

© Copyright SEK. Reproduction in any form without permission is prohibited.

Utformning av grafiska symboler för användning vid teknisk dokumentation av produkter – Del 2: Beskrivning av grafiska symboler för hantering i datorer, inklusive symboler för referensbibliotek och fordringar för utbyte

*Design of graphical symbols for use in the technical documentation of products –
Part 2: Specification for graphical symbols in a computer sensible form,
including graphical symbols for a reference library, and requirements for their interchange*

Som svensk standard gäller europastandarden EN 81714-2:2007. Den svenska standarden innehåller den officiella engelska språkversionen av EN 81714-2:2007.

Nationellt förord

Europastandarden EN 81714-2:2007

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 81714-2, Second edition, 2006 - Design of graphical symbols for use in the technical documentation of products - Part 2: Specification for graphical symbols in a computer sensible form, including graphical symbols for a reference library, and requirements for their interchange**

utarbetad inom International Electrotechnical Commission, IEC.

Del 1 av denna standard har beteckningen SS-EN ISO 81714-1.

Tidigare fastställd svensk standard SS-EN 81714-2, utgåva 1, 2000, gäller ej fr o m 2009-10-01.

ICS 01.080.50

Denna standard är fastställd av SEK Svensk Elstandard, som också kan lämna upplysningar om **sakinnehållet** i standarden.
Postadress: SEK, Box 1284, 164 29 KISTA
Telefon: 08 - 444 14 00. Telefax: 08 - 444 14 30
E-post: sek@elstandard.se. Internet: www.elstandard.se

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringsarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utformningen av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringsarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringsverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtida standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

English version

**Design of graphical symbols
for use in the technical documentation of products -
Part 2: Specification for graphical symbols
in a computer sensible form, including graphical symbols
for a reference library, and requirements for their interchange
(IEC 81714-2:2006)**

Création de symboles graphiques
utilisables dans la documentation
technique de produits -
Partie 2: Spécification
pour symboles graphiques
sous forme adaptée à l'ordinateur,
y compris les symboles pour bibliothèque
de références et exigences relatives
à leur échange
(CEI 81714-2:2006)

Gestaltung von graphischen Symbolen
zur Anwendung in der technischen
Produktdokumentation -
Teil 2: Spezifikation für graphische
Symbole in rechnerinterpretierbarer Form
einschließlich graphischer Symbole
für eine Referenzbibliothek
und Anforderungen
für ihren Datenaustausch
(IEC 81714-2:2006)

This European Standard was approved by CENELEC on 2006-10-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 81714-2:2006, prepared by IEC TC 3, Information structures, documentation and graphical symbols, in cooperation with ISO subcommittee SC 1, Basic conventions, of ISO technical committee 10, Technical product documentation, was submitted to the formal vote and was approved by CENELEC as EN 81714-2 on 2006-10-01 without any modification.

This European Standard supersedes EN 81714-2:1998.

The main changes with respect to EN 81714-2:1998 are as follows:

Subclauses 6.16, 6.18 and Annex D contain the major changes; other changes are basically updates.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2007-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2009-10-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 81714-2:2006 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:

ISO 10303-1	NOTE	Harmonized as ENV ISO 10303-1:1995 (not modified).
ISO 10303-11	NOTE	Harmonized as ENV ISO 10303-11:1995 (not modified).
ISO 10303-21	NOTE	Harmonized as ENV ISO 10303-21:1995 (not modified).
IEC 60445	NOTE	Harmonized as EN 60445:2000 (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60617	Data-base	Graphical symbols for diagrams	-	-
IEC 61082-1	- ¹⁾	Preparation of documents used in electrotechnology - Part 1: Rules	EN 61082-1	2006 ²⁾
IEC 61286 (mod)	2001	Information technology - Coded graphic character set for use in the preparation of documents used in electrotechnology and for information interchange	EN 61286	2002
IEC 61346-1	1996	Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations - Part 1: Basic rules	EN 61346-1	1996
IEC 61346-2	2000	Industrial systems, installations and equipment and industrial products - Structuring principles and reference designations - Part 2: Classification of objects and codes for classes	EN 61346-2	2000
IEC 61360-1 A1	2002 2003	Standard data element types with associated classification scheme for electric components - Part 1: Definitions - Principles and methods	EN 61360-1 A1	2002 2004
IEC 61360-4	- ¹⁾	Standard data element types with associated classification scheme for electric components - Part 4: IEC reference collection of standard data element types and component classes	EN 61360-4 + corr. December	2005 ²⁾ 2005
IEC 61666	1997	Industrial systems, installations and equipment and industrial products - Identification of terminals within a system	EN 61666	1997

