BS EN 50411-3-8:2016

BSI Standards Publication

Fibre organizers and closures to be used in optical fibre communication systems — Product specifications

Part 3-8: Fibre management system, terminal equipment box type 1 for category C

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National foreword

This British Standard is the UK implementation of EN 50411-3-8:2016.

The UK participation in its preparation was entrusted to Technical Committee GEL/86/2, Fibre optic interconnecting devices and passive components.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Fibre organizers and closures to be used in optical fibre communication systems - Product specifications - Part 3-8: Fibre management system, terminal equipment box type 1 for category C

Organiseurs et boîtiers de fibres destinés à être utilisés dans les systèmes de communication par fibres optiques - Spécifications de produits - Partie 3-8: Système de gestion des fibres, boîtier d'équipement terminal de type 1 pour la catégorie C

LWL-Spleißkassetten und -Muffen für die Anwendung in LWL-Kommunikationssystemen - Produktspezifikationen - Teil 3-8: Faser Management System, Kasten für Endeinrichtungen Typ 1 für Kategorie C

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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European foreword

This document (EN 50411-3-8:2016) has been prepared by CLC/TC 86BXA "Fibre optic interconnect, passive and connectorised components".

The following dates are fixed:

latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2016-10-12
latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2018-10-12

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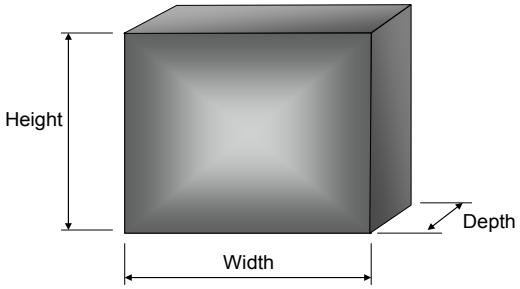
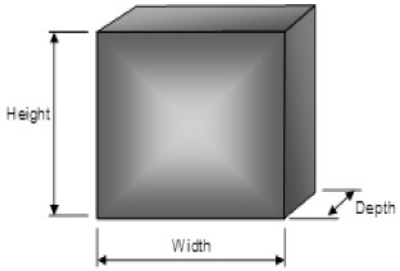
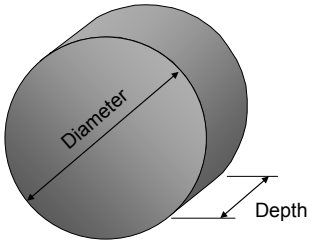
Fibre organizers and closures to be used in optical fibre communication systems – Product specifications

Part 3-8: Fibre management system, terminal equipment box type 1 for category C

Description		Performance
Construction:	Wall mounted box	**Applications**: Optical Fibre Terminal Equipment Box including the ONT/CPE for indoor controlled environments EN 61753-1 Category C
Cable Fixing:	Mechanical	
Connectors:	EN 50377 series EN 60603-7 Series	
Fibre types:	EN 60793-2-50 B1 and B6	**Sealing performance:** IP 40
Fibre management:	Integrated in box	

Related documents:

EN 60529	Degrees of protection provided by enclosures (IP Code) (IEC 60529)
EN 60793-2-50	Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres (IEC 60793-2-50)
EN 61753-1	Fibre optic interconnecting devices and passive components – Part 1: General and guidance for performance standard (IEC 61753-1)
EN 61300 series	Fibre optic interconnecting devices and passive components – Basic test and measurement procedures (IEC 61300 series)

Shape		Maximum outline dimensions
Rectangular shape		Width: 300 mm Height: 150 mm Depth: 100 mm
Square shape		Width: 210 mm Height: 210 mm Depth: 50 mm
Circular		Diameter: 250 mm Depth: 100 mm

1 Scope

1.1 Product definition

This European Standard specifies the dimensional, optical, mechanical and environmental performance requirements of a Terminal Equipment Boxes for the FTTX networks. The Terminal Equipment Box will house the ONT/CPE (electronics) and it protects the optical fibres, splices and connectors from direct contact with the user. Optionally it can contain the network test interface, the power supply and the batteries.

The performance of the electronics, power supply or batteries are not part of this document. These are covered by another EN document, EN 50700.

This specification contains the initial, start of life optical, mechanical and environmental performance requirements of the optical fibre termination in a Terminal Equipment Box, in order for it to be categorized as an EN standard product.

