

This is a preview - click here to buy the full publication



ISO/IEC 14763-2

Edition 1.1 2015-09

CONSOLIDATED VERSION



**Information technology – Implementation and operation of customer premises
cabling –
Part 2: Planning and installation**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 35.200

ISBN 978-2-8322-2906-4

Warning! Make sure that you obtained this publication from an authorized distributor.



REDLINE VERSION



**Information technology – Implementation and operation of customer premises cabling –
Part 2: Planning and installation**



CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	13
2 Normative references	14
3 Terms, definitions and abbreviations	15
3.1 Terms and definitions	15
3.2 Abbreviations	22
3.3 Conventions	22
4 Conformance.....	22
5 Specification of installations	23
5.1 General.....	23
5.2 Installation specification	24
5.2.1 Requirements	24
5.2.2 Recommendations	25
5.3 Technical specification	25
5.3.1 General	25
5.3.2 Safety requirements	26
5.3.3 Security requirements.....	26
5.3.4 Performance and configuration – Requirements.....	26
5.3.5 Environmental conditions.....	27
5.4 Scope of work	27
5.4.1 Pre-installation	27
5.4.2 Installation.....	28
5.4.3 Post-installation.....	29
5.5 Quality assurance	30
6 Quality planning	30
6.1 Quality plan.....	30
6.2 Sampling	31
6.2.1 Balanced cabling	31
6.2.2 Optical fibre cabling.....	33
6.3 Treatment of marginal results.....	34
6.3.1 Balanced cabling	34
6.3.2 Optical fibre cabling.....	35
6.4 Treatment of non-compliant results	35
6.5 Change control.....	35
7 Installation planning	35
7.1 General.....	35
7.2 Safety	35
7.2.1 General	35
7.2.2 Mains power cabling.....	36
7.2.3 Optical fibre cabling.....	36
7.3 Environment.....	36
7.4 Points of electrical contact.....	36
7.5 External service provision	36

7.5.1	Requirements	36
7.5.2	Recommendations	36
7.6	Pathways and pathway systems	37
7.6.1	General	37
7.6.2	Inside buildings	39
7.6.3	Outside buildings	42
7.7	Spaces	46
7.7.1	Requirements	46
7.7.2	Recommendations	49
7.8	Functional elements	50
7.8.1	Requirements	50
7.8.2	Recommendations	52
7.9	Segregation of information technology cabling and mains power cabling	52
7.9.1	General	52
7.9.2	Requirements	53
7.9.3	Recommendations	59
7.10	Cabling – Requirements	59
7.10.1	General	59
7.10.2	Unscreened cabling	59
7.10.3	Screened cabling	60
7.10.4	Optical fibre cabling	60
8	Installation practices	60
8.1	General	60
8.2	Safety	60
8.2.1	General	60
8.2.2	Mains power cabling	60
8.2.3	Functional bonding	60
8.2.4	Optical fibre cabling	60
8.2.5	Guards and signs	61
8.2.6	Enclosed spaces	61
8.2.7	Maintenance holes	61
8.2.8	Closures	61
8.3	Environment	61
8.3.1	Storage	61
8.3.2	Installation – Requirements	61
8.4	Component inspection and testing – Requirements	61
8.5	Pathways	62
8.5.1	Requirements	62
8.5.2	Inside buildings – Requirements	62
8.5.3	Outside buildings	62
8.6	Spaces	63
8.6.1	Requirements	63
8.6.2	Entrance facilities	63
8.6.3	Rooms and enclosures intended to contain distributors	63
8.6.4	Cabinets, frames and racks	63
8.6.5	Closures	63
8.6.6	Outlets	63
8.7	Pathway system installation	64

8.7.1	General	64
8.7.2	Inside buildings	64
8.7.3	Outside buildings	64
8.8	Closure installation	65
8.9	Cable installation	65
8.9.1	Cable installation within pathway systems	65
8.9.2	General	65
8.9.3	Inside buildings	66
8.9.4	Cable installation in maintenance holes	66
8.9.5	Cable installation within closures – Requirements	67
8.10	Joining and terminating of cables	67
8.10.1	Requirements	67
8.10.2	Balanced cabling	68
8.10.3	Screened balanced cabling	68
8.10.4	Optical fibre cabling	68
8.11	Cords and jumpers	68
8.12	Surge protective devices	69
8.13	Acceptance	69
8.13.1	Inspection	69
8.13.2	Testing	69
9	Documentation and administration	69
9.1	Symbols and preparation of documents	69
9.1.1	Requirements	69
9.1.2	Recommendations	69
9.2	Administration	69
9.2.1	General	69
9.2.2	Administration system	70
9.2.3	Identifiers – Requirements	72
9.2.4	Component labelling	73
9.2.5	Records	75
9.2.6	Cable administration system	79
9.2.7	Reports	82
10	Testing	82
10.1	General	82
10.1.1	Links and permanent links	82
10.1.2	Channels	83
10.1.3	Cabling interface adaptors	84
10.1.4	Calibration	84
10.1.5	Equipment protection	85
10.1.6	Measurement conditions	85
10.2	Test procedures for balanced cabling	85
10.2.1	General	85
10.2.2	Measurement of length-related parameters	85
10.2.3	Treatment of marginal test results	85
10.2.4	Treatment of unacceptable test results	85
10.2.5	Test result format	86
10.2.6	Test result documentation	86
10.3	Test procedures for optical fibre cabling	86

