

INTERNATIONAL STANDARD



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

<https://standards.iteh.ai>
Document Preview

[IEC 61156-1:2023](#)

<https://standards.iteh.ai/catalog/standards/iec/60a77900-2ecd-40ca-b398-65948fea788f/iec-61156-1-2023>





THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2023 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

International
Standards.iteh.ai
Document Preview

[IEC 61156-1:2023](https://standards.iteh.ai/catalog/standards/iec/60a77900-2ecd-40ca-b398-65948fea788f/iec-61156-1-2023)

<https://standards.iteh.ai/catalog/standards/iec/60a77900-2ecd-40ca-b398-65948fea788f/iec-61156-1-2023>



IEC 61156-1

Edition 4.0 2023-03
REDLINE VERSION

INTERNATIONAL STANDARD



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

iteh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 61156-1:2023](#)

<https://standards.iteh.ai/catalog/standards/iec/60a77900-2ecd-40ca-b398-65948fea788f/iec-61156-1-2023>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.120.20

ISBN 978-2-8322-6666-3

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

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references	7
3 Terms and definitions	10
4 Installation considerations	16
5 Materials and cable construction	16
5.1 General remarks	16
5.2 Cable constructions	16
5.2.1 General	16
5.2.2 Conductor.....	16
5.2.3 Insulation.....	17
5.2.4 Cable element	17
5.2.5 Cable make-up	18
5.2.6 Screening of the cable core	18
5.2.7 Sheath.....	18
5.2.8 Identification.....	19
5.2.9 Finished cable	19
6 Characteristics and requirements	19
6.1 General remarks – Test configurations.....	19
6.2 Electrical characteristics and tests	21
6.2.1 Conductor resistance.....	21
6.2.2 Resistance unbalance.....	21
6.2.3 Dielectric strength.....	22
6.2.4 Insulation resistance.....	22
6.2.5 Mutual capacitance.....	22
6.2.6 Capacitance unbalance to earth.....	22
6.2.7 Transfer impedance.....	23
6.2.8 Coupling attenuation.....	23
6.2.9 Current-carrying capacity.....	23
6.3 Transmission characteristics	23
6.3.1 General requirements	23
6.3.2 Velocity of propagation (phase velocity).....	24
6.3.3 Phase delay and differential delay (delay skew).....	25
6.3.4 Attenuation	26
6.3.5 Unbalance attenuation	28
6.3.6 Near-end crosstalk	36
6.3.7 Far-end crosstalk.....	38
6.3.8 Alien (exogenous) near-end crosstalk.....	42
6.3.9 Alien (exogenous) far-end crosstalk.....	46
6.3.10 Alien (exogenous) crosstalk of bundled cables	46
6.3.11 Impedance.....	47
6.3.12 Return loss	49
6.4 Mechanical and dimensional characteristics and requirements.....	50
6.4.1 Measurement of dimensions	50
6.4.2 Elongation at break of the conductor.....	50
6.4.3 Tensile strength of the insulation	50

