
Sistemi kanalov za električne inštalacije – 1. del: Splošne zahteve (IEC 61386-1:1996 + A1:2000)

Conduit systems for electrical installations - Part 1: General requirements (IEC 61386-1:1996 + A1:2000)

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EUROPEAN STANDARD

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NORME EUROPÉENNE

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Conduit systems for electrical installations
Part 1: General requirements
(IEC 61386-1:1996 + A1:2000)

Systèmes de conduits pour installations
électriques
Partie 1: Règles générales
(CEI 61386-1:1996 + A1:2000)

Elektroinstallationsrohrsysteme für
elektrische Energie und für Informationen
Teil 1: Allgemeine Anforderungen
(IEC 61386-1:1996 + A1:2000)

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This European Standard was approved by CENELEC on 2003-09-23. 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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and 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 61386-1:1996 + A1:2000, prepared by SC 23A, Cable management systems, of IEC TC 23, Electrical accessories, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 61386-1 on 2003-09-23.

This European Standard supersedes EN 50086-1:1993 + corrigendum February 2001.

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) 2004-10-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) –

This part 1 of EN 61386 is to be used in conjunction with the appropriate part 2, which contains clauses to supplement or modify the corresponding clauses in part 1, to provide the relevant particular requirements for each type of product. A conduit system which conforms to this standard is deemed safe for use.

In this standard, the following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- explanatory matter: in smaller roman type.

Annexes ZA and ZB have been added by CENELEC.

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Endorsement notice

The text of the International Standard IEC 61386-1:1996 + A1:2000 was approved by CENELEC as a European Standard without any modification.

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 60417	1973 ¹⁾	Graphical symbols for use on equipment - Index, survey and compilation of the single sheets	HD 243 S12	1995
IEC 60423 (mod)	1993	Conduits for electrical purposes - Outside diameters of conduits for electrical installations and threads for conduits and fittings	EN 60423	1994
IEC 60529	1989	Degrees of protection provided by enclosures (IP Code)	EN 60529 + corr. May	1991 1993
IEC 60670	1989	General requirements for enclosures for accessories for household and similar fixed electrical installations	-	-
IEC 60695-2-1/1	1994	Fire hazard testing Part 2: Test methods – Section 1/sheet 1: Glow-wire end-product test and guidance	EN 60695-2-1/1 ²⁾	1996
IEC 60695-2-4/1	1991	Part 2: Test methods – Section 4/sheet 1: 1 kW nominal pre-mixed test flame and guidance	EN 60695-2-4/1 ³⁾	1993

¹⁾ IEC 60417:1973 and its supplements are superseded by the IEC 60417 database, which is to be used instead.

²⁾ EN 60695-2-1/1:1996 is superseded by EN 60695-2-11:2001, which is based on IEC 60695-2-11:2000.

³⁾ EN 60695-2-4/1:1993 is superseded by EN 60695-11-2:2003, which is based on IEC 60695-11-2:2003.

Annex ZB
(informative)

**Tests to be carried out for conduit systems
complying with EN 50086-1:1993**

This annex contains the following additional tests which are necessary to be carried out on conduit systems already complying with EN 50086-1:1993 in order for them to be declared to meet the requirements of EN 61386-1:2003.

10.3 Impact test

NOTE The test has to be carried out because the compliance after the test has to be checked with a gauge.

13.1.3.2 Test with 1kW flame

NOTE The test has to be carried out because the combustion has been expanded to include flaming or glowing.

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**Systèmes de conduits pour installations
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Conduit systems for electrical installations –

**Part 1:
General requirements**

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Bureau central de la Commission Electrotechnique Internationale 3, rue de Varembe Genève, Suisse



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

CONDUIT SYSTEMS FOR ELECTRICAL INSTALLATIONS –**Part 1: General requirements**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 1386-1 has been prepared by subcommittee 23A: Cable management systems, of IEC technical committee 23: Electrical accessories.

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

FDIS	Report on voting
23A/260/FDIS	23A/274/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 part 1 is to be used in conjunction with the appropriate part 2, which contains clauses to supplement or modify the corresponding clauses in part 1, to provide the relevant particular requirements for each type of product. A conduit system which conforms to this standard is deemed safe for use.

In this publication, the following print types are used:

- Requirements proper: in roman type.
- *Test specifications: in italic type.*
- Explanatory matter: in smaller roman type.

Annex A is an integral part of this standard.

CONDUIT SYSTEMS FOR ELECTRICAL INSTALLATIONS –

Part 1: General requirements

1 Scope

This part of IEC 1386 specifies requirements and tests for conduit systems, including conduits and conduit fittings, for the protection and management of insulated conductors and/or cables in electrical installations or in communication systems up to 1000 V a.c. and/or 1500 V d.c. This standard applies to metallic, non-metallic and composite conduit systems, including threaded and non-threaded entries which terminate the system. This standard does not apply to enclosures and connecting boxes which come within the scope of IEC 670.

