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Coaxial communication cables –
Part 6: Sectional specification for CATV drop cables

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COAXIAL COMMUNICATION CABLES –

Part 6: Sectional specification for CATV drop cables

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 61196-6:2009. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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IEC 61196-6 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 2009. This edition constitutes a technical revision.

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

a) extended scope,

b) revised sheath marking and labelling.

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

FDIS	Report on voting
46A/1498/FDIS	46A/1514/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.

A list of all the 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/standardsdev/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- withdrawn,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
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COAXIAL COMMUNICATION CABLES –

Part 6: Sectional specification for CATV drop cables

1 Scope

~~This part of IEC 61196 applies to coaxial communications cables. It specifies the requirements for CATV drop cables for use in cabled television distribution networks operating at temperature between −40 °C and +70 °C and in the frequency range from 5 MHz to 1 000 MHz or from 5 MHz to 3 000 MHz.~~

This part of IEC 61196 applies to coaxial communications cables. It specifies the requirements for CATV drop cables for analogue and digital one and two way signal transmission, e.g. for cable networks for television signals, sound signals, interactive services, surveillance & control systems, and satellite television receiving systems according to the requirements of IEC 60728-1, IEC 60728-1-1, IEC 60728-101, IEC 60728-10, ISO/IEC 11801-1 and ISO/IEC 11801-4. This also includes the transmission of BCT signals provided by a CATV, MATV or SMATV cable network.

The operating frequency is from 5 MHz to 1 000 MHz or from 5 MHz to 3 000 MHz.

Operating temperature is between −40 °C and +70 °C.

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:~~1988~~2013, *Environmental testing − Part 1: General and guidance*

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60096-0-1, *Radio frequency cables – Part 0-1: Guidelines to the design of detail specifications – Coaxial cables*

IEC 60811-605, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 605: Physical tests – Measurement of carbon black and/or mineral filler in polyethylene compounds*

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

IEC 61196-1-1~~:2007~~, *Coaxial communication cables – Part 1-1: Capability approval for coaxial cables*

~~IEC 61196-1-100 (all parts), *Coaxial communication cables – Part 1-1XX: Electrical test methods*~~

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~~IEC 61196-1-200 (all parts), *Coaxial communication cables – Part 1-2XX: Environmental test methods*~~

~~IEC 61196-1-300 (all parts), *Coaxial communication cables – Part 1-3XX: Mechanical test methods*~~

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 61196-1-105, *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 61196-1-112, *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 61196-1-201, *Coaxial communication cables – Part 1-201: Environmental test methods – Test for cold bend performance of cable*

IEC 61196-1-203, *Coaxial communication cables – Part 1-203: Environmental test methods – Test for water penetration of cable*

IEC 61196-1-206, *Coaxial communication cables – Part 1-206: Environmental test methods – Climatic sequence*

IEC 61196-1-209, *Coaxial communication cables – Part 1-209: Environmental test methods – Thermal cycling*

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

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 61196-1-308, *Coaxial communication cables – Part 1-308: Mechanical test methods – Test for tensile strength and elongation for copper-clad metals*

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IEC 61196-1-310, *Coaxial communication cables − Part 1-310: Mechanical test methods − Test for torsion characteristics of copper-clad metals*

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 61196-1-317, *Coaxial communication cables – Part 1-317: Mechanical test methods – Test for crush resistance of cable*

IEC 61196-1-324, *Coaxial communication cables – Part 1-324: Mechanical test methods – Test for abrasion resistance of cable*

~~IEC 62153 (all parts), *Metallic communication cable test methods*~~

IEC 62153-1-1, *Metallic communication cables test methods − Part 1-1: Electrical − Measurement of the pulse/step return loss in the frequency domain using the Inverse Discrete Fourier (IDFT)*

IEC 62153-4-3, *Metallic communication cable test methods – Part 4-3: Electromagnetic compatibility (EMC) – Surface transfer impedance – Triaxial method*

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 apply.

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

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

4 Materials and cable construction

4.1 Cable construction

The cable construction shall be in accordance with 4.2 to 4.6 of this document and the requirements stated in the relevant detail specification.

4.2 Inner conductor

4.2.1 Conductor material

IEC 61196-1:2005, Subclause 4.4.1 applies. The conductor material shall be stated in the relevant detail specification.

