IEC 61196-6-2

Edition 2.0 2020-05

INTERNATIONAL STANDARD

Coaxial communication cables –
Part 6-2: Detail specification for 75-4 type CATV drop cables

IEC 61196-6-2:2020-05(en)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.120.10

ISBN 978-2-8322-8227-4

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FOREWORD

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International Standard IEC 61196-6-2 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.

This second edition cancels and replaces the first edition, published in 2018. This edition constitutes a technical revision.

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

– designation of variants including construction details,
– consistent screening classes,
– bending test only for flexible cables.

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

FDIS	Report on voting
46A/1402/FDIS	46A/1409/RVD

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

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

It is to be used in conjunction with IEC 61196-1:2005 and IEC 61196-6:2009.

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.

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

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- withdrawn,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

COAXIAL COMMUNICATION CABLES –

Part 6-2: Detail specification for 75-4 type CATV drop cables

1 Scope

This part of IEC 61196 applies to coaxial communication cables described in IEC 61196-6. It specifies the requirements for 75-4 type CATV drop cables. These cables are used in CATV distribution systems, surveillance & control systems, satellite television receiving systems and as bidirectional hybrid fibre coaxes (HFC). The operating frequency is from 5 MHz to 3 000 MHz.

This part of IEC 61196 is to be used in conjunction with IEC 61196-1 and IEC 61196-6. It determines the layout and style with respect to the model and type.

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.

NOTE Documents which are needed to achieve the tests according to Clause 4, item [8] or item [9], respectively, are listed in IEC 61196-6.

IEC 60966-4 (all parts), *Radio frequency and coaxial cable assemblies*

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

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

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

IEC 61196-6:2009, *Coaxial communication cables – Part 6: Sectional specification for CATV drop cables*

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*

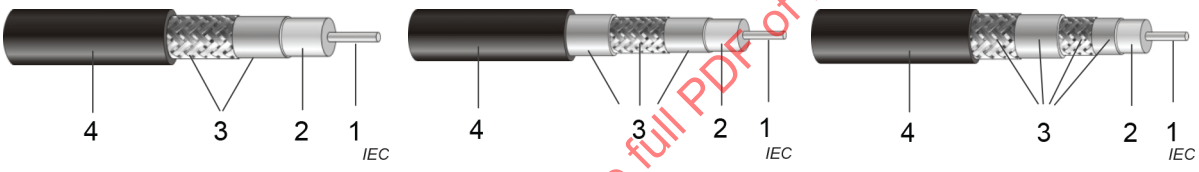
3 Terms and definitions

No terms and definitions are listed in this document.

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 Detail specification

<table>
<tr><td colspan="5">COAXIAL COMMUNICATION CABLES –
Part 6-2: Detail specification for 75-4 type CATV drop cables</td></tr>
<tr><td colspan="2">[1] Prepared by:
IEC SC 46A</td><td></td><td colspan="2">[2] Document No.: IEC 61196-6-2
Issue: Edition 2.0
Date:</td></tr>
<tr><td colspan="2">[3] Available from:
IEC</td><td colspan="3">[4] Generic specification: IEC 61196-1
Sectional specification: IEC 61196-6</td></tr>
<tr><td colspan="5">[5] Additional references</td></tr>
<tr><td colspan="5">[6] Cable construction</td></tr>
<tr><td colspan="5">75-4S (Standard shield) 75-4T (Tri-shield) 75-4Q (Quad-shield)
 

