BS EN 62275:2015

BSI Standards Publication

Cable management systems — Cable ties for electrical installations

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National foreword

This British Standard is the UK implementation of EN 62275:2015. It is derived from IEC 62275:2013. It supersedes BS EN 62275:2009 which is withdrawn.

The CENELEC common modifications have been implemented at the appropriate places in the text. The start and finish of each common modification is indicated in the text by tags 〚C〉 〈C〛.

The UK participation in its preparation was entrusted to Technical Committee PEL/213, Cable management.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Foreword

This document (EN 62275:2015*)* consists of the text of IEC 62275:2013 prepared by SC 23A “Cable management systems” of IEC/TC 23 "Electrical accessories", together with the common modifications prepared by CLC/TC 213 "Cable management systems″.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2016-01-19
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2018-01-19

This document supersedes EN 62275:2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

Endorsement notice

The text of the International Standard IEC 62275:2013 was approved by CENELEC as a European Standard with agreed common modifications.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu

Publication	Year	Title	EN/HD	Year
IEC 60068-2-6	2007	Environmental testing - Part 2-6: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	2008
IEC 60695-11-5	2004	Fire hazard testing - Part 11-5: Test flames - Needle-flame test method - Apparatus, confirmatory test arrangement and guidance	EN 60695-11-5	2005
IEC 60216-4-1	2006	Electrical insulating materials - Thermal endurance properties - Part 4-1: Ageing ovens - Single-chamber ovens	EN 60216-4-1	2006
ISO 4892-2	2006	Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps	EN ISO 4892-2	2006
ISO 9227	2012	Corrosion tests in artificial atmospheres - Salt spray tests	EN ISO 9227	2012

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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

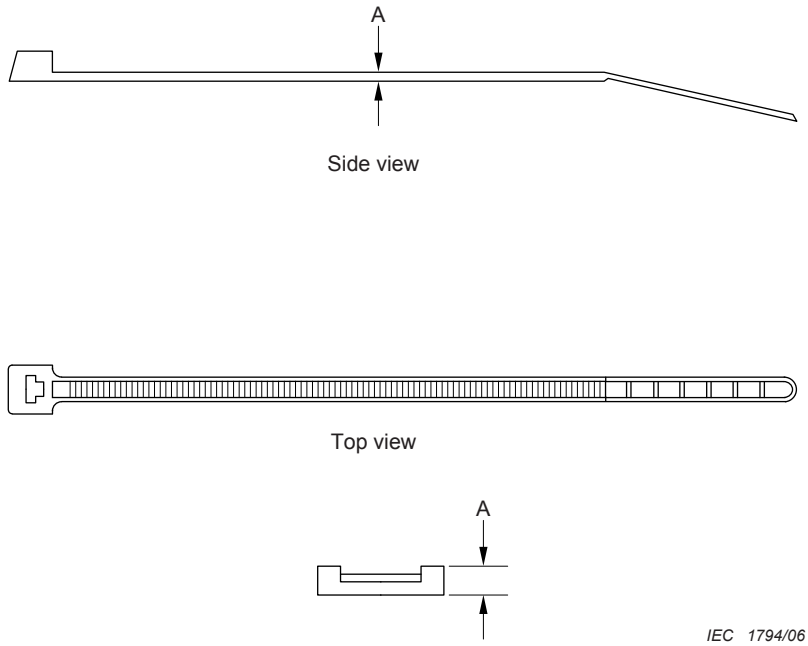
The reference thickness of a cable tie is measured at the midpoint of the strap. The reference thickness of a fixing device shall be the smallest cross section in the area that interfaces with the cable tie or as declared by the manufacturer. See Figure 1.

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

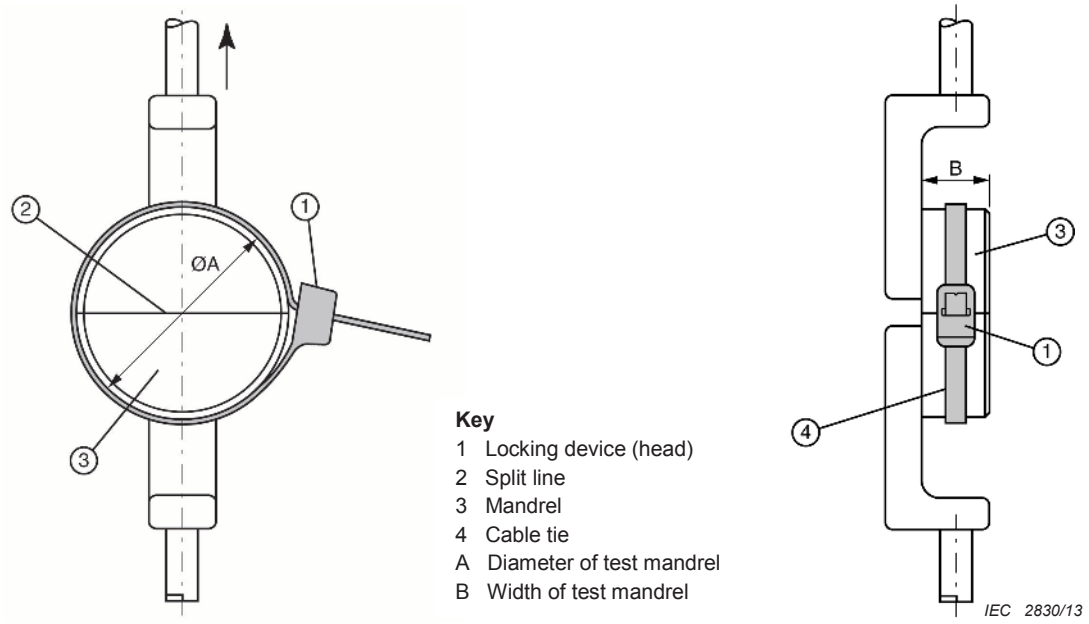
Maximum declared diameter mm	Test mandrel diameter (A) mm
≤ 20	9,5 ± 1
> 20 and ≤ 38	20 ± 2
> 38	38 ± 2

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.

