

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Industrial communication networks – Profiles –
Part 5-12: Installation of fieldbuses – Installation profiles for CPF 12**

**Réseaux de communication industriels – Profils –
Partie 5-12: Installation de bus de terrain – Profils d'installation pour CPF 12**



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PROFILES –****Part 5-12: Installation of fieldbuses –
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International Standard IEC 61784-5-12 has been prepared by subcommittee 65C: Industrial networks, of IEC technical committee 65: Industrial-process measurement, control and automation.

This second edition cancels and replaces the first edition published in 2010 and Amendment 1:2015. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) addition of connectors (see A.4.4.2.2);
- b) alignment with IEC 61918:2018.

This standard is to be used in conjunction with IEC 61918:2018.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
65C/924/FDIS	65C/925/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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INTRODUCTION

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

IEC 61918:2018 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 document, see IEC 61158-1.

Each CP installation profile is specified in a separate annex of this document. 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 document are defined in Clause 5.

The provision of the installation profiles in one standard for each CPF (for example IEC 61784-5-12 for CPF 12) allows readers to work with standards of a convenient size.

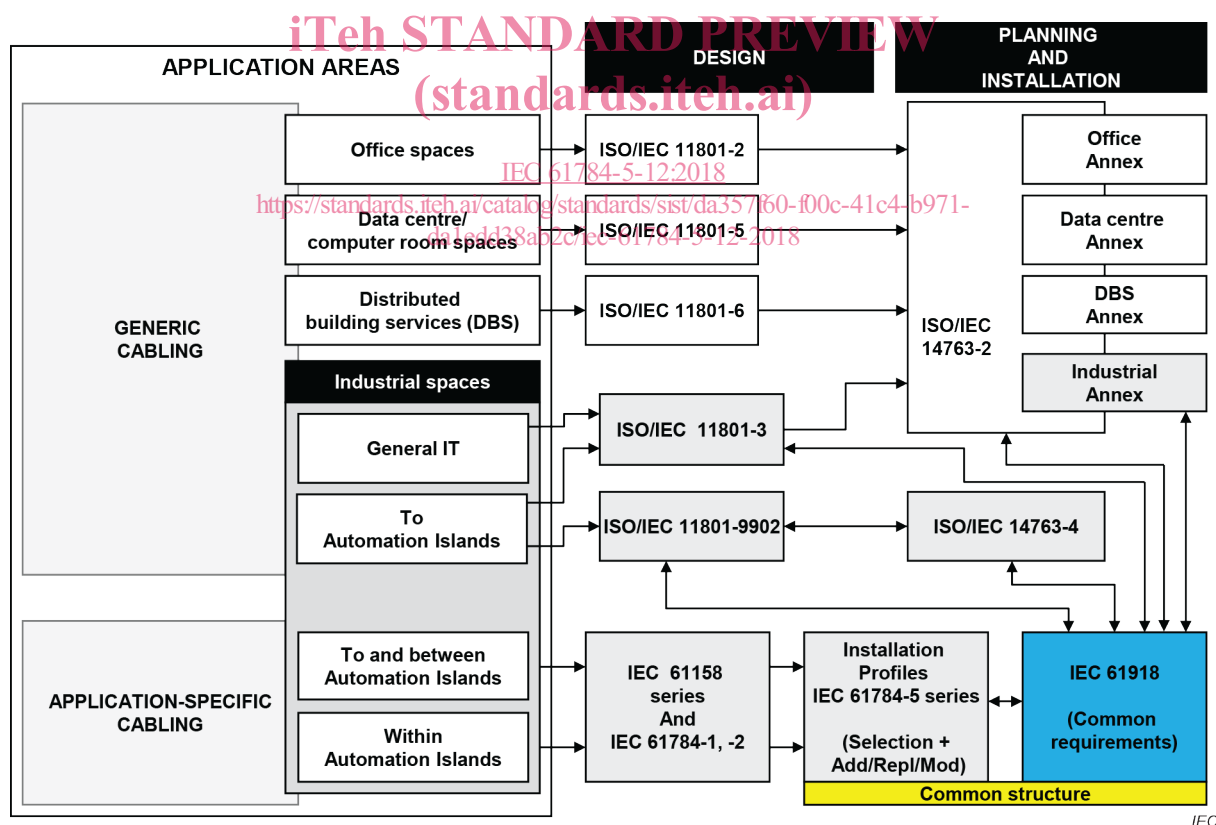


Figure 1 – Standards relationships

Attention is drawn to the fact that the document IEC 61918 specifies all the installation requirements that apply to large part of the industrial communication networks and that these requirements automatically apply to each single network with the exception of those requirements that in the relevant document of the IEC 61784-5 series are explicitly defined as modified or replaced.

