SVENSK STANDARD SS-EN 61918

Fastställd	Utgåva	Sida	Ansvarig kommitté
2009-02-23	1	1 (1+155)	SEK TK 65

Industriell processtyrning – Installation av nät för informationsöverföring

Industrial communication networks – Installation of communication networks in industrial premises

Som svensk standard gäller europastandarden EN 61918:2008. Den svenska standarden innehåller den officiella engelska språkversionen av EN 61918:2008.

Nationellt förord

Europastandarden EN 61918:2008

består av:

– **europastandardens ikraftsättningsdokument,** utarbetat inom CENELEC
– **IEC 61918, First edition, 2007 - Industrial communication networks - Installation of communication networks in industrial premises**

utarbetad inom International Electrotechnical Commission, IEC.

Vid installation av generella kabelnät enligt SS-EN 50173-3 ska standarden användas tillsammans med standarder i serien SS-EN 50174 och, när det gäller installation av fältbussar, även tillsammans med standarder i serien SS-EN 61784-5.

ICS 35.110; 25.040.40; 33.180

Denna standard är fastställd av SEK Svensk Elstandard,
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Du som vill dra nytta av dessa möjligheter är välkommen att kontakta SEKs kansli för mer information.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61918

May 2008

ICS 35.110; 25.040.40; 33.180; 22.060

English version

Industrial communication networks - Installation of communication networks in industrial premises

(IEC 61918:2007, modified)

Réseaux de communication industriels - Installation des réseaux de communication dans les locaux industriels (CEI 61918:2007, modifiée)

Industrielle Kommunikationsnetze - Installation von Kommunikationsnetzen in Industrieanlagen (IEC 61918:2007, modifiziert)

CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Ref. No. EN 61918:2008 E

SEK Svensk Elstandard

Foreword

The text of the International Standard IEC 61918:2007, prepared by SC 65C, Industrial networks, of IEC TC 65, Industrial-process measurement, control and automation, together with common modifications agreed between the Technical Committees CENELEC TC 65CX, Fieldbus, and CENELEC TC 215, Electrotechnical aspects of telecommunication equipment, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 61918 on 2008-03-01.

This standard is to be used in conjunction with EN 61784-5 series with regard to the installation of communication profiles (CPs) and with series EN 50174 with regard to the installation of generic cabling in accordance with EN 50173-3.

IEC 61918 was developed in cooperation with ISO/IEC JTC1/SC 25 which is responsible for ISO/IEC 24702.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2009-03-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2011-03-01

Annex ZA has been added by CENELEC.

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Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Where a standard cited below belongs to the EN 50000 series, the European Standard applies instead of the relevant International Standard.

Publication	Year	Title	EN/HD	Year
-	-	Connector sets and interconnect components to be used in optical fibre communication systems - Product specifications - Part 6-1: Type SC-RJ terminated on IEC 60793-2 category A1a and A1b multimode fibre	EN 50377-6-1	-[1)]
-	-	Sectional specification: Radio frequency coaxial connectors - Series BNC	EN 122120	-[1)]
IEC 60079-14	-[1)]	Explosive atmospheres - Part 14: Electrical installations design, selection and erection	EN 60079-14	200X[2)]
IEC 60364-1 (mod)	2005	Low-voltage electrical installations - Part 1: Fundamental principles, assessment of general characteristics, definitions	HD 60364-1	2008
IEC 60364-4-41 (mod)	-[1)]	Low-voltage electrical installations - Part 4-41: Protection for safety - Protection against electric shock	HD 60364-4-41 + corr. July	2007[3)] 2007
IEC 60364-4-44	-[1)]	Low-voltage electrical installations - Part 4-44: Protection for safety - Protection against voltage disturbances and electromagnetic disturbances	-	-
IEC 60364-5-54 (mod)	-[1)]	Electrical installations of buildings - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements, protective conductors and protective bonding conductors	HD 60364-5-54	2007[3)]
IEC 60603-7	Series	Connectors for electronic equipment - Part 7: Detail specification for 8-way, shielded free and fixed connectors with common mating features, with assessed quality	EN 60603-7	Series
IEC 60757	-[1)]	Code for designation of colours	HD 457 S1	1985[3)]
IEC 60793	Series	Optical fibres	EN 60793	Series
IEC 60794	Series	Optical fibre cables	EN 60794	Series

[1)] Undated reference.

