INTERNATIONAL STANDARD

IEC 61156-5-1

Second edition
2007-06

Multicore and symmetrical pair/quad cables for digital communications –

Part 5-1: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Horizontal floor wiring – Blank detail specification

Reference number
IEC 61156-5-1:2007(E)

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

PRICE CODE J

For price, see current catalogue

INTERNATIONAL ELECTROTECHNICAL COMMISSION

MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR DIGITAL COMMUNICATIONS –

Part 5-1: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Horizontal floor wiring – Blank detail specification

FOREWORD

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International Standard IEC 61156-5-1 has been prepared by subcommittee 46C: Wires and symmetric cables, of IEC technical committee 46: Cables, wires, waveguides, r.f. connectors, r.f. and microwave passive components and accessories.

This second edition cancels and replaces the first edition published in 2002. This edition constitutes a technical revision.

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

a) new requirements for new cables $Cat6_A$, $Cat7_A$, for 10 GBase-T applications;
b) revised requirements and tests for the cables.

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

FDIS	Report on voting
46C/817/FDIS	46C/825/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 publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This specification is to be used in conjunction with IEC 61156-1 and IEC 61156-5.

A list of all parts of the IEC 61156 series, under the general title *Multicore and symmetrical pair/quad cables for digital communications*, 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- withdrawn;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.

MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR DIGITAL COMMUNICATIONS –

Part 5-1: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Horizontal floor wiring – Blank detail specification

1 Scope

This part of IEC 61156 describes symmetrical pair/quad cables intended for horizontal floor cabling in class D, E, E_A, F and F_A channels (Cat 5e, Cat 6, Cat 6_A, Cat 7, Cat 7_A) as defined in ISO/IEC 11801 and ISO/IEC 24702.

NOTE Cabling for various severities of industrial environments is specified in ISO/IEC 24702. Environmental classifications are presented in ISO/IEC 24702 with three levels of severity in four areas: mechanical, ingress, climatic, and electromagnetic; thus, in tabular form, they are referred to as the “MICE table”.

This blank detail specification includes additional recommended environmental characteristics and severities, which are derived from the environmental classifications that are specified for cabling for industrial environments.

The blank detail specification determines the layout and style for detail specifications describing symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz for digital communications. Detail specifications, based on the blank detail specification, may be prepared by a national organization, a manufacturer, or a user.

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 61156-1, *Multicore and symmetrical pair/quad cables for digital communications – Part 1: Generic specification*

IEC 61156-5, *Multicore and symmetrical pair/quad cables for digital communications – Part 5: Symmetrical pair/quad cables with transmission characteristics up to 1000 MHz – Horizontal floor wiring – Sectional specification*

ISO/IEC 11801, Information technology – Generic cabling for customer premises.

ISO/IEC 24702, *Information technology – Generic cabling – Industrial premises*

3 Guidance for preparation of detail specifications

It is necessary to keep the transmission characteristics indicated in the relevant sectional specification for the referenced category number, i.e. 5e, 6, 6_A, 7 or 7_A.

The detail specification shall be written in accordance with the layout of the blank detail specification, which forms part of this standard.

The numbers shown in brackets in this and the following pages correspond to the following items of required information, which shall be entered in the spaces provided.

[1] Name and address of the organization that has prepared the document.

[2] IEC document number, issue number and date of issue.

[3] Address of the organization from which the document is available.

[4] Related documents.

[5] Any other reference to the cable, national reference, trade name, etc.

[6] A complete description of the cable which shall include

a) type and number of elements;
b) nominal impedance;
c) screening;
d) application;
e) category;
f) other distinguishing performance characteristics.

Example: 4-pair, unshielded twisted pair cable for use in horizontal floor wiring, having a nominal impedance of 100 Ω, and meeting the transmission requirements of Category 6 and the coupling attenuation requirements of Type III.

[7] Details of the cable material and construction.

[8] Special requirements for bending radius or operating temperatures.

[9] List of cable characteristics.They are separated into electrical, transmission, mechanical and environmental characteristics.

[10] Appropriate subclause references in the sectional specification IEC 61156-5.

[11] Requirements applicable to this cable. The values entered shall meet as a minimum the requirements of sectional specification IEC 61156-5.

[12] Comments – Relevant remarks.

4 Blank detail specification for symmetrical pair/quad cables with transmission characteristics up to 1000 MHz for digital communications

[1] Prepared by:		[2] Document: Issue: Date:	
[3] Available from:		[4] Generic specification: IEC 61156-1 Sectional specification: IEC 61156-5 Blank detail specification: IEC 61156-5-1	
[5] Additional references:			
[6] Cable description: a) Type and number of elements: b) Nominal impedance: c) Screening: d) Application: e) Category: f) Other distinguishing performance characteristics:			
[7] Cable construction:	IEC 61156-5 subclause		Comments
	5.2.1	Conductor description:	
	5.2.2	Insulation description: Maximum diameter: Colour code of elements:	
	5.2.3	Number of elements (pair(s)/quad(s)):	
	5.2.3.1	Screening of the cable element: Tape material Drain wire Braid wire Braid material	
	5.2.4	Cross web, spacer or protective wrapping(s):	
	5.2.5	Screen of the cable core: Tape material Minimum overlap Drain wire Braid wire Braid material	
	5.2.6	Sheath Material Nominal thickness Colour Maximum overall Diameter Marking Ripcord	
	5.2.7	Identification	
	5.2.8	Packaging of finished cable	

