second squared                                                                                                                                                              |
| UAB398     | $cm/s^2$     | centimetre per second squared                                                                                                                                                             |
| UAB400     | $mm/s^2$     | millimetre per second squared                                                                                                                                                             |

**Table B.4 – Active power**

|                                   |              |                                                                                                                                                                                                               |
|-----------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD003                            | active power | $P = \frac{1}{T} \int_0^T p dt$ <p>where <math>T</math> is the period (ISO 80000-3:2006, 3-12) and <math>p</math> is instantaneous power (ISO 80000-6:2008, 6-45)</p> <p>[SOURCE: IEC 80000-6:2008, 6-56]</p> |
| m <sup>2</sup> kg s <sup>-3</sup> |              | SI coherent derived unit expressed in terms of base units                                                                                                                                                     |
| UAA935                            | pW           | picowatt                                                                                                                                                                                                      |
| UAA910                            | nW           | nanowatt                                                                                                                                                                                                      |
| UAA080                            | µW           | microwatt                                                                                                                                                                                                     |
| UAA807                            | mW           | milliwatt                                                                                                                                                                                                     |
| UAA583                            | kW           | kilowatt                                                                                                                                                                                                      |
| UAA224                            | MW           | megawatt                                                                                                                                                                                                      |
| UAA154                            | GW           | gigawatt                                                                                                                                                                                                      |
| UAA289                            | TW           | terawatt                                                                                                                                                                                                      |
| UAB506                            | PW           | petawatt                                                                                                                                                                                                      |
| UAB507                            | EW           | exawatt                                                                                                                                                                                                       |
| UAA306                            | W            | watt                                                                                                                                                                                                          |
| UAB508                            | pJ/s         | picojoule per second                                                                                                                                                                                          |
| UAB509                            | nJ/s         | nanojoule per second                                                                                                                                                                                          |
| UAB510                            | µJ/s         | microjoule per second                                                                                                                                                                                         |
| UAB511                            | mJ/s         | millijoule per second                                                                                                                                                                                         |
| UAB447                            | kJ/s         | kilojoule per second                                                                                                                                                                                          |
| UAB177                            | MJ/s         | megajoule per second                                                                                                                                                                                          |
| UAB512                            | GJ/s         | gigajoule per second                                                                                                                                                                                          |
| UAB513                            | TJ/s         | terajoule per second                                                                                                                                                                                          |
| UAB514                            | PJ/s         | petajoule per second                                                                                                                                                                                          |
| UAB515                            | EJ/s         | exajoule per second                                                                                                                                                                                           |
| UAB356                            | J/s          | joule per second                                                                                                                                                                                              |
| UAB445                            | J/h          | joule per hour                                                                                                                                                                                                |
| UAB449                            | kJ/h         | kilojoule per hour                                                                                                                                                                                            |
| UAB444                            | J/min        | joule per minute                                                                                                                                                                                              |
| UAB448                            | kJ/min       | kilojoule per minute                                                                                                                                                                                          |
| UAB446                            | J/d          | joule per day                                                                                                                                                                                                 |
| UAB450                            | kJ/d         | kilojoule per day                                                                                                                                                                                             |

**Table B.5 – Amount of substance**

|        |                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD004 | amount of substance | <p>quantity proportional to the number of elementary entities of a specified nature which are contained in a given sample of matter, the proportionality coefficient being the same for all samples</p> <p>NOTE 1 The elementary entities must be specified and may be of any kind: atoms, molecules, ions, electrons, holes, other particles or quasi-particles, groups of particles, double bonds, etc.</p> <p>NOTE 2 The proportionality coefficient in the definition is the reciprocal of the Avogadro constant <math>N_A</math>, thus <math>N = n \cdot N_A</math>, where <math>N</math> is the number of elementary entities</p> <p>NOTE 3 The term “amount of substance” is to be interpreted as a whole, not as a combination of two terms. However, the words “of substance” could be replaced by words to specify the substance concerned in any specific application, e.g. “amount of hydrogen chloride, HCl”</p> <p>NOTE 4 Amount of substance is one of the seven base quantities in the International System of Units is based. The coherent SI unit of amount of substance is mole, symbol mol.</p> <p>[SOURCE: IEC 60050-113:2011, 113-02-07]</p> |
| mol    |                     | SI base unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| UAA882 | mol                 | mole                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| UAA640 | kmol                | kilomole                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| UAA877 | mmol                | millimole                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| UAA093 | μmol                | micromole                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| UAB523 | nmol                | nanomole                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

**Table B.6 – Amount of substance concentration**

|                             |                                                             |                                                                                                                                                                                                                              |
|-----------------------------|-------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD005                      | amount of substance concentration of B, molar concentration | $c_B = \frac{n_B}{V}$ <p>where <math>n_B</math> is the amount of substance (ISO 80000-9:2009, 9-1) of B and <math>V</math> is the volume (ISO 80000-3:2006, 3-4) of the solution</p> <p>[SOURCE: ISO 80000-9:2009, 9-13]</p> |
| $\text{m}^{-3} \text{ mol}$ |                                                             | SI coherent derived unit expressed in terms of base units                                                                                                                                                                    |
| UAA891                      | mol/m <sup>3</sup>                                          | mole per metre cubed                                                                                                                                                                                                         |
| UAB500                      | mmol/l                                                      | millimole per litre                                                                                                                                                                                                          |
| UAA642                      | kmol/m <sup>3</sup>                                         | kilomole per metre cubed                                                                                                                                                                                                     |
| UAA883                      | mol/dm <sup>3</sup>                                         | mole per decimetre cubed                                                                                                                                                                                                     |
| UAA888                      | mol/l                                                       | mole per litre                                                                                                                                                                                                               |

