SLOVENSKI STANDARD
oSIST prEN 50288-13-2:2020

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Večelementni kovinski kabli za analogne in digitalne komunikacije in krmiljenje - 13-2. del: Področna specifikacija za zaslonjene kable z lastnostmi od 1 MHz do 2000 MHz - Kabli na delovnih območjih

Multi-element metallic cables used in analogue and digital communication and control - Part 13-2: Sectional specification for outer screened cables characterised from 1 MHz up to 2000 MHz - Work Area cables

Câbles métalliques à éléments multiples utilisés pour les transmissions et les commandes analogiques et numériques - Partie 13-2: Spécification intermédiaire pour les câbles écrantés extérieurs caractérisés de 1 MHz à 2 000 MHz - Câbles de zone de travail

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ICS:

33.120.20	Žice in simetrični kabli	Wires and symmetrical cables

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EUROPEAN STANDARD

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English Version

Multi-element metallic cables used in analogue and digital communication and control - Part 13-2: Sectional specification for outer screened cables characterised from 1 MHz up to 2000 MHz - Work Area cables

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To be completed

This draft European Standard is submitted to CENELEC members for enquiry.
Deadline for CENELEC: 2020-07-31.

It has been drawn up by CLC/SC 46XC.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CENELEC in three official versions (English, French, German).
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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 50288-13-2:2020) has been prepared by SC 46XC, “Multicore, multipair and quad data communication cables”, of TC 46X, “Communication cables”.

This document is currently submitted to the Enquiry.

The following dates are proposed:

• latest date by which the existence of this document has to be announced at national level	(doa)	dor + 6 months
• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	dor + 12 months
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dor + 36 months (to be confirmed or modified when voting)

This Part 13-2 is to be read in conjunction with EN 50288-1:2013.

1 Scope

This document relates to EN 50288-1, *Multi-element metallic cables used in analogue and digital communication and control.*

It covers screened cables, characterized up to 2GHz, used in work area wiring for information technology, generic-cabling systems.

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

This sectional specification is expected to be read in conjunction with EN 50288-1, which contains the essential provisions for its application.

The cables covered by this sectional specification are intended to operate with voltages and currents normally encountered in communication systems. These cables are not intended to be used in conjunction with low impedance sources, for example, the electric power supplies of public utility mains.

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.

EN 50288-1:2013, *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 50289-3-9:2001, *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 50290-2 series, Communication cables

3 Definitions, symbols and abbreviations

For the purposes of this document, the terms and definitions given in EN 50288-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
ex
exogenous (derived or originating externally)

4 Cable construction

4.1 Conductor

The conductor shall be solid copper or stranded and meet the requirements of EN 50288-1:2013, 4.1. The conductor shall be plain or metal coated.

The nominal conductor diameter shall be ≥ 0,50 mm and ≤ 0,80 mm.

4.2 Insulation

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

4.3 Cabling elements

The cable element shall be a pair.

4.4 Identification of cabling elements

Unless otherwise specified, the colour coding for identification is given in IEC 60189-2 or IEC 60708, as appropriate. The colours shall meet the requirements of EN 50288-1:2013, 4.4.

4.5 Screening of cabling elements

Where appropriate, screening of the cabling elements shall be applied in accordance with EN 50288-1:2013, 4.5.

4.6 Cable make-up

The cable elements shall be laid up in concentric layer(s) or units 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 EN 50288-1:2013, 4.8.

4.9 Screening of the cable core

The screening of the cable core shall be applied in accordance with EN 50288-1:2013, 4.9. When a braid is used the minimum braid coverage (for mechanical purposes) shall be 60 %. When a foil and braid are used, and/or where a foil is used over each cabling element / the core, the minimum braid coverage (for mechanical purposes) shall be 30 %. Coverage is defined in EN 50290-2-1.

4.10 Moisture barriers

Not applicable.

4.11 Wrapping layers

Where wrapping layers are used they shall be in accordance with EN 50288-1:2013, 4.11.

4.12 Sheath

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

5 Test methods and requirements for completed cables

5.1 General

Tables 1 to 5 give the tests to be applied, together with the respective limits, in order to demonstrate compliance with this specification.

