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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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INDUSTRIAL COMMUNICATION NETWORKS –

Installation of communication networks in industrial premises

FOREWORD

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International Standard IEC 61918 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 the IEC 61784-5 series with regard to the installation of communication profiles (CPs). This standard is to be used in conjunction with ISO/IEC 14763-2 with regard to the installation of generic cabling in accordance with ISO/IEC 24702.

NOTE For further information, see the Introduction.

This standard was developed in cooperation with ISO/IEC JTC1/SC25 which is responsible for ISO/IEC 24702.

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

FDIS	Report on voting
65C/467/FDIS	65C/478/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.

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

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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- withdrawn;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.

The contents of the corrigendum of February 2009 have been included in this copy.

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.

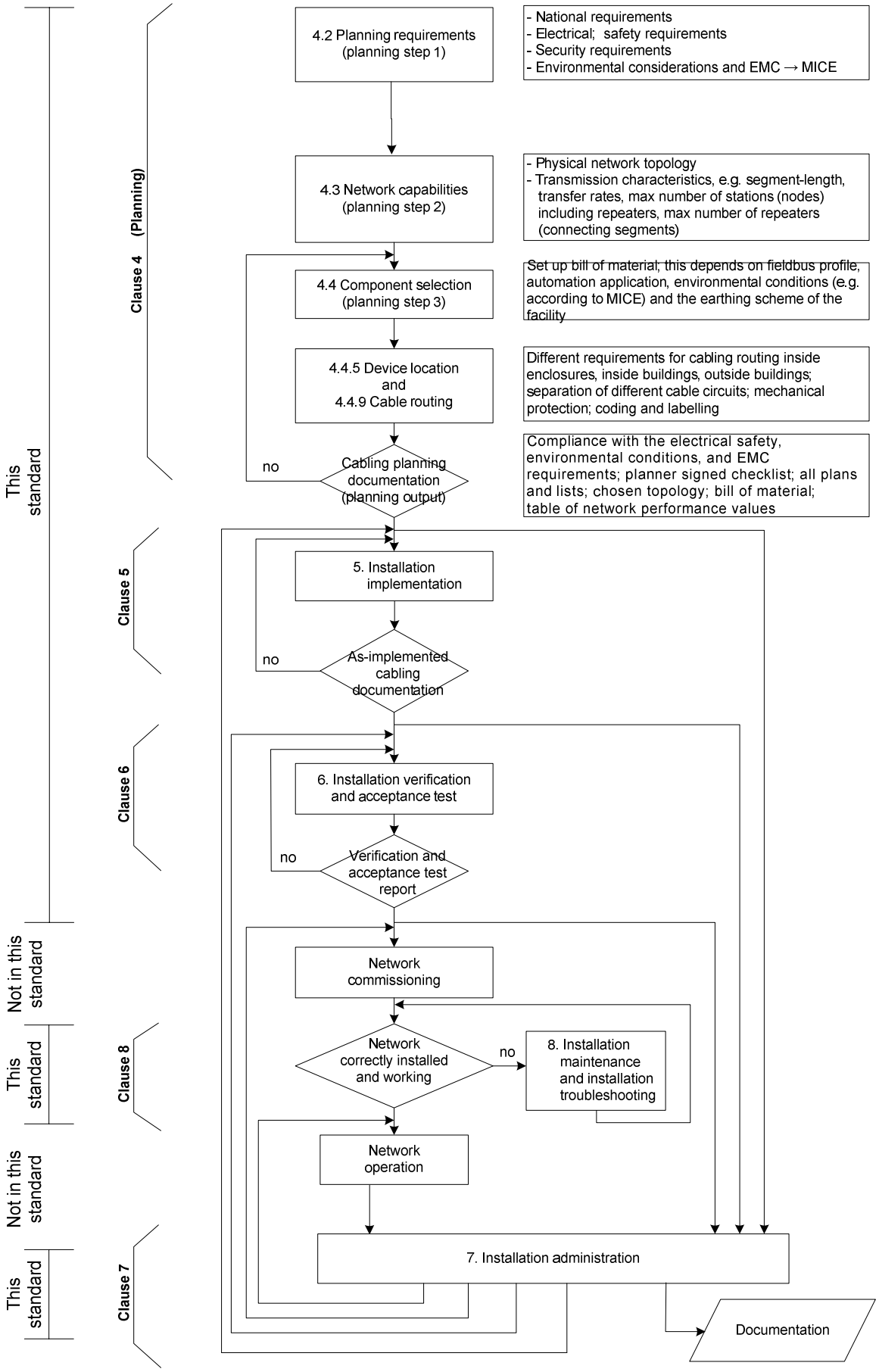

Figure 1 – Industrial network installation life cycle

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).

