

To: 3P Customers and Business Partners

Your Ref.	Your Date	Our Ref. 5785@PV	Our Date 2008.01.21
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3P Newsletter No. 2/2008

Category 5e Communication Cable Requirements

The complexity in standardisation of copper communication cabling and cabling components is continuously increasing. Some years back it was reasonably easy to overview the requirements of the international standards. However, new applications and different installation types have developed and transmission requirements have become much more demanding. Today it is difficult for most people to conclude performance requirements for a given cabling class or component category without carrying out an extensive study. There are many small differences between the various international standards. Some of these are cost sensitive for the components if compliance to the standard in question is required.

3P believes that the market is generally unaware of the differences between the standards and we has often seen TIA/EIA, ISO/IEC, IEC and CENELEC standards all being referenced for an installation with the feeling that the difference in requirements and consequently potentially increased costs of the installation were not being realised.

3P is now in progress of preparing summarised overview of requirements for each individual category and class of cables, patch cords, connecting hardware, channels and permanent links. The first of the surveys is attached to the present 3P Newsletter and concerns Category 5e cables.

The document and all future documents will contain a list of applicable standards, including drafts. Not all such drafts are available to the market as they may be working group documents still under development. However, the requirements are listed by 3P if we consider that the new requirements are mature even if not yet published. The very many differences in requirements between ISO/IEC, IEC, TIA/EIA and CENELEC specifications will appear from this document.

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Also included in the document is the overall 3P requirements, which 3P qualified cables therefore comply with. 3P requirements are fundamentally the worst case of limits from all the standards. The only exceptions apply for requirements we know will be going out in the next edition of the standard in question.

The attached document is of course subject to change according to modified or new requirements coming in new drafts being developed.

3P must make reservation for printing errors or mistakes in the written requirements. Correctness of limits of the different parameters must of course always be checked in the relevant specifications.

Yours sincerely,
3P Third Party Testing

A handwritten signature in purple ink that reads "Poul Villien". The signature is written in a cursive style and is located below the typed name.

Poul Villien

Attachment: Category 5e Communication Cable Requirements

Category 5e Communication Cable Requirements

as specified in ISO/IEC, IEC, CENELEC and TIA/EIA standards and draft specifications per 1 January 2008

1. Applicable standards and draft specifications:

- 2nd edition ISO/IEC 11801:2002
- ISO/IEC cable requirements, draft 3 N 855
- IEC 61156-5
- 2nd edition IEC 61156-5, draft 46C/831/CD
- IEC 61156-6
- 2nd edition IEC 61156-6
- CENELEC EN 50173-1
- 2nd edition CENELEC EN 50288-2-1
- 2nd edition CENELEC EN 50288-2-2
- 2nd edition CENELEC EN 50288-3-1
- 2nd edition CENELEC EN 50288-3-2
- CENELEC EN 50441-1
- 2nd edition CENELEC EN 50441-1, WG draft 2007
- CENELEC EN 50441-2
- 2nd edition CENELEC EN 50441-2, WG draft 2007
- ANSI/TIA/EIA-568-B.2

2. Requirements for Unscreened Category 5e Horizontal Cables:

Parameter	ISO/IEC	IEC	CENELEC	TIA/EIA	Worst Case (3P Requirements)
Standards	2 nd edition ISO/IEC 11801:2002 ISO/IEC cable requirements, draft 3 N 855	IEC 61156-5 2 nd edition IEC 61156-5, draft 46C/831/CD	2 nd edition CENELEC EN 50288-3-1 CENELEC EN 50441-1 2 nd edition CENELEC EN 50441-1, WG draft 2007 CENELEC EN 50273-1	ANSI/TIA/EIA-568-B.2	
current carrying capacity	175 mA per conductor @60°C	not specified	not specified	not specified	175 mA per conductor @60°C
dc resistance	not specified	max. 95,0 Ω/km @ 20°C	not specified	max. 93,8 Ω/km @ 20°C	max. 93,8 Ω/km @ 20°C
dc loop resistance	max. 190 Ω/km @ 20°C	max. 190 Ω/km @ 20°C	max. 190 Ω/km @ 20°C	not specified	max. 190 Ω/km @ 20°C

resistance unbalance within a pair	max. 2,0 % (max.-min.) / (min.+max.)	max. 2,0 % (max.-min.) / (min.+max.)	max. 2,0 % (max.-min.) / (min.+max.)	max. 5 % (max.-min.) / min.	max. 2,0 % (max.-min.) / (min.+max.)
resistance unbalance between pairs	not specified	max. 4,0 % (max.-min.) / (min.+max.)	not specified	not specified	max. 4,0 % (max.-min.) / (min.+max.)
mutual capacitance	not specified	not specified	not specified	max. 56,0 nF/km @ 1 kHz (for information)	max. 56,0 nF/km @ 1 kHz (for information)
capacitance unbalance	max. 1600 pF/km @ 1 kHz	max. 1600 pF/km @ 0,8 kHz or 1 kHz	max. 1600 pF/km	max. 3300 pF/km @ 1 kHz	max. 1600 pF/km @ 1 kHz
insulation resistance	min. 5000 MΩ·km	min. 5000 MΩ·km	min. 500 MΩ·km @ 100 - 500 V	not specified	min. 5000 MΩ·km @ 500 V
dielectric strength	min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	not specified	min. 2,5 kVdc for 3 secs
input impedance	4-100 MHz: 100 Ω±15 Ω for information	4-100 MHz: 100 Ω±15 Ω for information	not specified	not specified	4-100 MHz: 100 Ω±15 Ω for information
mean characteristic impedance	100±5 Ω @ 100 MHz	100±5 Ω @ 100 MHz	100±5 Ω @ 100 MHz	not specified	100±5 Ω @ 100 MHz
return loss	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-7log(f) dB @ 100 m cable 100-125 MHz is for information	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-7log(f) dB @ 100 m cable 100-125 MHz is for information	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-100 MHz: 25-7log(f) dB @ "long" cable	1-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-100 MHz: 25-7log(f) dB @ 100 m cable	1-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-7log(f) dB @ 100 m cable 100-125 MHz is for information

