
Multi-element metallic cables used in analogue and digital communication and control - Part 1: Generic specification

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EUROPEAN STANDARD

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EUROPÄISCHE NORM

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English version

**Multi-element metallic cables used in analogue
and digital communication and control
Part 1: Generic specification**

Câbles métalliques à éléments multiples
utilisés pour les transmissions
et les commandes analogiques
et numériques
Partie 1: Spécification générique

Mehradrige metallische Daten-
und Kontrollkabel für analoge
und digitale Übertragung
Teil 1: Fachgrundspezifikation

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~~This European Standard was approved by CENELEC on 2003-10-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.~~

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

This European Standard was prepared by SC 46XC, Multicore, Multipair and Quad Data communication cables, of Technical Committee CENELEC TC 46X, Communication cables.

The text of the draft was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 50288-1 on 2003-10-01.

This European Standard supersedes EN 50288-1:2001

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2004-10-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2006-10-01

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Contents

	Page
1 Scope	4
2 Normative references	4
3 Definitions	5
4 Requirements for cable construction	6
4.1 Conductors	6
4.2 Insulation.....	6
4.3 Cable elements	7
4.4 Identification of cabling elements.....	7
4.5 Screening of cabling elements.....	7
4.6 Cable make-up	8
4.7 Filling compounds	8
4.8 Interstitial fillers	8
4.9 Screening of the cable core.....	8
4.10 Moisture barriers	8
4.11 Protective wrappings.....	8
4.12 Sheath.....	9
4.13 Bedding layers for metallic protection	9
4.14 Metallic protection.....	9
4.15 Integral suspension strand	9
4.16 Oversheath.....	9
4.17 Fauna protection	9
4.18 Chemical and /or environmental protection	9
5 Test methods for completed cables.....	10
5.1 Electrical test methods	12
5.2 Mechanical test methods.....	12
5.3 Environmental test methods	12
5.4 Fire performance test methods.....	12
Bibliography.....	13

1 Scope

When used together with EN 50290 and EN 50289, this European Standard covers cables for instrumentation, inter-connection of equipment and information technology cabling applications.

Cables for information technology cabling systems, covered by this standard are suitable for use in digital and analogue data systems meeting the requirements, for example, of EN 50090-2-1, EN 50090-3-1, EN 50098-1, EN 50098-2 and EN 50173.

Instrumentation cables covered by this standard are suitable for connecting instruments and control systems for analogue or digital signal transmission.

Unless otherwise specified, all cables covered by this standard may be subjected to voltages greater than 50 V a.c or 75 V d.c. but not more than 300 V a.c. or 450 V d.c. and shall meet the essential requirements of the low voltage directive. Due to current limitation related to the conductor cross sectional area, they are not intended for direct connection to mains electricity supply. The maximum current rating per conductor is less than or equal to 175 mA unless otherwise specified in the relevant sectional specification.

Cabling elements as defined in 4.3 of this standard may be incorporated in hybrid construction cables together with coaxial or optical fibre cabling elements.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the cited publications are listed hereafter. For dated references, subsequent amendments to or revisions of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

EN 10002-1		Tensile testing of metallic materials - Part 1: Method of test at ambient temperature
EN 50173		Information technology - Generic cabling systems
EN 50289	Series	Communication Cables - Specifications for tests methods
EN 50290-1-2	¹⁾	Communication cables - Part 1-2: Definitions
EN 50290-2	Series	Communication cables - Part 2: Common design rules and construction
EN 60811-1-1		Insulating and sheathing materials of electric and optical cables - Common test methods – Part 1-1: General application - Measurement of thickness and overall dimensions - Tests for determining the mechanical properties (IEC 60811-1-1)

¹⁾ At draft stage.

EN 60811-1-3	Insulating and sheathing materials of electric and optical cables - Common test methods - Part 1-3: General application - Methods for determining the density - Water absorption tests - Shrinkage test (IEC 60811-1-3)
EN 60811-1-4	Insulating and sheathing materials of electric and optical cables - Common test methods - Part 1-4: General application - Tests at low temperature (IEC 60811-1-4)
HD 402 S2	Standard colours for insulation for low-frequency cables and wires (IEC 60304)
IEC 60028	International standard of resistance for copper
IEC 60189-1	Low-frequency cables and wires with PVC insulation and PVC sheath - Part 1: General test and measuring methods

3 Definitions

For the purposes of this European Standard, the definitions given in EN 50290-1-2 and EN 50173 apply in addition to the following:

3.1

horizontal cable

cable suitable for connecting a floor distributor to a telecommunications outlet. It is suitable for horizontal installation in ducts, trunking, suspended floors and ceiling cavities

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3.2

building backbone cable

cable suitable for connecting a building distributor to a floor distributor and may also connect floor distributors in the same building. It is suitable for horizontal installation or vertical installation between floors provided the cable has adequate mechanical strength

NOTE Horizontal cable as defined in 3.1 may also be used as building backbone cable provided that it has adequate mechanical strength and fire performance characteristics.

