

© Copyright SEK. Reproduction in any form without permission is prohibited.

Industriell processtyrning – Profiler – Del 5-2: Installation av fältbussar – Installationsprofiler för CPF 2 (CIP)

Industrial communication networks –

Profiles –

Part 5-2: Installation of fieldbuses –

Installation profiles for CPF 2

Som svensk standard gäller europastandarden EN 61784-5-2:2013. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61784-5-2:2013.

Nationellt förord

Europastandarden EN 61784-5-2:2013

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 61784-5-2, Third edition, 2013 - Industrial communication networks - Profiles - Part 5-2: Installation of fieldbuses - Installation profiles for CPF 2**

utarbetad inom International Electrotechnical Commission, IEC.

Standarden ska användas tillsammans med SS-EN 61918, utgåva 2, 2014.

Tidigare fastställd svensk standard SS-EN 61784-5-2, utgåva 2, 2012, gäller ej fr o m 2016-10-14.

ICS 25.040.40; 35.100.40

Standarder underlättar utvecklingen och höjer elsäkerheten

Det finns många fördelar med att ha gemensamma tekniska regler för bl a säkerhet, prestanda, dokumentation, utförande och skötsel av elprodukter, elanläggningar och metoder. Genom att utforma sådana standarder blir säkerhetskraven tydliga och utvecklingskostnaderna rimliga samtidigt som marknadens acceptans för produkten eller tjänsten ökar.

Många standarder inom elområdet beskriver tekniska lösningar och metoder som åstadkommer den elsäkerhet som föreskrivs av svenska myndigheter och av EU.

SEK är Sveriges röst i standardiseringssarbetet inom elområdet

SEK Svensk Elstandard svarar för standardiseringen inom elområdet i Sverige och samordnar svensk medverkan i internationell och europeisk standardisering. SEK är en ideell organisation med frivilligt deltagande från svenska myndigheter, företag och organisationer som vill medverka till och påverka utformningen av tekniska regler inom elektrotekniken.

SEK samordnar svenska intressenters medverkan i SEKs tekniska kommittéer och stödjer svenska experters medverkan i internationella och europeiska projekt.

Stora delar av arbetet sker internationellt

Utdriften av standarder sker i allt väsentligt i internationellt och europeiskt samarbete. SEK är svensk nationalkommitté av International Electrotechnical Commission (IEC) och Comité Européen de Normalisation Electrotechnique (CENELEC).

Standardiseringssarbetet inom SEK är organiserat i referensgrupper bestående av ett antal tekniska kommittéer som speglar hur arbetet inom IEC och CENELEC är organiserat.

Arbetet i de tekniska kommittéerna är öppet för alla svenska organisationer, företag, institutioner, myndigheter och statliga verk. Den årliga avgiften för deltagandet och intäkter från försäljning finansierar SEKs standardiseringssverksamhet och medlemsavgift till IEC och CENELEC.

Var med och påverka!

Den som deltar i SEKs tekniska kommittéarbete har möjlighet att påverka framtidens standarder och får tidig tillgång till information och dokumentation om utvecklingen inom sitt teknikområde. Arbetet och kontakterna med kollegor, kunder och konkurrenter kan gynnsamt påverka enskilda företags affärsutveckling och bidrar till deltagarnas egen kompetensutveckling.

Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

SEK Svensk Elstandard

Box 1284
164 29 Kista
Tel 08-444 14 00
www.elstandard.se

English version

**Industrial communication networks -
Profiles -
Part 5-2: Installation of fieldbuses -
Installation profiles for CPF 2
(IEC 61784-5-2:2013)**

Réseaux de communication industriels -
Profils -
Partie 5-2: Installation des bus de terrain -
Profils d'installation pour CPF 2
(CEI 61784-5-2:2013)

Industrielle Kommunikationsnetze -
Profile -
Teil 5-2: Feldbusinstallation -
Installationsprofile für die
Kommunikationsprofilfamilie 2
(IEC 61784-5-2:2013)

This European Standard was approved by CENELEC on 2013-10-14. 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.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 65C/738/FDIS, future edition 3 of IEC 61784-5-2, prepared by SC 65C "Industrial networks" of IEC/TC 65 "Industrial-process measurement, control and automation" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61784-5-2:2013.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2014-07-14
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2016-10-14

This document supersedes EN 61784-5-2:2012.

