

INTERNATIONAL STANDARD



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

WITHDRAWN

Itch Standards
(<https://standards.itech.ai>)
Document Preview

ISO/IEC 14763-3:2014

<https://standards.itech.ai/collections/standards/iec/eb8d79fb-d68d-4446-a4b4-6c04c8726cc8/iso-iec-14763-3-2014>





THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2018 ISO/IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about ISO/IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 21 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

INTERNATIONAL STANDARD



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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 35.200

ISBN 978-2-8322-6020-3

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

Withdrawn

iTech Standards
(<https://standards.itech.ai>)
Document Preview

[ISO/IEC 14763-3:2014](https://standards.itech.ai/standards/iec/eb8179fb-d68d-4446-a4b4-6c04c8726cc8/iso-iec-14763-3-2014)

<https://standards.itech.ai/standards/iec/eb8179fb-d68d-4446-a4b4-6c04c8726cc8/iso-iec-14763-3-2014>

REDLINE VERSION



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

ISO/IEC 14763-3:2014

<https://standards.iteh.ai/country/standards/iec/eb8d79fb-d68d-4446-a4b4-6c04c8726cc8/iso-iec-14763-3-2014>

CONTENTS

FOREWORD.....	7
INTRODUCTION.....	9
INTRODUCTION to the amendment	10
1 Scope.....	11
2 Normative references.....	11
3 Terms, definitions and abbreviations	12
3.1 Terms and definitions	12
3.2 Abbreviations	15
3.3 Symbols.....	16
4 Conformance.....	16
5 General requirements	16
5.1 Test system	16
5.2 Reference measurement and calibration	17
5.3 Environmental conditions.....	17
5.3.1 Protection of transmission and terminal equipment.....	17
5.3.2 Inspecting and cleaning connectors.....	17
5.3.3 Use of test equipment.....	17
5.3.4 Relevance of measurement	18
5.3.5 Treatment of marginal test results.....	18
5.4 Documentation	18
6 Test equipment.....	18
6.1 Light source and power meter.....	18
6.1.1 General.....	18
6.1.2 Light sources	19
6.1.3 Power meters	19
6.1.4 Test system stability (ffs).....	19
6.2 OTDR	19
6.2.1 General.....	19
6.2.2 OTDR characterization using a launch test cord and a tail test cord	20
6.3 Test cords and adapters.....	21
6.3.1 Connecting hardware at test interfaces	21
6.3.2 Reference connector requirements	21
6.3.3 Test cords.....	22
6.4 MMF launched modal distribution	24
6.5 SMF launch condition	24
7 Inspection equipment.....	25
8 Cabling under test – Channels and permanent links	25
8.1 General.....	25
8.2 Reference planes	25
8.3 Wavelength of measurement	26
8.4 Direction of measurement.....	26
9 Testing of installed cabling.....	27
9.1 Attenuation	27
9.1.1 LSPM.....	27

9.1.2	OTDR	32
9.2	Propagation delay	34
9.2.1	Test method	34
9.2.2	Treatment of results	35
9.3	Length	35
9.3.1	Test method	35
9.3.2	Measurement uncertainty	35
9.3.3	Treatment of results	35
10	Testing of cabling components within installed cabling	36
10.1	Attenuation of optical fibre cable	36
10.1.1	Test method	36
10.1.2	Measurement uncertainty	36
10.1.3	Treatment of results	36
10.2	Attenuation of local and remote test interfaces	37
10.2.1	Test method	37
10.2.2	Test system measurement uncertainty	37
10.2.3	Treatment of results	38
10.3	Attenuation of connecting hardware	39
10.3.1	Test method	39
10.3.2	Treatment of results	39
10.4	Return loss of connecting hardware	40
10.4.1	Test method (in accordance with IEC 61300-3-6, method 2)	40
10.4.2	Treatment of results	41
10.4.3	Measurement uncertainty	42
10.5	Optical fibre length	42
10.5.1	Test method	42
10.5.2	Measurement uncertainty	44
10.5.3	Treatment of results	44
10.6	Attenuation of cords	44
10.6.1	Test method	44
10.6.2	Treatment of results	45
11	Inspection of cabling and cabling components	45
11.1	Optical fibre continuity	45
11.2	Cabling polarity	45
11.3	Optical fibre cable length	45
11.4	Inspection of optical fibre end faces	46
11.5	Optical fibre core size	46
Annex A (normative) Launch modal conditions for testing multimode optical fibre cabling		47
Annex B (normative) Visual inspection inspection criteria for connectors and cleaning of optical fibre cabling interface		48
B.1	Specified optical fibre cabling interfaces	48
B.2	The inspection equipment	48
B.3	Return loss requirements for cabling interfaces	49
B.3.1	General	49
B.3.2	Multimode cylindrical and rectangular ferrules (20 dB return loss)	49
B.3.3	Single mode PC cylindrical ferrules (35 dB return loss)	51

