

INTERNATIONAL STANDARD

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

IEC 61196-10:2022

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COAXIAL COMMUNICATION CABLES –**Part 10: Sectional specification for semi-rigid cables
with fluoropolymer dielectric**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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IEC 61196-10 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: Sectional specification for semi-rigid cables with fluoropolymer dielectric
- b) 4.3, Dielectric: other fluoropolymer materials (such as FEP, PFA) were added
- c) Table 1 – Distinguishing number was added
- d) Table 2 – Rated temperature was added

- e) New requirements were added as below:
- 8.2.13, Phase stability vs temperature
 - 8.2.14, Phase stability vs bending (for cable with corrugated tube outer conductor)
 - 8.2.15, Corona voltage
 - 8.2.16, RF power
 - 8.2.18, Screening attenuation
 - 8.3.5, Thermal shock
 - 8.3.6, Ultraviolet stability of the sheath
 - 8.4.8, Tensile strength of cable (longitudinal pull)
 - 8.5, Fire performance requirements (applicable to the cable with sheath)
 - 8.5.1, Flame propagation
 - 8.5.2, Halogen acid gas emission
 - 8.5.3, Toxic gas emission
 - 8.5.4, Smoke density
- f) 7.4.8, Thermal cycling was deleted
- g) Annex A: Performance requirements of typical cables was added
- h) Annex B: Requirements for thermal shock was added

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

Draft	Report on voting
46A/1601/FDIS	46A/1606/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.

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. The main document types developed by IEC are described in greater detail at 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 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: Sectional specification for semi-rigid cables with fluoropolymer dielectric

1 Scope

This part of IEC 61196 specifies the materials and cable construction for semi-rigid coaxial communication cables with fluoropolymer dielectric, IEC type designation, identification, marking and labelling, standard rating and characteristics, requirements of finished cables, quality assessment, delivery and storage, etc.

This part of IEC 61196 applies to semi-rigid coaxial communication cables with fluoropolymer dielectric and tubular outer conductor. Semi-rigid coaxial communication cables with fluoropolymer dielectric are widely used in mobile communication systems, microwave test equipment, radar, aerospace and other fields.

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 60068-1:2013, *Environmental testing – Part 1: General and guidance*

IEC 60332-1-2, *Test on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame*

IEC 60754-1, *Test on gases evolved during combustion of materials from cables – Part 1: Determination of the amount of halogen acid gas*

IEC 61034-2, *Measurement of smoke density of cables burning under defined conditions – Part 2: Test procedure and requirements*

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 Ω (type 7-16)*

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

IEC 61196-1-101, *Coaxial communication cables – Part 1-101: Electrical test methods – Test for conductor d.c. resistance of cable*

IEC 61196-1-102, *Coaxial communication cables – Part 1-102: Electrical test methods – Test for insulation resistance of cable dielectric*

IEC 61196-1-103, *Coaxial communication cables – Part 1-103: Electrical test methods – Test for capacitance of cable*

IEC 61196-1-105, *Coaxial communication cables – Part 1-105: Electrical test methods – Test for withstand voltage of cable dielectric*

IEC 61196-1-106, *Coaxial communication cables – Part 1-106: Electrical test methods – Test for withstand voltage of cable sheath*

IEC 61196-1-108, *Coaxial communication cables – Part 1-108: Electrical test methods – Test for characteristic impedance, phase and group delay, electrical length and propagation velocity*

IEC 61196-1-110, *Coaxial communication cables – Part 1-110: Electrical test methods – Test for continuity*

IEC 61196-1-112, *Coaxial communication cables – Part 1-112: Electrical test methods – Test for return loss (uniformity of impedance)*

IEC 61196-1-113, *Coaxial communication cables – Part 1-113: Electrical test methods – Test for attenuation constant*

IEC 61196-1-115, *Coaxial communication cables – Part 1-115: Electrical test methods – Test for regularity of impedance (pulse/step function return loss)*

