IEC 61196-12

Edition 1.0 2024-05

INTERNATIONAL STANDARD

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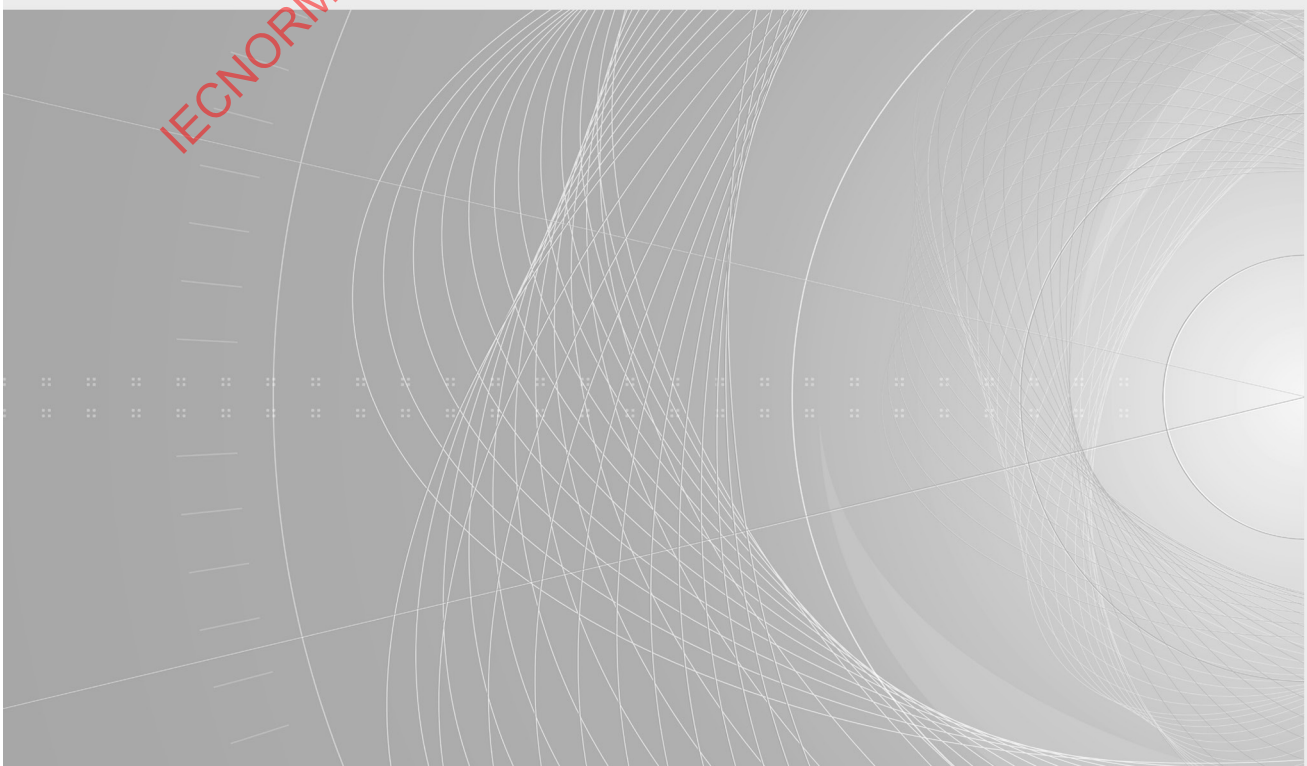
Coaxial communication cables –
Part 12: Specification for spacer clamps for radiating cables



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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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COAXIAL COMMUNICATION CABLES –

Part 12: Specification for spacer clamps for radiating cables

FOREWORD

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IEC 61196-12 has been prepared by subcommittee 23A: Cable management systems, of IEC technical committee 23: Electrical accessories. It is an International Standard.

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

Draft	Report on voting
23A/1073/FDIS	23A/1076/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/publications.

A list of all parts in the IEC 61196 series, published under the general title *Coaxial communication cables*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

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COAXIAL COMMUNICATION CABLES –

Part 12: Specification for spacer clamps for radiating cables

1 Scope

This part of IEC 61196 defines general requirements for spacer clamps for radiating cables, including terms and definitions, design and construction, IEC type designation, requirements and test procedures and type tests.

The contents of this document are suitable for spacer clamps for installation of radiating cables. These cables and their spacer clamps are widely used in tunnels, subways, underpasses, and shafts. Their intended application is in weather-protected environments and, optionally, outdoors.

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 60068-2-1, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-5, *Environmental testing – Part 2-5: Tests – Test S: Simulated solar radiation at ground level and guidance for solar radiation testing and weathering*

IEC 60068-2-30, *Environmental testing – Part 2-30: Tests – Test Db: Damp heat, cyclic (12 h + 12 h cycle)*

IEC 61196-4, *Coaxial communication cables – Part 4: Sectional specification for radiating cables*

ISO 834-1:1999, *Fire-resistance tests – Elements of building construction – Part 1: General requirements*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61196-4 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
spacer clamp
mechanical device to install a radiating cable at a certain distance from the base or from a steel rope

3.2
suspended clamp
spacer clamp to install a radiating cable on suspended steel ropes

3.3
cantilever clamp
spacer clamp to install a radiating cable at a certain distance from the base

3.4
fireproof clamp
spacer clamp with a fireproof device that can prevent the radiating cable from falling if it catches fire

3.5
fireproof device
device that can prevent the radiating cable from falling when a fire happens

4 Design and construction

4.1 Ratings and characteristics

Spacer clamps shall be designed and built to satisfy the environmental requirements as follows:

a) Temperature range: −40 °C to +85 °C
b) Humidity: 5 % to 95 %

4.2 Material and design

Spacer clamps shall be designed and built to meet the following requirements:

a) Spacer clamps shall be made of metallic, non-metallic or composite materials.