B.3.4	Single-mode APC cylindrical and rectangular ferrules (60 dB return loss).....	53
Annex C (informative)	Optical time domain reflectometry	56
C.1	Operational capability.....	56
C.1.1	Effective characterization	56
C.1.2	Dynamic range	56
C.1.3	Pulse width	56
C.1.4	Integration or sample count	56
C.2	Limitations of OTDR capability.....	57
C.2.1	Minimum lengths of operation – Attenuation dead zone	57
C.2.2	Ghosting	58
C.2.3	Effective group index of refraction.....	59
C.2.4	Backscattering coefficient.....	59
Annex D (normative)	Inspection and testing of launch test cords, tail test cords and substitution test cords.....	60
D.1	General requirements.....	60
D.2	Attenuation (test and substitution test cord reference connections).....	60
Annex E (informative)	Enhanced three-test-cord and one-test-cord reference methods for link and channel attenuation.....	62
E.1	Reference methods for link attenuation.....	62
E.2	One-test-cord reference method for link attenuation.....	62
E.2.1	General.....	62
E.2.2	Test method.....	62
E.3	Test method for channel attenuation.....	63
E.3.1	General.....	63
E.3.2	Test method.....	63
Annex F (informative)	Quality planning.....	65
F.1	Inspection and test schedules.....	65
F.2	Stage 1 inspection and testing.....	65
F.3	Stage 2 testing.....	65
F.3.1	Basic test group	65
F.3.2	Extended test group	66
Annex G (informative)	Examples of calculations of channel and permanent link limits.....	67
G.1	Channel measurement.....	67
G.2	Permanent link measurement	67
Annex H (informative) Cleaning and inspection of fibre optic connections		70
Bibliography		70
Figure 1 – Relationship of related International Standards		9
Figure 2 – Test system and the cabling under test		17
Figure 3 – OTDR characterization using a launch test cord and a tail test cord.....		20
Figure 4 – An example of test cord labelling and identification		22
Figure 5 – OTDR launch test cord and/or tail test cord schematic.....		24
Figure 6 – Channels and permanent links in accordance with ISO/IEC 11801-1 and equivalent standards.....		25
Figure 7 – Channel and permanent link test configuration		26

~~Figure 8 – LSPM enhanced three-test-cord attenuation measurement of installed channels~~