3.3

work area cable

a cable connecting the telecommunications outlet to the terminal equipment

3.4

patch cord cable

flexible cable unit or element with connector(s) used to establish connections on a patch panel

NOTE Work area cables, as defined in 3.3, may be used as patch cord cable in any distributor of a generic building wiring system to interconnect with equipment or to cross-connect between cabling systems.

3.5

campus backbone cable

cable suitable for connecting a campus distributor to a building distributor(s). If used outdoors or for direct burial, it shall have adequate protection for its operational environment

3.6

equipment cable

a cable connecting equipment to a distributor

3.7

instrumentation cable

a multi-element cable suitable for connecting instruments and control systems. It may incorporate screening, armouring and/or moisture barriers or environmental protection layers

4 Requirements for cable construction

4.1 Conductors

Conductors may be solid or stranded.

The conductivity of copper conductors shall be in accordance with IEC 60028.

Stranded conductors shall consist of wires circular in section and assembled, without insulation between them, by concentric stranding or bunching. As most of these cables are used together with insulation displacement connecting devices (IDC), a maximum of seven strands should be used.

The solid conductors or the individual wires of stranded conductor may be plain or metal-coated.

There shall be no joint in the wire made subsequent to the last wire drawing operation.

Joints in individual strands of a stranded copper inner conductor shall be cold pressure welded, brazed or silver soldered using a non acid flux such that the strand diameter shall not be increased.

No joint in an individual strand shall be within 0,3 m of a joint in any other individual strand.

4.2 Insulation

The choice of the insulating material shall take into account electrical and environmental requirements.

The insulation material(s) shall meet the requirements of the relevant part or parts of EN 50290-2, or otherwise as detailed in the appropriate sectional specification. Conductor insulation shall be composed of one or more suitable dielectric materials. The insulation may be solid, cellular or composite (e.g. foam-skin).

The insulation shall be continuous, having a thickness as uniform as possible. When required, the thickness of the insulation shall be measured in accordance with the method specified in 8.1 of EN 60811-1-1.

The insulation shall be applied to fit closely to the conductor. When required, the stripping properties of the insulation shall be checked in accordance with the method specified in EN 50289-3-17. When not used with IDC termination, it shall be possible to strip the insulation from the conductor easily and without visible damage to the conductor, its coating, or the insulation remaining on the conductor.

4.3 Cable elements

The cable element is

- a single insulated wire, or
- a pair consisting of two insulated conductors twisted together and designated wire “a” and wire “b”, or
- a triple consisting of three insulated conductors twisted together and designated wire “a”, wire “b” and wire “c” in order of rotation, or
- a quad consisting of four insulated conductors twisted together and designated wire “a”, wire “c”, wire “b” and wire “d” in order of rotation. Wires “a” and “b” form pair 1 and wires “c” and “d” form pair 2.

The choice of the lay length of the cable elements in the finished cable shall take into account the transmission requirements, handling performance and identification.

4.4 Identification of cabling elements

When required, the insulated conductors shall be identified by colours and/or additional ring markings and/or symbols achieved by the use of coloured insulation or by a coloured surface using extrusion, printing or painting. Colours shall be clearly identifiable and shall correspond reasonably with the standard colours shown in HD 402.

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The colour(s) or the symbol used for core identification shall be durable such that it cannot be removed when tested to EN 50289-3-8.

4.5 Screening of cabling elements

When required by the relevant sectional specification the cabling elements shall be screened by one or any combination of the following:

- a metal tape;
- a metal tape laminated to a plastic tape;
- a plain or coated metal braid;
- a helical wrap of parallel copper wires;
- a semi-conducting layer.

If a drain wire is incorporated, it shall be in contact with the screen element. The drain wire shall be either solid or stranded, made of plain or metal coated copper wire.

Care should be taken when placing dissimilar metals in contact with each other. Coatings or other methods of protection may be necessary to prevent galvanic interaction.

A protective wrapping may be applied under and/or over the screen.