

ISO/IEC 14763-3:2014-06 (E)

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

CONTENTS

- FOREWORD 6
- INTRODUCTION 8
- 1 Scope 9
- 2 Normative references 9
- 3 Terms, definitions and abbreviations 10
 - 3.1 Terms and definitions 10
 - 3.2 Abbreviations 13
 - 3.3 Symbols 13
- 4 Conformance 14
- 5 General requirements 14
 - 5.1 Test system 14
 - 5.2 Reference measurement and calibration 15
 - 5.3 Environmental conditions 15
 - 5.3.1 Protection of transmission and terminal equipment 15
 - 5.3.2 Inspecting and cleaning connectors 15
 - 5.3.3 Use of test equipment 15
 - 5.3.4 Relevance of measurement 16
 - 5.3.5 Treatment of marginal test results 16
 - 5.4 Documentation 16
- 6 Test equipment 16
 - 6.1 Light source and power meter 16
 - 6.1.1 General 16
 - 6.1.2 Light sources 16
 - 6.1.3 Power meters 17
 - 6.1.4 Test system stability (ffs) 17
 - 6.2 OTDR 17
 - 6.2.1 General 17
 - 6.2.2 OTDR characterization using a launch test cord and a tail test cord 18
 - 6.3 Test cords and adapters 18
 - 6.3.1 Connecting hardware at test interfaces 18
 - 6.3.2 Reference connector requirements 19
 - 6.3.3 Test cords 20
 - 6.4 MMF launched modal distribution 22
 - 6.5 SMF launch condition 22
- 7 Inspection equipment 22
- 8 Cabling under test – Channels and permanent links 23
 - 8.1 General 23
 - 8.2 Reference planes 23
 - 8.3 Wavelength of measurement 24
 - 8.4 Direction of measurement 24

9	Testing of installed cabling	25
9.1	Attenuation	25
9.1.1	LSPM	25
9.1.2	OTDR	29
9.2	Propagation delay	31
9.2.1	Test method	31
9.2.2	Treatment of results.....	32
9.3	Length	32
9.3.1	Test method	32
9.3.2	Measurement uncertainty.....	32
9.3.3	Treatment of results.....	32
10	Testing of cabling components within installed cabling	33
10.1	Attenuation of optical fibre cable	33
10.1.1	Test method	33
10.1.2	Measurement uncertainty.....	33
10.1.3	Treatment of results.....	33
10.2	Attenuation of local and remote test interfaces.....	34
10.2.1	Test method	34
10.2.2	Test system measurement uncertainty.....	34
10.2.3	Treatment of results.....	35
10.3	Attenuation of connecting hardware	36
10.3.1	Test method	36
10.3.2	Treatment of results.....	36
10.4	Return loss of connecting hardware	37
10.4.1	Test method (in accordance with IEC 61300-3-6, method 2)	37
10.4.2	Treatment of results.....	38
10.4.3	Measurement uncertainty.....	39
10.5	Optical fibre length.....	39
10.5.1	Test method	39
10.5.2	Measurement uncertainty.....	41
10.5.3	Treatment of results.....	41
10.6	Attenuation of cords	41
10.6.1	Test method	41
10.6.2	Treatment of results.....	42
11	Inspection of cabling and cabling components	42
11.1	Optical fibre continuity	42
11.2	Cabling polarity.....	42
11.3	Optical fibre cable length	42
11.4	Inspection of optical fibre end faces	43
11.5	Optical fibre core size	43

Annex A (normative) Launch modal conditions for testing multimode optical fibre cabling.....	44
Annex B (normative) Visual inspection criteria for connectors	45
Annex C (informative) Optical time domain reflectometry	46
C.1 Operational capability	46
C.1.1 Effective characterization.....	46
C.1.2 Dynamic range	46
C.1.3 Pulse width.....	46
C.1.4 Integration or sample count	46
C.2 Limitations of OTDR capability	47
C.2.1 Minimum lengths of operation – Attenuation dead zone	47
C.2.2 Ghosting.....	48
C.2.3 Effective group index of refraction	49
C.2.4 Backscattering coefficient	49
Annex D (normative) Inspection and testing of test and substitution test cords.....	50
D.1 General requirements	50
D.2 Attenuation (test and substitution test cord reference connections)	50
Annex E (informative) Enhanced three-test-cord and one-test-cord reference methods for link and channel attenuation	52
E.1 Reference methods for link attenuation	52
E.2 One-test-cord reference method for link attenuation.....	52
E.3 Test method for channel attenuation	52
Annex F (informative) Quality planning	53
F.1 Inspection and test schedules	53
F.2 Stage 1 inspection and testing	53
F.3 Stage 2 testing.....	53
F.3.1 Basic test group.....	53
F.3.2 Extended test group.....	54
Annex G (informative) Examples of calculations of channel and permanent link limits	55
G.1 Channel measurement	55
G.2 Permanent link measurement.....	55
Annex H (informative) Cleaning and inspection of fibre optic connections	57
Bibliography.....	58

Figure 1 – Relationship of related International Standards	8
Figure 2 – Test system and the cabling under test	15
Figure 3 – OTDR characterization using a launch test cord and a tail test cord	18
Figure 4 – An example of test cord labelling and identification	20
Figure 5 – OTDR launch test cord and/or tail test cord schematic	21
Figure 6 – Channels and permanent links in accordance with ISO/IEC 11801 and equivalent standards.....	23
Figure 7 – Channel and permanent link test configuration	24
Figure 8 – LSPM enhanced three-test-cord attenuation measurement of installed channels	26
Figure 9 – LSPM one test cord attenuation measurement of installed permanent links	27
Figure 10 – OTDR measurement of installed cabling (channel): 2 point attenuation measurement method	30
Figure 11 – OTDR measurement of installed cabling (permanent link)	31
Figure 12 – OTDR measurement of optical fibre attenuation	34
Figure 13 – OTDR measurement of connection attenuation.....	35
Figure 14 – OTDR measurement of joint attenuation.....	37
Figure 15 – OTDR measurement of return loss	38
Figure 16 – Determination of length using an OTDR	39
Figure 17 – OTDR characterization of a SMF permanent link containing a break	40
Figure 18 – OTDR characterization of a permanent link containing a macrobend	41
Figure 19 – Measurement of cord interface attenuation.....	42
Figure C.1 – OTDR characterization using different length launch test cords	47
Figure C.2 – OTDR characterization showing ghost effects	48
Figure C.3 – OTDR characterization showing complex ghost effects.....	49
Figure D.1 – Measurement of substitution test cord interface attenuation.....	50
Table 1 – MMF light source characteristics	17
Table 2 – SMF light source characteristics.....	17
Table 3 – Non-LC reference connector requirements	19
Table 4 – Connecting hardware attenuation	28
Table C.1 – Default effective group IOR values.....	49
Table C.2 – Default backscattering coefficient values	49