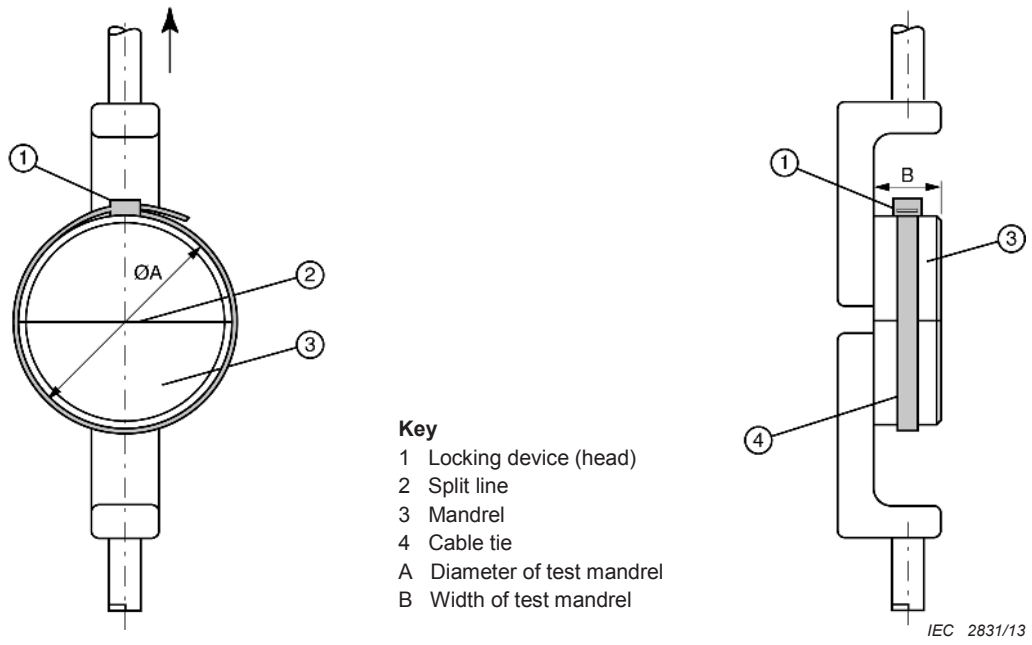


Key
1 Locking device (head)
2 Split line
3 Mandrel
4 Cable tie
A Diameter of test mandrel
B Width of test mandrel

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)
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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.

6.5 According to environmental influences

6.5.1 According to resistance to ultraviolet light for non-metallic and composite components

6.5.1.1 Not declared

6.5.1.2 Resistant to ultraviolet light

6.5.2 According to resistance to corrosion for metallic and composite components

6.5.2.1 Not declared

6.5.2.2 Resistant to corrosion

7 Marking and documentation

7.1 Each cable tie and fixing device shall be marked with the manufacturer's or responsible vendor's name or trademark and identifying symbol.

Where it is not possible, for example, due to the small size of a cable tie or fixing device to mark on it the identifying symbol, then this symbol may be marked on the packaging.

NOTE 1 The identifying symbol can be a reference number, letter etc.

NOTE 2 Marking can be applied, for example, by moulding, pressing, engraving, printing, adhesive labels, etc.

7.2 Marking on the cable ties or fixing device shall be clearly legible and durable.

Compliance is checked by inspection and by rubbing the marking by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

Marking made by moulding, pressing or engraving is not subjected to this test.

After the test, the marking shall be legible to normal or corrected vision.

NOTE Petroleum spirit is defined as the aliphatic solvent hexane with a content of aromatics of maximum 0,1 % by volume, a kauri-butanol value of 29, initial boiling point of 65 ºC, a dry point of 69 ºC and a specific gravity of 680 kg/m^3.

7.3 The manufacturer or responsible vendor shall provide in his literature:

a) the classification according to Clause 6,

b) the maximum and minimum bundle diameter in mm in relation to each cable tie,

c) the recommended method of installation, including the tool to be used, if any, and the load to be applied,

d) recommendations on transport and storage,

e) the manufacturer’s declared mechanical strength for a fixing device, and

f) specific mounting or assembly conditions such as mounting hole sizes, material thicknesses, mounting orientations, etc., for fixing devices according to 5.8.

NOTE In some countries, the marking information may be required to be placed on the packaging accompanying the product.

Compliance is checked by inspection.

8 Construction

The surface of the cable tie or fixing device shall be free from burrs and similar inconsistencies, and edges shall be smooth so as not to damage the cables or to inflict injury to the installer or user.

Compliance is checked by inspection.

9 Mechanical properties

9.1 Requirements

The cable tie and/or its associated fixing device shall withstand the stresses likely to occur during installation and application. The cable tie shall:

– be capable of fixing the maximum and minimum bundle diameter declared by the manufacturer.

Compliance is checked by the test according to 9.2;

– be able to be installed at the minimum temperature declared by the manufacturer.

Compliance is checked by the test according to 9.3, for cable ties classified according to 6.1.2 and 6.1.3 only;

– be resistant to the effect of impact forces at the minimum operating temperature declared by the manufacturer.

Compliance is checked by the test according to 9.4, for cable ties classified according to 6.1.2 and 6.1.3 only;

– maintain its fixing function at the minimum and maximum application temperature declared by the manufacturer. Metallic cable ties shall maintain their fixing function when exposed to vibration.

NOTE Non-metallic and composite cable ties are considered to be resistant to the effects of vibration.

Compliance is checked by the relevant tests. For cable ties classified according to 6.2.2, by the tests according to 9.5. For cable ties classified according to 6.2.3, by the tests according to 9.6.

Cable ties classified according to 6.1.1 are considered only as Type 2 according to 6.2.3.

The fixing device shall maintain its fixing function at the minimum and maximum application temperature as declared by the manufacturer.

Compliance is determined by the tests according to 9.7.

9.2 Installation test

The sample shall be installed on a mandrel representing the maximum specified diameter or size and the minimum specified diameter or size to determine that it is able to be installed in the intended manner, as specified by the manufacturer.

Moisture stabilisation according to 5.2 is not applicable for this test.

9.3 Minimum installation temperature test for cable ties

If the manufacturer gives no recommendation that the cable tie should be installed immediately after unpacking, in order to keep its humidity level, non-metallic and composite cable ties shall be dried out for (72 ± 1) h at the maximum operating temperature declared by the manufacturer before the following test is carried out:

The sample and a steel or aluminium mandrel, which reflects the minimum bundle diameter, shall be placed separately in a refrigerator, the temperature in which shall be maintained at the declared minimum temperature for installation with a tolerance of ± 2 °C. When the sample has attained this temperature or after 2 h, whichever is the longer period, the sample is installed on the mandrel.

