IEC 80000-13

Edition 1.0 2008-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Quantities and units –
Part 13: Information science and technology

Grandeurs et unités –
Partie 13: Science et technologies de l'information

IEC 80000-13:2008

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

QUANTITIES AND UNITS –

Part 13: Information science and technology

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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International Standard IEC 80000-13 has been prepared by IEC technical committee 25: Quantities and units, and their letter symbols.

This standard cancels and replaces subclauses 3.8 and 3.9 of IEC 60027-2:2005.

The only significant change is the addition of explicit definitions for some quantities.

The text of this standard is based on the following documents:

FDIS	Report on voting
25/371/FDIS	25/377/RVD

Full information on the voting for the approval of this standard 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.

IEC 80000 consists of the following parts, under the general title *Quantities and units*:

Part 6: *Electromagnetism*

Part 13: *Information science and technology*

Part 14: *Telebiometrics related to human physiology*

The following parts are published by ISO:

Part 1: *General*

Part 2: *Mathematical signs and symbols to be used in the natural sciences and technology*

Part 3: *Space and time*

Part 4: *Mechanics*

Part 5: *Thermodynamics*

Part 7: *Light*

Part 8: *Acoustics*

Part 9: *Physical chemistry and molecular physics*

Part 10: *Atomic and nuclear physics*

Part 11: *Characteristic numbers*

Part 12: *Solid state physics*

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

INTRODUCTION

0.1 Arrangements of the tables

The tables of quantities and units in ISO/IEC 80000 are arranged so that the quantities are presented on the left-hand pages and the units on the corresponding right-hand pages.

All units between two full lines on the right-hand pages belong to the quantities between the corresponding full lines on the left-hand pages.

Where the numbering of an item has been changed in the revision of a part of IEC 60027, the number in the preceding edition is shown in parenthesis on the left-hand page under the new number for the quantity; a dash is used to indicate that the item in question did not appear in the preceding edition.

0.2 Tables of quantities

The names in English and in French of the most important quantities within the field of this document are given together with their symbols and, in most cases, their definitions. These names and symbols are recommendations. The definitions are given for identification of the quantities in the International System of Quantities (ISQ), listed on the left hand pages of Table 1; they are not intended to be complete.

The scalar, vectorial or tensorial character of quantities is pointed out, especially when this is needed for the definitions.

In most cases only one name and only one symbol for the quantity are given; where two or more names or two or more symbols are given for one quantity and no special distinction is made, they are on an equal footing. When two types of italic letters exist (for example as with ϑ and θ; φ and ϕ; *a* and a; *g* and g) only one of these is given. This does not mean that the other is not equally acceptable. It is recommended that such variants should not be given different meanings. A symbol within parenthesis implies that it is a reserve symbol, to be used when, in a particular context, the main symbol is in use with a different meaning.

In this English edition the quantity names in French are printed in an italic font, and are preceded by *fr*. The gender of the French name is indicated by (m) for masculine and (f) for feminine, immediately after the noun in the French name.

0.3 Tables of units

0.3.1 General

The names of units for the corresponding quantities are given together with the international symbols and the definitions. These unit names are language-dependent, but the symbols are international and the same in all languages. For further information, see the SI Brochure (8th edition 2006) from BIPM and ISO 80000-1 (under preparation).

The units are arranged in the following way:

a) The coherent SI units are given first. The SI units have been adopted by the General Conference on Weights and Measures (Conférence Générale des Poids et Mesures, CGPM). The use of coherent SI units, and their decimal multiples and submultiples formed with the SI prefixes are recommended, although the decimal multiples and submultiples are not explicitly mentioned.

b) Some non-SI units are then given, being those accepted by the International Committee for Weights and Measures (Comité International des Poids et Mesures, CIPM), or by the International Organization of Legal Metrology (Organisation Internationale de Métrologie Légale, OIML), or by ISO and IEC, for use with the SI.

Such units are separated from the SI units in the item by use of a broken line between the SI units and the other units.

c) Non-SI units currently accepted by the CIPM for use with the SI are given in small print (smaller than the text size) in the “Conversion factors and remarks” column.

d) Non-SI units that are not recommended are given only in annexes in some parts of ISO/IEC 80000. These annexes are informative, in the first place for the conversion factors, and are not integral parts of the standard. These deprecated units are arranged in two groups:

   1) units in the CGS system with special names;

   2) units based on the foot, pound, second, and some other related units.

e) Other non-SI units given for information, especially regarding the conversion factors, are given in another informative annex.

0.3.2 Remark on units for quantities of dimension one, or dimensionless quantities

The coherent unit for any quantity of dimension one, also called a dimensionless quantity, is the number one, symbol 1. When the value of such a quantity is expressed, the unit symbol 1 is generally not written out explicitly.