1.2 Operating environment

The tests selected combined with the severity and duration is representative of indoor and outside plant for above ground environments defined by:

EN 61753-1 Category C Controlled environment

1.3 Reliability

Whilst the anticipated service life expectancy of the product in this environment is 20 years, compliance with this specification does not guarantee the reliability of the product. This should be predicted using a recognised reliability assessment programme.

1.4 Quality assurance

Compliance with this specification does not guarantee the manufacturing consistency of the product. This should be maintained using a recognised quality assurance programme.

1.5 Allowed fibre types

All EN 60793-2-50 fibres can be stored in the Terminal Equipment Box with a minimum storage radius of 20 mm (up to a length of maximum 2 m).

Smaller storage radii down to 15 mm are possible with the EN 60793-2-50 B6_a fibre types, but in this case the reduction in mechanical reliability should be taken into account (see Annex A).

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.

EN 50377 (all parts), *Connector sets and interconnect components to be used in optical fibre communication systems — Product specifications*

EN 50700, *Information technology — Premises distribution access network (PDAN) cabling to support deployment of optical broadband networks*

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529)*

EN 60695-11-10, *Fire hazard testing — Part 11-10: Test flames — 50 W horizontal and vertical flame test methods (IEC 60695-11-10)*

EN 60754-1, *Test on gases evolved during combustion of materials from cables — Part 1: Determination of the halogen acid gas content (IEC 60754-1)*

EN 60793-2-50, *Optical fibres — Part 2-50: Product specifications — Sectional specification for class B single-mode fibres (IEC 60793-2-50)*

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

EN 61034-2, *Measurement of smoke density of cables burning under defined conditions — Part 2: Test procedure and requirements (IEC 61034-2)*

EN 61300-2-1, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-1: Tests — Vibration (sinusoidal) (IEC 61300-2-1)*

EN 61300-2-4, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-4: Tests — Fibre/cable retention (IEC 61300-2-4)*

EN 61300-2-9, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-0: Tests — Shock (IEC 61300-2-9)*

EN 61300-2-12, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-12: Tests — Impact (IEC 61300-2-12)*

EN 61300-2-22, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-22: Tests — Change of temperature (IEC 61300-2-22)*

EN 61300-2-33, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-33: Tests — Assembly and disassembly of fibre optic mechanical splices, fibre management systems and closures (IEC 61300-2-33)*

EN 61300-3-1, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 3-1: Examinations and measurements — Visual examination (IEC 61300-3-1)*

EN 61300-3-3, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 3-3: Examinations and measurements — Active monitoring of changes in attenuation and return loss (IEC 61300-3-3)*

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

EN 61300-3-28, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 3-28: Examinations and measurements — Transient loss (IEC 61300-3-28)*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1
fibre management system
system to control fibre routing from the incoming to the out-going fibres, containing one or more splice cassettes and additional functional elements, and which provides a means for routing, storing and protecting of fibre splices, connectors or other passive optical devices in a predetermined order, from one cable sheath opening to another

3.1.2
external network test interface
ENTI
test point which defines the service maintenance boundary of an access network at which external service provision may be assessed and which can be associated with protection devices

3.1.3
microduct system
system that provides for routing air blown fibres or microduct fibre units, between hollow conduits (microducts), and interconnects the microducts by use of pneumatic connectors, tube welding, crimp connectors or push on connectors

3.2 Abbreviations

FMS Fibre Management System
CPE Customer Premises Equipment
ONT Optical Network Terminal
ENTI External Network Test Interface
CATV Cable Television

4 Description

4.1 Optical fibre terminal equipment box housing

The terminal equipment box provides:

— facilities for mounting and protection of stored fibres, connectors, network test interface ENTI (optional), electronics (ONT/CPE), power supply (optional) and batteries (optional),

— access by user to the electrical data, CATV and telephone outputs,

— a protected fibre management system for storing fibres, connectors and splices,

— sealing of input and output optical and electrical cables.

This also includes terminal equipment boxes used for microduct cable or fibre. The design of the terminal equipment housing shall allow the jointing or termination of minimum one incoming cable to the specified number of optical connectors.

Examples of typical terminal equipment applications are given in Figure 1.

