

# INTERNATIONAL STANDARD

**Coaxial communication cables –  
Part 10-1: Blank detail specification for semi-rigid cables with fluoropolymer  
dielectric**

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INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## COAXIAL COMMUNICATION CABLES –

**Part 10-1: Blank detail specification for semi-rigid cables  
with fluoropolymer dielectric**

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IEC 61196-10-1 has been prepared by subcommittee 46A: Coaxial cables, of IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories. It is an International Standard.

This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision.

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

- a) Title was changed to: Blank detail specification for semi-rigid cables with fluoropolymer dielectric.
- b) Further changes in accordance with IEC 61196-10.

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

| Draft         | Report on voting |
|---------------|------------------|
| 46A/1600/FDIS | 46A/1607/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 International Standard is to be used in conjunction with IEC 61196-1:2005 and IEC 61196-10:2022.

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.

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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

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](http://webstore.iec.ch) in the data related to the specific document. At this date, the document will be

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- withdrawn,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

## COAXIAL COMMUNICATION CABLES –

### Part 10-1: Blank detail specification for semi-rigid cables with fluoropolymer dielectric

#### 1 Scope

This part of IEC 61196 applies to coaxial communication cables described in IEC 61196-10, which specifies the requirements of semi-rigid coaxial communication cables with fluoropolymer dielectric and tubular outer conductors. Semi-rigid coaxial communication cables with fluoropolymer dielectric are widely used in mobile communication systems, microwave test equipment, radar, aerospace, electronic countermeasures and other fields.

This part of IEC 61196 is used in conjunction with IEC 61196-1 and IEC 61196-10, which determines the layout and style for detail specifications, based on the blank detail specification, that can be prepared by a national organization, a manufacturer, or a user.

#### 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 61196-1:2005, *Coaxial communication cables – Part 1: Generic specification: General, definitions and requirements*

IEC 61196-10:2022, *Coaxial communication cables – Part 10: Sectional specification for semi-rigid cables with fluoropolymer dielectric*

IEC 61169-4, *Radio-frequency connectors – Part 4: RF coaxial connectors with inner diameter of outer conductor 16 mm (0,63 in) with screw lock-Characteristic impedance 50  $\Omega$  (type 7-16)*

#### 3 Terms and definitions

No terms and definitions are listed in this document.

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>

#### 4 Guidance for the preparation of detail specifications

The detail specification shall be written in accordance with the layout of the blank detail specification, which forms part of this document.

When a characteristic does not apply, then NA (not applicable) should be entered in the appropriate space.

When a characteristic applies but a specific value is not considered necessary, then NS (not specified) should be entered.

The numbers shown in brackets in Clause 5 correspond to the following items of required information, which should be entered in the space provided.

- [1] Name and address of the organization that has prepared the document.
- [2] IEC document number and date of issue.
- [3] Address of the organization from which the document is available.
- [4] Related documents.
- [5] Any other references to the cable, national reference, trade name, etc.
- [6] Complete description of the cable.
- [7] Cable construction.
- [8] Engineering information.
- [9] Parameter or characteristic.
- [10] Reference to the relevant subclause of the sectional specification.
- [11] Minimum requirements, the values entered shall meet as a minimum the requirements of the sectional specification.
- [12] Remarks.

## 5 Blank detail specification

| Title                                                                                                                                                                              |                                              |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------|
| [1] Prepared by:                                                                                                                                                                   | [2] Document No.:<br><br>Issue:<br><br>Date: |              |
| [3] Available from:                                                                                                                                                                | [4] Generic specification                    | IEC 61196-1  |
|                                                                                                                                                                                    | Sectional specification                      | IEC 61196-10 |
| [5] Additional references:<br>References to the different test procedures of Column 8 are given in IEC 61196-10.                                                                   |                                              |              |
| [6] Cable description:<br>a) Cable variant<br>b) Material of inner conductor<br>c) Material and construction of dielectric<br>d) Outer conductor<br>e) Material of sheath (if any) |                                              |              |



