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Multicore and symmetrical pair/quad cables for digital communications – Part 11: Symmetrical single pair cables with transmission characteristics up to 600 MHz – Horizontal floor wiring – Sectional specification

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FOREWORD

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International Standard IEC 61156-11 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.

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

FDIS	Report on voting
46C/1118/FDIS	46C/1123/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 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 "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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR DIGITAL COMMUNICATIONS –

Part 11: Symmetrical single pair cables with transmission characteristics up to 600 MHz – Horizontal floor wiring – Sectional specification

1 Scope

This part of IEC 61156 describes cables intended to be used for transmission of 1 Gbps over a single twisted pair for office, home and industrial application. An example of existing application is 1000BASE-T1, see ISO/IEC TR 11801-9906[1]. The transmission characteristics of these cables are specified up to a frequency of 600 MHz and at a temperature of 20 °C. The cable type recognised is intended to be used for shielded channels with a nominal length of 40 m. Possible designs are U/FTP, X/UTP and X/FTP, where X stands for F, S or SF. A blank detail specification can be found in Annex A.

These cables can comprise more than one pair in the event that several systems are operated in parallel. In this case, refer to Clause 7 of this document.

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.

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 60708:2005, *Low-frequency cables with polyolefin insulation and moisture barrier polyolefin sheath*

IEC 61156-1:2007, *Multicore and symmetrical pair/quad cables for digital communications – Part 1: Generic specification*
IEC 61156-1:2007/AMD1:2009[2]

IEC 61156-5:2009, *Multicore and symmetrical pair/quad cables for digital communications – Part 5: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Horizontal floor wiring – Sectional specification*

IEC 62153-4-3:2013, *Metallic communication cable test methods – Part 4-3: Electromagnetic compatibility (EMC) – Surface transfer impedance – Triaxial method*

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1 Under consideration.

2 A consolidated version of this publication exists, comprising IEC 61156-1:2007 and IEC 61156-1:2007/AMD1:2009.

IEC 62153-4-5:2006, *Metallic communication cables test methods – Part 4-5: Electromagnetic compatibility (EMC) – Coupling or screening attenuation – Absorbing clamp method*

IEC 62153-4-9:2018, *Metallic communication cable test methods – Part 4-9: Electromagnetic compatibility (EMC) – Coupling attenuation of screened balanced cables, triaxial method*

ISO/IEC TS 29125:2017, *Information technology – Telecommunications cabling requirements for remote powering of terminal equipment*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61156-1:2007 and in IEC 61156-1:2007/AMD1:2009 apply.

ISO and IEC maintain terminological databases for use in standardisation at the following addresses:

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

4 Installation considerations

4.1 General remarks

Installation area considerations are defined in Clause 4 of IEC 61156-1:2007. Other areas may be considered.

4.2 Bending radius of installed cable

The minimum bending radius of the cable shall be equal to or less than 4 times the outside diameter of the cable unless otherwise specified.

4.3 Climatic conditions

Under static conditions, the cable shall operate at least in the temperature range of the environment from −20 °C to +60 °C.

The attenuation increase due to the elevated operating temperature (temperature of the environment) is described in 6.3.3.2.

In the case of application of remote powering, the maximum temperature of the conductor shall not exceed the maximum operation temperature under static conditions in order to maintain the integrity of the dielectric material performance which is aligned to environmental temperature range.

Extended temperature ranges are permitted and may be specified in the relevant detail specification.

5 Materials and cable construction

5.1 General remarks

For the purposes of this document, the requirements of Clause 5 of IEC 61156-5:2009 apply.

The choice of materials and cable construction shall be suitable for the intended application and installation of the cable and in line with the requirements of IEC 61156-1. Particular care shall be taken to meet any requirements for EMC and fire performance (such as burning properties, smoke generation, evolution of halogen gas).

5.2 Cable construction

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

5.3 Conductor

The conductor shall be a solid annealed copper conductor in accordance with 5.2.1 of IEC 61156-1:2007 and should have a nominal diameter between 0,4 mm and 0,65 mm. A conductor diameter of up to 1,0 mm may be used.

5.4 Insulation

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

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

The colour code shall be in accordance with IEC 60708 if not specified differently in the relevant detail specification.

5.5 Cable element

The cable element shall be a pair and shall be twisted. The entire cable may comprise more than one cable element, see 6.3.5 and Clause 7.

5.6 Screening of the cable element

The screen for the cable element shall be in accordance with 5.2.3.2 of IEC 61156-1:2007.

5.7 Cable make-up

Spacers may be used in the cable elements and to separate cable elements. The cable elements and their screens, if they are screened, may be covered by an intermediate jacket. This jacket shall be in accordance with 5.9 of this document. The core of the cable may be wrapped with a protective layer of non-hygroscopic and non-wicking material.

5.8 Screening of the cable core

A screen for the cable core shall be provided. The screen shall be in accordance with 5.2.5 of IEC 61156-1:2007.

5.9 Sheath

The sheath material shall consist of a suitable 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 and non-wicking.

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

5.10 Identification

Each length of cable shall be identified as to the supplier and, when required, a traceability code, using one of the following methods:

– appropriately coloured threads or tapes;
– with a printed tape;
– printing on the cable core wrapping;
– marking on the sheath.

Additional markings, such as length marking, are permitted. If used, such markings shall refer to this document.

5.11 Finished cable

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

6 Characteristics and requirements

6.1 General remarks

Clause 6 lists the characteristics and minimum requirements of a cable complying with this document. Test methods shall be in accordance with IEC 61156-1:2007 and IEC 61156-1:2007/AMD1:2009, Clause 6, except for the length of the cable under test which shall be as specified in Clause 6 of this document.

The computed requirements in dB, rounded to one decimal place, shall be used to determine compliance.

The tests for electrical characteristics in accordance with 6.2 shall be carried out on a cable length of not less than 100 m, unless otherwise specified.

The tests for transmission characteristics in accordance with 6.3 shall be carried out on a cable length of 100 m, unless otherwise specified.

6.2 Electrical characteristics and tests

6.2.1 Conductor resistance

The maximum conductor resistance at or corrected to 20 °C shall not exceed 145 Ω/km.

6.2.2 Resistance unbalance

6.2.2.1 Resistance unbalance within a pair

The resistance unbalance shall not exceed 2,0 %.

6.2.2.2 Resistance unbalance between pairs

If applicable, the pair-to-pair resistance unbalance shall not exceed 5,0 %.