attenuation (20°C)	1-125 MHz: $19,108\sqrt{f}+$ $0,222 \cdot f+$ $\frac{2,0}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	4-125 MHz: $19,108\sqrt{f}+$ $0,222 \cdot f+$ $\frac{2,0}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: $19,108\sqrt{f}+$ $0,222 \cdot f+$ $\frac{2,0}{\sqrt{f}}$ dB/km 1-4 MHz is for information	772 kHz- 100 MHz: $19,670\sqrt{f}+$ $0,230 \cdot f+$ $\frac{0,50}{\sqrt{f}}$ dB/km	772 kHz- 2,6 MHz: $19,670\sqrt{f}+$ $0,230 \cdot f+$ $\frac{0,50}{\sqrt{f}}$ dB/km 2,6-125 MHz: $19,108\sqrt{f}+$ $0,222 \cdot f+$ $\frac{2,0}{\sqrt{f}}$ dB/km 100-125 MHz is for information
attenuation (40°C)	1-125 MHz: $20,637\sqrt{f}+$ $0,240 \cdot f+$ $\frac{2,16}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	4-125 MHz: $20,637\sqrt{f}+$ $0,240 \cdot f+$ $\frac{2,16}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: $20,637\sqrt{f}+$ $0,240 \cdot f+$ $\frac{2,16}{\sqrt{f}}$ dB/km 1-4 MHz is for information	772 kHz- 100 MHz: $21,244\sqrt{f}+$ $0,248 \cdot f+$ $\frac{0,54}{\sqrt{f}}$ dB/km	772 kHz- 2,6 MHz: $21,244\sqrt{f}+$ $0,248 \cdot f+$ $\frac{0,54}{\sqrt{f}}$ dB/km 2,6-125 MHz: $20,637\sqrt{f}+$ $0,240 \cdot f+$ $\frac{2,16}{\sqrt{f}}$ dB/km 100-125 MHz is for information
attenuation (60°C)	1-125 MHz: $22,165\sqrt{f}+$ $0,258 \cdot f+$ $\frac{2,32}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	4-125 MHz: $22,165\sqrt{f}+$ $0,258 \cdot f+$ $\frac{2,32}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: $22,930\sqrt{f}+$ $0,266 \cdot f+$ $\frac{2,4}{\sqrt{f}}$ dB/km 1-4 MHz is for information	772 kHz- 100 MHz: $22,817\sqrt{f}+$ $0,267 \cdot f+$ $\frac{0,58}{\sqrt{f}}$ dB/km	772 kHz- 2,6 MHz: $22,817\sqrt{f}+$ $0,267 \cdot f+$ $\frac{0,58}{\sqrt{f}}$ dB/km 2,6-125 MHz: $22,165\sqrt{f}+$ $0,258 \cdot f+$ $\frac{2,32}{\sqrt{f}}$ dB/km 100-125 MHz is for information
temperature correction factor for attenuation	1-125 MHz: 0,4 %/°C @ 20-60°C 100-125 MHz is for information	4-125 MHz: 0,4 %/°C @ 20-60°C 100-125 MHz is for information	1-100 MHz: 0,4 %/°C @ 20-40°C 0,6 %/°C @ 40-60°C	772 kHz- 100 MHz: 0,4 %/°C @ 20-60°C	772 kHz- 125 MHz: 0,4 %/°C @ 20-60°C 100-125 MHz is for information

near end crosstalk	1-125 MHz: 65,3-15log(f) dB 100-125 MHz is for information	4-125 MHz: 65,3-15log(f) dB 100-125 MHz is for information	1-100 MHz: 65,3-15log(f) dB	772 kHz- 100 MHz: 65,3-15log(f) dB	772 kHz- 125 MHz: 65,3-15log(f) dB 100-125 MHz is for information
power sum near end crosstalk	1-125 MHz: 62,3-15log(f) dB 100-125 MHz is for information	4-125 MHz: 62,3-15log(f) dB 100-125 MHz is for information	1-100 MHz: 62,3-15log(f) dB	772 kHz- 100 MHz: 62,3-15log(f) dB	772 kHz- 125 MHz: 62,3-15log(f) dB 100-125 MHz is for information
ACR	not specified	not specified	not specified	not specified	1-125 MHz: min. pair-pair NEXT- attenuation 100-125 MHz is for information
power sum ACR	not specified	not specified	not specified	not specified	1-125 MHz: min. power sum NEXT- attenuation 100-125 MHz is for information
ACR far (former ELFEXT)	1-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	4-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	1-100 MHz: 63,8-20log(f) dB	1-100 MHz: 63,8-20log(f) dB	1-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information
power sum ACR far (former PSELFEXT)	1-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	4-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	1-100 MHz: 60,8-20log(f) dB	1-100 MHz: 60,8-20log(f) dB	1-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information

transverse conversion loss	1-100 MHz: 40-10log(f) dB	Type III: 1-100 MHz: 40-10log(f) dB Type II: 1-100 MHz: 50-10log(f) dB Type I: 1-100 MHz: 50-10log(f) dB	1-100 MHz: 40-10log(f) dB	not specified	Type III: 1-125 MHz: 40-10log(f) dB 100-125 MHz is for information Type II: 1-100 MHz: 50-10log(f) dB Type I: 1-100 MHz: 50-10log(f) dB
equal level transverse conversion transfer loss	1-30 MHz: 35-20log(f) dB	1-30 MHz: 35-20log(f) dB	not specified	not specified	1-30 MHz: 35-20log(f) dB
propagation delay	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-125 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km
velocity of propagation	4-100 MHz: min. 0,6·c	4-100 MHz: min. 0,6·c	not specified	not specified	4-100 MHz: min. 0,6·c
delay skew (20°C)	1-100 MHz: max. 450 ns/km @10±2°C	4-100 MHz: max. 450 ns/km @10±2°C	max. 400 ns/km @ 100 MHz	1-100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew (40°C)	1-100 MHz: max. 450 ns/km @40±1°C	4-100 MHz: max. 450 ns/km @40±1°C	not specified	1 MHz- 100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew (60°C)	not specified	not specified	not specified	1 MHz- 100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew variation with temperature	1-100 MHz: max. ±100 ns/km of value at 20°C when measured between -40°C and 60°C	4-100 MHz: max. ±100 ns/km of value at 20°C when measured between -40°C and 60°C	not specified	1-100 MHz: max. ±100 ns/km of value at 20°C when measured at 40°C and 60°C	1-100 MHz: max. ±100 ns/km of value at 20°C when measured at 40°C and 60°C

