INTERNATIONAL STANDARD

IEC 61156-6

First edition
2002-03

Multicore and symmetrical pair/quad cables for digital communications –

Part 6: Symmetrical pair/quad cables with transmission characteristics up to 600 MHz– Work area wiring – Sectional specification

Câbles multiconducteurs à paires symétriques et quartes pour transmissions numériques –

Partie 6: Câbles à paires symétriques et quartes avec caractéristiques de transmission allant jusqu'à 600 MHz – Raccordement de terminal – Spécification intermédiaire

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MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR DIGITAL COMMUNICATIONS –

Part 6: Symmetrical pair/quad cables with transmission characteristics up to 600 MHz – Work area wiring – Sectional specification

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International Standard IEC 61156-6 has been prepared by subcommittee 46C: Wires and symmetric cables, of IEC technical committee 46: Cables, wires, waveguides, RF connectors and accessories for communication and signalling.

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

FDIS	Report on voting
46C/512/FDIS	46C/518/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 should be read in conjunction with IEC 61156-1.

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

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

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- withdrawn;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

MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR DIGITAL COMMUNICATIONS –

Part 6: Symmetrical pair/quad cables with transmission characteristics up to 600 MHz – Work area wiring – Sectional specification

1 General

1.1 Scope

This sectional specification relates to IEC 61156-1: *Multicore and symmetrical pair/quad cables for digital communications – Part 1: Generic specification*. The cables described herein are specifically intended to construct patch, equipment, and work area cords for class D, E and F channels, as defined in IEC 11801:2000, *Information technology – Generic cabling for customer premises* (see Table 1).

It covers individually screened (STP), common screened (FTP) and unscreened (UTP) pairs or quads having a pair count of four pairs or less. The transmission characteristics of the cables are specified at 20 °C. See Annex A of IEC 61156-5 for a discussion of cable performance at temperatures higher than 20 °C.

The designation "Category 5e" is used herein to describe an enhanced Category 5 cable and is used in the same context as "Category 5" in ISO/IEC 11801. This enhanced cable is designated Category 5e to differentiate it from the Category 5 cables described in IEC 61156-2, 61156-3, and 61156-4. Although both Category 5 and 5e cables are characterized to 100 MHz and can in used for Class D channels, Category 5e has additional requirements, as compared to Category 5, which make it preferred for use in systems utilizing four pairs transmitting simultaneously in both directions.

Table 1 – Cable categories

Cable designation	Maximum reference frequency MHz	Channel designation
Category 5e	100[a]	D
Category 6	250	E
Category 7	600	F

[a] Some characteristics are measured up to 125 MHz in order to comply with IEEE's request to specify the electrical performances up to a frequency 25 % higher than the referenced frequency.

These cables are intended for various new communication systems that are under development and which use as many as four pairs simultaneously. In this sense, this sectional specification provides the cable characteristics required by system developers to evaluate new systems.

The cables covered by this sectional specification are intended to operate with voltages and currents normally encountered in communication systems. These cables are not intended to be used in conjunction with low impedance sources, for example, the electric power supplies of public utility mains.

Though the recommended temperature range during installation is 0 °C +50 °C, the actual temperature range during installation should be indicated in the detail specification.

1.2 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 61156-5, *Multicore and symmetrical pair/quad cables for digital communications – Part 5: Symmetrical pair/quad cables with transmission characteristics up up to 600 MHz – Horizontal floor wiring – Sectional specification*

ISO/IEC 11801:2000, *Information technology – Generic cabling for customer premises*

Publications listed in IEC 61156-1 also apply.

1.3 Installation considerations

Installation considerations will be addressed in a future revision of 1.3 of IEC 61156-1.

1.4 Climatic conditions

Under static conditions, the cables shall operate in the temperature range from –40 °C to +60 °C. The temperature dependence of the cables is specified for screened and unscreened cables, and should be taken into account for the design of an actual cabling system. Patch cables are susceptible to moisture pick-up. This in turn impacts also on the attenuation. Therefore the maximum increase in attenuation due to long term exposure to humidity is specified.

