



SLOVENSKI STANDARD
oSIST prEN IEC 61784-5-X:2022
01-junij-2022

Industrijska komunikacijska omrežja - Profili - 5-x. del: Inštalacija procesnih vodil - Inštalacijski profili za CPF x (x = 2, 3, 6, 12, 21)

Industrial communication networks - Profiles - Part 5-x: Installation of fieldbuses - Installation profiles for CPF x (x=2, 3, 6, 12, 21)

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PREVIEW

Réseaux de communication industriels - Profils - Partie 5-x: Installation des bus de terrain - Profils d'installation pour CPF x (x = 2, 3, 6, 12, 21)

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ICS:

25.040.40	Merjenje in krmiljenje industrijskih postopkov	Industrial process measurement and control
35.100.40	Transportni sloj	Transport layer

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65C/1158/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:

IEC 61784-5-X ED5

DATE OF CIRCULATION:

2022-03-25

CLOSING DATE FOR VOTING:

2022-06-17

SUPERSEDES DOCUMENTS:

65C/1111/RR

IEC SC 65C : INDUSTRIAL NETWORKS	
SECRETARIAT: France	SECRETARY: Ms Valérie DEMASSIEUX
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 22G,TC 57,SC 121A	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Industrial communication networks – Profiles – Part 5-x: Installation of fieldbuses – Installation profiles for CPF x (x=2, 3, 6, 12, 21)

PROPOSED STABILITY DATE: 2028

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INCLUDED SUBPARTS

- NOTE 1: The page numbers of each subpart are prefixed with the CPF number of the subpart to facilitate identification, and so that the numbering of each subpart can be independent of those that precede it.
- NOTE 2: The Contents of each subpart begins on page xxx2, so that the page numbering will be unchanged when the final International Standard is issued with its IEC-Central-Office-provided cover sheet.
- NOTE 3: Part 5-8 (Ed 3.0), Part 5-19 (Ed 2.0) and Part 5-22 (Ed 1.0) are not included since they are circulated separately (Part 5-8 and Part 5-19 have substantial changes, Part 5-22 is a new part).
- NOTE 4: Part 5-1 (Ed 1.0), Part 5-4 (Ed 1.1), Part 5-10 (Ed 2.1), Part 5-11 (Ed 3.0), Part 5-13 (Ed 1.0), Part 5-14 (Ed 2.0), Part 5-15 (Ed 1.1), Part 5-16 (Ed 1.0), Part 5-17 (Ed 1.0), Part 5-18 (Ed 1.0) and Part 5-20 (Ed 1.0) are not included since they are simply reconfirmed, as indicated in 65C/1090/Q, 65C/1097/RQ and 65C/1111/RR.

IEC 61784-5-2 Ed4.0, Amendment 1, Industrial communication networks - Profiles – Part 5-2: Installation of fieldbuses – Installation profiles for CPF 2	2002
IEC 61784-5-3 Ed4.0, Amendment 1, Industrial communication networks - Profiles – Part 5-3: Installation of fieldbuses – Installation profiles for CPF 3	3002
IEC 61784-5-6 Ed5.0, Industrial communication networks - Profiles – Part 5-6: Installation of fieldbuses – Installation profiles for CPF 6	6002
IEC 61784-5-12 Ed3.0, Industrial communication networks - Profiles Part 5-12: Installation of fieldbuses – Installation profiles for CPF 12	12002
IEC 61784-5-21 Ed1.0, Amendment 1, Industrial communication networks - Profiles – Part 5-21: Installation of fieldbuses – Installation profiles for CPF 21	21002

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<https://standards.iteh.ai/catalog/standards/sist/5e0f5e3c-6fdc-45b0-95f0-0ddccfd7fbd7/osist-pren-iec-61784-5-x-2022>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL COMMUNICATION NETWORKS –
PROFILES –Part 5-2: Installation of fieldbuses –
Installation profiles for CPF 2

AMENDMENT 1

FOREWORD

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Amendment 1 to IEC 61784-5-2:2018 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

The text of this Amendment is based on the following documents:

Draft	Report on voting
65C/XX/XXXX	65C/XX/XXX

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

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54 The language used for the development of this Amendment is English.