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61966-2-1	1999	Multimedia systems and equipment - Colour measurement and management - Part 2-1: Colour management - Default RGB colour space - sRGB	EN 61966-2-1	2000
IEC 81714-3	2004	Design of graphical symbols for use in the technical documentation of products - Part 3: Classification of connect nodes, networks and their encoding	-	-
ISO/IEC 646	1991	Information technology - ISO 7-bit coded character set for information interchange	-	-
ISO/IEC 7942-1	1994	Information technology - Computer graphics and image processing - Graphical Kernel System (GKS) - Part 1: Functional description	EN ISO/IEC 7942-1	1995
ISO/IEC 9592-1	1997	Information technology - Computer graphics and image processing - Programmer's Hierarchical Interactive Graphics System (PHIGS) - Part 1: Functional description	-	-
ISO 128-20	1996	Technical drawings - General principles of presentation - Part 20: Basic conventions for lines	EN ISO 128-20	2001
ISO 128-21	1997	Technical drawings - General principles of presentation - Part 21: Preparation of lines by CAD systems	EN ISO 128-21	2001
ISO 639-1	2002	Codes for the representation of names of languages - Part 1: Alpha-2 code	-	-
ISO 3098-0	1997	Technical product documentation - Lettering - Part 0: General requirements	EN ISO 3098-0	1997
ISO 3098-5	1997	Technical product documentation - Lettering - Part 5: CAD lettering of the Latin alphabet, numerals and marks	EN ISO 3098-5	1997
ISO 3166-1	1997	Codes for the representation of names of countries and their subdivisions - Part 1: Country codes	EN ISO 3166-1	1997
ISO 6428	1982	Technical drawings - Requirements for microcopying	EN ISO 6428	1999
ISO 6523-1	1998	Information technology - Structure for the identification of organizations and organization parts - Part 1: Identification of organization identification schemes	-	-
ISO 10303-201	1994	Industrial automation systems and integration - Product data representation and exchange - Part 201: Application protocol: Explicit draughting	ENV ISO 10303-201	1995

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
ISO 81714-1	1999	Design of graphical symbols for use in the technical documentation of products - Part 1: Basic rules	EN ISO 81714-1	1999

CONTENTS

1	Scope.....	15
2	Normative references	15
3	Terms and definitions	19
3.1	Graphical symbols for use on documents	19
3.2	Nodes	19
3.3	Administration of openings	21
3.4	Graphical constructs.....	23
3.5	Routing and placing of graphical symbols in diagrams.....	23
3.6	Administration of graphical symbols	23
3.7	Text.....	25
4	Markers	27
4.1	Markers for reference points and connect nodes	27
4.2	Markers for alignment of text	27
5	Reference symbols	27
6	Specifications for symbols including symbols for a reference library	29
6.1	General	29
6.2	Variants of graphical symbols.....	31
6.3	Scaling	35
6.4	Module sizes in reference libraries	37
6.5	Use of layer technique.....	39
6.6	Constructs used in the creation of graphical symbols	39
6.7	Text.....	43
6.8	Connect nodes	49
6.9	Reference point of reference symbols	57
6.10	Identification of schematic connect nodes	59
6.11	Routing and placing of symbols	61
6.12	Identifying block	65
6.13	Descriptive data block	65
6.14	Defaulted location of identifying and descriptive block.....	69
6.15	Creation of reference symbols not shown in IEC 60617 nor in ISO 14617).....	69
6.16	Classification of graphical symbols.....	71
6.17	Description of symbols	73
6.18	Reference symbol identifier	75
	Annex A (informative) Relations to IEC 60617 and ISO 14617).....	79
	Annex B (informative) Interchange of diagrams and symbol libraries.....	81
	Annex C (informative) Application reference model.....	89
	Annex D (informative) Product identification	129
	Annex E (normative) Data types, value formats, recommended lengths, defaults	131
	Annex F (normative) Requirements concerning lines.....	137
	Annex G (normative) Requirements concerning text.....	143