5.2 Electrical tests

5.2.1 Low-frequency and d.c. electrical measurements

Table 1 — Low-frequency and d.c. electrical measurements

EN 50288-1: 2013, Clause	Parameter	Requirement
5.1.1.1	Conductor loop resistance	The maximum value shall be ≤ 14 Ω/100 m.
5.1.1.2	Conductor resistance unbalance	≤ 2 %
5.1.1.2.1	Resistance unbalance between pairs	≤ 4 %
5.1.1.3	Dielectric strength conductor/conductor and conductor/screen	1,0 kV d.c. or 0,7 kV a.c. for 1 min or 2,5 kV d.c. or 1,7 kV ac. for 2 s
5.1.1.4	Insulation resistance	≥ 5000 MΩ.km using (100–500) V test voltage
5.1.1.5	Mutual capacitance	No requirement specified
5.1.1.6	Capacitance unbalance to earth	≤ 99pF/30m

5.2.2 High-frequency electrical and transmission measurements

Table 2 — High-frequency electrical and transmission measurements

EN 50288-1:2013, Clause	Parameter	Requirement									
5.1.2.1	Velocity of Propagation	Phase Delay ≤ 534 + 36/√f ns/100 m, 1 MHz ≤ f ≤ 2GHz									
5.1.2.2	Propagation delay difference (skew)	≤ 45 ns/100 m, 4 MHz ≤ f ≤ 2GHz									
5.1.2.3	Longitudinal Attenuation [b c f]	4	10	20	100	250	500	600	1000	2000	MHz
		2,0	2,0	2,5	5,6	8,9	12,8	14,1	18,6	27,2	dB/30m
		$\alpha_{100m} \leq 1{,}8\sqrt{f} + 0{,}005\,f + 0{,}25/\sqrt{f}$, 1 MHz ≤ f ≤ 2GHz									

EN 50288-1:2013, Clause	Parameter	Requirement									
5.1.2.4	Near-end Crosstalk [a b f] (NEXT)	4	10	20	100	250	500	600	1000	2000	MHz
		66,3	60,3	55,8	45,3	39,3	34,8	33,6	30,3	25,8	dB
		≥ 75,3 – 15 logf, 1 MHz ≤ f ≤ 2GHz (78 dB max.)									
5.1.2.5	Power sum Near-end Crosstalk [b f] (PSNEXT)	4	10	20	100	250	500	600	1000	2000	MHz
		63,3	57,3	52,8	42,3	36,3	31,8	30,6	27,3	25,8	dB
		≥ 75,3 – 15 $\log_{10}$f, 1 MHz ≤ f ≤ 2GHz (75 dB max.)									
5.1.2.6	Attenuation to crosstalk ratio at the far end [b d] (ACR-F)	4	10	20	100	250	500	600	1000	2000	MHz
		67,0	59,0	53,0	39,0	31,0	25,0	23,4	19,0	13,0	dB/30m
		≥ 79,0 – 20 $\log_{10}$f, 1 MHz ≤ f ≤ 2GHz (78 dB max.)									
5.1.2.7	Power Sum Attenuation to crosstalk ratio at the far end [b d] (PSACR-F)	4	10	20	100	250	500	600	1000	2000	MHz
		64,0	56,0	50,0	36,0	28,0	22,0	20,4	16,0	10,0	dB/30m
		≥ 76,0 – 20 $\log_{10}$f, 1 MHz ≤ f ≤ 2GHz (75 dB max.)									
5.1.2.8	Power Sum Exogenous Crosstalk [b e g] (PSExNEXT)	4	10	20	100	250	500	600	1000	2000	MHz
		80,0	80,0	80,0	80,0	80,0	77,0	75,8	72,5	68,0	dB
		≥ 117,0 – 15 $\log_{10}$f, 1 MHz ≤ f ≤ 2GHz (80 dB max.)									
5.1.2.9	Power Sum Attenuation to crosstalk ratio at the far end Exogenous Crosstalk PSExACR-F [b c d e g]	4	10	20	100	250	500	600	1000	2000	MHz
		80,0	80	76,2	62,2	54,2	48,2	46,6	42,2	36,2	dB
		≥ 102,0 – 20 $\log_{10}$f, 1 MHz ≤ f ≤ 2GHz (80 dB max.)									
5.1.2.10	Mean Characteristic Impedance	100 ± 5 Ω, at 100 MHz;									
5.1.2.11	Return loss [a b f h]	4	10	20	100	250	500	600	1000	2000	MHz
		23,0	25,0	25,0	22,2	19,4	17,3	16,8	15,2	13,1	dB
		≥ 20 + 5 log (f), 4 MHz ≤ f ≤ 10 MHz 25 dB, 10 MHz ≤ f < 40 MHz 25 - 7 log (f/40), 40 MHz < f ≤ 2GHz;									
5.1.2.12	Near End Unbalance Attenuation [f]	X/UTP cables: ≥ 58 - 15 log10 (f); 1 MHz ≤ f ≤ 2GHz, (40dB min) X/FTP cables: ≥ 50 - 15 log10 (f); 1 MHz ≤ f ≤ 2GHz, (40dB max, 7dB min)									
5.1.2.13	Equal Level Far End Unbalance Attenuation [f]	X/UTP cables: ≥ 47,2 - 20 log10 (f); 1 MHz ≤ f ≤ 200MHz, (10dB min) X/FTP cables: ≥ 40 - 20 log10 (f); 1 MHz ≤ f ≤ 200MHz, (5dB min)									