[2)] To be published.

[3)] Valid edition at date of issue.

Publication	Year	Title	EN/HD	Year
IEC 60807-2	-[1)]	Rectangular connectors for frequencies below 3 MHz - Part 2: Detail specification for a range of connectors, with assesed quality, with trapezoidal shaped metal shells and round contacts - Fixed solder contact types	-	-
IEC 60807-3	-[1)]	Rectangular connectors for frequencies below 3 MHz - Part 3: Detail specification for a range of connectors with trapezoidal shaped metal shells and round contacts - Removable crimp types with closed crimp barrels, rear insertion/rear extraction	-	-
IEC 60825-2	-[1)]	Safety of laser products - Part 2: Safety of optical fibre communication systems (OFCS)	EN 60825-2	2004[3)]
IEC 60874-10	Series	Connectors for optical fibres and cables - Part 10: Detail specification for fibre optic connector type BFOC/2,5 terminated to multimode fibre type A1	-	-
IEC 60874-14	Series	Connectors for optical fibres and cables - Part 14: Detail specification for fibre optic connector type SC/PC standard terminated to multimode fibre type A1a, A1b	-	-
IEC 60947-5-2	-[1)]	Low-voltage switchgear and controlgear - Part 5-2: Control circuit devices and switching elements - Proximity switches	EN 60947-5-2	2007[3)]
IEC 60950-1 (mod)	2005	Information technology equipment - Safety - Part 1: General requirements	EN 60950-1	2006
IEC 61076-2-101	200X[2)]	Connectors for electronic equipment - Product requirements - Part 2-101: Circular connectors - Detail specification for M12 connectors with screw-locking	-	-
IEC 61076-3-106	-[1)]	Connectors for electronic equipment - Product requirements - Part 3-106: Rectangular connectors - Detail specification for protective housings for use with 8-way shielded and unshielded connectors for industrial environments incorporating the IEC 60603-7 series interface	EN 61076-3-106	2006[3)]
IEC 61076-3-117	200X[2)]	Connectors for electronic equipment - Product requirements - Part 3-117: Rectangular connectors - Detail specification for protective housings for use with 8-way shielded and unshielded connectors for industrial environments incorporating the IEC 60603-7 series interface - Variant 14 related to IEC 61076-3-106 - Push pull coupling	-	-
IEC 61158-2	-[1)]	Industrial communication networks - Fieldbus specifications - Part 2: Physical layer specification and service definition	EN 61158-2	2008[3)]

Publication	Year	Title	EN/HD	Year
IEC 61754-2	-[1)]	Fibre optic connector interfaces - Part 2: Type BFOC/2,5 connector family	EN 61754-2	1997[3)]
IEC 61754-4	-[1)]	Fibre optic connector interfaces - Part 4: Type SC connector family	EN 61754-4	1997[3)]
IEC 61754-20	-[1)]	Fibre optic connector interfaces - Part 20: Type LC connector family	EN 61754-20	2002[3)]
IEC 61754-22	-[1)]	Fibre optic connector interfaces - Part 22: Type F-SMA connector family	EN 61754-22	2005[3)]
IEC 61784-1	-[1)]	Industrial communication networks - Profiles - Part 1: Fieldbus profiles	EN 61784-1	2008[3)]
IEC 61784-2	-[1)]	Industrial communication networks - Profiles - Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3	EN 61784-2	2008[3)]
IEC 61784-3	-[1)]	Industrial communication networks - Profiles - Part 3: Functional safety fieldbuses - General rules and profile definitions	EN 61784-3	2008[3)]
IEC 61784-4	200X[4)]	Industrial communication networks - Profiles - Part 4: Profiles for secure communications in industrial networks	-	-
IEC 61784-5-2	-[1)]	Industrial communication networks - Profiles - Part 5-2: Installation of fieldbuses - Installation profiles for CPF 2	EN 61784-5-2	2008[3)]
IEC 61784-5-3	-[1)]	Industrial communication networks - Profiles - Part 5-3: Installation of fieldbuses - Installation profiles for CPF 3	EN 61784-5-3	2008[3)]
IEC 61784-5-6	-[1)]	Industrial communication networks - Profiles - Part 5-6: Installation of fieldbuses - Installation profiles for CPF 6	EN 61784-5-6	2008[3)]
IEC 61784-5-10	-[1)]	Industrial communication networks - Profiles - Part 5-10: Installation of fieldbuses - Installation profiles for CPF 10	EN 61784-5-10	2008[3)]
IEC 61784-5-11	-[1)]	Industrial communication networks - Profiles - Part 5-11: Installation of fieldbuses - Installation profiles for CPF 11	EN 61784-5-11	2008[3)]
IEC 61935-1 (mod)	2005	Testing of balanced communication cabling in accordance with ISO/IEC 11801 - Part 1: Installed cabling [5)]	EN 61935-1	2005
IEC 62439	200X[2)]	High availability automation networks	-	-
IEC 62443	200X[4)]	Security for industrial process measurement and control - Network and system security	-	-
ISO/IEC 8802-3	-[1)]	Information technology - Telecommunications and information exchange between systems - Local and metropolitan area networks - Specific requirements - Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications	-	-