| Title                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>[7] Cable construction</b></p> <p><b>a) Inner conductor</b></p> <p>Material:</p> <p>Diameter (mm) nominal:</p> <p>Tolerance (mm): <math>\pm \dots</math></p> <p><b>b) Dielectric</b></p> <p>Material:</p> <p>Construction:</p> <p>Diameter (mm) nominal:</p> <p>Tolerance (mm) tube: <math>\pm \dots</math> (for cable with smooth tube outer conductor)</p> <p><b>c) Outer conductor</b></p> <p>Material:</p> <p>Construction:</p> <p>For smooth tube outer conductor:</p> <p>Diameter and tolerance (mm): <math>\dots \pm \dots</math></p> <p>For corrugated outer conductor:</p> <p>Peak diameter and tolerance(mm): <math>\dots \pm \dots</math></p> <p>Root diameter and tolerance(mm): <math>\dots \pm \dots</math></p> <p>Pitch and tolerance(mm): <math>\dots \pm \dots</math></p> <p><b>d) Sheath(if any)</b></p> <p>Material</p> <p>Minimum thickness(mm)</p> <p>Diameter (mm)</p> <p>Tolerance(mm): <math>\pm \dots</math></p> |
| <p><b>[8] Engineering information (reference only)</b></p> <p>a) Operating temperature range, storage temperature range, installation temperature range:</p> <p>b) Maximum recommended operating frequency, cut-off frequency:</p> <p>c) Nominal characteristic impedance:</p> <p>d) Relative propagation velocity (velocity ratio):</p> <p>e) Maximum continuous working voltage:</p> <p>f) Minimum bending radius(static state):</p> <p>g) Minimum bending radius(dynamic state for corrugated outer conductor):</p> <p>h) Nominal weight:</p> <p>i) Capacitance:</p> <p>j) Maximum tensile force:</p> <p>k) Average power (when required):</p> <p>l) Peak power (when required):</p>                                                                                                                                                                                                                                                         |