6.4.4	Elongation at break of the insulation	51
6.4.5	Adhesion of the insulation to the conductor.....	51
6.4.6	Elongation at break of the sheath	51
6.4.7	Tensile strength of the sheath.....	51
6.4.8	Crush test of the cable.....	51
6.4.9	Cold Impact test of the cable	51
6.4.10	Bending under tension	51
6.4.11	Repeated bending of the cable	54
6.4.12	Tensile performance of the cable	55
6.4.13	Shock test of the cable	55
6.4.14	Bump test of the cable	55
6.4.15	Vibration test of the cable	55
6.5	Environmental characteristics	55
6.5.1	Shrinkage of the insulation	55
6.5.2	Wrapping test of the insulation after thermal ageing	55
6.5.3	Bending test of the insulation at low temperature	56
6.5.4	Elongation at break of the sheath after ageing	56
6.5.5	Tensile strength of the sheath after ageing	56
6.5.6	Sheath pressure test at high temperature	56
6.5.7	Cold bend test of the cable	56
6.5.8	Heat shock test.....	57
6.5.9	Damp heat, steady state	57
6.5.10	Solar radiation	57
6.5.11	Solvents and contaminating fluids.....	57
6.5.12	Salt mist and sulphur dioxide.....	57
6.5.13	Water immersion	57
6.5.14	Hygroscopicity	57
6.5.15	Wicking.....	57
6.5.16	Flame propagation characteristics of a single cable	58
6.5.17	Flame propagation characteristics of bunched cables	58
6.5.18	Resistance to fire test method	59
6.5.19	Halogen gas evolution	59
6.5.20	Smoke generation.....	59
6.5.21	Toxic gas emission	59
6.5.22	Integrated fire test method for cables in environmental air handling spaces.....	59
Annex A (informative) Acronyms for common cable constructions.....		60
Bibliography.....		62
Figure 1 – Resistor terminations in balun measurements		20
Figure 2 – Test set-up for the measurement of attenuation, velocity of propagation and phase delay		26
Figure 3 – Test set-up for the measurement of the differential-mode loss of the baluns.....		30
Figure 4 – Test set-up for the measurement of the common-mode loss of the baluns.....		31
Figure 5 – Test set-up for unbalance attenuation at near end (TCL).....		33
Figure 6 – Test set-up for unbalance attenuation at far end (TCTL)		34
Figure 7 – Test set-up for near-end crosstalk.....		36
Figure 8 – Test set-up for far-end crosstalk.....		39

Figure 9 – Test set-up for alien (exogenous) near-end crosstalk 42

Figure 10 – Test assembly cross-section: six cables around one cable 44

Figure 11 – Test assembly layout: six cables around one cable 44

Figure 12 – Test set-up for characteristic impedance, terminated input impedance, and return loss 47

Figure 13 – U-bend test configuration 52

Figure 14 – S-bend test configuration 53

Figure 15 – Repeated bending test configuration 54

Figure 16 – Wicking test configuration 58

~~Figure 18 – Schematic diagram representing the position of the 9 cables on a wooden drum 59~~

~~Figure 19 – Arrangement of the cables on the drum 60~~

~~Figure 20 – Preparation of one end 61~~

Figure A.1 – Common cable construction examples 61

Table 1 – Test balun performance characteristics 29

Table A.1 – Cable construction acronyms 60

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 61156-1:2023](#)

<https://standards.iteh.ai/catalog/standards/iec/60a77900-2ecd-40ca-b398-65948fea788f/iec-61156-1-2023>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MULTICORE AND SYMMETRICAL PAIR/QUAD
CABLES FOR DIGITAL COMMUNICATIONS –****Part 1: Generic 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 itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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 redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 61156-1:2007+AMD1:2009 CSV. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

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:

Draft	Report on voting
46C/1242/FDIS	46C/1249/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 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.

MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR DIGITAL COMMUNICATIONS –

Part 1: Generic specification

1 Scope

This part of IEC 61156 ~~is applicable to communication systems such as ISDN, local area networks and data communication systems and~~ 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 60050-726, International Electrotechnical Vocabulary (IEV) – Part 726: Transmission lines and wave guides~~

IEC 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Tests A: Cold*

~~IEC 60169-22, Radio-frequency connectors – Part 22: RF two-pole bayonet coupled connectors for use with shielded balanced cables having twin inner conductors (Type BNO)~~

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

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

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

¹⁾ There exists a 2007 edition of 60189-1.

