SLOVENSKI STANDARD
SIST EN 50288-6-1:2013

01-oktober-2013

Večelementni kovinski kabli za analogne in digitalne komunikacije in krmiljenje - 6-1. del: Področna specifikacija za nezaslonjene kable z lastnostmi do 250 MHz - Hrbtenični kabli za vodoravno montažo in montažo v stavbah

Multi-element metallic cables used in analogue and digital communication and control - Part 6-1: Sectional specification for unscreened cables characterised up to 250 MHz - Horizontal and building backbone cables

Mehradrige metallische Daten- und Kontrollkabel für analoge und digitale Übertragung - Teil 6-1: Rahmenspezifikation für ungeschirmte Kabel bis 250 MHz - Kabel für den Horizontal- und Steigbereich

Câbles métalliques à éléments multiples utilisés pour les transmissions et les commandes analogiques et numériques - Partie 6-1: Spécification intermédiaire pour les câbles non blindés pour applications jusqu'à 250 MHz - Câbles horizontaux et verticaux de bâtiment

Ta slovenski standard je istoveten z: **EN 50288-6-1:2013**

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33.120.20	Žice in simetrični kabli	Wires and symmetrical cables

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EUROPEAN STANDARD

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English version

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CENELEC

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

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Contents

Foreword

This document EN 50288-6-1:2013 has been prepared by CLC/SC 46XC "Multicore, Multipair and Quad Data communication cables," of CLC/TC 46X, "Communication cables".

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2014-03-18
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2016-03-18

This document supersedes EN 50288-6-1:2003.

EN 50288-6-1:2013 includes the following significant technical changes with respect to EN 50288-6-1:2003:

- the addition of the Blank Detail Specification Annex;

- a number minor corrections and updating of references;

- the re-classification of ‘ELFEXT’ to ‘ACR-F’.

This Part 6-1 is to be read in conjunction to EN 50288-1.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This standard covers the Principle Elements of the Safety Objectives for Electrical Equipment Designed for Use within Certain Voltage Limits (LVD - 2006/95/EC).

1 Scope

EN 50288-6-1 is a sectional specification for unscreened cables, characterised from 1 MHz up to 250 MHz, to be used in horizontal and building backbone wiring as defined in EN 50173.

This sectional specification contains the electrical, mechanical, transmission and environmental performance characteristics of the cables, when tested in accordance with the referenced test methods.

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

The cables covered in 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, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 50173	series	*Information technology — Generic cabling systems*
EN 50288-1		*Multi-element metallic cables used in analogue and digital communication and control — Part 1: Generic specification*
EN 50289	series	*Communication cables — Specifications for test methods*
EN 50290	series	*Communication cables*
EN 60811	series	*Electric and optical fibre cables - Test methods for non-metallic materials (IEC 60811 series)*
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*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

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

3.2 Symbols and abbreviations

For the purposes of this document, the following abbreviations apply.

EX	Exogenous (derived or originating externally)
POE	Power Over Ethernet

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 ≥ 0,5 mm and ≤ 0,8 mm.

NOTE Constructions with 'copper clad' conductors **do not** meet the requirements

4.2 Insulation

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

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 EN 50288-1, 4.4

4.5 Screening of cabling elements

Not applicable.

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, 4.8

4.9 Screening of the cable core

Not applicable.

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 relevant part of EN 50290-2.

5 Tests 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

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

EN 50288-1 sub-clause	Parameter	Requirement
5.1.1.1	Conductor loop resistance	≤ 19,0 Ω/100 m
5.1.1.2	Conductor resistance unbalance	≤ 2,0 %
5.1.1.3	Dielectric strength conductor/conductor	1,0 kV d.c. or 0,7 kV 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	≥ 5 ,000 MΩ km when tested in accordance with EN 50289-1-4
5.1.1.5	Mutual capacitance	No requirement specified
5.1.1.6	Capacitance unbalance to earth	≤ 1 200 pF/km

5.1.2 High-frequency electrical and transmission measurements

Table 2 - High-frequency electrical and transmission requirements

EN 50288-1 sub-clause	Parameter	Requirement
5.1.2.1	Velocity of propagation	Phase delay ≤ 534+36/√f ns/100 m, 1 MHz ≤ f ≤ 250 MHz
5.1.2.2	Propagation delay difference (skew)	≤ 45 ns/100 m at 100 MHz
5.1.2.3	Longitudinal attenuation [2) 3) 4)]	1 / 4 / 10 / 16 / 20 / 31,25 / 62,5 / 100 / 155 / 200 / 250 MHz 2,1 / 3,8 / 6,0 / 7,6 / 8,5 / 10,7 / 15,5 / 19,9 / 25,3 / 29,1 / 33,0 dB/100m $\alpha \leq 1{,}82\sqrt{f}+0{,}0169f+0{,}25/\sqrt{f}$, 1 MHz ≤ f ≤ 250 MHz
5.1.2.4	Near-end unbalance attenuation	≥ 40-10log(f) dB, 1 MHz ≤ f ≤ 250 MHz