| [9] Parameter                                                                            | [10]<br>IEC 61196-<br>10:2022<br>Subclause | [11] Value                                                                                              | [12] Remarks                                                                                                                                                                                                                                                                                                                                                                                     |
|------------------------------------------------------------------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Electrical characteristics</b>                                                        | <b>8.2</b>                                 |                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                  |
| Continuity                                                                               | 8.2.1                                      | Inner conductor shall be continuous.<br>Outer conductor shall be continuous.                            |                                                                                                                                                                                                                                                                                                                                                                                                  |
| Inner and outer conductor direct current resistance                                      | 8.2.2                                      | $\leq \dots \Omega/\text{km}$ (Inner conductor)<br>$\leq \dots \Omega/\text{km}$ (Outer conductor)      |                                                                                                                                                                                                                                                                                                                                                                                                  |
| Withstand voltage of dielectric                                                          | 8.2.3                                      | $\dots \text{ kV RMS}$                                                                                  | 40 Hz to 60 Hz                                                                                                                                                                                                                                                                                                                                                                                   |
| Withstand voltage of sheath(or spark test) <sup>a</sup>                                  | 8.2.4                                      | $\dots \text{ kV RMS}$                                                                                  | 40 Hz to 60 Hz                                                                                                                                                                                                                                                                                                                                                                                   |
| Insulation resistance                                                                    | 8.2.5                                      | $\geq 10^4 \text{ M}\Omega \cdot \text{km}$                                                             |                                                                                                                                                                                                                                                                                                                                                                                                  |
| Capacitance                                                                              | 8.2.6                                      | $\leq \dots \text{ pF/m}$                                                                               | The value of typical cable; see IEC 61196-10:2022, Annex A                                                                                                                                                                                                                                                                                                                                       |
| Characteristic impedance                                                                 | 8.2.7                                      | $(\dots \pm \dots) \Omega$                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                  |
| Regularity of impedance <sup>b</sup>                                                     | 8.2.8                                      | $\geq 40 \text{ dB}$ or resp $\leq 1 \%$                                                                |                                                                                                                                                                                                                                                                                                                                                                                                  |
| Propagation velocity <sup>b</sup>                                                        | 8.2.9                                      | $\geq \dots \%$ or $\dots \% \pm \dots \%$                                                              | The value of typical cable; see IEC 61196-10:2022, Annex A                                                                                                                                                                                                                                                                                                                                       |
| Return loss                                                                              | 8.2.10                                     | $\dots \text{ MHz to MHz}$<br>$\geq \dots \text{ dB}$                                                   | Specimen length: $\geq 2\text{m}$                                                                                                                                                                                                                                                                                                                                                                |
| Attenuation constant                                                                     | 8.2.11                                     | $\dots \text{ MHz} \leq \dots \text{ dB/m at } 20^\circ \text{C}$                                       | The value of typical cable; see IEC 61196-10:2022, Annex A                                                                                                                                                                                                                                                                                                                                       |
| Attenuation stability <sup>b</sup>                                                       | 8.2.12                                     | See 8.3.1                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                  |
| Phase stability vs temperature <sup>c</sup>                                              | 8.2.13                                     | $\leq \dots \text{ PPM}$<br>Frequency: $\dots \text{ GHz}$<br>Test temperature:                         | The value of typical cable; see IEC 61196-10:2022, Annex A                                                                                                                                                                                                                                                                                                                                       |
| Phase stability vs bending (for cable with corrugated tube outer conductor) <sup>c</sup> | 8.2.14                                     | $\pm \dots^\circ$ ( $\dots \text{ GHz to } \dots \text{ GHz}$ )<br>Mandrel diameter: $\dots \text{ mm}$ |                                                                                                                                                                                                                                                                                                                                                                                                  |
| Corona voltage <sup>b</sup>                                                              | 8.2.15                                     | $\geq \dots \text{ kV}$                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                  |
| RF power <sup>b</sup>                                                                    | 8.2.16                                     | $\dots \text{ W}$<br>Frequency: $\dots \text{ GHz}$                                                     |                                                                                                                                                                                                                                                                                                                                                                                                  |
| Passive Intermodulation <sup>b c</sup>                                                   | 8.2.17                                     | Better than $-158 \text{ dBc}$                                                                          | This test is only applicable to the cable with characteristic impedance of $50 \Omega$ .<br><br>Both ends of the specimen should be attached with suitable RF connectors (recommended type 7-16 connectors, in accordance with IEC 61169-4).<br><br>PIM should be performed under the minimum bending radius.<br><br>Input power: $2 \times 20 \text{ W}$<br>Test frequency: $\dots \text{ MHz}$ |