10.3.1	General	86
10.3.2	Treatment of unacceptable test results	87
10.3.3	Test result documentation	87
11	Inspection.....	87
11.1	General	87
11.2	Inspection Level 1	88
11.3	Inspection Level 2	88
11.4	Inspection Level 3	88
11.5	Inspection documentation – Requirements	89
12	Operation	89
12.1	Standard operating procedure	89
12.1.1	Requirements	89
12.1.2	Recommendations	89
12.2	Cords and jumpers	89
12.3	Optical fibre adaptors	90
13	Maintenance.....	90
13.1	Approaches to maintenance	90
13.1.1	General	90
13.1.2	Requirements	90
13.2	Maintenance procedures	90
13.2.1	Requirements	90
13.2.2	Recommendations	91
14	Repair	91
Annex A (normative)	Optical fibre polarity maintenance: connecting hardware for multiple optical fibres	92
Annex B (normative)	Common infrastructures within multi-tenant premises.....	101
Annex C (normative)	Cabling in accordance with ISO/IEC 11801	109
Annex D (normative)	Cabling in accordance with ISO/IEC 15018	116
Annex E (normative)	Cabling in accordance with ISO/IEC 24764	122
Annex F (normative)	Cabling in accordance with ISO/IEC 24702	135
Annex G (normative)	Cabling in accordance with ISO/IEC TR 24704	138
Annex H (normative)	Automated infrastructure management (AIM) systems.....	139
Bibliography.....		142
Figure 1 – Schematic relationship between ISO/IEC 14763-2 and other relevant standards.....		12
Figure 2 – Quality assurance schematic.....		23
Figure 3 – Example of conformant and non-conformant bend radius management		40
Figure 4 – Example of use of curved corners in pathway systems		42
Figure 5 – Example of cabling installations outside buildings		43
Figure 6 – Dimensions of rooms intended to contain distributors.....		50
Figure 7 – Process of determining cable separation		54
Figure 8 – Flowchart for cable separation calculation.....		57
Figure 9 – Separation of mains power and information technology cables without dividers.....		58

Figure 10 – Separation of mains power and information technology cables with dividers.....	58
Figure 11 – Examples of cord and jumper labelling	75
Figure 12 – Cable administration database and possible linkages	80
Figure 13 – Basic cabling administration	80
Figure 14 – Examples of cabling permanent links	83
Figure 15 – Reference planes for link and channels (point-to-point).....	83
Figure 16 – Example of a cabling channel.....	84
Figure A.1 – Duplex connecting hardware plug	93
Figure A.2 – Duplex connecting adapter	93
Figure A.3 – Duplex patch cord.....	93
Figure A.4 – Views of crossover patch cords.....	94
Figure A.5 – Optical fibre sequences and adapter orientation in patch panel for the symmetrical position method.....	95
Figure A.6 – Optical fibre sequences and adapter orientation in patch panel for the reverse-pair position method.....	96
Figure A.7 – Array connector cable or patch cord (key-up to key-up)	97
Figure A.8 – Array adapter with aligned keyways	98
Figure A.9 – Transition assembly.....	99
Figure A.10 – Connectivity method for duplex signals	99
Figure A.11 – Connectivity method for parallel optics channels	100
Figure B.1 – Example of common pathways and spaces in a multi-tenant building	102
Figure B.2 – Example of a campus entrance facility	104
Figure B.3 – Example 1: Common equipment room.....	106
Figure B.4 – Example 1: Common telecommunications room	107
Figure B.5 – Example 2: Common telecommunications room	107
Figure C.1 – Connection of functional elements providing redundancy.....	110
Figure E.1 – Connection of functional elements providing redundancy.....	123
Figure E.2 – Example of layered cable trays with smaller width upper trays	126
Figure E.3 – Example of uncovered (accessible) row of floor tiles to provide access to lower tray.....	127
Figure E.4 – Dimensions of rooms intended to contain distributors	129
Figure E.5 – Example of "hot" aisles, "cold" aisles and cable pathway locations	131
Table 1 – Installed balanced cabling test parameters	31
Table 2 – Minimum sample sizes for alien (exogenous) crosstalk testing	33
Table 3 – Installed optical fibre cabling test parameters	33
Table 4 – Examples of pathway systems.....	37
Table 5 – Stacking height for non-continuous and interval support pathway systems	41
Table 6 – Design and planning of pathways outside buildings	43
Table 7 – Separation recommendations between metallic information technology cabling and specific EMI sources	53
Table 8 – Classification of information technology cables	55
Table 9 – Minimum separation S.....	55

Table 10 – Power cabling factor P	56
Table 11 – Level of installation complexity	70
Table 12 – Level of operational complexity	71
Table 13 – Minimum requirements of administration systems	71
Table 14 – Minimum requirements of operational administration systems	72
Table 15 – Labelling requirements	73
Table 16 – Labelling recommendations (additional).....	74
Table 17 – Infrastructure records for spaces, cabinets, racks, frames and closures	76
Table 18 – Infrastructure records for cables and termination points	77
Table 19 – Infrastructure records	78
Table 20 – Infrastructure records for pathways and premises.....	79
Table 21 – Recommendations of installation administration systems.....	81
Table 22 – Recommendations of operational administration systems	81
Table A.1 – Optical fibre colour code scheme of IEC 60794-2	92
Table B.1 – Summary of common spaces used to service a multi-tenant building.....	102
Table D.1 – Minimum requirements for dimensions of primary distribution spaces	118
Table D.2 – Requirements for dimensions of secondary distribution spaces	119
Table D.3 – Minimum dimensions of spaces allocated to junction boxes	120
Table D.4 – Recommendations for dimensions of primary distribution spaces	120
Table D.5 – Recommendations for dimensions of secondary distribution spaces.....	121
Table E.1 – Environmental requirements for data centres	124
Table F.1 – Risk elements for consideration in determining an appropriate maintenance approach.....	137

INFORMATION TECHNOLOGY – IMPLEMENTATION AND OPERATION OF CUSTOMER PREMISES CABLING –

Part 2: Planning and installation

FOREWORD

- 1) ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.
- 2) The formal decisions or agreements of IEC and ISO on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees and ISO member bodies.
- 3) IEC, ISO and ISO/IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees and ISO member bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC, ISO and ISO/IEC publications is accurate, IEC or ISO cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees and ISO member bodies undertake to apply IEC, ISO and ISO/IEC publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any ISO, IEC or ISO/IEC publication and the corresponding national or regional publication should be clearly indicated in the latter.
- 5) ISO and IEC do not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. ISO or IEC are not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or ISO or its directors, employees, servants or agents including individual experts and members of their technical committees and IEC National Committees or ISO member bodies for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication of, use of, or reliance upon, this ISO/IEC Publication or any other IEC, ISO or ISO/IEC publications.
- 8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this ISO/IEC Publication may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

DISCLAIMER

This Consolidated version is not an official IEC Standard and has been prepared for user convenience. Only the current versions of the standard and its amendment(s) are to be considered the official documents.

