# IEC 61196-6

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REDLINE VERSION

# INTERNATIONAL STANDARD

colour inside

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



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# 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.**

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- withdrawn,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
- amended.



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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*~~

~~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*

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.

#### 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.)

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",

- 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.~~ | | | |

### 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;<br>≥ 18 dB from 1 000 MHz to 2 000 MHz;<br>≥ 16 dB from 2 000 MHz to 3 000 MHz<br>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<br>Regularity ≥ 40 dB resp ≤ 1 %<br>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<br>Screening Class A: ≤ 5 mΩ/m from 5 MHz to 30 MHz<br>Screening Class B: ≤ 15 mΩ/m from 5 MHz to 30 MHz<br>Screening Class C:[b] ≤ 50 mΩ/m from 5 MHz to 30 MHz<br>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:<br>Radius = 10 × cable diameter<br>Tension = as specified in 7.3.10<br>Speed =/< 1 m/s cycles = 1 (one move forward and back) |

| No. | IEC test procedure | Parameter | Requirements/remarks |
|---|---|---|---|
| 7.2.2.7 | 62153-4-4<br>~~or~~<br>~~62153-4-8~~ | Screening attenuation [a] | Screening Class A+:<br>≥ 95 dB from 30 MHz to 1 000 MHz;<br>≥ 85 dB from 1 000 MHz to 2 000 MHz;<br>≥ 75 dB from 2 000 MHz to 3 000 MHz<br>Screening Class A:<br>≥ 85 dB from 30 MHz to 1 000 MHz;<br>≥ 75 dB from 1 000 MHz to 2 000 MHz;<br>≥ 65 dB from 2 000 MHz to 3 000 MHz<br>Screening Class B:<br>≥ 75 dB from 30 MHz to 1 000 MHz;<br>≥ 65 dB from 1 000 MHz to 2 000 MHz;<br>≥ 55 dB from 2 000 MHz to 3 000 MHz<br>Screening Class C:[b]<br>≥ 75 dB from 30 MHz to 1 000 MHz;<br>≥ 65 dB from 1 000 MHz to 2 000 MHz;<br>≥ 55 dB from 2 000 MHz to 3 000 MHz<br>Test procedure according to IEC 62153-4-4 (triaxial method) after completion of the flexure test according to IEC 61196-1-314:2015, 8.3.3, Procedure 2:<br>Radius = 10 × cable diameter<br>Tension = as specified in 7.3.10<br>Speed =/< 1 m/s cycles = 1 (one move forward and back) |

[a] Screening classification is determined by the minimum class obtained in transfer impedance and screening attenuation.

[b] Class C cables are not intended for applications operating below 30 MHz~~, e.g. cabling according to ISO/IEC 15018~~.

### 7.3 Environmental testing of the finished cable

Environmental testing of the finished cable is given in Table 3.

**Table 3 – Environmental testing of the finished cable**

| No. | IEC test procedure | Parameter | Requirements/remarks |
|---|---|---|---|
| 7.3.1 | 61196-1-201 | Cold bend performance | Test method A or B as specified in the relevant detail specification.<br>The test temperature shall be stated in the relevant detail specification.<br>No physical damages of conductors, dielectric and sheaths. |
| 7.3.2 | 61196-1-203 | Water penetration | When required, in accordance with the relevant detail specification |
| 7.3.3 | 61196-1-206 | Climatic sequence | $T_A$ = –40 °C; $T_B$ = +70 °C; $t_1$ = 24 h, unless otherwise specified in the detail specification.<br>No. of cycles: 3<br>Influenced mechanical and electrical characteristics shall be as specified in the relevant detail specification. |
| 7.3.4 | ~~61196-1-207 (under consideration)~~<br>60068-2-78 | Damp heat (steady state) | Influenced mechanical and electrical characteristics shall be as specified in the relevant detail specification. |
| 7.3.5 | 61196-1-212 ~~(under consideration~~ | Ultraviolet stability of the sheath or jacket | Applicable to cables for outdoor or other applications which are subjected to UV radiation and do not fulfil the requirement of Subclause 4.5 of this document regarding the carbon black content of the sheath or jacket.<br>– no visual cracks<br>– magnitude of change in elongation ≤ 20 % after 720 h<br>– magnitude of change in tensile strength ≤ 20 % after 720 h |
| 7.3.6 | ~~61196-1-213 (under consideration~~<br>61196-1-209 | Thermal ~~ageing~~ cycling | Transmission characteristics shall remain within the specified limits procedure (under consideration) |

## 7.4 Tests for mechanical characteristics of the finished cable

Mechanical testing of the finished cable is given in Table 4.