EN 61784-5-2:2013 includes the following significant technical changes with respect to EN 61784-5-2:2012:

- updates pertaining to current installation practices;
- addition of new technology that has become recently available;
- errors have been corrected;
- improved alignment with EN 61918.

This standard is to be used in conjunction with EN 61918:2013.

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.

Endorsement notice

The text of the International Standard IEC 61784-5-2:2013 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

- | | | |
|------------------|------|---|
| IEC 61158 Series | NOTE | Harmonized as EN 61158 Series (not modified). |
| IEC/TR 61158-1 | NOTE | Harmonized as CLC/TR 61158-1. |
| IEC 62026-3 | NOTE | Harmonized as EN 62026-3. |

Annex ZA
(normative)

**Normative references to international publications
with their corresponding European publications**

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Annex ZA of EN 61918:2013 applies, except as follows:

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
--------------------	-------------	--------------	--------------	-------------

Addition to Annex ZA of EN 61918:2013:

IEC 61918	2013	Industrial communication networks - Installation of communication networks in industrial premises	EN 61918	2013
-----------	------	---	----------	------

CONTENTS

INTRODUCTION.....	11
1 Scope.....	12
2 Normative references	12
3 Terms, definitions and abbreviated terms	12
4 CPF 2: Overview of installation profiles	12
5 Installation profile conventions	13
6 Conformance to installation profiles.....	14
Annex A (normative) CP 2/1 (ControlNet™) specific installation profile	15
A.1 Installation profile scope.....	15
A.2 Normative references	15
A.3 Installation profile terms, definitions, and abbreviated terms.....	15
A.3.1 Terms and definitions	15
A.3.2 Abbreviated terms	15
A.3.3 Conventions for installation profiles.....	15
A.4 Installation planning	16
A.4.1 General	16
A.4.2 Planning requirements.....	17
A.4.3 Network capabilities	18
A.4.4 Selection and use of cabling components	24
A.4.5 Cabling planning documentation.....	41
A.4.6 Verification of planning specification	41
A.5 Installation implementation	41
A.5.1 General requirements.....	41
A.5.2 Cable installation.....	41
A.5.3 Connector installation.....	43
A.5.4 Terminator installation	53
A.5.5 Device installation	53
A.5.6 Coding and labelling.....	55
A.5.7 Earthing and bonding of equipment and devices and shield cabling.....	56
A.5.8 As-implemented cabling documentation.....	57
A.6 Installation verification and installation acceptance test.....	57
A.6.1 General	57
A.6.2 Installation verification.....	57
A.6.3 Installation acceptance test	60
A.7 Installation administration.....	62
A.8 Installation maintenance and installation troubleshooting	62
A.8.1 General	62
A.8.2 Maintenance.....	62
A.8.3 Troubleshooting	62
A.8.4 Specific requirements for maintenance and troubleshooting	67
Annex B (normative) CP 2/2 (EtherNet/IP™) specific installation profile.....	68
B.1 Installation profile scope.....	68
B.2 Normative references	68

B.3 Installation profile terms, definitions, and abbreviated terms	68
B.3.1 Terms and definitions	68
B.3.2 Abbreviated terms	68
B.3.3 Conventions for installation profiles	68
B.4 Installation planning	69
B.4.1 General	69
B.4.2 Planning requirements	70
B.4.3 Network capabilities	70
B.4.4 Selection and use of cabling components	74
B.4.5 Cabling planning documentation	86
B.4.6 Verification of cabling planning specification	87
B.5 Installation implementation	87
B.5.1 General requirements	87
B.5.2 Cable installation	87
B.5.3 Connector installation	88
B.5.4 Terminator installation	89
B.5.5 Device installation	89
B.5.6 Coding and labelling	89
B.5.7 Earthing and bonding of equipment and devices and shield cabling	89
B.5.8 As-implemented cabling documentation	91
B.6 Installation verification and installation acceptance test	91
B.6.1 General	91
B.6.2 Installation verification	91
B.6.3 Installation acceptance test	93
B.7 Installation administration	94
B.8 Installation maintenance and installation troubleshooting	94
Annex C (normative) CP 2/3 (DeviceNet™) specific installation profile	95
C.1 Installation profile scope	95
C.2 Normative references	95
C.3 Installation profile terms, definitions, and abbreviated terms	95
C.3.1 Terms and definitions	95
C.3.2 Abbreviated terms	95
C.3.3 Conventions for installation profiles	95
C.4 Installation planning	96
C.4.1 General	96
C.4.2 Planning requirements	97
C.4.3 Network capabilities	98
C.4.4 Selection and use of cabling components	112
C.4.5 Cabling planning documentation	121
C.4.6 Verification of cabling planning specification	121
C.5 Installation implementation	121
C.5.1 General requirements	121
C.5.2 Cable installation	121
C.5.3 Connector installation	124
C.5.4 Terminator installation	136
C.5.5 Device installation	138
C.5.6 Coding and labelling	141