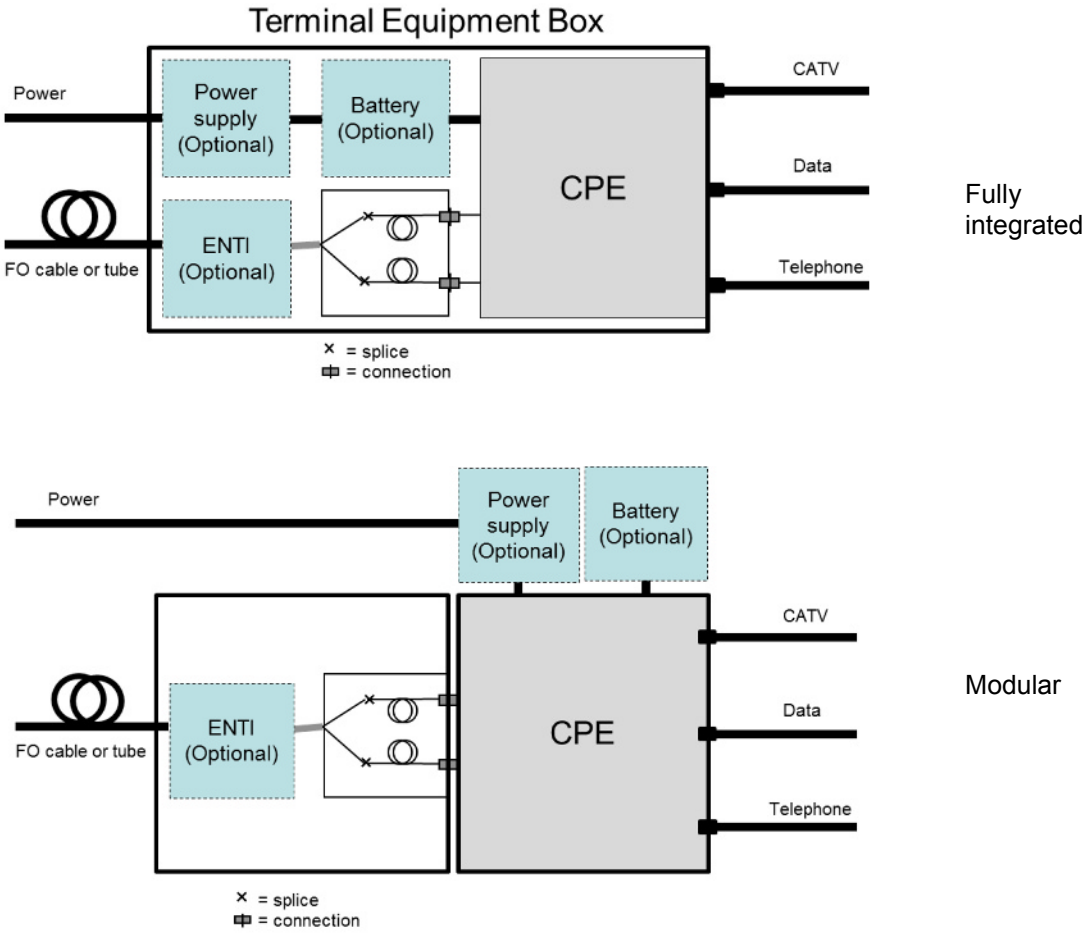


Figure 1 — Examples of terminal equipment applications

4.2 Cable fixing

Cable or microduct fixing will be secured by means of mechanical attachment. Axial movement of the fibre with respect to the microduct shall be taken into account.

4.3 FMS system

The fibre management system provides means for routing, storing and protecting optical fibre and/or fibre splices, connectors or other passive optical devices.

4.4 Materials

All materials that are likely to come in contact with personnel shall meet appropriate health and safety regulations.

The Terminal Equipment Box materials shall be compatible with each other and with the materials of the cables and/or microducts.

All components of the wall outlet shall be resistant to solvents and degreasing agents that are typically used to clean and degrease fibres and cables.

Metallic parts shall be resistant to the corrosive influences they may encounter during the lifetime of the product.

4.5 Laser safety

Laser safety shall be in accordance with EN 60825-2.

4.6 Marking and identification

Marking/identification of the 'variant number' (see Clause 5) to be on the packaging label along with the following:

a) identification of supplier;

b) manufacturing date code: year / month.

5 Variants

Table 1 — Optical fibre terminal equipment box Type 1, for category C - variants

EN 50411-3-8– C- X_1 – X_2 –X X_3 – X_4 – X_5 – XX_6– X_7– X_8– X_9

Variant No. X_1	Mounting location
O	On wall
T	On surface trunking
F	Flush (in wall)
M	Multi purpose

Variant No. X_2	Cable entry ports
S	Side entries more than one
B	Back entries more than one
D	Dual - back and side entries more than one

Variant No. XX_3	Minimum fibre storage radius
15	15 mm storage radius for B6 fibre only
20	20 mm storage radius for all fibre types B1.1, B1.3 and B6 or for use in EN 50700 premises distribution access network (PDAN) cabling.

