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INTERNATIONAL STANDARD

colour inside

Information technology – Implementation and operation of customer premises cabling – Part 3: Testing of optical fibre cabling

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Information technology – Implementation and operation of customer premises cabling – Part 3: Testing of optical fibre cabling

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CONTENTS

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INFORMATION TECHNOLOGY – IMPLEMENTATION AND OPERATION OF CUSTOMER PREMISES CABLING –

Part 3: Testing of optical fibre cabling

FOREWORD

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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.

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International Standard ISO/IEC 14763-3 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

This second edition cancels and replaces the first edition published in 2006 and its Amendment 1:2009.

This edition constitutes a technical revision.

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

– general requirements (Clause 5) have been revised and the concept of normalization has been replaced by reference measurements;
– OTDR characterization (6.2) and requirements for cabling interface adapters (6.3) and test cords have been revised and requirements for single-mode fibre test cords (6.3.4) have been removed;
– enhanced three-test-cord reference method has been introduced (9.1.1.2);
– requirements for the attenuation measurement of cords (10.6) have been revised;
– Annex A "Launched modal distribution (LMD)" has been simplified and the new title now reads "Launched modal conditions for testing multimode optical fibre cabling";
– visual inspection criteria for connectors have been reworked (Annex B);
– information on optical time domain reflectometry (Annex C) has been revised;
– examples of calculations of channel and permanent link limits (Annex G) have been revised;
– and information regarding cleaning and inspection of fibre optic connections have been added (Annex H).

A list of all parts in the ISO/IEC 14763 series, published under the general title *Information technology – Implementation and operation of customer premises cabling*, can be found on the IEC website.

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 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.

The contents of the corrigendum of March 2015 have been included in this copy.

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 four prepared in support of International Standard ISO/IEC 11801 and other cabling standards.

Figure 1 below shows the inter-relationship between ISO/IEC 11801 and other International Standards and for cabling systems with related standards.

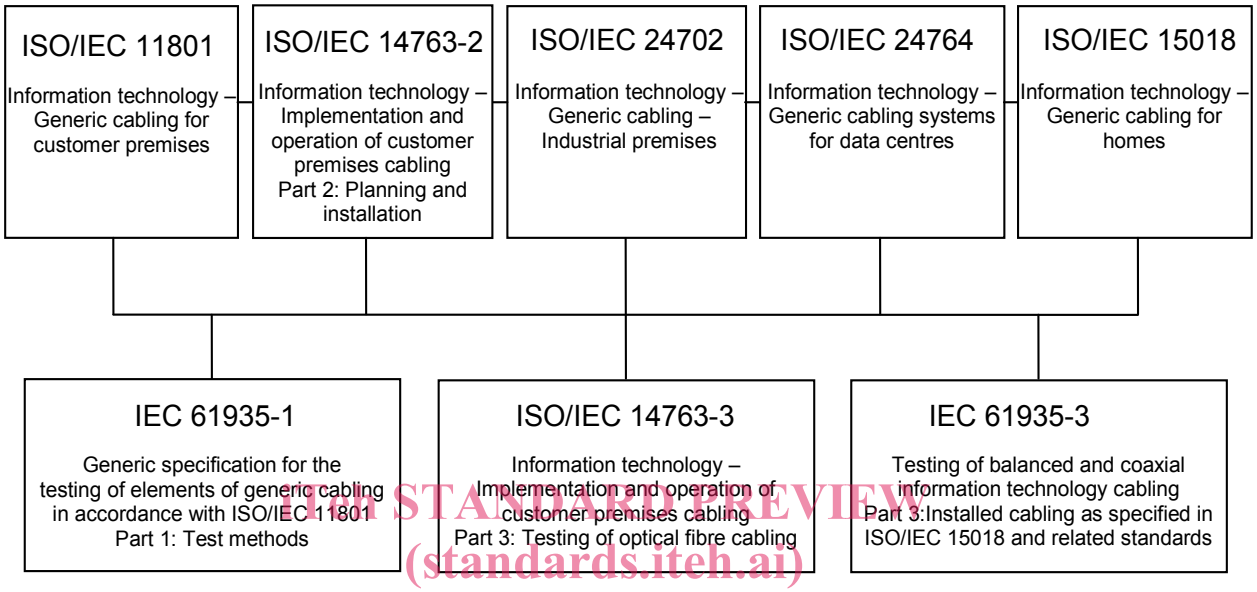

Figure 1 – Relationship of related International Standards

ISO/IEC 14763-3 details the inspection and test procedures for optical fibre cabling,

a) designed in accordance with premises cabling standards including ISO/IEC 11801, ISO/IEC 24764, ISO/IEC 24702 and ISO/IEC 15018, and

b) installed according to the requirements and recommendations of ISO/IEC 14763-2.

