IEC 61784-5-11

Edition 2.0 2010-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Industrial communication networks – Profiles – Part 5-11: Installation of fieldbuses – Installation profiles for CPF 11

Réseaux de communication industriels – Profils – Partie 5-11: Installation de bus de terrain – Profils d'installation pour CPF 11

IEC 61784-5-11:2010

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INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 5-11: Installation of fieldbuses – Installation profiles for CPF 11

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International Standard IEC 61784-5-11 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 2007. This edition constitutes a technical revision.

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

– Addition of a new Annex B 8 (normative).

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.

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 communications 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- withdrawn,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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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 61784-5-11 for CPF 11), allows readers to work with standards of a convenient size.

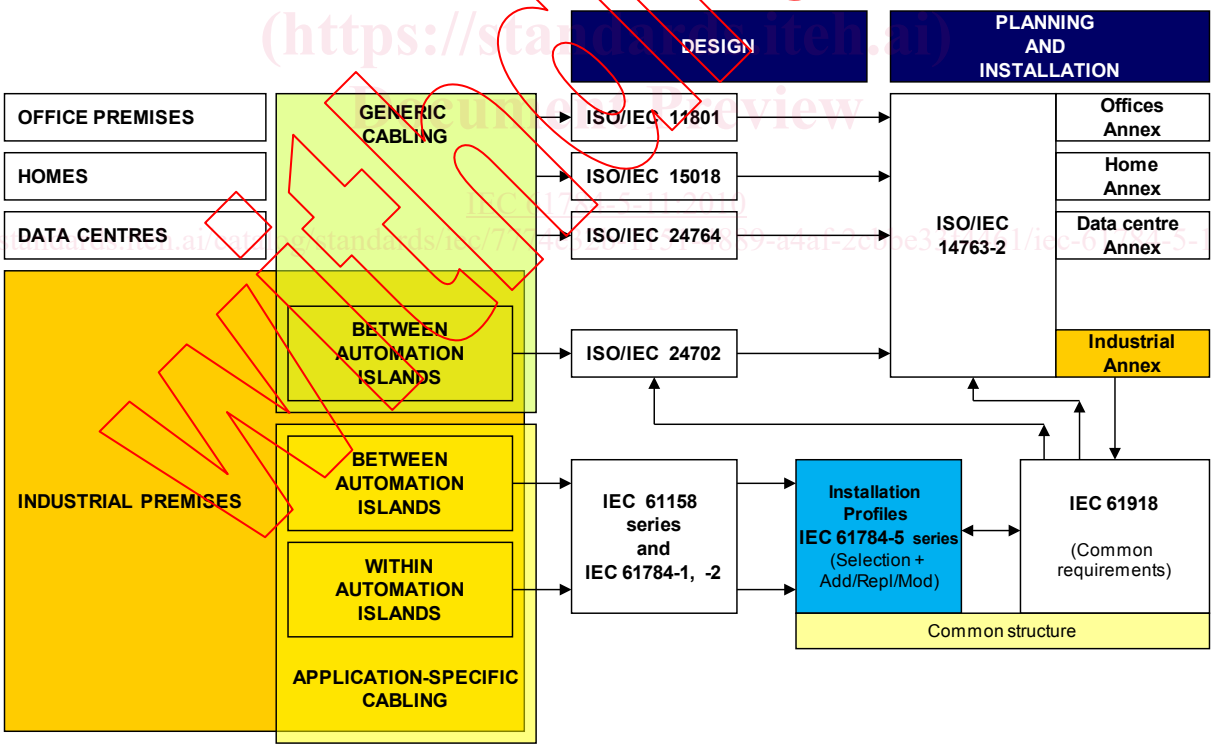

Figure 1 – Standards relationships

INDUSTRIAL COMMUNICATION NETWORKS – PROFILES –

Part 5-11: Installation of fieldbuses – Installation profiles for CPF 11

1 Scope

This part of IEC 61784 specifies the installation profiles for CPF 11 (TCnet[1]).

The installation profiles are specified in the annexes. These annexes are 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 11: Overview of installation profiles

CPF 11 consists of two communication profiles as specified in IEC 61784-2.

The installation requirements for CP 11/1 are specified in Annex A.

The installation requirements for CP 11/2 are specified in Annex B.

5 Installation profile conventions

The numbering of the clauses and subclauses in the annexes of this standard corresponds to the numbering of 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] TCnet is the technology name of the CPF11. TCnet is the trade name of TOSHIBA corporation, if used in Japan. 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.

Where there is no corresponding subclause of IEC 61918 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 A.4.4" in IEC 61784-5-11 means that CP 11/1 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 apply.

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 the 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 61784-5-11:2010[3] for CP 11/m <name> or

Compliance to IEC 61784-5-11 (Ed.2.0) for CP 11/m <name>

where the name within the angle brackets < > is optional and the angle brackets are not to be included. The m within CP 11/m shall be replaced by the profile number 1 to 2.

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

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.

Annex A
(normative)

CP 11/1 (TCnet) specific installation profile

A.1 Installation profile scope

Addition:

This standard specifies the installation profile for Communication Profile CP 11/1 (TCnet). The CP 11/1 is specified in IEC 61784-2.

A.2 Normative references

Addition:

IEC 61754-18:2001, *Fibre optic connector interfaces - Part 18: Type MT-RJ connector family*

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

Subclause 3.3 is not applicable.