2 Definitions, materials and cable construction

2.1 Definitions

See 2.1 of IEC 61156-1.

2.2 Materials and cable construction

2.2.1 General remarks

The choice of materials and cable construction shall be suitable for the intended application and installation of the cable. Particular care shall be taken to meet any special requirements for fire performance (such as burning properties, smoke generation, evolution of halogen gas, etc.).

2.2.2 Cable construction

The cable construction shall be in accordance with the details and dimensions given in the relevant detail specification.

2.2.3 Conductor

The conductor shall be solid or stranded annealed copper conductor, in accordance with 2.2.3 of IEC 61156-1 and shall have a nominal diameter between 0,4 mm to 0,65 mm. The stranded conductor should have preferably seven strands. Conductor diameter up to 0,8 mm may be used if compatible with the connecting hardware.

The conductor shall be plain or tinned.

The conductor may consist of one or more elements of thin copper or copper alloy tape, which shall be applied helically over a fibrous thread (tinsel cord). In this case, joints in the complete element shall not be permitted.

2.2.4 Insulation

The conductor shall be insulated with a suitable thermoplastic material. Examples of suitable materials are

– polyolefin;
– fluoropolymer;
– low-smoke zero-halogen thermoplastic material.

The insulation may be solid or cellular with or without a solid dielectric skin. The insulation shall be continuous and shall have a thickness such that the completed cable meets the specified requirements. The nominal thickness of the insulation shall be compatible with the method of conductor termination.

2.2.5 Colour code of insulation

The colour code is not specified but shall be indicated in the relevant detail specification. The colours shall be readily identifiable and shall correspond reasonably with the standard colours shown in IEC 60304.

NOTE It is acceptable to mark or stripe the "a" wire with the colour of the "b" wire to facilitate pair identification.

2.2.6 Cable element

The cable element shall be a pair or quad adequately twisted.

2.2.7 Screening of cable element

When required, the screen for the cable element shall be in accordance with 2.2.7 of IEC 61156-1.

2.2.8 Cable make-up

A cross web or any other spacer may be used to separate the cable elements. The cable elements, including cross webs or spacers, shall be assembled to form the cable core.

The core of the cable may be wrapped with a protective layer of non-hygroscopic material.

2.2.9 Screening of cable core

When required by the relevant detail specification, a screen for the cable core shall be provided.

The screen shall be in accordance with 2.2.9 of IEC 61156-1.

2.2.10 Sheath

The sheath material shall consist of a suitable thermoplastic material.

Examples of suitable materials are

– polyolefin;
– PVC;
– fluoropolymer;
– low-smoke zero-halogen thermoplastic material.

The sheath shall be continuous, having a thickness as uniform as possible. A non-metallic ripcord may be provided. When provided, the ripcord shall be non-hygroscopic.

2.2.11 Colour of sheath

The colour of the sheath is not specified, but it should be stated in the relevant detail specification.

2.2.12 Identification

Each length of cable shall be identified as to the manufacturer, and when required, the year of manufacture, using one of the following methods:

a) appropriately coloured threads or tapes;
b) with a printed tape;
c) printing on the cable core wrapping;
d) marking on the sheath.

Additional markings, such as length marking, etc., are permitted on the cable sheath. If used, such markings should be indicated in the relevant detail specification.

2.2.13 Finished cable

The finished cable shall be adequately protected for storage and shipment.

3 Characteristics and requirements

3.1 General remarks

This clause lists the characteristics and minimum requirements of a cable complying with this sectional specification. Test methods shall be in accordance with clause 3 of IEC 61156-1. A detail specification may be prepared to identify a specific product and its performance capabilities (see clause 4).

3.2 Electrical characteristics

The tests shall be carried out on a cable length of not less than 100 m, unless otherwise specified.

3.2.1 Conductor resistance

When measured in accordance with 5.1 of IEC 60189-1, the maximum loop resistance shall not exceed 29,0 Ω/100 m of cable.

3.2.2 Resistance unbalance

The conductor resistance unbalance shall not exceed 2 %.