NOTES

- 1 Certain conduit systems may also be suitable for use in hazardous atmospheres. Regard should then be taken of the extra requirements necessary for equipment to be installed in such conditions.
- 2 Earthing conductors may or may not be insulated.

2 Normative references

The following normative documents contain provisions which through reference in this text, constitute provisions of this part of IEC 1386. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 1386 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 417: 1973, *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets, as well as all of the supplements A to L*

IEC 423: 1993, *Conduits for electrical purposes – Outside diameters of conduits for electrical installations and threads for conduits and fittings*

IEC 529: 1989, *Degrees of protection provided by enclosures (IP Code)*

IEC 670: 1989, *General requirements for enclosures for accessories for household and similar fixed electrical installations*

IEC 695-2-1/1:1991, *Fire hazard testing – Part 2: Test methods – Section 1/Sheet 1: Glow-wire end-product test and guidance*

IEC 695-2-4/1: 1991, *Fire hazard testing – Part 2: Test methods – Section 4/Sheet 1: 1 kW nominal pre-mixed test flame and guidance*

3 Definitions

For the purposes of this International Standard, the following definitions apply:

3.1 **conduit system:** Closed wiring system consisting of conduits and conduit fittings for the protection and management of insulated conductors and/or cables in electrical or communication installations, allowing them to be drawn in and/or replaced, but not to be inserted laterally.

3.2 **conduit:** Part of a closed wiring system of general circular cross-section for insulated conductors and/or cables in electrical or communication installations, allowing them to be drawn in and/or replaced.

3.3 **conduit fitting:** Device designed to join or terminate one or more components of a conduit system, or for them to change direction.

3.4 **metallic conduit and/or conduit fitting:** Conduit or conduit fitting which consists of metal only.

3.5 **non-metallic conduit and/or conduit fitting:** Conduit or conduit fitting which consists uniquely of non-metallic material and which has no metallic components whatsoever.

3.6 **composite conduit and/or conduit fitting:** Conduit or conduit fitting comprising both metallic and non-metallic materials.

3.7 **non-flame propagating conduit and/or conduit fitting:** Conduit or conduit fitting which is liable to catch fire as a result of an applied flame, but in which the flame does not propagate, and which extinguishes itself within a limited time after the flame is removed.

3.8 **plain conduit:** Conduit in which the profile is even in the longitudinal section. (see note to 3.9).

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3.9 **corrugated conduit:** Conduit in which the profile is corrugated in the longitudinal section.

NOTE – Both annular and helical corrugated conduits are permissible, and a combination of both corrugated and plain conduit is possible.

3.10 **rigid conduit:** Conduit which cannot be bent, or which can only be bent with the help of a mechanical aid, with or without special treatment.

3.11 **pliable conduit:** Conduit which can be bent by hand with reasonable force, and which is not intended for frequent flexing.

3.12 **flexible conduit:** Conduit which can be bent by hand with reasonable small force, and which is intended to flex frequently throughout its life.

3.13 **self-recovering conduit:** Pliable conduit which deforms when a transverse force is applied for a short time and which, after removal of this force, returns close to its original shape within a further short time.

3.14 **material thickness of a plain conduit:** Average difference between the outside and inside diameter, divided by two.

3.15 **material thickness of a corrugated conduit:** Average thickness of material measured at any point along the shape of one corrugation.

3.16 **material thickness of a combined plain and corrugated conduit:** Sum of the plain conduit material thickness and the corrugated material thickness.

3.17 **threadable conduit and conduit fitting:** Conduit and conduit fittings which carry a thread for connection; or in or on which a thread can be formed.

3.18 **non-threadable conduit and conduit fitting:** Conduit and conduit fittings which are suitable for connection only by means other than threads.

3.19 **conduit joint:** Interface between two or more components of a conduit system, or between a conduit system and other equipment.

3.20 **external influence:** Factors which may affect the conduit system.

NOTE – Examples of such factors are a presence of water, oil or building materials, low and high temperatures, and corrosive or polluting substances.

3.21 **hot dip galvanising:** Coating of zinc, and zinc-iron alloy layers, obtained by dipping prepared iron or steel articles in molten zinc.

Note – Under some circumstances, the whole coating may consist of zinc-alloy layers.

3.22 **sherardizing:** Diffusion process in which articles are heated in close contact with zinc dust and inert operating media.

NOTE – The process is normally carried out in a slowly rotating closed container at a temperature in the region of 385 °C. The corrosion resistance is proportional to the coating thickness, which can be controlled.

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4 General requirements

4.1 Conduit and conduit fittings within the scope of this standard shall be so designed and constructed that in normal use their performance is reliable and without danger to the user or surroundings.

When assembled in accordance with manufacturer's instructions as part of a conduit system, conduits and conduit fittings shall provide mechanical and, where required, electrical protection of the insulated conductors and cables contained therein.