EN 50288-1:2013, Clause	Parameter	Requirement
5.1.2.14	Coupling attenuation	For the frequency range 30 MHz ≤ f ≤ 2GHz: Type I: 85 - 20 $\log_{10}$ f/100 dB, max 85dB Type Ib: 70 - 20 $\log_{10}$ f/100 dB, max 70dB Type II: 55 — 20 $\log_{10}$ f/100 dB, max 55dB
5.1.2.15	Transfer impedance	Grade 1 ≤ 15 mΩ/m at 1 MHz; ≤ 10 mΩ/m at 10 MHz; ≤ 30 mΩ/m at 30 MHz ; ≤ 60 mΩ/m at 100MHz Grade 2 ≤ 50 mΩ/m at 1 MHz; ≤ 100 mΩ/m at 10 MHz; ≤ 200 mΩ/m at 30 MHz
NOTE See also Table A.1 in Annex A, proposed table for data cable current, voltage and power ratings.		
[a] For the measurement of RL the test sample having a round trip loss ≥ 40 dB at any measured frequency shall be used. [b] The values in the table are for information only. The formula given shall be used to determine compliance, rounded to one decimal place. [c] The attenuation shall meet values adjusted for temperature of 0,2 % per degree rise above 20 °C [d] No Measurement of ACR-F and PSACR-F is required when FEXT is above 70 dB. [e] PSExNEXT, -F and EXPSACR-F for cables complying with the minimum requirements of this standard for, transfer impedance and coupling attenuation type 2 and above values need not be measured and are for information only. [f] Values between 1 MHz and 4 MHz are for information only. [g] For cables meeting transfer impedance and coupling attenuation limits PSEXNEXT is met by design [h] Limits for 30m lengths below 40 MHz are for information only		

5.3 Mechanical tests

Table 3 — Mechanical tests

EN 50288-1: 2013, Clause	Parameter	Requirement
5.2.1	Conductor elongation at break EN 50289-3-2	≥ 8 %
5.2.2	Shrinkage of insulation EN 50289-3-4	≤ 5 %
5.2.3	Crush resistance of the cable EN 50289-3-5	1 000 N/1 min/100 mm Near end Crosstalk, Return Loss and Characteristic Impedance 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 at 1 m from the measured end. Near end Crosstalk, Return Loss and Characteristic Impedance shall remain within the specified limits
5.2.5	Abrasion resistance of the sheath markings EN 50289-3-8	Marking shall remain legible 50 Cycles Force 4N
5.2.6	Simulated installation testing of the cable	