Variant No. X_4	Colour of terminal equipment box outer housing
1	White
2	Grey
3	Brown
4	User defined

Variant No. X_5	**Shape**
R	Rectangular
S	Square
C	Circular
Q	Customized (outer dimensions shall be stated separately)

Variant No. XX_6	**Number of terminated fibres**
L1	1 fibre with LC connector
L2	2 fibres with LC connectors
L4	4 fibres with LC connectors
S1	1 fibre with SC connector
S2	2 fibres with SC connectors

Variant No. X_7	**ENTI**
N	No ENTI
E	ENTI included

Variant No. X_8	**Power supply**
N	No internal power supply
P	Power supply

Variant No. X_9	**Battery**
N	No battery
B	Battery

6 Dimensional requirements

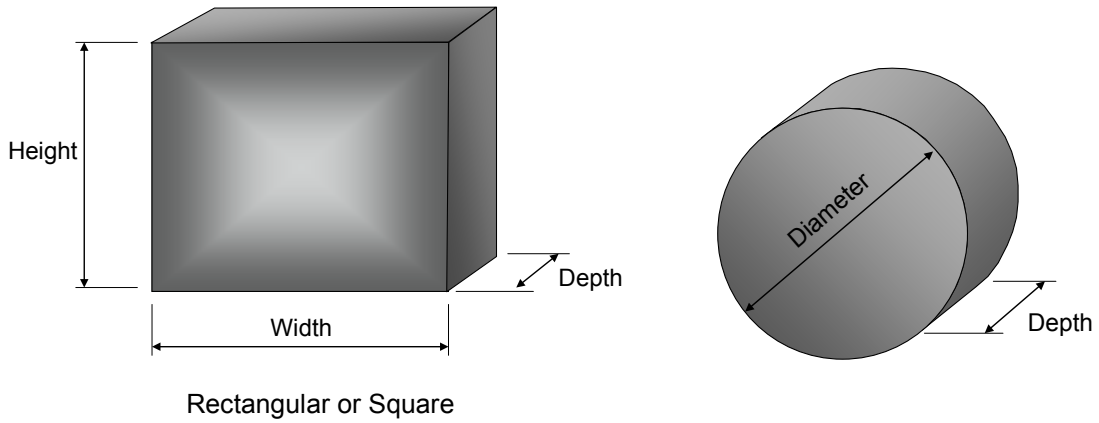


Figure 2 — Terminal equipment dimensions

See also the cable port orientation from the schematic diagrams in the title page to illustrate some typical applications.

Table 2 — Maximum outline dimensions for terminal equipment boxes

Variant X_5	Shape	Width (in mm)	Height (in mm)	Depth (in mm)
R	Rectangular	300	150	100
S	Square	210	210	50
C	Circular	Diameter (mm) 250		100

7 Tests

7.1 Test sample size

Separate test samples for ingress performance and optical performance evaluation may be used. The mechanical and climatic tests listed in Clause 9 can be done simultaneously on the ingress performance test samples and the optical test samples (only the final measurements or pass/fail criteria will be different).

For the purposes of this standard, an ingress performance test sample is defined as a Terminal Equipment Box installed with several cable ends.

Optical test samples shall be constructed as described in 7.2. Due to their complexity, consecutive testing on the same optical sample is allowed.

The minimum recommended sample sizes are given in Annex B.

7.2 Test sample preparation

Ingress performance test samples shall be installed with cables and/or tubes. Electrical cables shall be included in the test samples. The length of the cables or tubes extending from the boxes shall be at least 1 m. The open ends of the cables and tubes shall be sealed. Each applicable cable type with minimum and maximum cable dimensions shall be represented in the test program.

Optical test samples shall be constructed in such a way that they will cover all the allowed functions of the optical parts in the Terminal Equipment Box. The fibres for the optical test samples with 20 mm fibre storage radius are EN 60793-2-50, B1.3 (information given in

Table A.1). The fibres for the optical test samples with 15 mm fibre storage radius are EN 60793-2-50 B6_a1 (information in Table A.2).

