

# INTERNATIONAL STANDARD

---

**Coaxial communication cables –  
Part 6-5: Detail specification for Type A quad-shield CATV drop cables with  
screening class A++**





**THIS PUBLICATION IS COPYRIGHT PROTECTED**  
**Copyright © 2020 IEC, Geneva, Switzerland**

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office  
3, rue de Varembe  
CH-1211 Geneva 20  
Switzerland

Tel.: +41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)

**About the IEC**

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

**About IEC publications**

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

**IEC publications search - [webstore.iec.ch/advsearchform](http://webstore.iec.ch/advsearchform)**

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

**IEC Just Published - [webstore.iec.ch/justpublished](http://webstore.iec.ch/justpublished)**

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

**IEC Customer Service Centre - [webstore.iec.ch/csc](http://webstore.iec.ch/csc)**

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: [sales@iec.ch](mailto:sales@iec.ch).

**Electropedia - [www.electropedia.org](http://www.electropedia.org)**

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

**IEC Glossary - [std.iec.ch/glossary](http://std.iec.ch/glossary)**

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.



IEC 61196-6-5

Edition 1.0 2020-06

# INTERNATIONAL STANDARD

---

**Coaxial communication cables –  
Part 6-5: Detail specification for Type A quad-shield CATV drop cables with  
screening class A++**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 33.120.10

ISBN 978-2-8322-8297-7

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references .....	5
3 Terms and definitions .....	6
4 Detail specification .....	6
Annex A (normative) Cable identification and marking .....	12
A.1 Cable identification .....	12
A.2 Cable marking.....	13
Annex B (normative) Attenuation.....	14
Table A.1 – Variants of dielectric diameter.....	12
Table A.2 – Inner conductor material .....	12
Table A.3 – Variants of shield type.....	12
Table B.1 – Maximum attenuation .....	15

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## COAXIAL COMMUNICATION CABLES –

**Part 6-5: Detail specification for Type A quad-shield CATV  
drop cables with screening class A++**

## 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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61196-6-5 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.

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

FDIS	Report on voting
46A/1407/FDIS	46A/1412/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.

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 6-5: Detail specification for Type A quad-shield CATV drop cables with screening class A++

#### 1 Scope

This part of IEC 61196 applies to coaxial communication cables described in IEC 61196-6. It specifies the requirements for type A quad-shield CATV drop cables with screening class A++. These cables are used in CATV distribution systems, surveillance and control systems, satellite television receiving systems and bidirectional hybrid fibre coaxes (HFC). The operating frequency is up to 3000 MHz.

This part of IEC 61196 is to be used in conjunction with IEC 61196-1 and IEC 61196-6:2009.

#### 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 60811-410, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 410: Miscellaneous tests – Test method for copper-catalyzed oxidative degradation of polyolefin insulated conductors*

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

IEC 61196-1-115:2006, *Coaxial communication cables – Part 1-115: Electrical test methods – Test for regularity of impedance (pulse/step function return loss)*

IEC 61196-1-201:2009, *Coaxial communication cables – Part 1-201: Environmental test methods – Test for cold bend performance of cable*

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

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  $a_s$  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

<b>COAXIAL COMMUNICATION CABLES –</b>				
<b>Part 6-5: Detail specification for Type A quad-shield CATV drop cables with screening class A++</b>				
<b>[1] Prepared by:</b> IEC SC 46A		<b>[2] Document No.:</b> IEC 61196-6-5 <b>Issue:</b> First <b>Date:</b>		
<b>[3] Available from:</b> IEC	<b>[4] Generic specification:</b> IEC 61196-1 <b>Sectional specification:</b> IEC 61196-6:2009			
<b>[5] Additional references</b>				
<b>[6] Cable construction</b>				
<b>Type A quad-shield CATV drop cables with screening class A++</b>				
<b>Variants <sup>a</sup> constructions</b>		75-3QYZA++	75-4QYZA++	75-5QYZA++
<b>Inner conductor</b>	Material	BC or CCS		
	Diameter (mm)	0,58	0,81	1,02
	Tolerance (mm)	±0,01	±0,01	±0,02
<b>Dielectric</b>	Material	Foamed PE		
	Diameter (mm)	2,55	3,60	4,57
	Tolerance (mm)	±0,13	±0,15	±0,15
<b>Outer conductor or shield</b>	Material	ALT+TC+ALT+TC or ALT+A+ALT+A		
	Nominal inner shield diameter (mm)	2,80	3,85	4,85
	Maximum outer diameter (mm)	4,55	5,60	6,60

Sheath	Material	PVC or PE or LSZH		
	Minimum thickness (mm)	0,40	0,45	0,50
	Maximum outer diameter (mm)	5,80	7,20	8,00

NOTE

BC – Bare copper wire

CCS – Copper clad steel wire

ALT – Aluminium-polymeric laminated tape

TC – Tinned copper wire

A – Aluminium alloy wire

PE – Polyethylene

PVC – Polyvinylchloride

LSZH – Low smoke zero halogen polyolefin

<sup>a</sup> Variants are shown in Annex A.