NOTE Spacer clamps that are made of metal or comprise metallic components can cause the creation of external passive intermodulation.

b) The structure and dimensions of spacer clamps shall be matched to the cable to be fastened.
c) For radiating cables with a radial direction marking line, the spacer clamp shall be designed with a structure to locate the radiating direction, which shall be consistent with the marking line of the radiating cable.
d) Minimum vertical distance from the surface of the radiating cable installed to that of the base after installation shall be in accordance with the stated requirements of the corresponding cable.
e) Spacer clamps and their fireproof devices, if any, shall be designed so that they cannot influence radiating performance of the cable, and shall be compatible with the climate and mechanical environments during operation.
f) Fasteners and fixings for spacer clamps shall be specified in the product detail specification.

Spacer clamps may be assembled from various components of a modular system. Depending on the combination of components, different features may be made available, for example different spacing to the base and fire retardancy. In this case, the spacer clamp shall also be understood to be a specific combination of system elements.

5 IEC type designation

5.1 Type

The type designation of spacer clamps for radiating cables shall be as follows:

a) SC: the code of the spacer clamp;
b) minimum outer diameter for clamping the cable, expressed by an integer, in mm;
c) maximum outer diameter for clamping the cable, expressed by an integer, in mm.

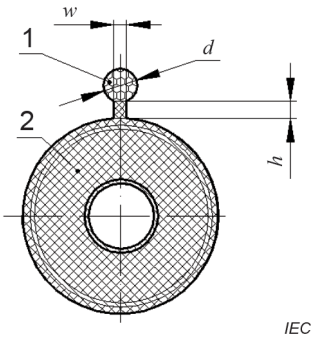
For example, SC38-41 represents spacer clamps for radiating cables with the outer diameter range from 38 mm to 41 mm for clamping the cables.

5.2 Variant

The variant designation of spacer clamps shall be as follows:

a) Fireproof type – expressed as follows:
   – F: for fireproof clamp;
   – omitted for non-fireproof clamp.
b) Installation type – expressed as follows:
   – C: cantilever type;
   – S: suspended type;
   – CM: cantilever type for self-supporting radiating cable with messenger;
   – SM: suspended type for self-supporting radiating cable with messenger.
c) The space distance of cable surface to the base or wire, in mm; for example, 80 means 80 mm.
d) Nominal dimensions of the integrated messenger wire for self-supporting radiating cables – expressed as follows:

   d*w*h: d, w and h are the nominal dimensions of the integrated messenger wire, expressed by an integer, in mm, as shown in Figure 1.



Key

1 integrated messenger wire of the radiating cable
2 self-supporting radiating cable

Figure 1 – The dimensions of the integrated messenger wire

For example, SC38-41FCM80 9*2*3 represents spacer clamps, the outer diameter range from 38 mm to 41 mm for clamping the cables, fireproof cantilever clamp, the space distance of cable surface to the base or wire is 80 mm, for self-supporting radiating cables with the nominal dimensions of the integrated messenger wire d = 9, w = 2 and h = 3.

5.3 Marking

A marking on the product shall enable the user to unambiguously assign the product to the technical data provided by the manufacturer and the IEC standard applied.

The marking on the product itself does not have to include the full designation in accordance with this standard.

A marking on the product shall allow clear identification of the responsible supplier.

5.4 Packaging

Packaging boxes of spacer clamps shall be marked with manufacturer name (or code), trademark, type designation of the spacer clamps, quantity, production lot number, and IEC standard number.

6 Requirements and test procedures

6.1 General conditions for the tests

Spacer clamps shall be tested in the following general conditions:

a) Tests in accordance with this document are type tests.

b) Unless otherwise specified, the tests shall be carried out in standard atmospheric conditions as follows:

   – temperature: (23 ± 2)° C;

   – relative humidity: (45 to 55) %;

   – air pressure: (86 to 106) kPa.

c) Unless otherwise specified, tests shall be carried out with the spacer clamps assembled and installed as in normal use according to the manufacturer's or responsible vendor's instructions.

d) Tests on non-metallic spacer clamps or composite spacer clamps shall not be commenced earlier than 168 h after manufacture.

e) When toxic or hazardous processes are used, precautions shall be taken to safeguard the person performing the test.

f) If there are different sizes for each type series of spacer clamps, the size (e.g. clamping diameter) that is most critical for tests is to be used for the respective test. The result obtained then also applies to all other sizes of this type of series by similarity.