A.4 Installation planning

A.4.1 Introduction

Subclause 4.1.4 is not applicable.

A.4.2 Planning requirements

A.4.2.1 Safety

Subclause 4.2.1.3 is not applicable.

Subclause 4.2.1.4 is not applicable.

A.4.2.2 Security

Not applicable.

A.4.2.3 Environmental considerations and EMC

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

Subclause 4.3.1.4 is not applicable.

Subclause 4.3.1.5 has addition:

Star topology applies to CP 11/1 network.

Switches shall not be used. Hubs shall be used instead.

Double star topology shall be used for redundancy.

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 11/1
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
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 requirement

[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 IEC 61918:2010, Table 3.

Table A.2 – Network characteristics for optical fibre cabling

CP 11/1		
Optical fibre type	**Description**	
Single mode silica	Standard	–
	Attenuation coefficient at λ	–
	Bandwidth or equivalent at λ	–
	Alternative description	
	Mode field diameter (μm)	–
	Outer diameter (μm)	–
	Minimum length (m)	–
	Maximum length (m)	–
Multimode silica	Standard	λ= 1 310 nm
	Attenuation coefficient at λ	1,0 dB/km
	Modal bandwidth (MHz × km) at λ	600 MHz × km
	Alternative description	
	Core diameter (μm)	50
	Outer diameter (μm)	125
	NA	0,21±0,02
	Minimum length (m)	0
	Maximum length (m)	2 000
Multimode silica	Standard	λ= 1 310 nm
	Attenuation coefficient at λ	1,5 dB/km
	Modal bandwidth (MHz × km) at λ	500 MHz × km
	Alternative description	
	Core diameter (μm)	62,5
	Outer diameter (μm)	125
	NA	0,275±0,02
	Minimum length (m)	0
	Maximum length (m)	2 000
POF	Standard	–
	Attenuation coefficient at λ	–
	Modal bandwidth (MHz × km) at λ	–
	Alternative description	
	Core diameter (μm)	–
	Outer diameter (μm)	–
	NA	–
	Minimum length (m)	–
	Maximum length (m)	–
Hard clad silica	Standard	–
	Attenuation coefficient at λ	–
	Modal bandwidth (MHz × km) at λ	–
	Alternative description	
	Core diameter (μm)	–
	Outer diameter (μm)	–
	NA	–
	Minimum length (m)	–
	Maximum length (m)	–

A.4.3.2.5 Specific network characteristics

Not applicable.

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 provides values based on the template given in IEC 61918:2010, Table 4.

Table A.3 – Information relevant to copper cable: fixed cables

Characteristic	CP 11/1
Nominal impedance of cable (tolerance)	100 Ω ± 15 Ω
DCR of conductors	< 9,38 Ω /100m
DCR of shield	Not defined
Number of conductors	8
Shielding	Yes
Colour code for conductor	WH/OG, OG, WH/GN, BU, WH/BU, GN, WH/BN, BN
Jacket colour requirements	No requirement
Jacket material	No requirement
Resistance to harsh environment (e.g. UV, oil resist, LS0H)	No requirement
Agency ratings	No requirement

Replacement: Table A.4 provides values based on the template given in IEC 61918:2010, Table 5.

Table A.4 – Information relevant to copper cable: cords

Characteristic	CP 11/1
Nominal impedance of cable (tolerance)	100 Ω +/- 15 Ω
DCR of conductors	< 9,38 Ω/100m
DCR of shield	Not defined
Number of conductors	8
Length	100m
Shielding	Yes
Colour code for conductor	WH/OG, OG, WH/GN, BU, WH/BU, GN, WH/BN, BN
Jacket colour requirements	No requirement
Jacket material	No requirement
Resistance to harsh environment (e.g. UV, oil resist, LS0H)	No requirement
Agency ratings	No requirement

A.4.4.1.2.2 Copper cables for non Ethernet based CPs

Not applicable.

A.4.4.1.3 Cables for wireless installation

Not applicable.

A.4.4.1.4 Optical fibre cables

Replacement: Table A.5 provides values based on the template given in IEC 61918:2010, Table 6.

Table A.5 – 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
Attenuation per km (650 nm)	–	–	–	–	–
Attenuation per km (820 nm)	–	–	–	–	–
Attenuation per km (1 310 nm)	–	1,0 dB/km	1,5 dB/km	–	–
Number of optical fibres	–	2	2	–	–
Connector type (e.g. duplex or simplex)	–	MT–RJ, SC Duplex	MT–RJ, SC Duplex	–	–
Jacket colour requirements	–	No requirement	No requirement	–	–
Jacket material	–	No requirement	No requirement	–	–
Resistance to harsh environment (e.g. UV, oil resist, LS0H)	–	No requirement	No requirement	–	–
Breakout (Y/N)	–	Yes	Yes	–	–

A.4.4.1.5 Special purpose balanced and optical fibre cables

A.4.4.1.6 Specific requirements for CPs

Not applicable.

A.4.4.1.7 Specific requirements for generic cabling in accordance with ISO/IEC 24702

A.4.4.2 Connecting hardware selection

A.4.4.2.1 Common description

A.4.4.2.2 Connecting hardware for balanced cabling CPs based on Ethernet

Replacement: Table A.6 provides values based on the template given in IEC 61918:2010, Table 7.