<p>coupling attenuation</p>	<p>Type III: 30-100 MHz: min. 40 dB 100-1000 MHz: 40- $20\log(\frac{f}{100})$ dB</p>	<p>Type III: 30-100 MHz: min. 40 dB 100-1000 MHz: 40- $20\log(\frac{f}{100})$ dB Type II: 30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB Type I: 30-100 MHz: min. 85 dB 100-1000 MHz: 85- $20\log(\frac{f}{100})$ dB</p>	<p>30-100 MHz: min. 40 dB 100-1000 MHz: 40- $20\log(\frac{f}{100})$ dB</p>	<p>not specified</p>	<p>Type III: 30-100 MHz: min. 40 dB 100-1000 MHz: 40- $20\log(\frac{f}{100})$ dB Type II: 30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB Type I: 30-100 MHz: min. 85 dB 100-1000 MHz: 85- $20\log(\frac{f}{100})$ dB</p>
<p>EMC performance</p>	<p>Type III: min. 40 dB</p>	<p>Type III: min. 40 dB Type II: min. 55 dB Type I: min. 85 dB</p>	<p>min. 40 dB</p>	<p>not specified</p>	<p>Type III: min. 40 dB Type II: min. 55 dB Type I: min. 85 dB</p>

3. Requirements for Unscreened Category 5e Stranded Cables:

Parameter	ISO/IEC	IEC	CENELEC	TIA/EIA	Worst Case (3P Requirements)
Standards	2 nd edition ISO/IEC 11801:2002 ISO/IEC cable requirements, draft 3 N 855	IEC 61156-6 2 nd edition IEC 61156-6	2 nd edition CENELEC EN 50288-3-2 CENELEC EN 50273-1	ANSI/TIA/EIA- 568-B.2	
current carrying capacity	175 mA per conductor @60°C	not specified	not specified	not specified	175 mA per conductor @60°C
dc resistance	not specified	max. 145 Ω/km @ 20°C	not specified	max. 112,6 Ω/km @ 20°C	24 AWG: max. 112,6 Ω/km @ 20°C 26 AWG: max. 145 Ω/km @ 20°C
dc loop resistance	max. 290 Ω/km @ 20°C	max. 290 Ω/km @ 20°C	max. 290 Ω/km @ 20°C	not specified	max. 290 Ω/km @ 20°C
resistance unbalance within a pair	max. 2,0 % (max.-min.) / (min.+max.)	max. 2,0 % (max.-min.) / (min.+max.)	max. 2,0 % (max.-min.) / (min.+max.)	max. 5 % (max.-min.) / min.	max. 2,0 % (max.-min.) / (min.+max.)
resistance unbalance between pairs	not specified	max. 4,0 % (max.-min.) / (min.+max.)	not specified	not specified	max. 4,0 % (max.-min.) / (min.+max.)
mutual capacitance	not specified	not specified	not specified	max. 56,0 nF/km @ 1 kHz (for information)	max. 56,0 nF/km @ 1 kHz (for information)
capacitance unbalance	max. 1600 pF/km @ 1 kHz	max. 1600 pF/km @ 0,8 kHz or 1 kHz	max. 1600 pF/km	max. 3300 pF/km @ 1 kHz	max. 1600 pF/km @ 1 kHz
insulation resistance	min. 5000 MΩ·km	min. 5000 MΩ·km	min. 500 Ω·km @ 100 - 500 V	not specified	min. 5000 Ω·km @ 500 V

dielectric strength	min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	not specified	min. 2,5 kVdc for 3 secs
input impedance	4-100 MHz: 100 Ω±15 Ω for information	4-100 MHz: 100 Ω±15 Ω for information	not specified	not specified	4-100 MHz: 100 Ω±15 Ω for information
mean characteristic impedance	100±5 Ω @ 100 MHz	100±5 Ω @ 100 MHz	100±5 Ω @ 100 MHz	not specified	100±5 Ω @ 100 MHz
return loss	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-8,6log(f) dB @ 100 m cable 100-125 MHz is for information	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-8,6log(f) dB @ 100 m cable 100-125 MHz is for information	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-100 MHz: 25-7log(f) dB @ "long" cable	1-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-100 MHz: 25-8,6log(f) dB @ 100 m cable	1-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-7log(f) dB @ 100 m cable 100-125 MHz is for information
attenuation (20°C)	1-125 MHz: 28,660√f+ 0,330·f+ $\frac{3,0}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	24 AWG: 4-125 MHz: 23,600√f+ 0,280·f+ $\frac{1,2}{\sqrt{f}}$ dB/km 26 AWG: 4-125 MHz: 28,660√f+ 0,330·f+ $\frac{3,0}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: 28,662√f+ 0,333·f+ $\frac{3,0}{\sqrt{f}}$ dB/km 1-4 MHz attenuation is for information	772 kHz- 100 MHz: 23,604√f+ 0,276·f+ $\frac{0,60}{\sqrt{f}}$ dB/km	24 AWG: 772 kHz- 125 MHz: 23,604√f+ 0,276·f+ $\frac{0,60}{\sqrt{f}}$ dB/km 26 AWG: 772 kHz- 2,6 MHz: 29,505√f+ 0,345·f+ $\frac{0,75}{\sqrt{f}}$ dB/km 2,6-125 MHz: 28,660√f+ 0,330·f+ $\frac{3,0}{\sqrt{f}}$ dB/km 100-125 MHz is for information

