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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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International Standard IEC 61196-6 has been prepared by subcommittee 46A: Coaxial cables, of IEC technical committee 46: Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories.

The text of this standard is based on the following documents:

FDIS	Report on voting
46A/917/FDIS	46A/926/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This standard is to be read in conjunction with IEC 61196-1. It is based on the second edition of that standard.

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

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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- withdrawn;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

A bilingual version of this publication may be issued at a later date.

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.

2 Normative references

The following referenced documents are indispensable for the application 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, *Environmental testing – Part 1: General and guidance*

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

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.

4 Materials and cable construction

4.1 Cable construction

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

4.2 Inner conductor

4.2.1 Conductor material

Subclause 4.4.1 of 61196-1 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.

Subclause 4.4 of IEC 61196-1 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

Subclause 4.5 of IEC 61196-1 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 ovalityand eccentricity are given in 7.3, Table 4 of this standard.

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 4.6 f) or 4.6 g) of IEC 61196-1.

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

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

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

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 ovalityand eccentricity are given in 7.3, Table 4 of this standard.

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

Subclause 6.1 of IEC 61196-1 applies.

6.1.1 Cable 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.

6.1.2 Labelling

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

7 Tests for completed cables

When tested in accordance with the IEC 61196-1 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 Clause 5 of IEC 60068-1.

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 series and the IEC 62153 series.

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.

7.1 Electrical testing of the finished cable

7.1.1 Low-frequency and d.c. electrical measurements

Table 1 – Low-frequency and d.c. electrical measurements

No.	IEC test procedure	Parameter	Requirements/remarks
7.1.1.1	61196-1-101	Conductor resistance	Applicable, value in accordance with the detail specification
7.1.1.2	61196-1-102	Insulation resistance	$\geq 10^4$ MΩ × km
7.1.1.3	61196-1-105	Withstand voltage of dielectric	2 kV d.c. or 1,5 kV a.c. for 1 min, unless otherwise specified in the relevant detail specification
7.1.1.4	61196-1-106	Withstand voltage of sheath	3,5 kV d.c. or 2,5 kV a.c., unless otherwise specified in the relevant detail specification
7.1.1.5	60096-0-1*	Current carrying capacity	May be specified for information purposes in the relevant detail specification.
7.1.1.6	IEC 62230	Spark test	2,5 kV a.c, or 3,75 kV d.c., or pulse , or 3,5 kV h.f
* IEC 60096-0-1 is under consideration.			

7.1.2 High-frequency electrical and transmission measurements

Table 2 – High-frequency electrical and transmission measurements

No.	IEC test procedure	Parameter	Requirements/remarks
7.1.2.1	61196-1-108	Characteristic impedance	75 Ω ± 3 Ω
7.1.2.2	61196-1-108	Relative propagation velocity (velocity ratio)	May be specified for information purposes only in the detail specification
7.1.2.3	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
7.1.2.4	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
7.1.2.5	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)
7.1.2.6	62153-4-3	Transfer impedance [a]	Screening Class A+: ≤ 2,5 mΩ/m from 5 MHz - 30 MHz Screening Class A: ≤ 5 mΩ/m from 5 MHz - 30 MHz Screening Class B: ≤ 15 mΩ/m from 5 MHz - 30 MHz Screening Class C:[b] ≤ 50 mΩ/m 5 from MHz - 30 MHz Test procedure according to IEC 62153-4-3, triaxial method, after completion of the flexure test according to IEC61196-1-314, 8.3.3, Procedure 2: Radius = 10 x Cable diameter Tension =as specified in 7.3.10 Speed =/< 1 m/s cycles = 1 (one move forward and back)