3.2.3 Dielectric strength

The test shall be performed on conductor/conductor and, where screen(s) are present, conductor/screen with 1,0 kV d.c. for 1 min or, alternately, with 2,5 kV d.c. for 2 s. An a.c. voltage may be used. The a.c. voltage levels in these cases shall be 0,7 kV a.c. for 1 min or, alternately, 1,7 kV a.c. for 2 s.

3.2.4 Insulation resistance

The test shall be performed both on

– conductor/conductor;
– conductor/screen (when present).

The minimum insulation resistance at 20 °C shall not be less than 5 000 MΩ·km.

3.2.5 Mutual capacitance

The mutual capacitance is not specified but may be indicated in the relevant detail specification.

3.2.6 Capacitance unbalance pair to ground

The maximum capacitance unbalance pair to ground shall not exceed 1 600 pF/km at a frequency of 1 kHz.

3.2.7 Transfer impedance

For cables containing a screen or screens, two grades of performance are recognized for transfer impedance. The transfer impedance shall not exceed the values shown in Table 2 at the discrete frequencies indicated for each grade.

Table 2 – Transfer impedance

Frequency MHz	Maximum surface transfer impedance mΩ/m	
	Grade 1	Grade 2
1	10	50
10	10	100
30	30	200
100	60	1 000

3.2.8 Resistance of the screen

The d.c. resistance of the individual screens or an overall screen is not specified but may be indicated in the relevant detail specification.

3.3 Transmission characteristics

All the tests shall be carried out on a cable length of 100 m, unless otherwise specified.

3.3.1 Velocity of propagation, delay and differential delay (delay skew)

3.3.1.1 Velocity of propagation

The minimum velocity of propagation for any pair within the cable is equal to or greater than $0{,}6 \times c$ for all frequencies between 4 MHz and the maximum referenced frequency. Values below 4 MHz are given only for information purposes (see 3.3.2).

NOTE The velocity of propagation, group velocity and phase velocity are approximately equal for frequencies greater than 4 MHz when measured on symmetric cables, i.e. when the cables are operated in a balanced mode.

3.3.1.2 Delay and differential delay (delay skew)

The delay for a specified length of cable is understood as the inverse of the velocity of propagation. The delay shall be less than or equal to:

$$\text{delay} = 534 + \frac{36}{\sqrt{f}} \quad (\text{ns} / 100\,\text{m}) \qquad (1)$$

where f is the frequency in MHz.

Differential delay (delay skew) is the difference in delay between any two pairs.

3.3.1.3 Differential delay (delay skew)

When the delay is measured at 10 ± 2 °C and 40 ± 1 °C, the maximum delay skew between any two pairs at a given temperature shall not be greater than 45 ns/100 m for cat5e and cat6 cables and 25 ns/100 m for cat7 cables in the frequency range from 4,0 MHz to the maximum referenced frequency.

3.3.1.4 Environmental effects

The differential delay (delay skew) between any two pairs due to temperature shall not vary by more than ±10 ns/100 m over the temperature range from –40 °C to +60 °C within the differential delay (delay skew) of 3.3.1.3

3.3.2 Attenuation

The maximum attenuation α of any pair in the frequency range indicated in Table 3 shall be less than or equal to the value obtained from equation (2) using the corresponding values of the constants given in Table 3. The values indicated correspond to an increase of attenuation of 20 % or 50 % with respect to the horizontal cable of the same category (see 3.3.2 of IEC 61156-5)

$$\alpha = a \times \sqrt{f} + b \times f + \frac{c}{\sqrt{f}} \quad (\text{dB} / 100\,\text{m}) \qquad (2)$$

