

**SLOVENSKI STANDARD
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SIST EN 60027-2:2008**

Črkovni simboli za uporabo v elektrotehnik - 2. del: Telekomunikacije in elektronika (IEC 60027-2:2019)

Letter symbols to be used in electrical technology - Part 2: Telecommunications and electronics (IEC 60027-2:2019)

Formelzeichen für die Elektrotechnik - Teil 2: Telekommunikation und Elektronik (IEC 60027-2:2019)

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Symboles littéraux à utiliser en électrotechnique - Partie 2: Télécommunications et électronique (IEC 60027-2:2019)

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Ta slovenski standard je istoveten z: EN IEC 60027-2:2019**ICS:**

01.075	Simboli za znake	Character symbols
31.020	Elektronske komponente na splošno	Electronic components in general
33.020	Telekomunikacije na splošno	Telecommunications in general

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EUROPEAN STANDARD

EN IEC 60027-2

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2019

ICS 01.060, 33.020

Supersedes EN 60027-2:2007

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Letter symbols to be used in electrical technology - Part 2:
Telecommunications and electronics
(IEC 60027-2:2019)

Symboles littéraux à utiliser en électrotechnique - Partie 2:
Télécommunications et électronique
(IEC 60027-2:2019)

Formelzeichen für die Elektrotechnik - Teil 2:
Telekommunikation und Elektronik
(IEC 60027-2:2019)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 60027-2:2019 (E)**European foreword**

The text of document 25/635/FDIS, future edition 4 of IEC 60027-2, prepared by IEC/TC 25 "Quantities and units" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60027-2:2019.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2019-11-12
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2022-02-12

This document supersedes EN 60027-2:2007.

This edition constitutes a technical revision and includes the following significant changes with respect to the previous edition:

- a) former Subclauses 3.8 and 3.9 are cancelled and replaced by EN 80000-13:2008;
- b) former Subclause 3.10, now 4.8, is revised in accordance with IEC 60050-192:2015;
- c) former Subclause 3.11, now 4.9, is revised in accordance with IEC 60050-561:2014;
- d) former Subclause 3.13, now 4.11, is revised in accordance with EN ISO 80000-8:2007, IEC 60050-801:1994 and IEC 60050-802:2011;
- e) technical and editorial corrections have been carried out, mainly in Subclause 4.1.
- f) tables are simplified, mainly by deleting useless columns.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 60027-2:2019 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60027-3	NOTE	Harmonized as EN 60027-3
IEC 60747 (series)	NOTE	Harmonized in EN 60747 (series)
IEC 61703:2001	NOTE	Harmonized as EN 61703:2002 (not modified)
ISO 80000-1:2009	NOTE	Harmonized as EN ISO 80000-1:2013 (not modified)
ISO 80000-8:2007	NOTE	Harmonized as EN ISO 80000-8:2007 (not modified)
IEC 80000-13:2008	NOTE	Harmonized as EN 80000-13:2008 (not modified)

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60027-1	1992	Letters symbols to be used in electrical technology - Part 1: General		
+ A1	1997		EN 60027-1	2006
+ A2	2005		+ A2	2007

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Part 2: Telecommunications and electronics
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LETTER SYMBOLS TO BE USED IN ELECTRICAL TECHNOLOGY –

Part 2: Telecommunications and electronics

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 60027-2 has been prepared by IEC technical committee 25: Quantities and units.

This fourth edition cancels and replaces the third edition published in 2005. This fourth edition constitutes a technical revision.

This edition includes the following significant changes with respect to the previous edition:

- a) former Subclauses 3.8 and 3.9 are cancelled and replaced by IEC 80000-13:2008;
- b) former Subclause 3.10, now 4.8, is revised in accordance with IEC 60050-192:2015;
- c) former Subclause 3.11, now 4.9, is revised in accordance with IEC 60050-561:2014;
- d) former Subclause 3.13, now 4.11, is revised in accordance with ISO 80000-8:2007, IEC 60050-801:1994 and IEC 60050-802:2011;
- e) technical and editorial corrections have been carried out, mainly in Subclause 4.1.
- f) tables are simplified, mainly by deleting useless columns.

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

FDIS	Report on voting
25/635/FDIS	25/640/RVD

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

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

A list of all parts in the IEC 60027 series, published under the general title *Letter symbols to be used in electrical technology*, can be found on the IEC website.