Optical test sample construction:

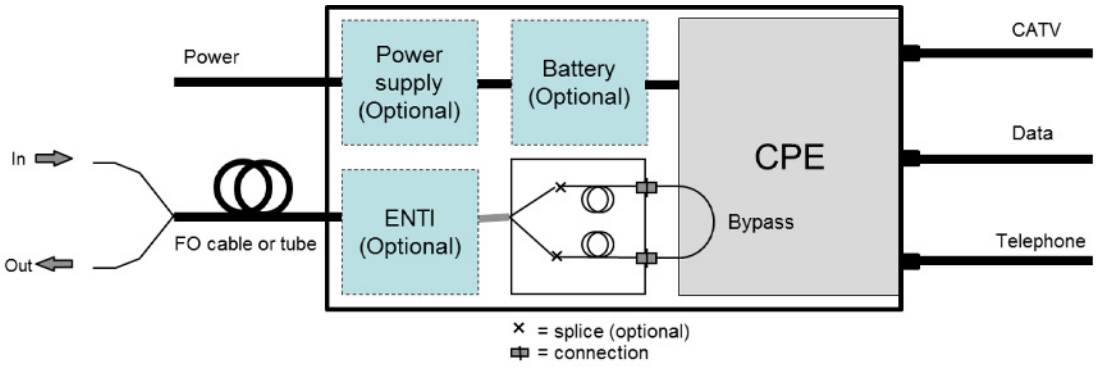


Figure 3 — Terminal equipment optical test sample construction

The optical circuit will be built by two incoming fibres which will be interconnected inside the Terminal Equipment Box by a bypass in the CPE. The connectors shall meet the Grade B attenuation performance as specified in the EN 50377 series. The incoming fibres may be spliced onto fibre pigtails using fusion or mechanical splicing or the cable may be directly terminated using field installable connectors.

7.3 Test and measurement methods

All tests and measurements have been selected from the EN 61300 series.

Unless otherwise stated in the individual test details, all attenuation measurements shall be performed at 1 310 nm ± 25 nm, 1 550 nm ± 25 nm and 1 625 nm ± 25 nm

All optical losses indicated are referenced to the initial attenuation at the start of the test.

No deviation from the specified test method is allowed.

7.4 Test sequence

Tests 1 to 4 are performance criteria tests that need to be performed during and after the other mechanical or environmental tests (5 - 13). There is no defined sequence in which tests 5 – 13 shall be run. Tests 14 to 16 are material tests.

7.5 Pass/fail criteria

A product will have met the requirements of this specification provided no failures occur in any test. In the event of a failure occurring on an intrusion performance test sample, the test shall be re-run using a sample size double that of the original.

Due to the complexity of the optical test samples, consecutive testing on the same optical sample is allowed. In case of a failure during the consecutive testing, a new sample shall be prepared and the failed test shall be redone, if this fails again the qualification procedure shall be redone completely.

8 Test report

A fully documented test report and supporting data shall be prepared and shall be available for inspection as evidence that the tests described in Clause 9 have been carried out in accordance with this specification.

9 Performance requirements

9.1 Dimensional and marking requirements

Dimensions and marking of the product shall be in accordance with the requirements of 6.1 and shall be measured using the appropriate EN test method.

9.2 Ingress, optical and appearance performance criteria

Table 4 — Ingress, optical and appearance performance criteria

No.	Test	Requirement	Details	
0	Attenuation (without ENTI)	0.5 dB max at 1 310 nm and 1 550 nm per incoming fibre [b]	Method:	EN 61300-3-4
1	Ingress resistance	IP 40 No ingress of objects or wires with diameter larger than 1 mm	Method:	EN 60529
			Test temperature:	23 °C ± 3 °C
			Pre-conditioning procedure:	Sample should be conditioned to room temperature for at least 4 h.
2	Visual appearance	No defects which would affect functionality of the closure	Method: Examination:	EN 61300-3-1 Product shall be checked with naked eye.
3	Change in attenuation [a b]	$\delta IL \leq 0{,}2$ dB per incoming fibre during and after test	Method: Wavelengths: Source stability: Detector linearity: Measurements required: Sampling rate:	EN 61300-3-3 Method 1 1 310 nm ± 25 nm 1 550 nm ± 25 nm 1 625 nm ± 25 nm Within ± 0,05 dB over the measuring period Within ± 0,05 dB over the dynamic range to be measured Before, during and after the test Every 10 min
4	Transient loss [a c]	$\delta IL \leq 0{,}5$ dB at 1 550 nm per active circuit during test	Method: Wavelengths: Source stability: Detector linearity: Measurements required: Active circuit:	EN 61300-3-28 1 550 nm ± 25 nm Within ± 0,05 dB over the measuring period Within ± 0,05 dB over the dynamic range to be measured Before, during and after the test 2 incoming fibres in series

[a] All optical losses indicated are referenced to the initial attenuation at the start of the test.