55 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
56 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement,
57 available at www.iec.ch/members_experts/refdocs. The main document types developed by
58 IEC are described in greater detail at www.iec.ch/standardsdev/publications/.

59 A list of all parts of IEC 61784-5 series, under the general title *Industrial communications*
60 *networks – Profiles – Installation of fieldbuses*, can be found on the IEC website.

61 The committee has decided that the contents of this document will remain unchanged until the
62 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
63 specific document. At this date, the document will be

- 64 • reconfirmed,
- 65 • withdrawn,
- 66 • replaced by a revised edition, or
- 67 • amended.

68

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INTRODUCTION to Amendment 1

73 This Amendment 1 includes the following significant technical changes with respect to
74 IEC 61784-5-2:2018:

- 75 a) Update references of IEC 61918:2018 to include additions of IEC 61918:2018/AMD1:—
- 76 b) Add references for consideration of security to clause B.4.2.2
- 77 c) Update optical fiber specifications and references in clauses B.4.3.3.2 and B.4.4.1.4
- 78 d) Add definition of electromagnetic compatibility options for conformance to clause
79 B.4.4.1.2.1
- 80 e) Add support of mesh bonding systems to clauses B.4.4 and B.5
- 81 f) Add acceptance of end-to-end link verification and certification testing to clause B.6

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85

FOREWORD

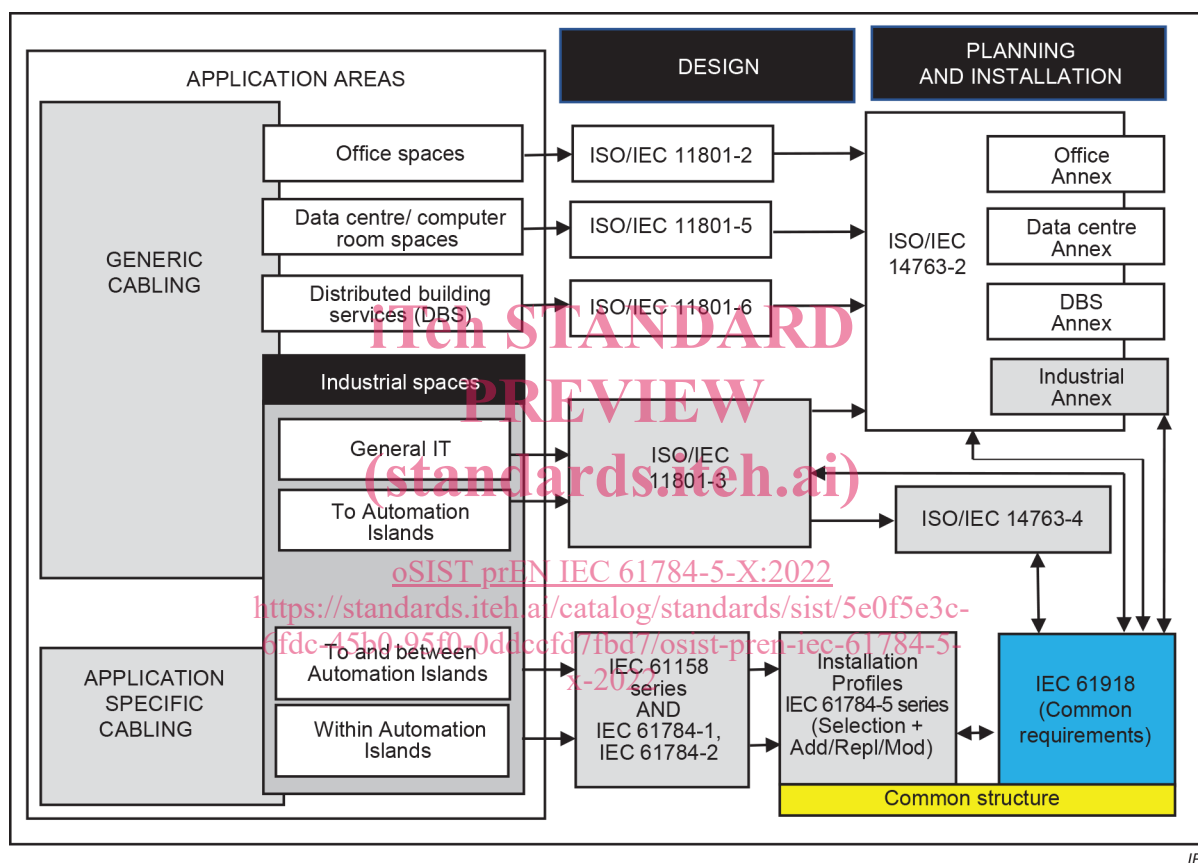
86 *Replace* “This document is to be used in conjunction with IEC 61918:2018” *with* “This
87 document is to be used in conjunction with IEC 61918:2018 and IEC 61918:2018/AMD1:—”.