[4)] In preparation.

[5)] The title of EN 61935-1 is: *Testing of balanced communication cabling in accordance with standards series EN 50173 - Part 1: Installed cabling.*

Publication	Year	Title	EN/HD	Year
ISO/IEC 11801	2002	Information technology - Generic cabling for customer premises	EN 50173-1[6] and EN 50173-2[7]	2007 2007
ISO/IEC 14763-1	-[1]	Information technology - Implementation and operation of customer premises cabling - Part 1: Administration	-	
ISO/IEC/TR 14763-2	-[1]	Information technology - Implementation and operation of customer premises cabling - Part 2: Planning and installation	EN 50174-2[8]	-[1]
ISO/IEC 14763-3	-[1]	Information technology - Implementation and operation of customer premises cabling - Part 3: Testing of optical fibre cabling	-	-
ISO/IEC 18010	-[1]	Information technology - Pathways and spaces for customer premises cabling	EN 50174-1[9] and EN 50174-2	-[1]
ISO/IEC 24702	2006	Information technology - Generic cabling- Industrial premises	EN 50173-1 and EN 50173-3[10]	2007 2007
ANSI/NFPA T3.5.29 R1	2003	Fluid power systems and components - Electrically-controlled industrial valves - Interface dimensions for electrical connectors	-	-

[6] The title of EN 50173-1 is: *Information technology - Generic cabling systems – Part 1: General requirements.*

[7] The title of EN 50173-2 is: *Information technology - Generic cabling systems – Part 2: Office premises.*

[8] The title of EN 50174-2 is: *Information technology - Cabling installation - Part 2: Installation planning and practices inside buildings.*

[9] The title of EN 50174-1 is: *Information technology - Cabling installation - Part 1: Installation specification and quality assurance.*

[10] The title of EN 50173-3 is: *Information technology - Generic cabling systems - Part 3: Industrial premises.*

CONTENTS

INTRODUCTION

Process and factory automation are increasingly relying on communication networks and fieldbuses that are inherently designed to cope with the specific environmental conditions of the industrial premises. The networks and fieldbuses provide for an effective integration of applications among the several functional units of the plant/factory. As a result the integration of field generated data with higher-level management systems can produce reduction in production costs while maintaining or increasing quantity and quality of production. A correct network installation is an important prerequisite for communications availability and performance. This requires proper consideration of important aspects of industrial automation sites such as topologies, climatic conditions, vibrations, chemical pollution, EMC, functional safety.

The specifications of these communication networks are provided in the following standards.

ISO/IEC 24702 specifies design of generic telecommunications infrastructures within industrial premises and provides the foundations for some of the transmission performance specifications of this standard. ISO/IEC 24702 specifies only the raw bandwidth capability of a channel; it does not specify useful data transfer rate for a specific network using that channel or expected errors after taking account of interference during the communication process.