This Consolidated version of ISO/IEC 14763-2 bears the edition number 1.1. It consists of the first edition (2012-02) and its amendment 1 (2015-09). The technical content is identical to the base edition and its amendment.

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendments 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

ISO/IEC 14763-2:2012+AMD1:2015 CSV – 9 –
© ISO/IEC 2015

International Standard ISO/IEC 14763-2 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

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

In addition to the supersession of parts of earlier standards and the incorporation of other standards, this standard provides much greater detail in all aspects of planning and installation with respect to ISO/IEC TR 14763-2 and provides clearly differentiated and directed requirements and recommendations.

The list of all currently available parts of the ISO/IEC 14763 series, under the general title *Information technology – Implementation and operation of customer premises cabling*, can be found on the IEC web site.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

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

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

The importance of services delivered by information technology cabling infrastructure is similar to that of utilities such as heating, lighting and electricity supplies. As with those utilities, interruptions to service can have a serious impact. Poor quality of service due to lack of planning, use of inappropriate components, incorrect installation, poor administration or inadequate support can threaten an organisation's effectiveness.

There are four phases in the successful implementation of information technology cabling

- a) design,
- b) specification – the detailed requirement for the cabling, including the planning of its accommodation and associated building services addressing safety and specific environments (e.g. electromagnetic) together with the quality assurance requirements to be applied,
- c) installation – in accordance with the requirements of the specification,
- d) operation – the management of connectivity and the maintenance of transmission performance during the life of the cabling.

This International Standard supports the specification, implementation and operation of generic information technology cabling designed in accordance with the standards and associated documents developed by ISO/IEC JTC 1/SC 25 and addresses the following topics

- specification depending on the application, environment, building infrastructure and facilities, etc.,
- quality assurance,
- installation planning (including pathways and spaces) depending on the application, environment, building infrastructure and facilities, etc,
- installation practice (including pathways and spaces),
- documentation and administration,
- testing,
- inspection,
- operation,
- maintenance and maintainability (based on any impact from planning and installation),
- repair and repairability (based on any impact from planning and installation).

It does not cover those aspects of installation associated with the transmission of signals in free space between transmitters, receivers or their associated antenna systems (e.g. wireless, radio, microwave or satellite).

The following normative Annexes support specific aspects of planning and installation

- Annex A: Optical fibre polarity,
- Annex B: Common infrastructures within multi-tenant premises.

The requirements and recommendations of the main body of this standard are premises-independent. The following normative Annexes include requirements for generic cabling in accordance with specific standards

- Annex C: Cabling in accordance with ISO/IEC 11801,
- Annex D: Cabling in accordance with ISO/IEC 15018,
- Annex E: Cabling in accordance with ISO/IEC 24764,

ISO/IEC 14763-2:2012+AMD1:2015 CSV – 11 –
© ISO/IEC 2015

- Annex F: Cabling in accordance with ISO/IEC 24702,
- Annex G: Cabling in accordance with ISO/IEC TR 24704.

This standard sets out the responsibilities of information technology cabling installers and premises owners, and is intended to be referenced in relevant contracts. The owners may delegate selected responsibilities to designers, specifiers, operators and maintainers of installed information technology cabling.

This standard is also relevant to

- architects, building designers and builders,
- main contractors,
- designers, suppliers, installers, inspectors (auditors), building managers, maintainers and owners of information technology cabling,
- public network providers and local service providers,
- end users.

This International Standard is one of a number of documents prepared in support of international standards and technical reports for cabling design produced by ISO/IEC JTC 1/SC 25. Figure 1 shows the inter-relationship between these standards and technical reports.

Users of this standard should be familiar with the applicable cabling design standard.

NOTE Telecommunications infrastructure affects raw material consumption. The infrastructure design and installation methods also influence product life and sustainability of electronic equipment life cycling. These aspects of telecommunications infrastructure impact our environment. Since building life cycles are typically planned for decades, technological electronic equipment upgrades are necessary. The telecommunications infrastructure design and installation process magnifies the need for sustainable infrastructures with respect to building life, electronic equipment life cycling and considerations of effects on environmental waste. Telecommunications designers are encouraged to research local building practices for a sustainable environment and conservation of fossil fuels as part of the design process.