Table 3 – Attenuation, constants values

Cable designation	Increase of attenuation %	Frequency range MHz	Constants		
			a	*b*	*c*
Category 5e	20	4 – 125	2,360	0,028	0,120
Category 6		4 – 250	2,184	0,020	0,300
Category 7		4 – 600	2,160	0,012	0,240
Category 5e	50	4 – 125	2,866	0,033	0,300
Category 6		4 – 250	2,730	0,026	0,375
Category 7		4 – 600	2,700	0,015	0,300
For Category 5e cables, the frequency range has been extended by 25 % to 125 MHz. In this case values above 100 MHz are for information only.					
NOTE 1 The increase of attenuation refers to an increase of the attenuation of stranded patch cables with respect to solid horizontal cables. This increase is also referred to as “de-rating”. NOTE 2 For channels, or for cascaded cables with differing impedance or cables with a distinct impedance roughness, the term insertion loss is used (see IEC 61156-5, Annex B). The term insertion loss refers to inserting a device under test between a generator and a load. Only if the generator, the device under test, and the load have the same impedance, are we talking strictly speaking about “attenuation”. NOTE 3 See Annex B of IEC 61156-5 for a discussion of ILD,					

The values in Table 4 are for information only. Because the measurement of attenuation at 1 MHz on a length of 100 m is prone to error, these values are given in brackets for reference purposes only.

Table 4 – Attenuation at 20 °C

Attenuation at 20 °C dB/100 m						
Frequency MHz	**Cable designation**					
	20 % increase of attenuation			**50 % increase of attenuation**		
	Category 5e	**Category 6**	**Category 7**	**Category 5e**	**Category 6**	**Category 7**
1	[2,5]	[2,5]	[2,4]	[3,2]	[3,1]	[3,0]
4	4,9	4,6	4,5	6,0	5,8	5,6
10	7,8	7,2	7,0	9,5	9,0	8,8
16	9,9	9,1	8,9	12,1	11,4	11,1
20	11,1	10,2	10,0	13,5	12,8	12,4
31,25	14,1	12,9	12,5	17,1	16,1	15,6
62,5	20,4	18,6	17,9	24,8	23,3	22,3
100	26,4	23,9	22,8	32,0	29,9	28,5
125	[29,9]	26,9	25,7	[36,2]	33,8	32,1
200		34,9	33,0		43,8	41,2
250		39,6	37,2		49,7	46,5
300			41,0			51,3
600			60,1			75,1

3.3.2.1 Temperature effects

The increase in attenuation due to elevated temperature shall not be greater than 0,4 %/°C in the frequency range from 1 MHz to 250 MHz and 0,6 %/°C for frequencies above 250 MHz for unscreened cables and 0, 2 %/°C for screened cables.

The method for determining compliance with this requirement is under consideration.

3.3.2.2 Environmental effects

To simulate a long term exposure to higher humidity levels at normal operating temperatures, the cable is exposed for a short term to a higher temperature and a high humidity level, i.e. 120 h to a temperature of 60 °C at a relative humidity of 95 % minimum.

The method for determining attenuation increase due to long term exposure to humidity and compliance with this requirement is under consideration.

3.3.3 Unbalance attenuation

The minimum unbalance attenuation near-end (transverse conversion loss or TCL) shall be equal to or greater than the value obtained from equation (3) for the frequency ranges given in Table 5.

The formula for the TCL is:

$$\mathrm{TCL} = 40{,}0 - 10 \times \log_{10}(f) \quad \mathrm{(dB)} \qquad (3)$$

Table 5 – Unbalance attenuation

Cable category	Frequency range for TCL MHz
Category 5e	1 – 100
Category 6	1 – 200
Category 7	1 – 200

NOTE Unbalance attenuation near-end (TCL) for Category 7 at frequencies greater than 200 MHz is for further study.

The minimum equal level unbalance attenuation far end (equal level transverse conversion transfer loss or EL TCTL) for all categories shall be equal to or greater than the value obtained from equation (4) for all frequencies in the range from 1 MHz to 30 MHz.

The formula for the EL TCTL is:

$$\text{EL TCTL} = 35{,}0 - 20 \times \log_{10}(f) \quad \text{(dB)} \qquad (4)$$

3.3.4 Near-end crosstalk

When measured in accordance with IEC 61156-1, the worst pair power sum near-end crosstalk, PS NEXT, of any pair in the frequency range indicated in Table 6 shall be equal to or greater than the value obtained from equation (5) using the corresponding value of PS NEXT(1) given in Table 6.

$$\text{PS NEXT}(f) = \text{PS NEXT}(1) - 15 \times \log_{10}(f) \quad \text{(dB)} \qquad (5)$$

Table 6 – Worst pair PS NEXT values

Cable designation	Frequency range MHz	PS NEXT(1) dB
Category 5e	4 – 125	62,3
Category 6	4 – 250	72,3
Category 7	4 – 600	99,4

For Category 5e cables, the frequency range has been extended by 25 % to 125 MHz. Values above 100 MHz are for information only and are given in brackets.