IEC 61158 fieldbus standard and its companion standard IEC 61784 (including parts 1, 2, 3, 4 and relevant subparts) jointly specify several CPs suitable for industrial automation. These CPs specify a raw bandwidth capability and in addition, they specify bit modulation and encoding rules for their fieldbus. Some profiles also specify target levels for useful data transfer rate, and maximum values for errors caused by interference during the communication process.

This standard provides a consistent set of installation rules for both the generic cabling (of the telecommunication infrastructures) and the fieldbuses in industrial premises. One of the problems it seeks to solve is the situation created when different parts of a large automation site are provided by suppliers that use non-homogeneous installation guidelines having different structures and contents. This creates a risk that communication system may not work properly.

This standard was developed by harmonising the approaches of several user groups and industrial consortia.

This standard provides a common point of reference for the installation of the media of most used industrial communication networks for most industrial sites. The standard covers the life cycle of an installation in the following clauses (see the map of the standard in Figure 1):

— Clause 4: Installation planning;

— Clause 5: Installation implementation;

— Clause 6: Installation verification and acceptance test;

— Clause 7: Installation administration;

— Clause 8: Installation maintenance and troubleshooting.

The methods described in these clauses are written in such a way as to provide installation guidance for a wide range of technician skills.

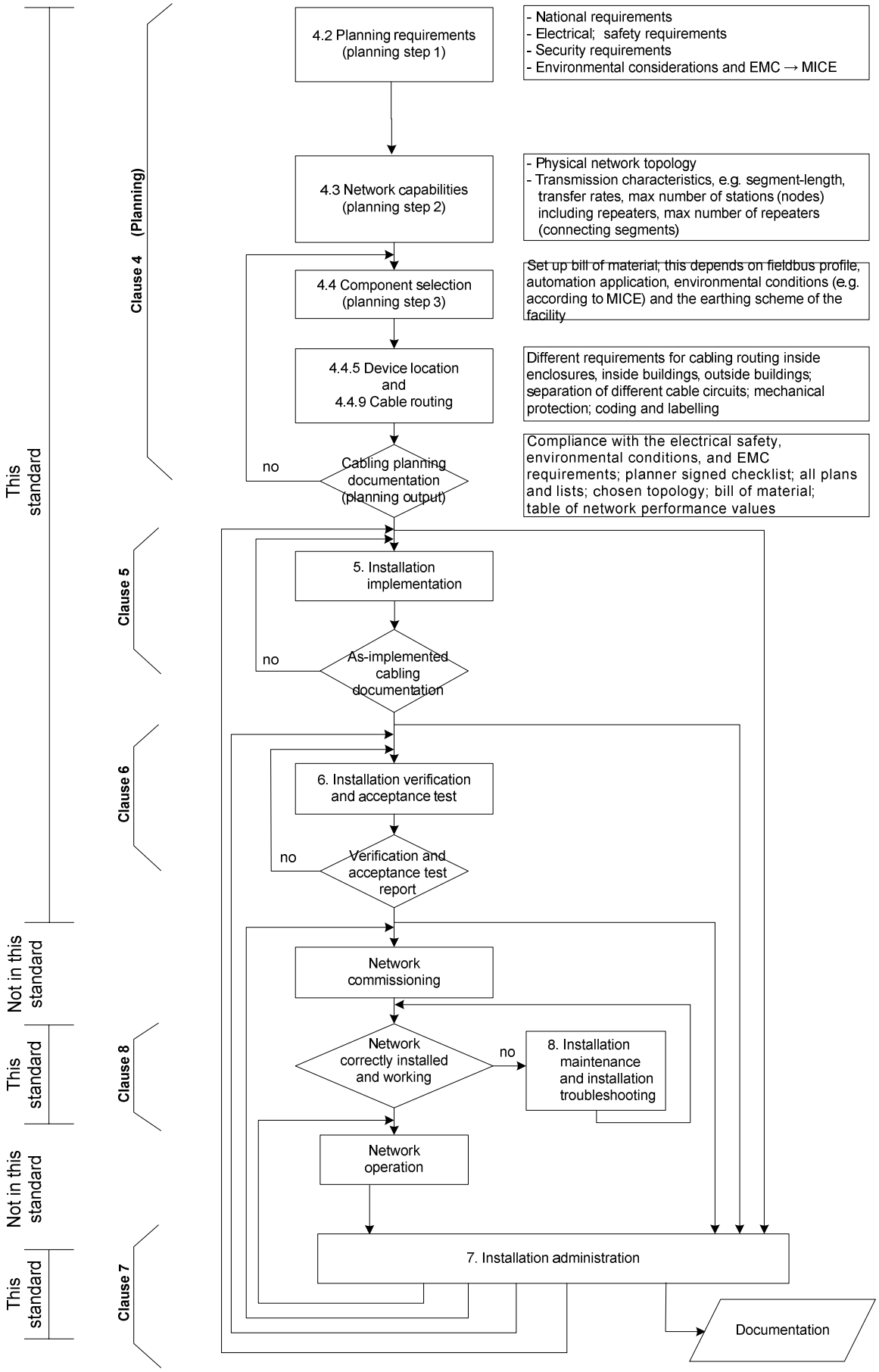

Figure 1 – Industrial network installation life cycle

For each communication system, this standard is to be used in conjunction with the relevant installation profile that establishes which selections, additions and replacements of the subclauses of this standard apply.

As regards the communication profiles (CPs) of the communication profile families (CPF) defined in IEC 61784 series, the relevant installation profiles are available in IEC 61784-5-x series, where x is the number of CPF x. IEC/TR 61158-1 describes the relationship between the fieldbus and the CPs and the relevant installation profiles (see Figure 2).

For the installation of generic cabling, this standard is to be used in conjunction with ISO/IEC 14763-2 (see Figure 2).

