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Cable cleats for electrical installations

Brides de câbles pour installations électriques

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.120.20

ISBN 978-2-8322-1030-0

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CABLE CLEATS FOR ELECTRICAL INSTALLATIONS

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IEC 61914 has been prepared by subcommittee 23A: Cable management systems, of IEC technical committee 23: Electrical accessories. It is an International Standard.

This third edition cancels and replaces the second edition published in 2015. This edition constitutes a technical revision.

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

- a) requirements for mandrels used in testing rationalised and detailed in the general test requirements (Clause 5);
- b) definition of liner added and test requirements where liners and other optional parts are used;
- c) definitions for LV, MV and HV cables added and test requirements where MV & HV cable are used ;
- d) new corrosion resistance classes for plated products added;
- e) new requirements and test for durability and legibility of markings added;
- f) new test requirements for axial load testing of cleats for more than one cable added;

g) lateral load test requirements for intermediate restraints added.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
23A/976/FDIS	23A/982/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

In this standard, the following print types are used:

- requirements proper: in roman type;
- *test specifications: in italic type;*
- notes: in smaller roman type.

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- withdrawn, <https://standards.iteh.ai/catalog/standards/sist/fb52f38c-dc02-4aed-8b2b-5a99122f8203/iec-61914-2021>
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CABLE CLEATS FOR ELECTRICAL INSTALLATIONS

1 Scope

This International Standard specifies requirements and tests for cable cleats used for securing cables in electrical installations and for intermediate restraints used for holding cables together in formation in electrical installations. Cable cleats provide resistance to electromechanical forces where declared. This document includes cable cleats that rely on a mounting surface specified by the manufacturer for axial and/or lateral retention of cables.

Various types of cable cleats and intermediate restraints are shown in Annex A.

NOTE Requirements for manufacturers in this document also apply to importers and responsible vendors where appropriate.

This document does not apply to cable ties.

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 60060-1:2010, *High-voltage test techniques – Part 1: General definitions and test requirements* <https://standards.iteh.ai/catalog/standards/sist/fb52f38c-dc02-4aed-8b2b-5a99122f8203/iec-61914-2021>

IEC 60502-1, *Power cables with extruded insulation and their accessories for rated voltages from 1 kV ($U_m = 1,2$ kV) up to 30 kV ($U_m = 36$ kV) – Part 1: Cables for rated voltages of 1 kV ($U_m = 1,2$ kV) and 3 kV ($U_m = 3,6$ kV)*

IEC 60695-11-5, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles – Specifications and test methods*

ISO 2081, *Metallic and other inorganic coatings – Electroplated coatings of zinc with supplementary treatments on iron or steel*

ISO 3575, *Continuous hot dip zinc-coated and zinc-iron alloy-coated carbon steel sheet of commercial and drawing qualities*

ISO 4287, *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Terms, definitions and surface texture parameters*

ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 4998, *Continuous hot-dip zinc-coated and zinc-iron alloy-coated carbon steel sheet of structural quality*

ISO 9227, *Corrosion tests in artificial atmospheres – Salt spray tests*

ISO 14713-1, *Zinc coatings – Guidelines and recommendations for the protection against corrosion of iron and steel in structures – Part 1: General principles of design and corrosion resistance*

ISO 14713-2, *Zinc coatings – Guidelines and recommendations for the protection against corrosion of iron and steel in structures – Part 2: Hot dip galvanizing*

EN 10346, *Continuously hot-dip coated steel flat products for cold forming – Technical delivery conditions*

3 Terms, definitions and abbreviations

For the purposes of this document, the following terms and definitions apply.

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>

3.1

cable cleat

device provided with a means of attachment to a mounting surface and that provides securing of cables when installed at intervals along the length of cables

Note 1 to entry: Examples of mounting surfaces that may be specified are ladder, tray, strut (see Figure A.8) or rail. Hardware, such as screws or bolts, needed to secure cable cleats to the mounting surface is not necessarily supplied with cable cleats.