88

INTRODUCTION

89 *Replace, at the beginning of the second paragraph,* “IEC 61918:2018” *with* “IEC 61918:2018
90 and IEC 61918:2018/AMD1:—”.

91 *Replace Figure 1 with the following updated Figure.*



IEC

93

Figure 1 – Standards relationships

94 **1 Scope**

95 *Replace, in the second paragraph,* “IEC 61918:2018” *with* “IEC 61918:2018 and IEC
96 61918:2018/AMD1:—”.

97 **2 Normative references**

98 *Add the following normative reference:*

99 IEC 61918:2018/AMD1:—, *Amendment 1 – Industrial communication networks – Installation of*
100 *communication networks in industrial premises*¹

¹ Under preparation. Stage at the time of publication: IEC/FDIS 61918:2018/AMD1

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101 *Replace, in the last sentence, “IEC 61918:2018 Clause 2” with “IEC 61918:2018 Clause 2 and*
102 *IEC 61918:2018/AMD1:— Clause 2”*

103 **3 Terms, definitions, and abbreviated terms**

104 *Replace, in the first sentence, “IEC 61918:2018 Clause 3” with “IEC 61918:2018, Clause 3*
105 *and IEC 61918:2018/AMD1:—, Clause 3, and the Annexes, Clause 3”*

106 **6 Conformance to installation profiles**

107 *Replace the two items in the list following the second paragraph with the following items:*

108 “Compliance with IEC 61784-5-2:2018 and IEC 61784-5-2:2018/AMD1:—² for CP 2/m
109 <name> or”

110 “Compliance with IEC 61784-5-2 (Ed.4.1:—) for CP 2/m <name>”.

111 **B.2 Normative references**

112 *Replace “ANSI/TIA-568-C.1” with “ANSI/TIA-568.2-D” (no change to title).*

113 **B.4.2.2 Security**

114 *Replace the last paragraph with the following new paragraph:*

115 CP 2/2 has provisions for supporting secure system designs aligned with IEC 62443.
116 IEC 62443 breaks down the design of security within a system to security levels based on risk
117 level. For each level there are different measures such as identification and authentication,
118 data access control, tamper detection, data access restriction, data confidentiality, response
119 time, and resource availability. Aspects of the system may need mitigations depending on the
120 level of security risk identified.

121 NOTE See [45] for more information on securing the installation of CP 2/2 systems. See ANSI/TIA 5017 [46] for
122 more information for deterrence or restricted access measures that may be taken for securing the physical
123 infrastructure of zones where it is deemed necessary or appropriate.