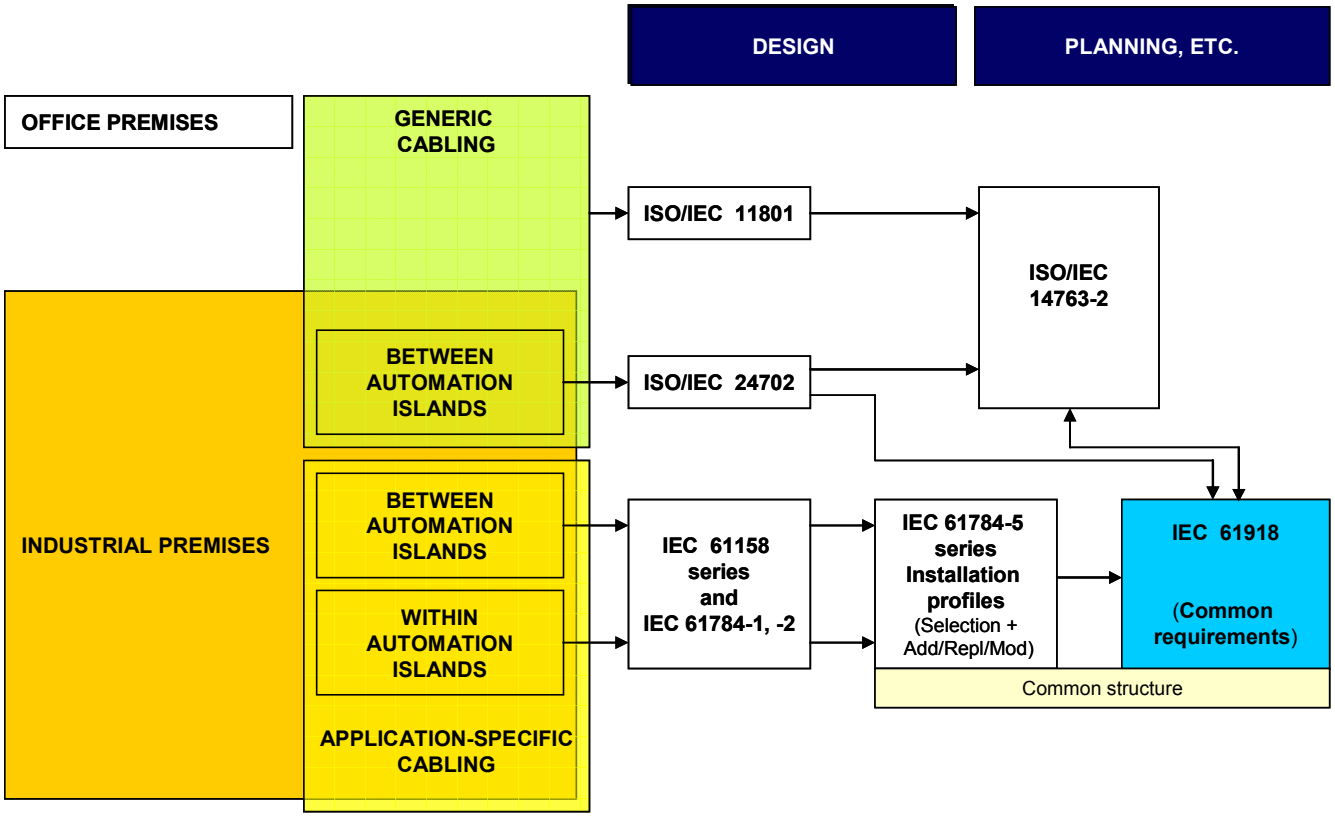

Figure 2 – Standards relationships

INDUSTRIAL COMMUNICATION NETWORKS –

Installation of communication networks in industrial premises

1 Scope

This International Standard specifies basic requirements for the installation of media for communication networks in industrial premises and within and between the automation islands, of industrial sites. This standard covers balanced and optical fibre cabling. It also covers the cabling infrastructure for wireless media, but not the wireless media itself. Additional media are covered in IEC 61784-5 series.

This standard is a companion standard to the communication networks of the industrial automation islands and especially to the communication networks specified in the IEC 61158 series and the IEC 61784 series. In addition, this standard covers:

- the installation of generic telecommunication cabling for industrial premises as specified in ISO/IEC 24702;
- the connection between the generic telecommunications cabling specified in ISO/IEC 24702 and the specific communication cabling of an automation island, where an automation outlet (AO) replaces the telecommunication outlet (TO) of ISO/IEC 24702.

NOTE If the interface used at the AO does not conform to that specified for the TO of ISO/IEC 24702, the cabling no longer conforms to ISO/IEC 24702 although certain features, including performance, of generic cabling may be retained.

This standard provides guidelines that cope with the critical aspects of the industrial automation area (topologies, climatic conditions, vibrations, chemical pollution, EMC, functional safety, security, etc.).

This standard deals with the roles of planner, installer, verifier, and acceptance test personnel, administration and maintenance personnel and specifies the relevant responsibilities and/or gives guidance.