Figure 8 – Connection of LS – LTC – Near end EQP cord – PM for reference setting.....	28
Figure 9 – LSPM one test cord attenuation measurement of installed permanent links.....	30
Figure 10 – OTDR measurement of installed cabling (channel): 2 point attenuation measurement method	33
Figure 11 – OTDR measurement of installed cabling (permanent link).....	34
Figure 12 – OTDR measurement of optical fibre attenuation	37
Figure 13 – OTDR measurement of connection attenuation.....	38
Figure 14 – OTDR measurement of joint attenuation.....	40
Figure 15 – OTDR measurement of return loss	41
Figure 16 – Determination of length using an OTDR	42
Figure 17 – OTDR characterization of a SMF permanent link containing a break.....	43
Figure 18 – OTDR characterization of a permanent link containing a macrobend.....	44
Figure 19 – Measurement of cord interface attenuation.....	45
Figure 20 – Connections to channel test for attenuation measurement	29
Figure B.1 – Normal illumination of male MPO.....	49
Figure B.2 – Same ferrule with floodlight.....	49
Figure B.3 – Example of multimode LC channel interface.....	50
Figure B.4 – Example of multimode LC link interface	50
Figure B.5 – Example of MPO channel interface.....	51
Figure B.6 – Example of MPO link interface.....	51
Figure B.7 – Example of single-mode LC channel interface.....	52
Figure B.8 – Example of single-mode LC link interface	52
Figure B.9 – Example of single-mode LC/APC channel interface.....	54
Figure B.10 – Example of single-mode LC/APC link interface.....	54
Figure B.11 – Example of SM MPO/APC channel interface	55
Figure B.12 – Example of SM MPO/APC link interface	55
Figure C.1 – OTDR characterization using different length launch test cords.....	57
Figure C.2 – OTDR characterization showing ghost effects	58
Figure C.3 – OTDR characterization showing complex ghost effects	59
Figure D.1 – Measurement of launch test cord, tail test cord and substitution test cord interface attenuation	61
Figure E.1 – Connection of LS – LTC – PM for reference setting.....	63
Figure E.2 – Connections to link for attenuation measurement	63
Figure E.3 – Connection of LS – LTC – PM for reference setting.....	64
Figure E.4 – Connection of LTC – STC – TTC for enhanced three-test-cord verification	64
Figure E.5 – Connections to link for attenuation measurement	64
Table 1 – MMF light source characteristics.....	19
Table 2 – SMF light source characteristics	19
Table 3 – Non-LC reference connector requirements	21
Table 4 – Connecting hardware attenuation.....	31
Table B.1 – Inspection requirements for cabling interfaces with 20 dB return loss.....	50

Table B.2 – Inspection requirements for cabling interfaces with 35 dB return loss.....	52
Table B.3 – Inspection requirements for cabling interfaces with 60 dB return loss.....	53
Table C.1 – Default effective group IOR values	59
Table C.2 – Default backscattering coefficient values	59

Withdrawing

iTech Standards
(<https://standards.iteh.ai>)
Document Preview

INTERNATIONAL ELECTROTECHNICAL COMMISSION

INFORMATION TECHNOLOGY – IMPLEMENTATION AND OPERATION OF CUSTOMER PREMISES CABLING –

Part 3: Testing of optical fibre cabling

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.

This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

ISO/IEC 14763-3 edition 2.1 contains the second edition (2014-06) and its corrigendum (2015-03), and its amendment 1 (2018-08).

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 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.

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 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 the base publication and its amendment will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