After the test, there shall be no sign of disintegration nor shall there be any crack visible to normal or corrected vision.

9.4 Minimum operating temperature test for cable ties

The test mandrel as specified in 5.9 with the sample installed shall be placed in a refrigerator the temperature within which shall be maintained at the declared temperature according to Table 5 with a tolerance of ± 2 °C.

Two hours after the refrigerator has recovered to the declared temperature, the sample is removed from the refrigerator and placed on a V block as shown in Figure 3, with the locking device of the tie placed opposite to the point of impact.

Moisture stabilisation according to 5.2 after removal from the refrigerator is not applicable.

An impact shall be applied on the strap by a free fall hammer (12 ± 2) s after removal of the test assembly from the refrigerator. Compliance with impact applied before 10 s also complies with this test of the standard. A typical apparatus is shown in Figure 3.

The energy of the hammer shall be as given in Table 6.

The sample shall be deemed to have passed the test if, after the test, it has not broken open, nor shall there be any crack visible to normal or corrected vision.

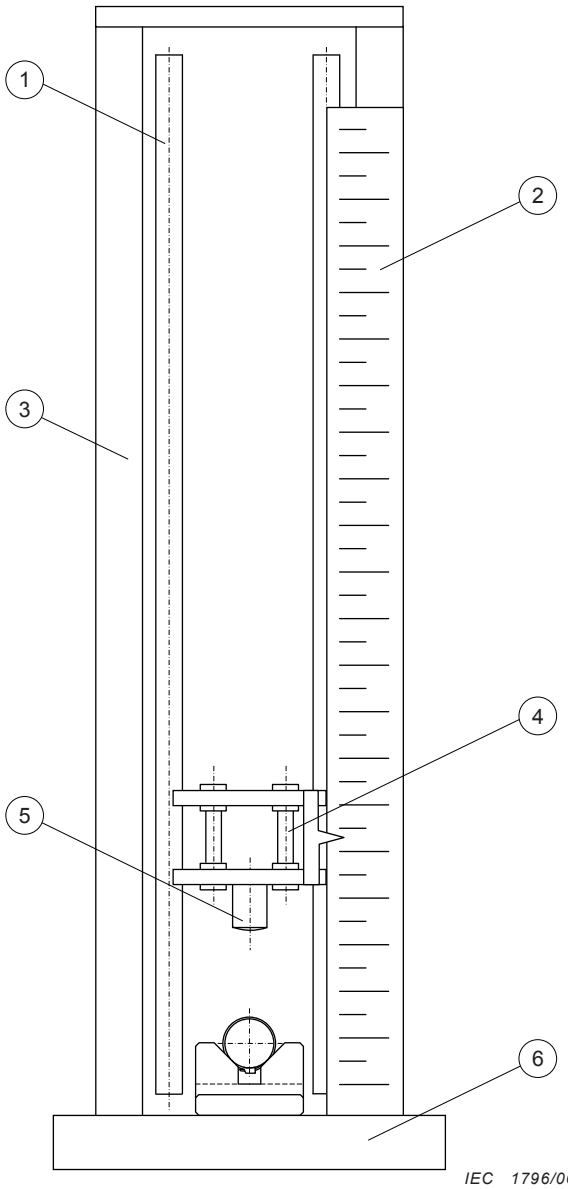


Figure 3a) Test apparatus assembly

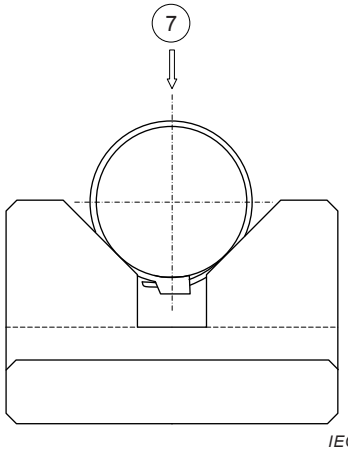


Figure 3b) Test mandrel with supporting V-block

Dimensions in millimetres

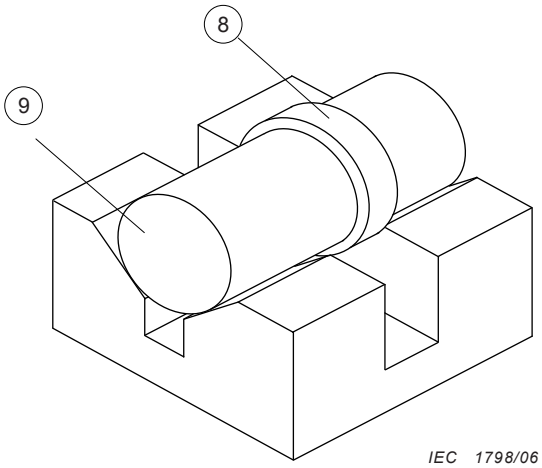


Figure 3c) Position of tie strap on test mandrel

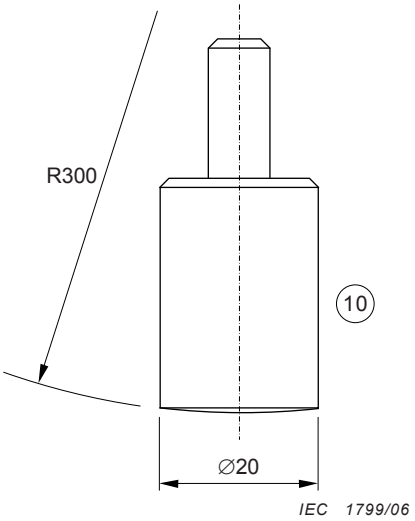


Figure 3d) Hammer details

Key

1 Guide rails
2 Height scale
3 Frame
4 Hammer guidance weight carriage
5 Hammer
6 Rigid base
7 Impact direction
8 Tie strap
9 Position of the test mandrel on mounting fixture (V-Block)
10 Hammer

The gap in the V block should be so wide and deep that neither the strap nor the tie locking device are in contact with the V block.

Figure 3 – Test apparatus for cable tie impact test

Table 6 – Energy values of hammer

Minimum declared loop tensile strength N		≤ 80	> 80 to 180	> 180 to 230	> 230 to 540	> 540 to 1 300	> 1 300
Energy	J	0,14	0,35	0,7	1	2	5
Equivalent mass	kg	0,25	0,25	0,25	0,25	0,5	1,7
Height of fall	mm ± 1 %	56	140	280	400	400	300

9.5 Loop tensile strength test for cable ties classified according to 6.2.2

9.5.1 As-received condition

The test is carried out on a new set of ten cable ties. Each sample shall be installed on a test mandrel as specified in 5.9.

