IEC 62275

Edition 3.0 2018-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Cable management systems – Cable ties for electrical installations

Systèmes de câblage – Colliers pour installations électriques

IEC 62275:2018-08(en-fr)

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INTERNATIONAL
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COMMISSION

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ELECTROTECHNIQUE
INTERNATIONALE

ICS 29.120.10; 29.120.99

ISBN 978-2-8322-5924-5

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

CABLE MANAGEMENT SYSTEMS – CABLE TIES FOR ELECTRICAL INSTALLATIONS

FOREWORD

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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 third edition cancels and replaces the second edition published in 2013. This edition constitutes a technical revision.

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

a) consideration of adhesive fixing devices,

b) revised and updated normative references,

c) modified definitions for metallic and composite cable ties,

d) new definitions,

e) improvement of test procedures,

f) new figures for typical arrangement of test assembly for fixing devices and for integral fixing devices.

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

FDIS	Report on voting
23A/851A/FDIS	23A/868/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.

The following differing practices of a less permanent nature exist in the countries indicated below.

– 6.2.2: additional type classifications are applicable when pre-qualified moulding materials are used (Canada, USA).
– 6.2.3: additional type classifications are applicable when pre-qualified moulding materials are used (Canada, USA).
– 7.3: some marking information is required to be placed on the packaging (Canada, Russia, USA).

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 website 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 document 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 can also be suitable for other applications and where so used, additional requirements can apply.

This document 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 document contains requirements for the mechanical interface of an adhesive fixing device to a solid surface. It does not consider the mechanical behaviour of the solid surface in itself.

This document does not consider the mechanical interface, for example the mounting screw, of a fixing device other than adhesive to a solid surface.

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

IEC 60695-11-5:2016, *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 4892-2:2013, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 9227:2017, *Corrosion tests in artificial atmospheres – Salt spray tests*

3 Terms and definitions

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 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

3.3
metallic component
component that consists of metal only

Note 1 to entry: A metallic cable tie having a thin non-metallic or organic coating, where the coating does not contribute to the determination of the loop tensile strength, is considered a metallic component

Note 2 to entry: In case of doubt, "as-received condition" tests with and without coating can be carried out.

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

3.5
composite component
component comprising both metallic and non-metallic materials where both metallic and non-metallic materials contribute to the determination of the loop tensile strength

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

3.11
integral assembly
component which incorporates a cable tie and a fixing device

3.12
adhesive fixing device
fixing device provided with an adhesive tape specifically designed to secure the cable tie to a mounting surface

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.

NOTE Annex A details the compliance checks to be carried out for cable ties and fixing devices currently complying with IEC 62275:2013 in order to comply with this edition 3.

5 General notes on tests

5.1 Tests according to this document 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.

Unless otherwise specified, requirements and tests for fixing devices also apply to adhesive fixing devices.

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 identical generic material description, 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 stabilized 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 stabilization intends to achieve equilibrium of moisture content for all samples before and after further conditioning and testing.

Table 1 – Stabilization time for samples

Reference thickness (RT) of 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

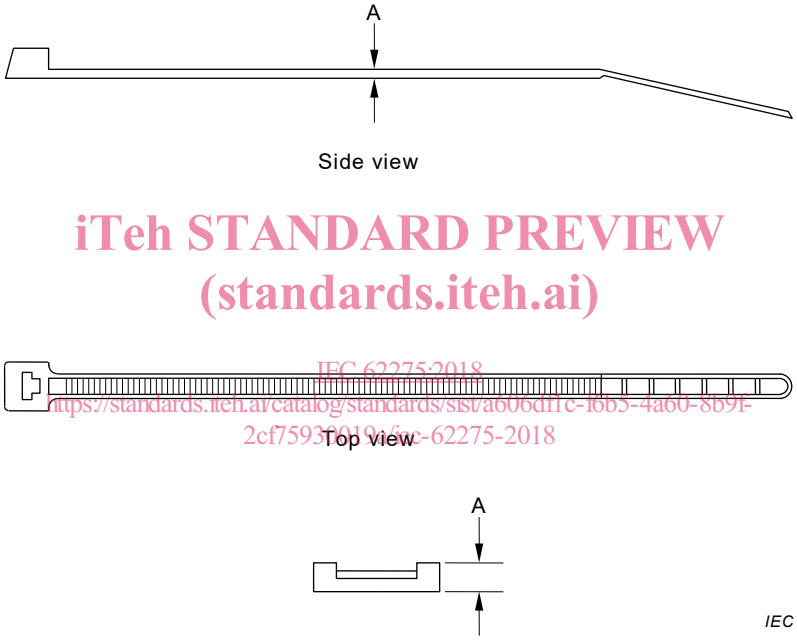
The reference thickness of a cable tie is measured at the midpoint of the strap. The reference thickness of a fixing device shall be the smallest cross-section in the area that interfaces with the cable tie or as declared by the manufacturer. See Figure 1.

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 stabilization 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 owing 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 that follow shall be carried out 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 five complete fresh-air changes per hour.

5.8 An integral assembly shall be tested as a complete sample. The integral assembly shall be subjected to the conditionings for the cable tie prior to conducting the mechanical strength test for the fixing device in accordance with 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 in accordance with Table 7, 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.