Annex H (informative) Examples of pattern definitions	151
Annex I (normative) Library versions – Conformance requirements	155
Annex J (normative) Requirements concerning global definitions in a library	157
Annex K (informative) Data element type specification	161
Bibliography	169
Figure 1 – Examples of presentation of connect node linkage	21
Figure 2 – Encoding of text alignment	27
Figure 3 – Variants of a graphical symbol	31
Figure 4 – Example of variants of a graphical symbol representing a thyristor	33
Figure 5 – Example of variants of a graphical symbol representing a variable resistor showing terminal designations with respect to the product aspect	33
Figure 6 – Example of variants of a graphical symbol representing a resistor	35
Figure 7 – Graphical symbols indicating a delayed action	35
Figure 8 – Example of enlarging a symbol with a scaling factor 1:2	37
Figure 9 – Example of a change of the module size	39
Figure 10 – Example of use of the spline function	41
Figure 11 – Recommended colours	41
Figure 12 – General labels in graphical symbols and their alignment	47
Figure 13 – Use of general labels in graphical symbols	47
Figure 14 – Examples of location of schematic connect nodes	49
Figure 15 – Examples of locations of schematic connect nodes	51
Figure 16 – Example of position of the textfield for product terminal designations	53
Figure 17 – Example of position of the textfield for product terminal designations for symbols without terminal lines	55
Figure 18 – Example of position of the textfields for product terminal and function terminal designations	55
Figure 19 – Reference point of symbols	57
Figure 20 – Connect node identification	59
Figure 21 – Schematic connect node identification	59
Figure 22 – Examples of embedded areas	61
Figure 23 – Examples of sectors for drawing connecting lines onto a schematic connect node	61
Figure 24 – Example of graphical swapping of schematic connect nodes	63
Figure 25 – Example of graphical swapping of schematic connect nodes	63
Figure 26 – Sequence and justification of the textfields associated with the identifying block	65
Figure 27 – Justification and sequence of the textfields associated with the descriptive block	67
Figure 28 – Example of defaulted locations of ib, db, and textfield for the product terminal designation	69
Figure 29 – Examples taken from the section on recording, integrating and measuring instruments	71

Figure 30 – Structure of the symbol identifier 75

Figure 31 – Examples of symbol identifiers of reference symbols 77

Figure B.1 – Data interchange 83

Figure C.1 – EXPRESS-G model of the graphical part of a symbol 91

Figure C.2 – Hatching patterns 99

Figure C.3 – EXPRESS-G model concerning text requirements 103

Figure C.4 – EXPRESS-G symbol part 109

Figure C.5 – Symbol variant text block part 123

Figure F.1 – Line end types and their codes 139

Figure F.2 – Line corner types and their codes 141

Figure F.3 – Grouping of lines 141

Figure G.1 – Character slant angle 143

Figure G.2 – Character spacing 145

Figure G.3 – Tabular lettering 145

Figure G.4 – Examples of proportional lettering with different character spacing 147

Figure G.5 – Possible alignments of a textstring using a character slant angle of 0° and a rotation of 0° 149

DESIGN OF GRAPHICAL SYMBOLS FOR USE IN THE TECHNICAL DOCUMENTATION OF PRODUCTS –

Part 2: Specification for graphical symbols in a computer sensible form, including graphical symbols for a reference library, and requirements for their interchange

1 Scope

This part of International Standard 81714 specifies requirements for graphical symbols to be included in a reference symbol library in a computer sensible form, and requirements for their interchange among computer aided tools. The reference symbol library may be used as a basis for the design and editing of documents, and for the interchange of documents and graphical symbol libraries among computer-aided tools.

The specification of a physical file format required for the interchange is not included in this standard.

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 60617-DB, *Graphical symbols for diagrams*

IEC 61082-1, *Preparation of documents used in electrotechnology – Part 1: General requirements*

IEC 61286:2001, *Information technology – Coded graphic character set for use in the preparation of documents used in electrotechnology and for information interchange*

IEC 61346-1:1996, *Industrial systems, installations and equipment, and industrial products – Structuring principles and reference designations – Part 1: Basic rules*

IEC 61346-2:2000, *Industrial systems, installations and equipment, and industrial products – Structuring principles and reference designations – Part 2: Classification of objects and codes for classes*

IEC 61360-1:2004, *Standard data element types with associated classification scheme for electric components – Part 1: Definitions – Principles and methods*

IEC 61360-4, *Standard data element types with associated classification scheme for electric components – Part 4: IEC reference collection of standard data element types and component classes*