   If it cannot be technically determined which size is the critical one, all sizes shall be tested individually. All sizes shall be checked individually if the manufacturer or distributor wishes to specify different performances per size.

g) The test samples shall be taken as a random sample from series production. Unless otherwise defined, the sample size to be tested per test is at least 3.

h) The test requirement is considered fulfilled when all test samples have successfully passed the test.

i) If one of the samples does not satisfy a test, that test and any preceding ones that might have influenced the results of the test shall be repeated, and also the tests that follow shall be made in the required sequence on another full set of samples, all of which shall comply with the requirements.

j) If relative humidity or the ambient temperature has a significant effect on performance data obtained under the conditions of 6.1d), these shall be determined and declared. If necessary, the limits of use of the product shall be restricted compared to 4.1.

k) If a system component or system is coated in paint or any other substance that is likely to affect its classified properties, then the relevant tests in this document shall be performed on the coated sample.

l) The total applied load for each of the load tests shall have a tolerance of 0 % to +3 %.

m) All lengths and distances for test arrangements shall not exceed a tolerance of ±5 %.

6.2 Visual inspection

6.2.1 Requirements

All metal parts of spacer clamps shall be flat, free from burrs, scratches, oxidation and other obvious mechanical damages to their surfaces, and shall show no evidence of bubbles, discoloration, pinholes and other defects on plating when plated.

The non-metallic parts shall be smooth, and free from blowholes, cracks, pits, swelling, discoloration from degradation, as well as significant foreign substance, at their surfaces. In addition, all edges shall be smooth, and free from wrinkles, sharp corners, burrs as well as other defects.

6.2.2 Test procedure

Visual examinations shall be performed with naked eyes.

6.3 Structural dimensions

6.3.1 Requirements

Structural dimensions for spacer clamps shall be in accordance with the relevant detail specification.

If necessary, a groove for the location of radiation direction shall be provided and it shall be consistent with the identification line of the radiating cable.

6.3.2 Test procedure

Measurements shall be performed by using measuring tools or gauges with adequate accuracy.

6.4 Mechanical performance

6.4.1 Clamping force

6.4.1.1 Requirements

Spacer clamps shall meet following requirements:

a) For suspended clamps, the clamping forces F_1 and F_2 shall be in accordance with the requirements specified in the product detail specification. After the test, no displacement greater than 2 mm of the spacer clamp relative to radiating cable and the steel rope shall be allowed. The cable shall show no evidence of deformation and damage. The spacer clamps shall show no evidence of loosening, deformation and mechanical damage for their fastening parts.

b) For cantilever clamps, the clamping force F_1 shall be in accordance with the requirements specified in the product detail specification. After the test, no remaining displacement greater than 2 mm of the spacer clamp relative to radiating cable and the steel rope shall be allowed. The cable shall show no evidence of damage. The spacer clamps shall show no evidence of loosening, deformation and mechanical damage, including to their fastening parts.

c) If a limited maximum clamping force is required, it shall be possible to move the radiating cable in the spacer clamp when the force F_1 is reached. The cable shall show no evidence of damage due to this movement.

6.4.1.2 Test procedure

Test procedure shall be as follows:

a) Select a radiating cable with a length of 200 mm ± 20 mm and its outer diameter shall be the minimum outer diameter for clamping the cable of spacer clamp (±1 mm). Install the spacer clamp into the test device in the normal manner, as shown in Figure 2.

b) For suspended clamps:

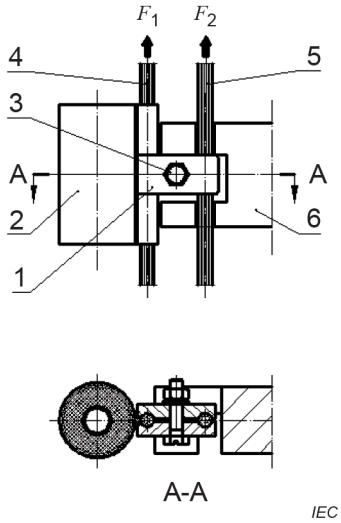
- Apply a specified force F_1 to the integrated messenger wire of the radiating cable as shown in Figure 2a) or the radiating cable as shown in Figure 2b). Remove the force F_1, and measure the remaining displacement between the suspended clamp and the radiating cable.
- Apply the specified force F_2 to the steel rope. Remove the force F_2 and measure the remaining displacement between the suspended clamp and the steel rope.

c) For cantilever clamps:

- For cantilever clamps for self-supporting radiating cables – Apply the specified force F_1 to the integrated messenger wire of the radiating cable as shown in Figure 2c). Remove the force F_1, and measure the remaining displacement between the cantilever clamp and the steel rope.
- For cantilever clamps for non-self-supporting radiating cables – Apply the specified force F_1 to the radiating cable as shown in Figure 2d). Remove the force F_1, and measure the remaining displacement between the cantilever clamp and the radiating cable.

NOTE The measured displacement is always dependent on the specific cable and its surface condition. The result is therefore only valid for one type of manufacturer and can vary between different manufacturers.

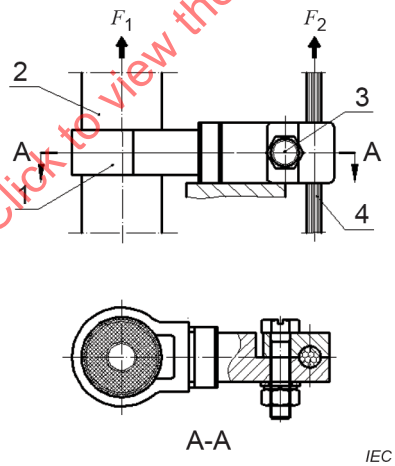
d) After the test, the components shall be examined for compliance with the requirements of 6.4.1.1.