4.2 The protective properties of the joint between the conduit and conduit fitting shall not be less than that declared for the conduit system.

4.3 Conduit and conduit fittings shall withstand the stresses likely to occur during transport, storage, recommended installation practice and application.

4.4 In general, compliance is checked by carrying out all the tests specified.

5 General conditions for tests

5.1 Tests in accordance with this standard are type tests.

5.2 Unless otherwise specified, the tests shall be carried out at an ambient temperature of (23 ± 2) °C.

5.3 Unless otherwise specified, each test shall be made on three new samples.

NOTE – Certain tests, for instance the checking of dimensions, do not affect a change in the property of the samples; therefore these samples are considered as new samples and can be used for further tests.

5.4 Samples of non-metallic and composite conduits and conduit fittings shall be conditioned for at least 240 h, at a temperature of (23 ± 2) °C and a relative humidity between 40 % and 60 %. All tests shall be carried out immediately after general conditioning.

5.5 Unless otherwise specified, the samples for each test shall be in a clean and new condition, with all parts in place and mounted as in normal use. After checking dimensions in accordance with clause 8, and unless otherwise specified in the relevant test, the conduit fittings shall be assembled with adequate lengths of conduit of the type for which they are intended. Due regard shall be taken of the manufacturer's instructions, especially where force is required in the assembly of the joint.

NOTE – Where similarities are claimed, the selection of representative fittings for test purposes can be agreed between the manufacturer, or responsible vendor, and the testing station.

5.6 Where the conduit entries are part of the detachable or loose type conduit fitting, the detachable conduit fitting shall be capable of being assembled again, after the test, according to the manufacturer's instructions without loss of the declared properties according to clause 6.

5.7 Unless otherwise specified, three samples are submitted to the tests, and the requirements are satisfied if the tests are met.

If only one of the samples does not satisfy a test, due to an assembly or a manufacturing defect, that test and any preceding one which may have influenced the result of the test shall be repeated, and also the tests which follow shall be made in the required sequence on another full set of samples, all of which shall comply with the requirements.

NOTE – If the additional set of samples is not submitted at the same time, a failure of one sample will entail a rejection. The applicant, when submitting the first set of samples, may also submit an additional set of samples which may be used, should one sample fail. The testing station will then, without further request, test the additional set of samples and will reject them only if a further failure occurs.

5.8 When toxic or hazardous processes are used, due regard shall be taken of the safety of the persons within the test area.

5.9 Conduit systems which are used as an integral part of other equipment shall also be tested in accordance with the relevant standard for that equipment.

6 Classification

NOTE – Annex A shows the classification coding format for declared properties of the conduit system, which may be incorporated in the manufacturer's literature.

6.1 According to mechanical properties

6.1.1 Resistance to compression

- 1 Very light
- 2 Light
- 3 Medium
- 4 Heavy
- 5 Very heavy

6.1.2 Resistance to impact

- 1 Very light
- 2 Light
- 3 Medium
- 4 Heavy
- 5 Very heavy

6.1.3 Resistance to bending

- 1 Rigid
- 2 Pliable
- 3 Pliable/Self-recovering
- 4 Flexible

6.1.4 Tensile strength

- 1 Very light
- 2 Light
- 3 Medium
- 4 Heavy
- 5 Very heavy

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6.1.5 Suspended load capacity

- 1 Very light
- 2 Light
- 3 Medium
- 4 Heavy
- 5 Very heavy

6.2 According to temperature

Table 1 – Lower temperature range

Classification (1st numeral)	Transport, permanent application and installation – Temperature not less than: °C
1X	+ 5
2X	– 5
3X	– 15
4X	– 25
5X	– 45

Table 2 – Upper temperature range

Classification (2nd numeral)	Permanent application and installation – Temperature not more than: °C
X1	60
X2	90
X3	105
X4	120
X5	150
X6	250
X7	400

6.3 *According to electrical characteristics*

6.3.1 With electrical continuity characteristics

6.3.2 With electrical insulating characteristics

6.4 *According to resistance to external influences*

6.4.1 Protection against ingress of solid objects: protection in accordance with IEC 529 to a minimum of IP3X

6.4.2 Protection against ingress of water: protection in accordance with IEC 529 to a minimum of IPX0

6.4.3 Resistance against corrosion

6.4.3.1 Without protection

6.4.3.2 With protection as detailed in table 10

6.5 *According to resistance to flame propagation*

6.5.1 Non-flame propagating

6.5.2 Flame propagating

6.5.3 Other fire effects: under consideration

7 **Marking and documentation**

7.1 The conduit shall be marked by a trade mark or a name identifying the manufacturer or responsible vendor.

The conduit shall also be marked in such a way that it can be identified in the manufacturer's, or responsible vendor's, literature.

7.1.1 The conduit may also be marked with the classification code, which shall be in accordance with annex A, and which shall include at least the first four digits.

7.1.2 The manufacturer shall be responsible for indicating the compatibility of parts within a conduit system.