

INTERNATIONAL STANDARD

IEC
62255-1

First edition
2003-11

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

**Part 1:
Generic specification**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES
FOR BROADBAND DIGITAL COMMUNICATIONS (HIGH BIT RATE
DIGITAL ACCESS TELECOMMUNICATION NETWORKS) –
OUTSIDE PLANT CABLES –**

Part 1: Generic specification

FOREWORD

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International Standard IEC 62255-1 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.

The text of this standard is based on the following documents:

FDIS	Report on voting
46C/622/FDIS	46C/632/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This standard consists of this part 1, which forms the generic specification, and the other parts, which form the sectional specifications, under the general title *Multicore and symmetrical pair/quad cables for broadband digital communications (high bit rate digital access telecommunication networks) – Outside plant cables*:

Part 1: generic specification

NOTE The general design details and requirements are common to all broadband cables/wires and are applicable to Parts 2 to 5.

Part 2: Sectional specification for unfilled cables

Part 2-1: Blank detail specification for unfilled cables

Part 3: Sectional specification for filled cables

Part 3-1: Blank detail specification for filled cables

Part 4: Sectional specification for aerial drop cables

Part 4-1: Blank detail specification for aerial drop cables

Part 5: Sectional specification for filled drop cables

Part 6: Blank detail specification for filled drop cables

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until 2008. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

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MULTICORE AND SYMMETRICAL PAIR/QUAD CABLES FOR BROADBAND DIGITAL COMMUNICATIONS (HIGH BIT RATE DIGITAL ACCESS TELECOMMUNICATION NETWORKS) – OUTSIDE PLANT CABLES –

Part 1: Generic specification

1 Scope

This part of IEC 62255 is applicable to polyolefin insulated symmetrical pair/quad telecommunication cables, filled or unfilled with copper conductor intended for broadband digital communications in the local outdoor network.

It provides definitions of characteristics, establishes general requirement for materials and cable construction, and details test methods and procedures.

Cables are differentiated by bandwidth. They have a maximum referenced frequency of 30 MHz, 60 MHz and 100 MHz.

The local cables covered by this standard are divided into two types based on cable design – filled and unfilled.

These cables have typically 6 to 300 pairs.

The drop cables covered by this standard are divided into two types based on method of installation – aerial and buried.

Drop cables typically have a pair-count of 2 to 6 pairs.

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 60028, *International standard of resistance for copper*

IEC 60050-300:2001, *International Electrotechnical Vocabulary – Electrical and electronic measurements and measuring instruments – Part 311: General terms relating to measurements – Part 312: General terms relating to electrical measurements – Part 313: Types of electrical measuring instruments – Part 314: Specific terms according to the type of instrument*

IEC 60189-1, *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, *Tests on electric cables under fire conditions – Part 1: Test on a single vertical insulated wire or cable*

IEC 60344, *Guide to the calculation of resistance of plain and coated copper conductors of low-frequency cables and wires*

IEC 60708-1, *Low-frequency cables with polyolefin insulation and moisture barrier polyolefin sheath – Part 1: General design details and requirements*

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

IEC 60811-1-1, *Common test methods for insulating and sheathing materials of electric and optical cables – Part 1-1: General application – Measurement of thickness and overall dimensions – Test for determining the mechanical properties*

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

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

IEC 60811-4-2, *Common test methods for insulating and sheathing materials of electric cables – Part 4: Methods specific to polyethylene and polypropylene compounds – Section Two: Elongation at break after pre-conditioning – Wrapping test after pre-conditioning – Wrapping test after thermal ageing in air*

IEC 61156-1:2002, *Multicore and symmetrical pair/quad cables for digital communications – Part 1: Generic specification*

IEC 61156-5, *Multicore and symmetrical pair/quad cables for digital communication – Part 5: Symmetrical pair/quad cables with transmission characteristics up to 600 MHz – Horizontal floor wiring – Sectional specification*

IEC 61196-1, *Radio-frequency cables – Part 1: Generic specification – General, definitions, requirements and test methods*

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

3 Terms and definitions

For the purposes of this document, the following definitions given in IEC 61156-1 and some of the definitions given in IEC 60050-300 apply.

Table 1 – Definition of electrical and transmission properties

Parameter	IEC referenced standard	Clause
Resistance unbalance	61156-1	2.1.1
Pair or one side of a quad to earth capacitance unbalance	61156-1	2.1.2
Pair or one side of a quad to screen capacitance unbalance	61156-1	2.1.3
Mutual capacitance of a pair	61156-1	2.1.4
Velocity of propagation (phase velocity) ¹	61156-1	2.1.5
Attenuation	61156-1	2.1.6
Unbalance attenuation	61156-1	2.1.7
Near-end crosstalk loss (NEXT)	61156-1	2.1.8
Far-end crosstalk loss (FEXT)	61156-1	2.1.9
Power sum of near-end and far-end crosstalk	61156-1	2.1.10
Characteristic impedance	61156-1	2.1.11
Surface transfer impedance	61156-1	2.1.12
Group propagation delay	61156-1	2.1.13
Differential phase delay (skew)	61156-1	2.1.16

4 Installation considerations

The requirements are under consideration. In the meantime, IEC 60794-1-1 should be used as guidance.

5 Materials and cable construction

5.1 General remarks

The choice of materials and cable construction shall be suitable for the intended application and installation of the cable. Particular care shall be taken to meet any special requirements resulting from the local climatic conditions or method of installation.

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 IEC 60028

The conductor shall have a nominal diameter between 0,5 mm and 0,9 mm.

Joints in the uninsulated conductors are allowed. Joints in uninsulated conductors shall be free from lumps and sharp projections.

The tensile strength of any conductor containing a joint shall not be less than 90 % of the tensile strength of an adjacent length of conductor outside the joint area.

¹ The velocity of propagation, group velocity and phase velocity are approximately equal for frequencies greater than 1 MHz when measured on symmetric cables, i.e. when the cables are operated in a balanced mode.

5.4 Insulation

The conductor shall be insulated with a suitable polyolefin material.

The type of conductor insulation shall be either solid or cellular or any combination thereof. The insulation may be made with or without a solid dielectric skin. The skin material may be different from the base material. Other multilayer insulating systems may be used.

The insulation shall be continuous and shall have a thickness such that the finished cable meets the specified requirements.

Joints in insulated conductors are allowed. Joints shall be free from lumps and reinsulated with a dielectric material.

The nominal thickness of the insulation shall be compatible with the method of conductor termination.

5.5 Colour code

The colour code is not specified but shall be indicated in the relevant detail specification. The colours shall be readily identifiable and should correspond with the standard colours shown in IEC 60304.

5.6 Cable element

The cable element shall be a twisted pair or quad.

Variable lay length or oscillated pairing or quadding is allowed.

5.7 Cable make-up

The cable elements shall be assembled to form the cable core. The cable may contain water swellable materials in order to prevent longitudinal water migration.

The core of the cable may be wrapped with a protective layer of non-hygroscopic material.

5.8 Filling compound type

The core of the cable may be filled with a suitable filling compound.

Examples of suitable filling compounds are:

- polyethylene/petroleum jelly;
- extended thermoplastic rubber;
- absorbent thixotropic gel;
- super absorbent polymers.

The type of filling compound shall be indicated in the relevant detail specification.

The filling compound shall be compatible with all the component materials with which it is in contact.

5.9 Flooding compound

A flooding compound may be provided as a moisture barrier. The flooding compound shall be a uniformly mixed compound. The flooding compound shall be compatible with all the component materials with which it is in contact.