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

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

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LETTER SYMBOLS TO BE USED IN ELECTRICAL TECHNOLOGY –

Part 2: Telecommunications and electronics

1 Scope

This part of IEC 60027 is applicable to telecommunications and electronics. It gives names and symbols for quantities and their units.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60027-1:1992, *Letter symbols to be used in electrical technology – Part 1: General*

IEC 60027-1:1992/AMD1:1997

IEC 60027-1:1992/AMD2:2005

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3 Terms and definitions (standards.iteh.ai)

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Introduction to tables

In this part of IEC 60027, complex quantities are in general denoted by underlining their symbols. However, this does not constitute a compulsory rule in applications (see IEC 60027-1).

To avoid any ambiguity, some quantity names are followed by a specific use, enclosed in angle brackets "<...>" after a comma.

When several symbols are indicated for a given quantity, the first is the preferred symbol and the others are reserve symbols, unless otherwise stated.

When several units are indicated for a given quantity, the first is the coherent SI unit, unless otherwise stated. For logarithmic ratios, the first mentioned unit is the decibel.

For quantities defined as a logarithm of the ratio of two power quantities or two root-power quantities (also known as field quantities), the submultiple decibel (dB) of the bel (B) is generally used, rather than the neper (Np). The bel is not explicitly mentioned in the tables. See IEC 60027-3 and ISO 80000-1:2009, Annex C.

5 Quantities and units

5.1 General concepts

Item number	Entry number in IEC 60050	Name	Symbol	Quantity	Definition and remarks	Units		
						Name	Symbol	Remarks
101	101-12-02	signal	S	signal	A signal is any physical phenomenon whose presence, absence or variation is considered as representing information. In general, a signal is a quantity, one or more parameters of which represent information. https://standards.iteh.ai/catalog/standards/iec/60027-2-2019 In this document, s_1 and s_2 are used for input and output signals respectively. See IEC 60027-1 for other suitable subscripts. In cases where the type of signal quantity is known, for example, electric current, voltage, pressure, etc., use the appropriate symbol. With respect to capital and lower-case letters, see IEC 60027-1:1992, 2.1.			The unit depends on the kind of quantity constituting the signal (electric current, voltage, pressure, etc.).
102		signal power	P_s P_{sig}	power	"s" (lower case, upright) is used as subscript for "signal". In signal theory, the term "instantaneous power" is by convention used for the square of the instantaneous value of a signal. This square is proportional to a physical power if the signal is a root-power quantity (or field quantity) (see Note 1 to entry of IEC 60050-103:2009, 103-09-05). In a physical system, a signal power is always a physical power.	watt	W	
103		signal level	L L_s L_{sig}	level	$L = 10 \lg \left \frac{S}{S_{ref}} \right \text{ dB} = \frac{1}{2} \lg \left \frac{P}{P_{ref}} \right \text{ Np}$ where S and S_{ref} are two signals of the same kind, S_{ref} being a reference signal.	decibel neper	dB Np	
104	702-07-04	absolute power level; power level	L_p	power level	$L_p = 10 \lg \frac{P}{P_{ref}} \text{ dB} = \frac{1}{2} \ln \frac{P}{P_{ref}} \text{ Np}$ where P is a power and P_{ref} is a reference power.	decibel neper	dB Np	
105	702-07-06	absolute voltage level; voltage level	L_U	voltage level	$L_U = 20 \lg \frac{U}{U_{ref}} \text{ dB} = \ln \frac{U}{U_{ref}} \text{ Np}$ where U is a voltage and U_{ref} is a reference voltage. The synonym "voltage level" may be used only where there is no ambiguity.	decibel neper	dB Np	

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Item number	Quantity				Units		
	Entry number in IEC 60050	Name	Symbol	Definition and remarks	Name	Symbol	Remarks
106	702-07-05	relative power level	$L_{p,i}$ L_r	$L_{p,i}$, $L_{p,r}$, $L_{p,0}$ where $L_{p,i}$ and $L_{p,r}$ are the absolute power levels (104) at the measuring point and at a reference point, respectively. A noise is any variable physical phenomenon, generally a quantity, apparently not conveying information and which can be superimposed on, or combined with, a wanted signal. Concerning upper and lower-case letters, see IEC 60027-1:1992, 2.1. "n" (lower case, upright) is used as subscript for "noise". In cases where the type of noise quantity is known, use the appropriate symbol (for example, I , i for electric current) with n as subscript (e.g. I_n , i_n).	decibel neper	dB Np	The unit depends on the kind of quantity constituting the noise (electric current, voltage, pressure, etc.).
107	702-08-03	noise	N S_n s_n	 Concerning upper and lower-case letters, see IEC 60027-1:1992, 2.1. "n" (lower case, upright) is used as subscript for "noise". In cases where the type of noise quantity is known, use the appropriate symbol (for example, I , i for electric current) with n as subscript (e.g. I_n , i_n).			
108	103-09-05	power spectral density, <for a signal or noise>	$w(f)$	$P = \int_0^{\infty} w(f) df$ where f is the frequency and P is the total power. In signal theory, the term "instantaneous power" is by convention used for the square of the instantaneous value of a signal or noise. This square is proportional to a physical power if the signal or the noise is a root-power (or field quantity). See Note 1 to entry of 103-09-05 in IEC 60050-103:2009. In a physical system, the power spectral density is always a physical power spectral density.	watt per hertz	W/Hz	
109		power spectral density of white noise	N_0	The power spectral density (108) is frequency-independent: $w(f) = N_0$	watt per hertz	W/Hz	
110	702-08-51	equivalent noise voltage	U_n	Applies to a one-port network. U_n is an RMS voltage.	volt	V	