Each sample shall be subjected to a tensile pull. The maximum force is measured.

No individual value shall be less than the loop tensile strength declared according to 6.2.

9.5.2 After heat ageing

The test is carried out on a new set of ten cable ties. Each sample shall be installed on a test mandrel as specified in 5.9.

Moisture stabilisation according to 5.2 before heat ageing is not applicable for this test.

The samples shall be aged in a full draft circulating-air oven with forced air at the maximum declared temperature according to Table 4 increased by (15 ± 1) °C for ($1\,000^{+48}_{0}$) h. Then the samples and the mandrels shall be conditioned according to 5.2.

Each sample shall be subjected to a tensile pull. The maximum force is measured.

No individual value shall be less than 50 % of the loop tensile strength declared according to 6.2.

9.5.3 After temperature cycling

The test is carried out on a set of ten new samples. The sample shall be installed on a test mandrel as specified in 5.9.

Moisture stabilisation according to 5.2 before temperature cycling is not applicable for this test.

The test assembly is subjected to the following temperature cycling with transfer between each condition described in list items a) to f), of 4 min to 5 min duration:

a) for 120 min to 130 min, the assembly is stored in a full draft circulating-air oven at the maximum operating temperature as declared by the manufacturer according to Table 4 with a tolerance of $^{+2}_{0}$ °C;

b) for 60 min to 70 min, the assembly is then be placed in a refrigerator at the minimum temperature for application in normal use as declared by the manufacturer according to Table 5 with a tolerance of $^{+0}_{2}$ °C;

c) condition a) is repeated;

d) condition b) is repeated but for (18^{+2}_{0}) h;

e) the test conditions a) and b) are repeated twice;

f) the test assembly consisting of non-metallic and composite components shall be conditioned according to 5.2.

After the cycling, there shall be no sign of disintegration nor shall there be any crack visible to normal or corrected vision.

Each sample shall be subjected to a tensile pull. The maximum force is measured.

No individual value shall be less than 50 % of the loop tensile strength declared according to 6.2.

9.6 Loop tensile strength test for cable ties classified according to 6.2.3

9.6.1 As-received condition

The test is carried out on a new set of ten cable ties. Each sample shall be installed on a test mandrel as specified in 5.9.

Each sample shall be subjected to a tensile pull until the load equivalent to the loop tensile strength declared by the manufacturer is reached. This load is maintained for (60^{+5}_{0}) s.

Excessive slippage measurements shall be determined by marking each tie across its width 1,6 mm beyond where the strap exits the locking device. A second mark is then to be placed 5,6 mm beyond the first mark for cable ties subjected to a load of 450 N or less, or 7,9 mm beyond the first mark for cable ties subjected to a load greater than 450 N. After the tie has withstood its test load for 1 min and the first mark is still visible, the test shall be terminated. When the slippage is more than 1,6 mm, the tie shall be tested for an additional 5 min. If the second mark moves out of sight within 5 min, the slippage is deemed excessive.

The cable tie shall not break and excessive slippage shall not occur as a result of the test.

9.6.2 After heat ageing

The test is carried out on a new set of ten cable ties. Each sample shall be installed on a test mandrel as specified in 5.9.

Moisture stabilisation according to 5.2 before heat ageing is not applicable for this test.

The samples shall be aged in a full draft circulating-air oven with forced air at the maximum declared temperature according to Table 4 increased by (15 ± 1) °C for ($1\,000^{+48}_{0}$) h. Then the samples and the mandrels shall be conditioned according to 5.2.

Each sample shall be subjected to a tensile pull until the load equivalent to the loop tensile strength declared by the manufacturer is reached. This load is maintained for (60^{+5}_{0}) s.

The samples shall be deemed to have passed the test if the samples perform according to the requirements in 9.6.1.

9.6.3 After temperature cycling

The test is carried out on a new set of ten cable ties. The sample shall be installed on a test mandrel as specified in 5.9. Samples shall be stabilised by being exposed to a temperature of (23 ± 2) °C and (50 ± 5) % relative humidity between each phase of the cycle for at least

1/2 h. Moisture stabilisation according to 5.2 before temperature cycling is not applicable for this test.

The test assembly is subjected to the following cycling.

a) The samples shall be placed in a full-draft circulating-air oven at the declared maximum operating temperature of the device for 48 h.

b) The samples shall then be placed in a chamber at (90 ± 5) % relative humidity and (40 ± 2) °C for 48 h.

c) The samples shall then be placed in a cold chamber at (-35 ± 2) °C for 8 h.

d) The samples shall then be placed in a full-draft circulating-air oven, at the declared maximum operating temperature for 64 h.

e) The test assembly consisting of non-metallic and composite components shall be conditioned according to 5.2.

After the cycling, there shall be no sign of disintegration nor shall there be any crack visible to normal or corrected vision.

Each sample shall be subjected to a tensile pull until the load equivalent to the loop tensile strength declared by the manufacturer is reached. This load is maintained for (60^{+5}_{0}) s.

The samples shall be deemed to have passed the test if the samples perform according to the requirements in 9.6.1.

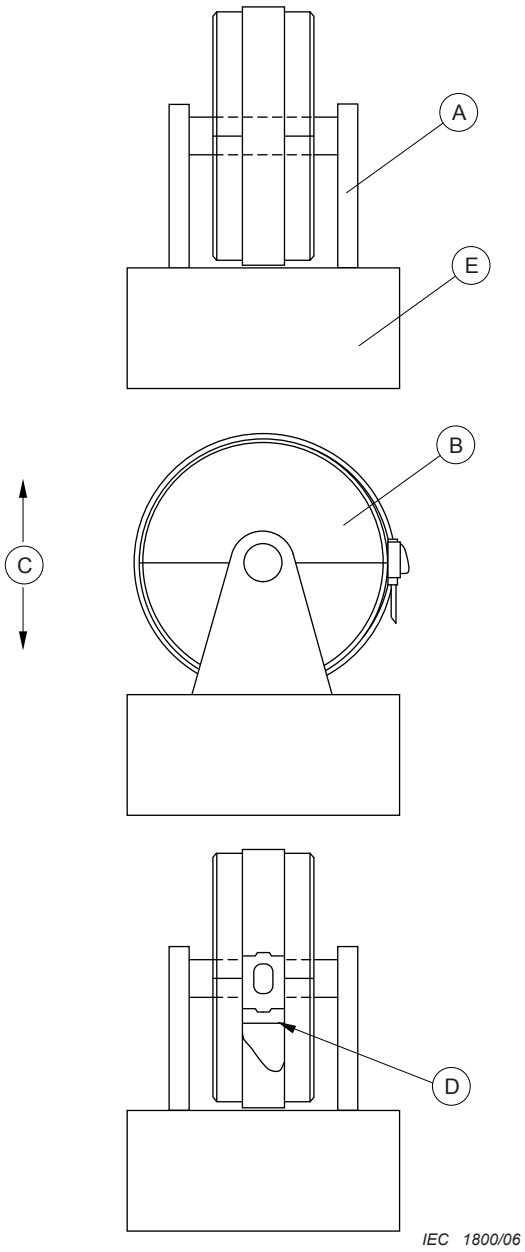
9.6.4 After vibration test for metallic cable ties