The values given in Table 7 are for information only. For those frequencies where the calculated value of PS NEXT is greater than 75 dB, the requirement shall be 75 dB.

Table 7 – PS NEXT

PS NEXT dB			
Frequency MHz	**Cable designation**		
	Category 5e	**Category 6**	**Category 7**
1	62	72	75
4	53	63	75
10	47	57	75
16	44	54	75
20	43	53	75
31,25	40	50	75
62,5	35	45	72
100	32	42	69
125	[31]	41	68
200		38	65
250		36	63
300			62
600			58

The minimum pair-to-pair NEXT for any pair combination shall be at least 3 dB better than the PS NEXT for any pair.

3.3.5 Far-end crosstalk (FEXT)

When measured in accordance with IEC 61156-1, the worst pair power sum equal level far-end crosstalk, PS EL FEXT, of any pair in the frequency range indicated in Table 8 shall be equal to or greater than the value obtained from equation (6) using the corresponding value of the PS EL FEXT(1) given in Table 8.

$$\text{PS EL FEXT}(f) = \text{PS EL FEXT}(1) - 20 \times \log_{10}(f) \quad \text{(dB for 100 m)} \tag{6}$$

Table 8 – Worst pair PS EL FEXT

Cable designation	**Frequency range** MHz	**PS EL FEXT(1)** dB for 100 m
Category 5e	4 – 125	61,0
Category 6	4 – 250	65,0
Category 7	4 – 600	91.0
NOTE If FEXT loss is greater than 70 dB, ELFEXT loss has not to be measured		

For Category 5e cables, the frequency range has been extended by 25 % to 125 MHz. Values above 100 MHz are for information only and are given in brackets.

The values given in Table 9 are for information only. For those frequencies where the calculated value of PS EL FEXT is greater than 75 dB, the requirement shall be 75 dB.

Table 9 – PS EL FEXT

PS EL FEXT dB for 100 m			
Frequency MHz	**Cable designation**		
	Category 5e	**Category 6**	**Category 7**
1	61	65	75
4	49	53	75
10	41	45	71
16	37	41	67
20	35	39	65
31,25	31	35	61
62,5	25	29	55
100	21	25	51
125	19	23	49
200		19	45
250		17	43
300			41
600			35

The minimum pair-to-pair EL FEXT for any pair combination shall be at least 3 dB better than the PS EL FEXT for any pair.

3.3.6 Characteristic impedance

3.3.6.1 Open-short circuit impedance (input impedance)

The magnitude of the input impedance, when measured in a swept frequency mode (open-short circuit method per 3.3.6.2.2 of IEC 61156-1) over the frequency range from 4 MHz to the maximum referenced frequency shall meet the requirements given in Table 10.

Table 10 – Input impedance

Input impedance Ω			
Frequency range MHz	**Cable designation**		
	Category 5e	**Category 6**	**Category 7**
4 – 100	N ± 15	N ± 15	N ± 15
100 – 250		N ± 22	N ± 22
200 – 600			N ± 25
N = nominal impedance			

Measurement of input impedance is not required when the mean characteristic impedance of 3.3.8.2 is measured.

3.3.6.2 Function fitted impedance/mean characteristic impedance

When measured in accordance with 3.3.6.3, 3.3.6.3/3.3.6.2.3 or 3.3.6.3/3.3.6.2.3 to 3.3.6.2.5 of IEC 61156-1, the mean characteristic impedance shall be within ±5 % of the requested nominal impedance at 100 MHz.