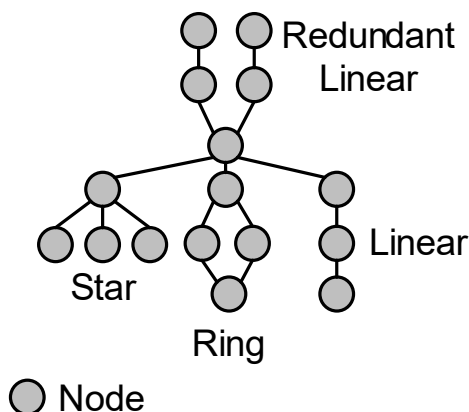
124 **B.4.3.1.4 Combination of basic topologies**

125 *Replace “Not applicable” with the following new text and figure:*

126 *Replacement:*

127 Through IEEE 802.1 bridging, CP 2/2 provides for routing of data through active topologies
128 and allows interfacing of all equipment through a hierarchical star topology. This is typically
129 facilitated through a network zone approach where an individual node on a network can be
130 replaced with an entire subnetwork configured in an independent topology such as a ring,
131 active linear bus, redundant active linear bus, or an additional active star. This concept is
132 shown in Figure B.18.

² The date should not be used when the edition number is used.



133

134

Figure B.18 – Example of combination of basic active topologies

135

B.4.3.3.2 Network characteristics for optical fibre cabling

137 *Replace, in the first row of Table B.2, “Bandwidth (MHz)” with “Bandwidth (Mbit/s)”*

138 *Replace, in the second column of Table B.2, all occurrences of “Modal bandwidth (MHz x km)”*
139 *with “Bandwidth (Mbit/s)”*

140 *Replace, in the third column of Table B.2, all occurrences of “MHz” with “Mbit/s”*

141 *Replace Table B.5 with the following new table:*

142

Table B.5 – Recognized fibre types

Fibre Type	Supported fibres	Designations	Bandwidth @ 850 nm/1 310 nm	Standard
Multimode	62,5 µm/125 µm	OM1	200 MHz × km/500 MHz × km	IEC 60793-2-10, type A1-OM1
	62,5 µm/200 µm/230 µm	OM1	200 MHz × km/500 MHz × km	IEC 60793-2-30, type A3g
	50 µm/125 µm	OM2	500 MHz × km/500 MHz × km	IEC 60793-2-10, type A1-OM2
		OM3	2 000 MHz × km/500 MHz × km	IEC 60793-2-10, type A1-OM3
		OM4	4 700 MHz × km/500 MHz × km	IEC 60793-2-10, type A1-OM4
		OM5	4 700 MHz × km/500 MHz × km	IEC 60793-2-10, type A1-OM5
	50 µm/200 µm/230 µm	OM2	400 MHz × km/400 MHz × km	IEC 60793-2-30, type A3f
Single-mode	9 µm/125 µm	OS1	N/A	IEC 60793-2-50, type B-652.B
		OS2	N/A	IEC 60793-2-50, type B-652.D
Setp Index Multimode	980 µm/1 000 µm	N/A	4 MHz × km	IEC 60793-2-40, type A4a.2 and A4d

143

144 *Add, in all cells of the second column of Table B.6, “,OM5” at the end of the list of supported*
145 *fibre types.*

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146 *Replace, in the last row of Table B.6, “1000BASE-LX10” with “1000BASE-LX10 and*
147 *100BASE-LX10”*

148 **B.4.4.1.2.1 Balanced cables for Ethernet-based CPs**

149 *Replace, in Table B.8, all occurrences of “ANSI/TIA 568-C.2” with “ANSI/TIA 568.2-D”.*

150 *Replace, in Table B.8, in row “Conductor gauges”, the contents of the right cell with “0,40 mm*
151 *to 0,65 mm (26AWG to 22AWG)”*

152 *Delete, in Table B.8, rows for “Coupling Attenuation”, “Shielding Effectiveness”, “TCL”, and*
153 *“ELTCTL”.*

154 *Add, after Table B.9, the following text:*

155 *Where category 6 or 6a cables are used, the extended requirements of ANSI/TIA 568.2-D*
156 *apply in addition to the requirements listed in this subclause B.4.4.1.2.1.*

157 *Replace all text and tables at the end of the subclause beginning at “Modification:” with the*
158 *following new text and tables:*

159 *Addition:*

160 *Cables shall be selected based on ability to support one of the four options of channel and*
161 *link electromagnetic performance as defined below.*