[7] Engineering information (reference only)	
Operating temperature range	–40 °C to 85 °C (PE sheath) –20 °C to 70 °C (PVC sheath) –15 °C to 70 °C (LSZH sheath)
Operating frequency range	DC to 3 000 MHz
Nominal characteristic impedance	75 Ω
Minimum bending radius	10 <i>D</i> ( <i>D</i> is the nominal cable outer diameter)
Relative propagation velocity	85 % (nominal)
Current carrying capacity	75-3QYZA++ 4 A ( $T_a = 20\text{ °C}$ ); 2 A ( $T_a = 40\text{ °C}$ ) for BC conductor 2 A ( $T_a = 20\text{ °C}$ ); 1 A ( $T_a = 40\text{ °C}$ ) for CCS conductor
	75-4QYZA++ 6 A ( $T_a = 20\text{ °C}$ ); 4 A ( $T_a = 40\text{ °C}$ ) for BC conductor 3 A ( $T_a = 20\text{ °C}$ ); 2 A ( $T_a = 40\text{ °C}$ ) for CCS conductor
	75-4QYZA++ 8 A ( $T_a = 20\text{ °C}$ ); 6 A ( $T_a = 40\text{ °C}$ ) for BC conductor 4 A ( $T_a = 20\text{ °C}$ ); 3 A ( $T_a = 40\text{ °C}$ ) 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
Return loss	7.1.2.3	$\geq 20$ dB (5 MHz to 1000 MHz) $\geq 18$ dB (1 000 MHz to 2 000 MHz) $\geq 16$ dB (2 000 MHz to 3 000 MHz)	The measurement inaccuracy $a_{r,f}$ shall be better than 1 dB
Attenuation constant, $\alpha$	7.1.2.4	No more than the values in Annex B	20 °C
Regularity of impedance	7.1.2.5	$\geq 40$ dB resp. $\leq 1$ %	Perform on both ends of tested cable  Test procedure: IEC 61196-1-115:2006, Procedure A
Transfer impedance after flex	7.1.2.6	Screening class A++: $\leq 0,9$ m $\Omega$ /m from 5 MHz to 30 MHz	The flexure test according to IEC 61196-1-314:2015, 8.3.3, Procedure 2: a) Radius: 10 × cable diameter b) Tension: 5 N c) Speed: $\leq 1$ 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	Screening class A++: $\geq 105$ dB from 30 MHz to 1 000 MHz $\geq 95$ dB from 1 000 MHz to 2 000 MHz $\geq 85$ dB from 2 000 MHz to 3 000 MHz	The flexure test according to IEC 61196-1-314:2015, 8.3.3, Procedure 2: a) Radius: 10 × cable diameter b) Tension: 5 N c) Speed: $\leq 1$ m/s d) Number of cycles: 3  After flexure test, measure the screening attenuation according to IEC 62153-4-4
<b>Environmental testing of finished cable</b>	7.2		
Cold bend	7.2.1	No visible physical damages of the sheath	a) Test method: IEC 61196-1-201:2009, method B b) Mandrel diameter: 20 × cable diameter c) Test temperature: PE sheath: $-40$ °C $\pm 2$ °C PVC sheath: $-20$ °C $\pm 2$ °C LSZH sheath: $-15$ °C $\pm 2$ °C
Water penetration	7.2.2	Not applicable	