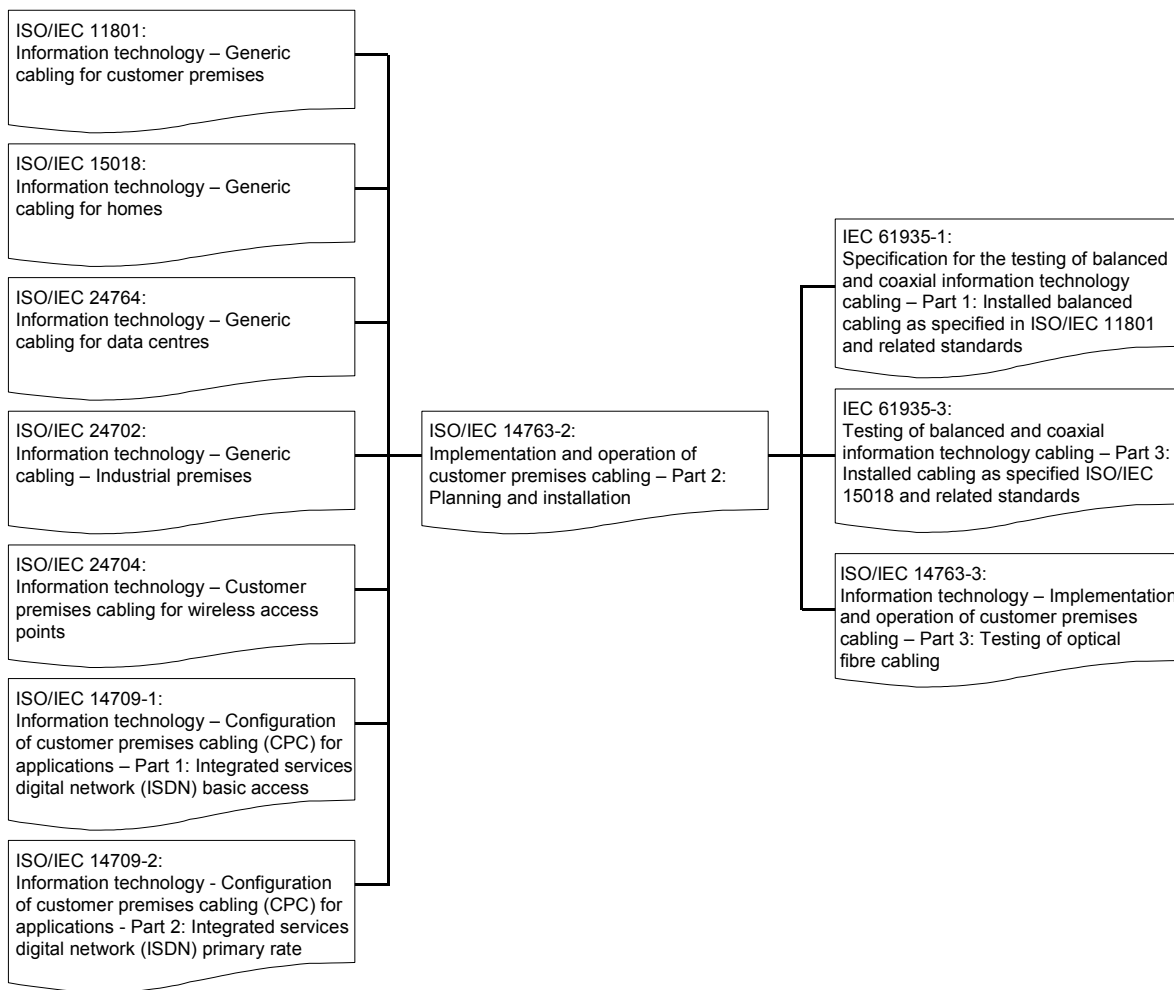


Figure 1 – Schematic relationship between ISO/IEC 14763-2 and other relevant standards

INFORMATION TECHNOLOGY – IMPLEMENTATION AND OPERATION OF CUSTOMER PREMISES CABLING –

Part 2: Planning and installation

1 Scope

This part of ISO/IEC 14763 specifies requirements for the planning, installation and operation of cabling and cabling infrastructures (including cabling, pathways, spaces, earthing and bonding) in support of generic cabling standards and associated documents.

The following aspects are addressed

- specification of the installation,
- quality assurance,
- installation planning,
- installation practice,
- documentation,
- administration,
- testing,
- inspection,
- operation,
- maintenance,
- repair.

The requirements of Clauses 5 to 14 of this standard are premises-independent and may be amended by the requirements of premises-specific Annexes.

This part of ISO/IEC 14763 excludes

- specific requirements applicable to other cabling systems (e.g. mains power cabling); however, it takes account of the effects other cabling systems may have on the installation of information technology cabling (and vice versa) and gives general advice,
- those aspects of installation associated with the transmission of signals in free space between transmitters, receivers or their associated antenna systems (e.g. wireless, radio, microwave or satellite).

This standard is applicable to certain hazardous environments but does not exclude additional requirements which are applicable in particular circumstances (e.g. electricity supply and electrified railways).

Safety (electrical safety and protection, optical power, fire, etc.) and electromagnetic compatibility (EMC) requirements are outside the scope of this international standard and are covered by other standards and regulations. However, information given in this international standard may be of assistance in meeting these standards and regulations.

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 60364-5-52, *Low-voltage electrical installations – Part 5-52: Selection and erection of electrical equipment – Chapter 52: Wiring systems*

IEC 60794-2, *Optical fibre cables – Part 2: Indoor cables – Sectional specification*

IEC 61082-1, *Preparation of documents used in electrotechnology – Part 1: Rules*

IEC 61084 (all parts), *Cable trunking and ducting systems for electrical installations*

IEC 61156-5 (all parts), *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*

IEC 61156-6 (all parts), *Multicore and symmetrical pair/quad cables for digital communications – Part 6: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Work area wiring*

IEC 61386 (all parts), *Conduit systems for cable management*

IEC 61537, *Cable management – Cable tray systems and cable ladder systems*

IEC 61784-5 (all parts), *Industrial communication networks – Profiles*

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

IEC 61935-1, *Specification for the testing of balanced and coaxial information technology cabling – Part 1: Installed balanced cabling as specified in ISO/IEC 11801 and related standards*

IEC 61935-3, *Testing of balanced and coaxial information technology cabling – Part 3: Installed cabling as specified in ISO/IEC 15018*

IEC 61969-1, *Mechanical structures for electronic equipment – Outdoor enclosures – Part 1: Design guidelines*

IEC 61969-2, *Mechanical structures for electronic equipment – Outdoor enclosures – Part 2: Sectional specification – Coordination dimensions for cases and cabinets*

IEC 62305-4, *Protection against lightning – Electrical and electronic systems within structures*

ISO/IEC 11801:2002, *Information technology – Generic cabling for customer premises*
Amendment 1 (2008)
Amendment 2 (2010)

ISO/IEC 14709-1, *Information technology – Configuration of Customer Premises Cabling (CPC) for applications – Part 1: Integrated Services Digital Network (ISDN) basic access*

ISO/IEC 14763-2:2012+AMD1:2015 CSV – 15 –
© ISO/IEC 2015

ISO/IEC 14709-2, *Information technology – Configuration of Customer Premises Cabling (CPC) for applications – Part 2: Integrated services Digital Network (ISDN) primary rate*

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

ISO/IEC 15018:2004, *Information technology – Generic cabling for homes*
Amendment 1 (2009)

ISO/IEC 20000-1, *Information technology – Service management – Part 1: Service management system requirements*

ISO/IEC 24702:2006, *Information technology – Generic cabling – Industrial premises*
Amendment 1 (2009)

ISO/IEC TR 24704:2004, *Information technology – Customer premises cabling for wireless access points*

ISO/IEC 24764:2010, *Information technology – Generic cabling systems for data centres*

ISO/IEC TR 29106, *Information technology – Generic cabling – Introduction to the MICE environmental classification*