**Table B.7 – Angular acceleration**

|                     |                      |                                                                                                                                                                                                        |
|---------------------|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD006              | angular acceleration | $\alpha = \frac{d\omega}{dt}$ <p>where <math>\omega</math> is angular velocity (ISO 80000-3:2006, 3-10) and <math>t</math> is time (ISO 80000-3:2006, 3-7)</p> <p>[SOURCE: ISO 80000-3:2006, 3-11]</p> |
| s <sup>-2</sup> rad |                      | SI coherent derived unit expressed in terms of base units                                                                                                                                              |
| UAB407              | °/s <sup>2</sup>     | degree per second squared                                                                                                                                                                              |
| UAA969              | rad/s <sup>2</sup>   | radian per second squared                                                                                                                                                                              |

**Table B.8 – Angular cross-section**

|                                 |                       |                                                                                                                     |
|---------------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------|
| UAD007                          | angular cross-section | <p>differential cross-section (ISO 921:1997, 316) with respect to solid angle</p> <p>[SOURCE: ISO 921:1997, 44]</p> |
| m <sup>2</sup> sr <sup>-1</sup> |                       | SI coherent derived unit expressed in terms of base units                                                           |
| UAA755                          | m <sup>2</sup> /sr    | metre squared per steradian                                                                                         |
| UAB128                          | b/sr                  | barn per steradian                                                                                                  |

**Table B.9 – Angular momentum**

|                                   |                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD008                            | angular momentum     | <p>for a material point and a given origin point, axial vector quantity equal to the vector product of the position vector <math>\mathbf{r}</math> and the momentum <math>\mathbf{p}</math>, thus</p> $\mathbf{L} = \mathbf{r} \times \mathbf{p}$ <p>NOTE 1 For a continuous body, angular momentum is equal to the integral</p> $\mathbf{L} = \int \mathbf{r} \times \mathbf{v} dm = \int (\mathbf{r} \times \mathbf{v}) \rho dV$ <p>where <math>\rho</math> is the mass density in an domain having quasi-infinitesimal mass <math>dm</math> and volume <math>dV</math>, position vector <math>\mathbf{r}</math>, and velocity <math>\mathbf{v}</math>.<br/>For a system of particles, it is equal to the sum of their angular momentums.</p> <p>NOTE 2 A body with moment of inertia <math>J_z</math> with respect to an axis <math>z</math> and rotating with angular velocity <math>\omega_z</math> round that axis has angular momentum</p> $L_z = J_z \omega_z.$ <p>NOTE 3 The coherent SI unit of angular momentum is kilogram metre squared per second,<br/>(kg·m<sup>2</sup>)/s .</p> <p>[SOURCE: IEC 60050-113:2011, 113-03-22]</p> |
| m <sup>2</sup> kg s <sup>-1</sup> |                      | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| UAA245                            | N·m·s                | newton metre second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| UAA623                            | kg·m <sup>2</sup> /s | kilogram metre squared per second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

**Table B.10 – Angular velocity**

|                     |                  |                                                                                                                                                                                                    |
|---------------------|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD009              | angular velocity | $\omega = \frac{d\varphi}{dt}$ <p>where <math>\varphi</math> is plane angle (ISO 80000-3:2006, 3-5) and <math>t</math> is time (ISO 80000-3:2006, 3-7)</p> <p>[SOURCE: ISO 80000-3:2006, 3-10]</p> |
| s <sup>-1</sup> rad |                  | SI coherent derived unit expressed in terms of base units                                                                                                                                          |
| UAA026              | °/s              | degree per second                                                                                                                                                                                  |
| UAA968              | rad/s            | radian per second                                                                                                                                                                                  |

**Table B.11 – Angular wave number**

|                     |                     |                                                                                                                                                                                                                                                                                                                                                  |
|---------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD010              | angular wave number | $k = \frac{\omega}{c} = \frac{2\pi}{\lambda}$ <p>where <math>\omega</math> is angular frequency (ISO 80000-8:2007, 8-4), <math>c</math> is phase speed of sound (ISO 80000-8:2007, 8-14.1), <math>2\pi</math> is the phase difference, and <math>\lambda</math> is wavelength (ISO 80000-8:2007, 8-5)</p> <p>[SOURCE: ISO 80000-8:2007, 8-7]</p> |
| m <sup>-1</sup> rad |                     | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                        |
| UAA025              | °/m                 | degree per metre                                                                                                                                                                                                                                                                                                                                 |
| UAA967              | rad/m               | radian per metre                                                                                                                                                                                                                                                                                                                                 |

**Table B.12 – Apparent power**

|                                   |                |                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD011                            | apparent power | <p>product of the rms voltage <math>U</math> between the terminals of a two-terminal element or two-terminal circuit and the rms electric current <math>I</math> in the element or circuit:</p> $S = U \cdot I$ <p>NOTE 1 Under sinusoidal conditions, the apparent power is the modulus of the complex power.</p> <p>NOTE 2 The SI unit for apparent power is the voltampere.</p> <p>[SOURCE: IEC 60050-131:2002, 131-11-41]</p> |
| m <sup>2</sup> kg s <sup>-3</sup> |                | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                                                         |
| UAB530                            | pV·A           | pico volt ampere                                                                                                                                                                                                                                                                                                                                                                                                                  |
| UAB531                            | nV·A           | nano volt ampere                                                                                                                                                                                                                                                                                                                                                                                                                  |
| UAB532                            | μV·A           | micro volt ampere                                                                                                                                                                                                                                                                                                                                                                                                                 |
| UAB533                            | mV·A           | milli volt ampere                                                                                                                                                                                                                                                                                                                                                                                                                 |
| UAA581                            | kV·A           | kilovolt ampere                                                                                                                                                                                                                                                                                                                                                                                                                   |
| UAA222                            | MV·A           | megavolt ampere                                                                                                                                                                                                                                                                                                                                                                                                                   |
| UAB534                            | GV·A           | giga volt ampere                                                                                                                                                                                                                                                                                                                                                                                                                  |
| UAB535                            | TV·A           | tera volt ampere                                                                                                                                                                                                                                                                                                                                                                                                                  |
| UAB536                            | PV·A           | peta volt ampere                                                                                                                                                                                                                                                                                                                                                                                                                  |
| UAB537                            | EV·A           | exa volt ampere                                                                                                                                                                                                                                                                                                                                                                                                                   |
| UAA298                            | V·A            | volt ampere                                                                                                                                                                                                                                                                                                                                                                                                                       |