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 60079-14, *Electrical apparatus for explosive gas atmospheres – Part 14: Electrical installations in hazardous areas (other than mines)*

IEC 60364-1:2005, Low voltage *electrical installations – Part 1: Fundamental principles, assessment of general characteristics, definitions*

IEC 60364-4-41, *Low voltage electrical installations – Part 4-41: Protection for safety – Protection against electric shock*

IEC 60364-4-44, *Electrical installations of buildings – Part 4-44: Protection for safety – Protection against voltage disturbances and electromagnetic disturbances*

IEC 60364-5-54, *Electrical installations of buildings – Part 5-54: Selection and erection of electrical equipment – Earthing arrangements, protective conductors and protective bonding conductors*

IEC 60603-7 (all subparts), *Connectors for frequencies below 3 MHz for use with printed boards – Part 7: Detail specification for connectors, 8-way, including fixed and free connectors with common mating features, with assessed quality*

IEC 60757, *Code for designation of colours*

IEC 60793 (all parts), *Optical fibres*

IEC 60794 (all parts), *Optical fibre cables*

IEC 60807-2, *Rectangular connectors for frequencies below 3 MHz – Part 2: Detail specification for a range of connectors, with assessed quality, with trapezoidal shaped metal shells and round contacts – Fixed solder contact types*

IEC 60807-3, *Rectangular connectors for frequencies below 3 MHz – Part 3: Detail specification for a range of connectors with trapezoidal shaped metal shells and round contacts – Removable crimp contact types with closed crimp barrels, rear insertion/rear extraction*

IEC 60825-2, *Safety of laser products – Part 2: Safety of optical fibre communication systems (OFCS)*