Users of this International Standard should be familiar with relevant premises cabling standards and ISO/IEC 14763-2.

The quality plan for each installation will define the acceptance tests and sampling levels selected for that installation. Requirements and recommendations for the development of a quality plan are described in ISO/IEC 14763-2.

NOTE JTC 1/SC 25, in cooperation with IEC/TC 86, is currently developing an overall quantitative model to calculate total measurement uncertainty as stated in the reference planes of ISO/IEC 11801. When such a model has been verified, it is expected to be incorporated into this standard in form of an Amendment, thereby removing pertinent clauses currently marked “ffs” (for further study).

INFORMATION TECHNOLOGY – IMPLEMENTATION AND OPERATION OF CUSTOMER PREMISES CABLING –

Part 3: Testing of optical fibre cabling

1 Scope

This part of ISO/IEC 14763 specifies systems and methods for the inspection and testing of installed optical fibre cabling designed in accordance with premises cabling standards including ISO/IEC 11801, ISO/IEC 24764, ISO/IEC 24702 and ISO/IEC 15018. The test methods refer to existing standards-based procedures where they exist.

2 Normative references

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

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

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

IEC 60050-731, *International Electrotechnical Vocabulary – Chapter 731: Optical fibre communication*

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

IEC 60874-14-3, *Connectors for optical fibres and cables – Part 14-3: Detail specification for fibre optic adapter (simplex) type SC for single-mode fibre*

IEC 60874-19-1, *Fibre optic interconnecting devices and passive components – Connectors for optical fibres and cables – Part 19-1: Fibre optic patch cord connector type SC-PC (floating duplex) standard terminated on multimode fibre type A1a, A1b – Detail specification*

IEC 61280-1-3, *Fibre optic communication subsystem test procedures – Part 1-3: General communication subsystems – Central Wavelength and spectral width measurement*

IEC 61280-1-4, *Fibre optic communication subsystem test procedures – Part 1-4: General communication subsystems – Light source encircled flux measurement method*

IEC 61280-4-1, *Fibre-optic communication subsystem test procedures – Part 4-1: Installed cable plant – Multimode attenuation measurement*

IEC 61280-4-2, *Fibre optic communication subsystem basic test procedures – Part 4-2: Fibre optic cable plant – Single-mode fibre optic cable plant attenuation*

IEC 61300-3-4, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-4: Examinations and measurements – Attenuation*

IEC 61300-3-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-6: Examinations and measurements – Return loss*

IEC 61300-3-35:2009, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-35: Examinations and measurements – Fibre optic connector endface visual and automated inspection*

IEC 61300-3-42, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-42: Examinations and measurements – Attenuation of single mode alignment sleeves and or adaptors with resilient alignment sleeves*

IEC 61755-3-1, *Fibre optic connector optical interfaces – Part 3-1: Optical interface, 2,5 mm and 1,25 mm diameter cylindrical full zirconia PC ferrule, single mode fibre*

IEC 61755-3-2, *Fibre optic connector optical interfaces – Part 3-2: Optical interface, 2,5 mm and 1,25 mm diameter cylindrical full zirconia ferrules for 8 degrees angled-PC single mode fibres*

IEC 62614, *Fibre optics – Launch condition requirements for measuring multimode attenuation*

IEC 62664-1-1, *Fibre optic interconnecting devices and passive components – Fibre optic connector product specifications – Part 1-1: LC-PC duplex multimode connectors terminated on IEC 60793-2-10 category A1a fibre*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions of ISO/IEC 11801 and IEC 60050-731 as well as the following apply.

3.1.1
adapter
device that enables interconnection between terminated optical fibre cables

3.1.2
attenuation
A
reduction in optical power induced by transmission through a medium such as optical fibre, given as A = 10 lg(P_{out}/P_{in}), where P_{in} and P_{out} are the power, typically measured in mW, into and out of the cabling

Note 1 to entry: The values of A are in decibel (dB).

