IEC 61784-5-12

Edition 1.0 2010-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

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Withdrawn

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

IEC 61784-5-12:2010

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CONTENTS

FOREWORD 3
INTRODUCTION 5
1 Scope 6
2 Normative references 6
3 Terms, definitions and abbreviated terms 6
4 CPF 12: Overview of installation profiles 6
5 Installation profile conventions 6
6 Conformance to installation profiles 7
Annex A (Normative) CP 12/1 + CP 12/2 (EtherCAT™) specific installation profile 8

Figure 1 – Standards relationships 5

Table A.1 – Network characteristics for balanced cabling based on Ethernet 10
Table A.2 – Network characteristics for optical fibre cabling 11
Table A.3 –Information relevant to copper cable: CP12/1, CP12/2 fixed cables 12
Table A.4 – Information relevant to copper cable: CP12/1, CP12/2 flexible cables 13
Table A.5 –Information relevant to copper cable: CP12/1, CP12/2 special cables 13
Table A.6 – Information relevant to optical fibre cables 14
Table A.7 – Connectors for balanced cabling CPs based on Ethernet 15
Table A.8 – Optical fibre connecting hardware 15

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

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

FOREWORD

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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 standard is to be used in conjunction with IEC 61918:2010.

This bilingual version (2012-02) corresponds to the monolingual English version, published in 2010-07.

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

FDIS	Report on voting
65C/602/FDIS	65C/616/RVD

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

The French version of this standard has not been voted upon.

This publication 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 publication 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 publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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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 61918:2010 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/TR 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 61784-5-12 for CPF 12), allows readers to work with standards of a convenient size.

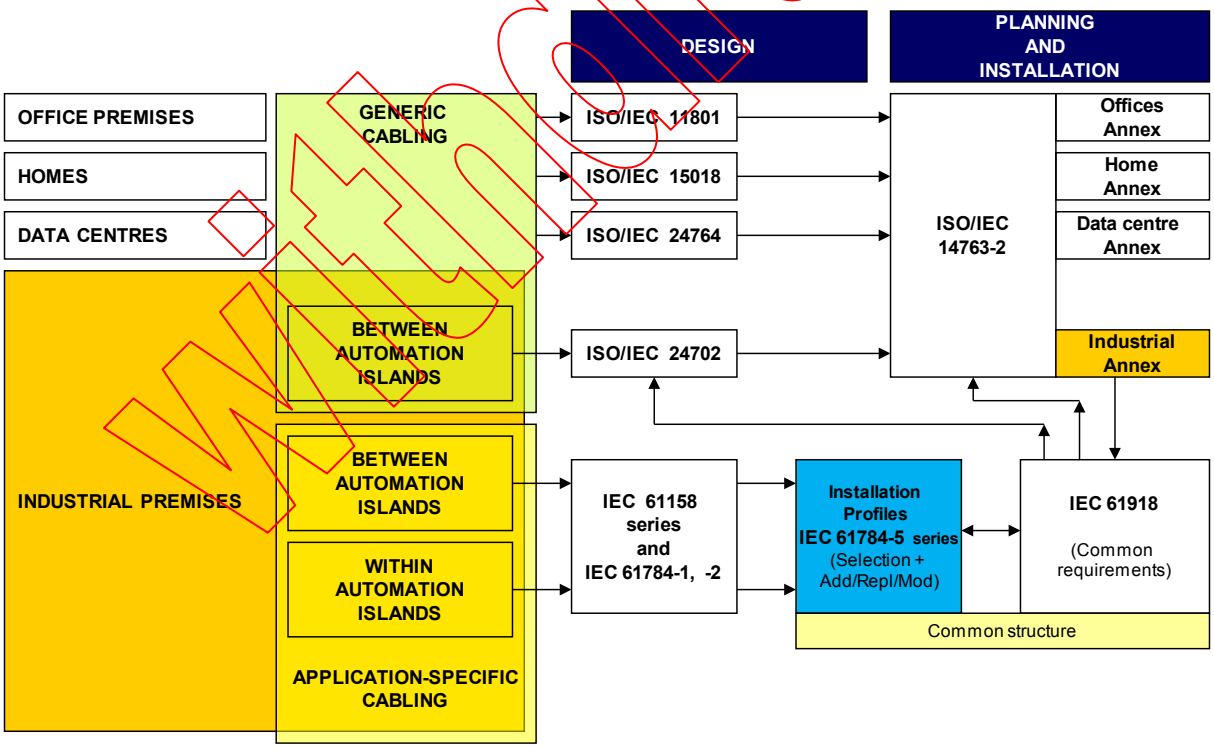

Figure 1 – Standards relationships

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INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

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

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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 61918:2010.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61918:2010 *Industrial communication networks – Installation of communication networks in industrial premises*

The normative references of IEC 61918:2010, Clause 2, apply. For profile specific normative references, see Clause A.2.

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms, definitions and abbreviated terms of IEC 61918:2010, Clause 3, apply.

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.