[8] Parameter or characteristic	[9] Subclause of IEC 61196-6:2009	[10] Value	[11] Remarks
Climatic sequence	7.2.3	a) No visible physical damages of the sheath b) Magnitude of change in attenuation constant is no more than 10 % in Annex B	a) Test temperature: PE sheath: $T_A = -40\text{ °C}$ , $T_B = 70\text{ °C}$ PVC sheath: $T_A = -20\text{ °C}$ , $T_B = 70\text{ °C}$ LSZH sheath: $T_A = -15\text{ °C}$ , $T_B = 70\text{ °C}$ b) $t_1$ : 24 h c) Number of cycles: 3
Damp heat (steady state)	7.2.4	a) No visible physical damages of the sheath b) Insulation resistance is no less than 10 000 MΩ•km c) Magnitude of change in attenuation constant is no more than 10 % in Annex B	
Ultraviolet stability of sheath or jacket	7.2.5	a) No visual cracks b) Magnitude of change in elongation $\leq 20\%$ c) Magnitude of change in tensile strength $\leq 20\%$	Test times: 720 h
Thermal ageing	7.2.6	a) No visible physical damages of the sheath b) Magnitude of change in attenuation constant is no more than 10 % in Annex B	a) Test temperature: $80\text{ °C} \pm 2\text{ °C}$ b) Test times: 168 h
Oxidation induction time (OIT)	IEC 60811-410	a) OIT initial (before aging): 20 minutes minimum b) OIT (after aging): Minimum 70 percent of OIT initial value	a) Test method: IEC 60811-410 b) Aging: $90\text{ °C}$ , 14 days c) Test temperature: $180\text{ °C} \pm 2\text{ °C}$
<b>Mechanical characteristics of finished cable</b>	7.3		
Ovality of dielectric	7.3.1	$\leq 7\%$	
Ovality of sheath	7.3.2	$\leq 7\%$	
Eccentricity of dielectric	7.3.3	$\leq 10\%$	
Eccentricity of sheath	7.3.4	$\leq 10\%$	
Carbon black content, where applicable	7.3.5	$\geq 2\%$	Only applicable to PE sheath

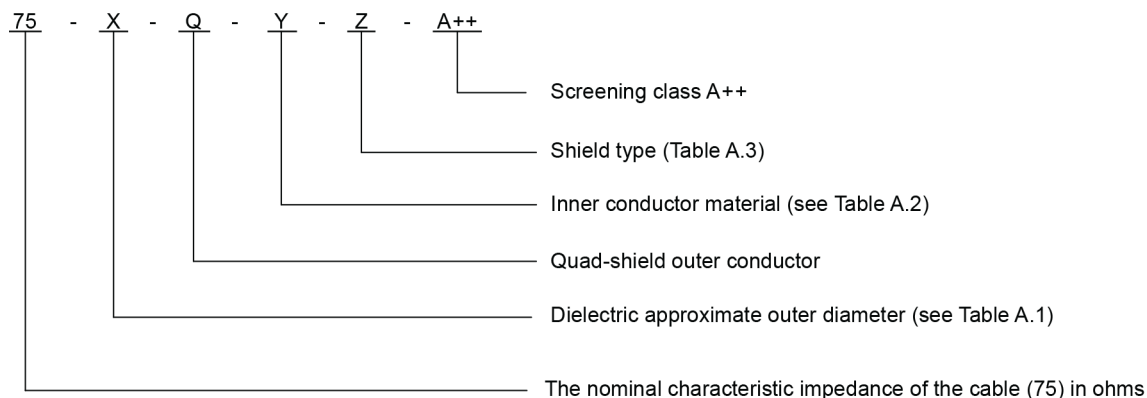
[8] Parameter or characteristic	[9] Subclause of IEC 61196-6:2009	[10] Value	[11] Remarks
Tensile strength and elongation of the copper or copper-clad metals	7.3.6	a) CCS inner conductor Tensile strength: $\geq 792$ MPa Elongation: $\geq 1,0$ % b) BC inner conductor Tensile strength: under consideration Elongation: $\geq 25$ %	
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 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, test method: IEC 61196-1-310
Adhesion testing: Inner conductor to dielectric	7.3.8	22 N ~ 89 N (75-3QYZA++) 22 N ~ 89 N (75-4QYZA++) 22 N ~ 111 N (75-5QYZA++)	a) Test temperature: $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ b) $L = 50$ mm
Bending characteristic	7.3.9	a) No physical damage of the sheath b) Screening attenuation shall be $\geq 95$ dB from 30 MHz to 1 000 MHz	The bending test according to IEC 61196-1-314:2015, Clause 5: a) Test mandrel radius: $10 \times$ cable diameter b) Number of cycles: 50 c) Test angle: $\pm 90^{\circ}$ d) Test temperature: $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ 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	Not applicable	
Crush resistance of cable	7.3.11	a) No physical damage of the sheath b) The maximum impedance irregularity shall be $\leq 1$ %	a) Test load: 400 N (75-3QYZA++) 500 N (75-4QYZA++) 700 N (75-3QYZA++) b) Test time: 2 min
Abrasion resistance	7.3.12	Not applicable	

## Annex A (normative)

### Cable identification and marking

#### A.1 Cable identification

Cables type shall be identified by the following:



where

"X" represents the dielectric approximate outer diameter (see Table A.1).