1: Inner conductor 2: Dielectric 3: Outer conductor 4: Sheath or jacket</td></tr>
<tr><td colspan="2">Variant [a] constructions</td><td>75-4S-Y-Z-A-B</td><td>75-4T-Y-Z-A-B</td><td>75-4Q-Y-Z-A-B</td></tr>
<tr><td rowspan="3">Inner conductor</td><td>Material</td><td colspan="3">BC or CCS</td></tr>
<tr><td>Diameter (mm)</td><td colspan="3">0,81</td></tr>
<tr><td>Tolerance (mm)</td><td colspan="3">± 0,01</td></tr>
<tr><td rowspan="3">Dielectric</td><td>Material</td><td colspan="3">Foamed PE</td></tr>
<tr><td>Diameter (mm)</td><td colspan="3">3,66</td></tr>
<tr><td>Tolerance (mm)</td><td colspan="3">± 0,15</td></tr>
<tr><td rowspan="6">Outer conductor or shield</td><td>Material</td><td>ALT+A
or ALT+TC</td><td>ALT+A+ALT
or ALT+TC+ALT</td><td>ALT+A+ALT+A
or ALT+TC+ALT+TC</td></tr>
<tr><td>Inner shield diameter (mm)</td><td colspan="3">3,86</td></tr>
<tr><td>Tolerance (mm)</td><td colspan="3">± 0,15</td></tr>
<tr><td>Longitudinally overlap (%)</td><td colspan="3">18 to 35</td></tr>
<tr><td>Braid coverage (%)</td><td>≥ 59</td><td>≥ 59</td><td>Inner braid ≥ 59
Outer braid ≥ 32</td></tr>
<tr><td>Maximum outer diameter (mm)</td><td>4,60</td><td>4,70</td><td>5,30</td></tr>
<tr><td rowspan="2">Sheath or jacket</td><td>Material</td><td colspan="3">PVC or PE or LSZH</td></tr>
<tr><td>Minimum thickness (mm)</td><td colspan="3">0,60</td></tr>
</table>

	Diameter (mm)	6,10	6,20	6,73
	Tolerance (mm)	± 0,20		

NOTE
BC — Bare copper wire
CCS — Copper clad steel wire
ALT — Aluminium-polymeric laminated tape
AL — Aluminium alloy wire
TC — Tinned copper wire
PE — Polyethylene
PVC — Polyvinylchloride
LSZH — Low smoke zero halogen polyolefin

[a] Variants are shown in Annex A.

[7] Engineering information (reference only)	
Operating temperature range	−40 °C to 70 °C (PE sheath) −20 °C to 70 °C (PVC sheath) −15 °C to 70 °C (LSZH sheath)
Operating frequency	5 MHz to 3 000 MHz
Nominal characteristic impedance	75 Ω
Minimum bending radius	10 × D (D is the nominal cable outer diameter)
Relative propagation velocity	85 % (nominal)
Maximum current carrying capacity (Inner conductor T_c max = 65 °C)	6 A (T_a = 20 °C); 4 A (T_a = 40 °C) for BC conductor 3 A (T_a = 20 °C); 2 A (T_a = 40 °C) for CCS conductor
Cable identification and marking	see Annex A.

[8] Parameter or characteristic	**[9] Subclause of IEC 61196-6:2009**	**[10] Value**	**[11] Remarks**
Electrical testing of finished cable	7.1		
Low-frequency and DC electrical measurements	7.1.1		
Conductor resistance Inner conductor Outer conductor	7.1.1.1	≤ 33,46 Ω/km (BC conductor) ≤ 159,32 Ω/km (CCS conductor) ≤ 40,38 Ω/km (ALT+A) ≤ 14,76 Ω/km (ALT+TC) ≤ 30,98 Ω/km (ALT+A+ ALT) ≤ 11,33 Ω/km (ALT+TC+ALT) ≤ 24,78 Ω/km (ALT+A+ ALT+A) ≤ 9,06 Ω/km (ALT+TC+ ALT+TC)	At 20 °C
Insulation resistance	7.1.1.2	≥ 10 000 MΩ•km	
Withstand voltage of dielectric	7.1.1.3	1,5 kV AC, 1 min 2,1 kV DC, 1 min	alternative: 3,75 kV AC, 2 s 5,25 kV DC, 2 s

