IEC 62275

Edition 2.0 2013-11

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Cable management systems – Cable ties for electrical installations

Systèmes de câblage – Colliers pour installations électriques

IEC 62275:2013

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE
CODE PRIX V

ICS 29.120.10, 29.120.99

ISBN 978-2-8322-1198-4

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

CABLE MANAGEMENT SYSTEMS – CABLE TIES FOR ELECTRICAL INSTALLATIONS

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 62275 has been prepared by subcommittee 23A: Cable management systems, of IEC technical committee 23: Electrical accessories.

This second edition cancels and replaces the first edition published in 2006 and constitutes a technical revision. It incorporates additional tables, an annex and figures as well as revisions to such that appeared in the first edition. In places the text has been substantially altered including:

– revised and updated normative references,
– integral cable ties and fixing devices,
– change in the range of the diameter of the test mandrel,
– general notes on tests,
– mechanical properties and associated tests as well as tests for resistance to ultraviolet light and corrosion.

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

FDIS	Report on voting
23A/693/FDIS	23A/695/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 publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

In this publication, the following print types are used:

– Requirements proper: in roman type.
– *Test specifications: in italic type.*
– Notes: in smaller roman type.

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

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- withdrawn,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

CABLE MANAGEMENT SYSTEMS – CABLE TIES FOR ELECTRICAL INSTALLATIONS

1 Scope

This International Standard specifies requirements for metallic, non-metallic and composite cable ties and their associated fixing devices used for the management and support of wiring systems in electrical installations.

Cable ties and associated fixing devices may also be suitable for other applications and where so used, regard should be taken of any additional requirements.

This standard does not contain requirements that evaluate any electrical insulation properties of the cable tie or mechanical protection of the cables provided by the cable tie.

This standard does not consider the mechanical interface of a fixing device to a solid surface such as a wall or ceiling.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60695-11-5:2004, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

IEC 60216-4-1:2006, *Electrical insulating materials – Thermal endurance properties – Part 4-1: Ageing ovens – Single-chamber ovens*

ISO 4892-2:2006, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 9227:2012, *Corrosion tests in artificial atmospheres – Salt spray tests*

3 Terms and definitions

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

3.1
cable tie
band or length of material, employing a locking device, used for bundling or tying groups of cables together, securing and/or supporting the cables

Note 1 to entry: Type 1 and Type 2 cable ties are classified in 6.2.2 and 6.2.3.

Note 2 to entry: In some countries, such as Canada and the United States, additional Type classifications are applicable when prequalified moulding materials are used. See UL 62275/CSA C22.2 No. 62275.

3.2
fixing device
component (such as a block or bracket) specifically designed to secure the cable tie to a mounting surface

Note 1 to entry: A cable tie and the fixing device may be manufactured as an integrated component.

3.3
metallic component
component which consists of metal only

3.4
non-metallic component
component which consists of non-metallic material only

3.5
composite component
component comprising both metallic and non-metallic materials

3.6
environmental influence
effect of corrosive substances or solar radiation, etc.

3.7
loop tensile strength
reference mechanical characteristic of a cable tie with its locking mechanism engaged

3.8
locking device
feature of a cable tie for fixing it in a closed position

3.9
low hygroscopic polymer
polymer having the characteristic of not enabling attraction or holding water greater than 1,0 % by weight of the material from the surrounding environment at 23 °C and 50 % relative humidity

Note 1 to entry: Examples of low hygroscopic polymers include: polypropylene, acetal, ethylene tetrafluoroethylene, ethylene chlorotrifluoroethylene, nylon 12, polyetheretherketone.

3.10
equilibrium moisture content
state at which a polymer neither absorbs or releases moisture when exposed to a surrounding environment of 23 °C and 50 % relative humidity

4 General requirements

A cable tie and a fixing device shall withstand the stresses likely to occur during recommended installation practice and perform under the conditions of classifications in Clause 6 as declared by the manufacturer.

Compliance is checked by carrying out all the appropriate specified tests.

5 General notes on tests

5.1 Tests according to this standard are type tests. Unless otherwise specified, tests are carried out with the cable ties and their associated fixing devices, where available, installed as in normal use according to the manufacturer's instructions.

NOTE For guidance in determining product types and sample sets, a family of cable ties or fixing devices having material, construction characteristics, and classifications according to Clause 6, in common, are considered of the same product type. Examples for consideration are material colours, or variable lengths of a cable tie of otherwise similar construction.

The sample sets selected for testing from each product type is representative of the extremes of the range (example: shortest and longest), and the minimum performance level obtained for either extreme is determined to be representative of the entire range.

Consideration is given to minor construction variations that can be determined by inspection to have no effect on performance, when determining product types.