This is a preview - click here to buy the full publication



ISO/IEC 14763-2

Edition 1.1 2015-09

FINAL VERSION



**Information technology – Implementation and operation of customer premises cabling –
Part 2: Planning and installation**



CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	13
2 Normative references	14
3 Terms, definitions and abbreviations	15
3.1 Terms and definitions	15
3.2 Abbreviations	22
3.3 Conventions	22
4 Conformance.....	22
5 Specification of installations	23
5.1 General.....	23
5.2 Installation specification	24
5.2.1 Requirements	24
5.2.2 Recommendations	25
5.3 Technical specification	25
5.3.1 General	25
5.3.2 Safety requirements	26
5.3.3 Security requirements.....	26
5.3.4 Performance and configuration – Requirements.....	26
5.3.5 Environmental conditions.....	27
5.4 Scope of work	27
5.4.1 Pre-installation	27
5.4.2 Installation.....	28
5.4.3 Post-installation.....	29
5.5 Quality assurance	30
6 Quality planning	30
6.1 Quality plan.....	30
6.2 Sampling	31
6.2.1 Balanced cabling	31
6.2.2 Optical fibre cabling.....	33
6.3 Treatment of marginal results.....	34
6.3.1 Balanced cabling	34
6.3.2 Optical fibre cabling.....	35
6.4 Treatment of non-compliant results	35
6.5 Change control.....	35
7 Installation planning	35
7.1 General.....	35
7.2 Safety	35
7.2.1 General	35
7.2.2 Mains power cabling.....	36
7.2.3 Optical fibre cabling.....	36
7.3 Environment.....	36
7.4 Points of electrical contact.....	36
7.5 External service provision	36

7.5.1	Requirements	36
7.5.2	Recommendations	36
7.6	Pathways and pathway systems	37
7.6.1	General	37
7.6.2	Inside buildings	39
7.6.3	Outside buildings	42
7.7	Spaces	46
7.7.1	Requirements	46
7.7.2	Recommendations	49
7.8	Functional elements	50
7.8.1	Requirements	50
7.8.2	Recommendations	52
7.9	Segregation of information technology cabling and mains power cabling	52
7.9.1	General	52
7.9.2	Requirements	53
7.9.3	Recommendations	59
7.10	Cabling – Requirements	59
7.10.1	General	59
7.10.2	Unscreened cabling	59
7.10.3	Screened cabling	60
7.10.4	Optical fibre cabling	60
8	Installation practices	60
8.1	General	60
8.2	Safety	60
8.2.1	General	60
8.2.2	Mains power cabling	60
8.2.3	Functional bonding	60
8.2.4	Optical fibre cabling	60
8.2.5	Guards and signs	61
8.2.6	Enclosed spaces	61
8.2.7	Maintenance holes	61
8.2.8	Closures	61
8.3	Environment	61
8.3.1	Storage	61
8.3.2	Installation – Requirements	61
8.4	Component inspection and testing – Requirements	61
8.5	Pathways	62
8.5.1	Requirements	62
8.5.2	Inside buildings – Requirements	62
8.5.3	Outside buildings	62
8.6	Spaces	63
8.6.1	Requirements	63
8.6.2	Entrance facilities	63
8.6.3	Rooms and enclosures intended to contain distributors	63
8.6.4	Cabinets, frames and racks	63
8.6.5	Closures	63
8.6.6	Outlets	63
8.7	Pathway system installation	64

8.7.1	General	64
8.7.2	Inside buildings	64
8.7.3	Outside buildings	64
8.8	Closure installation	65
8.9	Cable installation	65
8.9.1	Cable installation within pathway systems	65
8.9.2	General	65
8.9.3	Inside buildings	66
8.9.4	Cable installation in maintenance holes	66
8.9.5	Cable installation within closures – Requirements	67
8.10	Joining and terminating of cables	67
8.10.1	Requirements	67
8.10.2	Balanced cabling	68
8.10.3	Screened balanced cabling	68
8.10.4	Optical fibre cabling	68
8.11	Cords and jumpers	68
8.12	Surge protective devices	69
8.13	Acceptance	69
8.13.1	Inspection	69
8.13.2	Testing	69
9	Documentation and administration	69
9.1	Symbols and preparation of documents	69
9.1.1	Requirements	69
9.1.2	Recommendations	69
9.2	Administration	69
9.2.1	General	69
9.2.2	Administration system	70
9.2.3	Identifiers – Requirements	72
9.2.4	Component labelling	73
9.2.5	Records	75
9.2.6	Cable administration system	79
9.2.7	Reports	81
10	Testing	82
10.1	General	82
10.1.1	Links and permanent links	82
10.1.2	Channels	83
10.1.3	Cabling interface adaptors	84
10.1.4	Calibration	84
10.1.5	Equipment protection	85
10.1.6	Measurement conditions	85
10.2	Test procedures for balanced cabling	85
10.2.1	General	85
10.2.2	Measurement of length-related parameters	85
10.2.3	Treatment of marginal test results	85
10.2.4	Treatment of unacceptable test results	85
10.2.5	Test result format	86
10.2.6	Test result documentation	86
10.3	Test procedures for optical fibre cabling	86

10.3.1	General	86
10.3.2	Treatment of unacceptable test results	87
10.3.3	Test result documentation	87
11	Inspection.....	87
11.1	General	87
11.2	Inspection Level 1	88
11.3	Inspection Level 2	88
11.4	Inspection Level 3	88
11.5	Inspection documentation – Requirements	89
12	Operation	89
12.1	Standard operating procedure	89
12.1.1	Requirements	89
12.1.2	Recommendations	89
12.2	Cords and jumpers	89
12.3	Optical fibre adaptors	90
13	Maintenance.....	90
13.1	Approaches to maintenance	90
13.1.1	General	90
13.1.2	Requirements	90
13.2	Maintenance procedures	90
13.2.1	Requirements	90
13.2.2	Recommendations	91
14	Repair	91
Annex A (normative)	Optical fibre polarity maintenance: connecting hardware for multiple optical fibres	92
Annex B (normative)	Common infrastructures within multi-tenant premises	101
Annex C (normative)	Cabling in accordance with ISO/IEC 11801	109
Annex D (normative)	Cabling in accordance with ISO/IEC 15018	116
Annex E (normative)	Cabling in accordance with ISO/IEC 24764	122
Annex F (normative)	Cabling in accordance with ISO/IEC 24702	135
Annex G (normative)	Cabling in accordance with ISO/IEC TR 24704	138
Annex H (normative)	Automated infrastructure management (AIM) systems.....	139
Bibliography	142
Figure 1 – Schematic relationship between ISO/IEC 14763-2 and other relevant standards.....		12
Figure 2 – Quality assurance schematic.....		23
Figure 3 – Example of conformant and non-conformant bend radius management		40
Figure 4 – Example of use of curved corners in pathway systems		42
Figure 5 – Example of cabling installations outside buildings		43
Figure 6 – Dimensions of rooms intended to contain distributors.....		50
Figure 7 – Process of determining cable separation		54
Figure 8 – Flowchart for cable separation calculation.....		57
Figure 9 – Separation of mains power and information technology cables without dividers.....		58