C.5.7 Earthing and bonding of equipment and devices and shield cabling.....	141
C.5.8 As-implemented cabling documentation.....	142
C.6 Installation verification and installation acceptance test.....	142
C.6.1 General	142
C.6.2 Installation verification.....	142
C.6.3 Installation acceptance test	145
C.7 Installation administration.....	146
C.8 Installation maintenance and installation troubleshooting	146
C.8.1 General	146
C.8.2 Maintenance.....	146
C.8.3 Troubleshooting	146
C.8.4 Specific requirements for maintenance and troubleshooting	146
Annex D (informative) Additional information	150
D.1 Network validation check sheet for CP 2/3 (DeviceNet)	150
Bibliography.....	154
 Figure 1 – Standards relationships.....	11
Figure A.1 – Interconnection of CPF 2 networks	16
Figure A.2 – Overview of CPF 2/1 networks	17
Figure A.3 – Drop cable requirements	19
Figure A.4 – Placement of BNC/TNC plugs	19
Figure A.5 – Placement of terminators	20
Figure A.6 – Extending a network using repeaters	20
Figure A.7 – Extending a network using active star topology	21
Figure A.8 – Links.....	21
Figure A.9 – Extending the network beyond 99 nodes	22
Figure A.10 – Maximum allowable taps per segment.....	30
Figure A.11 – Example of repeaters in star configuration	31
Figure A.12 – Repeaters in parallel.....	32
Figure A.13 – Repeaters in combination series and parallel	33
Figure A.14 – Ring repeater.....	33
Figure A.15 – Installing bulkheads	34
Figure A.16 – Coaxial BNC and TNC terminators	35
Figure A.17 – Terminator placement in a segment	35
Figure A.18 – Redundant network icons	37
Figure A.19 – Redundant coax media	38
Figure A.20 – Redundant fibre media	38
Figure A.21 – Repeaters in series versus length difference for coax media	39
Figure A.22 – Repeaters in series versus length difference for fibre media	39
Figure A.23 – Example of redundant coax network with repeaters.....	40
Figure A.24 – Example of improper redundant node connection.....	40
Figure A.25 – Example tool kit for installing BNC connectors	44
Figure A.26 – Calibration of coaxial stripper.....	45
Figure A.27 – Coax PVC strip length detail (informative).....	45

Figure A.28 – Memory cartridge and blade.....	46
Figure A.29 – Cable position.....	47
Figure A.30 – Locking the cable.....	47
Figure A.31 – Stripping the cable	47
Figure A.32 – Install the crimp ferrule	48
Figure A.33 – Cable preparation for PVC type cables (informative)	48
Figure A.34 – Cable preparation for FEP type cables (informative)	49
Figure A.35 – Strip guides	49
Figure A.36 – Using the flare tool.....	50
Figure A.37 – Expanding the shields.....	50
Figure A.38 – Install the centre pin	50
Figure A.39 – Crimping the centre pin.....	51
Figure A.40 – Installing the connector body	51
Figure A.41 – Installing the ferrule	51
Figure A.42 – Crimp tool	52
Figure A.43 – Sealed IP65/67 cable.....	53
Figure A.44 – Terminator placement	53
Figure A.45 – Mounting the taps	54
Figure A.46 – Mounting the tap assembly using the universal mounting bracket	55
Figure A.47 – Mounting the tap using tie wraps or screws.....	55
Figure A.48 – Redundant network icons	56
Figure A.49 – Network test tool.....	58
Figure A.50 – Shorting the cable to test for continuity	59
Figure A.51 – Testing fibre segments.....	61
Figure A.52 – Multi-fibre backbone cable housing	63
Figure A.53 – Repeater adapter module.....	63
Figure A.54 – Short and medium distance fibre module LEDs	65
Figure A.55 – Long and extra long repeater module LEDs	66
Figure B.1 – Interconnection of CPF 2 networks	69
Figure B.2 – Redundant linear bus	71
Figure B.3 – Peer to peer connections	71
Figure B.4 – Mated connections.....	74
Figure B.5 – The 8-way modular sealed jack & plug (plastic housing)	78
Figure B.6 – The 8-way modular sealed jack & plug (metal housing)	79
Figure B.7 – M12-4 connectors	79
Figure B.8 – Simplex LC connector	80
Figure B.9 – Duplex LC connector	80
Figure B.10 – IP65/67 sealed duplex LC connector	81
Figure B.11 – IP65/67 sealed duplex SC-RJ connector	81
Figure B.12 – M12-4 to 8-way modular bulkhead	83
Figure B.13 – The 8-way modular sealed jack & plug (plastic housing)	88
Figure B.14 – The 8-way modular sealed jack & plug (metal housing).....	89
Figure B.15 – M12-4 connectors	89