No.	IEC test procedure	Parameter	Requirements/remarks
7.1.2.7	62153-4-4 or 62153-4-8	Screening attenuation [a]	Screening Class A+: ≥ 95 dB from 30 MHz to 1 000 MHz; ≥ 85 dB from 1 000 MHz to 2 000 MHz; ≥ 75 dB from 2 000 MHz to 3 000 MHz Screening Class A: ≥ 85 dB from 30 MHz to 1 000 MHz; ≥ 75 dB from 1 000 MHz to 2 000 MHz; ≥ 65 dB from 2 000 MHz to 3 000 MHz Screening Class B: ≥ 75 dB from 30 MHz to 1 000 MHz; ≥ 65 dB from 1 000 MHz to 2 000 MHz; ≥ 55 dB from 2 000 MHz to 3 000 MHz Screening Class C:[b] ≥ 75 dB from 30 MHz to 1 000 MHz; ≥ 65 dB from 1 000 MHz to 2 000 MHz; ≥ 55 dB from 2 000 MHz to 3 000 MHz Test procedure according to IEC 62153-4-4 (triaxial method) after completion of the flexure test according to IEC61196-1-314, 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)

[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

7.2 Environmental testing of the finished cable

Table 3 – Environmental testing of the finished cable

No.	IEC test procedure	Parameter	Requirements/remarks
7.2.1	61196-1-201	Cold bend performance	Test method A or B as specified in the relevant detail specification. The test temperature shall be stated inthe relevant detail specification." No physical damages of conductors, dielectric and sheaths
7.2.2	61196-1-203	Water penetration	When required, in accordance with the relevant detail specification
7.2.3	61196-1-206	Climatic sequence	T_A = –40 °C; T_B = +70 °C; t_1 = 24 h, unless otherwise specified in the detail specification. No. of cycles: 3 Influenced mechanical and electrical characteristics shall be as specified in the relevant detail specification.
7.2.4	61196-1-207 (under consideration)	Damp heat (steady state)	Influenced mechanical and electrical characteristics shall be as specified in the relevant detail specification.
7.2.5	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 standard regarding the carbon black content of the sheath or jacket. - No visual cracks - magnitude of change in elongation ≤ 20 % after 720 h - magnitude of change in tensile strength ≤ 20 % after 720 h
7.2.6	61196-1-213 (under consideration	Thermal ageing	Transmission characteristics shall remain within the specified limits Procedure uc

7.3 Tests for mechanical characteristics of the finished cable

Table 4 – Tests for mechanical characteristics of the finished cable

No.	IEC test procedure	Parameter	Requirements/remarks
7.3.1	61196-1-301	Dielectric	≤ 7 %
7.3.2	61196-1-301	Ovality of sheath	≤ 7 %
7.3.3	61196-1-302	Eccentricity of dielectric	≤ 10 %
7.3.4	61196-1-302	Eccentricity of sheath	≤ 10 %
7.3.5	60811-4-1	Carbon black content	≥ 2 % (where applicable)
7.3.6	61196-1-308	Tensile strength and elongation of the copper or copper-clad aluminium inner conductor	Shall be in accordance with 4.4.1.1 of IEC 61196-1
7.3.7	61196-1-310	Torsion test for copper-clad metals	Shall be in accordance with IEC 61196-1-310 if applicable
7.3.8	61196-1-313	Adhesion of the dielectric to inner conductor	Sample length = 50 mm. Pressure force Fa required to remove dielectric shall be 0,1 MPa ≤ F_a ≤ 1,0 MPa. Refer to footnotes a and b below.
7.3.9	61196-1-314	Bending characteristics	According to the detail specification
7.3.10	61196-1-316	Tensile strength of cable (longitudinal pull)	According to the detail specification
7.3.11	61196-1-317	Crush resistance of cable	Load = 700 N, applied for 2 min. After a 2 min recovery time, the maximum impedance irregularity shall be ≤ 1 %, when measured in accordance with IEC 61196-1-115. No physical damage of the sheath or jacket.
7.3.12	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: $F_a = \frac{F}{\pi \cdot d \cdot l}$

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).

7.4 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).

Table 5 – Fire performance test methods (FFS)

No.	IEC test procedure	Parameter	Requirements/remarks
7.4.1		Flame propagation	
7.4.2		Acid gas emission	
7.4.3		Smoke generation	
7.4.4		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 Clause 9 of IEC 61196-1.

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