IEC 60874-10 (all subparts), *Connectors for optical fibres and cables – Part 10: Detail specification for fibre optic connector type BFOC/2,5 terminated to multimode fibre type A1*

IEC 60874-14 (all subparts), *Connectors for optical fibres and cables – Part 14: Detail specification for fibre optic connector type SC/PC standard terminated to multimode fibre type A1a, A1b*

IEC 60947-5-2, *Low-voltage switchgear and controlgear – Part 5-2: Control circuit devices and switching elements – Proximity switches*

IEC 60950-1:2005, *Information technology equipment – Safety – Part 1: General requirements*

IEC 61076-2-101, *Connectors for electronic equipment – Product requirements – Part 2-101: Detail specification for circular connectors M12 with screw-locking*[1]

IEC 61076-3-106, *Connectors for electronic equipment – Product requirements – Part 3-106: Rectangular connectors – Detail specification for protective housings for use with 8-way shielded and unshielded connectors for industrial environments incorporating the IEC 60603-7 series interface*

IEC/PAS 61076-3-117, *Connectors for electronic equipment - Product requirements – Part 3-117: Rectangular connectors – Protective housings for use with 8-way shielded and unshielded connectors for frequencies up to 600 MHz for industrial environments incorporating IEC 60603-7*

IEC 61158-2, *Industrial communication networks – Fieldbus specifications – Part 2: Physical layer specification and service definition*

IEC 61754-2, *Fibre optic connector interfaces – Part 2: Type BFOC/2,5 connector family*

IEC 61754-4, *Fibre optic connector interfaces – Part 4: Type SC connector family*

IEC 61754-20, *Fibre optic connector interfaces – Part 20: Type LC connector family*

IEC 61754-22, *Fibre optic connector interfaces – Part 22: Type F-SMA connector family*

IEC 61784-1, *Industrial communication networks – Profiles – Part 1: Fieldbus profiles*

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[1] To be published.

IEC 61784-2, *Industrial communication networks – Profiles – Part 2: Additional fieldbus profiles for real-time networks based on ISO/IEC 8802-3*

IEC 61784-3, *Industrial communication networks – Profiles – Part 3: Functional safety fieldbuses – General rules and profile definitions*

IEC 61784-4, *Industrial communication networks – Profiles – Part 4: Profiles for secure communications in industrial networks* (in preparation)

IEC 61784-5 series, *Industrial communication networks – Profiles –*

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

Part 5-3: Installation of fieldbuses – Installation profiles for CPF 3

Part 5-6: Installation of fieldbuses – Installation profiles for CPF 6

Part 5-10: Installation of fieldbuses – Installation profiles for CPF 10

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

IEC 61935-1:2005, *Testing of balanced communication cabling in accordance with ISO/IEC 11801 – Part 1: Installed cabling*

IEC 62439, *Industrial communication networks – High availability automation networks*[1]

IEC 62443, *Security for industrial process measurement and control – Network and system security* (in preparation)

ISO/IEC 8802-3, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area networks – Specific requirements – Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications*

ISO/IEC 11801:2002, *Information technology – Generic cabling for customer premises*

ISO/IEC 14763-1, *Information technology – Implementation and operation of customer premises cabling – Part 1: Administration*

ISO/IEC 14763-2, *Information technology – Implementation and operation of customer premises cabling – Part 2: Planning and installation*

ISO/IEC 14763-3, *Information technology – Implementation and operation of customer premises cabling – Part 3: Testing of optical fibre cabling*

ISO/IEC 18010, *Information technology – Pathways and spaces for customer premises cabling*

ISO/IEC 24702:2006, *Information technology – Generic cabling – Industrial premises*

EN 50377-6-1, *Connector sets and interconnect components to be used in optical fibre communication systems, Product specifications, Part 6-1: Type SC-RJ terminated on IEC 60793-2 category A1a and A1b multimode fibre*

EN 122120, *Sectional specification: Radio frequency coaxial connectors series TNC*

ANSI/NFPA T3.5.29 R1-2003, *Fluid power systems and components – Electrically-controlled industrial valves – Interface dimensions for electrical connectors*