Figure 10 – Separation of mains power and information technology cables with dividers.....	58
Figure 11 – Examples of cord and jumper labelling	75
Figure 12 – Cable administration database and possible linkages	80
Figure 13 – Basic cabling administration	80
Figure 14 – Examples of cabling permanent links	83
Figure 15 – Reference planes for link and channels (point-to-point).....	83
Figure 16 – Example of a cabling channel.....	84
Figure A.1 – Duplex connecting hardware plug	93
Figure A.2 – Duplex connecting adapter	93
Figure A.3 – Duplex patch cord.....	93
Figure A.4 – Views of crossover patch cords.....	94
Figure A.5 – Optical fibre sequences and adapter orientation in patch panel for the symmetrical position method.....	95
Figure A.6 – Optical fibre sequences and adapter orientation in patch panel for the reverse-pair position method.....	96
Figure A.7 – Array connector cable or patch cord (key-up to key-up)	97
Figure A.8 – Array adapter with aligned keyways	98
Figure A.9 – Transition assembly.....	99
Figure A.10 – Connectivity method for duplex signals	99
Figure A.11 – Connectivity method for parallel optics channels	100
Figure B.1 – Example of common pathways and spaces in a multi-tenant building	102
Figure B.2 – Example of a campus entrance facility	104
Figure B.3 – Example 1: Common equipment room.....	106
Figure B.4 – Example 1: Common telecommunications room	107
Figure B.5 – Example 2: Common telecommunications room	107
Figure C.1 – Connection of functional elements providing redundancy.....	110
Figure E.1 – Connection of functional elements providing redundancy.....	123
Figure E.2 – Example of layered cable trays with smaller width upper trays	126
Figure E.3 – Example of uncovered (accessible) row of floor tiles to provide access to lower tray.....	127
Figure E.4 – Dimensions of rooms intended to contain distributors	129
Figure E.5 – Example of "hot" aisles, "cold" aisles and cable pathway locations	131
Table 1 – Installed balanced cabling test parameters	31
Table 2 – Minimum sample sizes for alien (exogenous) crosstalk testing	33
Table 3 – Installed optical fibre cabling test parameters	33
Table 4 – Examples of pathway systems.....	37
Table 5 – Stacking height for non-continuous and interval support pathway systems	41
Table 6 – Design and planning of pathways outside buildings	43
Table 7 – Separation recommendations between metallic information technology cabling and specific EMI sources	53
Table 8 – Classification of information technology cables	55
Table 9 – Minimum separation S.....	55

Table 10 – Power cabling factor P	56
Table 11 – Level of installation complexity	70
Table 12 – Level of operational complexity	71
Table 13 – Minimum requirements of administration systems	71
Table 14 – Minimum requirements of operational administration systems	72
Table 15 – Labelling requirements	73
Table 16 – Labelling recommendations (additional).....	74
Table 17 – Infrastructure records for spaces, cabinets, racks, frames and closures	76
Table 18 – Infrastructure records for cables and termination points	77
Table 19 – Infrastructure records	78
Table 20 – Infrastructure records for pathways and premises.....	79
Table 21 – Recommendations of installation administration systems.....	81
Table 22 – Recommendations of operational administration systems	81
Table A.1 – Optical fibre colour code scheme of IEC 60794-2	92
Table B.1 – Summary of common spaces used to service a multi-tenant building.....	102
Table D.1 – Minimum requirements for dimensions of primary distribution spaces	118
Table D.2 – Requirements for dimensions of secondary distribution spaces	119
Table D.3 – Minimum dimensions of spaces allocated to junction boxes	120
Table D.4 – Recommendations for dimensions of primary distribution spaces	120
Table D.5 – Recommendations for dimensions of secondary distribution spaces.....	121
Table E.1 – Environmental requirements for data centres	124
Table F.1 – Risk elements for consideration in determining an appropriate maintenance approach.....	137

INFORMATION TECHNOLOGY – IMPLEMENTATION AND OPERATION OF CUSTOMER PREMISES CABLING –

Part 2: Planning and installation

FOREWORD

- 1) ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.
- 2) The formal decisions or agreements of IEC and ISO on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees and ISO member bodies.
- 3) IEC, ISO and ISO/IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees and ISO member bodies in that sense. While all reasonable efforts are made to ensure that the technical content of IEC, ISO and ISO/IEC publications is accurate, IEC or ISO cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees and ISO member bodies undertake to apply IEC, ISO and ISO/IEC publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any ISO, IEC or ISO/IEC publication and the corresponding national or regional publication should be clearly indicated in the latter.
- 5) ISO and IEC do not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. ISO or IEC are not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or ISO or its directors, employees, servants or agents including individual experts and members of their technical committees and IEC National Committees or ISO member bodies for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication of, use of, or reliance upon, this ISO/IEC Publication or any other IEC, ISO or ISO/IEC publications.
- 8) Attention is drawn to the normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this ISO/IEC Publication may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

DISCLAIMER

This Consolidated version is not an official IEC Standard and has been prepared for user convenience. Only the current versions of the standard and its amendment(s) are to be considered the official documents.