5.2 Unless otherwise specified, tests on non-metallic and composite components shall commence when the samples have been removed from their packaging and then stabilised at a temperature of (23 ± 5) °C and at a relative humidity of (50 ± 5) %, for a period as indicated in Table 1.

NOTE This stabilisation intends to achieve equilibrium of moisture content for all samples before and after further conditioning and testing.

Table 1 – Stabilisation time for samples

Reference thickness (RT) of the device mm	**Stabilization time** days
RT ≤ 1,2	7 ± 1
1,2 < RT ≤ 1,4	21^{0}_{-7}
1,4 < RT	35^{0}_{-7}
All thicknesses of materials known to have low hygroscopic characteristics	2 ± 1/3

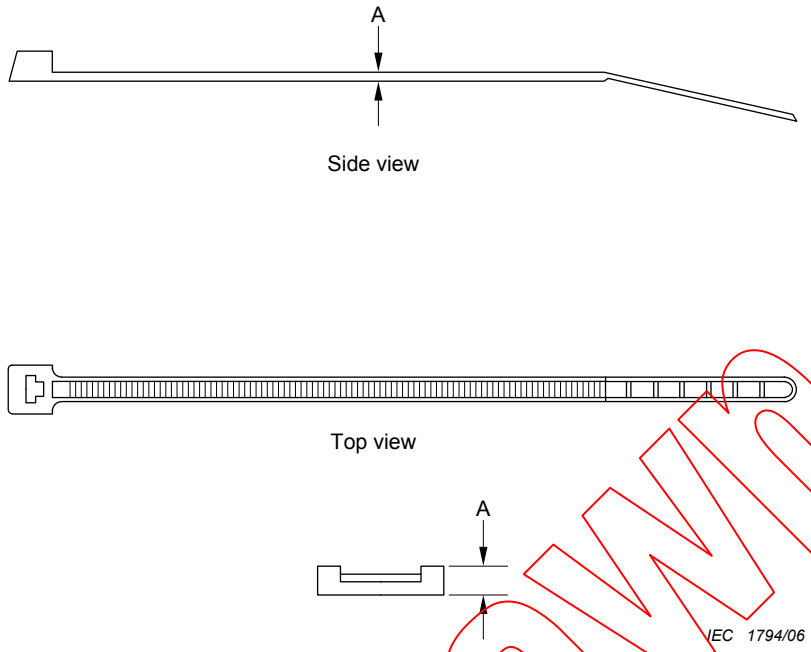
The reference thickness of a cable tie is measured at the midpoint of the strap. The reference thickness of a fixing device shall be the smallest cross section in the area that interfaces with the cable tie or as declared by the manufacturer. See Figure 1.

When the equilibrium moisture content for a material at (23 ± 5) °C and (50 ± 5) % relative humidity is determined through a method agreed to by the manufacturer and the testing laboratory, the stabilisation time in Table 1 may be reduced when all of the following conditions are met:

a) the product's moisture content in the as-received condition and after each appropriate conditioning is measured using a calibrated moisture analyzer device;

b) the samples are subjected to exposure to a constant temperature not exceeding 50 °C and a relative humidity not exceeding 80 %; and

c) the product's equilibrium moisture content at (23 ± 5) °C and (50 ± 5) % relative humidity is verified using a calibrated moisture analyzer device. This verification process is repeated until equilibrium is determined.



Key

A Reference thickness of cable tie

Figure 1 – Reference thickness for cable ties

5.3 Unless otherwise specified, the tests shall be carried out at an ambient temperature of (23 ± 5) °C and with a relative humidity of between 40 % and 60 %.

5.4 Unless otherwise specified, three new samples are submitted to the tests and the requirements are satisfied if all the tests are met. If only one of the samples does not satisfy a test due to an assembly or manufacturing fault, that test and any preceding one which may have influenced the results of the test shall be repeated; 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 The applicant, when submitting the first set of samples, can also submit an additional set of samples which may be necessary if one sample fails. The test station will then without further request test the additional set of samples and will reject only if a further failure occurs. If the additional set of samples is not submitted at the same time, a failure of one sample will entail a rejection.

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

5.6 Unless otherwise specified, the cross-head speed of a tensile machine used during the tests shall be (25 ± 2,5) mm/min.

5.7 Where required for heat ageing, a full draft circulating-air oven as specified in IEC 60216-4-1:2006 shall be used. A portion of the air shall be allowed to re-circulate and a substantial amount of air shall be admitted continuously to maintain the normal air content surrounding the samples. The oven shall be adjusted to achieve more than 5 complete fresh-air changes per hour.