**Table B.13 – Areic bit density**

| UAD012 | areic bit density    | number of bits which can be placed per area on a storage medium<br>[SOURCE: [42] modified] |
|--------|----------------------|--------------------------------------------------------------------------------------------|
| UAA341 | bit/m <sup>2</sup>   | bit per metre squared                                                                      |
| UAA195 | Kibit/m <sup>2</sup> | kibibit per metre squared                                                                  |
| UAA231 | Mibit/m <sup>2</sup> | mebibit per metre squared                                                                  |
| UAA160 | Gibit/m <sup>2</sup> | gibibit per metre squared                                                                  |
| UAA293 | Tibit/m <sup>2</sup> | tebibit per metre squared                                                                  |
| UAA272 | Pibit/m <sup>2</sup> | pebibit per metre squared                                                                  |
| UAA141 | Eibit/m <sup>2</sup> | exbibit per metre squared                                                                  |

**Table B.14 – Areic charge density**

| UAD013              | areic charge density | at a given point on a surface element of quasi-infinitesimal area A, scalar quantity equal to the total electric charge Q on the surface element divided by the area A:<br>$\sigma = \frac{Q}{A}$<br>[SOURCE: IEC 60050-121:1998, 121-11-08] |
|---------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| m <sup>-2</sup> s A |                      | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                    |
| UAA134              | C/m <sup>2</sup>     | coulomb per metre squared                                                                                                                                                                                                                    |
| UAA564              | kC/m <sup>2</sup>    | kilocoulomb per metre squared                                                                                                                                                                                                                |
| UAB101              | C/cm <sup>2</sup>    | coulomb per centimetre squared                                                                                                                                                                                                               |
| UAB100              | C/mm <sup>2</sup>    | coulomb per millimetre squared                                                                                                                                                                                                               |
| UAA207              | MC/m <sup>2</sup>    | megacoulomb per metre squared                                                                                                                                                                                                                |
| UAA060              | μC/m <sup>2</sup>    | microcoulomb per metre squared                                                                                                                                                                                                               |
| UAA784              | mC/m <sup>2</sup>    | millicoulomb per metre squared                                                                                                                                                                                                               |

**Table B.15 – Areic mass**

|                            |                  |                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------|------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD014                     | areic mass       | <p>at a given point on a two-dimensional domain of quasi-infinitesimal area <math>dA</math>, scalar quantity equal to the mass <math>dm</math> within the domain divided by the area <math>dA</math>, thus</p> $\rho_A = \frac{dm}{dA}$ <p>NOTE The coherent SI unit of surface density is kilogram per square metre,</p> $\frac{\text{kg}}{\text{m}^2}$ <p>[SOURCE: IEC 60050-113:2011, 113-03-10]</p> |
| $\text{m}^{-2} \text{ kg}$ |                  | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                               |
| UAA617                     | $\text{kg/m}^2$  | kilogram per metre squared                                                                                                                                                                                                                                                                                                                                                                              |
| UAB103                     | $\text{g/cm}^2$  | gram per centimetre squared                                                                                                                                                                                                                                                                                                                                                                             |
| UAB389                     | $\text{g/mm}^2$  | gram per millimetre squared                                                                                                                                                                                                                                                                                                                                                                             |
| UAB174                     | $\text{kg/cm}^2$ | kilogram per centimetre squared                                                                                                                                                                                                                                                                                                                                                                         |
| UAA818                     | $\text{mg/cm}^2$ | milligram per centimetre squared                                                                                                                                                                                                                                                                                                                                                                        |
| UAA486                     | $\text{g/m}^2$   | gram per metre squared                                                                                                                                                                                                                                                                                                                                                                                  |
| UAA829                     | $\text{mg/m}^2$  | milligram per metre squared                                                                                                                                                                                                                                                                                                                                                                             |

**Table B.16 – Avogadro constant**

|                   |                   |                                                                                                                                                                |
|-------------------|-------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD015            | avogadro constant | $L = \frac{N}{n}$ <p><math>N</math> is the number of entities, <math>n</math> is the amount of substance or the chemical amount</p> <p>[SOURCE: [36], p39]</p> |
| $\text{mol}^{-1}$ |                   | SI coherent derived unit expressed in terms of base units                                                                                                      |
| UAA896            | 1/mol             | reciprocal mole                                                                                                                                                |

