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Več elementni kovinski kabli za analogne in digitalne komunikacije in krmiljenje - 8. del: Specifikacija za kable tipa 1 za zmogljivosti do 2 MHz

Multi-element metallic cables used in analogue and digital communication and control -- Part 8: Specification for type 1 cables characterised up to 2 MHz

Mehradrige metallische Daten- und Kontrollkabel für analoge und digitale Übertragung -- Teil 8: Spezifikation für Typ 1 Kabel bis 2 MHz

Câbles métalliques à éléments multiples utilisés pour les transmissions et les commandes analogiques et numériques -- Partie 8: Spécification pour les câbles de type 1 pour applications jusqu'à 2 MHz

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This draft European Standard is submitted to CENELEC members for CENELEC enquiry.
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It has been drawn up by CLC/SC 46XC.

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CENELEC

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

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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 CENELEC enquiry.

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1 Scope

This specification defines 1 to 7 multi-pair cables for use in analogue, digital telecommunication networks and control with their relative definitions and requirements.

It covers indoor cables, with or without screen (s), characterised up to 2 MHz, to be used in Small Office Home Office (SOHO) type 1 cable application.

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

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.

EN 50090-2-2, *Home and Building Electronic Systems (HBES) - Part 2-2: System overview - General technical requirements*

EN 50288-1:2003, *Multi-element metallic cables used in analogue and digital communication and control - Part 1: Generic specification*

EN 50289-3-2, *Communication cables - Specifications for test methods - Part 3-2: Mechanical test methods - Tensile strength and elongation for conductor*

EN 50289-3-4, *Communication cables - Specifications for test methods - Part 3-4: Mechanical test methods - Tensile strength, elongation and shrinkage of insulation and sheath*

EN 50289-3-5, *Communication cables - Specifications for test methods - Part 3-5: Mechanical test methods - Crush resistance of the cable*

EN 50289-3-6, *Communication cables - Specifications for test methods - Part 3-6: Mechanical test methods - Impact resistance of the cable*

EN 50289-3-8, *Communication cables - Specifications for test methods - Part 3-8: Mechanical test methods - Abrasion resistance of cable sheath markings*

EN 50289-3-9, *Communication cables - Specifications for test methods - Part 3-9: Mechanical test methods - Bending tests*

EN 50289-3-16, *Communication cables - Specifications for test methods - Part 3-16: Mechanical test methods - Cable tensile performance*

EN 50289-4-6 [1)]

EN 50290-2 Series, *Communication cables*

EN 50290-2-23, *Communication cables - Part 2-23: Common design rules and construction – PE insulation*

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/TR 60344, *Calculation of d.c. resistance of plain and coated copper conductors of low-frequency cables and wires - Application guide*

IEC 60708-1, *Low-frequency cables with polyolefin insulation and moisture barrier polyolefin sheath*

NOTE Additional references to be added at later editing stage.

1) Under consideration.

3 Definitions, symbols and abbreviations

For the purposes of this document, the definitions given in EN 50288-1, Clause 3, apply.

4 Cable construction

4.1 Conductor

The conductor shall be solid copper and meet the requirements of EN 50288-1, 4.1. The conductor shall be plain or metal coated. The nominal conductor diameter shall be between 0,4 mm and 0,8 mm.

4.2 Insulation

Conductor insulation shall be composed of solid, cellular or composite (e.g. foam skin) polyolefin according to the appropriate part of EN 50290-2-23.

4.3 Cabling elements

The cable element shall be a pair. The number of twist per meter shall be at least 5.

4.4 Identification of cabling elements

Unless otherwise specified, the colour coding for identification is given in IEC 60189-2 or IEC 60708-1, as appropriate. The colours shall meet the requirements of EN 50288-1, 4.4.

4.5 Screening of cabling elements

Where appropriate, screening of the cabling elements shall be applied in accordance with EN 50288-1, 4.5. When a braid is used the minimum braid coverage (for mechanical purposes) shall be 60 %. When a foil and braid are used the minimum braid coverage (for mechanical purposes) shall be 30 %. Coverage is defined in EN 50290-2.

4.6 Cable make-up

The cable elements shall be laid up in concentric layer(s) or units to form the cable core.
The number of cores shall be 1 to 7 twisted pairs.

4.7 Filling compound

When required the interstices of the cable core shall be filled continuously with a compound suitable to prevent water penetration within the cable. The filling compound shall meet the requirements specified in EN 50290-2-XX.

4.8 Interstitial fillers

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

4.9 Screening of the cable core

The cable core shall be screened. The screen may consist of the following:

- an aluminium tape laminated to a plastic tape and a metal-coated drain wire whereby the metal tape is in contact with the drain wire;
- a protective wrapping may be applied under or/and over the screen;
- the drain wire diameter shall be at least 0,4 mm.

4.10 Moisture barriers

Not applicable.

4.11 Wrapping layers

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

4.12 Sheath

The sheath shall be of a suitable material according to the appropriate part of EN 50290-2-1.

5 Test methods and requirements for completed cables

The following tables give the tests to be applied, together with the respective limits, in order to demonstrate compliance with this specification.