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Note 2 to entry: Some examples of cable cleats are shown in Annex A (see Figure A.1 to Figure A.10). These examples do not limit the use of other cable cleat designs that conform to the requirements of this document.

3.2

intermediate restraint

cable retaining device intended to be used with cable cleats, without being attached to a mounting surface, to hold cables together in formation and/or to provide resistance to electromechanical forces

3.3

metallic

consisting of metal only

3.4

non-metallic

consisting of non-metallic material only

3.5

composite

consisting of metallic and non-metallic materials

Note 1 to entry: Fibre reinforced resin materials are not considered to be composite under this definition.

Note 2 to entry: Materials include any materials supplied by the manufacturer as part of a cable cleat or intermediate restraint or with a cable cleat or intermediate restraint in the same packaging. This may include fixings such as nuts, bolts, screws, washers, springs and pins. Fixings supplied by the installer are not considered in this document.

3.6**short-circuit current**

overcurrent resulting from a circuit condition in which the current flows through an abnormal or unintended path of negligible impedance between live conductors, or between a live conductor and an earth, having a difference in potential under normal operating conditions

3.7**peak short-circuit current** i_p

maximum possible instantaneous value of the short-circuit current

SEE: Annex B

3.8**initial r.m.s. symmetrical short-circuit current** I''_k

r.m.s. value of the a.c. symmetrical component of a short-circuit current, applicable at the instant of the short circuit if the impedance remains at the zero-time value

SEE: Annex B

3.9**decaying aperiodic component of short-circuit current** $i_{d.c.}$

mean value between the top and bottom envelope of a short-circuit current decaying from an initial value to zero

SEE: Annex B

3.10**steady-state short-circuit current** I_k

r.m.s. value of the short-circuit current which remains after the decay of the transient phenomena

SEE: Annex B

3.11**trefoil formation**

formation of three cables so laid as to be mutually equidistant

Note 1 to entry: Viewed in cross-section, the lines joining the cable centres form an equilateral triangle (see Figure 7).

3.12**flat formation**

formation of a number of cables laid in a plane, usually with equal spacing between adjacent cables (see Figure 8)

3.13**electromechanical forces**

induced forces acting on current-carrying conductors

3.14**retention**

limiting the lateral and/or axial movement of the cable

3.15**securing**

fixing to or from a mounting surface

3.16**environmental influences**

capacity for environmental factors to have an effect on the intended function of cable cleats and/or intermediate restraints (e.g. effect of corrosive substances or solar radiation, etc.)

3.17**LV cables**

cables with a rated voltage of 1,0 kV ac, 1,5 kV dc or less

3.18**MV or HV cables**

cables with a rated voltage of more than 1,0 kV ac or 1,5 kV dc

3.19**liner**

polymeric component between the cable and the cable cleat or intermediate restraint

3.20**product type**

group of cable cleats for which only the cable or bundle diameter may be changed

Note 1 to entry: For guidance in determining product types, cable cleats or intermediate restraints having material, design, construction characteristics, and classifications according to Clause 6 below, in common, are considered to be the same product type.

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4 General requirements

Products covered by this document shall be so designed and constructed that, when assembled and installed as for normal use according to the manufacturer's instructions, they ensure securing and/or holding in formation of cables as declared in accordance with Clause 6 and shall not cause damage to the cable.

Compliance is checked by the relevant tests specified in this document.

5 General notes on tests

5.1 Tests according to this document are type tests.

- Products of all sizes shall comply with Clause 8 and 9.1 a).
- Where cleats or intermediate restraints may be supplied with optional extra parts (e.g. liners), all tests shall be performed on the product without any of the optional parts. Where the addition of any optional part affects the performance of the product (e.g. the axial load performance with the addition of a liner), the tests shall be repeated with the optional parts in place.
- For the requirements in 9.1 b), 9.1 c) and 9.1 d) where there are a number of cable cleats in a range, the range is divided into one or more product types. In this case, the smallest and the largest size of cable cleat of each type are tested.
- The test for compliance with 9.1 e) is performed on the set of samples selected as defined in 9.5.1.