This Consolidated version of ISO/IEC 14763-2 bears the edition number 1.1. It consists of the first edition (2012-02) and its amendment 1 (2015-09). The technical content is identical to the base edition and its amendment.

This Final version does not show where the technical content is modified by amendment 1. A separate Redline version with all changes highlighted is available in this publication.

ISO/IEC 14763-2:2012+AMD1:2015 CSV – 9 –
© ISO/IEC 2015

International Standard ISO/IEC 14763-2 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

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

In addition to the supersession of parts of earlier standards and the incorporation of other standards, this standard provides much greater detail in all aspects of planning and installation with respect to ISO/IEC TR 14763-2 and provides clearly differentiated and directed requirements and recommendations.

The list of all currently available parts of the ISO/IEC 14763 series, under the general title *Information technology – Implementation and operation of customer premises cabling*, can be found on the IEC web site.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

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

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

The importance of services delivered by information technology cabling infrastructure is similar to that of utilities such as heating, lighting and electricity supplies. As with those utilities, interruptions to service can have a serious impact. Poor quality of service due to lack of planning, use of inappropriate components, incorrect installation, poor administration or inadequate support can threaten an organisation's effectiveness.

There are four phases in the successful implementation of information technology cabling

- a) design,
- b) specification – the detailed requirement for the cabling, including the planning of its accommodation and associated building services addressing safety and specific environments (e.g. electromagnetic) together with the quality assurance requirements to be applied,
- c) installation – in accordance with the requirements of the specification,
- d) operation – the management of connectivity and the maintenance of transmission performance during the life of the cabling.

This International Standard supports the specification, implementation and operation of generic information technology cabling designed in accordance with the standards and associated documents developed by ISO/IEC JTC 1/SC 25 and addresses the following topics

- specification depending on the application, environment, building infrastructure and facilities, etc.,
- quality assurance,
- installation planning (including pathways and spaces) depending on the application, environment, building infrastructure and facilities, etc,
- installation practice (including pathways and spaces),
- documentation and administration,
- testing,
- inspection,
- operation,
- maintenance and maintainability (based on any impact from planning and installation),
- repair and repairability (based on any impact from planning and installation).

It does not cover those aspects of installation associated with the transmission of signals in free space between transmitters, receivers or their associated antenna systems (e.g. wireless, radio, microwave or satellite).

The following normative Annexes support specific aspects of planning and installation

- Annex A: Optical fibre polarity,
- Annex B: Common infrastructures within multi-tenant premises.

The requirements and recommendations of the main body of this standard are premises-independent. The following normative Annexes include requirements for generic cabling in accordance with specific standards

- Annex C: Cabling in accordance with ISO/IEC 11801,
- Annex D: Cabling in accordance with ISO/IEC 15018,
- Annex E: Cabling in accordance with ISO/IEC 24764,

ISO/IEC 14763-2:2012+AMD1:2015 CSV – 11 –
© ISO/IEC 2015

- Annex F: Cabling in accordance with ISO/IEC 24702,
- Annex G: Cabling in accordance with ISO/IEC TR 24704.

This standard sets out the responsibilities of information technology cabling installers and premises owners, and is intended to be referenced in relevant contracts. The owners may delegate selected responsibilities to designers, specifiers, operators and maintainers of installed information technology cabling.

This standard is also relevant to

- architects, building designers and builders,
- main contractors,
- designers, suppliers, installers, inspectors (auditors), building managers, maintainers and owners of information technology cabling,
- public network providers and local service providers,
- end users.

This International Standard is one of a number of documents prepared in support of international standards and technical reports for cabling design produced by ISO/IEC JTC 1/SC 25. Figure 1 shows the inter-relationship between these standards and technical reports.

Users of this standard should be familiar with the applicable cabling design standard.

NOTE Telecommunications infrastructure affects raw material consumption. The infrastructure design and installation methods also influence product life and sustainability of electronic equipment life cycling. These aspects of telecommunications infrastructure impact our environment. Since building life cycles are typically planned for decades, technological electronic equipment upgrades are necessary. The telecommunications infrastructure design and installation process magnifies the need for sustainable infrastructures with respect to building life, electronic equipment life cycling and considerations of effects on environmental waste. Telecommunications designers are encouraged to research local building practices for a sustainable environment and conservation of fossil fuels as part of the design process.