A minimum of two cable ties shall be installed around separate mandrels as described in 5.9. Each tie then shall be marked across its width adjacent to the strap's entry into the locking device. The ties then shall be subjected to the temperature cycle conditioning in accordance with 9.6.3 but not the loop tensile strength test. Upon completion of this conditioning, the mandrels shall be securely mounted to the vibration table such that the direction of the vibration is parallel to the plane of the circular configuration of the assembled tie. See Figure 4. The mandrels then shall be subjected to the following vibration test in accordance with IEC 60068-2-6:

– *frequency range: 10 Hz to 150 Hz, logarithmic ramp and return;*
– *duration 8 h: 10 sweep cycles, 1 octave/min;*
– *maximum peak amplitude: 0,35 mm (0,7 mm from peak to peak);*
– *maximum acceleration: 50 m/s2;*
– *crossover frequency between 58 Hz and 62 Hz.*

Each sample shall be subjected to a tensile pull until the load equivalent to the loop tensile strength declared by the manufacturer is reached. This load is maintained for (60^{+5}_{0}) s.

The samples shall be deemed to have passed the test if the samples perform according to the requirements in 9.6.1 including the measurement of the slippage from the original reference mark.



Key

A Mounting bracket
B Split mandrel
C Direction of vibration
D Reference line scribed on strap
E Vibration table

Figure 4 – Typical arrangement for the vibration test

9.7 Mechanical strength test for fixing devices

9.7.1 As-received

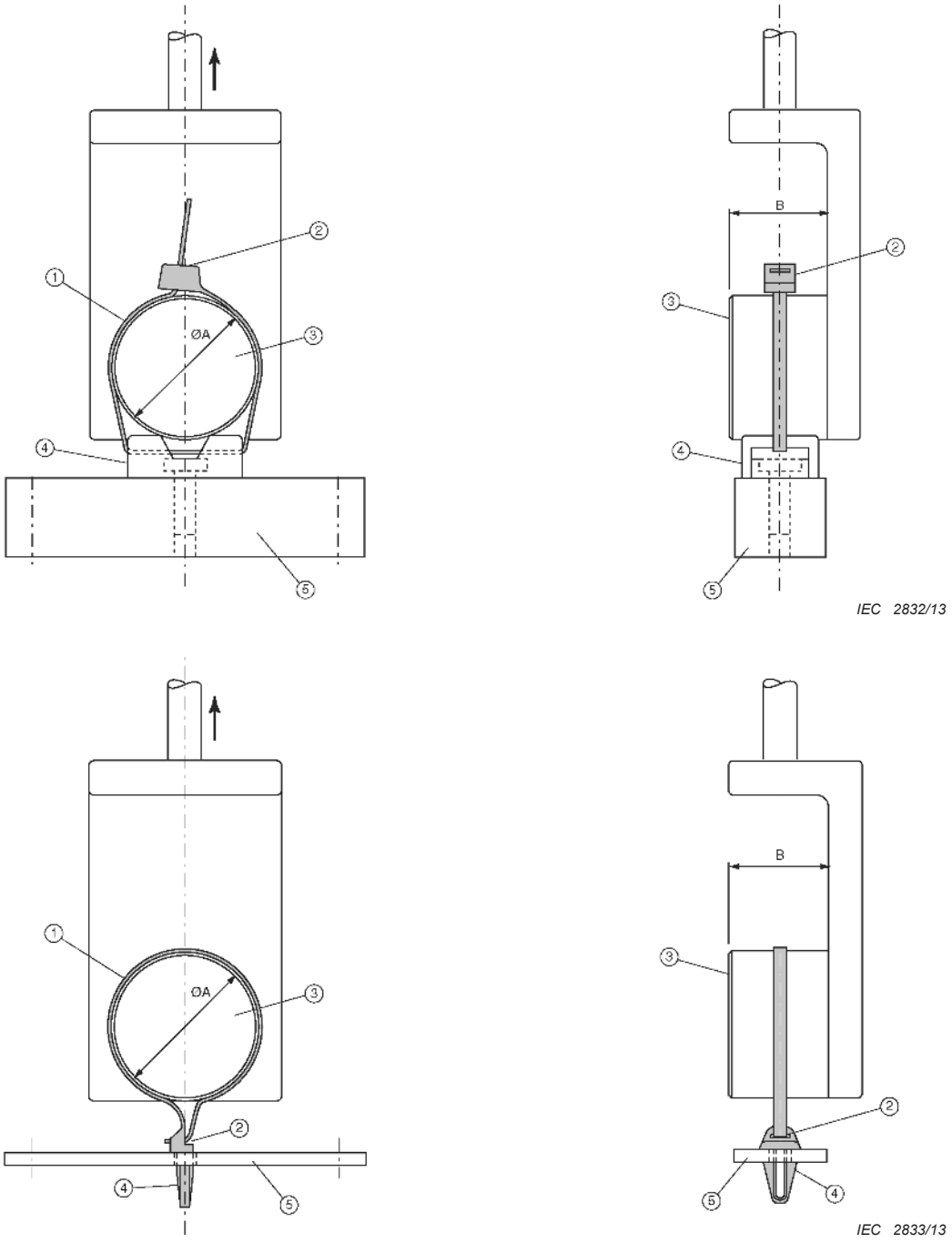
The samples shall be fixed firmly to a rigid support. An appropriate cable tie shall be assembled to the fixing device and then to a steel or aluminium mandrel according to 5.9. Typical arrangements of the test assembly for fixing devices are shown in Figure 5. See 5.8.