**Table B.17 – Bandwidth distance product**

|                   |                             |                                                                                                                                                                                                                         |
|-------------------|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD016            | bandwidth distance product  | <p>product of the length of a fiber-optic link and its maximum data rate (not actually its optical bandwidth)</p> <p>NOTE That product is typically limited by the acceptable bit error rate.</p> <p>[SOURCE: [43]]</p> |
| $\text{m s}^{-1}$ |                             | SI coherent derived unit expressed in terms of base units                                                                                                                                                               |
| UAA567            | $\text{kHz} \cdot \text{m}$ | kilohertz metre                                                                                                                                                                                                         |
| UAA210            | $\text{MHz} \cdot \text{m}$ | megahertz metre                                                                                                                                                                                                         |
| UAA151            | $\text{GHz} \cdot \text{m}$ | gigahertz metre                                                                                                                                                                                                         |
| UAA171            | $\text{Hz} \cdot \text{m}$  | hertz metre                                                                                                                                                                                                             |

**Table B.18 – Battery capacity**

|        |                  |                                                                                                                                                                                                                              |
|--------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD017 | battery capacity | the electric charge which can be delivered by a galvanic cell under specified conditions<br><br>NOTE The capacity is often expressed in ampere hours Ah, where 1 Ah = 3600 C.<br><br>[SOURCE: IEC 60050-111:1996, 111-15-24] |
| s A    |                  | SI coherent derived unit expressed in terms of base units                                                                                                                                                                    |
| UAA107 | A·s              | ampere second                                                                                                                                                                                                                |
| UAA777 | mA·h             | milliampere hour                                                                                                                                                                                                             |
| UAB053 | kA·h             | kiloampere hour                                                                                                                                                                                                              |
| UAA102 | A·h              | ampere hour                                                                                                                                                                                                                  |
| UAB383 | A·min            | ampere minute                                                                                                                                                                                                                |

**Table B.19 – Bit rate**

|        |          |                                                                                        |
|--------|----------|----------------------------------------------------------------------------------------|
| UAD018 | bit rate | the speed at which bits are transferred<br><br>[SOURCE: ISO/IEC 2382-9:1995, 09.05.17] |
| UAA343 | bit/s    | bit per second                                                                         |
| UAA291 | Tbit/s   | terabit per second                                                                     |
| UAA270 | Pbit/s   | petabit per second                                                                     |
| UAA139 | Ebit/s   | exabit per second                                                                      |
| UAA586 | kbit/s   | kilobit per second                                                                     |
| UAA226 | Mbit/s   | megabit per second                                                                     |
| UAA156 | Gbit/s   | gigabit per second                                                                     |
| UAB342 | o/s      | octet per second                                                                       |

**Table B.20 – Burst factor**

|                   |                         |                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD019            | burst factor            | multiplying factor applied to the maximum expected operating pressure (MEOP), or maximum design pressure (MDP), to obtain the design burst pressure<br><br>NOTE 1 Burst factor is synonymous with design factor of safety for burst.<br><br>NOTE 2 design burst pressure (ISO 14623:2003, 2.16) sometimes referred to as burst pressure, is synonymous with “ultimate pressure”.<br><br>[SOURCE: ISO 14623:2003, 2.8] |
| m s <sup>-2</sup> |                         | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                                             |
| UAB462            | Pa/(kg/m <sup>2</sup> ) | pascal metre squared per kilogram                                                                                                                                                                                                                                                                                                                                                                                     |
| UAB130            | kPa/(g/m <sup>2</sup> ) | kilopascal metre squared per gram                                                                                                                                                                                                                                                                                                                                                                                     |

**Table B.21 – Byte rate**

|        |           |                                                                                             |
|--------|-----------|---------------------------------------------------------------------------------------------|
| UAD020 | byte rate | the speed at which bytes are transferred<br>[SOURCE: ISO/IEC 2382-9:1995, 09.05.17modified] |
| UAB305 | byte/s    | byte per second                                                                             |
| UAB306 | kbyte/s   | kilobyte per second                                                                         |
| UAB307 | Mbyte/s   | megabyte per second                                                                         |
| UAA157 | Gbyte/s   | gigabyte per second                                                                         |

**Table B.22 – Capacitance**

|                                                  |               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------------------------------|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD021                                           | capacitance   | <p>for a capacitive two-terminal element with terminals A and B, quotient of the electric charge <math>q</math> at A by the voltage [IEC 60050-131:2002,131-11-56] <math>u_{AB}</math> between the terminals:</p> $C = \frac{q}{u_{AB}}$ <p>where the sign of the electric charge is determined by taking the electric current in the time integral defining this charge as positive if its direction is from A to B and negative in the opposite case</p> <p>NOTE A capacitance cannot be negative.</p> <p>[SOURCE: IEC 60050-131:2002,131-12-13 modified]</p> |
| $m^{-2} \text{ kg}^{-1} \text{ s}^4 \text{ A}^2$ |               | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| UAA319                                           | aF            | attofarad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| UAB588                                           | fF            | femtofarad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| UAA930                                           | pF            | picofarad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| UAA903                                           | nF            | nanofarad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| UAA063                                           | $\mu\text{F}$ | microfarad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| UAA787                                           | mF            | millifarad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| UAB384                                           | kF            | kilofarad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| UAA144                                           | F             | farad                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

