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

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**NOTE FROM TC/SC OFFICERS:**
CONTENTS

FOREWORD ........................................................................................................................................ 5
1 Scope .............................................................................................................................................. 7
2 Normative references ...................................................................................................................... 7
3 Terms and definitions ...................................................................................................................... 9
4 Installation considerations .............................................................................................................14
5 Materials and cable construction ..................................................................................................15
  5.1 General remarks .......................................................................................................................15
  5.2 Cable constructions ..................................................................................................................15
    5.2.1 General ...............................................................................................................................15
    5.2.2 Conductor ..........................................................................................................................15
    5.2.3 Insulation ...........................................................................................................................15
    5.2.4 Cable element .......................................................................................................................16
    5.2.5 Cable make-up .....................................................................................................................16
    5.2.6 Screening of the cable core ................................................................................................17
    5.2.7 Sheath ................................................................................................................................17
    5.2.8 Identification .......................................................................................................................17
    5.2.9 Finished cable .....................................................................................................................18
6 Characteristics and requirements ..................................................................................................18
  6.1 General remarks – Test configurations .....................................................................................18
  6.2 Electrical characteristics and tests ............................................................................................19
    6.2.1 Conductor resistance ..........................................................................................................19
    6.2.2 Resistance unbalance .......................................................................................................19
    6.2.3 Dielectric strength ...............................................................................................................20
    6.2.4 Insulation resistance ...........................................................................................................20
    6.2.5 Mutual capacitance ............................................................................................................20
    6.2.6 Capacitance unbalance .......................................................................................................20
    6.2.7 Transfer impedance ............................................................................................................21
    6.2.8 Coupling attenuation ..........................................................................................................21
    6.2.9 Current-carrying capacity .................................................................................................21
  6.3 Transmission characteristics ......................................................................................................21
    6.3.1 General requirements ..........................................................................................................21
    6.3.2 Velocity of propagation (phase velocity) ..........................................................................22
    6.3.3 Phase delay and differential delay (delay skew) ................................................................23
    6.3.4 Attenuation .........................................................................................................................23
    6.3.5 Unbalance attenuation ........................................................................................................26
    6.3.6 Near-end crosstalk .............................................................................................................32
    6.3.7 Far-end crosstalk ...............................................................................................................34
    6.3.8 Alien (exogenous) near-end crosstalk ...............................................................................36
    6.3.9 Alien (exogenous) far-end crosstalk ..................................................................................39
    6.3.10 Alien (exogenous) crosstalk of bundled cables ...............................................................39
    6.3.11 Impedance .........................................................................................................................40
    6.3.12 Return loss .........................................................................................................................42
  6.4 Mechanical and dimensional characteristics and requirements ................................................43
    6.4.1 Measurement of dimensions .............................................................................................43
    6.4.2 Elongation at break of the conductor .................................................................................43
6.4.3 Tensile strength of the insulation ................................................................. 43
6.4.4 Elongation at break of the insulation ............................................................ 43
6.4.5 Adhesion of the insulation to the conductor ................................................ 43
6.4.6 Elongation at break of the sheath ................................................................. 43
6.4.7 Tensile strength of the sheath ..................................................................... 43
6.4.8 Crush test of the cable ................................................................................ 43
6.4.9 Cold Impact test of the cable ..................................................................... 43
6.4.10 Bending under tension ............................................................................... 44
6.4.11 Repeated bending of the cable .................................................................. 46
6.4.12 Tensile performance of the cable ............................................................... 47
6.4.13 Shock test of the cable .............................................................................. 47
6.4.14 Bump test of the cable ............................................................................. 47
6.4.15 Vibration test of the cable ........................................................................ 48

6.5 Environmental characteristics ...................................................................... 48
6.5.1 Shrinkage of the insulation ........................................................................ 48
6.5.2 Wrapping test of the insulation after thermal ageing ................................... 48
6.5.3 Bending test of the insulation at low temperature ....................................... 48
6.5.4 Elongation at break of the sheath after ageing ........................................... 48
6.5.5 Tensile strength of the sheath after ageing ................................................ 48
6.5.6 Sheath pressure test at high temperature .................................................. 48
6.5.7 Cold bend test of the cable ......................................................................... 48
6.5.8 Heat shock test ............................................................................................ 49
6.5.9 Damp heat, steady state .............................................................................. 49
6.5.10 Solar radiation .......................................................................................... 49
6.5.11 Solvents and contaminating fluids ............................................................ 49
6.5.12 Salt mist and sulphur dioxide .................................................................... 49
6.5.13 Water immersion ...................................................................................... 49
6.5.14 Hygroscopicity ......................................................................................... 49
6.5.15 Wicking ..................................................................................................... 50
6.5.16 Flame propagation characteristics of a single cable ................................. 50
6.5.17 Flame propagation characteristics of bunched cables .............................. 51
6.5.18 Resistance to fire test method .................................................................. 51
6.5.19 Halogen gas evolution .............................................................................. 51
6.5.20 Smoke generation ..................................................................................... 51
6.5.21 Toxic gas emission .................................................................................... 51
6.5.22 Integrated fire test method for cables in environmental air handling spaces .................................................. 51

Annex A (informative) Acronyms for common cable constructions .................. 52
Bibliography ........................................................................................................ 54