5 Installation profile conventions

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

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

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[1] EtherCAT™ is a trade name of Beckhoff, Verl. 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 profile does not require use of the trade name. Use of the trade name requires permission of the trade name holder.

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Where there is no corresponding subclause of IEC 61918:2010 in the normative annexes in this standard, 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 "Annex B.4.4" in IEC 61784-5-3 means that CP 3/2 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 standard includes part of IEC 61918:2010. It may also include defined additional specifications.

A statement of compliance to an installation profile of this standard shall be stated[2] as either

Compliance to IEC 61784-5-12:2010[3] for CP 12/m<name> or

Compliance to IEC 61784-5-12 (Ed.1.0) 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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2 In accordance with ISO/IEC Directives

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

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Annex A
(normative)

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

A.1 Installation profile scope

Addition:

This standard 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 61156-5, *Multicore and symmetrical pair/quad cables for digital communications - Part 5: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz - Horizontal floor wiring – Sectional specification*

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

A.3.1 Terms and definitions

A.3.2 Abbreviated terms

A.3.3 Conventions for installation profiles

Not applicable.

A.4 Installation planning

A.4.1 Introduction

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.

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A.4.1.5 Specific requirements for generic cabling in accordance with ISO/IEC 24702

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 24702

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.

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A.4.3.1.6 Specific requirements for generic cabling in accordance with ISO/IEC 24702

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 61918:2010, 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 24702 (min.) [b]	D
Cable category per ISO/IEC 24702 (min.) [c]	5
Connecting HW category per ISO/IEC 24702 (min.)	5
Cable types	No specific requirement; up to manufacturer's differentiation

[a] See 4.4.3.2.

[b] For the purpose of this table, the channel definitions of ISO/IEC 24702 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 IEC61918:2010, Table 3.

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Table A.2 – Network characteristics for optical fibre cabling

CP 12/1, CP12/2 (EtherCAT)		
Optical fibre type	**Description**	
Single mode silica	Standard	IEC 60793-2-50; Type B1
	Nominal transmission wavelength λ	1 310 nm
	Attenuation coefficient at λ	≤ 0,5 dB/km
	Cut off wavelength	< 1 260 nm
	Alternative description	
	Mode field diameter (μm)	9 … 10
	Cladding diameter (μm)	125
	Minimum length (m)	0
	Maximum length (m)	14 000
Multimode silica	Standard	IEC 60793-2-10; Type A1a, A1b
	Nominal transmission wavelength λ	1 310 nm
	Attenuation coefficient at λ	≤ 1,5 dB/km
	Modal bandwidth at λ	600 MHz × km
	Alternative description	
	Core diameter (μm)	50 (A1a), 62,5 (A1b)
	Cladding diameter (μm)	125
	NA	0,20 ± 0,02 or 0,23 ± 0,02 at 50/125 0,275 ± 0,02 at 62,5/125
	Minimum length (m)	0
	Maximum length (m)	2 000
POF	Standard	IEC 60793-2-40; Type A4a
	Nominal transmission wavelength λ	650 nm
	Attenuation coefficient at λ	≤ 160 dB/km
	Modal bandwidth at λ	35 MHz × 100m
	Alternative description	
	Core diameter (μm)	980
	Cladding diameter (μm)	1 000
	NA	0,5 ± 0,05
	Minimum length (m)	0
	Maximum length (m)	50

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CP 12/1, CP12/2 (EtherCAT)		
Optical fibre type	**Description**	
Plastic clad silica	Standard	IEC 60793-2-30; Type A3c
	Nominal transmission wavelength λ	650 nm
	Attenuation coefficient at λ	≤ 10 dB/km
	Modal bandwidth at λ	70 MHz × km
	Alternative description	
	Core diameter (μm)	200
	Cladding diameter (μm)	230
	NA	0,37 ± 0,04
	Minimum length (m)	0
	Maximum length (m)	100

A.4.3.2.5 Specific network characteristics

A.4.3.2.6 Specific requirements for generic cabling in accordance with ISO/IEC 24702

A.4.4 Selection and use of cabling components

A.4.4.1 Cable selection

A.4.4.1.1 Common description

A.4.4.1.2 Copper cables

A.4.4.1.2.1 Balanced cables for Ethernet based CPs

Replacement:

Table A.3, Table A.4 and Table A.5 provide values for different cable types based on the template given in IEC 61918:2010, Table 4.

Table A.3 –Information relevant to copper cable: CP12/1, CP12/2 fixed cables

Characteristic	CP 12/1, CP12/2 (EtherCAT) Type A cable
Nominal impedance of cable (tolerance)	100 Ω ± 15 Ω (IEC 61156-5)
Balanced or unbalanced	Balanced
DCR of conductors	≤ 115 Ω/km
DCR of shield	Tbd
Number of conductors	4
Shielding	S/FTP, S/FTQ, S/STP
Colour code for conductor	WH, BU / YE, OG
Jacket colour requirements	-
Jacket material	-
Resistance to harsh environment (e.g. UV, oil resist, LS0H)	Application dependent
Transfer Impedance	< 50 mΩ/m at 10 MHz
Installation Type	Stationary, no movement after installation

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