**Table B.23 – Catalytic activity**

|                             |                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|-----------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD022                      | catalytic activity | <p>property of a component corresponding to the catalysed substance rate of conversion of a specified chemical reaction, in a specified measurement system</p> <p>NOTE 1 Adapted from IUPAC/IFCC 1995:9.101.3.</p> <p>NOTE 2 In this technical specification the "component" is an enzyme.</p> <p>NOTE 3 The quantity "catalytic activity" relates to an amount of active enzyme, not its concentration, see ISO 18153:2003, 3.3.</p> <p>NOTE 4 The coherent derived SI unit is "katal" (kat), equal to "mole per second" (<math>\text{mol s}^{-1}</math>).</p> <p>NOTE 5 The measurement procedure is an essential element of the definition of the measurand.</p> <p>NOTE 6 In many instances, instead of the conversion rate of the substrate ascribed in the short name of the enzyme analyte, e.g. "creatine" in "creatine kinase", the conversion rate of an indicator substance as substrate of a combined reaction is measured. Then the measurand should be defined as "catalytic activity of the enzyme as measured by the conversion rate of an indicator substance in a specified system according to a given measurement procedure", e.g., "catalytic activity of creatine kinase as measured by the rate of conversion of NADP<sup>+</sup> in the IFCC reference procedure in human serum."</p> <p>[SOURCE: ISO 18153:2003, 3.2]</p> |
| $\text{s}^{-1} \text{ mol}$ |                    | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| UAB196                      | kat                | katal                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

**Table B.24 – Catalytic activity concentration**

|        |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD369 | catalytic activity concentration | <p>catalytic activity of a component divided by volume of the original system</p> <p>NOTE 1 Adapted from IUPAC/IFCC 1995:9.104.2.</p> <p>NOTE 2 The coherent derived SI unit is "katal per cubic metre" or "mole per second cubic metre" (<math>\text{kat m}^{-3} = \text{mol s}^{-1} \text{ m}^{-3}</math>). In laboratory medicine, the unit of volume can be chosen to be "litre" (l).</p> <p>NOTE 3 In this technical specification the "component" is an enzyme and the "original system" can be, e.g., the plasma of a blood sample.</p> <p>[ISO 18153:2003, 3.3]</p> |
| UAB602 | $\text{kat/m}^3$                 | katal per cubic metre                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

**Table B.25 – Celsius temperature**

|        |                     |                                                                                                                                                     |
|--------|---------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD023 | Celsius temperature | $t = T - T_0$<br>where $T$ is the thermodynamic temperature (ISO 80000-5:2007, 5-1) and $T_0 := 273,15\text{ K}$<br>[SOURCE: ISO 80000-5:2007, 5-2] |
| K      |                     | SI coherent base unit                                                                                                                               |
| UAA033 | °C                  | degree Celsius                                                                                                                                      |

**Table B.26 – Compressibility**

|                               |                       |                                                                                                                                                                                                                                                                                                                                                                                                            |
|-------------------------------|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD024                        | compressibility       | quantity<br>$\kappa = -\frac{1}{V} \frac{dV}{dp}$<br>characterizing the relative variation of volume $V$ with pressure $p$ under given conditions<br>NOTE 1 See the thermodynamic concepts of isothermal compressibility and isentropic compressibility.<br>NOTE 2 The coherent SI unit of compressibility is pascal to the power minus one, $\text{Pa}^{-1}$ .<br>[SOURCE: IEC 60050-113:2011, 113-03-70] |
| $\text{m kg}^{-1} \text{s}^2$ |                       | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                                  |
| UAA269                        | 1/Pa                  | reciprocal pascal or pascal to the power minus one                                                                                                                                                                                                                                                                                                                                                         |
| UAB492                        | $\text{m}^2/\text{N}$ | metre squared per newton                                                                                                                                                                                                                                                                                                                                                                                   |
| UAA328                        | 1/bar                 | reciprocal bar                                                                                                                                                                                                                                                                                                                                                                                             |

**Table B.27 – Conductivity**

|                                                      |                         |                                                                                                                                                                                                                                                                                                         |
|------------------------------------------------------|-------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD025                                               | conductivity            | scalar or tensor quantity the product of which by the electric field strength in a medium is equal to the electric current density<br>NOTE For an isotropic medium the conductivity is a scalar quantity; for an anisotropic medium it is a tensor quantity.<br>[SOURCE: IEC 60050-121:1998, 121-12-03] |
| $\text{m}^{-3} \text{kg}^{-1} \text{s}^3 \text{A}^2$ |                         | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                               |
| UAA934                                               | pS/m                    | pico Siemens per metre                                                                                                                                                                                                                                                                                  |
| UAA908                                               | nS/m                    | nanosiemens per metre                                                                                                                                                                                                                                                                                   |
| UAA076                                               | $\mu\text{S}/\text{m}$  | microsiemens per metre                                                                                                                                                                                                                                                                                  |
| UAA579                                               | kS/m                    | kilosiemens per metre                                                                                                                                                                                                                                                                                   |
| UAA220                                               | MS/m                    | megasiemens per metre                                                                                                                                                                                                                                                                                   |
| UAA279                                               | S/m                     | siemens per metre                                                                                                                                                                                                                                                                                       |
| UAA907                                               | nS/cm                   | nanosiemens per centimetre                                                                                                                                                                                                                                                                              |
| UAA075                                               | $\mu\text{S}/\text{cm}$ | microsiemens per centimetre                                                                                                                                                                                                                                                                             |
| UAA801                                               | mS/cm                   | millisiemens per centimetre                                                                                                                                                                                                                                                                             |
| UAA278                                               | S/cm                    | siemens per centimetre                                                                                                                                                                                                                                                                                  |

**Table B.28 – Cross-section**

|                |               |                                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------|---------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD026         | cross-section | <p><math>\sigma</math>, of a target entity, for a particular interaction produced by incident charged or uncharged particles, is the quotient of <math>P</math> by <math>\Phi</math>, where <math>P</math> is the probability of that interaction for a single target entity when subjected to the particle fluence, <math>\Phi</math>, thus</p> $\sigma = \frac{P}{\Phi}$ <p>[SOURCE: [35], 3.1]</p> |
| m <sup>2</sup> |               | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                             |
| UAB297         | b             | barn                                                                                                                                                                                                                                                                                                                                                                                                  |

