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Multi-element metallic cables used in analogue and digital communication and control - Part 2-2: Sectional specification for screened cables characterized up to 100 MHz - Work area and patch cord cables

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Mehradrige metallische Daten- und Kontrollkabel für analoge und digitale Übertragung -- Teil 2-2: Rahmenspezifikation für geschirmte Kabel bis 100 MHz - Geräteanschlußkabel und Schaltkabel

Câbles métalliques à éléments multiples utilisés pour les transmissions et les commandes analogiques et numériques -- Partie 2-2: Spécification intermédiaire pour les câbles blindés pour applications jusqu'à 100 MHz - Câbles de zone de travail et de brassage

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English version

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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.

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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

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Foreword

This draft European Standard was prepared by SC 46XC, Multicore, Multipair and Quad Data communication cables, of Technical Committee CENELEC TC 46X, Communication cables. It is submitted to the Unique Acceptance Procedure.

This European Standard supersedes EN 50168:1994.

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) 2001-09-01
- latest date by which national standards conflicting with the EN have to be withdrawn (dow) 2002-10-01

This part 2-2 is to be used in conjunction with EN 50288-1.

Contents

1 Scope

This sectional specification covers cables, characterised up to 100 MHz, with an overall screen intended for work area cables to connect a telecommunications outlet to the terminal equipment and for patch cord cables to establish connections on a patch panel as defined in EN 50173. Work area cables may also be used as patch cord cables in any distributor of a generic building wiring system to interconnect with equipment or to cross-connect between cabling systems.

The electrical, mechanical, transmission and environmental performance characteristics of the screened cables, related to their reference test methods, are detailed.

This sectional specification is to be read in conjunction with EN 50288-1, the generic specification for multi-element metallic cables used in analogue and digital communication and control, which contains the essential provisions for its application.

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 publications are listed hereafter. For dated references, subsequent amendments to or revisions of any 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 publication referred to applies (including amendments).

EN 50173	Information technology - Generic cabling systems
IEC 60189-2	Low-frequency cables and wires with PVC insulation and PVC sheath Part 2: Cables in pairs, triples, quads and quintuples for inside installations
IEC 60344	Guide to the calculation of resistance of plain and coated copper conductors of low-frequency cables and wires

3 Definitions

For the purposes of this European Standard, the definitions given in 50288-1 apply.

4 Cable construction

4.1 Conductor

The conductor shall be solid or stranded and meet the requirements of 4.1 of EN 50288-1. The stranded conductor shall consist of seven wires each with a nominal diameter of ≥ 0,12 mm to ≤ 0,21 mm. The conductor shall be plain or metal coated.

4.2 Insulation

The insulation shall be either:

- polyolefin (polyethylene or polypropylene to the relevant parts of EN 50290-2), or
- low smoke zero halogen thermoplastic material to the relevant part of EN 50290-2.

The insulation shall meet the requirements of 4.2 of EN 50288-1.

4.3 Cabling elements

The cable element shall be a pair or a quad.

4.4 Identification of cabling elements

Unless otherwise specified, the colour coding for identification is given in IEC 60189-2. The colours shall meet the requirements of 4.4 of EN 50288-1.

4.5 Screening of cabling elements

Where appropriate, screening of the cabling elements shall be applied in accordance with 4.5 of EN 50288-1. When a braid is used the minimum coverage (for mechanical purposes) shall be 60%. When a foil and braid are used the minimum coverage (for mechanical purposes) shall be 40%.

4.6 Cable make-up

The cable elements shall be laid up in concentric layer(s) or unit(s) to form the cable core.

4.7 Filling compound

Not applicable

4.8 Interstitial fillers

Where fillers are used they shall meet the requirements of 4.8 of EN 50288-1.

4.9 Screening of the cable core

The screening of the cable core shall be applied in accordance with 4.9 of EN 50288-1. When a braid is used the minimum coverage (for mechanical purposes) shall be 60%. When a foil and braid are used the minimum coverage (for mechanical purposes) shall be 40%.

4.10 Moisture barriers

Not applicable

4.11 Wrapping layers

Where wrapping layers are used they shall be in accordance with 4.11 of EN 50288-1.