attenuation (40°C)	1-125 MHz: $30,955\sqrt{f} + 0,356 \cdot f + \frac{3,24}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	24 AWG: 4-125 MHz: $25,488\sqrt{f} + 0,302 \cdot f + \frac{1,2}{\sqrt{f}}$ dB/km 26 AWG: 4-125 MHz: $30,955\sqrt{f} + 0,356 \cdot f + \frac{3,24}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: $30,955\sqrt{f} + 0,360 \cdot f + \frac{3,24}{\sqrt{f}}$ dB/km 1-4 MHz attenuation is for information	772 kHz- 100 MHz: $25,492\sqrt{f} + 0,298 \cdot f + \frac{0,65}{\sqrt{f}}$ dB/km	24 AWG: 772 kHz- 125 MHz: $25,492\sqrt{f} + 0,298 \cdot f + \frac{0,65}{\sqrt{f}}$ dB/km 26 AWG: 772 kHz- 2,6 MHz: $31,865\sqrt{f} + 0,373 \cdot f + \frac{0,81}{\sqrt{f}}$ dB/km 2,6-125 MHz: $30,955\sqrt{f} + 0,360 \cdot f + \frac{3,24}{\sqrt{f}}$ dB/km 100-125 MHz is for information
attenuation (60°C)	1-125 MHz: $33,246\sqrt{f} + 0,386 \cdot f + \frac{3,48}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	24 AWG: 4-125 MHz: $27,376\sqrt{f} + 0,325 \cdot f + \frac{1,39}{\sqrt{f}}$ dB/km 26 AWG: 4-125 MHz: $33,246\sqrt{f} + 0,386 \cdot f + \frac{3,48}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: $34,950\sqrt{f} + 0,399 \cdot f + \frac{3,6}{\sqrt{f}}$ dB/km 1-4 MHz attenuation is for information	772 kHz- 100 MHz: $25,493\sqrt{f} + 0,298 \cdot f + \frac{0,70}{\sqrt{f}}$ dB/km	24 AWG: 772 kHz- 125 MHz: $27,381\sqrt{f} + 0,320 \cdot f + \frac{0,70}{\sqrt{f}}$ dB/km 26 AWG: 772 kHz- 125 MHz: $34,950\sqrt{f} + 0,399 \cdot f + \frac{3,6}{\sqrt{f}}$ dB/km 100-125 MHz is for information
temperature correction factor for attenuation	1-125 MHz: 0,4 %/°C @ 20-60°C 100-125 MHz is for information	4-125 MHz: 0,4 %/°C @ 20-60°C 100-125 MHz is for information	1-100 MHz: 0,4 %/°C @ 20-40°C 0,6 %/°C @ 40-60°C	772 kHz- 100 MHz: 0,4 %/°C @ 20-60°C	772 kHz- 125 MHz: 0,4 %/°C @ 20-60°C 100-125 MHz is for information

near end crosstalk	1-125 MHz: 65,3-15log(f) dB 100-125 MHz is for information	4-125 MHz: 65,3-15log(f) dB 100-125 MHz is for information	1-100 MHz: 65,3-15log(f) dB	772 kHz- 100 MHz: 65,3-15log(f) dB	772 kHz- 125 MHz: 65,3-15log(f) dB 100-125 MHz is for information
power sum near end crosstalk	1-125 MHz: 62,3-15log(f) dB 100-125 MHz is for information	4-125 MHz: 62,3-15log(f) dB 100-125 MHz is for information	1-100 MHz: 62,3-15log(f) dB	772 kHz- 100 MHz: 62,3-15log(f) dB	772 kHz- 125 MHz: 62,3-15log(f) dB 100-125 MHz is for information
ACR	not specified	not specified	not specified	not specified	1-125 MHz: min. pair-pair NEXT- attenuation 100-125 MHz is for information
power sum ACR	not specified	not specified	not specified	not specified	1-125 MHz: min. power sum NEXT- attenuation 100-125 MHz is for information
ACR far (former ELFEXT)	1-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	4-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	1-100 MHz: 63,8-20log(f) dB	1-100 MHz: 63,8-20log(f) dB	1-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information
power sum ACR far (former PSELFEXT)	1-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	4-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	1-100 MHz: 60,8-20log(f) dB	1-100 MHz: 60,8-20log(f) dB	1-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information

transverse conversion loss	1-100 MHz: 40-10log(f) dB	Type III: 1-100 MHz: 40-10log(f) dB Type II: 1-100 MHz: 50-10log(f) dB Type I: 1-100 MHz: 50-10log(f) dB	1-100 MHz: 40-10log(f) dB	not specified	Type III: 1-125 MHz: 40-10log(f) dB 100-125 MHz is for information Type II: 1-100 MHz: 50-10log(f) dB Type I: 1-100 MHz: 50-10log(f) dB
equal level transverse conversion transfer loss	1-30 MHz: 35-20log(f) dB	1-30 MHz: 35-20log(f) dB	not specified	not specified	1-30 MHz: 35-20log(f) dB
propagation delay	1-100 MHz: $\frac{5340}{\sqrt{f}} + \frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: $\frac{5340}{\sqrt{f}} + \frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: $\frac{5340}{\sqrt{f}} + \frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: $\frac{5340}{\sqrt{f}} + \frac{360}{\sqrt{f}}$ ns/km	1-125 MHz: $\frac{5340}{\sqrt{f}} + \frac{360}{\sqrt{f}}$ ns/km
velocity of propagation	4-100 MHz: min. 0,6-c	4-100 MHz: min. 0,6-c	not specified	not specified	4-100 MHz: min. 0,6-c
delay skew (20°C)	1-100 MHz: max. 450 ns/km @10±2°C	4-100 MHz: max. 450 ns/km @10±2°C	max. 400 ns/km @ 100 MHz	1-100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew (40°C)	1-100 MHz: max. 450 ns/km @40±1°C	4-100 MHz: max. 450 ns/km @40±1°C	not specified	1-100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew (60°C)	not specified	not specified	not specified	1-100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew variation with temperature	1-100 MHz: max. ±100 ns/km of value at 20°C when measured between -40°C and 60°C	4-100 MHz: max. ±100 ns/km of value at 20°C when measured between -40°C and 60°C	not specified	1-100 MHz: max. ±100 ns/km of value at 20°C when measured at 40°C and 60°C	1-100 MHz: max. ±100 ns/km of value at 20°C when measured at 40°C and 60°C

<p>coupling attenuation</p>	<p>Type III: 30-100 MHz: min. 40 dB 100-1000 MHz: 40- $20\log(\frac{f}{100})$ dB</p>	<p>Type III: 30-100 MHz: min. 40 dB 100-1000 MHz: 40- $20\log(\frac{f}{100})$ dB Type II: 30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB Type I: 30-100 MHz: min. 85 dB 100-1000 MHz: 85- $20\log(\frac{f}{100})$ dB</p>	<p>30-100 MHz: min. 40 dB 100-1000 MHz: 40- $20\log(\frac{f}{100})$ dB</p>	<p>not specified</p>	<p>Type III: 30-100 MHz: min. 40 dB 100-1000 MHz: 40- $20\log(\frac{f}{100})$ dB Type II: 30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB Type I: 30-100 MHz: min. 85 dB 100-1000 MHz: 85- $20\log(\frac{f}{100})$ dB</p>
<p>EMC performance</p>	<p>Type III: min. 40 dB</p>	<p>Type III: min. 40 dB Type II: min. 55 dB Type III: min. 85 dB</p>	<p>min. 40 dB</p>	<p>not specified</p>	<p>Type III: min. 40 dB Type II: min. 55 dB Type I: min. 85 dB</p>