5.8 A fixing device that is integral to a cable tie shall comply with the requirements for both the fixing device and the cable tie. The integral assembly shall be classified according to 6.2.2 or 6.2.3 and subjected to the conditionings for the cable tie prior to conducting the mechanical strength test for the fixing device according to 9.7.

A fixing device, the performance of which is dependent on the mounting hole size, the thickness of the material sheet to which it is to be mounted, or the mounting orientation declared by the manufacturer according to 7.3 f), shall comply with all applicable tests when the device is assembled to the minimum and maximum thickness of each mounting surface, in the largest hole size, and in each intended mounting orientation declared by the manufacturer.

When it can be determined that a particular mounting orientation represents the most onerous condition, the results of the tests in that orientation may represent all mounting orientations.

5.9 Unless otherwise specified, when conducting the tests on cable ties in Clause 9, the samples shall be installed according to the manufacturer's instructions on a steel or aluminium mandrel which has a diameter A according to Table 2:

If the minimum declared diameter of the cable tie is greater than the diameter of the test mandrel specified in Table 2, then a test mandrel that has the minimum diameter as declared by the manufacturer shall be used.

The width B of the mandrel shall be at least 5 mm greater than the maximum width of the cable tie as shown in Figure 2.

Table 2 – Test mandrel diameter

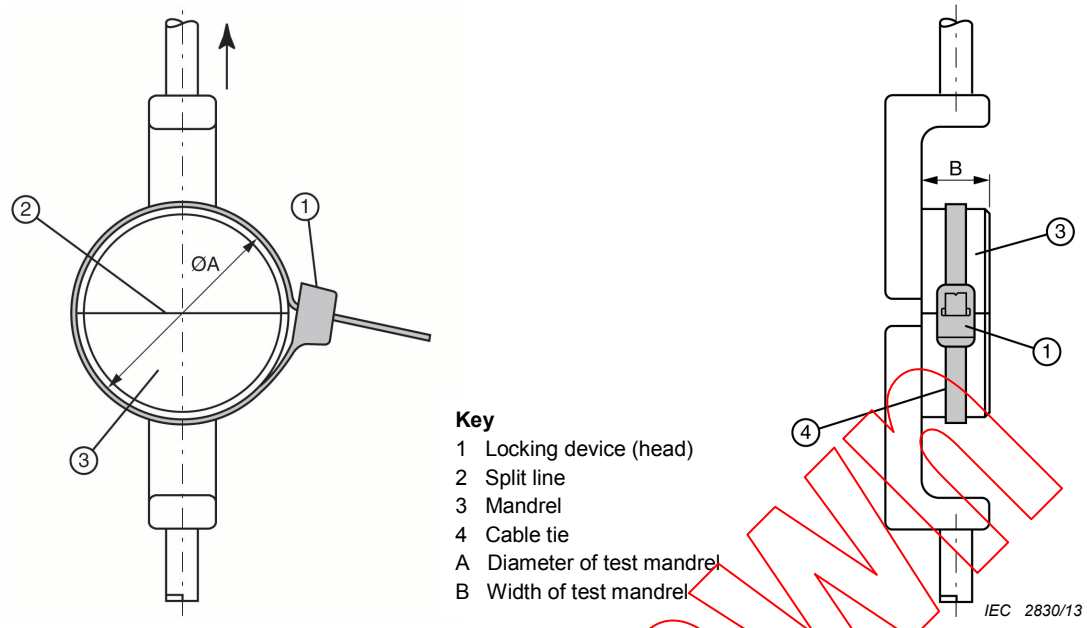
Maximum declared diameter mm	Test mandrel diameter (A) mm
≤ 20	9,5 ± 1
> 20 and ≤ 38	20 ± 2
> 38	38 ± 2

For the loop tensile strength tests, the mandrel shall be split in two equal parts and the cable ties positioned as shown in Figure 2a).

Cable ties having a parallel entry strap shall be mounted to the mandrel as shown in Figure 2b).

The excess end (tail) of the cable tie is permitted to be cut off after assembly, except in the tests where marking is required for the purpose of measurement (see 9.6).

The use of separate steel or aluminum conditioning mandrels is permitted. The conditioning mandrels need not be split but shall have a diameter approximately equivalent to the appropriate test mandrel to allow transfer of the sample to the test mandrel. Conditioned samples shall be carefully transferred to the appropriate test mandrel for carrying out the loop tensile test. Where it has been determined that the transfer of the samples from the conditioning mandrel to a test mandrel has influenced the test results, an additional sample set shall be conditioned and tested.