3.3.7 Return loss (RL)

When measured in accordance with 3.3.7 of IEC 61156-1, the minimum return loss of any pair in the frequency range indicated in Table 11 shall be equal to or greater than the values in Table 11 for the respective categories.

Table 11 – Return loss

Cable designation	Frequency range MHz	Return loss dB
All	4 – 10	$20{,}0 + 5{,}0 \times \log_{10}(f)$
All	10 – 20	25,0
Category 5e	20 – 125	$25{,}0 - 8{,}6 \times \log_{10}(f/20)$
Category 6 and Category 7	20 – 250	$25{,}0 - 8{,}6 \times \log_{10}(f/20)$
Category 7	250 – 600	$25{,}0 - 8{,}6 \times \log_{10}(f/20)$
NOTE Calculated values below 15,6 dB revert to a 15,6 dB plateau.		

For Category 5e cables, the frequency range has been extended by 25 % to 125 MHz. Values above 100 MHz are for information only.

3.3.8 Screening attenuation

Two grades of performance are recognized for screening attenuation. Screening attenuation is a part of the coupling attenuation. When measured separately, using the absorbing clamp method, the screening attenuation for cables containing a screen in the frequency range from 30,0 MHz to the maximum referenced frequency shall be equal to or greater than the values indicated below

– for Grade 1 cables: ≥60 dB;

– for Grade 2 cables: ≥40 dB.

There are no requirements for unscreened cables.

3.3.9 Coupling attenuation

Three types of performance are recognized for coupling attenuation. When measured using the absorbing clamp method, the coupling attenuation in the frequency range from f = 30,0 MHz to the maximum referenced frequency shall be equal to or greater than the values indicated in Table 12.

Table 12 – Coupling attenuation

Coupling attenuation type	Frequency range MHz	Coupling attenuation dB
Type I	30 – 100	≥85,0
	100 to the maximum referenced frequency	$\geq 85{,}0 - 20 \times \log_{10}(f/100)$
Type II	30 – 100	≥55,0
	100 to the maximum referenced frequency	$\geq 55{,}0 - 20 \times \log_{10}(f/100)$
Type III	30 – 100	≥40,0
	100 to the maximum referenced frequency	$\geq 40{,}0 - 20 \times \log_{10}(f/100)$

3.4 Mechanical and dimensional characteristics and requirements

3.4.1 Dimensional requirements

The overall diameter of insulation, the nominal thickness of the sheath and the maximum overall diameter of the sheath are not specified, but shall be indicated in the relevant detail specification.

3.4.2 Elongation at break of the conductor

The minimum elongation of the conductor shall be 8 %.

3.4.3 Elongation at break of the insulation

The minimum value of the elongation at break of the insulation shall be 100 %.

3.4.4 Elongation at break of the sheath

The minimum value of the elongation at break of the sheath shall be 100 %.

3.4.5 Tensile strength of the sheath

The minimum tensile strength of the sheath shall be 9 MPa.

3.4.6 Crush test of the cable

The crush test of the cable is not specified but may be indicated in the relevant detail specification. If specified, the minimum force shall be 1 000 N.

3.4.7 Impact test of the cable

The impact test of the cable is not specified but may be indicated in the relevant detail specification.

3.4.8 Repeated bending of the cable

The repeated bending test of the cable is not specified but may be indicated in the relevant detail specification (The repeated bending test and specification and the corresponding requirements are under consideration.)

3.4.9 Tensile performance of the cable

Not applicable.

3.5 Environmental characteristics

3.5.1 Shrinkage of insulation

When tested at 100 °C ± 2 °C for 1 h, the shrinkage of the insulation shall be less than or equal to 5 %. The length of the sample shall be 150 mm, and the shrink-back shall be measured as the sum from both ends.

3.5.2 Wrapping test of insulation after thermal ageing

Not applicable.

3.5.3 Bending test of insulation at low temperature

The bending test of the insulated conductor shall be carried out at –20 °C ± 2 °C. The mandrel diameter shall be 6 mm. There shall be no cracks in the insulation.

3.5.4 Elongation at break of the sheath after ageing

The ageing regime shall be 7 days at 100 °C ± 2 °C. The elongation shall not be less than 50 % of the unaged value.