**Table B.29 – Dataset of bits**

|        |                 |                                                                                                                                                                                                                               |
|--------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD027 | dataset of bits | <p>dataset:<br/>identifiable collection of data</p> <p>[SOURCE: ISO 19115:2003, 4.2]</p> <p>bit:<br/>either of the digits 0 or 1 when used in the binary numeration system</p> <p>[SOURCE: ISO/IEC 2382-1:1993, 01.02.08]</p> |
| UAA339 | bit             | bit                                                                                                                                                                                                                           |
| UAB191 | Tbit            | terabit                                                                                                                                                                                                                       |
| UAB190 | Pbit            | petabit                                                                                                                                                                                                                       |
| UAB159 | kbit            | kilobit                                                                                                                                                                                                                       |
| UAB171 | Mbit            | megabit                                                                                                                                                                                                                       |
| UAB156 | Gbit            | gigabit                                                                                                                                                                                                                       |
| UAB158 | Kibit           | kibibit                                                                                                                                                                                                                       |
| UAB167 | Mibit           | mebibit                                                                                                                                                                                                                       |
| UAB152 | Gibit           | gibibit                                                                                                                                                                                                                       |
| UAB341 | o               | octet                                                                                                                                                                                                                         |

**Table B.30 – Dataset of bytes**

|        |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|--------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD028 | dataset of bytes | <p>dataset:<br/>identifiable collection of data</p> <p>[SOURCE: ISO 19115:2003, 4.2]</p> <p>byte:<br/>set of strings that consist of a number of bits, each treated as a unit, and usually representing a character or a part of a character</p> <p>NOTES</p> <p>1 The number of bits in a byte is fixed for a given data processing system.</p> <p>2 The number of bits in a byte is usually 8.</p> <p>[SOURCE: ISO/IEC 2382-4:1999, 04.05.08 modified]</p> |
| UAA354 | byte             | byte                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| UAB186 | Tbyte            | terabyte                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAB187 | Pbyte            | petabyte                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAB129 | kbyte            | kilobyte                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAB131 | Mbyte            | megabyte                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAB185 | Gbyte            | gigabyte                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAA197 | Kibyte           | kibibyte                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAA233 | Mibyte           | mebibyte                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAA162 | Gibyte           | gibibyte                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAA295 | Tibyte           | tebibyte                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAA274 | Pibyte           | pebibyte                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAA143 | Eibyte           | exbibyte                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

**Table B.31 – Density**

|          |          |                                                                                                                                                                                                                                                                                                                                                       |
|----------|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD029   | density  | <p>qualifies the name of a quantity to indicate the quotient of that quantity by the volume</p> <p>NOTE Examples: mass density (also called density) or volumic mass, electric charge density or volumic electric charge. See also the term "volume concentration" (IEC 60050-112:2010, 112-03-17)</p> <p>[SOURCE: IEC 60050-112:2010, 112-03-11]</p> |
| $m^{-3}$ |          | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                             |
| UAA740   | $1/m^3$  | reciprocal metre cubed                                                                                                                                                                                                                                                                                                                                |
| UAA667   | $1/l$    | reciprocal litre                                                                                                                                                                                                                                                                                                                                      |
| UAA383   | $1/cm^3$ | reciprocal centimetre cubed                                                                                                                                                                                                                                                                                                                           |
| UAA870   | $1/mm^3$ | reciprocal millimetre cubed                                                                                                                                                                                                                                                                                                                           |

**Table B.32 – Density of states**

|                                           |                                  |                                                                                                                                                                                   |
|-------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD030                                    | density of states                | $N_E = \frac{dN(E)}{dE}$ <p><math>N(E)</math> is the total number of states of electronic energy less than <math>E</math>, divided by the volume.</p> <p>[SOURCE: [36], p.37]</p> |
| $\text{m}^{-5} \text{kg}^{-1} \text{s}^2$ |                                  | SI coherent derived unit expressed in terms of base units                                                                                                                         |
| UAB165                                    | $1/(\text{J} \cdot \text{m}^3)$  | reciprocal joule per metre cubed                                                                                                                                                  |
| UAB164                                    | $1/(\text{eV} \cdot \text{m}^3)$ | reciprocal electron volt per metre cubed                                                                                                                                          |

**Table B.33 – Diffusion constant, thermal diffusivity**

|                            |                                         |                                                                                                                                                                                                                                                                                                                                |
|----------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD031                     | diffusion constant, thermal diffusivity | $\alpha = \frac{\lambda}{\rho \cdot c_p}$ <p>where <math>\lambda</math> is thermal conductivity (ISO 80000-5:2007, 5-9), <math>\rho</math> is mass density (ISO 80000-4:2006, 4-2), and <math>c_p</math> is specific heat capacity at constant pressure (ISO 80000-5:2007, 5-16.2)</p> <p>[SOURCE: ISO 80000-5:2007, 5-14]</p> |
| $\text{m}^2 \text{s}^{-1}$ |                                         | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                      |
| UAA752                     | $\text{m}^2/\text{s}$                   | metre squared per second                                                                                                                                                                                                                                                                                                       |
| UAB408                     | $\text{cm}^2/\text{s}$                  | centimetre squared per second                                                                                                                                                                                                                                                                                                  |
| UAA872                     | $\text{mm}^2/\text{s}$                  | millimetre squared per second                                                                                                                                                                                                                                                                                                  |