162 a) *The UTP cable supporting 10BASE-T or 100BASE-T applications shall be selected and*
163 *installed based on the ability to meet the Transverse Conversion Loss (TCL) and Equal*
164 *Level Transverse Conversion Transfer Loss (ELTCTL) requirements at both ends of the*
165 *cabling in accordance with Table B.27 and the environment local to the cabling.*

166 **Table B.27 – Unbalance attenuation limits for unshielded twisted-pair cabling serving**
167 **10BASE-T and 100BASE-T applications**

Parameter	Frequency MHz	Limit dB ^a
TCL	$1 \leq f < 100$	Compliant with ISO/IEC 11801
ELTCTL	$1 \leq f < 30$	Compliant with ISO/IEC 11801

^a Limits are applicable to all environmental classifications aligned with delineation in ISO/IEC 11801-1

168

169 b) *The UTP cable supporting 1000BASE-T applications shall be selected and installed based*
170 *on the ability to meet the Transverse Conversion Loss (TCL) and Equal Level Transverse*
171 *Conversion Transfer Loss (ELTCTL) requirements at both ends of the cabling in*
172 *accordance with Table B.28 and the environment local to the cabling.*

173 **Table B.28 – Unbalance attenuation limits for unshielded twisted-pair cabling serving**
174 **1000BASE-T applications**

Parameter	Frequency MHz	Limit dB		
		E1	E2	E3
TCL	$1 \leq f < 30$	Compliant with ISO/IEC 11801	$69,2 - 15 \times \log_{10}(f)$	$79,2 - 15 \times \log_{10}(f)$
	$1 \leq f \leq 100$		$76,6 - 20 \times \log_{10}(f)$ (max. 40 dB)	$86,6 - 20 \times \log_{10}(f)$ (max. 46 dB)

Parameter	Frequency MHz	Limit dB		
		E1	E2	E3
ELTCTL	$1 \leq f < 30$	Compliant with ISO/IEC 11801	$42 - 20 \times \log_{10}(f)$ (max. 40 dB)	$52 - 20 \times \log_{10}(f)$ (max. 40 dB)

175

- 176 c) The UTP cable supporting 1000BASE-T applications shall be selected and installed based
177 on the ability to meet the Transverse Conversion Loss (TCL) and Equal Level Transverse
178 Conversion Transfer Loss (ELTCTL) requirements at both ends of the cabling while also
179 restricting the insertion loss and indirectly the associated cable length in accordance with
180 Table B.29 and the environment local to the cabling. Under this condition the nominal
181 maximum cable length is limited to 72 m instead of the expected 100 m.

182 **Table B.29 – Unbalance attenuation limits for unshielded twisted-pair cabling serving**
183 **1000BASE-T applications**

Parameter	Frequency MHz	Limit dB ^a
Insertion Loss	$1 \leq f \leq 100$	$0,72 \times (1,967\sqrt{f} + 0,023 \times f + 0,1/\sqrt{f})$
TCL	$1 \leq f \leq 100$	Compliant with ISO/IEC 11801
ELTCTL	$1 \leq f \leq 30$	Compliant with ISO/IEC 11801

^a Limits are applicable to all environmental classifications aligned with delineation in ISO/IEC 11801-1

184

- 185 d) The shielded cable shall be selected and installed based on the ability to meet the
186 coupling attenuation requirements at both ends of the cabling in accordance with
187 Table B.30 and the environment local to the cabling. Coupling attenuation (see
188 Table B.30) shall be measured in accordance with IEC 61156-5.