3.5.5 Tensile strength of the sheath after ageing

The ageing regime shall be 7 days at 100 °C ± 2 °C. The tensile strength shall not be less than 70 % of the unaged value.

3.5.6 Sheath pressure test at high temperature

Not applicable.

3.5.7 Cold bend test of the cable

The bending test shall be carried out at –20 °C ± 2 °C. The mandrel diameter shall be eight times the overall diameter of the cable. There shall be no cracks in the sheath.

3.5.8 Heat shock test

Not applicable.

3.5.9 Flame propagation characteristics of a single cable

If required by local regulations and indicated in the relevant detail specification, the test shall be performed in accordance with the generic specification (IEC 61156-1).

3.5.10 Flame propagation characteristics of bunched cables

If required by local regulations and indicated in the relevant detail specification, the test shall be performed in accordance with the generic specification.

3.5.11 Acid gas evolution

If required by local regulations and indicated in the relevant detail specification, the test shall be performed in accordance with the generic specification.

3.5.12 Smoke generation

If required by local regulations and indicated in the relevant detail specification, the test shall be performed in accordance with the generic specification.

3.5.13 Toxic gas emission

Under consideration.

3.5.14 Combined flame and smoke test

Under consideration.

4 Introduction to the blank detail specification

The blank detail specification for cables described in this standard is published as IEC 61156-6-1 and should be used to identify a specific product.

When completing the detail specification, the following information shall be supplied:

a) conductor size;
b) number of elements;
c) cable construction details;
d) category number (5e, 6, 7) to describe basic performance requirements;
e) nominal impedance of the cable;
f) flammability requirements.

Standards Survey

The IEC would like to offer you the best quality standards possible. To make sure that we continue to meet your needs, your feedback is essential. Would you please take a minute to answer the questions overleaf and fax them to us at +41 22 919 03 00 or mail them to the address below. Thank you!

Customer Service Centre (CSC)

International Electrotechnical Commission
3, rue de Varembé
1211 Genève 20
Switzerland

or

Fax to: **IEC**/CSC at +41 22 919 03 00

Thank you for your contribution to the standards-making process.

A Prioritaire

Nicht frankieren
Ne pas affranchir

Non affrancare
No stamp required

RÉPONSE PAYÉE

SUISSE

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Q1 Please report on **ONE STANDARD** and **ONE STANDARD ONLY**. Enter the exact number of the standard: *(e.g. 60601-1-1)*

.....

Q2 Please tell us in what capacity(ies) you bought the standard *(tick all that apply)*. I am the/a:

purchasing agent ❑
librarian ❑
researcher ❑
design engineer ❑
safety engineer ❑
testing engineer ❑
marketing specialist ❑
other.....

Q3 I work for/in/as a: *(tick all that apply)*

manufacturing ❑
consultant ❑
government ❑
test/certification facility ❑
public utility ❑
education ❑
military ❑
other.....

Q4 This standard will be used for: *(tick all that apply)*

general reference ❑
product research ❑
product design/development ❑
specifications ❑
tenders ❑
quality assessment ❑
certification ❑
technical documentation ❑
thesis ❑
manufacturing ❑
other.....

Q5 This standard meets my needs: *(tick one)*

not at all ❑
nearly ❑
fairly well ❑
exactly ❑

Q6 If you ticked NOT AT ALL in Question 5 the reason is: *(tick all that apply)*

standard is out of date ❑
standard is incomplete ❑
standard is too academic ❑
standard is too superficial ❑
title is misleading ❑
I made the wrong choice ❑
other .....

Q7 Please assess the standard in the following categories, using the numbers:
(1) unacceptable,
(2) below average,
(3) average,
(4) above average,
(5) exceptional,
(6) not applicable

timeliness .....
quality of writing.....
technical contents.....
logic of arrangement of contents .....
tables, charts, graphs, figures.....
other .....

Q8 I read/use the: *(tick one)*

French text only ❑
English text only ❑
both English and French texts ❑

Q9 Please share any comment on any aspect of the IEC that you would like us to know:

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