| [9] Parameter                                      | [10]<br>IEC 61196-10:2022<br>Subclause | [11] Value                                                                                                                                                                                                                                                                                          | [12] Remarks                                                                                                                                                                                                                               |
|----------------------------------------------------|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Screening attenuation <sup>b</sup>                 | 8.2.18                                 | Better than –110 dB, or specified in the detailed specification.                                                                                                                                                                                                                                    | 0,5 GHz to 3 GHz                                                                                                                                                                                                                           |
| <b>Environmental characteristics</b>               | <b>8.3</b>                             |                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                            |
| Ageing <sup>b</sup>                                | 8.3.1                                  | a) Displacement of the dielectric: ≤...mm<br>b) The return loss shall be in accordance with the detail specification<br>c) The attenuation shall be in accordance with the detail specification<br>d) No cracks, flaws or other damage in the cable surface                                         | Length of sample: ...m<br>Test temperature: ...°C ±...°C<br>Duration: 168 h                                                                                                                                                                |
| Heat behaviour                                     | 8.3.2                                  | Neither cracks nor longitudinal splits shall be visible in the outer conductor. Nor shall the dielectric core protrude from the ends of the test specimen.                                                                                                                                          | For sheathed cable, the sheath shall be stripped off.<br>Length of the cable under test: 300 mm to 350 mm<br>Temperature of the heating: 175 °C ± 5 °C, or as specified in detail specification                                            |
| Solderability                                      | 8.3.3                                  | The surface of tubular outer conductor corresponding to the immersed length shall be correctly tinned, i.e. more than 95 % of this surface shall be wetted by solder, the spots and marks of soldering shall not be concentrated in one area and they shall not exceed 5 % of the immersed surface. |                                                                                                                                                                                                                                            |
| Resistance to soldering <sup>c</sup>               | 8.3.4                                  | ...mm                                                                                                                                                                                                                                                                                               |                                                                                                                                                                                                                                            |
| Thermal shock                                      | 8.3.5                                  | a) Displacement of the dielectric: ≤...mm<br>b) The return loss shall be in accordance with the detail specification<br>c) The attenuation shall be in accordance with the detail specification<br>d) No cracks, flaws or other damage in the cable surface                                         | Length of sample: ...m<br>Low temperature: ...°C ±...°C<br>High temperature: ...°C ±...°C<br>Duration time: see IEC 61196-10:2022, Annex B, or as specified in detail specification.<br>Cycles: 5 or as specified in detail specification. |
| Ultraviolet stability of the sheath <sup>a c</sup> | 8.3.6                                  | a) After 720h, change in elongation ≤ ±20 %<br>b) After 720h, change in tensile strength ≤ ±20 %<br>c) No visual cracks                                                                                                                                                                             | Test procedure shall be specified in detail specification (only for PE sheath).                                                                                                                                                            |

| [9] Parameter                                              | [10]<br>IEC 61196-10:2022<br>Subclause | [11] Value                                                                                                                                                                                                                                        | [12] Remarks                                                                                                                                                                                                |
|------------------------------------------------------------|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Mechanical characteristics</b>                          | <b>8.4</b>                             |                                                                                                                                                                                                                                                   |                                                                                                                                                                                                             |
| Visual examination                                         | 8.4.1                                  | The sheath shall be free of cracks, splits, irregularities, and imbedded foreign material.<br><br>The outer conductor shall be free of black spots or cracks.                                                                                     |                                                                                                                                                                                                             |
| Dimensional examination                                    | 8.4.2                                  | The requirement shall be specified in the detailed specification.                                                                                                                                                                                 |                                                                                                                                                                                                             |
| Ovality of inner conductor <sup>c</sup>                    | 8.4.3                                  | ≤ ... %                                                                                                                                                                                                                                           | ≤ 7 % in accordance with IEC 61196-10                                                                                                                                                                       |
| Eccentricity of dielectric <sup>c</sup>                    | 8.4.4                                  | ≤ ... %                                                                                                                                                                                                                                           | ≤ 10 % in accordance with IEC 61196-10                                                                                                                                                                      |
| Ovality of sheath <sup>a c</sup>                           | 8.4.5                                  | ≤ ... %                                                                                                                                                                                                                                           | ≤ 7 % in accordance with IEC 61196-10                                                                                                                                                                       |
| Adhesion of dielectric                                     | 8.4.6                                  | ≥...N to ≤ ...N                                                                                                                                                                                                                                   | Test temperature:<br>20 °C ± 5 °C<br><br>Specimen length (L) = 50 mm                                                                                                                                        |
| Cable bending                                              | 8.4.7                                  | a) Attenuation change in accordance with the relevant detail specification<br><br>b) The return loss in accordance with the relevant detail specification.<br><br>c) No physical damage in cable surface<br><br>When applicable,<br>PIM ≥ 158 dBc | a) For smooth tube outer conductor: single bending<br><br>Procedure:<br>Bend radius:...mm<br><br>b) For corrugated tube outer conductor: repeated bending<br><br>Bend radius:...mm<br><br>Number of cycles: |
| Tensile strength of cable (longitudinal pull) <sup>b</sup> | 8.4.8                                  | a) The characteristic impedance: (...±...) Ω<br><br>b) No physical damage in cable .                                                                                                                                                              | The maximum tension applied shall be greater than the cable weight of 100 m or be specified in the detail specification.                                                                                    |