Figure B.16 – Earthing of cable shield	91
Figure C.1 – Interconnection of CPF 2 networks	96
Figure C.2 – Connection to generic cabling.....	97
Figure C.3 – DeviceNet cable system uses a trunk/drop line topology.....	98
Figure C.4 – Measuring the trunk length	100
Figure C.5 – Measuring the trunk and drop length.....	101
Figure C.6 – Measuring drop cable in a network with multiports	101
Figure C.7 – Removable device using open-style connectors	102
Figure C.8 – Fixed connection using open-style connector.....	102
Figure C.9 – Open-style connector pin out	102
Figure C.10 – Open-style connector pin out 10 position	103
Figure C.11 – Power supply sizing example	106
Figure C.12 – Current limit for thick cable for one power supply.....	107
Figure C.13 – Current limit for thick cable and two power supplies.....	108
Figure C.14 – Worst case scenario	109
Figure C.15 – Example using the lookup method	109
Figure C.16 – One power supply end connected	111
Figure C.17 – Segmenting power in the power bus	112
Figure C.18 – Segmenting the power bus using power taps	112
Figure C.19 – Thick cable construction	122
Figure C.20 – Cable Type I construction	123
Figure C.21 – Thin cable construction.....	123
Figure C.22 – Flat cable construction.....	123
Figure C.23 – Cable preparation	124
Figure C.24 – Connector assembly	125
Figure C.25 – Micro connector pin assignment.....	125
Figure C.26 – Mini connector pin assignment.....	125
Figure C.27 – Preparation of cable end.....	126
Figure C.28 – Shrink wrap installation.....	126
Figure C.29 – Wire preparation	126
Figure C.30 – Open-style connector (female)	127
Figure C.31 – Open-style (male plug)	127
Figure C.32 – Flat cable.....	128
Figure C.33 – Aligning the cable	128
Figure C.34 – Closing the assembly.....	129
Figure C.35 – Proper orientation of cable.....	129
Figure C.36 – Locking the assembly	129
Figure C.37 – Driving the IDC contacts in to the cable	130
Figure C.38 – End cap placement	130
Figure C.39 – End cap seated.....	131
Figure C.40 – End cap installation on alternate side of cable	131
Figure C.41 – Flat cable IDC connectors.....	132
Figure C.42 – Installing the connectors	132