Item number	Quantity					Units		
	Entry number in IEC 60050	Name	Symbol	Definition and remarks	Name	Symbol	Remarks	
111	702-08-52	equivalent noise resistance; noise resistance	R_{eq} R_n	<p>Applies to a one-port network.</p> <p>$R_{eq} = \frac{U_n^2}{4kT_{ref}\Delta f}$</p> <p>where U_n is the equivalent noise voltage (110), k is the Boltzmann constant, T_{ref} is a reference temperature and Δf is the frequency bandwidth (154) considered.</p> <p>The synonym "noise resistance" may be used only where there is no ambiguity.</p>	ohm	Ω		
112	702-08-54	spot noise temperature	$T(f)$	Applies to a one-port network. f is frequency.	kelvin	K		
113	702-08-55	mean noise temperature	\bar{T}	Applies to a one-port network.	kelvin	K		
114	702-08-56	equivalent spot noise temperature	$T_{eq}(f)$	Applies to a two-port network. f is frequency.	kelvin	K		
115	702-08-58	mean equivalent noise temperature; mean noise temperature	\bar{T}_{eq}	Applies to a two-port network. The synonym "mean noise temperature" may be used only where there is no ambiguity.	kelvin	K		
116	702-08-57	spot noise factor	$F(f)$	<p>Applies to a two-port network.</p> <p>The noise factor is the ratio of the exchangeable power spectral density (108) of output noise to the power spectral density that would be present at the output if the only source of noise were input thermal noise at a reference temperature T_{ref}:</p> $F(f) = 1 + \frac{T_{eq}(f)}{T_{ref}}$ <p>where $T_{eq}(f)$ is the equivalent spot noise temperature (114). For exchangeable power, see IEC 60050-702:1992, 702-07-11.</p>	one	1		

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Item number	Quantity				Units	
	Entry number in IEC 60050	Name	Symbol	Definition and remarks	Name	Symbol
117	702-08-57	spot noise figure	$F_n(f)$	<p>$F_n(f) = 10 \lg F(f)$ dB = $\frac{1}{2} \ln F(f)$ Np</p> <p>where $F(f)$ is the spot noise factor (116).</p> <p>In English "noise factor" is generally used for the arithmetic expression and "noise figure" is used for the logarithmic expression. See IEC 60050-702:1992, 702-08-57, Note 2.</p> <p>In French, "facteur de bruit" is generally used in both cases.</p> <p>Applies to a two-port network.</p> $\bar{F} = 1 + \frac{\bar{T}_{eq}}{T_{ref}}$ <p>where \bar{T}_{eq} is the mean equivalent noise temperature (115) and T_{ref} is a reference temperature.</p> <p>The synonym "noise factor" may be used only where there is no ambiguity.</p>	decibel neper	dB Np
118	702-08-59	mean noise factor; noise factor	\bar{F}	<p>$\bar{F}_n = 10 \lg \bar{F}$ dB = $\frac{1}{2} \ln \bar{F}$ Np</p> <p>where \bar{F} is the mean noise factor (118).</p> <p>In English, "noise factor" is generally used for the arithmetic expression and "noise figure" is used for the logarithmic expression. See IEC 60050-702:1992, 702-08-59, Note 2.</p> <p>In French, "facteur de bruit" is generally used in both cases and the adjective "logarithmique" is omitted in practice.</p> <p>The synonym "noise figure" may be used only where there is no ambiguity.</p> <p>Signal power (102) divided by noise power.</p> <p>In practice, the symbol S/N is generally used.</p>	decibel neper	dB Np
119	702-08-59	mean noise figure; noise figure	\bar{F}_n	<p>Signal power (102) divided by noise power.</p> <p>In practice, the symbol S/N is generally used.</p>	one	1
120	702-08-61	signal-to-noise ratio; SNR	k_{SN}		one	1