Key

1 suspended clamp
2 self-supporting radiating cable
3 fixing
4 integrated messenger wire of the radiating cable
5 steel rope
6 test device

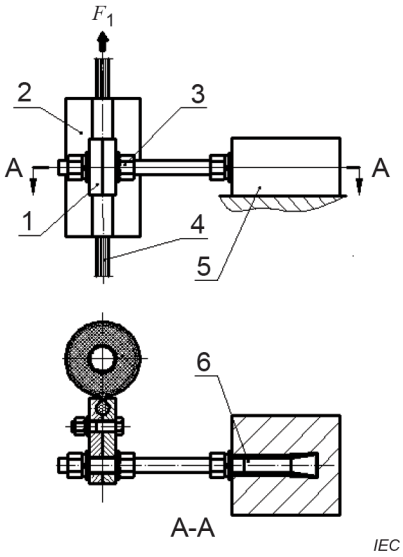
a) Suspended clamp for self-supporting radiating cable



Key

1 suspended clamp
2 non-self-supporting radiating cable
3 fixing
4 steel rope

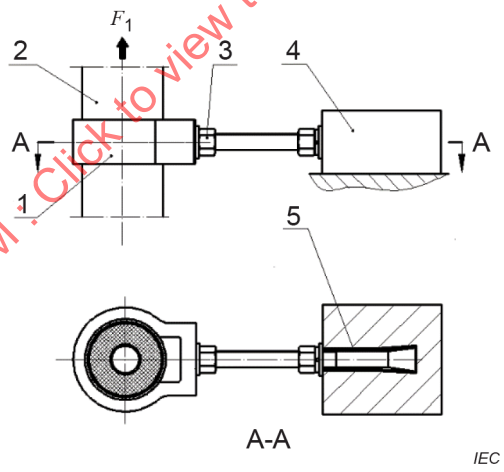
b) Suspended clamp for non-self-supporting radiating cable



Key

1 cantilever clamp
2 self-supporting radiating cable
3 fixing
4 integrated messenger wire of the radiating cable
5 base (cement concrete blocks conforming to the designation, etc.)
6 anchor

c) Cantilever clamp for self-supporting radiating cable



Key

1 cantilever clamp
2 non-self-supporting radiating cable
3 fixing
4 base (cement concrete blocks conforming to the designation, etc.)
5 anchor

d) Cantilever clamp for non-self-supporting radiating cable

Figure 2 – Schematic diagram of test for clamping force

6.4.1.3 Information to be given in the product detail specification

The following information shall be given in the relevant specification:

a) For suspended clamps: F_1 and F_2 values for clamping force (see Annex A for recommended values).

b) For cantilever clamps: F_1 value for clamping force (see Annex A for recommended values).

c) Any deviation from the standard procedure.

6.4.2 Normal tensile force

6.4.2.1 Requirements

The maximum normal tensile force of spacer clamps shall be not less than the value stated in the product's detail specification.

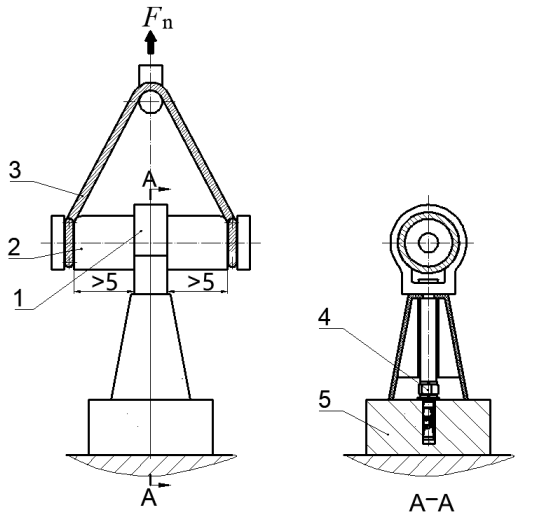
6.4.2.2 Test procedure

Test procedure shall be as follows:

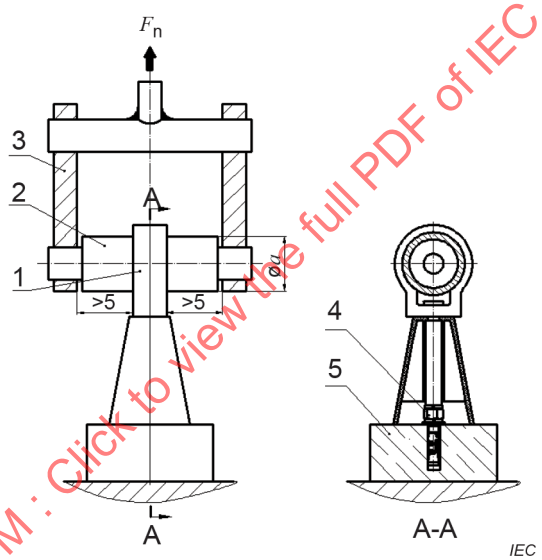
a) Install a spacer clamp and insert a cable dummy (see Annex B) well in a normal installation manner, as shown in Figure 3. Figure 3a) and Figure 3b) show optional test setups

b) Apply force F_n to both ends of the cable dummy by using a tension tester at a speed of 5 mm per minute until the maximum force appears on the tensile curve, then the force at this point is just the maximum normal tensile force that the spacer clamp can withstand