[b] Since the optical circuit is built by 2 incoming fibres the attenuation and change in attenuation values per incoming fibre will be calculated as half of the attenuation or change in attenuation of a circuit.

[c] A circuit is built by concatenation of 2 incoming fibres.

9.3 Mechanical ingress performance requirements

Table 5 — Mechanical ingress performance requirements

No.	Test	Requirement	Details	
5	Vibration	Ingress resistance (test 1) Visual appearance (test 2)	Method:	EN 61300-2-1
			Frequency range:	5 Hz - 500 Hz at 1 octave/min
			Amplitude / acceleration force:	1.5 mm or 0.5 g_n maximum
			Cross-over frequency:	9 Hz
			Number of sweeps	10 sweeps (5-500-5)
			Number of axes:	3 mutually perpendicular
			Test temperature:	+23 °C ± 3 °C
			Pre-conditioning procedure:	Sample should be conditioned to room temperature for at least 4 h.
6	Cable retention	Ingress resistance (test 1) Visual appearance (test 2)	Method:	EN 61300-2-4
			Test temperature:	23 °C ± 3 °C
			Load:	25 N on cables
			Duration:	1 h per cable
			Pre-conditioning procedure:	Sample should be conditioned to specified temperature for at least 4 h.
7	Impact	Ingress resistance (test 1) Visual appearance (test 2)	Method:	EN 61300-2-12 Method B
			Test temperature:	+23 °C ± 3 °C
			Impact tool:	Steel ball of 1 kg
			Drop height:	0.2 m
			Impact locations:	In the middle of the front side
			Number of impacts:	1 per location
			Pre-conditioning procedure:	Sample should be conditioned to specified temperature for at least 4 h.
8	Re-entries	Ingress resistance (test 1) Visual appearance (test 2)	Method:	EN 61300-2-33
			Test temperature:	+23 °C ± 3 °C
			Conditioning between each re-entry:	Ageing of minimum 1 temperature cycle as specified in test 9
			Number of re-entries:	10

9.4 Environmental ingress performance requirements

Table 6 — Environmental ingress performance requirements

No.	Test	Requirement	Details	
9	Change of temperature	Ingress resistance (test 1) Visual appearance (test 2)	Method:	EN 61300-2-22
			Extreme temperatures:	-10 °C ± 2 °C and +60 °C ± 2 °C
			Dwell time:	4 h
			Rate of change	1 °C/min
			Number of cycles:	5
			Recovery procedure:	4 h at normal ambient conditions

9.5 Mechanical optical performance requirements

Table 7 — Mechanical optical performance requirements

No	Test	Requirement	Details	
10	Vibration (sinusoidal)	Transient loss (test 4) Visual appearance (test 2)	Method: Test temperature: Frequency range: Amplitude / acceleration force: Cross-over frequency: Number of sweeps Number of axes: Optical circuit:	EN 61300-2-1 +23 °C ± 3 °C 5 Hz - 500 Hz at 1 octave/min 1.5 mm or 0.5 g_n maximum 9 Hz 10 sweeps (5-500-5) 3 mutually perpendicular 2 live circuits placed in series
11	Shock	Transient loss (test 4) Visual appearance (test 2)	Method: Test temperature: Severity: Duration: Wave form: Number of shocks: Axes: Optical circuit:	EN 61300-2-9 +23 °C ± 3 °C 15 g 11 milliseconds Half sine 3 per axis 3 mutually perpendicular 2 live circuits placed in series
12	Intervention and reconfiguration	Residual loss after test (test 4) Visual appearance (test 2)	Method: Test temperature: Operations: Optical circuit:	EN 61300-2-33 +23 °C ± 3 °C All manipulations that will normally occur during an intervention after initial installation. These are typically: 1. open box; 2. gaining access to previously installed fibres in the fibre management system; 3. remove cords, break splice or fibre, remove connector. Resplice and reinstall connector. Install new cord; 4. close box 1 live circuit containing two incoming fibres in series

9.6 Environmental optical performance requirements

Table 8 — Environmental optical performance requirements

No.	Test	Requirement	Details	
13	Change of temperature	Change in attenuation (test 3) Visual appearance (test 2)	Method:	EN 61300-2-22
			Low temperature:	-10 °C ± 2 °C
			High temperature:	+60 °C ± 2 °C
			Duration at temperature extreme:	4 h
			Rate of change of temperature:	1 °C/min
			Number of cycles:	5
			Measurements required:	Before, during (max. interval 10 min) and after the test
			Recovery procedure:	4 h at normal ambient conditions