**Table 4 – Tests for mechanical characteristics of the finished cable**

| No. | IEC test procedure | Parameter | Requirements/remarks |
|---|---|---|---|
| 7.4.1 | 61196-1-301 | Dielectric | ≤ 7 % |
| 7.4.2 | 61196-1-301 | Ovality of sheath | ≤ 7 % |
| 7.4.3 | 61196-1-302 | Eccentricity of dielectric | ≤ 10 % |
| 7.4.4 | 61196-1-302 | Eccentricity of sheath | ≤ 10 % |
| 7.4.5 | ~~60811-4-1~~ 60811-605 | Carbon black content | ≥ 2 % (where applicable) |
| 7.4.6 | 61196-1-308 | Tensile strength and elongation of the copper or copper-clad aluminium inner conductor | Shall be in accordance IEC 61196-1:2005. Subclause 4.4.1 |
| 7.4.7 | 61196-1-310 | Torsion test for copper-clad metals | Shall be in accordance with IEC 61196-1-310 if applicable |
| 7.4.8 | 61196-1-313 | Adhesion of the dielectric to inner conductor | Sample length = 50 mm.<br>Pressure force $F_a$ required to remove dielectric shall be 0,1 MPa ≤ $F_a$ ≤ 1,0 MPa. Refer to footnotes a and b below. |
| 7.4.9 | 61196-1-314 | Bending characteristics | According to the detail specification |
| 7.4.10 | 61196-1-316 | Tensile strength of cable (longitudinal pull) | According to the detail specification |
| 7.4.11 | 61196-1-317 | Crush resistance of cable | Load = 700 N, applied for 2 min.<br>After a 2 min recovery time, the maximum impedance irregularity shall be ≤ 1 %, when measured in accordance with IEC 61196-1-115.<br>No physical damage of the sheath or jacket. |
| 7.4.12 | 61196-1-324 | Abrasion resistance | According to the detail specification |

[a] The adhesion of the dielectric to the inner conductor, $F_a$ is given in MPa by the following equation:

$$F_a = \frac{F}{\pi \cdot d \times l}$$

where

$F$ is the force;

$d$ is the diameter of inner conductor;

$l$ is the length of the sample.

[b] Other values may be specified if special tools for preparing connector mounting are used (see relevant detail specification).

## 7.5 Fire performance test methods

When intended to be installed in buildings, these cables may fall under the requirements of local, regional or governmental regulations for the reaction to fire, for example the construction products directive (CPD).

Fire performance testing of the finished cable is given in Table 5.

**Table 5 – Fire performance test methods (FFS)**

| No. | IEC test procedure | Parameter | Requirements/remarks |
|---|---|---|---|
| 7.5.1 | | Flame propagation | |
| 7.5.2 | | Acid gas emission | |
| 7.5.3 | | Smoke generation | |
| 7.5.4 | | Toxic gas emission | |

## 8 Quality assessment

When specified in the sectional or detail specifications, quality procedures shall be in accordance with IEC 61196-1-1.

## 9 Delivery and storage

Delivery of cables shall be in accordance with IEC 61196-1:2005, Clause 9.

## 10 Fire performance test methods (FFS)

Fire performance tests are performed in accordance with local and/or national regulations.

NOTE IEC TR 62222 could be used if requested by local or national regulations.

# Annex A
(normative)

# Cable identification and marking

## A.1 Cable identification

### A.1.1 Type name

Cable type shall be identified by the following:

- 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, see A.1.2,
- a letter that corresponds 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 (61196-7).