EXAMPLE

Refractive index $n = 1{,}53 \times 1 = 1{,}53$

Prefixes shall not be used to form multiples or submultiples of this unit. Instead of prefixes, powers of 10 are recommended.

EXAMPLE

Reynolds number $Re = 1{,}32 \times 10^3$

Considering that plane angle is generally expressed as the ratio of two lengths and solid angle as the ratio of two areas, in 1995 the CGPM specified that, in the SI, the radian, symbol rad, and steradian, symbol sr, are dimensionless derived units. This implies that the quantities plane angle and solid angle are considered as derived quantities of dimension one. The units radian and steradian are thus equal to one; they may either be omitted, or they may be used in expressions for derived units to facilitate distinction between quantities of different kinds but having the same dimension.

0.4 Numerical statements in this International Standard

The sign = is used to denote “is exactly equal to”, the sign ≈ is used to denote “is approximately equal to”, and the sign := is used to denote “is by definition equal to”.

Numerical values of physical quantities that have been experimentally determined always have an associated measurement uncertainty. This uncertainty should always be specified. In this standard, the magnitude of the uncertainty is represented as in the following example.

EXAMPLE

$l = 2{,}347\ 82(32)$ m

In this example, $l = a(b)$ m, the numerical value of the uncertainty b indicated in parentheses is assumed to apply to the last (and least significant) digits of the numerical value a of the length l. This notation is used when b represents one standard uncertainty (estimated standard deviation) in the last digits of a. The numerical example given above may be interpreted to mean that the best estimate of the numerical value of the length l, when l is expressed in the unit metre, is 2,347 82, and that the unknown value of l is believed to lie between (2,347 82 – 0,000 32) m and (2,347 82 + 0,000 32) m with a probability determined by the standard uncertainty 0,000 32 m and the probability distribution of the values of l.

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QUANTITIES AND UNITS –

Part 13: Information science and technology

1 Scope

In IEC 80000-13 names, symbols and definitions for quantities and units used in information science and technology are given. Where appropriate, conversion factors are also given.

2 Normative references

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

IEC 60027-3:2002, *Letter symbols to be used in electrical technology – Part 3: Logarithmic and related quantities, and their units*

IEC 60050-704:1993, *International electrotechnical vocabulary – Part 704: Transmission*

IEC 60050-713:1998, *International electrotechnical vocabulary – Part 713: Radiocommunications: transmitters, receivers, networks and operation*

IEC 60050-715:1996, *International electrotechnical vocabulary – Part 715: Telecommunication networks, teletraffic and operation*

IEC 60050-721:1991, *International electrotechnical vocabulary – Part 721: Telegraphy, facsimile and data communication*

ISO/IEC 2382-16:1996, *Information technology – Vocabulary – Part 16: Information theory*

3 Names, definitions and symbols

The names, definitions and symbols for quantities and units of information science and technology are given in the tables on the following pages. Prefixes for binary multiples are also given.

INFORMATION SCIENCE AND TECHNOLOGY **QUANTITIES**

Item No.	Name	Symbol	Definition	Remarks
13-1 (*801*)	traffic intensity *fr* *intensité* (f) *de trafic*	A	number of simultaneously busy resources in a particular pool of resources	See IEC 60050-715, item 715-05-02.
13-2 (*802*)	traffic offered intensity *fr* *intensité* (f) *de trafic offert*	A_o	traffic intensity (item 13-1) of the traffic that would have been generated by the users of a pool of resources if their use had not been limited by the size of the pool	See IEC 60050-715, item 715-05-05.
13-3 (*803*)	traffic carried intensity, traffic load *fr* *intensité* (f) de *trafic écoulé; charge* (f) *de trafic*	Y	traffic intensity (item 13-1) of the traffic served by a particular pool of resources	General practice is to estimate the traffic intensity as an average over a specified time interval, e.g. the busy hour. See IEC 60050-715, item 715-05-04.
13-4 (*804*)	mean queue length *fr* *longueur* (f) *moyenne de file d'attente*	L, (Ω)	time average of queue length	
13-5 (*805*)	loss probability *fr* *probabilité* (f) *de perte*	B	probability for losing a call attempt	
13-6 (*806*)	waiting probability *fr* *probabilité* (f) *d'attente*	W	probability for waiting for a resource	
13-7 (*807*)	call intensity, calling rate *fr* *intensité* (f) *d'appel*; *taux* (m) *d'appel*	λ	number of call attempts over a specified time interval divided by the duration (ISO 80000-3, item 3-7) of this interval	See IEC 60050-715, item 715-03-13.
13-8 (*808*)	completed call intensity *fr* *intensité* (f) *d'appel efficace*	μ	call intensity (item 13-7) for the call attempts that result in the transmission of an answer signal	For a definition of the complete call attempt, see IEC 60050-715, item 715-03-11.