Dimensions in millimetres



a) Schematic diagram example A



b) Schematic diagram example B

Key

1 cantilever clamp
2 cable dummy
3 tension tester
4 anchor
5 base (cement concrete blocks conforming to the designation, etc)

Figure 3 – Schematic diagram of normal tensile force

6.4.2.3 Information to be given in the product detail specification

The following information shall be given in the relevant specification:

a) maximum normal tensile force for spacer clamps (see Annex A for recommended values);
b) application speed, if other than 5 mm per minute;
c) any deviation from the standard procedure.

6.4.3 Shear force

6.4.3.1 Requirements

The maximum shear force of the spacer clamp shall be not less than the value stated in the product detail specification.

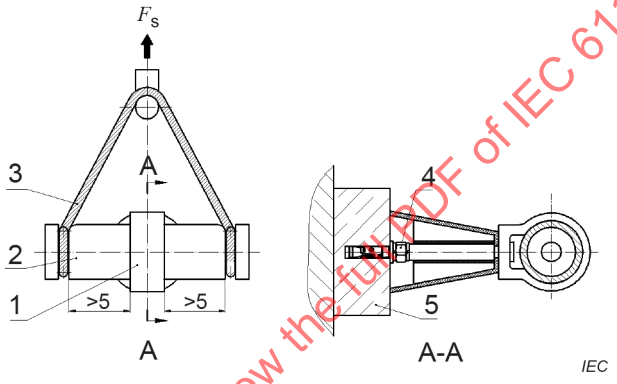
6.4.3.2 Test procedure

The test procedure shall be as follows:

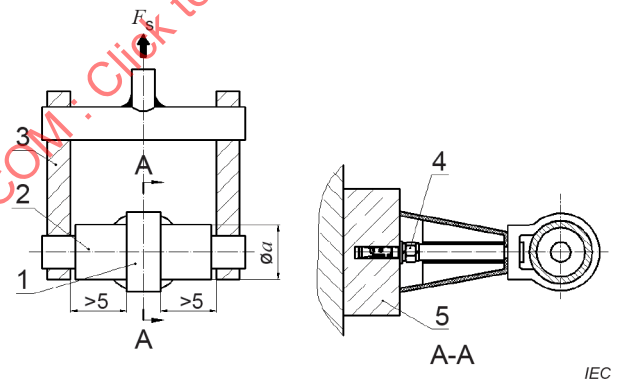
a) Install a spacer clamp and insert a cable dummy (see Annex B) well in a normal installation manner, as shown in Figure 4. Figure 4a) and Figure 4b) show optional test setups.

b) Apply force F_s to both ends of the cable by a tension tester at speed of 5 mm per minute until the maximum force appears on the tensile curve, then the force at this point is just the maximum shear force that the spacer clamp can withstand.

Dimensions in millimetres



a) Schematic diagram example A



b) Schematic diagram example B

Key

1 cantilever clamp
2 cable dummy
3 tension tester
4 anchor
5 base (cement concrete blocks conforming to the designation, etc)

Figure 4 – Schematic diagram of shear force

6.4.3.3 Information to be given in the product detail specification

The following information shall be given in the relevant specification:

a) maximum shear force for spacer clamps (see Annex A for recommended values);

b) application speed, if other than 5 mm per minute;

c) any deviation from the standard procedure.

6.5 Environmental characteristics

6.5.1 Cold temperature installation

6.5.1.1 Requirements

After the test, spacer clamps shall meet the following requirements:

a) Spacer clamps shall be mountable, and cable dummies shall be installable at the specified minimum installation temperature without any cracks or other damage to the clamp. Fasteners and cable dummies shall not have loosened or become loose after being warmed up again to room temperature.

b) Required number of tests: n_{min} = 3.

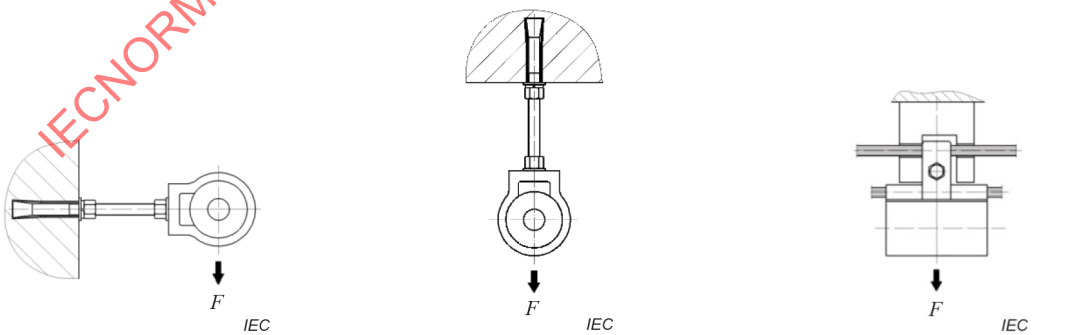
6.5.1.2 Test procedure

Test procedure shall be as follows:

a) Store 3 spacer clamps including all required installation hardware (bolts, nuts, dowels, etc.), 3 cable dummies and the required foundation material in a walk-in temperature chamber. Use a solid concrete block for cantilever style of clamps as foundation material and an external messenger wire for suspended clamps that is stretched in a suitable fixture.