3.1.3
attenuation dead zone
<for a reflective or non-reflective event> region after the event where the displaced trace deviates from the undisturbed backscatter trace by more than a given vertical distance ΔF

Note 1 to entry: ΔF is commonly accepted to be a value of 0,5 dB.

[SOURCE: IEC 61746-1:2009, and IEC 61746-2:2010, 3.3, modified – The note has been changed and Figure 1 has not been included.]

3.1.4
cable sheath
covering over the optical fibre or conductor assembly that may include one or more metallic members, strength members or jackets

Note 1 to entry: Sometimes simply referred to as “sheath”.

3.1.5
3.1.5.1
connection
mated device including terminations connecting two cables or cable elements

3.1.5.2
connection
combination of devices including terminations connecting two cables or cable elements

3.1.6
encircled flux
fraction of cumulative near-field power to the total output power as a function of radial distance from the optical centre of the core

3.1.7
event dead zone
distance in which an OTDR cannot detect a reflective event following a reflective event

3.1.8
fail result
measured value which fails to meet the specified requirement and where the absolute value of the difference between the measured value and the specified requirement is greater than the stated measurement uncertainty

Note 1 to entry: The fail result is for further study (ffs).

3.1.9
launch test cord
cable assembly used to connect from a light source to the cabling under test or as part of a test reference measurement

3.1.10
light source and power meter
test system consisting of a light source (LS), power meter (PM) and associated test cords used to measure the attenuation of installed cable plant

3.1.11
marginal result
measured value which differs from the specified requirement by an amount not exceeding the stated measurement uncertainty

Note 1 to entry: The marginal result is for further study (ffs).

3.1.12
multimode optical fibre
optical fibre along whose core the radiation of two or more bound modes can propagate at the wavelength of interest

Note 1 to entry: A typical multimode fibre propagates about 100 modes or more.

[SOURCE: IEC 60050-731:1991, 731-02-03, modified – definition slightly changed and note added.]

3.1.13
optical fibre
filament shaped optical waveguide made of dielectric materials

[SOURCE: IEC 60050-731:1991, 731-02-01]

3.1.14
optical time domain reflectometer
instrument used to characterise optical fibre cabling by measuring the backscatter and reflection of injected light pulses as a function of time

3.1.15
pass result
measured value which meets the specified requirements and where the absolute value of the difference between the measured value and the specified requirement is greater than the stated measurement uncertainty, provided any apparent gain does not exceed the measurement uncertainty

Note 1 to entry: The pass result is for further study (ffs).

3.1.16
reference adapter
adapter that ensures that the performance of reference connections can be attained

Note 1 to entry: This definition is only applicable to connectors with cylindrical ferrules.

3.1.17
reference connector
connector with tightened tolerances terminated onto an optical fibre that may require tightened tolerances such that the expected attenuation formed by mating two such assemblies is less than or equal to a specified value that is lower than the normal expected attenuation

3.1.18
reference measurement
measurement of the output power of the light source that is used to determine the input power level to the cabling under test

3.1.19
singlemode optical fibre
optical fibre which supports only one mode of light transmission

3.1.20
substitution test cord
test cord used within a reference measurement which is replaced during the measurement of the attenuation of the cabling under test

3.1.21
tail test cord
cable assembly used to connect from a power meter to the cabling under test or as part of a test reference measurement

3.1.22
test cord
cable assembly used either to connect test equipment to the cabling under test or as part of a test reference measurement

3.1.23
test operator
skilled person testing in accordance with instructions provided by the test system designer

3.1.24
test system
test equipment, test cords and adapters necessary to undertake a given test in accordance with the requirements of this standard

3.2 Abbreviations

For the purposes of this document, the abbreviations of ISO/IEC 11801 as well as the following apply.

APC	Angled Physical Contact
CP	Consolidation Point
DUT	Device Under Test
EQP	Equipment
ffs	for further study
IOR	Index Of Refraction
LTC	Launch Test Cord
LS	Light Source
LSA	Least Squares Average
LSPM	Light Source And Power Meter
MMF	MultiMode optical Fibre
MPO	Multifibre Push-On connector
N/A	Not Applicable
OTDR	Optical Time Domain Reflectometer
PC	Physical Contact
PM	Power Meter
RL	Return Loss
SC	Subscriber Connector
SMF	Single-Mode optical Fibre
STC	Substitution Test Cord
TTC	Tail Test Cord

3.3 Symbols

For the purposes of this document the following symbols apply.