IEC 61196-1-116, *Coaxial communication cables – Part 1-116: Electrical test methods – Test for impedance with time domain reflectometry (TDR)*

IEC 61196-1-119, *Coaxial communication cables – Part 1-119: Electrical test methods – RF average power rating*

IEC 61196-1-126, *Coaxial communication cables – Part 1-126: Electrical test methods – Corona extinction voltage*

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IEC 61196-1-212, *Coaxial communication cables – Part 1-212: Environmental test methods – UV stability*

IEC 61196-1-215, *Coaxial communication cables – Part 1-215: Environmental test methods – High temperature cable ageing*

IEC 61196-1-301, *Coaxial communication cables – Part 1-301: Mechanical test methods – Test for ovality*

IEC 61196-1-302, *Coaxial communication cables – Part 1-302: Mechanical test methods – Test for eccentricity*

IEC 61196-1-305:2015, *Coaxial communication cables – Part 1-305: Mechanical test methods – Solderability and resistance to soldering*

IEC 61196-1-313, *Coaxial communication cables – Part 1-313: Mechanical test methods – Adhesion of dielectric and sheath*

IEC 61196-1-314:2015, *Coaxial communication cables – Part 1-314: Mechanical test methods – Test for bending*

IEC 61196-1-316, *Coaxial communication cables – Part 1-316: Mechanical test methods – Test of maximum pulling force of cable*

IEC 61196-1-318:2008, *Coaxial communication cables – Part 1-318: Mechanical test methods – Heat performance tests*

IEC 62037-4, *Passive RF and microwave devices, intermodulation level measurement – Part 4: Measurement of passive intermodulation in coaxial cables*

IEC 62153-4-4, *Metallic communication cable test methods – Part 4-4: Electromagnetic Compatibility (EMC) – Test method for measuring of the screening attenuation as up to and above 3 GHz, triaxial method*

IEC 62230, *Electric cables – Spark-test method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61196-1 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

semi-rigid coaxial communication cable

coaxial line with smooth or corrugated tube outer conductor, not intended to be bent or flexed in service or not intended to be flexed after initial forming

4 Materials and cable construction

4.1 General

The cable construction is composed of inner conductor, insulation, outer conductor and sheath.

4.2 Inner conductor

4.2.1 Conductor material

IEC 61196-1:2005, 4.4.1 applies.

The inner conductor material shall be as stated in the relevant cable detail specification.

4.2.2 Conductor construction

The conductor shall consist of a solid or stranded wire, or corrugated or smooth tube or rifled tube.

In addition, IEC 61196-1:2005, 4.4.4 applies.

The inner conductor diameter shall be stated in the detail specification.

For corrugated inner conductors, peak diameter and root diameter and pitch shall be specified in the detail specification.

The tolerance of the inner conductor shall be specified in the detail specification.

4.3 Dielectric

The dielectric shall be one of the following:

- solid polytetrafluoroethylene (PTFE) or perfluoroalkoxy (PFA) dielectric;
- low-density polytetrafluoroethylene (PTFE) dielectric;
- foamed dielectric fluorinated ethylene propylene (FEP) or perfluoroalkoxy (PFA) dielectric;
- or any other fluoropolymer dielectric materials as stated in the relevant detail specification.

4.4 Outer conductor

The outer conductor shall be a copper or aluminium smooth or corrugated tube with or without coating, or be as stated in the relevant cable detail specification.

The coating material and thickness, if any, shall be stated in the relevant detail specification.

In addition, the requirements of IEC 61196-1:2005, 4.6.1 apply.

For cables with smooth tube out conductors, the diameter and tolerance shall be stated in the detail specification. The recommended outer diameter ratings of outer conductors (approximate the rounded value) are as follows:

0,86 mm (0,034"), 1,19 mm (0,047"), 2,18 mm (0,079"), 3,58 mm (0,141"), 6,35 mm (0,250") or as specified in the detail specification.