4.12 Sheath

The sheath shall consist of low smoke halogen free flame retardant thermoplastic material in accordance with the relevant part of EN 50290-2.

The sheath shall meet the requirements of 4.12 of EN 50288-1.

5 Tests and requirements for completed cables

When tested as directed by EN 50288-1 the limits given in the tables of this standard shall apply.

5.1 Electrical tests

5.1.1 Low-frequency and d.c. electrical measurements

EN 50288-1 clause no.	Parameter	Requirement
5.1.1.1	Conductor loop resistance	The maximum value shall be calculated in accordance with IEC 60344 and shall be ≤ 45 Ω/100 m
5.1.1.2	Conductor resistance unbalance	≤ 3%
5.1.1.3	Dielectric strength - conductor/conductor - conductor/screen	1 kV d.c. or 700 V a.c. for 1 min or 2,5 kV d.c. or 1,7 kV a.c. for 2 s
5.1.1.4	Insulation resistance	≥ 500 MΩ km
5.1.1.5	Mutual capacitance	No requirement specified
5.1.1.6	Capacitance unbalance to earth	≤ 1600 pF/km

5.1.2 High-frequency electrical and transmission measurements

EN 50288-1 clause no.	Parameter	Requirement
5.1.2.1	Velocity of propagation	≥ 0,60 c at 1 Mhz ≥ 0,65 c at 10 Mhz ≥ 0,65 c at 100 MHz
5.1.2.2	Propagation delay difference (skew)	≤ 40 ns/100 m at 100 MHz f.f.s
5.1.2.3	Attenuation[1)]	1 / 4 / 10 / 16 / 20 / 31,25 / 62,5 / 100 / MHz 3,2 / 6,5 / 9,9 / 12,3 / 13,8 / 17,7 / 25,7 / 33,0 / dB/100m
5.1.2.4	Attenuation unbalance, near end (LCL)	≥ 40 dB at 1 Mhz ≥ 30 dB at 10 MHz f.f.s ≥ 20 dB at 100 MHz f.f.s
5.1.2.5	Near-end crosstalk[2)]	1 / 4 / 10 / 16 / 20 / 31,25 / 62,5 / 100 / MHz 62 / 53 / 47 / 44 / 42 / 40 / 35 / 32 / dB
5.1.2.6	Far-end crosstalk	Not applicable
5.1.2.7	Power sum (PS)	Not applicable
5.1.2.8	Characteristic impedance[3)]	Nominal Z: 100Ω / 120Ω / 150Ω input Z, 1 - 100 MHz: (100±15)Ω / (120±15)Ω / (150±15)Ω mean Z, 10 - 100 MHz: (100±10)Ω / (120±10)Ω / (150±10)Ω
5.1.2.9	Return loss[3)]	≥ 23 dB from 10 MHz to 100 MHz
5.1.2.10	Coupling attenuation	≥ 55 dB from 30 MHz to ≤ 100 MHz f.f.s ≥ 55 - 20log$_{10}$(f/100)] dB from >100 MHz to 1000 MHz f.f.s
5.1.2.11	Transfer impedance[4)]	≤ 50 mΩ/m at 1,0 MHz ≤ 100 mΩ/m at 10,0 MHz
5.1.2.12	Screening attenuation	≥ 35 dB up to 100 MHz f.f.s

1) The attenuation shall be better than or equal to a curve fitting the specified values over the whole frequency range. Depending on the conductor size and cable impedance, improved performance cables are available for use, e.g. 7 x 0,2 mm 120 Ω cable gives:

MHz	1	4	10	16	20	31,25	62,5	100
dB/100m	2,4	4,6	7,0	8,7	10,0	12,0	16,5	20,0

2) The near-end crosstalk shall be better than or equal to a curve fitting the specified values over the whole frequency range.

3) EITHER the input impedance shall be measured OR the mean impedance AND return loss shall be measured. For the measurement of return loss a test sample having a round trip loss ≥ 40 dB at any measured frequency shall be used.

4) It is anticipated that the values of transfer impedance at higher frequencies than specified will be covered by screening attenuation