5.2 Unless otherwise specified, all tests shall be carried out on three new samples of each size selected as specified in 5.1, assembled and installed as for normal use according to the manufacturer's instructions. Where a cable cleat is designed to accommodate more than one cable the number, size and shape of the mandrels used in the test shall represent the number, size and shape of the cables for which the cable cleat is intended.

5.3 Tests on non-metallic and composite cable cleats and intermediate restraints and any test that includes a liner shall not commence earlier than 168 h after manufacture.

5.4 Unless otherwise specified, the tests shall be carried out at an ambient temperature of (23^{+5}_{-5}) °C.

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

5.5 Metal mandrels used in testing shall be made from carbon steel, stainless steel, brass or aluminium. Where testing is performed at a temperature below 105 °C, mandrels may be made from polyamide or HDPE. All mandrels shall have a surface roughness less than or equal to 7 µm *Ra* in accordance with ISO 4287.

5.6 Compliance with this document is satisfied if all the applicable test requirements are achieved. If only one of the samples does not satisfy a test due to a manufacturing fault, then that test and any preceding one which may have influenced the results of the test shall be repeated and also the tests which follow shall be made in the same required sequence on another full set of samples, all of which shall comply with the requirements.

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

6 Classification

6.1 Classification according to material

6.1.1 Metallic

See 3.3 and examples in Annex A.

6.1.2 Non-metallic

See 3.4 and examples in Annex A.

6.1.3 Composite

See 3.5 and examples in Annex A.

6.2 Classification according to maximum and minimum temperature

Table 1 – Maximum temperature for permanent application

A. Maximum temperature
°C
+ 40
+ 60
+ 85
+ 105
+ 120

Table 2 – Minimum temperature for permanent application

B. Minimum temperature
°C
+ 5
- 5
- 15
- 25
- 40
- 60

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For temperature values above 120 °C and below -60 °C, the manufacturer may declare temperatures outside the values provided in Table 1, and Table 2 above.

6.3 Classification according to resistance to impact

6.3.1 Very light

See Table 5.

6.3.2 Light

See Table 5.

6.3.3 Medium

See Table 5.

6.3.4 Heavy

See Table 5.

6.3.5 Very heavy

See Table 5.

6.4 Classification according to type of retention or resistance to electromechanical forces or both

6.4.1 General

Manufacturers of cable cleats shall declare a classification under 6.4.2 and may also declare a classification under 6.4.3. Manufacturers of cable cleats may also declare a classification under 6.4.4 or 6.4.5.

Manufacturers of intermediate restraints shall declare a classification under 6.4.2 and under 6.4.4 or 6.4.5 in association with cable cleats.

6.4.2 With lateral retention

Tested in accordance with 9.3.

6.4.3 With axial retention

Tested in accordance with 9.4.

NOTE The axial retention test result is for guidance purposes as it is not possible to replicate cables using mandrels.

6.4.4 Resistant to electromechanical forces, withstanding one short circuit

Tested in accordance with 9.5.2.

6.4.5 Resistant to electromechanical forces, withstanding more than one short circuit

Tested in accordance with 9.5.3.

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NOTE The intent for cable cleats and intermediate restraints classified under 6.4.5 is that after one short-circuit application, the cable cleat and intermediate restraints, if used, will continue to perform as designed and tested according to this document. The physical condition of the cable cleats and intermediate restraints after short-circuit application has only been evaluated under laboratory conditions. The continued use of the cable cleats and intermediate restraints, if used, following an actual short-circuit incident, is solely at the discretion of the party responsible for the installation.

6.5 Classification according to environmental influences

6.5.1 Resistance to ultraviolet light for non-metallic and composite components

6.5.1.1 Not declared

No resistance to UV light is claimed.

6.5.1.2 Resistant to ultraviolet light

Tested in accordance with 11.1.

6.5.2 Resistance to corrosion

6.5.2.1 General

If components within the cable cleat or intermediate restraint have different classifications, then the manufacturer shall declare all relevant classifications.

6.5.2.2 Non-metallic components

Non-metallic components are considered to be inherently resistant to corrosion and do not require testing.