
Conduit systems for electrical installations -- Part 1: General requirements

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UDC 615.315.2

Descriptors: Electric wiring system, insulating conduit, dimension, mechanical characteristics, electrical characteristics, test

English version

Conduit systems for electrical installations Part 1: General requirements

Systèmes de conduits pour installations
électriques
Partie 1: Règles générales

Elektroinstallationsrohrsysteme für
elektrische Installationen
Teil 1: Allgemeine Anforderungen

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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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, 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

This European Standard has been prepared by CENELEC Technical Committee TC 113, Cable Management Systems.

This Part 1, which specifies general requirements for all conduit systems, 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.

The text of this standard was approved by CENELEC as EN 50086-1 on 1993-07-06.

The following dates were fixed.

- latest date of publication of an identical national standard (dop) 1994-07-01
- latest date of withdrawal of conflicting national standards (dow) 1996-01-31

For products which have complied with the relevant national standard before 1996-01-31, as shown by the manufacturer or by a certification body; this previous standard may continue to apply for production until 2001-01-31.

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1 Scope

This standard 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 1 000 V a.c. and/or 1 500 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.

This Part 1 shall be used in conjunction with the relevant Part 2 for particular requirements.

NOTE 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.

NOTE 2: Earthing conductors may or may not be insulated.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 60423 (in preparation)		Outside diameters of conduits for electrical installations and threads for conduits and fittings (IEC 423 - future ed. 2)
EN 60529	1991	Degrees of protection provided by enclosures (IP Code) (IEC 529:1989)
EN 60695-2-4/1	1993	Fire hazard testing - Part 2: Test methods Section 4/sheet 1: 1 kW nominal pre-mixed test flame and guidance (IEC 695-2-4/1:1991)
HD 243 S10	1993	Graphical symbols for use on equipment Index, survey and compilation of the single sheets (IEC 417:1973 + supplements A:1974 to K:1991)
IEC 670	1989	General requirements for enclosures for accessories for household and similar fixed electrical installations
IEC 695-2-1	1991	Fire hazard testing - Part 2: Test methods Section 1: Glow-wire test and guidance

3 Definitions

For the purposes of this standard, the following definitions apply.

3.1 conduit system: A 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 inserted laterally.

3.2 conduit: A 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: A device designed to join or terminate one or more components of a conduit system, or 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 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, in which the flame does not propagate and which extinguishes itself within a limited time after the flame is removed.

3.8 plain conduit: A conduit in which the profile is even in the longitudinal section. (See note 3.9).

3.9 corrugated conduit: A 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: A conduit which cannot be bent, or only be bent with the help of a mechanical aid and with or without special treatment.

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

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

3.13 self-recovering conduit: A 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: The average difference between the outside and inside diameter divided by two.

3.15 material thickness of a corrugated conduit: The 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: The sum of the plain conduit material thickness and the corrugated material thickness.

3.17 threadable conduit and conduit fitting: Conduit and conduit fitting 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 fitting which are suitable for connection only by means other than threads.

3.19 conduit joint: An 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: A 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 sheradizing: A 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.

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, they 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 be not 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.

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 $(23 \pm 2)^\circ\text{C}$.

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 and 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 $(23 \pm 2)^\circ\text{C}$ 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.

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.

If the additional set of samples is not submitted at the same time, a failure of one sample will entail a rejection.

NOTE: The applicant when submitting the first set of samples, may also submit the additional set of samples which may be necessary, should one sample fail. The testing station will then without further request test the additional set of samples and will reject 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.

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6 Classification

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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

6.1.5 Suspended load capacity

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

6.2 According to temperature:

6.2.1 Lower Temperature Range

Table 1
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Classification (1st Numeral)	Transport, permanent application and installation not less than °C
1X	+ 5
2X	- 5
3X	- 15
4X	- 25
5X	- 45

6.2.2 Upper Temperature Range

Table 2

Classification (2nd Numeral)	Permanent application and installation 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:
With protection in accordance with EN 60529 to minimum of IP3X

6.4.2 Protection against ingress of water:
With protection in accordance with EN 60529 to a minimum of IPX0.

6.4.3 Resistance against corrosion:

1 Without protection

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 on the product with:

- a) the name or trademark of the manufacturer, or responsible vendor;
- b) a product identification mark.

7.1.1 The conduit may also be marked with the classification code which shall be in accordance with annex A and 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.

7.2 The conduit fitting shall be marked in accordance with 7.1.1, on the product wherever possible but where this is impractical then the mark may be on a label attached to the product or to the box or carton containing the fittings.