b) Cool down all components to the specified minimum installation temperature. Keep a dwell time of at least 2 hours after having reached the specified temperature. Whilst stored in the temperature chamber, install 3 spacer clamps on the specified foundation, concrete block, or external messenger wire, and insert the cable dummy into each of the spacer clamps according to the applicable installation instruction. Apply an additional load as specified in the relevant specification to each cable dummy as shown in Figure 5. Maintain the temperature for 2 hours.

c) If cantilever spacer clamps are suitable for horizontal and vertical installation, run the test for both installation scenarios.



a) Cantilever clamp horizontal installation **b) Cantilever clamp vertical installation** **c) Suspended clamp**

Figure 5 – Schematic diagram of cold temperature installation

d) Heat up the chamber to room temperature and maintain the temperature for 2 hours. Visually inspect the spacer clamps for cracks and other damage. Check for tight fit of fastening material and dummies.

e) The test is considered passed if the spacer clamps can be mounted and the cable dummy can be installed at a low temperature without any damage. The fastener materials shall not have loosened or become loose.

6.5.1.3 Information to be given in the product detail specification

The minimum installation temperature shall be given in the product detail specification.

6.5.2 Climatic sequence

6.5.2.1 Requirements

After the test, the spacer clamps shall meet following requirements:

a) The cable dummies shall be firmly held in place after each step.

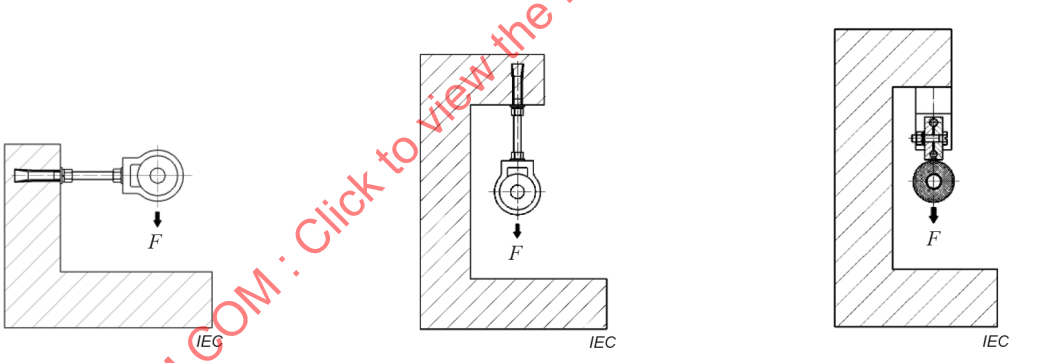
b) All parts of the spacer clamps, including fasteners shall be free from loosening, cracking and other damage.

c) Metal parts shall not show traces of corrosion.

d) Required number of tests: n_{min} = 3.

6.5.2.2 Test setup

Install the spacer clamps on a suitable fixture according to the installation instruction for horizontal cable installation. If cantilever spacer clamps are suitable for horizontal and vertical clamp installation, run the test for both installation scenarios. Insert a cable dummy and load the dummy with additional load F as stated in the relevant detail specification as shown in Figure 6.



a) Cantilever clamp horizontal installation

b) Cantilever clamp vertical installation

c) Suspended clamp

Figure 6 – Installation for climatic sequence test

6.5.2.3 Test procedure

The test procedure shall be as follows:

a) Step 1: Dry heat

- The specimen shall be exposed to the dry heat test at the upper operating temperature for 16 h. The relative humidity shall not exceed 50 %.
- After exposure, the specimen shall be removed from the chamber and allowed to recover for 1 h to 2 h in standard atmospheric conditions (see 6.1b)).
- Step 2 shall proceed within 12 h of completion of step 1.

b) Step 2: Damp heat
   - The specimen shall be exposed to three cycles (24 h each) of the damp heat cyclic test of IEC 60068-2-30. The upper temperature shall be 55 °C.
   - After exposure, the specimen shall be removed from the chamber and allowed to recover for 1 h to 2 h in standard atmospheric conditions.
   - The specimen shall be subjected to step 3 immediately after recovery.

c) Step 3: Cold
   - The specimen shall be exposed to the cold test Ab of IEC 60068-2-1 at the specified minimum operating temperature of the clamp.
   - The duration of the test should be 16 h.
   - After exposure, the specimen shall be removed from the chamber and allowed to recover for 1 h to 2 h in standard atmospheric conditions.

6.5.2.4 Information to be given in the relevant detail specification

The following information shall be given in the relevant specification:

a) the operating temperature range;
b) minimum operating temperature;
c) the maximum humidity;
d) the force f shall be given in the relevant specification.