189 **Table B.30 – Coupling attenuation limits for screened twisted-pair cabling**

Parameter	Frequency MHz	Limit dB ^a
Coupling Attenuation	$30 \leq f \leq 100$	Compliant with ISO/IEC 11801

^a Limits are applicable to all environmental classifications aligned with delineation in ISO/IEC 11801-1

190

191 B.4.4.1.4 Optical fibre cables

192 *Replace Table B.15 with the following new table:*

193 **Table B.15 – Information relevant to optical fibre cables**

Characteristic	9..10/125 μm single mode silica	50/125 μm multimode silica	62,5/125 μm multimode silica	980/1 000 μm step index POF	200/230 μm step index hard clad silica
Standard	OS1 or OS2	OM2, OM3, OM4, OM5	OM1	--	--
Maximum attenuation per km (650 nm)	–	–	–	18 dB	12 dB
Maximum attenuation per km (820 nm)	–	2,5 dB	3,0 dB	–	–
Maximum attenuation per km (1 310 nm)	0,4 dB	0,8 dB	1,0 dB	–	–

Characteristic	9..10/125 µm single mode silica	50/125 µm multimode silica	62,5/125 µm multimode silica	980/1 000 µm step index POF	200/230 µm step index hard clad silica
Number of optical fibres	2 minimum	2 minimum	2 minimum	–	–
Connector type (e.g. duplex or simplex)	Duplex, duplex-able, simplex	Duplex, duplex-able, simplex	Duplex, duplex-able, simplex	–	–
Jacket colour requirements	User defined	User defined	User defined	–	–
Jacket material	User defined	User defined	User defined	–	–
Resistance to harsh environment (e.g. UV, oil resist, LS0H)	As needed to support application and environment	As needed to support application and environment	As needed to support application and environment	–	–

194

195 **B.4.4.2.2 Connecting hardware for balanced cabling CPs based on Ethernet**196 *Replace Table B.17 with the following new table (title and contents):*197 **Table B.17 – Unbalance Attenuation limits for connectors based on Ethernet serving**
198 **1000BASE-T applications**

Parameter	Frequency MHz	Limit dB		
		E1	E2	E3
TCL	$1 \leq f < 250$	Not defined	Not defined	$94 - 20 \times \log_{10}(f)$
TCTL	$1 \leq f < 30$	Not defined	Not defined	$71.5 - 20 \times \log_{10}(f)$

199

200 *Delete, in Tables B.18 and B.19, rows for “Contact rating”.*201 *Replace, in Table B.19 and in Table B.20, in row “Contact plating”, the contents of the second*
202 *and third cells with the following text:*203 0,762 µm gold over 1,27 µm nickel or 0,127 µm gold minimum over 0,508 µm
204 palladium nickel over 1,27 µm nickel or equivalent plating.

205 Gold shall be 24 karat minimum.

206 **B.4.4.2.5 Connecting hardware for optical fibre cabling**207 *Replace, in Table B.22, in the column “200/230 µm step index hard clad silica”, in the cells*
208 *corresponding to rows “SC”, “ST”, and “SC-RJ”, “No” with “Yes”.*209 **B.4.4.7.4.1 Non-earthing or parallel RC**210 *Delete “Not applicable.”.*211 **B.4.4.7.4.2 Direct**212 *Delete “Not applicable.”.*213 **B.4.4.7.4.3 Derivatives of direct and parallel RC**214 *Replace, in the first sentence, the word “requires” with “recommends”.*

B.4.4.7.5 Specific requirements for CPs

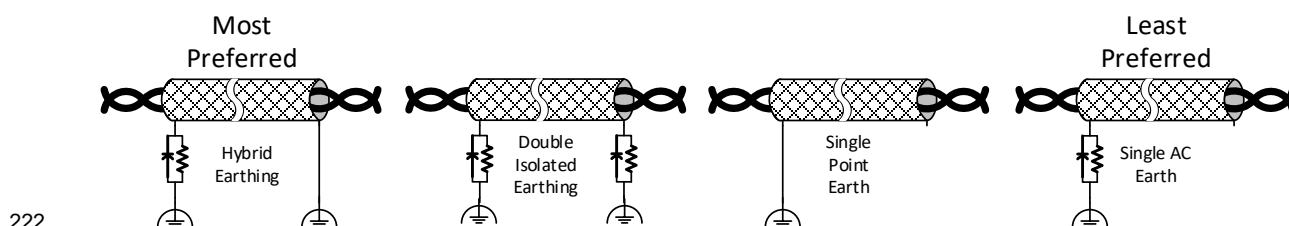
216 *Replace “Not applicable” with the following new text and figures:*

217 *Addition:*

218 CP 2/2 ranks the shield application according to the applied earthing and bonding system.

219 a) **Star earthing**

220 Ranking of preferred shield termination application in a star earthing arrangement is
221 shown in Figure B.19 in order from left to right.