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4.2.2 Conductor construction

The conductor shall consist of a single wire or tube.

IEC 61196-1:2005, Subclause 4.4 applies.

The nominal diameter of the inner conductor and tolerance shall be stated in the relevant detail specification.

The maximum allowable tolerance is ± 0,03 mm.

4.3 Dielectric

IEC 61196-1:2005, Subclause 4.5 applies.

The type, nominal diameter and tolerance along with the ovality and eccentricity of the dielectric shall be stated in the relevant detail specification.

The maximum allowable tolerance of the diameter is ±0,15 mm. The maximum allowable values for ovality and eccentricity are given in 7.4, Table 4 of this document.

~~Note:~~ If the tape of the outer conductor is bonded to the dielectric, the measurement shall be made over this tape.

4.4 Outer conductor or screen

The construction and material of the outer conductor or screen shall be as stated in the relevant detail specification. The construction shall be in accordance with IEC 61196-1:2005, Subclause 4.6.1 f) or 4.6.1 g).

The nominal diameter of the outer conductor or screen shall be stated in the relevant detail specification.

The maximum allowable tolerance of the diameter is ±0,20 mm.

4.5 Sheath

IEC 61196-1:2005, Subclause 4.7, as amended by the following, applies:

Cables without an outer sheath shall not be subject to 4.5 of this document.

The outer sheath of the cable shall be a thermoplastic material as specified in the relevant detail specification.

The nominal sheath thickness shall be stated in the relevant detail specification.

The nominal diameter of the sheath shall be stated in the relevant detail specification.

The maximum allowable tolerance of the diameter is ±0,25 mm. The maximum allowable values for ovality and eccentricity are given in 7.4, Table 4 of this document.

For aerial cables or cables intended for outdoor applications utilising a black polyethylene sheath, the carbon black content shall be as stated in Table 4.

For other sheath material and colours of cables for outdoor use, the cable shall pass the UV stability test. (A relevant test procedure is under consideration.)

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The messenger type shall be specified in the relevant detail specification and shall include as a minimum the following criteria: type and material, tensile strength, corrosion properties and elongation.

4.6 Completed cable

The overall nominal completed cable dimensions shall be stated in the detail specification.

5 Standard ratings and characteristics

The ratings and characteristics applicable to each cable shall be specified herein or in the relevant detail specification.

6 Identification and marking

6.1 Cable identification

IEC 61196-1:2005, Subclause 6.1 applies.

6.2 ~~Cable~~ Sheath marking

~~The cable marking shall be applied to the sheath or jacket, or to the outer conductor when a sheath or jacket is not present. The marking shall consist of the IEC cable type number as given in 6.2 of IEC 61196-1 and/or the manufacturer's designated markings when specified in the relevant cable specification.~~

Unless otherwise specified in the detail specification, sheath marking shall be achieved as a non-degradable print containing the following minimum information:

- a number giving the nominal characteristic impedance of the cable in ohms, "75",
- a number that corresponds to the approximate dielectric outer diameter in mm, for example, the nominal dielectric diameter 3,66 mm shall be expressed by "4",
- a letter that corresponds to the different outer conductor construction types,
- letters that correspond to the different inner conductor types,
- letters that correspond to the different outer conductor construction types,
- letters that correspond to the different outer conductor materials,
- a designation of the different screening classes,
- the number of the IEC standard (61196-6-x),
- the name of the supplier,
- the length of cable.

EXAMPLE: 75-4T-BC-ALT/BC/ALT-A – <xxx> – IEC 61196-6-3

More detailed information is given in Annex A.

6.3 Labelling

~~Labelling shall be provided in accordance with 6.3 of IEC 61196-1 and the relevant detail specification.~~

Unless otherwise specified in the detail specification, drums or coils shall be provided with a label with a non-degradable print containing the following minimum information:

- a number giving the nominal characteristic impedance of the cable in ohms, "75",

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- a number that corresponds to the approximate dielectric outer diameter in mm; for example, the nominal dielectric diameter 3,66 mm shall be expressed by "4",
- a letter that corresponds to the different outer conductor construction types, see A.1.2,
- letters that correspond to the different inner conductor types, see A.1.2,
- letters that correspond to the different outer conductor construction types, see A.1.2,
- letters that correspond to the different outer conductor materials, see A.1.2,
- a designation of the different screening classes, see A.1.2,
- the name of the supplier,
- the number of the IEC standard (61196-6-x),
- the batch part number.