**Table A.1 – Variants of dielectric diameter**

"X"	Dielectric diameter of cable
3	Nominal dielectric diameter: 2,55 mm
4	Nominal dielectric diameter: 3,60 mm
5	Nominal dielectric diameter: 4,57 mm

"Y" represents the outer conductor or shield type (see Table A.2).

**Table A.2 – Inner conductor material**

"Y"	Inner conductor material
BC	Bare copper
CCS	Copper clad steel

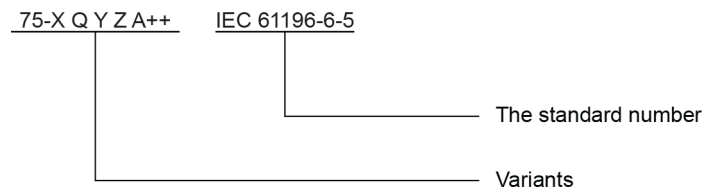
"Z" represents the variants of shield type (see Table A.3).

**Table A.3 – Variants of shield type**

"Z"	Outer conductor or shield type
TC	Aluminium-polymeric laminated tape + Tinned copper wire +Aluminium-polymeric laminated tape + Tinned copper wire (ALT+TC+ALT+TC)
AL	Aluminium-polymeric laminated tape + Aluminium alloy wire+ Aluminium-polymeric laminated tape + Aluminium alloy wire (ALT+A+ALT+A)

## A.2 Cable marking

Cable marking shall consist of cable type and IEC standard number, as follows:



For example:

75-3 Q CCS AL A++ 61196-6-5 means the nominal characteristic impedance of the cable is 75 ohm, 3 mm dielectric approximate outer diameter, ALT+TC+ALT+TC quad-shield outer conductor, CATV drop cables with screening class A++ according to IEC 61196-6-5.

## Annex B (normative)

### Attenuation

Maximum attenuation can be calculated using the following formulae (B.1), (B.2), (B.3):

1) 75-3QYZA++

$$\left[ \alpha_1 = 1,12 \times \sqrt{f} + 0,0013 \times f + \frac{1,35}{\sqrt{f}} + 0,055 \right] \quad (\text{B.1})$$

2) 75-4QYZA++

$$\left[ \alpha_2 = 0,80 \times \sqrt{f} + 0,0013 \times f + \frac{2,12}{\sqrt{f}} + 0,055 \right] \quad (\text{B.2})$$

3) 75-5QYZA++

$$\left[ \alpha_3 = 0,64 \times \sqrt{f} + 0,0013 \times f + \frac{1,05}{\sqrt{f}} + 0,055 \right] \quad (\text{B.3})$$

where

$\alpha$  is the attenuation at 20 °C, in dB/100 m;

$f$  is the frequency, in MHz.

Maximum attenuation constant in the typical frequency is given in Table B.1:

**Table B.1 – Maximum attenuation**

Frequency MHz	Maximum attenuation (dB/100 m at 20 °C)		
	75-3QYZA++	75-4QYZA++	75-5QYZA++
5	3,17	2,80	1,96
55	8,61	6,35	5,01
200	16,25	11,78	9,44
250	18,17	13,16	10,57
270	18,89	13,68	10,99
300	19,92	14,42	11,59
400	23,04	16,68	13,43
450	24,46	17,71	14,27
500	25,81	18,69	15,06
550	27,09	19,62	15,82
600	28,32	20,52	16,55
750	31,75	23,02	18,60
800	32,82	23,80	19,23
870	34,27	24,85	20,10
1 000	36,82	26,72	21,63
1 300	42,16	30,65	24,85
1 450	44,62	32,46	26,34
1 750	49,22	35,85	29,13
2 150	54,81	39,99	32,55
2 400	58,07	42,41	34,55
2 600	60,57	44,27	36,09
3 000	65,32	47,81	39,03





INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

3, rue de Varembé  
PO Box 131  
CH-1211 Geneva 20  
Switzerland

Tel: + 41 22 919 02 11  
[info@iec.ch](mailto:info@iec.ch)  
[www.iec.ch](http://www.iec.ch)