

INTERNATIONAL STANDARD

**Multicore and symmetrical pair/quad cables for digital communications –
Part 13: Symmetrical single pair cables with transmission characteristics up to
20 MHz – Horizontal floor wiring – Sectional specification**

IEC 61156-13:2023

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES
FOR DIGITAL COMMUNICATIONS –**
**Part 13: Symmetrical single pair cables with transmission characteristics
up to 20 MHz – Horizontal floor wiring – Sectional specification**

FOREWORD

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IEC 61156-13 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.

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

Draft	Report on voting
46C/1256/FDIS	46C/1260/RVD

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.

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/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- withdrawn,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.

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MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR DIGITAL COMMUNICATIONS –

Part 13: Symmetrical single pair cables with transmission characteristics up to 20 MHz – Horizontal floor wiring – Sectional specification

1 Scope

This part of IEC 61156 describes cables intended to be used for transmission of 10 Mbit/s over a single twisted pair and distances of up to 1 km. The transmission characteristics of these cables are specified up to a frequency of 20 MHz and at a temperature of 20 °C. Depending on the MICE environment and the installation conditions, either unscreened or screened cables can be used. Furthermore, to consider different maximum transmission lengths, two sets of requirements are specified. The cable type A-1000 is a design supporting up to 1 km channel length while the cable type A-400 is supporting up to 400 m channel length. A blank detail specification can be found in Annex A.

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 DC low voltage remote powering applications.

2 Normative references

[IEC 61156-13:2023](#)

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

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

IEC TS 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*

IEC 61156-5, *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, *Metallic communication cable test methods – Part 4-3: Electromagnetic compatibility (EMC) – Surface transfer impedance – Triaxial method*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61156-1 apply.

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

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

4 Installation considerations

4.1 General remarks

Installation area considerations are defined in IEC 61156-1. Other areas may be considered.

4.2 Bending radius of installed cable

The maximum value of the minimum bending radius shall be four times the cable diameter unless otherwise specified in the relevant detail specification.

4.3 Climatic conditions

Under static conditions, the cable shall operate at least in the temperature range of the environment from -20 °C to $+60\text{ °C}$.

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

When applications demand remote powering, the maximum temperature of the conductor shall not exceed the maximum operating temperature of the cable. Dielectric performance can be changed permanently due to over exposure of high temperatures.

Extended temperature ranges are permitted but might cause safety issues. An extended temperature range may be specified in the relevant detail specification.

5 Materials and cable construction

5.1 General remarks

For the purposes of this document, the respective requirements of IEC 61156-5 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. Any requirements for EMC and fire performance (such as burning properties, smoke generation, evolution of halogen gas) shall be met. Regional regulations can apply as well.

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 or stranded annealed copper conductor in accordance with IEC 61156-1 and should have a nominal diameter between 0,58 mm and 1,7 mm.

5.4 Insulation

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

- polyolefin,
- fluoropolymer, and
- low-smoke halogen-free thermoplastic material.

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

5.5 Cable element

The cable element shall be a pair and shall be twisted. A third insulated wire may be twisted together with the pair for earthing and grounding purposes.

5.6 Screening of the cable element

If screened, the screen of the cable element shall be in accordance with IEC 61156-1.

5.7 Cable make-up

Bedding material may be used in the cable element to separate the cable element from other design elements (e.g. braid, armouring). The cable element and its screen may be covered by an intermediate jacket. This jacket shall be in accordance with 5.9. 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

If screened, the screen of the cable core shall be in accordance with IEC 61156-1.

5.9 Sheath

The sheath material shall consist of a suitable material. Examples of suitable materials are

- polyolefin,
- PVC,
- fluoropolymer, and
- low-smoke halogen-free thermoplastic material.

The sheath shall be continuous. 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, etc. are permitted. If used, such markings shall refer to this specification.

5.11 Finished cable

The finished cable shall be protected for storage and transport as specified in the relevant detail specification.

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, except for the length of the cable under test which shall be as specified below. If balun-less testing is used, it should be in accordance with IEC TS 61156-1-2.

The computed requirements in decibels (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 in the relevant detail specification.

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

6.2 Electrical characteristics and tests

6.2.1 Conductor resistance

The maximum conductor resistance at or corrected to 20 °C shall not exceed 23 Ω/km for cable type A-1000 or 72,5 Ω/km for cable type A-400.

6.2.2 Resistance unbalance within a pair

The resistance unbalance shall not exceed 2,0 %.

6.2.3 Dielectric strength

There shall be no failures when a test is performed on a conductor/conductor and, where screen(s) are present, a conductor/screen with 1,0 kV DC for 1 min or, alternatively, with 2,5 kV DC for 2 s. An AC voltage may be used. The AC voltage levels in these cases shall be 0,7 kV AC for 1 min or alternatively 1,7 kV AC for 2 s.

6.2.4 Insulation resistance

The test, immediately after the dielectric strength test, shall be performed on

- conductor/conductor, and
- conductor/screen if screen(s) are present.

The minimum insulation resistance at or corrected to 20 °C shall be not less than 5 GΩ·km.

6.2.5 Mutual capacitance

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

6.2.6 Capacitance unbalance

The maximum capacitance unbalance pair to ground shall not exceed 1 600 pF/km at a frequency of 800 Hz or 1 000 Hz.