4. Requirements for Screened Category 5e Horizontal Cables:

Parameter	ISO/IEC	IEC	CENELEC	TIA/EIA	Worst Case (3P Requirements)
Standards	2 nd edition ISO/IEC 11801:2002 ISO/IEC cable requirements, draft 3 N 855	IEC 61156-5 2 nd edition IEC 61156-5, draft 46C/831/CD	2 nd edition CENELEC EN 50288-2-1 CENELEC EN 50441-22 nd edition CENELEC EN 50441-1, WG draft 2007 CENELEC EN 50273-1	ANSI/TIA/EIA- 568-B.2	
current carrying capacity	175 mA per conductor and screen @60°C	not specified	not specified	not specified	175 mA per conductor and screen @60°C
dc resistance	not specified	max. 95,0 Ω/km @ 20°C	not specified	max. 93,8 Ω/km @ 20°C	max. 93,8 Ω/km @ 20°C
dc loop resistance	max. 190 Ω/km @ 20°C	max. 190 Ω/km @ 20°C	max. 190 Ω/km @ 20°C	not specified	max. 190 Ω/km @ 20°C
pair resistance unbalance	max. 2,0 % (max.-min.) / (min.+max.)	max. 2,0 % (max.-min.) / (min.+max.)	max. 2,0 % (max.-min.) / (min.+max.)	5 % (max.-min.) / min.	max. 2,0 % (max.-min.) / (min.+max.)
resistance unbalance between pairs	not specified	max. 4,0 % (max.-min.) / (min.+max.)	not specified	not specified	max. 4,0 % (max.-min.) / (min.+max.)
mutual capacitance	not specified	not specified	not specified	max. 56,0 nF/km @ 1 kHz (for information)	max. 56,0 nF/km @ 1 kHz (for information)
capacitance unbalance	max. 1600 pF/km @ 1 kHz	max. 1600 pF/km @ 0,8 kHz or 1 kHz	max. 1600 pF/km	max. 3300 pF/km @ 1 kHz	max. 1600 pF/km @ 1 kHz
insulation resistance	min. 5000 MΩ·km	min. 5000 MΩ·km	min. 500 Ω·km @ 100 - 500 V	not specified	min. 5000 Ω·km @ 500 V

dielectric strength	conductor-conductor and conductor-screen: min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	conductor-conductor and conductor-screen: min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	conductor-screen: min. 2,5 kVdc or min. 1,7 kVac for 2 secs	conductor-conductor and conductor-screen: min. 2,5 kVdc for 3 secs
input impedance	4-100 MHz: 100 Ω±15 Ω for information	4-100 MHz: 100 Ω±15 Ω for information	not specified	not specified	4-100 MHz: 100 Ω±15 Ω for information
mean characteristic impedance	100±5 Ω @ 100 MHz	100±5 Ω @ 100 MHz	100±5 Ω @ 100 MHz	not specified	100±5 Ω @ 100 MHz
return loss	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-7log(f) dB @ 100 m cable 100-125 MHz is for information	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-7log(f) dB @ 100 m cable 100-125 MHz is for information	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-100 MHz: 25-7log(f) dB @ "long" cable	1-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-100 MHz: 25-7log(f) dB @ 100 m cable	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-7log(f) dB @ 100 m cable 100-125 MHz is for information
attenuation (20°C)	1-125 MHz: 19,108√f+ 0,222·f+ $\frac{2,0}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	4-125 MHz: 19,108√f+ 0,222·f+ $\frac{2,0}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: 19,108√f+ 0,222·f+ $\frac{2,0}{\sqrt{f}}$ dB/km 1-4 MHz attenuation is for information	772 kHz- 100 MHz: 19,670√f+ 0,230·f+ $\frac{0,50}{\sqrt{f}}$ dB/km	772 kHz- 2,6 MHz: 19,670√f+ 0,230·f+ $\frac{0,50}{\sqrt{f}}$ dB/km 2,6-125 MHz: 19,108√f+ 0,222·f+ $\frac{2,0}{\sqrt{f}}$ dB/km 100-125 MHz is for information

attenuation (40°C)	1-125 MHz: 19,872·√f+ 0,231·f+ $\frac{2,08}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	4-125 MHz: 20,637·√f+ 0,240·f+ $\frac{2,16}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: 19,872·√f+ 0,231·f+ $\frac{2,08}{\sqrt{f}}$ dB/km 1-4 MHz attenuation is for information	772 kHz- 100 MHz: 20,457·√f+ 0,239·f+ $\frac{0,52}{\sqrt{f}}$ dB/km	772 kHz- 2,6 MHz: 20,457·√f+ 0,239·f+ $\frac{0,52}{\sqrt{f}}$ dB/km 2,6-125 MHz: 19,872·√f+ 0,231·f+ $\frac{2,08}{\sqrt{f}}$ dB/km 100-125 MHz is for information
attenuation (60°C)	1-125 MHz: 20,637·√f+ 0,240·f+ $\frac{2,16}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	4-125 MHz: 22,165·√f+ 0,258·f+ $\frac{2,32}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: 20,637·√f+ 0,240·f+ $\frac{2,16}{\sqrt{f}}$ dB/km 1-4 MHz attenuation is for information	772 kHz- 100 MHz: 21,244·√f+ 0,248·f+ $\frac{0,54}{\sqrt{f}}$ dB/km	772 kHz- 2,6 MHz: 21,244·√f+ 0,248·f+ $\frac{0,54}{\sqrt{f}}$ dB/km 2,6-125 MHz: 20,637 + 0,240·f+ $\frac{2,16}{\sqrt{f}}$ dB/km 100-125 MHz is for information
temperature correction factor for attenuation	1-125 MHz: 0,2 %/°C @ 20-60°C 100-125 MHz is for information	4-125 MHz: 0,2 %/°C @ 20-60°C 100-125 MHz is for information	1-100 MHz: 0,2 %/°C @ 20-60°C	772 kHz- 100 MHz: 0,2 %/°C @ 20-60°C	772 kHz- 125 MHz: 0,2 %/°C @ 20-60°C 100-125 MHz is for information
near end crosstalk	1-125 MHz: 65,3-15log(f) dB 100-125 MHz is for information	4-125 MHz: 65,3-15log(f) dB 100-125 MHz is for information	1-100 MHz: 65,3-15log(f) dB	772 kHz- 100 MHz: 65,3-15log(f) dB	772 kHz- 125 MHz: 65,3-15log(f) dB 100-125 MHz is for information
power sum near end crosstalk	1-125 MHz: 62,3-15log(f) dB 100-125 MHz is for information	4-125 MHz: 62,3-15log(f) dB 100-125 MHz is for information	1-100 MHz: 62,3-15log(f) dB	772 kHz- 100 MHz: 62,3-15log(f) dB	772 kHz- 125 MHz: 62,3-15log(f) dB 100-125 MHz is for information