6.5.3 Salt mist

6.5.3.1 Requirements

After the test, spacer clamps shall satisfy the following requirements:

a) The spacer clamps and fasteners shall be free from any signs of corrosion. The coating shall be free of bubbles and flaking.
b) Non-metallic parts shall be free from deformation, degradation, and other abnormalities.

6.5.3.2 Test procedure

Place the spacer clamp in a test chamber to perform the test in accordance with ISO 9227 at 35 °C ± 2 °C with 5 % concentration of salt solution with the test duration specified in the relevant specification.

After the test, examine the spacer clamps and fasteners for compliance with the requirements of 6.5.5.1.

6.5.3.3 Information to be given in the product detail specification

The following information shall be given in the relevant specification:

a) Test temperature, duration, and concentration of salt solution, if other than 35 °C, 96 % and 5 %, respectively.
b) Document the surface of the tested and untested specimen side by side with a colour photograph. Note any signs of corrosion, bubbles, and flakes.
c) Any deviation from the standard procedure.

6.5.4 High cycle fatigue (optional)

6.5.4.1 Requirements

The spacer clamps shall satisfy the following requirements:

a) During the test, the maximum increase in displacement of the dummy from the test start compared to the current state shall not exceed 50 % × S_0 (see 6.5.4.2 b)) or 12 mm, whichever comes first.

b) After the test, the maximum permanent increase in displacement of the dummy from the test start shall not exceed 6 mm and all parts of the spacer clamp and fastener shall be free from breakage, loosening, and other damage.

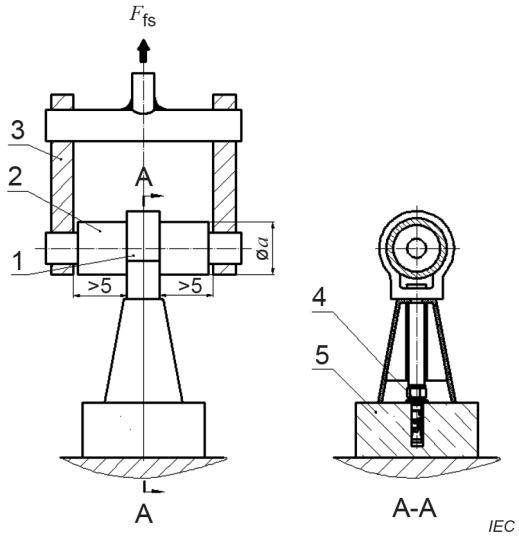
c) Required number of tests: n_{min} = 3.

6.5.4.2 Test procedure

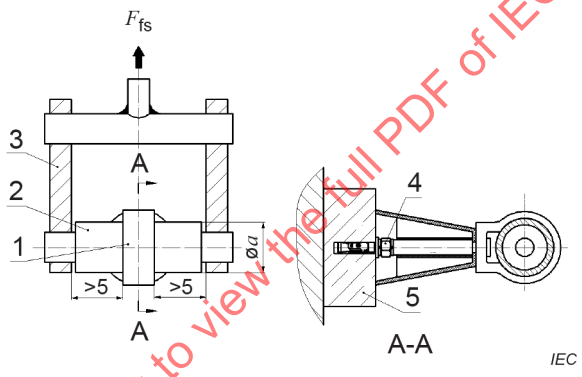
Test procedure shall be as follows:

a) Fix the spacer clamp according to the installation instructions in non-cracking bulk concrete with compressive strength not less than 20 MPa. Attach a dummy in position of the radiating cable as intended, as shown in Figure 7. Record the original position of the centre axis of the dummy.

Dimensions in millimetres



a) Tensile load test



b) Shear load test

Key

1 cantilever clamp
2 cable dummy
3 tension tester
4 anchor
5 base (cement concrete blocks conforming to the designation, etc)

Figure 7 – Schematic diagram of test for high cycle fatigue

b) First apply the specified fatigue load (F_{fs}) and measure the displacement S_0 of the centre axis of the dummy compared to the unloaded state (original place). See Annex A for the load (F_{fs}) recommendation.

c) Then perform the swelling load test shown in Figure 8 in a force-controlled manner with the following requirements:

- the frequency of the applied oscillation shall be less than 3 Hz;
- the number of cycles shall be > 10^6;
- the tests are performed at room temperature, permissible range 15 °C to 30 °C and humidity > 20 %.

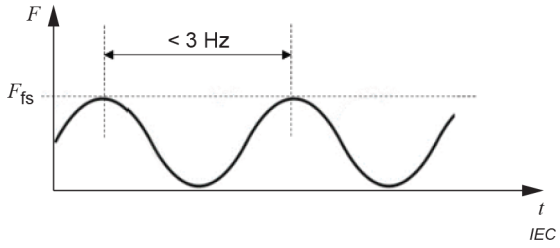


Figure 8 – Swelling load

d) During the test, continuously record the displacement and applied force (F_{fs}). The maximum force applied shall be < ±5 %.

e) After the test:

– Measure the displacement of the centre axis of the dummy after the test compared to the unloaded state (original place);

– Examine all parts of spacer clamps and fasteners.

6.5.4.3 Information to be given in the relevant detail specification

The following information shall be given in the relevant specification:

a) compressive strength of bulk concrete, if less than 20 MPa;

b) specified fatigue load F_{fs};

c) frequency;

d) number of cycles performed;

e) the maximum displacement and the permanent displacement;

f) any deviation from the standard procedure.