9.7 Material performance requirements

Table 9 — Material performance requirements

No.	Test	Requirement	Details	
14	Flammability	On material test samples only Rating V0 or V1	Method:	EN 60695 -11-10
15	Zero halogen	On material test samples only Halogen content ≤ 5mg/g	Method :	EN 60754-1
16	Smoke emission	On material test samples only Transmittance >50%	Method:	EN 61034-2

Annex A
(informative)

Fibre for test sample details

Table A.1 — Fibre references

Fibre type:	EN 60793-2-50, Type B1.1 and B1.3 Dispersion unshifted single mode fibre
Proof stress strain:	≥ 1 %
Mode field diameter at 1 310 nm:	9,3 µm ± 0,7 µm
Mode field diameter at 1 550 nm:	10,5 µm ± 1,0 µm
Cabled fibre cut off wavelength:	≤ 1 260 nm
1 550 nm loss performance:	< 0,5 dB for 100 turns on 60 mm mandrel diameter
Cladding diameter:	125 µm ± 1 µm
Non coloured primary coating diameter:	245 µm ± 10 µm
Coloured primary coating diameter:	250 µm ± 15 µm

Table A.2 — Fibre references

Fibre type:	EN 60793-2-50, Type B6_a1 Low bend loss single mode fibre
Proof stress strain:	≥ 1 %
Mode field diameter at 1 310 nm:	Between 8,2 µm and 9,8 µm
Cabled fibre cut off wavelength:	≤ 1 260 nm
1 625 nm bend loss performance:	< 1 dB for 10 turns on 30 mm mandrel diameter < 1,5 dB for 1 turn on 20 mm mandrel diameter
Cladding diameter:	125,0 µm ± 0,7 µm
Non coloured primary coating diameter:	245 µm ± 10 µm
Coloured primary coating diameter:	250 µm ± 15 µm

Probability of mechanical failure:

Up to 2 m of B6 fibres stored with a minimum 15 mm bend radius will meet the 10^{-5} maximum mechanical failure probability limit as recommended by ITU-T G657. It should be noted that for certain B6_a1 fibre types a bending loss up to 0,5 dB at 1 550 nm and 2 dB at 1 625 nm can be expected in these conditions. Either using a less bend sensitive fibre type B6_a2, B6_b2 or B6_b3 or reducing the stored length will reduce this bending loss.

Annex B
(normative)

Sample size and product sourcing requirements

Table B.1 — Minimum sample size requirements

No.	Test	Sample size (see 2nd paragraph below the table)		
		Ingress	**Optical**	**Material**
0	Dimensional	3	NA	NA
1	Ingress resistance performance	Criterion	NA	NA
2	Visual appearance	Criterion	Criterion	NA
3	Change in attenuation	NA	Criterion	NA
4	Transient loss	NA	Criterion	NA
5	Vibration (sinusoidal)	3	NA	NA
6	Cable retention	3	NA	NA
7	Impact	3	NA	NA
8	Re-entries	3	NA	NA
9	Change of temperature	3	NA	NA
10	Vibration (sinusoidal) (optical)	NA	3	NA
11	Shock	NA	3	NA
12	Intervention and reconfiguration	NA	3	NA
13	Change of temperature (optical)	NA	3	NA
14	Flammability	NA	NA	3
15	Zero halogen	NA	NA	3
16	Smoke emission	NA	NA	3
NA = Not Applicable				