222
223 **Figure B.19 – Shield termination in star earthing arrangements**

224 b) **Equipotential/mesh earthing**

225 In equipotential/mesh earthing arrangements, application of direct grounding at multiple
226 points of the cable is preferred (see Figure B.20).



227
228 **Figure B.20 – shield termination in mesh earthing arrangements**

B.5.3.1 Common description

230 *Replace, in the third sentence of the last paragraph, “see Figure H.2 of IEC 61918:2018” with*
231 *“see IEC 61918:2018, Annex H and IEC 61918:2018/AMD1:—, Annex H”.*

B.5.7.4.4 Derivatives of direct and parallel RC

233 *Replace, at the beginning of the fourth sentence of the first paragraph, the word “requires”*
234 *with “recommends”.*

235 *Replace the last paragraph with the following new paragraph:*

236 If the active device provides a low DC resistance (less than 500 kΩ) to earth at the jack and
237 connects to a link partner device that also provides a low DC resistance to earth at its jack, an
238 equalizing shunt conductor shall be used to mitigate earth voltage offsets between the two
239 end points, see IEC 61918:2018, Figure 35. The sizing of the conductor shall be in
240 accordance with IEC 61918:2018, Table 14.

B.6.2.1 General

242 *Replace the fifth bulleted item with the following new bulleted item:*

- 243 • presence of dust caps for unused connectorized cabling and equipment;

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244 *Replace the seventh bulleted item with the following new bulleted item:*

- 245 • routing of cables with respect to other circuits according to IEC 61918:2018, Table 17.

246 **B.6.2.5.1 Verification of cable routing**

247 *Replace list items a) and b) with the following new list items a) and b):*

- 248 a) The length of the end-to-end link or a channel is the sum of the lengths of the fixed
 249 horizontal cables and cords between the two end points. The length of a permanent link is
 250 the sum of the fixed horizontal cable and any intermediary cords not including those cords
 251 connecting directly to the end equipment. Length of the link/channel may be determined by
 252 physically measuring the length(s) of the cable(s), determined from the length markings on
 253 the cable(s), when present.
- 254 b) The length of the permanent link shall not be greater than 90 m (295 ft). The length of the
 255 end-to-end link or channel shall not be greater than 100 m (328 ft), including equipment
 256 cords and patch cords. If the channel or permanent link has been de-rated because of
 257 temperature or cable attenuation, then the total channel length is less than 100 m (328 ft)
 258 and the permanent link will be less than 90 m (295 ft). See the derating tables in
 259 IEC 61918:2018, Table 11 and Table 12.

260 **B.6.3.2.1.1 Common description**

261 *Replace the last paragraph with the following new paragraph:*

262 Electrical performance testing shall be performed either on the end-to-end link, channel, or
 263 permanent link or any combination thereof.

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Bibliography

[oSIST prEN IEC 61784-5-X:2022](https://standards.iteh.ai/catalog/standards/sist/5e0f5e3c-6fdc-45b0-95f0-0ddccfd7fbd7/osist-pren-iec-61784-5-x-2022)

266 *Add, at the end of Bibliography, the following new references.*

267 [45] ODVA: PUB00148: Ethernet/IP Media Planning & Installation Manual, 2006, available at
 268 <<http://www.odva.org>>

269 [46] ANSI/TIA-5017 – *Telecommunications Physical Network Security Standard*, February
 270 2016

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**INDUSTRIAL COMMUNICATION NETWORKS –
PROFILES –****Part 5-3: Installation of fieldbuses –
Installation profiles for CPF 3****AMENDMENT 1****FOREWORD**

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Amendment 1 to IEC 61784-5-2:2018 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

The text of this Amendment is based on the following documents:

Draft	Report on voting
65C/XX/XXXX	65C/XX/XXX

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Amendment is English.