[8] Minimum bending radius for static bending: mm Minimum bending radius for dynamic bending: mm Temperature range for installation °C Operating temperature range under static conditions: -20 °C to +60°C (minimum requirements, other temperature ranges may be specified).			
[9] Characteristics	[10] IEC 61156-5 subclause	[11]	Comments
Electrical characteristics	**6.2**		
Conductor resistance	6.2.1	≤ …. Ω/km	
Resistance unbalance	6.2.2	≤ …. %	
Dielectric strength Conductor/conductor Conductor/screen	 6.2.3 6.2.3	 ……. kV/time ……. kV/time	
Insulation resistance Conductor/conductor Conductor/screen	 6.2.4 6.2.4	 ≥ … MΩ•km ≥ … MΩ•km	
Mutual capacitance	6.2.5	≤ …. pF/m	
Capacitance unbalance pair to ground	6.2.6	≤ …. pF/km	
Transfer impedance	6.2.7	…….mΩ/m	
Coupling attenuation	6.2.8	……dB Cable type……	Cable type should be I, II or III
Ampacity	6.2.9	…..mA	Under consideration
Transmission characteristics	**6.3**		
Velocity of propagation	6.3.1	≥ …. m/s	
Delay **Differential phase delay (skew)** **Environmental effects**	6.3.2 6.3.2.1 6.3.2.2	≤ … ns/m ≤ … ns/m ≤ … ns/m	
Attenuation General figures Environmental temperature effects	6.3.3 6.3.3.1 6.3.3.2	 ≤ … dB/100 m ≤ … %/°C	

Unbalance attenuation near-end (TCL) Unbalance attenuation far-end (EL TCTL)	6.3.4 6.3.4	≥... dB ≥... dB	Cable grade shall be identified
Near-end crosstalk	6.3.5	≥ ... dB	
Far-end crosstalk	6.3.6	≥ ... dB	
Alien (exogenous) near-end crosstalk	6.3.7	≥ ... dB	
Alien (exogenous) far-end crosstalk	6.3.8	≥ ... dB	
Mean characteristic impedance	6.3.10	≥ ... %	
Return loss	6.3.11	≤ ... dB	
Mechanical and dimensional characteristics	**6.4**		
Dimensional requirements Insulation diameter Sheath thickness Cable diameter	6.4.1	... mm	
Elongation at break of the conductor	6.4.2	... % ≥8%	
Tensile strength of the insulation	6.4.3	≥ ... MPa	
Elongation at break of the insulation	6.4.4	... ≥ 100 %	
Adhesion of the insulation to the conductor	6.4.5	...	
Elongation at break of the sheath	6.4.6	... ≥100 %	
Tensile strength of the sheath	6.4.7	... ≥ 9MP_a	
Crush test of the cable	6.4.8	... ≥ 1 000 N	
Crush test of the cable	6.4.8	... ≥ 2 200 N	
Impact test of the cable	6.4.9	... J	
Impact test of the cable	6.4.9	... ≥10 J	
Impact test of the cable	6.4.9	... ≥20 J	
Bending under tension	6.4.10		
Repeated bending	6.4.11		
Tensile performance of the cable	6.4.12		
Shock test	Not applicable		
Shock test MICE(1)	Not applicable		

Shock test MICE(2)	6.4.13	… ≥15 g/11 ms	
Shock test MICE(3)	6.4.13	… ≥50 g/11 ms	
Bump test	Not applicable		
Bump test MICE(1)	Not applicable		
Bump test MICE(2)	6.4.14	… ≥15 g/11ms	
Bump test MICE(3)	6.4.14	… ≥50 g/11 ms	
Vibration test	Not applicable		
Vibration test MICE(1)	Not applicable		
Vibration test MICE(2)	6.4.15	10-500 Hz 10 g load	
Vibration test MICE(3)	6.4.15	10-2 000 Hz 20 g load	
Environmental characteristics	**6.5**		
Shrinkage of the insulation	6.5.1	≤ … 5 %	
Bending test of insulation at low temperature	6.5.3		
Elongation at break of the sheath after ageing	6.5.4	≥ … %	
Tensile strength of the sheath after ageing	6.5.5	≥ … %	
Sheath pressure test at high temperature	Not applicable		
Cold bend test of cable	6.5.7		
Heat shock test	Not applicable		
Damp heat steady state	Not applicable		
Solar radiation	6.5.10		
Solvents and contaminating fluids **MICE(1), MICE(2), MICE(3)**	6.5.11		This test is not required in IEC 61156-5; it may be required and defined in the detailed specification
Salt mist and sulphur dioxide tests	6.5.12		
Climatic sequence	Not applicable		
Water immersion test	Not applicable		
Smoke generation	6.5.19		The requirement and the test method shall be specified in the detailed specification
Toxic gas emission	6.5.20		
Integrated fire test	6.5.21		

NOTE 1 When a characteristic is marked as not applicable, it is not required by IEC 61156-5 but may be required in the detailed specification.

NOTE 2 Ingress requirements using particles is not applicable to a cable.

NOTE 3 Electromagnetic requirements coming from the MICE table of ISO/IEC 24702 have been dealt with by using the requirements that are given for transfer impedance, screening attenuation and coupling attenuation. ESD requirements are considered not applicable.

ISBN 2-8318-9142-6

ICS 33.120.20

Typeset and printed by the IEC Central Office
GENEVA, SWITZERLAND