~~IEC 60332-2-1, 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 – Apparatus~~

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 2-2: Test for vertical flame propagation for a single small insulated wire or cable – Procedure for diffusion flame

~~IEC 60332-3-10, Tests on electric cables under fire conditions – Part 3-10: Test for vertical flame spread of vertically-mounted bunched wires or cables – Apparatus~~

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 ~~electric~~ materials from cables – Part 2: ~~Determination of the degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity~~ Determination of acidity (by pH measurement) and conductivity

~~IEC 60794-1-2:2003, Optical fibre cables – Part 1-2: Generic specification – Basic optical cable test procedures~~

IEC 60794-1-21:2015, Optical fibre cables – Part 1-21: Generic specification – Basic optical cable test procedures – Mechanical test methods

~~IEC 60811-1-1:1993, Common test methods for insulating and sheathing materials of electric cables and optical cables – Part 1: Methods for general application – Section 1: Measurement of thickness and overall dimensions – Tests for determining the mechanical properties~~

~~IEC 60811-1-2:1985, Common test methods for insulating and sheathing materials of electric and optical cables – Part 1: Methods for general application – Section Two: Thermal ageing methods~~

~~IEC 60811-1-3:1993, Common test methods for insulating and sheathing materials of electric and optical cables – Part 1: Methods for general application – Section Three: Methods for determining the density – Water absorption tests – Shrinkage test~~

~~IEC 60811-1-4:1985, Common test methods for insulating and sheathing materials of electric and optical cables – Part 1: Methods for general application – Section Four: Test at low temperature~~

~~IEC 60811-3-1:1985, Common test methods for insulating and sheathing materials of electric and optical cables – Part 3: Methods specific to PVC compounds – Section One: Pressure test at high temperature – Tests for resistance to cracking~~

~~IEC 60811-4-2:2004, Insulating and sheathing materials of electric cables – Common test methods – Part 4-2: Methods specific to polyethylene and polypropylene compounds – Tensile strength and elongation at break after conditioning at elevated temperature – Wrapping test~~

~~after conditioning at elevated temperature – Wrapping test after thermal ageing in air – Measurement of mass increase – Long term stability test – Test method for copper catalyzed oxidative degradation~~

IEC 60811-201, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 201: General tests – Measurement of insulation thickness*

IEC 60811-202, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 202: General tests – Measurement of thickness of non-metallic sheath*

IEC 60811-203, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 203: General tests – Measurement of overall dimensions*

IEC 60811-401, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 401: Miscellaneous tests – Thermal ageing methods – Ageing in an air oven*

IEC 60811-501, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 501: Mechanical tests – Tests for determining the mechanical properties of insulating and sheathing compounds*

IEC 60811-502, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 502: Mechanical tests – Shrinkage test for insulations*

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 60811-506, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 506: Mechanical tests – Impact test at low temperature for insulations 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 60811-509, *Electric and optical fibre cables – Test methods for non-metallic materials – Part 509: Mechanical tests – Test for resistance of insulations and sheaths to cracking (heat shock test)*

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 61156-1-2², *Multicore and symmetrical pair/quad cables for digital communications – Part 1-2: Electrical transmission characteristics and test methods of symmetrical pair/quad cables*

IEC TR 61156-1-5, *Multicore and symmetrical pair/quad cables for digital communications – Part 1-5: Correction procedures for the measurement results of return loss and input impedance*

IEC 61196-1-105, *Coaxial communication cables – Part 1-105: Electrical test methods – Test for withstand voltage of cable dielectric*

² IEC TR 61156-1-2 is due to become a TS in 2023.

IEC 62012-1:2004/2002, *Multicore and symmetrical pair/quad cables for digital communications to be used in harsh environments – Part 1: Generic specification*

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

~~IEC 62153-4-4, *Metallic communication cables test methods – Part 4-4: Electromagnetic compatibility (EMC) – Shielded screening attenuation, test method for measuring of the screening attenuation α_s up to and above 3 GHz*~~

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

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

IEC 62255 (all parts), *Multicore and symmetrical pair/quad cables for broadband digital communications (high bit rate digital access telecommunication networks) – Outside plant cables*

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

~~ITU-T Recommendation G.117:1996, *Transmission aspects of unbalance about earth*~~

~~ITU-T Recommendation O.9:1999, *Measuring arrangements to assess the degree of unbalance about earth*~~

3 Terms and definitions

For the purposes of this document, the following terms and definitions, ~~as well as those given in IEC 60050-726~~, 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>

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.

