



IEC 61156-8

Edition 1.1 2013-05  
CONSOLIDATED VERSION

# INTERNATIONAL STANDARD



**Multicore and symmetrical pair/quad cables for digital communications –  
Part 8: Symmetrical pair/quad cables with transmission characteristics up to  
1 200 MHz – Work area wiring – Sectional specification**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

ICS 33.120.20

ISBN 978-2-8322-0853-3

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

|   |    |
|---|----|
| FOREWORD.....   | 4  |
| 1 Scope.....  | 6  |
| 2 Normative references.....   | 6  |
| 3 Terms and definitions .....   | 6  |
| 4 Installation considerations.....                                    | 7  |
| 4.1 Installation conditions .....                                     | 7  |
| 4.2 Climatic conditions.....  | 7  |
| 5 Materials and cable construction .....                              | 7  |
| 5.1 General remarks.....  | 7  |
| 5.2 Cable construction.....   | 7  |
| 5.2.1 Conductor.....  | 7  |
| 5.2.2 Insulation.....   | 7  |
| 5.2.3 Cable element .....   | 7  |
| 5.2.4 Cable make-up .....   | 8  |
| 5.2.5 Screening of cable core .....                                   | 8  |
| 5.2.6 Sheath.....   | 8  |
| 5.2.7 Identification .....  | 8  |
| 5.2.8 Finished cable .....  | 8  |
| 6 Characteristics and requirements.....                               | 8  |
| 6.1 General remarks.....  | 8  |
| 6.2 Electrical characteristics .....                                  | 9  |
| 6.2.1 Conductor resistance.....                                       | 9  |
| 6.2.2 Resistance unbalance.....                                       | 9  |
| 6.2.3 Dielectric strength.....  | 9  |
| 6.2.4 Insulation resistance .....                                     | 9  |
| 6.2.5 Mutual capacitance .....  | 9  |
| 6.2.6 Capacitance unbalance.....                                      | 9  |
| 6.2.7 Transfer impedance.....   | 9  |
| 6.2.8 Coupling attenuation .....                                      | 10 |
| 6.2.9 Current-carrying capacity .....                                 | 10 |
| 6.2.10 Shield resistance .....  | 10 |
| 6.3 Transmission characteristics.....                                 | 10 |
| 6.3.1 Velocity of propagation (phase velocity) .....                  | 10 |
| 6.3.2 Phase delay and differential delay (delay skew).....            | 10 |
| 6.3.3 Attenuation .....   | 11 |
| 6.3.4 Unbalance attenuation .....                                     | 11 |
| 6.3.5 Near-end crosstalk ( <i>NEXT</i> ).....                         | 12 |
| 6.3.6 Far-end crosstalk ( <i>FEXT</i> ) .....                         | 12 |
| 6.3.7 Alien (exogenous) near-end crosstalk .....                      | 12 |
| 6.3.8 Alien (exogenous) far-end crosstalk .....                       | 12 |
| 6.3.9 Alien (exogenous) crosstalk of bundled cables .....             | 12 |
| 6.3.10 Impedance.....   | 12 |
| 6.3.11 Return loss ( <i>RL</i> ).....                                 | 12 |
| 6.4 Mechanical and dimensional characteristics and requirements ..... | 13 |
| 6.4.1 Dimensional requirements.....                                   | 13 |
| 6.4.2 Elongation at break of the conductors .....                     | 13 |