### A.1.2 Variants

The variant of cables should be identified by the following:

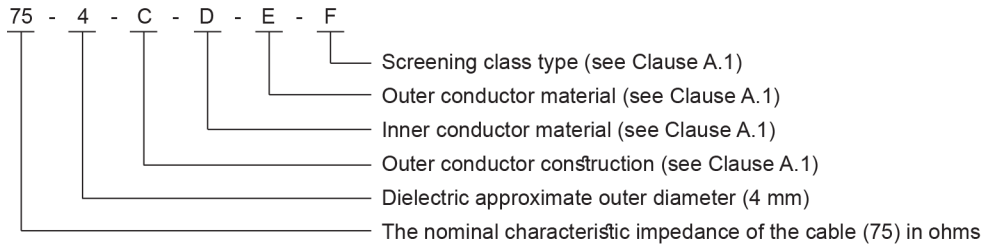
1) type name (75),
2) approximate dielectric outer diameter,
3) outer conductor construction distinguishing letters:
   S − Standard shield outer conductor (foil/braid)
   T − Tri-shield shield outer conductor (foil/braid/foil)
   Q − Quad-shield shield outer conductor (foil/braid/foil/braid)
4) inner conductor material
   BC − Bare copper
   CCS − Copper clad steel
5) outer conductor material
   a) ALT − Aluminium-polymeric laminated tape
   b) AL − Aluminium alloy wire
   c) TC − Tinned copper wire
   e.g. ALT/TC/ALT or ALT/AL/ALT/AL
6) screening class (same class for transfer impedance and screening attenuation)
   a) A+, A, B or C.

### A.1.3 Screening classes

Screening classes of transfer impedance and screening attenuation shall be consistent. The lower class determines the screening class of the overall cable: e.g. if the transfer impedance fulfils the requirement of screening class B and the screening attenuation fulfils the requirement of screening class A, then the overall screening class of the cable is screening class B, not class A.

## A.2 Cable marking

Cable marking consists of variants and IEC standard number, for example:




Example: 75-4T-BC-ALT/BC/ALT-A – <xxx> – IEC 61196-7

## Bibliography

IEC 61196-1 (all parts), *Coaxial communication cables − Part 1: Electrical test methods*

IEC 62153-4 (all parts), *Metallic communication cable test methods − Part 4: Electromagnetic compatibility (EMC)*

IEC TR 62222, *Fire performance of communication cables installed in buildings*

IEC 60728-1, *Cable networks for television signals, sound signals and interactive services − Part 1: System performance of forward paths*

IEC 60728-1-1, *Cable networks for television signals, sound signals and interactive services − Part 1-1: RF cabling for two way home networks*

IEC 60728-10, *Cable networks for television signals, sound signals and interactive services − Part 10: System performance of return paths*

IEC 60728-101, *Cable networks for television signals, sound signals and interactive services − Part 101: System performance of forward paths loaded with digital channels only*

ISO/IEC 11801-1, *Information technology − Generic cabling for customer premises − Part 1: General requirements*

ISO/IEC 11801-4, *Information technology − Generic cabling for customer premises − Part 4: Single-tenant homes*

# IEC 61196-6

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# INTERNATIONAL STANDARD

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



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IEC 61196-6

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# INTERNATIONAL STANDARD

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



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# COAXIAL COMMUNICATION CABLES –

# Part 6: Sectional specification for CATV drop cables

## 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 61196-6 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
- amended.

# 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 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 60068-1:2013, *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, *Coaxial communication cables – Part 1-1: Capability approval for coaxial cables*

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*

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 62153-1-1, *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.

#### 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.

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.)

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 Sheath marking

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

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",
- 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-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. |

### 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;<br>≥ 18 dB from 1 000 MHz to 2 000 MHz;<br>≥ 16 dB from 2 000 MHz to 3 000 MHz<br>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<br>Regularity ≥ 40 dB resp ≤ 1 %<br>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<br>Screening Class A: ≤ 5 mΩ/m from 5 MHz to 30 MHz<br>Screening Class B: ≤ 15 mΩ/m from 5 MHz to 30 MHz<br>Screening Class C:[b] ≤ 50 mΩ/m from 5 MHz to 30 MHz<br>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:<br>Radius = 10 × cable diameter<br>Tension = as specified in 7.3.10<br>Speed =/< 1 m/s cycles = 1 (one move forward and back) |