UNITS				INFORMATION SCIENCE AND TECHNOLOGY
Item No.	**Name**	**Symbol**	**Definition**	**Conversion factors and remarks**
13-1.a	erlang	E	1 E corresponds to the occupancy of one resource	The name "erlang" was given to the traffic intensity unit in 1946 by the CCIF, in honour of the Danish mathematician, A. K. Erlang (1878-1929), who was the founder of traffic theory in telephony.
13-2.a	erlang	E		See 13-1.a.
13-3.a	erlang	E		See 13-1.a.
13-4.a	one	1		See the introduction, 0.3.2.
13-5.a	one	1		See the introduction, 0.3.2.
13-6.a	one	1		See the introduction, 0.3.2.
13-7.a	second to the power minus one	s^{-1}		
13-8.a	second to the power minus one	s^{-1}		

INFORMATION SCIENCE AND TECHNOLOGY				QUANTITIES
Item No.	**Name**	**Symbol**	**Definition**	**Remarks**
13-9 (*809*)	storage capacity, storage size *fr* *capacité* (f) *de mémoire,* *taille* (f) *de mémoire*	M	amount of data that can be contained in a storage device, expressed as a number of specified data elements	The specified data elements depend on the organization of the storage device, for example, binary elements also called bits, octets also called bytes, words of a given number of bits, blocks. A subscript referring to a specified data element can be added to the symbol. EXAMPLES: storage capacity for bits, M_{b} or M_{bit} storage capacity for octets, M_{o} or M_{B}. For registers, the term “register length” is used with the same meaning.
13-10 (*810*)	equivalent binary storage capacity *fr* *capacité* (f) *binaire équivalente*	M_{e}	$M_{\mathrm{e}} = \mathrm{lb}\, n$ where n is the number of possible states of the given device	The minimum storage capacity of a bit-organized storage device which would contain the amount of data in the given storage device is equal to the smallest integer greater than or equal to the equivalent binary storage capacity.
13-11 (*812*)	transfer rate *fr* *débit* (m) *de transfert*	r, (ν)	quotient of the number of specified data elements transferred in a time interval by the duration of this interval	The symbol ν is the Greek letter nu. A subscript referring to a specified data element can be added to the symbol. EXAMPLES: digit rate, r_{d} or ν_{d} (see IEC 60050-702 and 60050-704, items 702-05-23 and 704-16-06); transfer rate for octets (or bytes), r_{o}, r_{B}, ν_{o}, or ν_{B}; binary digit rate or bit rate (item 13-13).

UNITS				INFORMATION SCIENCE AND TECHNOLOGY
Item No.	**Name**	**Symbol**	**Definition**	**Conversion factors and remarks**
13-9.a	one	1		See the introduction, 0.3.2.
13-9.b 13-9.c	bit octet byte	bit o, B		Although in this context the designation bit, symbol bit, is not really a unit, it is often used like a unit, e.g. $M_\mathrm{b} = 32\ 000$, where the unit one is implicit, is often written as $M = 32\ 000$ bit. Similarly, although the designation octet or byte, symbols o and B, respectively, are not units, they are often used like units, e.g. $M_\mathrm{o} = 64\ 000$ or $M_\mathrm{B} = 64\ 000$, where the unit one is implicit, are often written $M = 64\ 000$ o or $M = 64\ 000$ B. When used to express a storage capacity or an equivalent binary storage capacity, the bit and the octet (or byte) may be combined with SI prefixes or prefixes for binary multiples. In English, the name byte, symbol B, is used as a synonym for octet. Here byte means an eight-bit byte. However, byte has been used for numbers of bits other than eight. To avoid the risk of confusion, it is strongly recommended that the name byte and the symbol B be used only for eight-bit bytes. The symbol B for byte is not international and should not be confused with the symbol B for bel.
13-10.a	one	1		See the introduction, 0.3.2.
13-10.b	bit	bit		When used to express a storage capacity or an equivalent binary storage capacity, the bit may be combined with SI prefixes or prefixes for binary multiples (see clause 4). In this context, bit is a special name as well as symbol for the coherent unit one.
13-11.a	second to the power minus one	s^{-1}		
13-11.b	digit per second octet per second, byte per second	 o/s, B/s		In English, the name byte, symbol B, is used as a synonym for octet. Here byte means an eight-bit byte. See remarks in item 13-9.c. The octet per second (or byte per second) may be combined with prefixes, for example kilooctet per second, symbol ko/s (or kilobyte per second, symbol kB/s).