[8] Parameter or characteristic	[9] Subclause of IEC 61196-6:2009	[10] Value	[11] Remarks
Withstand voltage of sheath	7.1.1.4	2,5 kV AC, 1 min 3,5 kV DC, 1 min	alternative: 6,25 kV AC, 2 s 8,75 kV DC, 2 s
Current carrying capacity	7.1.1.5		See [7]
Spark test	7.1.1.6	2,5 kV AC 50 Hz, or 3 kV AC 15 kHz, or 3,75 kV DC	
High-frequency electrical and transmission measurements	7.1.2		
Characteristic impedance	7.1.2.1	75 Ω ± 3 Ω	Measured at 200 MHz
Relative propagation velocity	7.1.2.2		See [7]
Return loss	7.1.2.3	≥ 20 dB (5 MHz to 1 000 MHz) ≥ 18 dB (1 000 MHz to 2 000 MHz) ≥ 16 dB (2 000 MHz to 3 000 MHz)	The measurement inaccuracy Δa_{rf} shall be < 1 dB
Attenuation constant, α	7.1.2.4	Do not exceed the values specified in Annex B.	At 20 °C
Regularity of impedance	7.1.2.5	≥ 40 dB resp. ≤ 1 %	Perform on both ends of the cable Test procedure: IEC 61196-1-115
Transfer impedance after flex	7.1.2.6	a) Screening class C: ≤ 50 mΩ/m from 5 MHz to 30 MHz b) Screening class B: ≤ 15 mΩ/m from 5 MHz to 30 MHz c) Screening class A: ≤ 5 mΩ/m from 5 MHz to 30 MHz d) Screening class A+: ≤ 0,9 mΩ/m from 5 MHz to 30 MHz	The flexure test according to IEC 61196-1-314:2015, Subclause 8.3.2, Procedure 2: a) Radius: 10 × cable diameter b) Tension: 5 N c) Speed: ≤ 1 m/s d) Number of cycles: 3 After flexure test, measure the transfer impedance according to IEC 62153-4-3
Screening attenuation after flex	7.1.2.7	a) Screening class B & C: ≥ 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 b) 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 c) 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	The flexure test according to IEC 61196-1-314:2015, Subclause 8.3.2, Procedure 2: a) Radius: 10 × cable diameter b) Tension: 5 N c) Speed: ≤ 1 m/s d) Number of cycles: 3 After flexure test, measure the screening attenuation according to IEC 62153-4-4

[8] Parameter or characteristic	[9] Subclause of IEC 61196-6:2009	[10] Value	[11] Remarks
Environmental testing of finished cable	7.2		
Cold bend	7.2.1	No physical damages of sheath	a) Test method: Method B b) Mandrel diameter: 20 × cable diameter c) Test temperature: PE sheath: −40 °C ± 2 °C PVC sheath: −20 °C ± 2 °C LSZH sheath: −15 °C ± 2 °C
Water penetration	7.2.2	Not applicable	
Climatic sequence	7.2.3	No physical damages of sheath Magnitude of change of attenuation constant shall be not more than 7 % of cable measured values before the test.	a) Test temperature: PE sheath: T_A = −40 °C, T_B = 70 °C; PVC sheath: T_A = −20 °C , T_B = 70 °C LSZH sheath: T_A = −15 °C ,T_B = 70 °C b) t_1: 24 h c) Number of cycles: 3
Damp heat (steady state)	7.2.4	a) No physical damages of sheath b) Insulation resistance is not less than 10 000 MΩ•km c) Magnitude of change of attenuation constant is not more than 7 % compared to Annex B.	
Ultraviolet stability of sheath or jacket	7.2.5	a) No visual cracks b) Magnitude of change in elongation ≤ 20 % c) Magnitude of change in tensile strength ≤ 20 %	Test times: 720 h
Thermal ageing	7.2.6	a) No physical damages of sheath b) Magnitude of change of attenuation constant is not more than 7 % in Annex B.	a) Test temperature: 80 °C ± 2 °C b) Test time: 168 h
Mechanical characteristics of finished cable	7.3		
Ovality of dielectric	7.3.1	≤ 5 %	
Ovality of sheath	7.3.2	≤ 7 %	
Eccentricity of dielectric	7.3.3	≤ 10 %	
Eccentricity of sheath	7.3.4	≤ 10 %	
Carbon black content, where applicable	7.3.5	≥ 2 %	Only applicable to PE sheath