5.1 Electrical tests

5.1.1 Low-frequency and d.c. electrical measurements

Telecommunication wires and cables may carry low frequency (under 100 Hz) or dc electrical power under the following simultaneous requirements:

Parameter	Unit	Requirement
Maximum voltage	V	300
Maximum current density	A/mm²	3
Maximum short circuit current density	W/mm²	350
Maximum service current density	W/mm²	100
Maximum element temperature in service	°C	70

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 ≤ 180 Ω/km for 0,5 mm wire diameter, ≤ 74 Ω/km for 0,8 mm wire diameter.
5.1.1.2	Conductor resistance unbalance	≤ 2 %
5.1.1.3.1 **Regular cable**	Dielectric strength - conductor/conductor and conductor/screen	EN 50090-2-2, Clause 5. 1,0 kV d.c. or 0,8 kV a.c. for 1 min or 2,5 kV d.c. or 1,7 kV a.c. for 2 s.
5.1.1.3 **High voltage withstand cable**	Dielectric strength - conductor/conductor and conductor/screen	EN 50090-2-2, Clause 5. 2,5 kV AC 50 Hz / 5 min or 4 kV AC 50 Hz / 1 min
5.1.1.4	Insulation resistance	≥ 500 MΩ km using 100 V – 500 V test voltage
5.1.1.5	Mutual capacitance	800 Hz, 20 °C < 100 nF/km
5.1.1.6	Capacitance unbalance to earth	≤ 1 600 pF/km

5.1.2 High-frequency electrical and transmission measurements

50288-1 Clause no.	Parameter	Requirement
5.1.2.1.2	Propagation Delay	Not applicable
5.1.2.2	Propagation delay difference (skew)	Not applicable
5.1.2.3	Attenuation	**For 0,5 mm wire diameter** 50 / 300 / 1 000 / 2 000 / 5 000 / kHz 9,3 / 18,0 / 30,5 / 42,1 / 65,2 / dB/Km Values above 2 000 kHz are for information only **For 0,8 mm wire diameter** 50 / 300 / 1 000 / 2 000 / 5 000 / kHz 6,2 / 12,0 / 20,4 / 28,2 / 43,8 / dB/Km Values above 2 000 kHz are for information only
5.1.2.5	Near-end crosstalk [a] (NEXT)	50 / 300 / 1 000 / 2 000 / 5 000 / kHz 109,5 / 52,8 / 45,0 / 40,5 / 34,5 / dB/Km **≥ 135-15logf 1 KHz < f ≤ 25 000 KHz** (f in KHz) Values above 2 000 kHz are for information only Values below 70 dB shall revert to a requirement of 70 dB maximum.
5.1.2.7.1	Power sum Near-end Crosstalk (PSNEXT)	Not applicable
5.1.2.7.2	Equal Level Far-end crosstalk (ELFEXT)	Not applicable
5.1.2.7.3	Power Sum Equal Level Far-end crosstalk (PSELFEXT)	Not applicable
5.1.2.8	Characteristic impedance	70 Ω ≤ Zc ≤ 100 Ω @ 1 000 kHz
5.1.2.9	Return loss	Not applicable
5.1.2.4	Near End Unbalance Attenuation	Not applicable
5.1.2.10	Coupling attenuation	Not applicable
5.1.2.11	Transfer impedance	Not applicable
5.1.2.12	Screening attenuation	≥ 35 dB, 30 ≤ f ≤ 100 MHz ≥ 35 - 20 log (f/100) dB, 100 < f ≤ 1 000 MHz
f = Frequency in kHz.		
[a] The values in the table are for information only. The formula given shall be used to determine compliance. Value under 70 dB are for information only.		

5.2 Mechanical tests

50288-1 Clause no.	Parameter	Requirement
5.2.1	Conductor elongation at break EN 50289-3-2	≥ 10 %
5.2.2	Shrinkage of insulation EN 50289-3-4	≤ 5 % for 1 h at 100 ± 2 °C
5.2.3	Crush resistance of the cable EN 50289-3-5 *1 000 N/1 min/500 mm*	Any change in the transmission characteristics at 1 MHz shall remain within the specified limits
5.2.4	Impact resistance of the cable EN 50289-3-6 *12,5 mm radius/1J/3 impacts*	Any change in the transmission characteristics at 1 MHz shall remain within the specified limits
5.2.5	Abrasion resistance of the sheath markings EN 50289-3-8	Markings shall remain legible
5.2.6	Simulated installation testing of the cable	Not applicable
5.2.7	Tensile performance EN 50289-3-16 Combined with 5.2.6 Pulling force 50 N/mm2 of conductor	Any change in the transmission characteristics at 1 MHz shall remain within the specified limits

5.3 Environmental tests

50288-1 Clause no.	Parameter	Requirement
5.3.1	Cold bend performance of the cable EN 50289-3-9 *Mandrel dia?/No of turns?/Temp?*	No cracks when examined visually without magnification
5.3.2	Temperature Cycling EN 50289-4-6	After allowing the sample to return to ambient temperature the insulation resistance shall be tested in accordance with EN 50289-1-4. When subjected to a (100-500) V test voltage the insulation resistance shall be ≥ 500 MΩ km

5.4 Fire performance test methods

Indoor cables fall under the requirements of the Construction Products Directive (CPD) for reaction to fire. Appropriate requirements are under consideration.