6.5.5 Fire-resistance (fireproof clamp)

6.5.5.1 Requirements

The spacer clamps shall satisfy the following requirements:

a) the bearing capacity of the fireproof clamp F shall be as stated in the relevant detail specification;

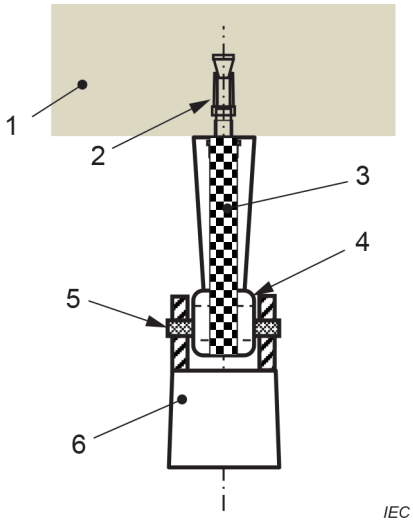
b) minimum required number of tests: n_{min} = 3.

6.5.5.2 Test procedure

The fireproof clamp shall be tested as follows:

a) Install the fire safety holders in accordance with the manufacturer's installation instructions in concrete with a minimum strength of C20/25. The slab thickness shall be in accordance with the expected fire resistance duration.

b) Install a loading with fireproof weight as specified in the relevant detail specification in the fireproof clamps, as shown in Figure 9. Every clamp shall be loaded separately.



Key

1 concrete slab
2 anchor
3 fire safety equipment
4 spacer clamp
5 steel axis
6 weight (steel)

Figure 9 – Schematic diagram of fire resistance test

c) Heat according to the curve of Figure 7 in ISO 834-1:1999 (see Formula (1)):

$$T = 345\log_{10}(8t+1)+20 \quad (1)$$

where

T is the temperature in the oven, expressed in °C;

t is the time, expressed in minutes.

d) Determine the time of component failure defined by the fall of the reference weight.

e) During the heating process, do not use any auxiliary materials to protect the specimen.

6.5.5.3 Information to be given in the relevant detail specification

The following information shall be given in the relevant specification:

a) The fire resistance bearing capacity of the clamp in weight and time (e.g. 150 N, 120 min).

NOTE Unless more detailed investigations are made, the resistance time can be given as follows:

$$t = \bar{X}/\gamma$$

where:

$\bar{X}$ is the mean value of the test results;

γ is the safety factor:

γ = 1,4 for variation coefficient < 15 %;

γ = 2 for variation coefficient > 15 %.

b) Any deviation from the standard procedure.

6.5.6 Solar radiation (outdoor spacer clamp with non-metallic material)

6.5.6.1 Requirements

After the test, the spacer clamps shall satisfy requirements as follows:

a) non-metallic parts of spacer clamps shall be free from fracture and other damage;

b) spacer clamps shall be free from cracks or fractures;

c) the loss of tensile strength performance (load forces) measured before and after the test shall be less than 10 %.

6.5.6.2 Test procedure

The test procedure shall be as follows:

a) Place the spacer clamp into a test chamber to perform test in accordance with IEC 60068-2-5, procedure Sa2 with radiation strength of 1,09 kw/m^2 at 65 °C black-standard-temperature within the chamber during a period of exposure to radiation.

b) The test shall be performed continuously for a minimum 35 cycles, with each 24 h cycle comprising 20 h for exposure and 4 h for non-exposure, with a total radiation dosage of 21,8 kWh/m^2 for a cycle.

c) Remove the spacer clamp to examine appearance for cracks and fractures.

d) Perform a normal tensile force test in accordance with 6.4.2. The loss of tensile force shall be less than 10 % compared to non-irradiated test samples.

6.5.6.3 Information to be given in the product detail specification

The following information shall be given in the relevant specification:

a) radiation strength, cycles, radiation duration for a cycle and total radiation dosage, if other than 1,09 kw/m^2 and 20 h with total radiation of 21,8 kWh/m^2;

b) the loss of tensile force shall be less than 10 %;

c) any deviation from the standard procedure.

7 Type test

For a type test, unless otherwise specified in detail specification, inspections and sampling plan shall be performed as specified in Table 1.

No failure is allowed.

Table 1 – Type test

Group	Inspection items	Paragraph	Samples
1	Visual inspection	6.2	All test samples
	Structural dimensions	6.3	
2	Clamping force	6.4.1	≥ 3
3	Normal tensile force	6.4.2	≥ 3
4	Shear force	6.4.3	≥ 3
5	Cold temperature installation	6.5.1	≥ 3
6	Climatic sequence	6.5.2	≥ 3
7	Salt mist	6.5.3	≥ 3
8	High cycle fatigue	6.5.4	≥ 3
9	Fire-resistance (fireproof clamp)	6.5.5	≥ 3
10	Solar radiation (outdoor spacer clamp with non-metallic material)	6.5.6	≥ 3
NOTE For non-self-supporting radiating cable, when users want to know whether the spacer clamp they choose is suitable for the radiating cable or not, a suitability test might need to be carried out in accordance with Annex C.			