Figure C.43 – Cable wiring to open-style terminals	133
Figure C.44 – Auxiliary power cable profile	133
Figure C.45 – Pin out auxiliary power connectors.....	134
Figure C.46 – Power supply cable length versus wire size	135
Figure C.47 – Sealed terminator	137
Figure C.48 – Open-style terminator	137
Figure C.49 – Open-style IDC terminator	137
Figure C.50 – Sealed terminator IDC cable	138
Figure C.51 – Direct connection to the trunk	138
Figure C.52 – Wiring of open-style connector.....	139
Figure C.53 – Wiring of open-style 10-position connector	139
Figure C.54 – Diagnostic temporary connections	139
Figure C.55 – Thick cable preterminated cables (cord sets).....	140
Figure C.56 – Thin cable preterminated cables (cord sets).....	141
 Table A.1 – Basic network characteristics for copper cabling not based on Ethernet	22
Table A.2 – Allowable fibre lengths	23
Table A.3 – RG6 coaxial electrical properties.....	25
Table A.4 – RG6 coaxial physical parameters	25
Table A.5 – Cable type selection.....	26
Table A.6 – Information relevant to optical fibre cables	27
Table A.7 – Copper connectors for ControlNet.....	27
Table A.8 – Fibre connectors for fieldbus systems	28
Table A.9 – Relationship between FOC and fibre types (CP 2/1).....	29
Table A.10 – Parameters for Coaxial RG6 Cables.....	42
Table A.11 – Bend radius for coaxial cables outside conduit	42
Table A.12 – Parameters for silica optical fibre cables	42
Table A.13 – Parameters for hard clad silica optical fibre	43
Table A.14 – Test matrix for BNC/TNC connectors.....	59
Table A.15 – Wave length and fibre types	62
Table A.16 – LED status table.....	64
Table A.17 – Repeater adapter and module diagnostic	64
Table A.18 – Repeater adapter indicator diagnostic	64
Table A.19 – Repeater module indicator	65
Table A.20 – Short and medium distance troubleshooting chart	65
Table A.21 – Long and extra long troubleshooting chart.....	67
Table B.1 – Network characteristics for balanced cabling based on Ethernet	72
Table B.2 – Network characteristics for optical fibre cabling.....	72
Table B.3 – Fibre lengths for 1 mm POF A4a.2 POF 0.5 NA	73
Table B.4 – Fibre lengths for 1 mm POF A4d POF 0.3 NA	74
Table B.5 – Information relevant to copper cable: fixed cables.....	75
Table B.6 – Information relevant to copper cable: cords	75
Table B.7 – TCL limits for unshielded twisted-pair cabling	76

Table B.8 – ELTCTL limits for unshielded twisted-pair cabling	76
Table B.9 – Coupling attenuation limits for screened twisted-pair cabling.....	76
Table B.10 – Information relevant to optical fibre cables	77
Table B.11 – Connectors for balanced cabling CPs based on Ethernet	78
Table B.12 – Industrial EtherNet/IP 8-way modular connector parameters	78
Table B.13 – Industrial EtherNet/IP M12-4 D-coding connector parameters	79
Table B.14 – Optical fibre connecting hardware	80
Table B.15 – Relationship between FOC and fibre types (CP2/2).....	81
Table B.16 – Connector insertion loss.....	82
Table B.17 – Parameters for balanced cables	87
Table B.18 – Parameters for silica optical fibre cables	87
Table B.19 – Parameters for POF optical fibre cables	88
Table C.1 – Basic network characteristics for copper cabling not based on Ethernet.....	99
Table C.2 – Cable trunk and drop lengths for CP 2/3	99
Table C.3 – Summary of available current for trunk cables (CP 2/3).....	103
Table C.4 – Permissible current for thin cable drop lines of various lengths	104
Table C.5 – Power supply specification for DeviceNet.....	104
Table C.6 – Power supply tolerance stack up for DeviceNet.....	105
Table C.7 – Current versus cable length for one power supply thick cable	107
Table C.8 – Current versus length for two power supplies	108
Table C.9 – Definition of equation variables	110
Table C.10 – Information relevant to copper cable: fixed cables	113
Table C.11 – Information relevant to copper cable: cords	113
Table C.12 – DeviceNet cables and connector support cross reference	114
Table C.13 – DeviceNet cable profiles	114
Table C.14 – Copper connectors for non-Ethernet based fieldbus	117
Table C.15 – Additional connectors for CP 2/3 (DeviceNet)	117
Table C.16 – Parameters for balanced cables	122
Table C.17 – Wire colour code and function	127
Table C.18 – Auxiliary power cable colour code	133
Table C.19 – Auxilliary power supply requirements	134
Table C.20 – Signal wire verification	143
Table C.21 – Shield to earth	144
Table C.22 – Connector pin out	145

INTRODUCTION

This International Standard is one of a series produced to facilitate the use of communication networks in industrial control systems.

IEC 61918:2013 provides the common requirements for the installation of communication networks in industrial control systems. This installation profile standard provides the installation profiles of the communication profiles (CP) of a specific communication profile family (CPF) by stating which requirements of IEC 61918 fully apply and, where necessary, by supplementing, modifying, or replacing the other requirements (see Figure 1).

For general background on fieldbuses, their profiles, and relationship between the installation profiles specified in this standard, see IEC 61158-1.