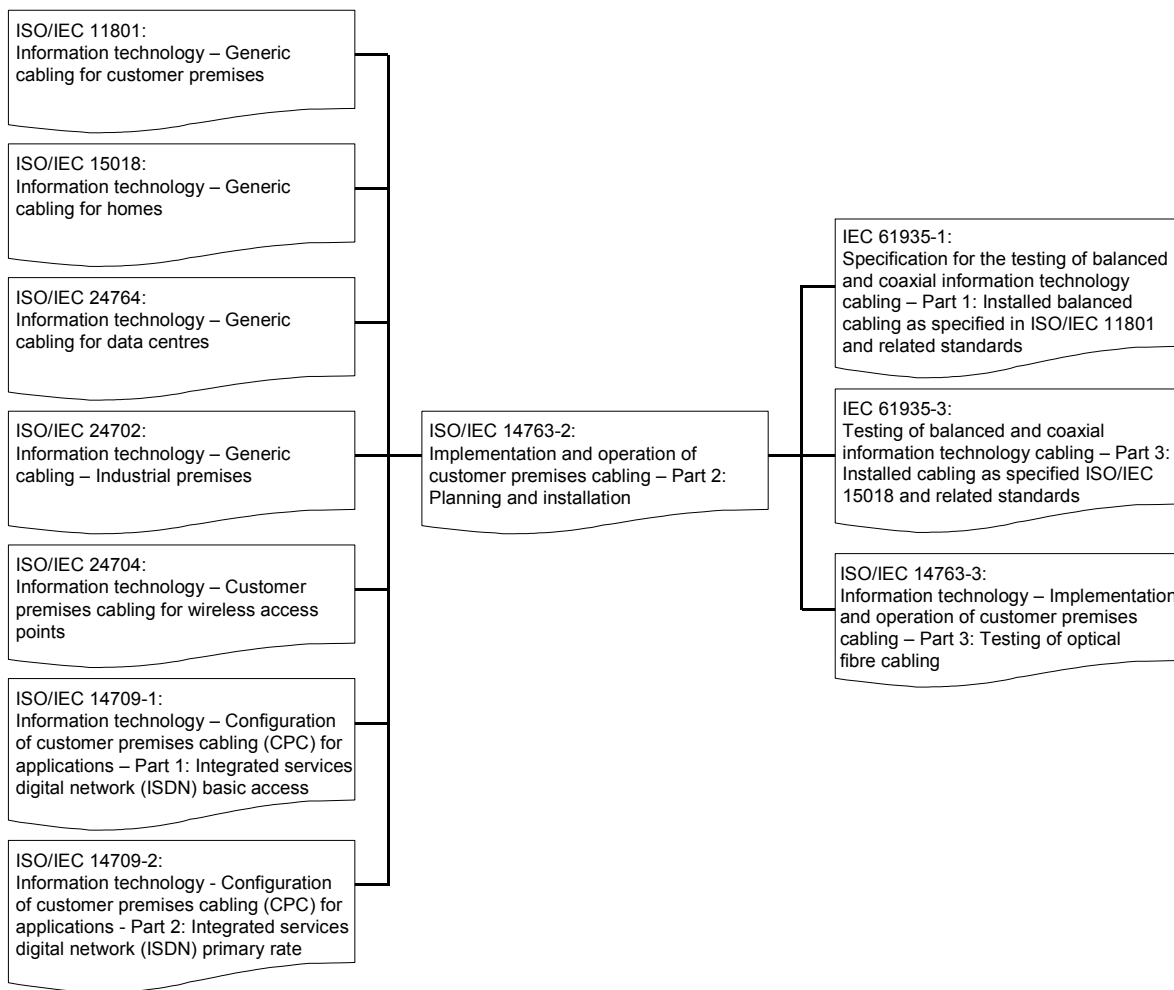


Figure 1 – Schematic relationship between ISO/IEC 14763-2 and other relevant standards

INFORMATION TECHNOLOGY – IMPLEMENTATION AND OPERATION OF CUSTOMER PREMISES CABLING –

Part 2: Planning and installation

1 Scope

This part of ISO/IEC 14763 specifies requirements for the planning, installation and operation of cabling and cabling infrastructures (including cabling, pathways, spaces, earthing and bonding) in support of generic cabling standards and associated documents.

The following aspects are addressed

- specification of the installation,
- quality assurance,
- installation planning,
- installation practice,
- documentation,
- administration,
- testing,
- inspection,
- operation,
- maintenance,
- repair.

The requirements of Clauses 5 to 14 of this standard are premises-independent and may be amended by the requirements of premises-specific Annexes.

This part of ISO/IEC 14763 excludes

- specific requirements applicable to other cabling systems (e.g. mains power cabling); however, it takes account of the effects other cabling systems may have on the installation of information technology cabling (and vice versa) and gives general advice,
- those aspects of installation associated with the transmission of signals in free space between transmitters, receivers or their associated antenna systems (e.g. wireless, radio, microwave or satellite).

This standard is applicable to certain hazardous environments but does not exclude additional requirements which are applicable in particular circumstances (e.g. electricity supply and electrified railways).

Safety (electrical safety and protection, optical power, fire, etc.) and electromagnetic compatibility (EMC) requirements are outside the scope of this international standard and are covered by other standards and regulations. However, information given in this international standard may be of assistance in meeting these standards and regulations.

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 60364-5-52, *Low-voltage electrical installations – Part 5-52: Selection and erection of electrical equipment – Chapter 52: Wiring systems*

IEC 60794-2, *Optical fibre cables – Part 2: Indoor cables – Sectional specification*

IEC 61082-1, *Preparation of documents used in electrotechnology – Part 1: Rules*

IEC 61084 (all parts), *Cable trunking and ducting systems for electrical installations*

IEC 61156-5 (all parts), *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*

IEC 61156-6 (all parts), *Multicore and symmetrical pair/quad cables for digital communications – Part 6: Symmetrical pair/quad cables with transmission characteristics up to 1 000 MHz – Work area wiring*

IEC 61386 (all parts), *Conduit systems for cable management*

IEC 61537, *Cable management – Cable tray systems and cable ladder systems*

IEC 61784-5 (all parts), *Industrial communication networks – Profiles*

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

IEC 61935-1, *Specification for the testing of balanced and coaxial information technology cabling – Part 1: Installed balanced cabling as specified in ISO/IEC 11801 and related standards*

IEC 61935-3, *Testing of balanced and coaxial information technology cabling – Part 3: Installed cabling as specified in ISO/IEC 15018*

IEC 61969-1, *Mechanical structures for electronic equipment – Outdoor enclosures – Part 1: Design guidelines*

IEC 61969-2, *Mechanical structures for electronic equipment – Outdoor enclosures – Part 2: Sectional specification – Coordination dimensions for cases and cabinets*

IEC 62305-4, *Protection against lightning – Electrical and electronic systems within structures*

ISO/IEC 11801:2002, *Information technology – Generic cabling for customer premises*
Amendment 1 (2008)
Amendment 2 (2010)

ISO/IEC 14709-1, *Information technology – Configuration of Customer Premises Cabling (CPC) for applications – Part 1: Integrated Services Digital Network (ISDN) basic access*

ISO/IEC 14763-2:2012+AMD1:2015 CSV – 15 –
© ISO/IEC 2015

ISO/IEC 14709-2, *Information technology – Configuration of Customer Premises Cabling (CPC) for applications – Part 2: Integrated services Digital Network (ISDN) primary rate*

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

ISO/IEC 15018:2004, *Information technology – Generic cabling for homes*
Amendment 1 (2009)

ISO/IEC 20000-1, *Information technology – Service management – Part 1: Service management system requirements*

ISO/IEC 24702:2006, *Information technology – Generic cabling – Industrial premises*
Amendment 1 (2009)

ISO/IEC TR 24704:2004, *Information technology – Customer premises cabling for wireless access points*

ISO/IEC 24764:2010, *Information technology – Generic cabling systems for data centres*

ISO/IEC TR 29106, *Information technology – Generic cabling – Introduction to the MICE environmental classification*