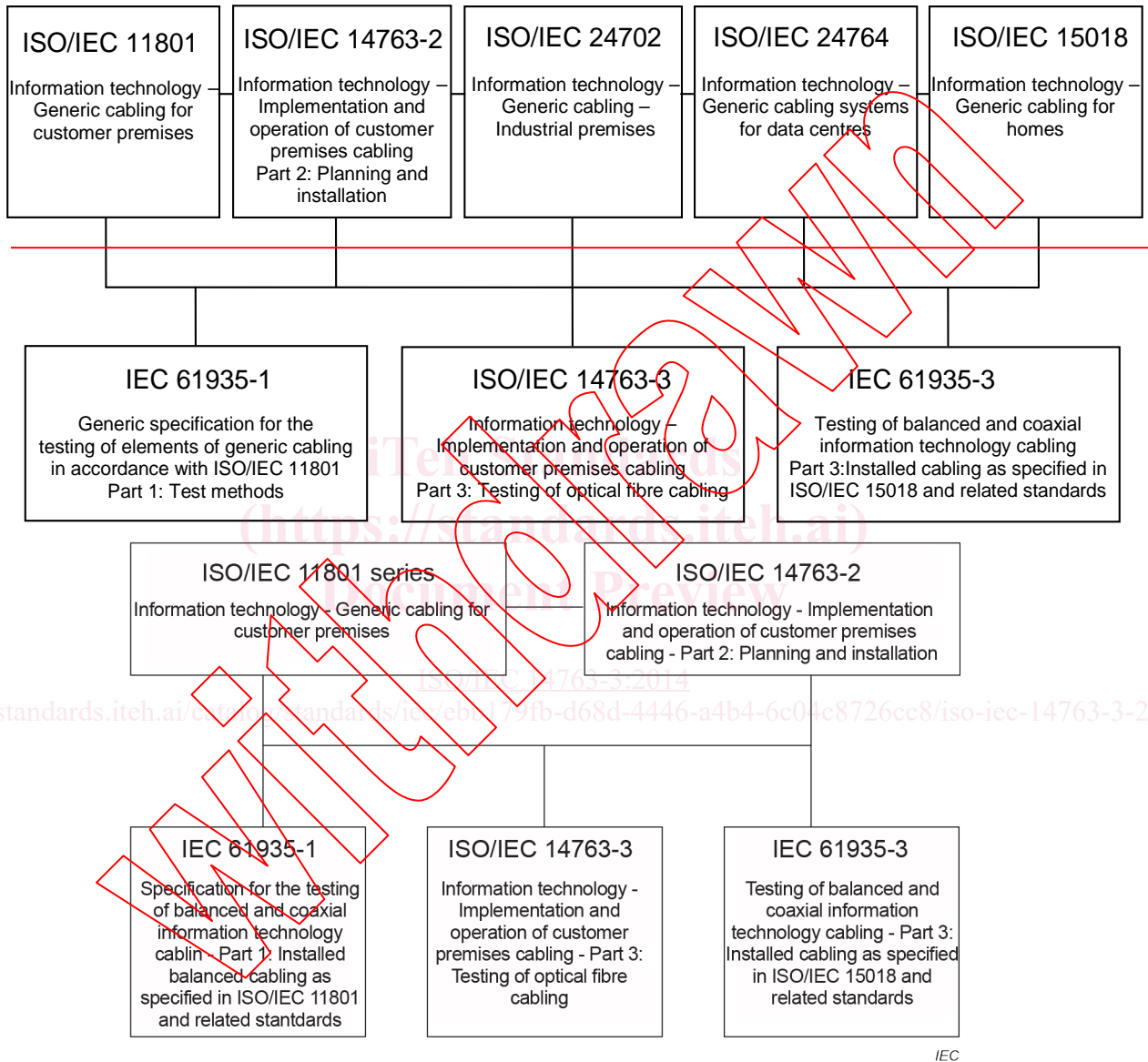
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

INTRODUCTION

This International Standard ~~is one of four~~ has been prepared in support of International Standard series ISO/IEC 11801 ~~and other cabling standards~~.

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



NOTE ISO/IEC 15018 has been replaced by ISO/IEC 11801-4.

Figure 1 – Relationship of related International Standards

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

- designed in accordance with premises cabling standards including the ISO/IEC 11801 series, ~~ISO/IEC 24764, ISO/IEC 24702 and ISO/IEC 15018~~, and
- 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 11801-1. 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).

INTRODUCTION to the amendment

This document contains information for inspecting end faces of the different kinds of installed fibre optic cabling interfaces and connectors of test cords and recommendations for cleaning these interfaces, and replaces the normative Annex B and deletes the informative Annex H of ISO/IEC 14763-3:2014.

Additional information regarding channel and link testing is provided to Annex E.

iTech Standards
(<https://standards.iteh.ai>)
Document Preview

<https://standards.iteh.ai/collections/standards/iec/eb8179fb-d68d-4446-a4b4-6c04c8726cc8/iso-iec-14763-3-2014>