SLOVENSKI STANDARD
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Multi-element metallic cables use in analogue and digital communication and control - Part 3-1: Sectional specification for unscreened cables characterized up to 100 MHz - Horizontal and building backbone cables

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EUROPEAN STANDARD **EN 50288-3-1**

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English version

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Teil 3-1: Rahmenspezifikation für ungeschirmte Kabel bis 100 MHz - Kabel für den Horizontal- und Steigbereich

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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 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 50288-3-1 on 1999-10-01.

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- latest date by which national standards conflicting with the EN have to be withdrawn (dow) 2002-10-01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 3-1 is to be used in conjunction with EN 50288-1.

Contents

1 Scope

This sectional specification covers unscreened cables, characterised up to 100 MHz, intended for horizontal floor and building backbone wiring as defined in EN 50173.

The electrical, mechanical, transmission and environmental performance characteristics of the unscreened 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 and meet the requirements of 4.1 of EN 50288-1. The conductor shall be plain or metal coated.

The nominal conductor diameter shall be ≥ 0,4 mm and ≤ 0,8 mm.

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

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 4.8 of EN 50288-1.

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 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 ≤ 30 Ω/100 m
5.1.1.2	Conductor resistance unbalance	≤ 2%
5.1.1.3	Dielectric strength conductor/conductor	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

<table>
<tr><th>EN 50288-1 clause no.</th><th>Parameter</th><th>Requirement</th></tr>
<tr><td>5.1.2.1</td><td>Velocity of propagation</td><td>≥ 0,60 c at 1 Mhz
≥ 0,65 c at 10 Mhz
≥ 0,65 c at 100 MHz</td></tr>
<tr><td>5.1.2.2</td><td>Propagation delay difference (skew)</td><td>≤ 40 ns/100 m at 100 MHz f.f.s</td></tr>
<tr><td>5.1.2.3</td><td>Attenuation[1)]</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>MHz</td></tr><tr><td>2,1</td><td>4,3</td><td>6,6</td><td>8,2</td><td>9,2</td><td>11,8</td><td>17,1</td><td>22,0</td><td>dB/100m</td></tr></table></td></tr>
<tr><td>5.1.2.4</td><td>Attenuation unbalance, near end (LCL)</td><td>≥ 40 dB at 1 MHz
≥ 30 dB at 10 Mhz f.f.s
≥ 20 dB at 100 Mhz f.f.s</td></tr>
<tr><td>5.1.2.5</td><td>Near-end crosstalk[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>MHz</td></tr><tr><td>62</td><td>53</td><td>47</td><td>44</td><td>42</td><td>40</td><td>35</td><td>32</td><td>dB</td></tr></table></td></tr>
<tr><td>5.1.2.6</td><td>Far-end crosstalk</td><td>Under consideration</td></tr>
<tr><td>5.1.2.7</td><td>Power sum (PS) for cables of more than 4 pairs or 2 quads</td><td>Specified NEXT values shall be met using power summation</td></tr>
<tr><td>5.1.2.8</td><td>Characteristic impedance[3)]</td><td>Input impedance, (100 ± 15) Ω from 1 MHz to 100 MHz
Mean impedance, (100 ± 10) Ω from 10 MHz to 100 MHz</td></tr>
<tr><td>5.1.2.9</td><td>Return loss[3)]</td><td>≥ 23 dB from 10 MHz to 100 MHz</td></tr>
<tr><td>5.1.2.10</td><td>Coupling attenuation</td><td>≥ 40 dB from 30 MHz to ≤ 100 MHz f.f.s
≥ 40 - 20log$_{10}$(f/100)] dB >100 MHz to 1000 MHz f.f.s</td></tr>
<tr><td colspan="3">1) The attenuation shall be better than or equal to a curve fitting the specified values over the whole frequency range.
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 ≥ 40dB at any measured frequency shall be used.</td></tr>
</table>

For hybrid and multi-unit cables and cables connected to multiple telecommunications outlets additional crosstalk considerations apply as described in 7.3 of EN 50173.