An adhesive fixing device, the performance of which is dependent on the mounting surface or the mounting orientation, shall comply with all applicable tests when the device is assembled on the surfaces for which it is intended, and in each intended mounting orientation declared by the manufacturer. When it can be determined that a 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

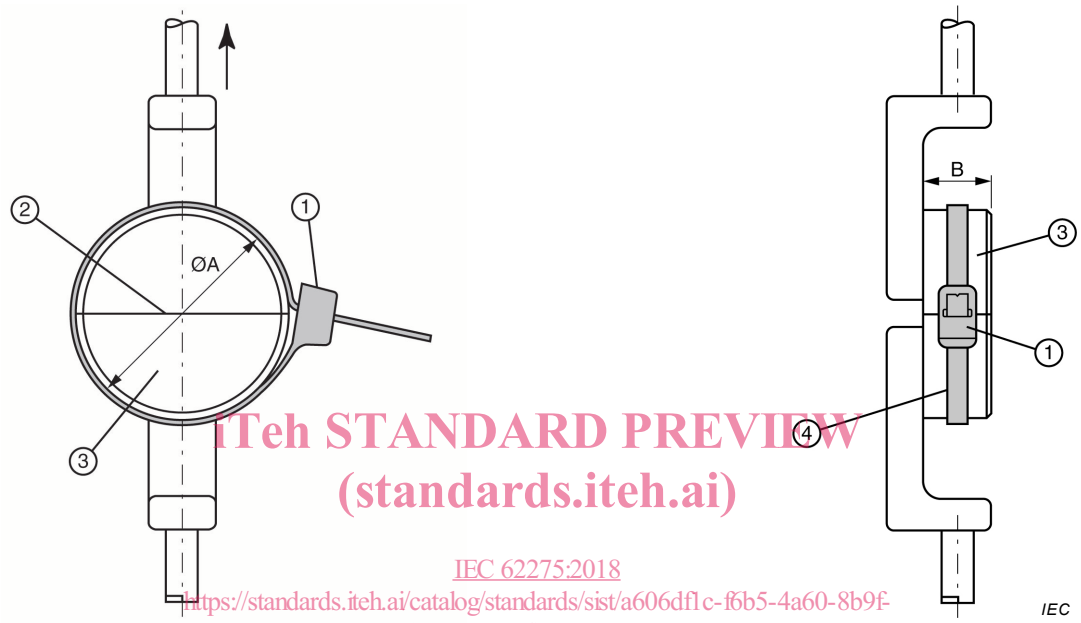
Maximum declared diameter mm	Test mandrel diameter (A) mm
≤ 20	9,5 ± 1
> 20 and ≤ 38	20 ± 2
> 38	38 ± 2

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 aluminium 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

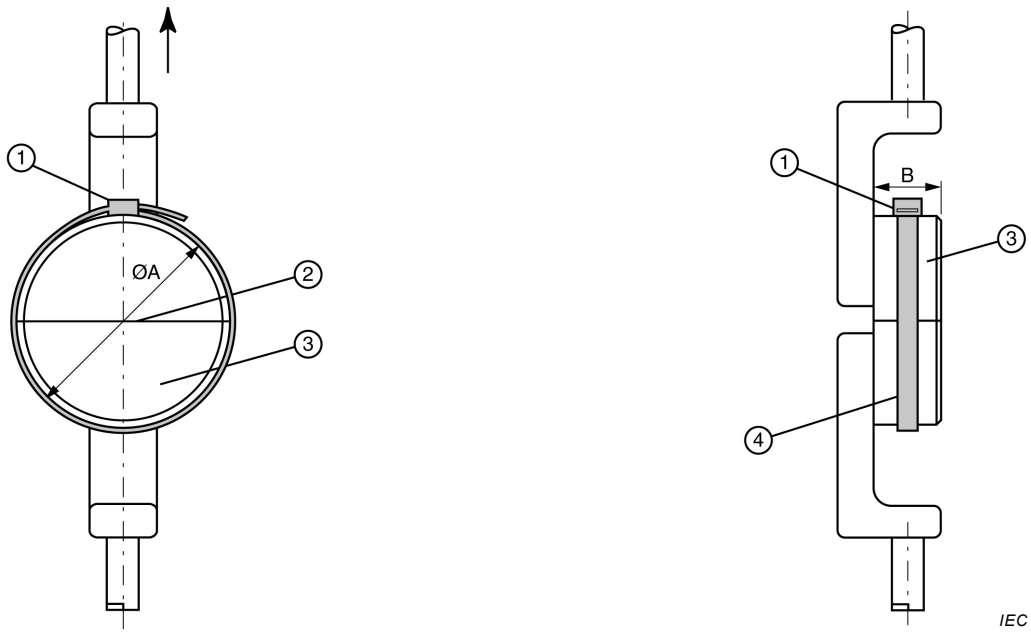
A Diameter of test mandrel

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

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 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

5.10 Tests for adhesive fixing devices on a stainless steel or aluminium bare panel covers the installation on any bare metal surface and on the following painted metal surfaces:

– enamel;

– epoxy;

– polyester.

The installation on other surfaces requires testing on these materials and painted surfaces.

Unless specified otherwise by the manufacturer, the samples are to be held to the panel for a period of 5^{+1}_{0} s with a force of (50 ± 5) N prior to the start of the prescribed pre-conditioning period or other exposures. Before applying any force, the time recommended by the manufacturer shall be respected.

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

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.

6.2.3 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.

6.2.4 According to loop tensile strength and mechanical strength of integral assemblies

An integral assembly shall have a single classification type according to 6.2.2 and 6.2.3.