Figure 1 – Resistor terminations in balun measurements .................................... 19
Figure 2 – Test set-up for the measurement of attenuation, velocity of propagation and phase delay ................................................................. 24
Figure 3 – Test set-up for the measurement of the differential-mode loss of the baluns ........................................................................................................ 28
Figure 4 – Test set-up for the measurement of the common-mode loss of the baluns ................................................................. 28
Figure 5 – Test set-up for unbalance attenuation at near end (TCL) .................... 30
Figure 6 – Test set-up for unbalance attenuation at far end (TCTL) .................... 30
Figure 7 – Test set-up for near-end crosstalk ................................................................. 32
Figure 8 – Test set-up for far-end crosstalk ................................................................ 34
Figure 9 – Test set-up for alien (exogenous) near-end crosstalk .................................. 37
Figure 10 – Test assembly cross-section: six cables around one cable ....................... 39
Figure 11 – Test assembly layout: six cables around one cable ..................................... 39
Figure 12 – Test set-up for characteristic impedance, terminated input impedance, and return loss ............................................................................................................ 40
Figure 13 – U-bend test configuration ............................................................................ 45
Figure 14 – S-bend test configuration ............................................................................ 45
Figure 15 – Repeated bending test configuration ............................................................. 46
Figure 16 – Wicking test configuration .......................................................................... 50
Figure A.1 – Common cable construction examples ...................................................... 53

Table 1 – Test balun performance characteristics ......................................................... 26
Table A.1 – Cable construction acronyms ................................................................. 52
INTERNATIONAL ELECTROTECHNICAL COMMISSION

MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR DIGITAL COMMUNICATIONS –

Part 1: Generic specification

FOREWORD

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

This fourth edition cancels and replaces the third edition published in 2007 and Amendment 1 published in 2009. This edition constitutes a technical revision.

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

a) modification of the scope in Clause 1 and updating of normative references documents in Clause 2;

b) addition of PoE-related definitions in Clause 3;

c) clarification of differential-mode and common-mode resistors, correction of formulae and addition of IEC 62153-4-9 test method for coupling attenuation in Clause 6;
d) introduction of balunless measurement method in 6.3.1, modification of equipment requirements of unbalance attenuation in 6.3.5 and updating of balun’s performance in Table 1;

e) deletion of 'three layers of cables on a drum' method in alien (exogenous) near-end crosstalk measurement in 6.3.8 and addition of terminated input impedance in 6.3.11.4.

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

<table>
<thead>
<tr>
<th>Draft</th>
<th>Report on voting</th>
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<tbody>
<tr>
<td>46C/XX/FDIS</td>
<td>46C/XX/RVD</td>
</tr>
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Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English and French.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 61156 series, published 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 document will remain unchanged until the stability date indicated on the IEC website under 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.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.
1 Scope

This part of IEC 61156 specifies the definitions, requirements and test methods of multicore, symmetrical pair and quad cables.

This document is applicable to communication systems such as local area networks (LANs) and data communication cables. It is also applicable to cables used for industrial applications, customer premises wiring and generic cabling comprising installation cables and cables for work area wiring which are defined in ISO/IEC 11801 (all parts).

The cables covered by this document are intended to operate with voltages and currents normally encountered in communication systems. While these cables are not intended to be used in conjunction with low impedance sources, for example the electric power supplies of public utility mains, they are intended to be used to support the delivery of low voltage remote powering applications including but not restricted to Power over Ethernet as specified in ISO/IEC/IEEE 8802-3. More information on the capacity to support these applications according to the installation practices are given in IEC 61156-1-4, IEC TR 61156-1-6 and ISO/IEC TS 29125.

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.

IEC 60028, International standard of resistance for copper


IEC 60189-1:2018, Low-frequency cables and wires with PVC insulation and PVC sheath – Part 1: General test and measuring methods

IEC 60304, Standard colours for insulation for low-frequency cables and wires

IEC 60332-1-2, Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame

IEC 60332-2-2, Tests on electric and optical fibre cables under fire conditions – Part 2-1: Test for vertical flame propagation for a single small insulated wire or cable – Procedure for diffusion flame

IEC 60332-3-24, Tests on electric and optical fibre cables under fire conditions – Part 3-24: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category C

IEC 60332-3-25, Tests on electric and optical fibre cables under fire conditions – Part 3-25: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category D
IEC 60708, *Low-frequency cables with polyolefin insulation and moisture barrier polyolefin sheath*

IEC 60754-2, *Test on gases evolved during combustion of materials from cables – Part 2: Determination of acidity (by pH measurement) and conductivity*


IEC 60811-504, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 504: Mechanical tests – Bending tests at low temperature for insulation and sheaths*


IEC 60811-508, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 508: Mechanical tests – Pressure test at high temperature for insulation and sheaths*


IEC 60811-510, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 510: Mechanical tests – Methods specific to polyethylene and polypropylene compounds – Wrapping test after thermal ageing in air*

IEC 61034 (all parts), *Measurement of smoke density of cables burning under defined conditions*

IEC TR 61156-1-2, *Multicore and symmetrical pair/quad cables for digital communications – Part 1-2: Electrical transmission characteristics and test methods of symmetrical pair/quad cables*

1 IEC TR 61156-1-2 is due to become a TS in 2023.
3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

• IEC Electropedia: available at http://www.electropedia.org/
• ISO Online browsing platform: available at https://www.iso.org/obp

3.1 resistance unbalance
difference in resistance of the conductors within a pair or one side of a quad or between pairs or quads

Note 1 to entry: Resistance unbalance is expressed as a percentage (%).

3.2 mutual capacitance
electrical charge storage parameter of a pair of conductors (or with respect to the side of a quad)

Note 1 to entry: Mutual capacitance is one of the four primary transmission line parameters: mutual capacitance, mutual inductance, resistance and conductance.

Note 2 to entry: Mutual capacitance is expressed in pF/m.

3.3 capacitance unbalance to earth
arithmetic difference of the capacitance to earth of the conductors of a pair or one side of a quad

Note 1 to entry: Capacitance unbalance is expressed in pF/m.