|        |   |    |
|--------|---|----|
| 6.4.3  | Tensile strength of the insulation.....                   | 13 |
| 6.4.4  | Elongation at break of the insulation.....                | 13 |
| 6.4.5  | Adhesion of the insulation to the conductor .....         | 13 |
| 6.4.6  | Elongation at break of the sheath .....                   | 13 |
| 6.4.7  | Tensile strength of the sheath .....                      | 13 |
| 6.4.8  | Crush test of the cable .....                             | 13 |
| 6.4.9  | Impact test of the cable.....                             | 13 |
| 6.4.10 | Bending under tension .....                               | 13 |
| 6.4.11 | Repeated bending of the cable .....                       | 14 |
| 6.4.12 | Tensile performance of the cable .....                    | 14 |
| 6.4.13 | Shock test of the cable.....                              | 14 |
| 6.4.14 | Bump test of the cable .....                              | 14 |
| 6.4.15 | Vibration test of a cable .....                           | 14 |
| 6.5    | Environmental characteristics .....                       | 14 |
| 6.5.1  | Shrinkage of insulation.....                              | 14 |
| 6.5.2  | Wrapping test of insulation after thermal ageing.....     | 14 |
| 6.5.3  | Bending test of insulation at low temperature .....       | 14 |
| 6.5.4  | Elongation at break of the sheath after ageing.....       | 14 |
| 6.5.5  | Tensile strength of the sheath after ageing.....          | 14 |
| 6.5.6  | Sheath pressure test at high temperature .....            | 14 |
| 6.5.7  | Cold bend test of the cable .....                         | 14 |
| 6.5.8  | Heat shock test.....                                      | 15 |
| 6.5.9  | Damp heat steady state .....                              | 15 |
| 6.5.10 | Solar radiation .....                                     | 15 |
| 6.5.11 | Solvents and contaminating fluids.....                    | 15 |
| 6.5.12 | Salt mist and sulphur dioxide .....                       | 15 |
| 6.5.13 | Water immersion .....                                     | 15 |
| 6.5.14 | Hygroscopicity .....                                      | 15 |
| 6.5.15 | Wicking .....   | 15 |
| 6.5.16 | Flame propagation characteristics of a single cable.....  | 15 |
| 6.5.17 | Flame propagation characteristics of bunched cables ..... | 15 |
| 6.5.18 | Halogen gas evolution.....                                | 15 |
| 6.5.19 | Smoke generation.....                                     | 15 |
| 6.5.20 | Toxic gas emission .....                                  | 15 |
| 6.5.21 | Integrated fire test .....                                | 15 |
| 7      | Introduction to the blank detail specification .....      | 16 |
|        | Bibliography .....  | 17 |
|        | Table 1 – Transfer impedance.....                         | 10 |
|        | Table 2 – Coupling attenuation.....                       | 10 |
|        | Table 3 – Attenuation, constant values .....              | 11 |
|        | Table 4 – Return loss ( <i>RL</i> ).....                  | 12 |

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR DIGITAL COMMUNICATIONS –

#### Part 8: Symmetrical pair/quad cables with transmission characteristics up to 1 200 MHz – Work area wiring – Sectional specification

#### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

**This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.**

**IEC 61156-8 edition 1.1 contains the first edition (2009) [documents 46C/887/FDIS and 46C/894/RVD], its corrigendum (July 2009) and its amendment 1 (2013) [documents 46C/957/CDV and 46C/966/RVC].**

**A vertical line in the margin shows where the base publication has been modified by amendment 1. Additions and deletions are displayed in red, with deletions being struck through.**

International Standard IEC 61156-8 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 publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 the base publication and its amendment 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.

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

## MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR DIGITAL COMMUNICATIONS –

### Part 8: Symmetrical pair/quad cables with transmission characteristics up to 1 200 MHz – Work area wiring – Sectional specification

#### 1 Scope

This sectional specification relates to IEC 61156-1 and IEC 61156-7. The cables described herein are specified up to 1 200 MHz and are specifically designed to build patch, equipment, and work area cables as defined in ISO/IEC 11801 and ISO/IEC 15018.

It covers a cable having four individually screened (STP) pairs. The cable may be provided with a common screen over the cable core. The transmission characteristics are specified for a frequency range 4 MHz to 1 200 MHz and at 20 °C.

These cables can be used for various communication channels 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.

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

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

IEC 61156-7, *Multicore and symmetrical pair/quad cables for digital communications – Part 7: Symmetrical pair cables with transmission characteristics up to 1 200 MHz – Sectional specification for digital and analog communication cables*