NOTE Where the fixing device and cable tie are manufactured as an integral product, the whole product will be the sample.

For a fixing device that is integrally moulded with a cable tie or supplied separately and classified according to 6.2.2, each sample shall be subjected to a tensile pull. The maximum force is measured. No individual value shall be less than the declared mechanical strength.

For a fixing device that is integrally moulded with a cable tie or supplied separately and classified according to 6.2.3, the samples shall be subjected to a tensile pull until the mechanical strength declared by the manufacturer is reached. This load is maintained for (60^{+5}_{0}) *s.*

After the test, the fixing device or cable tie shall show no sign of disintegration nor shall there be any crack visible to normal or corrected vision. The support structure is not to be considered.



Key

1 Cable tie
2 Locking device
3 Mandrel
4 Fixing device
5 Rigid support
A Diameter of test mandrel
B Width of test mandrel

Figure 5 – Typical arrangement of test assembly for fixing device test

9.7.2 After heat ageing

The test is conducted on a new set of samples. An appropriate cable tie shall be assembled to the fixing device and then to a steel or aluminium mandrel according to 5.9.

Moisture stabilisation according to 5.2 before heat ageing is not applicable for this test.

The assembly shall be aged in a full draft circulating-air oven at the maximum declared temperature according to Table 4 increased by (15 ± 1) °C for ($1\,000^{+48}_{0}$) h. Then the assembly shall be conditioned according to 5.2.

For a fixing device that is integrally moulded with a cable tie or supplied separately and classified according to 6.2.2, each sample shall be subjected to a tensile pull. No individual value shall be less than 50 % of the declared mechanical strength.

For a fixing device that is integrally moulded with a cable tie or supplied separately and classified according to 6.2.3, the samples shall be subjected to a tensile pull until the mechanical strength declared by the manufacturer is reached. This load is maintained for (60^{+5}_{0}) s.

After the test, the fixing device or cable tie shall show no sign of disintegration nor shall there be any crack visible to normal or corrected vision. The support structure is not to be considered.

9.7.3 After temperature cycling

The test is conducted on a new set of samples. An appropriate cable tie shall be assembled to the fixing device and then to a steel or aluminium mandrel according to 5.9.

Moisture stabilisation according to 5.2 before temperature cycling is not applicable for this test.

The test assembly is subjected to the temperature cycling as specified in 9.5.3.

For a fixing device that is integrally moulded with a cable tie or supplied separately and classified according to 6.2.2, each sample shall be subjected to a tensile pull. No individual value shall be less than 50 % of the declared mechanical strength.

For a fixing device that is integrally moulded with a cable tie or supplied separately and classified according to 6.2.3, the samples shall be subjected to a tensile pull until the mechanical strength declared by the manufacturer is reached. This load is maintained for (60^{+5}_{0}) s.

After the test, the fixing device or cable tie shall show no sign of disintegration nor shall there be any crack visible to normal or corrected vision. The support structure is not to be considered.

10 Contribution to fire

Non-metallic and composite cable ties classified according to 6.4.2 shall have adequate resistance to flame propagation.

Compliance is checked by the following test:

The sample shall be installed on a solid steel or aluminium mandrel with dimensions as specified in 5.9. The cable tie shall be mounted manually without tension. Then, the remaining end of the tie shall be cut away.

Using an arrangement as shown in Figure 6, the sample shall be submitted to the needle flame test as specified in IEC 60695-11-5:2004, with the following additional information:

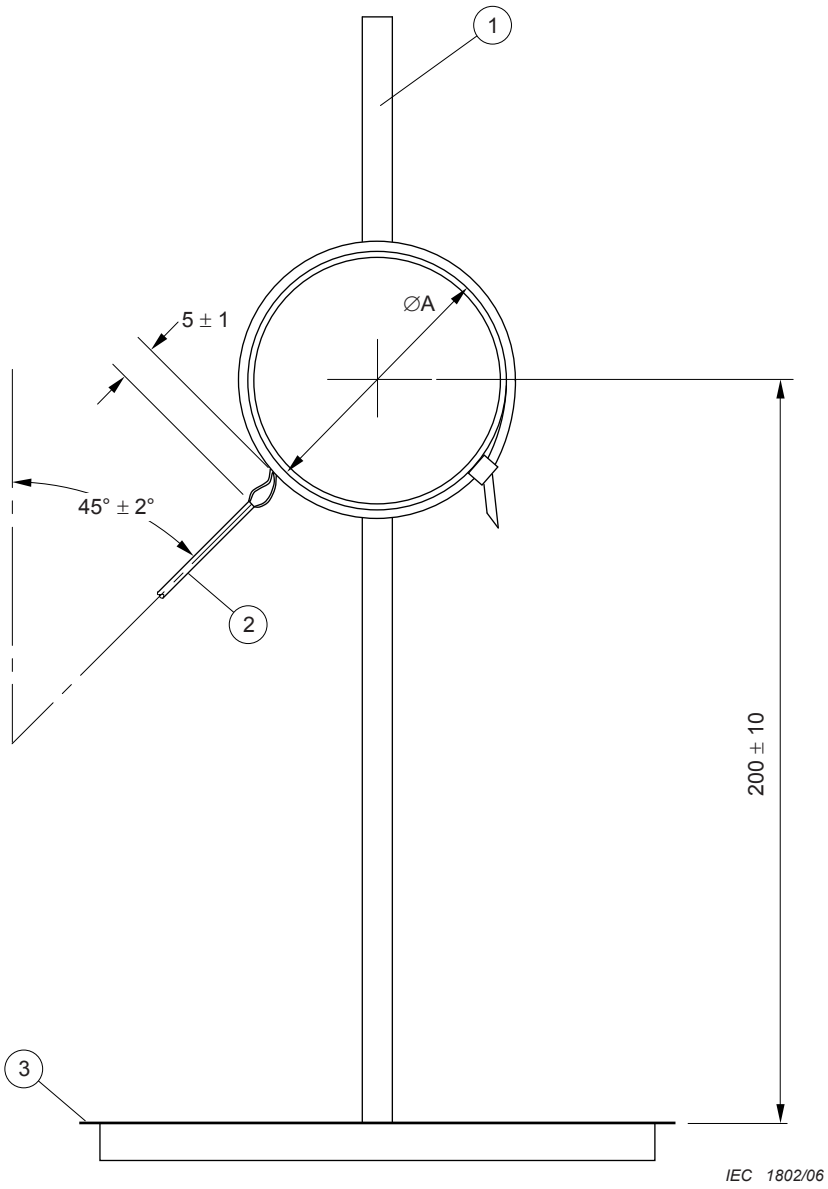
– *the flame shall be applied to the face of the sample for a maximum of 30 s or until such time as the sample has separated from the mandrel;*
– *the underlying layer shall consist of three layers of tissue paper of dimensions such that product material or broken product falls on it while testing.*