ACR	not specified	not specified	not specified	not specified	1-125 MHz: min. pair-pair NEXT- attenuation 100-125 MHz is for information
power sum ACR	not specified	not specified	not specified	not specified	1-125 MHz: min. power sum NEXT- attenuation 100-125 MHz is for information
ACR far (former ELFEXT)	1-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	4-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	1-100 MHz: 63,8-20log(f) dB	1-100 MHz: 63,8-20log(f) dB	1-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information
power sum ACR far (former PSELFEXT)	1-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	4-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	1-100 MHz: 60,8-20log(f) dB	1-100 MHz: 60,8-20log(f) dB	1-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information
transverse conversion loss	not specified	Type III: 1-100 MHz: 40-10log(f) dB Type II: 1-100 MHz: 50-10log(f) dB Type I: 1-100 MHz: 50-10log(f) dB	1-100 MHz: 40-10log(f) dB	not specified	Type III: 1-125 MHz: 40-10log(f) dB 100-125 MHz is for information Type II: 1-100 MHz: 50-10log(f) dB Type I: 1-100 MHz: 50-10log(f) dB
equal level transverse conversion transfer loss	not specified	1-30 MHz: 35-20log(f) dB	not specified	not specified	1-30 MHz: 35-20log(f) dB

propagation delay	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km
velocity of propagation	1-100 MHz: min. 0,6·c	4-100 MHz: min. 0,6·c	not specified	not specified	4-100 MHz: min. 0,6·c
delay skew (20°C)	1-100 MHz: max. 450 ns/km @10±2°C	4-100 MHz: max. 450 ns/km @10±2°C	max. 400 ns/km @ 100 MHz	1-100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew (40°C)	1-100 MHz: max. 450 ns/km @40±1°C	4-100 MHz: max. 450 ns/km @40±1°C	not specified	1-100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew (60°C)	not specified	not specified	not specified	1-100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew variation with temperature	1-100 MHz: max. ±100 ns/km of value at 20°C when measured between -40°C and 60°C	4-100 MHz: max. ±100 ns/km of value at 20°C when measured between -40°C and 60°C	not specified	1-100 MHz: max. ±100 ns/km of value at 20°C when measured at 40°C and 60°C	1-100 MHz: max. ±100 ns/km of value at 20°C when measured at 40°C and 60°C

<p>coupling attenuation</p>	<p>Type II: 30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB Type I: 30-100 MHz: min. 85 dB 100-1000 MHz: 85- $20\log(\frac{f}{100})$ dB</p>	<p>Type III: 30-100 MHz: min. 40 dB 100-1000 MHz: 40- $20\log(\frac{f}{100})$ dB Type II: 30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB Type I: 30-100 MHz: min. 85 dB 100-1000 MHz: 85- $20\log(\frac{f}{100})$ dB</p>	<p>30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB</p>	<p>not specified</p>	<p>Type II: 30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB Type I: 30-100 MHz: min. 85 dB 100-1000 MHz: 85- $20\log(\frac{f}{100})$ dB</p>
<p>EMC performance</p>	<p>Type II: min. 55 dB Type I: min. 85 dB</p>	<p>Type III: min. 40 dB Type II: min. 55 dB Type I: min. 85 dB</p>	<p>min. 55 dB</p>	<p>not specified</p>	<p>Type II: min. 55 dB Type I: min. 85 dB</p>
<p>transfer impedance</p>	<p>max. 50 mΩ/m @ 1 MHz max. 100 mΩ/m @ 10 MHz max. 200 mΩ/m @ 30 MHz max. 1000 mΩ/m @ 100 MHz</p>	<p>Grade 2: max. 50 mΩ/m @ 1 MHz max. 100 mΩ/m @ 10 MHz max. 200 mΩ/m @ 30 MHz max. 1000 mΩ/m @ 100 MHz Grade 1: max. 10 mΩ/m @ 1 MHz max. 10 mΩ/m @ 30 MHz max. 30 mΩ/m @ 30 MHz max. 60 mΩ/m @ 100 MHz</p>	<p>max. 50 mΩ/m @ 1 MHz max. 100 mΩ/m @ 10 MHz max. 200 mΩ/m @ 30 MHz</p>	<p>1-100 MHz: $37+4\cdot f+4\sqrt{f}+5\cdot 3\sqrt{f}$ mΩ/m</p>	<p>Grade 2: 1-100 MHz: $37+4\cdot f+4\sqrt{f}+5\cdot 3\sqrt{f}$ mΩ/m Grade 1: max. 10,4 mΩ/m @ 1 MHz max. 10,4 mΩ/m @ 30 MHz max. 30,4 mΩ/m @ 30 MHz max. 60,4 mΩ/m @ 100 MHz</p>

screening attenuation	Grade 2: 30-100 MHz: min. 40 dB	Grade 2: 30-100 MHz: min. 40 dB Grade 1: 30-100 MHz: min. 60 dB	30-100 MHz: min. 40 dB	not specified	Grade 2: 30-100 MHz: min. 40 dB Grade 1: 30-100 MHz: min. 60 dB
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5. Requirements for Screened Category 5e Stranded Cables:

Parameter	ISO/IEC	IEC	CENELEC	TIA/EIA	Worst Case (3P Requirements)
Standards	2 nd edition ISO/IEC 11801:2002 ISO/IEC cable requirements, draft 3 N 855	IEC 61156-6 2 nd edition IEC 61156-6	2 nd edition CENELEC EN 50288-2-2 CENELEC EN 50273-1	ANSI/TIA/EIA- 568-B.2	
current carrying capacity	175 mA per conductor and screen @60°C	not specified	not specified	not specified	175 mA per conductor and screen @60°C
dc resistance	not specified	max. 145 Ω/km @ 20°C	not specified	max. 112,6 Ω/km @ 20°C	max. 145 Ω/km @ 20°C
dc loop resistance	max. 290 Ω/km @ 20°C	max. 290 Ω/km @ 20°C	max. 290 Ω/km @ 20°C	not specified	max. 290 Ω/km @ 20°C
resistance unbalance within a pair	max. 2,0 % (max.-min.) / (min.+max.)	max. 2,0 % (max.-min.) / (min.+max.)	max. 2,0 % (max.-min.) / (min.+max.)	max. 5 % (max.-min.) / min.	max. 2,0 % (max.-min.) / (min.+max.)
resistance unbalance between pairs	not specified	max. 4,0 % (max.-min.) / (min.+max.)	not specified	not specified	max. 4,0 % (max.-min.) / (min.+max.)
mutual capacitance	not specified	not specified	not specified	max. 56,0 nF/km @ 1 kHz (for information)	max. 56,0 nF/km @ 1 kHz (for information)
capacitance unbalance	max. 1600 pF/km @ 1 kHz	max. 1600 pF/km @ 0,8 kHz or 1 kHz	max. 1600 pF/km	max. 3300 pF/km @ 1 kHz	max. 1600 pF/km @ 1 kHz
insulation resistance	min. 5000 MΩ·km	min. 5000 MΩ·km	min. 500 Ω·km @ 100 - 500 V	not specified	min. 5000 Ω·km @ 500 V

dielectric strength	conductor-conductor and conductor-screen: min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	conductor-conductor and conductor-screen: min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	conductor-conductor and conductor-screen: min. 1,0 kVdc or min. 0,7 kVac for 1 min or min. 2,5 kVdc or min. 1,7 kVac for 2 secs	conductor-screen: min. 2,5 kVdc or min. 1,7 kVac for 2 secs	conductor-conductor and conductor-screen: min. 2,5 kVdc for 3 secs
input impedance	4-100 MHz: 100 Ω±15 Ω for information	4-100 MHz: 100 Ω±15 Ω for information	not specified	not specified	4-100 MHz: 100 Ω±15 Ω for information
mean characteristic impedance	100±5 Ω @ 100 MHz	100±5 Ω @ 100 MHz	100±5 Ω @ 100 MHz	not specified	100±5 Ω @ 100 MHz
return loss	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-8,6log(f) dB @ 100 m cable 100-125 MHz is for information	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-8,6log(f) dB @ 100 m cable 100-125 MHz is for information	4-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-100 MHz: 25-7log(f) dB @ "long" cable	1-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-100 MHz: 25-7log(f) dB @ 100 m cable	1-10 MHz: 20+5log(f) dB 10-20 MHz: 25 dB 20-125 MHz: 25-7log(f) dB @ 100 m cable 100-125 MHz is for information
attenuation (20°C)	1-125 MHz: 28,660√f+ 0,330·f+ $\frac{3,0}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	4-125 MHz: 28,660√f+ 0,330·f+ $\frac{3,0}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: 28,662√f+ 0,333·f+ $\frac{3,12}{\sqrt{f}}$ dB/km 1-4 MHz attenuation is for information	772 kHz- 100 MHz: 29,505√f+ 0,345·f+ $\frac{0,75}{\sqrt{f}}$ dB/km	772 kHz- 2,6 MHz: 29,505√f+ 0,345·f+ $\frac{0,75}{\sqrt{f}}$ dB/km 2,6-125 MHz: 28,662√f+ 0,333·f+ $\frac{3,0}{\sqrt{f}}$ dB/km 100-125 MHz is for information

attenuation (40°C)	1-125 MHz: $29,806\sqrt{f}+0,343\cdot f+$ $\frac{3,12}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	4-125 MHz: $29,806\sqrt{f}+0,343\cdot f+$ $\frac{3,12}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: $29,808\sqrt{f}+0,346\cdot f+$ $\frac{3,12}{\sqrt{f}}$ dB/km 1-4 MHz attenuation is for information	772 kHz- 100 MHz: $30,685\sqrt{f}+0,359\cdot f+$ $\frac{0,78}{\sqrt{f}}$ dB/km	772 kHz- 2,6 MHz: $30,685\sqrt{f}+0,359\cdot f+$ $\frac{0,78}{\sqrt{f}}$ dB/km 2,6-125 MHz: $29,806\sqrt{f}+0,343\cdot f+$ $\frac{3,12}{\sqrt{f}}$ dB/km 100-125 MHz is for information
attenuation (60°C)	1-125 MHz: $30,952\sqrt{f}+0,356\cdot f+$ $\frac{3,24}{\sqrt{f}}$ dB/km min. 4,0 dB 100-125 MHz is for information	4-125 MHz: $30,952\sqrt{f}+0,356\cdot f+$ $\frac{3,24}{\sqrt{f}}$ dB/km 100-125 MHz is for information	1-100 MHz: $30,955\sqrt{f}+0,360\cdot f+$ $\frac{3,24}{\sqrt{f}}$ dB/km 1-4 MHz attenuation is for information	772 kHz- 100 MHz: $31,865\sqrt{f}+0,373\cdot f+$ $\frac{0,81}{\sqrt{f}}$ dB/km	772 kHz- 2,6 MHz: $31,865\sqrt{f}+0,373\cdot f+$ $\frac{0,81}{\sqrt{f}}$ dB/km 2,6-125 MHz: $30,952\sqrt{f}+0,356\cdot f+$ $\frac{3,24}{\sqrt{f}}$ dB/km 100-125 MHz is for information
temperature correction factor for attenuation	1-125 MHz: 0,2 %/°C @ 20-60°C 100-125 MHz is for information	4-125 MHz: 0,2 %/°C @ 20-60°C 100-125 MHz is for information	1-100 MHz: 0,2 %/°C @ 20-60°C	772 kHz- 100 MHz: 0,4 %/°C @ 20-60°C	1-125 MHz: 0,2 %/°C @ 20-60°C 100-125 MHz is for information
near end crosstalk	1-125 MHz: $65,3-15\log(f)$ dB 100-125 MHz is for information	4-125 MHz: $65,3-15\log(f)$ dB 100-125 MHz is for information	1-100 MHz: $65,3-15\log(f)$ dB	772 kHz- 100 MHz: $65,3-15\log(f)$ dB	772 kHz- 100 MHz: $65,3-15\log(f)$ dB 100-125 MHz is for information
power sum near end crosstalk	1-125 MHz: $62,3-15\log(f)$ dB 100-125 MHz is for information	4-125 MHz: $62,3-15\log(f)$ dB 100-125 MHz is for information	1-100 MHz: $62,3-15\log(f)$ dB	772 kHz- 100 MHz: $62,3-15\log(f)$ dB	772 kHz- 125 MHz: $62,3-15\log(f)$ dB 100-125 MHz is for information