Each CP installation profile is specified in a separate annex of this standard. Each annex is structured exactly as the reference standard IEC 61918 for the benefit of the persons representing the roles in the fieldbus installation process as defined in IEC 61918 (planner, installer, verification personnel, validation personnel, maintenance personnel, administration personnel). By reading the installation profile in conjunction with IEC 61918, these persons immediately know which requirements are common for the installation of all CPs and which are modified or replaced. The conventions used to draft this standard are defined in Clause 5.

The provision of the installation profiles in one standard for each CPF (for example IEC 61784-5-2 for CPF 2), allows readers to work with standards of a convenient size.

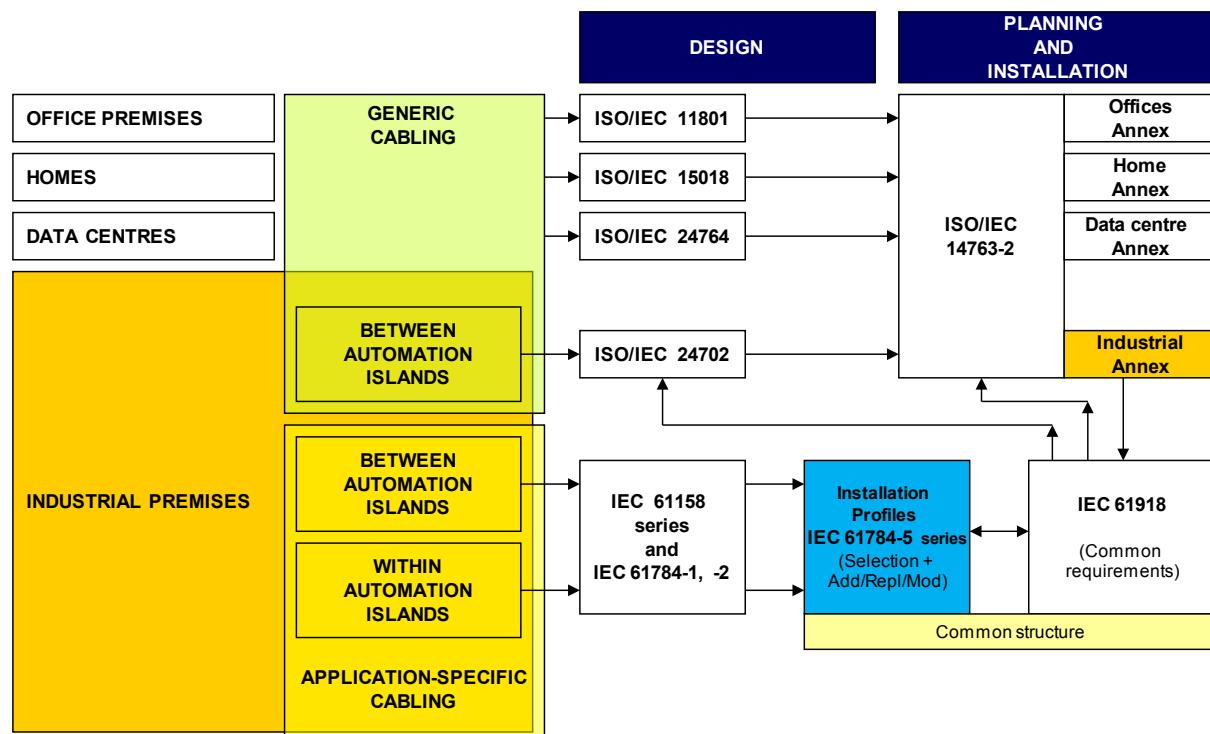


Figure 1 – Standards relationships

INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 5-2: Installation of fieldbuses – Installation profiles for CPF 2

1 Scope

This part of IEC 61784-5 specifies the installation profiles for CPF 2 (CIP™¹).

The installation profiles are specified in the annexes. These annexes are read in conjunction with IEC 61918:2013.

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.

IEC 61918:2013, *Industrial communication networks – Installation of communication networks in industrial premises*

The normative references of IEC 61918:2013, Clause 2, apply. For profile specific normative references, see Clauses A.2, B.2, C.2.

¹ CIP™ (Common Industrial Protocol) is a trade name of ODVA, Inc. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance to this standard does not require use of the trade name CIP™. Use of the trade name CIP™ requires permission of ODVA, Inc.