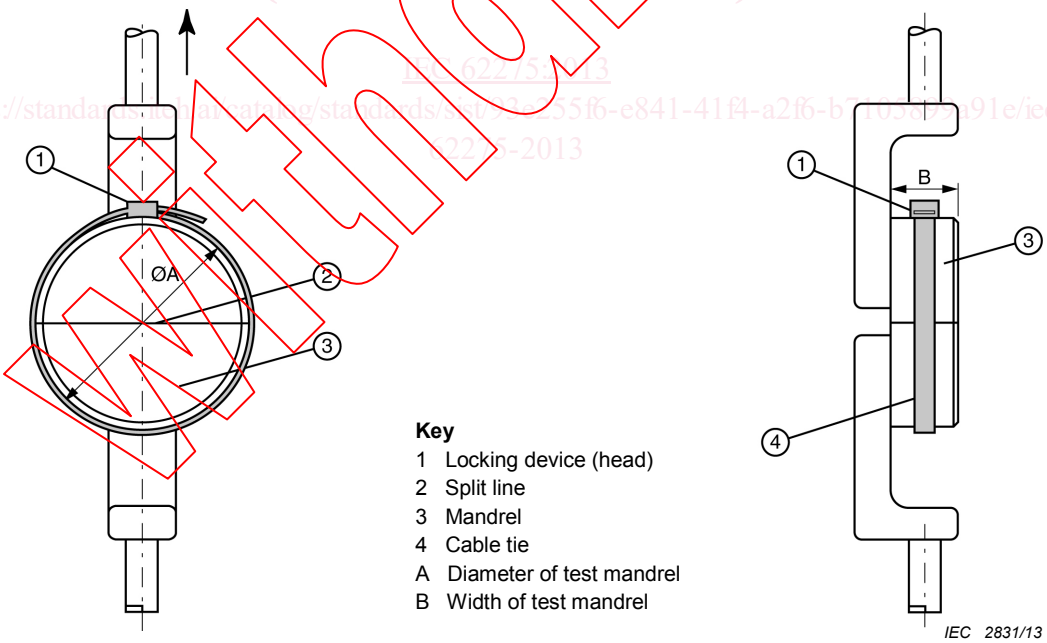


Key
1 Locking device (head)
2 Split line
3 Mandrel
4 Cable tie
A Diameter of test mandrel
B Width of test mandrel

Mandrels shall be made of steel or aluminium and shall be smooth and free of burrs.

Care should be taken that the separation of the two halves of the mandrel remains parallel to the split line.

Figure 2a) Typical arrangement for cable tie orientation on split mandrel for tensile test – Right angle entry strap



Key
1 Locking device (head)
2 Split line
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4 Cable tie
A Diameter of test mandrel
B Width of test mandrel

Mandrels shall be made of steel or aluminium and shall be smooth and free of burrs.

Care should be taken that the separation of the two halves of the mandrel remains parallel to the split line.

Figure 2b) Typical arrangement for cable tie orientation on split mandrel for tensile test – Parallel entry strap

Figure 2 – Typical arrangements for cable tie orientation on split mandrel for tensile test

6 Classification

6.1 According to material

6.1.1 Metallic component

6.1.2 Non-metallic component

6.1.3 Composite component

6.2 According to loop tensile strength for cable ties and mechanical strength for fixing devices

6.2.1 Loop tensile strength for cable ties

As given in Table 3.

Table 3 – Loop tensile strength

Loop tensile strength N	
50	530
80	800
130	890
180	1 150
220	1 300
360	2 200
450	

Other values may be declared at the manufacturer's discretion.

NOTE Loop tensile strength does not provide an indication of long-term static load-bearing capabilities.

6.2.2 Type 1 – Retains at least 50 % of declared loop tensile strength for cable ties and mechanical strength for fixing devices after test conditions

6.2.3 Type 2 – Retains 100 % declared loop tensile strength for cable ties and mechanical strength for fixing devices after test conditions

NOTE In some countries, such as Canada and the United States, additional Type classifications are applicable when pre-qualified moulding materials are used. See UL 62275/CSA C22.2 No.62275.

6.3 According to temperature

6.3.1 According to maximum operating temperature for application given in Table 4

Table 4 – Maximum operating temperature for application

Temperature °C
50
60
75
85
105
120
150

Additional ratings above 150 °C may be declared at the manufacturer's discretion.

6.3.2 According to minimum operating temperature for application given in Table 5

Table 5 – Minimum operating temperature for application

Temperature °C
0
–5
–15
–25
–40
–60

6.3.3 According to minimum temperature during installation as declared by the manufacturer

6.4 According to contribution to fire for non-metallic and composite cable ties only

6.4.1 Flame propagating

NOTE Due to the small mass of material, cable ties classified as flame propagating are considered to present only a minor potential contribution in the case of fire.

6.4.2 Non-flame propagating

NOTE Metallic cable ties are considered non-flame propagating.