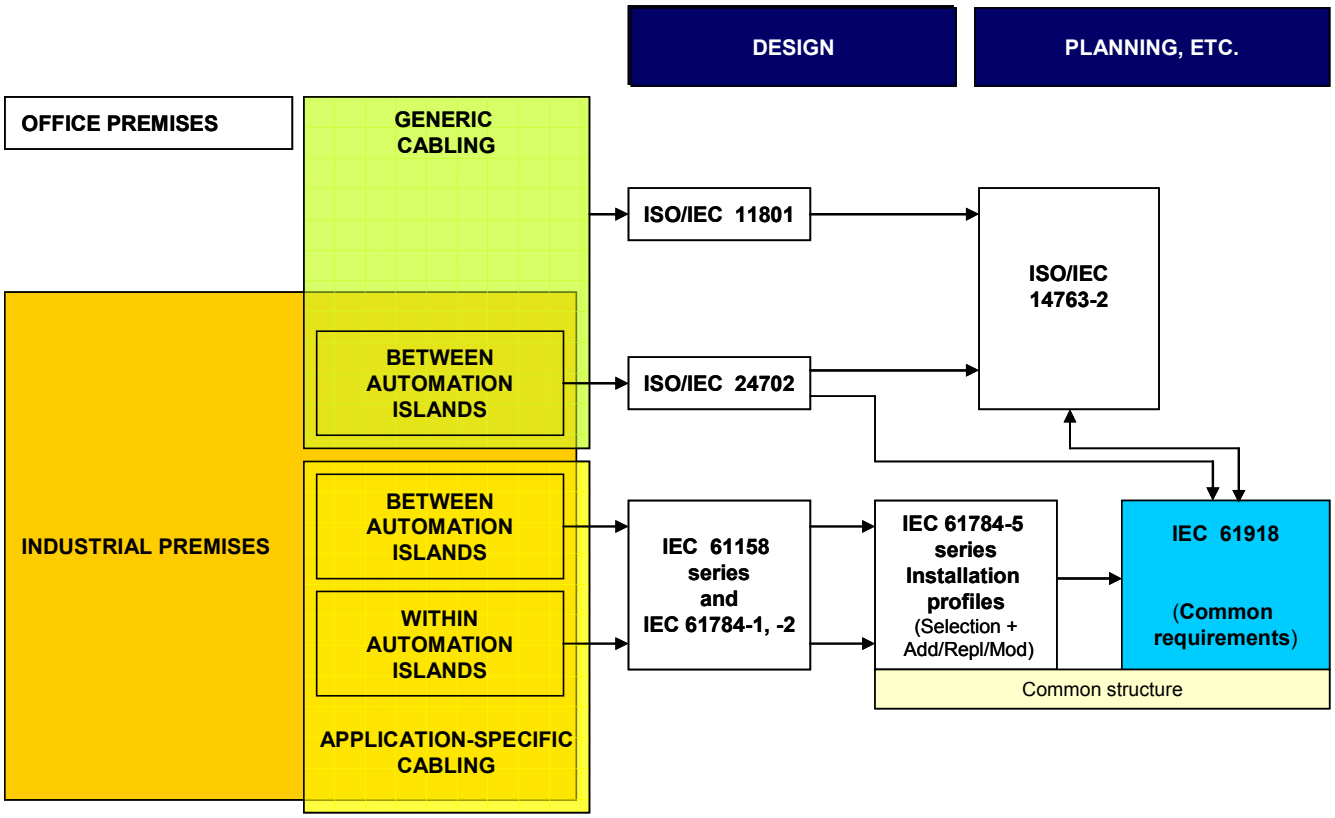

Figure 2 – Standards relationships

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*