The sample shall be deemed to have passed the test if:

– *30 s after the test flame is removed, there is no flaming of the sample, and*
– *there is no ignition of the tissue paper.*

For a metallic cable tie having a non-metallic coating, and classified as non-flame propagating according to 6.4.2, samples having a combination of the minimum coating thickness and minimum metal thickness, and samples having a combination of the maximum coating thickness and minimum metal thickness shall be tested.

Dimensions in millimeters



Key

1 Stand
2 Burner
3 Tissue paper
A Diameter of test mandrel

Figure 6 – Arrangement for the needle flame test

11 Environmental influences

11.1 Resistance to ultraviolet light

11.1.1 Cable ties and fixing devices classified according to 6.5.1.2 shall be resistant to ultraviolet light.

Compliance is checked by the following.

For cable ties and fixing devices classified according to 6.5.1.2, a set of ten samples installed on a mandrel according to 5.9 shall be subjected to ultraviolet light conditioning according to 11.1.2. When the product is provided in more than one colour, the colour having the heaviest organic pigment loading shall be subjected to this testing. All sets tested are considered representative of the material's entire colour range.

NOTE In determining the product types and sample set for testing, consideration is given to products coloured red or yellow which are known to have particular critical effects.

Moisture stabilisation according to 5.2 before ultraviolet light exposure is not applicable for this test.

Samples shall be mounted on the inside of the ultraviolet light apparatus so that the samples do not touch each other. Mandrels for cable ties shall be positioned in such a way that the cable tie locking device is placed in the position facing the light source. Mandrels to which a fixing device is mounted shall be positioned in such a way that the fixation surface for the cable tie is perpendicular to the light source.

If the fixing device, cable tie and mandrel assembly is not able to be mounted as described in the ultraviolet light apparatus, the fixing device is permitted to be separately exposed. After exposure, the samples shall be able to be assembled for conducting the test.

After the first 250 h of exposure, and after each subsequent 250 h exposure period, the specimens are to be repositioned in the equipment in order to compensate for exposure variability due to placement with respect to the light source. Repositioning at 200 h intervals is acceptable. See Figure 7 for recommended rotation. Some flexibility in practice is needed due to variations in the samples under test.

11.1.2 *The samples are to be exposed for 1 000 h to xenon-arc, method A, cycle 1 in accordance with ISO 4892-2:2006. There shall be continuous exposure to light and intermittent exposure to water spray. The cycle shall consist of 102 min without water spray and 18 min with water spray. The apparatus shall operate with a water-cooled or air-cooled xenon-arc lamp, borosilicate glass inner and outer optical filters, a spectral irradiance of 0,51W/(m^2·nm) at 340 nm and a blackpanel temperature of (65 ± 3) °C. The temperature of the chamber shall be (45 ± 3) °C. The relative humidity in the chamber shall be (50 ± 5) %.*

NOTE In some countries, such as Japan, ultraviolet-light exposure according to ISO 4892-4 is acceptable with specific test parameters.

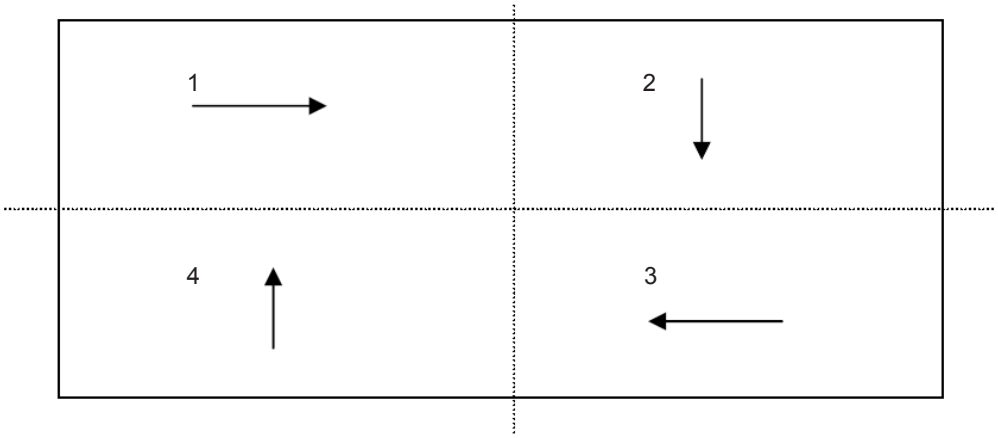
11.1.3 *Ultraviolet light conditioning is not required for a metallic cable tie or fixing device or for a metallic cable tie having a non-metallic coating when the non-coated version complies with the requirements in 11.2.*

11.1.4 *Following the exposure in 11.1.2 and stabilisation for a period according to 5.2, the following applies.*

Each sample of a cable tie, a fixing device that is integrally moulded with a cable tie, or a fixing device supplied separately and classified according to 6.2.2, shall be subjected to a tensile pull. No individual value shall be less than 50 % of the loop tensile strength declared according to 6.2 or the declared mechanical strength for a fixing device.

Each sample of a cable tie, a fixing device that is integrally moulded with a cable tie, or a fixing device supplied separately and classified according to 6.2.3, shall be subjected to a tensile pull until the load equivalent to the loop tensile strength for a cable tie or mechanical strength for a fixing device declared by the manufacturer is reached. This load is maintained for (60^{+5}_{0}) s. The samples shall be deemed to have passed the test if the samples perform according to the requirements in 9.6.1. After the test, there shall be no sign of disintegration nor shall there be any crack visible to normal or corrected vision.