<table>
<tr><th>EN 50288-1 sub-clause</th><th>Parameter</th><th>Requirement</th></tr>
<tr><td>5.1.2.5</td><td>Near-end crosstalk (NEXT) [1) 2)]</td><td>
<table>
<tr><td>1</td><td>4</td><td>10</td><td>16</td><td>20</td><td>31,25</td><td>62,5</td><td>100</td><td>155</td><td>200</td><td>250</td><td>MHz</td></tr>
<tr><td>75.3</td><td>66,3</td><td>60,3</td><td>57,2</td><td>55,8</td><td>52,9</td><td>48,4</td><td>45,3</td><td>42,4</td><td>40,8</td><td>39,3</td><td>dB</td></tr>
</table>
≥ 75,3-15log(f), 1 MHz ≤ f ≤ 250 MHz</td></tr>
<tr><td>5.1.2.6</td><td>Attenuation to crosstalk ratio at the far end [2)6)]

(ACR-F)</td><td>
<table>
<tr><td>1</td><td>4</td><td>10</td><td>16</td><td>20</td><td>31,25</td><td>62,5</td><td>100</td><td>155</td><td>200</td><td>250</td><td>MHz</td></tr>
<tr><td>66,0</td><td>58,0</td><td>50,0</td><td>45,9</td><td>44,0</td><td>40,1</td><td>34,1</td><td>30,0</td><td>26,2</td><td>24,0</td><td>22,0</td><td>dB</td></tr>
</table>
≥ 70-20log(f), 1 MHz ≤ f ≤ 250 MHz (maximum 66 dB),
values referenced to 100 m</td></tr>
<tr><td>5.1.2.7.1</td><td>Power sum near-end crosstalk [2)] (PSNEXT)</td><td>
<table>
<tr><td>1</td><td>4</td><td>10</td><td>16</td><td>20</td><td>31,25</td><td>62,5</td><td>100</td><td>155</td><td>200</td><td>250</td><td>MHz</td></tr>
<tr><td>72.3,0</td><td>63,3</td><td>57,3</td><td>54,2</td><td>52,8</td><td>49,9</td><td>45,4</td><td>42,3</td><td>39,4</td><td>37,8</td><td>36,3</td><td>dB</td></tr>
</table>
≥72,3-15log(f) 1 MHz ≤ f ≤ 250 MHz</td></tr>
<tr><td>5.1.2.7.2</td><td>Power Sum Attenuation to crosstalk ratio at the far end [2)6)]
(PSACR-F)</td><td>
<table>
<tr><td>1</td><td>4</td><td>10</td><td>16</td><td>20</td><td>31,25</td><td>62,5</td><td>100</td><td>155</td><td>200</td><td>250</td><td>MHz</td></tr>
<tr><td>64,0</td><td>55,0</td><td>47,0</td><td>43,0</td><td>41,0</td><td>37,1</td><td>31,1</td><td>27,0</td><td>23,2</td><td>21,0</td><td>19,0</td><td>dB</td></tr>
</table>
≥ 67-20log(f), 1 MHz ≤ f ≤ 250 MHz (maximum 64 dB),
values referenced to 100 m</td></tr>
<tr><td>5.1.2.8</td><td>Mean characteristic Impedance</td><td>100 Ω ± 5 Ω, 120 Ω ± 5 Ω, at 100 MHz</td></tr>
<tr><td>5.1.2.9</td><td>Return loss [5)]</td><td>
<table>
<tr><td>4</td><td>8</td><td>10</td><td>16</td><td>20</td><td>31,25</td><td>62,5</td><td>100</td><td>155</td><td>200</td><td>250</td><td>MHz</td></tr>
<tr><td>23,1</td><td>24,5</td><td>25,0</td><td>25,0</td><td>25,0</td><td>23,6</td><td>21,5</td><td>20,1</td><td>18,8</td><td>18,0</td><td>17,3</td><td>dB</td></tr>
</table>
≥ 20+5log(f), 4 MHz ≤ f ≤ 10 MHz; 25,0 dB, 10 MHz ≤ f ≤ 20 MHz;
25-7log(f/20), 20 MHz < f ≤ 250 MHz;</td></tr>
<tr><td>5.1.2.10</td><td>Coupling attenuation</td><td>≥ 40 dB, 30 MHz ≤ f ≤ 100 MHz
≥ 40-20log(f/100) dB, 100 MHz < f ≤ 1 000 MHz</td></tr>
<tr><td colspan="3">1) For hybrid cables and multi-unit cables, PSNEXT between all non fibre recognised cable units shall be 3 dB better than the specified pair to pair NEXT at all specified frequencies.
2) The values in the table are for information only. The formula given shall be used to determine compliance, rounded to one decimal place.
3) Above 20 ˚C the attenuation shall meet values adjusted for temperature. Up to 40 ˚C the temperature coefficient of 0,4 % per degree rise shall be used and for temperatures from 40 ˚C to 60 ˚C the temperature coefficient shall be 0,6 % per degree.
4) Values between 1 MHz and 4 MHz are for information only.
5) For the measurement of return loss, a test sample having a round trip loss ≥ 40 dB at any measured frequency should be used.
6) ELFEXT is now re-classified as ACR-F, PSELFEXT is now re-classified PSACR-F, see Annex A of EN 50288-1 for explanation</td></tr>
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