**Table B.34 – Digit rate**

|        |            |                                                                                                                                                                                                                                                                                                                                                 |
|--------|------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD032 | digit rate | <p>the quotient of the number of digits transferred in a time interval, by that time</p> <p>NOTE The term "digit rate" may be qualified, for example: "binary digit rate", "ternary digit rate", "n-ary digit rate" when the number of significant conditions is respectively two, three, n.</p> <p>[SOURCE: IEC 60050-702:1992, 702-05-23]</p> |
| UAA109 | Bd         | baud                                                                                                                                                                                                                                                                                                                                            |
| UAA560 | kBd        | kilobaud                                                                                                                                                                                                                                                                                                                                        |
| UAA204 | MBd        | megabaud                                                                                                                                                                                                                                                                                                                                        |

**Table B.35 – Dose equivalent**

|                            |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------|-----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD033                     | dose equivalent | <p>product of <math>D</math>, <math>Q</math> and <math>N</math> at the point of interest in tissue, where <math>D</math> is the absorbed dose, <math>Q</math> is the quality factor and <math>N</math> is the product of all other modifying factors:</p> $H = D \cdot Q \cdot N$ <p>NOTE The SI unit of dose equivalent is joule per kilogram and is given the special name sievert. The earlier special unit of dose equivalent, still in temporary use, was the rem.</p> <p>[SOURCE: IEC 60050-881:1983, 881-14-01]</p> |
| $\text{m}^2 \text{s}^{-2}$ |                 | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| UAA802                     | mSv             | millisievert                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| UAA284                     | Sv              | sievert                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |

**Table B.36 – Dose equivalent rate**

|                            |                      |                                                                                                                                                                                                                                                                                                                  |
|----------------------------|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD034                     | dose equivalent rate | <p>quotient of <math>dH</math> by <math>dt</math>, where <math>dH</math> is the increment of dose equivalent in the time interval of duration <math>dt</math>:</p> $\dot{H} = \frac{dH}{dt}$ <p>NOTE This quantity is expressed in sievert per second (Sv/s).</p> <p>[SOURCE: IEC 60050-393:2003, 393-14-75]</p> |
| $\text{m}^2 \text{s}^{-3}$ |                      | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                        |
| UAB304                     | nSv/s                | nanosievert per second                                                                                                                                                                                                                                                                                           |
| UAB303                     | $\mu\text{Sv/s}$     | microsievert per second                                                                                                                                                                                                                                                                                          |
| UAB302                     | mSv/s                | millisievert per second                                                                                                                                                                                                                                                                                          |
| UAB301                     | Sv/s                 | sievert per second                                                                                                                                                                                                                                                                                               |
| UAB467                     | nSv/h                | nanosievert per hour                                                                                                                                                                                                                                                                                             |
| UAB466                     | $\mu\text{Sv/h}$     | microsievert per hour                                                                                                                                                                                                                                                                                            |
| UAB465                     | mSv/h                | millisievert per hour                                                                                                                                                                                                                                                                                            |
| UAB464                     | Sv/h                 | sievert per hour                                                                                                                                                                                                                                                                                                 |
| UAB471                     | nSv/min              | nanosievert per minute                                                                                                                                                                                                                                                                                           |
| UAB470                     | $\mu\text{Sv/min}$   | microsievert per minute                                                                                                                                                                                                                                                                                          |
| UAB469                     | mSv/min              | millisievert per minute                                                                                                                                                                                                                                                                                          |
| UAB468                     | Sv/min               | sievert per minute                                                                                                                                                                                                                                                                                               |

**Table B.37 – Dynamic viscosity**

|                                   |                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD035                            | dynamic viscosity                       | <p>measure of the resistance to flow (ISO 5598:2008, 3.2.283) or deformation of a fluid (ISO 5598:2008, 3.2.305), expressed as the relationship between the applied shear stress and the rate of shear of the fluid</p> <p>NOTE It is usually expressed as the coefficient of dynamic viscosity, or simply viscosity (ISO 5598:2008, 3.2.766). In the SI, the unit of dynamic viscosity is the pascal second (Pa·s); for practical use, a submultiple is more convenient. The centipoise (cP) is <math>10^{-3}</math> Pa·s (i.e. 1 cP = 1 mPa·s) and is customarily used.</p> <p>[SOURCE: ISO 5598:2008, 3.2.232]</p> |
| $\text{m}^{-1} \text{ kg s}^{-1}$ |                                         | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| UAA797                            | mPa·s                                   | millipascal second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| UAA265                            | Pa·s                                    | pascal second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| UAB428                            | $(\text{N/m}^2) \cdot \text{s}$         | newton second per metre squared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| UAB429                            | $\text{kg}/(\text{m} \cdot \text{s})$   | kilogram per metre second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| UAB433                            | $\text{g}/(\text{cm} \cdot \text{s})$   | gram per centimetre second                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| UAB432                            | $\text{kg}/(\text{m} \cdot \text{h})$   | kilogram per metre hour                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| UAB430                            | $\text{kg}/(\text{m} \cdot \text{min})$ | kilogram per metre minute                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| UAB431                            | $\text{kg}/(\text{m} \cdot \text{d})$   | kilogram per metre day                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |

**Table B.38 – Einstein coefficients**

|                            |                       |                                                                                                                               |
|----------------------------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------|
| UAD036                     | Einstein coefficients | <p>Einstein transition probabilities for stimulated emission, induced emission, and absorption</p> <p>[SOURCE: [36], p31]</p> |
| $\text{kg}^{-1} \text{ s}$ |                       | SI coherent derived unit expressed in terms of base units                                                                     |
| UAB349                     | s/kg                  | second per kilogram                                                                                                           |