[8] Parameter or characteristic	[9] Subclause of IEC 61196-6:2009	[10] Value	[11] Remarks
Tensile strength and elongation of the copper or copper-clad metals	7.3.6	a) CCS inner conductor Tensile strength: ≥ 760 MPa Elongation: ≥ 1 % b) BC inner conductor Elongation: ≥ 25 % Not applicable to tensile strength	
Torsion test for copper-clad metals	7.3.7	CCS inner conductor shall meet the requirement: After 20 twists, the examination of the surface shall not reveal any seams, pits or slivers of sufficient magnitude inherent defects. After continued twisting of the wire to destruction, the examination of the ends shall not reveal any separation between the copper and the metal core wire.	Only applicable to CCS inner conductor
Adhesion testing: Inner conductor to dielectric	7.3.8	22 N to 89 N	a) Test temperature: 20 °C ± 5 °C b) Specimen length: 50 mm
Bending characteristic [a]	7.3.9	When required by users: a) No physical damage of the sheath b) Screening attenuation shall be in accordance to the manufacturer's specification	The bending test according to IEC 61196-1-314:2015, Clause 5: a) Test mandrel radius: 10 × cable diameter b) Number of cycles: 500 c) Test angle: ± 90° d) Test temperature: 20 °C ± 5 °C e) Load: 10 N After bending, measure the screening attenuation according to IEC 62153-4-4
Tensile strength of cable (longitudinal pull)	7.3.10	According to the manufacturer's specification	
Crush resistance of cable	7.3.11	a) No visible physical damage of the sheath b) After a 2 min recovery time, the maximum impedance irregularity shall be ≤ 1 %, when measured in accordance with IEC 61196-1-115	a) Test load: 700 N b) Test time: 2 min
Abrasion resistance	7.3.12	When required by users, according to the manufacturer's specification	

[a] Applicable only for flexible cables, e.g. for cable assemblies for radio and TV receivers according to IEC 60966-4 (all parts).

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 number that corresponds to the different outer conductor construction types, see A.1.2.
– A number that corresponds to the different inner conductor types, see A.1.2.
– A number that corresponds to the different outer conductor construction types, see A.1.2.
– A number that corresponds to the different outer conductor materials, see A.1.2.
– A number that corresponds to the different screening classes, see A.1.2.
– The number of the IEC standard (61196-6-2).

A.1.2 Variants

The variant of cables should be identified by the following:

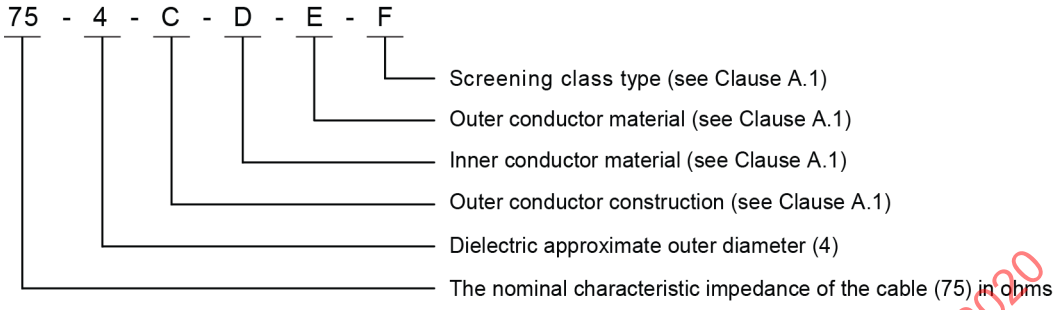
1) Type name, (75).
2) Approximate dielectric outer diameter, (4).
3) Outer conductor construction distinguishing letters:
   S – Standard shield outer conductor, (foil/braid).
   T – Tri-shield shield outer conductor, (foil/braid/foil).
   Q – Quad-shield shield outer conductor(foil/braid/foil/braid)
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 – IEC 61196-6-2