All the additions to the latest edition of the IEC 61918 apply to the networks of CPF 12.

INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 5-12: Installation of fieldbuses – Installation profiles for CPF 12

1 Scope

This part of IEC 61784 specifies the installation profiles for CPF 12 (EtherCAT™)¹.

The installation profiles are specified in the annex. This annex is read in conjunction with IEC 61918:2018.

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 61918:2018, *Industrial communication networks – Installation of communication networks in industrial premises*

The normative references of IEC 61918:2018, Clause 2, apply.

NOTE For profile specific normative references, see Clauses A.2.

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms, definitions and abbreviated terms of IEC 61918:2018, Clause 3, apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

NOTE For profile specific terms, definitions and abbreviated terms see Clauses A.3.

4 CPF 12: Overview of installation profiles

CPF 12 consists of two communication profiles as specified in IEC 61784-2:—.

The installation requirements for CP 12/1 (simple EtherCAT™ I/O devices) and CP 12/2 (EtherCAT™ devices with mailbox capabilities) are identical and are specified in Annex A.

¹ EtherCAT™ is a trade name of Beckhoff, Verl. This information is given for the convenience of users of this document and does not constitute an endorsement by IEC of the trademark holder or any of its products. Compliance to this profile does not require use of the trade name. Use of the trade name requires permission of the trade name holder.

5 Installation profile conventions

The numbering of the clauses and subclauses in the annexes of this document corresponds to the numbering of IEC 61918 main clauses and subclauses.

The annex clauses and subclauses of this document supplement, modify, or replace the respective clauses and subclauses in IEC 61918.

Where there is no corresponding subclause of IEC 61918:2018 in the normative annexes in this document, the subclause of IEC 61918 applies without modification.

The annex heading letter represents the installation profile assigned in Clause 4. The annex (sub)clause numbering following the annex letter shall represent the corresponding (sub)clause numbering of IEC 61918.

EXAMPLE "Subclause A.4.4" in IEC 61784-5-12 means that CP 12/1 and CP 12/2 specifies the Subclause 4.4 of IEC 61918.

All main clauses of IEC 61918 are cited and apply in full unless otherwise stated in each normative installation profile annex.

If all subclauses of a (sub)clause are omitted, then the corresponding IEC 61918 (sub)clause applies.

If in a (sub)clause it is written "Not applicable.", then the corresponding IEC 61918 (sub)clause does not apply.

If in a (sub)clause it is written "**Addition:**", then the corresponding IEC 61918 (sub)clause applies with the additions written in the profile.

If in a (sub)clause it is written "**Replacement:**", then the text provided in the profile replaces the text of the corresponding IEC 61918 (sub)clause.

NOTE A replacement can also comprise additions.

If in a (sub)clause it is written "**Modification:**", then the corresponding IEC 61918 (sub)clause applies with the modifications written in the profile.

If all (sub)clauses of a (sub)clause are omitted but in this (sub)clause it is written "(Sub)clause x has addition:" (or "**replacement:**") or "(Sub)clause x is not applicable.", then (sub)clause x becomes valid as declared and all the other corresponding IEC 61918 (sub)clauses apply.

6 Conformance to installation profiles

Each installation profile within this document includes part of IEC 61918:2018. It may also include defined additional specifications.

A statement of compliance to an installation profile of this document shall be stated² as either

² In accordance with ISO/IEC Directives.

Compliance to IEC 61784-5-12:—³ for CP 12/m <name> or

Compliance to IEC 61784-5-12 (Ed.2.0) for CP 12/m <name>

where the name within the angle brackets < > is optional and the angle brackets are not to be included. The m n within CP 12/m shall be replaced by the profile number 1 or 2.

NOTE The name may be the name of the profile, for example EtherCAT™.

If the name is a trade name then the permission of the trade name holder shall be required.

Product standards shall not include any conformity assessment aspects (including quality management provisions), neither normative nor informative, other than provisions for product testing (evaluation and examination).

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³ The date should not be used when the edition number is used.

Annex A (normative)

CP 12/1 + CP 12/2 (EtherCAT™) specific installation profile

A.1 Installation profile scope

Addition:

This annex specifies the installation profile for Communication Profiles CP 12/1 and CP12/2 (EtherCAT™). The CP12/1 and CP12/2 are specified in IEC 61784-2.

A.2 Normative references

Addition:

IEC 61076-2-104, *Connectors for electronic equipment – Product requirements – Circular connectors – Detail specification for circular connectors with M8 screw-locking or snap-locking*

IEC 61076-2-114⁴, *Connectors for electronic equipment – Circular connectors – Detail specification for data and power connectors with M8 screw-locking*

A.3 Installation profile terms, definitions, and abbreviated terms

- A.3.1 Terms and definitions** <https://standards.iteh.ai/catalog/standards/sist/da357f60-f00c-41c4-b971-da1edd38ab2c/iec-61784-5-12-2018>
- A.3.2 Abbreviated terms** <https://standards.iteh.ai/catalog/standards/sist/da357f60-f00c-41c4-b971-da1edd38ab2c/iec-61784-5-12-2018>

A.3.3 Conventions for installation profiles

Not applicable.