More detailed information is given in Annex A.

EXAMPLE: 75-4T-BC-ALT/BC/ALT-A – <xxx> – IEC 61196-6-3 – 03/04 543 m

7 Tests for completed cables

7.1 General

When tested in accordance with the IEC 61196-1-x series, the requirements given below shall apply.

Unless otherwise specified, all measurements shall be carried out under standard atmospheric conditions for testing in accordance with IEC 60068-1:2013, Clause 5.

Applicable test methods shall be in accordance with the ~~IEC 61196-1-100, IEC 61196-1-200, IEC 61196-1-300 and IEC 61196-1-400~~ IEC 61196-1-x series and the IEC 62153-4-x series unless otherwise specified.

The operational frequency range of the cable shall be specified in the relevant detail specification as either 5 MHz to 1 000 MHz or 5 MHz to 3 000 MHz and tested accordingly.

7.2 Electrical testing of the finished cable

7.2.1 Low-frequency and DC electrical measurements

Low-frequency and DC electrical measurements are described in Table 1.

Table 1 – Low-frequency and DC electrical measurements

No.	IEC test procedure	Parameter	Requirements/remarks
7.2.1.1	61196-1-101	Conductor resistance	Applicable, value in accordance with the detail specification
7.2.1.2	61196-1-102	Insulation resistance	≥ 10^4 MΩ × km
7.2.1.3	61196-1-105	Withstand voltage of dielectric	2 kV DC or 1,5 kV AC for 1 min, unless otherwise specified in the relevant detail specification
7.2.1.4	61196-1-106	Withstand voltage of sheath	3,5 kV DC or 2,5 kV AC, unless otherwise specified in the relevant detail specification
7.2.1.5	60096-0-1~~*~~	Current carrying capacity	May be specified for information purposes in the relevant detail specification
7.2.1.6	IEC 62230	Spark test	2,5 kV AC, or 3,75 kV DC, or pulse, or 3,5 kV h.f.
~~* IEC 60096-0-1 is under consideration.~~			

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7.2.2 High-frequency electrical and transmission measurements

High-frequency electrical and transmission measurements are described in Table 2.

Table 2 – High-frequency electrical and transmission measurements

No.	IEC test procedure	Parameter	Requirements/remarks
7.2.2.1	61196-1-108	Characteristic impedance	75 Ω ± 3 Ω
7.2.2.2	61196-1-108	Relative propagation velocity (velocity ratio)	May be specified for information purposes only in the detail specification
7.2.2.3	61196-1-112	Return loss	RL: ≥ 20 dB from 5 MHz to 1 000 MHz; ≥ 18 dB from 1 000 MHz to 2 000 MHz; ≥ 16 dB from 2 000 MHz to 3 000 MHz The measurement inaccuracy $a_{r,f}$ shall be < 1 dB
7.2.2.4	61196-1-113	Attenuation constant	The cable shall comply at any frequency with the formula $a \cdot \sqrt{f} + b \cdot f + c$. In case of copper clad conductor material, a term $d / \sqrt{f}$ should be added, to match the curve at low frequencies. The coefficients a, b, c and d shall be given in the relevant detail specification as well as the discrete values at 200 MHz and 800 MHz
7.2.2.5	61196-1-115	Regularity of impedance	Perform on both ends of tested cable Regularity ≥ 40 dB resp ≤ 1 % Test procedure: IEC 61196-1-115, (time domain) or IEC 62153-1-1 (transformation from frequency domain into time domain by IDFT)
7.2.2.6	62153-4-3	Transfer impedance [a]	Screening Class A+: ≤ 2,5 mΩ/m from 5 MHz to 30 MHz Screening Class A: ≤ 5 mΩ/m from 5 MHz to 30 MHz Screening Class B: ≤ 15 mΩ/m from 5 MHz to 30 MHz Screening Class C:[b] ≤ 50 mΩ/m from 5 MHz to 30 MHz Test procedure according to IEC 62153-4-3, triaxial method, after completion of the flexure test according to IEC 61196-1-314:2015, 8.3.3, Procedure 2: Radius = 10 × cable diameter Tension = as specified in 7.3.10 Speed =/< 1 m/s cycles = 1 (one move forward and back)

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