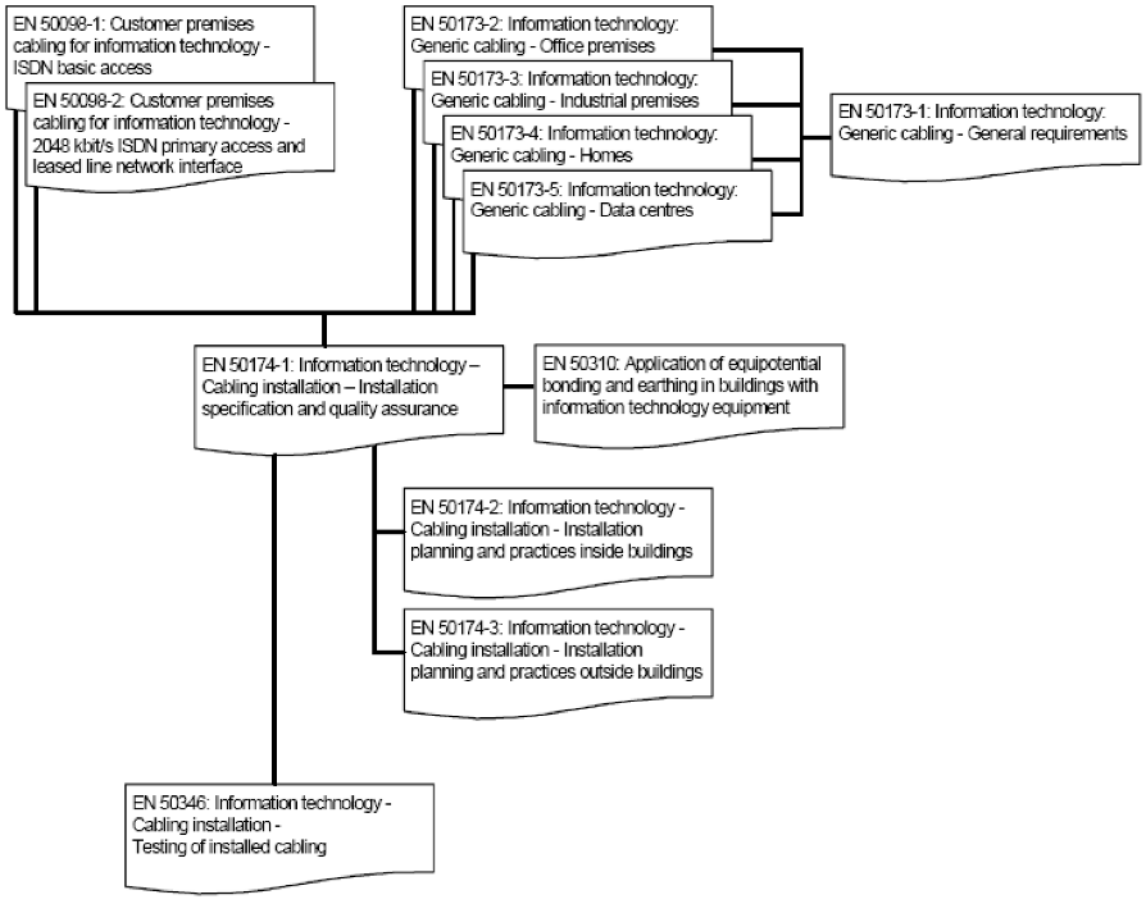
Tests 1 to 4 are performance criteria tests that need to be performed during and after the other mechanical or environmental tests (5 to 13). Tests 14 to 16 are material tests.

Separate test samples for ingress performance and optical performance evaluation may be used. The mechanical and climatic tests listed in Clause 9 can be done simultaneously on the ingress performance test samples and the optical test samples (only the final measurements or pass/fail criteria will be different).

Annex C
(informative)

Performance of copper cabling and connectivity

Performance of copper cabling and connectivity is not in the scope of this document, but should be carried out in line with EN 50346 which is shown as relationship diagram in Schematic 1 with relevant standards. This is also covered in EN 50173.



Schematic 1 – Relationship between EN 50346 and other relevant standards

Figure C.1

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[1] EN 50098 (all parts), *Customer premises cabling for Information Technology*

[2] EN 50173 (all parts), *Information technology — Generic cabling systems*

[3] EN 50174 (all parts), *Information technology — Cabling installation*

[4] EN 50310, *Application of equipotential bonding and earthing in buildings with information technology equipment*

[5] EN 50346, *Information technology — Cabling installation — Testing of installed cabling*

[6] EN 50411-2, *Fibre organisers and closures to be used in optical fibre communication systems — Product specifications — Part 2: General and guidance for optical fibre cable joint closures, protected microduct closures, and microduct connectors*

[7] EN 60794-2, *Optical fibre cables — Part 2: Indoor cables — Sectional specification (IEC 60794-2)*

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[9] EN 61753-1, *Fibre optic interconnecting devices and passive components performance standard — Part 1: General and guidance for performance standards (IEC 61753-1)*

[10] EN 61756-1, *Fibre optic interconnecting devices and passive components - Interface standard for fibre management systems — Part 1: General and guidance (IEC 61756-1)*

[11] EN 61758-1, *Fibre optic interconnecting devices and passive components — Interface standard for closures — Part 1: General and guidance (IEC 61758-1)*

[12] IEC TR 62048, *Optical fibres — Reliability — Power law theory*

[13] ETSI TS 102 873, *Access, Terminals, Transmission and Multiplexing (ATTM); Optical External Network Testing Interface*

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