A.4 Installation planning

A.4.1 General

- A.4.1.1 Objective**
- A.4.1.2 Cabling in industrial premises**
- A.4.1.3 The planning process**
- A.4.1.4 Specific requirements for CPs**

Not applicable.

⁴ Under preparation. Stage at the time of publication: IEC/CDV 61076-2-114:2017.

A.4.1.5 Specific requirements for generic cabling in accordance with ISO/IEC 11801-3**A.4.2 Planning requirements****A.4.2.1 Safety****A.4.2.1.1 General****A.4.2.1.2 Electric safety****A.4.2.1.3 Functional safety****A.4.2.1.4 Intrinsic safety**

Not applicable.

A.4.2.1.5 Safety of optical fibre communication systems**A.4.2.2 Security****A.4.2.3 Environmental considerations and EMC****A.4.2.3.1 Description methodology****A.4.2.3.2 Use of the described environment to produce a bill of material****A.4.2.4 Specific requirements for generic cabling in accordance with ISO/IEC 11801-3****A.4.3 Network capabilities****A.4.3.1 Network topology****A.4.3.1.1 Common description****A.4.3.1.2 Basic physical topologies for passive networks**

Not applicable.

A.4.3.1.3 Basic physical topologies for active networks

Addition:

Ring topologies shall be used when cable redundancy is required.

A.4.3.1.4 Combination of basic topologies

Replacement:

The combination of basic topologies is allowed according to A.4.3.1.5.

A.4.3.1.5 Specific requirements for CPs

Addition:

Slave devices with more than two ports shall be used to combine basic active topologies.

A.4.3.1.6 Specific requirements for generic cabling in accordance with ISO/IEC 11801-3

A.4.3.2 Network characteristics

A.4.3.2.1 General

A.4.3.2.2 Network characteristics for balanced cabling not based on Ethernet

Not applicable.

A.4.3.2.3 Network characteristics for balanced cabling based on Ethernet

Replacement:

Table A.1 provides values based on the template given in IEC 61918:2018, Table 2.

Table A.1 – Network characteristics for balanced cabling based on Ethernet

Characteristic	CP 12/1, CP12/2 (EtherCAT)
Supported data rates (Mbit/s)	100
Supported channel length (m) ^b	100
Number of connections in the channel (max.) ^{a b}	6
Patch cord length (m) ^a	100 (AWG22)
Channel class per ISO/IEC 11801-3 (min.) ^b	D
Cable category per ISO/IEC 11801-3 (min.) ^c	5
Connecting HW category per ISO/IEC 11801-3 (min.)	5
Cable types	No specific requirement; up to manufacturer's differentiation
^a See A.4.4.3.2. ^b For the purpose of this table, the channel definitions of ISO/IEC 11801-3 are applicable. ^c For additional information see IEC 61156 series.	

A.4.3.2.4 Network characteristics for optical fibre cabling

Replacement:

Table A.2 provides values based on the template given in IEC 61918:2018, Table 3.

Table A.2 – Network characteristics for optical fibre cabling

CP 12/1 and CP12/2		
Optical fibre type	Description	
Single mode silica	Bandwidth (MHz) or equivalent at λ (nm)	300 at 1 310
	Minimum length (m)	0
	Maximum length ^a (m)	14 000
	Maximum channel insertion loss/optical power budget (dB)	6 see IEEE 802.3 Clause 58 10 km specified
	Connecting hardware	See A.4.4.2.5
Multimode silica	Modal bandwidth (MHz × km) at λ (nm)	600 at 1 310
	Minimum length (m)	0
	Maximum length ^a (m)	2 000
	Maximum channel insertion loss/optical power budget (dB)	4,5
	Connecting hardware	See A.4.4.2.5
POF	Modal bandwidth (MHz × 100 m) at λ (nm)	35 at 650
	Minimum length (m)	0,055
	Maximum length ^a (m)	50
	Maximum channel insertion loss/optical power budget (dB)	4,2
	Connecting hardware	See A.4.4.2.5
Hard clad silica	Modal bandwidth (MHz × km) at λ (nm)	70 at 650
	Minimum length (m)	0
	Maximum length ^a (m)	100
	Maximum channel insertion loss/optical power budget (dB)	4
	Connecting hardware	See A.4.4.2.5
^a This value is reduced by connections, splices and bends in accordance with Formula (1) in 4.4.3.4.1 of IEC 61918:2018.		