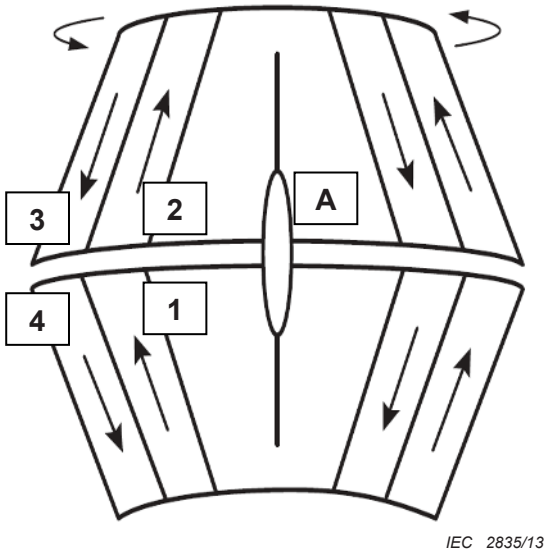
Each sample of a fixing device shall be subjected to a tensile pull until the mechanical strength declared by the manufacturer is reached. This load is maintained for (60^{+5}_{0}) s. After the test, there shall be no sign of disintegration nor shall there be any crack visible to normal or corrected vision.



Representative quadrants on flat panel.

Arrows represent relative position and direction of sample placement, and rotation sequence.

Figure 7a) Static flat panel apparatus



Interior view of sample mounting panels of typical rotating cylinder facing light source A.

Arrows represent relative position and direction of sample placement, and rotation sequence.

The surface of the sample facing the light source should remain constant throughout the full duration of the exposure.

Figure 7b) Cylinder-type apparatus

Figure 7 – Recommended sample repositioning for ultraviolet light and water exposure

11.2 Resistance to corrosion

Cable ties and fixing devices classified as resistant to corrosion according to 6.5.2.2 shall have adequate resistance to corrosion.

Compliance is checked by the following test:

Moisture stabilisation according to 5.2 before salt spray exposure is not applicable for this test.

Samples shall be exposed to a neutral salt spray (NSS) in accordance with ISO 9227 for 192 h followed by 12 h at (40 ± 2) °C. Samples of non-metallic coated devices shall be subjected to heat age conditioning in accordance with 9.5.2, 9.6.2 or 9.7.2 as appropriate before exposure to the salt spray.

The samples shall then be rinsed in demineralised water. Metallic cable ties and fixing devices shall be dried. Composite cable ties and fixing devices shall be stabilised according to 5.2.

After the test, the samples shall show no cracks visible to normal or corrected vision. Any traces of rust on sharp edges and a yellowish film may be removed by rubbing. There shall be no red rust visible to normal or corrected vision.

Each sample of a composite cable tie classified according to 6.2.2 (Type 1), shall be subjected to the tensile pull according to 9.5.1. No individual value shall be less than 50 % of the loop tensile strength declared according to 6.2.

Each sample of a metallic or composite cable tie classified according to 6.2.3 (Type 2), shall be subjected to the tensile pull according to 9.6.1 until the load equivalent to the loop tensile strength declared by the manufacturer is reached. This load shall be maintained for (60^{+5}_{0}) *s.*

The samples shall be deemed to have passed the test if the samples perform according to the requirements in 9.6.1.

Each sample of a fixing device shall be subjected to the tensile pull according to 9.7.1.

After the test, there shall be no sign of disintegration of a fixing device or any crack visible to normal or corrected vision.

Testing of products constructed of stainless steel having a chromium content of 16 % or more is not required.

A metallic cable tie having a non-metallic coating that is depended upon to provide resistance to corrosion, and that is declared as having resistance to ultraviolet light, shall be subjected to the conditioning in 11.1 followed by the appropriate requirements in 11.2 for metallic cable ties.

The requirements in 11.2 are not applicable for a metallic cable tie with a non-metallic coating when the uncoated version has been determined to meet the requirements in 11.2.

12 Electromagnetic compatibility

Products covered by this standard are, in normal use, passive with respect to electromagnetic influences (emission and immunity). Therefore no tests have been specified.

Annex A
(normative)

Compliance checks to be carried out for cable ties and fixing devices complying with EN 62275:2009

Introduction

This normative annex relates to changed requirements. It informs where compliance checks are not required and where compliance checks are required to be carried out in order that cables ties and fixing devices can be declared to meet the requirements of EN 62275:2015 if the cable ties and fixing devices already comply with EN 62275:2009.

Table A.1 - Required compliance checks

Test reference subclause	Description	Compliance check
	Marking and documentation	
7.1	Marking of cable ties and fixing devices	Not required
7.2	Durability and legibility marking	Not required
7.3	Literature declaration	Required only for specific mounting or assembly conditions for fixing devices
	Construction	
8	Surface and edges	Not required
	Mechanical properties	
9.2	Installation test	Not required
9.3	Minimum installation temperature test for cable ties	Not required
9.4	Minimum operating temperature test for cable ties	Not required
9.5.1	Loop tensile strength test for cable ties classified according to 6.2.2. As-received condition	Not required
9.5.2	Loop tensile strength test for cable ties classified according to 6.2.2. After heat aging	Not required
9.5.3	Loop tensile strength test for cable ties classified according to 6.2.2. After temperature cycling	Not required
9.6.1	Loop tensile strength test for cable ties classified according to 6.2.3. As-received condition	Not required
9.6.2	Loop tensile strength test for cable ties classified according to 6.2.3. After heat aging	Not required
9.6.3	Loop tensile strength test for cable ties classified according to 6.2.3. After temperature cycling	Not required
9.6.4	Loop tensile strength test for cable ties classified according to 6.2.3. After vibration test for metallic cable ties	Not required
9.7.1	Mechanical strength test for fixing devices. As-received condition	Required only for fixing devices classified according to 6.2.2
9.7.2	Mechanical strength test for fixing devices. After heat aging	Required only for fixing devices classified according to 6.2.2
9.7.3	Mechanical strength test for fixing devices. After temperature cycling	Required only for fixing devices classified according to 6.2.2
	Contribution to fire	
10	Needle flame test	Required only for metallic cable ties with coating
	Environmental influences	
11.1	Resistance to ultraviolet light	Not required
11.2	Resistance to corrosion (for metallic and composite components)	Required

Bibliography

IEC 62275:2006, *Cable management systems – Cable ties for electrical installations*

〖C〗 NOTE Harmonized as EN 62275:2009 (modified). 〖C〗

UL 62275/CSA C22.2 No. 62275, *Cable management systems – Cable ties for electrical installations*

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