ACR	not specified	not specified	not specified	not specified	1-125 MHz: min. pair-pair NEXT- attenuation 100-125 MHz is for information
power sum ACR	not specified	not specified	not specified	not specified	1-125 MHz: min. power sum NEXT- attenuation 100-125 MHz is for information
ACR far (former ELFEXT)	1-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	4-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	1-100 MHz: 63,8-20log(f) dB	1-100 MHz: 63,8-20log(f) dB	1-125 MHz: 64,0-20log(f) dB 100-125 MHz is for information
power sum ACR far (former PSELFEXT)	1-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	4-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information not required if FEXT 70 dB	1-100 MHz: 60,8-20log(f) dB	1-100 MHz: 60,8-20log(f) dB	1-125 MHz: 61,0-20log(f) dB 100-125 MHz is for information
transverse conversion loss	not specified	Type III: 1-100 MHz: 40-10log(f) dB Type II: 1-100 MHz: 50-10log(f) dB Type I: 1-100 MHz: 50-10log(f) dB	1-100 MHz: 40-10log(f) dB	not specified	Type III: 1-125 MHz: 40-10log(f) dB 100-125 MHz is for information Type II: 1-100 MHz: 50-10log(f) dB Type I: 1-100 MHz: 50-10log(f) dB
equal level transverse con- version transfer loss	not specified	1-30 MHz: 35-20log(f) dB	not specified	not specified	1-30 MHz: 35-20log(f) dB

propagation delay	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km	1-100 MHz: 5340 + $\frac{360}{\sqrt{f}}$ ns/km
velocity of propagation	4-100 MHz: min. 0,6·c	4-100 MHz: min. 0,6·c	not specified	not specified	4-100 MHz: min. 0,6·c
delay skew (20°C)	1-100 MHz: max. 450 ns/km @10±2°C	4-100 MHz: max. 450 ns/km @10±2°C	max. 400 ns/km @ 100 MHz	1-100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew (40°C)	1-100 MHz: max. 450 ns/km @40±1°C	4-100 MHz: max. 450 ns/km @40±1°C	not specified	1-100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew (60°C)	not specified	not specified	not specified	1-100 MHz: max. 450 ns/km	1-125 MHz: max. 400 ns/km 100-125 MHz is for information
delay skew variation with temperature	1-100 MHz: max. ±100 ns/km of value at 20°C when measured between -40°C and 60°C	4-100 MHz: max. ±100 ns/km of value at 20°C when measured between -40°C and 60°C	not specified	1-100 MHz: max. ±100 ns/km of value at 20°C when measured at 40°C and 60°C	1-100 MHz: max. ±100 ns/km of value at 20°C when measured at 40°C and 60°C
coupling attenuation	Type II: 30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB Type I: 30-100 MHz: min. 85 dB 100-1000 MHz: 85- $20\log(\frac{f}{100})$ dB	Type III: 30-100 MHz: min. 40 dB 100-1000 MHz: 40- $20\log(\frac{f}{100})$ dB Type II: 30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB Type I: 30-100 MHz: min. 85 dB 100-1000 MHz: 85- $20\log(\frac{f}{100})$ dB	30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB	not specified	Type II: 30-100 MHz: min. 55 dB 100-1000 MHz: 55- $20\log(\frac{f}{100})$ dB Type I: 30-100 MHz: min. 85 dB 100-1000 MHz: 85- $20\log(\frac{f}{100})$ dB

EMC performance	Type II: min. 55 dB Type III: min. 85 dB	Type III: min. 40 dB Type II: min. 55 dB Type III: min. 85 dB	min. 55 dB	not specified	Type II: min. 55 dB Type I: min. 85 dB
transfer impedance	max. 50 mΩ/m @ 1 MHz max. 100 mΩ/m @ 10 MHz max. 200 mΩ/m @ 30 MHz max. 1000 mΩ/m @ 100 MHz	Grade 2: max. 50 mΩ/m @ 1 MHz max. 100 mΩ/m @ 10 MHz max. 200 mΩ/m @ 30 MHz max. 1000 mΩ/m @ 100 MHz Grade 1: max. 10 mΩ/m @ 1 MHz max. 10 mΩ/m @ 30 MHz max. 30 mΩ/m @ 30 MHz max. 60 mΩ/m @ 100 MHz	max. 50 mΩ/m @ 1 MHz max. 100 mΩ/m @ 10 MHz max. 200 mΩ/m @ 30 MHz	1-100 MHz: $37+4\cdot f+4\sqrt{f}$ $+5\cdot 3\sqrt{f}$ mΩ/m	Grade 2: 1-100 MHz: $37+4\cdot f+4\sqrt{f}$ $+5\cdot 3\sqrt{f}$ mΩ/m Grade 1: max. 10,4 mΩ/m @ 1 MHz max. 10,4 mΩ/m @ 30 MHz max. 30,4 mΩ/m @ 30 MHz max. 60,4 mΩ/m @ 100 MHz
screening attenuation	Grade 2: 30-100 MHz: min. 40 dB	Grade 2: 30-100 MHz: min. 40 dB Grade 1: 30-100 MHz: min. 60 dB	30-100 MHz: min. 40 dB	not specified	Grade 2: 30-100 MHz: min. 40 dB Grade 1: 30-100 MHz: min. 60 dB