**Table B.39 – Electric charge**

|        |                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------|-----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD037 | electric charge | <p>additive scalar quantity attributed to any particle and, generally, any system of them, to characterize its electromagnetic interactions</p> <p>NOTE 1 Electric charge is always an integral multiple of the elementary electric charge, except for quarks. The result may be positive, negative, or zero.</p> <p>NOTE 2 Due to additivity, electric charge for any system of particles is well defined as the sum of their charges.</p> <p>NOTE 3 Electric charge is subject to a conservation law. It is an invariant under Lorentz transformation, and thus not dependent on the choice of a reference frame.</p> <p>NOTE 4 The electric current through a surface is the time derivative of the electric charge transferred through that surface.</p> <p>NOTE 5 The coherent SI unit of electric charge is coulomb, C. The unit ampere hour is used for electrolytic devices, such as storage batteries:<br/>1 Ah= 3,6 kC.</p> <p>NOTE 6 To denote the charge of a point object, <math>q</math> is often used.</p> <p>[SOURCE: IEC 60050-113:2011, 113-02-10]</p> |
| s A    |                 | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| UAA130 | C               | coulomb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| UAA929 | pC              | picocoulomb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| UAA902 | nC              | nanocoulomb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| UAA059 | μC              | microcoulomb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| UAA782 | mC              | millicoulomb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| UAA563 | kC              | kilocoulomb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| UAA206 | MC              | megacoulomb                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

**Table B.40 – Electrical conductance**

|                                                                |                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD038                                                         | electrical conductance | <p>for a resistive two-terminal element or two-terminal circuit with terminals A and B, quotient of the electric current <math>i</math> in the element or circuit by the voltage <math>u_{AB}</math> [131-11-56] between the terminals:</p> $G = \frac{i}{u_{AB}}$ <p>where the electric current is taken as positive if its direction is from A to B and negative in the opposite case</p> <p>NOTE 1 The conductance of an element or circuit is the inverse of its resistance.</p> <p>NOTE 2 The term "conductance" has a related meaning in 131-12-53.</p> <p>[SOURCE: IEC 60050-131:2002, 131-12-06]</p> |
| m <sup>-2</sup> kg <sup>-1</sup> s <sup>3</sup> A <sup>2</sup> |                        | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| UAB357                                                         | pS                     | picosiemens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| UAA074                                                         | μS                     | microsiemens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| UAA800                                                         | mS                     | millisiemens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| UAA578                                                         | kS                     | kilosiemens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| UAA277                                                         | S                      | siemens                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

**Table B.41 – Electric current**

|        |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|--------|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD039 | electric current | <p>scalar quantity equal to the flux of the electric current density <math>\mathbf{J}</math> through a given directed surface <math>S</math>:</p> $I = \int_S \mathbf{J} \cdot \mathbf{e}_n dA$ <p>where <math>\mathbf{e}_n dA</math> is the vector surface element.</p> <p>NOTE 1 The electric current through a surface is equal to the limit of the quotient of the electric charge transferred through that surface during a time interval by the duration of this interval when this duration tends to zero.</p> <p>NOTE 2 For charge carriers confined to a surface, the electric current is defined through a curve of this surface.</p> <p>[SOURCE: IEC 60050-121:1998, 121-11-13]</p> |
| A      |                  | SI base unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| UAB637 | aA               | attoampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAB638 | fA               | femtoampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| UAA928 | pA               | picoampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAA901 | nA               | nanoampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAA057 | μA               | microampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| UAA775 | mA               | milliampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| UAA557 | kA               | kiloampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAA202 | MA               | megaampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAB639 | GA               | gigaampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAB640 | TA               | teraampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAB641 | PA               | petaampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| UAA101 | A                | ampere                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |

**Table B.42 – Electric current density**

|                   |                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD040            | electric current density | <p>at a given point within a volume element of quasi-infinitesimal volume <math>V</math>, vector quantity equal to the sum, for all free charge carriers within the volume element, of the products of electric charge and velocity, divided by the volume <math>V</math>:</p> $J = \frac{1}{V} \sum_{i=1}^n Q_i v_i$ <p>where <math>n</math> is the number of free carriers within the volume element, <math>Q_i</math> the electric charge of the <math>i^{\text{th}}</math> carrier and <math>v_i</math> its velocity</p> <p>NOTE The flux of the electric current density <math>J</math> through any directed surface <math>S</math> is equal to the electric current <math>I</math> through that surface:</p> $I = \int_S J e_n dA$ <p>where <math>e_n dA</math> is the vector surface element.</p> <p>[SOURCE: IEC 60050-121:1998, 121-11-11]</p> |
| m <sup>-2</sup> A |                          | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| UAA559            | kA/m <sup>2</sup>        | kiloampere per metre squared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| UAA203            | MA/m <sup>2</sup>        | megaampere per metre squared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| UAA105            | A/m <sup>2</sup>         | ampere per metre squared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| UAB052            | A/cm <sup>2</sup>        | ampere per centimetre squared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| UAB051            | A/mm <sup>2</sup>        | ampere per millimetre squared                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

**Table B.43 – Electric dipole moment**

|        |                        |                                                                                                                                                                                                                                                                                                                                                                                                    |
|--------|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| UAD041 | electric dipole moment | <p>for a substance within a domain, vector quantity equal to the vector sum of the electric dipole moments of all elementary electric dipoles included in the domain</p> <p>NOTE The electric dipole moment of a substance within a domain <math>V</math> is the volume integral of the electric polarization <math>P</math>:</p> $p = \int_V P dV$ <p>[SOURCE: IEC 60050-121:1998, 121-11-36]</p> |
| m s A  |                        | SI coherent derived unit expressed in terms of base units                                                                                                                                                                                                                                                                                                                                          |
| UAA133 | C·m                    | coulomb metre                                                                                                                                                                                                                                                                                                                                                                                      |