For corrugated outer conductors, peak diameter and root diameter and pitch shall be as specified in the detail specification. The recommended outer diameter ratings of outer conductors (approximate the rounded value) is 6 mm (0,236"), or as specified in the detail specification.

The tolerance on the outer conductor shall be specified in the detail specification.

4.5 Sheath (when applicable)

The sheath of a cable is optional and shall be in accordance with IEC 61196-1:2005, 4.7, with the following amendments and additions.

- a) The material of cable sheath shall be specified in the detail specification.
- b) The diameter and minimum thickness and tolerance of the sheath shall be as stated in the detail specification.
- c) For cables intended for outdoor use or exposed to sunlight, the cable shall pass the UV stability test according to IEC 61196-1-212.

5 Type name and identification of cable

5.1 Type

The type of cable consists of nominal characteristic impedance, the hyphen, and the outer diameter rating of outer conductor. The specific names are as follows:

- a) The nominal characteristic impedance, giving the nominal characteristic impedance of the cable in ohms, e.g. 50.
- b) The hyphen is an interval.
- c) The outer diameter ratings (the approximate outer diameter) of the outer conductor in mm; when needed, the outer diameter ratings of the outer conductor in inches may be given in brackets.

EXAMPLE 50-3(0,141") is the cable type with nominal characteristic impedance of 50 Ω and the outer diameter rating of outer conductor is 3,58 mm (0,141") and 50-6 (0,250") is the cable type with nominal characteristic impedance of 50 Ω and the outer diameter rating of outer conductor is 6,35 mm (0,250").

5.2 Variants

The variant of cables should be identified by the following:

- a) Type name: see 5.1.
- b) Distinguishing number: it should consist of three digital characters (XYZ) which distinguishes the different construction and material of the various cables.

The "X" specifies the material type of the inner conductor.

The "Y" specifies the material type and structure of the dielectric.

The "Z" specifies the material type and structure of outer conductor.

The details are listed in Table 1.

Table 1 – Distinguishing number

"X"	Material of the inner Conductor	"Y"	Material and structure of dielectric	"Z"	Material and structure of outer conductor
No Entry	Silver plated copper wire	No Entry	PTFE	No Entry	Smooth copper tube
SS	Silver plated copper clad steel wire	L	Low-density PTFE	AT	Smooth aluminium tube
SA	Silver plated copper clad aluminium wire	UL	Ultra-low-density PTFE	H	Helically corrugated copper tube
		FF	Foamed FEP		
		FP	Foamed PFA		
		P	PFA		

5.3 Cable marking

The cable marking consists of cable type, variants and IEC standard number, as shown in Figure 1.

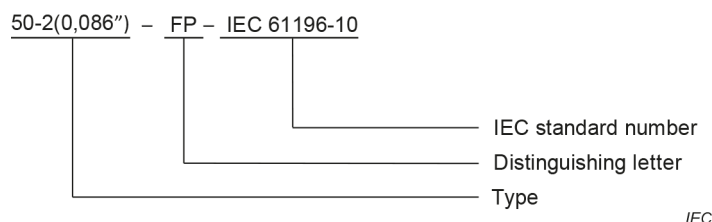


Figure 1 – Cable marking

EXAMPLE 50-2(0,086")-FP-IEC 61196-10 indicates that the characteristic impedance is 50 Ω, the outer diameter rating of outer conductor is 2,18 mm (0,086"), silver-plated copper inner conductor, foamed PFA dielectric, smooth copper tube, which conform to IEC 61196-10.

6 Identification, marking and labelling

6.1 Cable identification

IEC 61196-1:2005, 6.1 applies.

6.2 Cable marking

The cable marking shall be applied to the sheath. The marking shall consist of cable marking given in 5.3 and/or the manufacturer's designated marking when specified in the detail specification.