3.4

screen

continuous conducting layer or assembly of conducting layers having the function of reducing the penetration of an electric, magnetic or electromagnetic field into a given region

[SOURCE: IEC 60050-195:2021, 195-02-37, modified – "continuous conducting layer or assembly of conducting layers having the function of reducing " has replaced "device intended to reduce "]

3.5

balun

~~balanced to unbalanced impedance matching transformer~~

device to provide impedance transformation between balanced and unbalanced components

[SOURCE:ISO/IEC 11801-4:2017, 3.1.2]

3.6

balunless

virtual balun used instead of the physical transformers, achieved by mathematical algorithm, and calculated from lumped parameters or distributed parameter network

3.7

transfer impedance

Z_T

quotient of the longitudinal voltage of an electrically short uniform cable, induced in the outer circuit – formed by the screen under test and the measuring jig – and the current fed into the inner circuit – the cable under test itself or vice versa, related to unit length

Note 1 to entry: Transfer impedance is expressed in mΩ/m.

[SOURCE: IEC 62153-4-3:2013, 3.3, modified – "of an electrically short uniform cable" has been added, "outer circuit" has replaced "matched outer circuit", "the cable under test itself" has been added, "related to unit length" has replaced "(see Figure 1)".]

3.8

coupling attenuation

a_c

~~ratio between the transmitted power through the conductors and the maximum radiated peak power, conducted and generated by the exited common-mode currents~~

for a screened balanced cable, the sum of the effects of the unbalance attenuation a_U of the symmetric pair and the screening attenuation a_s of the screen of the cable under test

Note 1 to entry: For electrically long devices, i.e. above the cut-off frequency, the coupling attenuation a_c is defined as the logarithmic ratio of the feeding power P_1 and the periodic maximum values of the coupled power $P_{r, \max}$ in the outer circuit.

Note 2 to entry: Coupling attenuation is expressed in dB.

[SOURCE: IEC 62153-4-7:2021, 3.4, modified – "cable" has replaced "device", "sum of the effects" has replaced "sum", Note 2 has been added.]

3.9 current carrying capacity

maximum current a cable circuit (one or several conductors) can support resulting in a specified increase of the surface temperature of the conductor beyond the ambient temperature, not exceeding the maximum allowed operating temperature of the cable

3.10 velocity of propagation (phase velocity)

speed at which a sinusoidal signal propagates on a pair in the cable

Note 1 to entry: Velocity of propagation is expressed in m/s.

3.11 (phase delay)

delay

time duration between the instants that the wave front of a sinusoidal travelling wave, defined by a specified phase, passes two given points in a cable

Note 1 to entry: Phase delay is expressed in s/m.

3.12 differential phase delay (delay skew)

difference in phase delay between any two pairs in the cable

Note 1 to entry: Differential phase delay (skew) is expressed in s.

3.13 attenuation

decrease in magnitude of power of a signal that propagates along a pair of a cable

Note 1 to entry: Attenuation is expressed in dB/m.

3.14 ambient temperature

temperature of the room or space surrounding the cable

Note 1 to entry: Ambient temperature is expressed in degree Celsius (°C).

3.15 operating temperature

surface temperature of the conductors of a cable

Note 1 to entry: The operating temperature is the sum of the ambient temperature and of the temperature increase due to the carried power.

Note 2 to entry: Operating temperature is expressed in degree Celsius (°C).

3.16 unbalance attenuation UA

~~magnitude of power of a signal that propagates between the common mode circuit and the differential mode circuit of a cable~~

logarithmic ratio of the differential mode power to the common mode power in a balanced line, or vice versa

Note 1 to entry: Unbalance attenuation is expressed in dB.

Note 2 to entry: Unbalance attenuation is also often referred to as conversion loss: TCL (transverse conversion loss), TCTL (transverse conversion transfer loss), LCL (longitudinal conversion loss), LCTL (longitudinal conversion