BS EN 50411-3-5:2015

BSI Standards Publication

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

Part 3-5: Wall outlet

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National foreword

This British Standard is the UK implementation of EN 50411-3-5:2015.

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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

Fibre organisers and closures to be used in optical fibre communication systems - Product specifications - Part 3-5: Wall outlet

Organiseurs et boîtiers de fibres à utiliser dans les systèmes de communication par fibres optiques - Spécifications de produits - Partie 3-5: Prise murale

LWL-Spleißkassetten und Muffen für die Anwendung in LWL-Kommunikationssystemen - Produktspezifikationen - Teil 3-5: Wandanschlussdose

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European Committee for Electrotechnical Standardization
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Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

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European foreword

This document (EN 50411-3-5:2015) 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)	2016-06-11
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2018-06-15

EN 50411, *Fibre organisers and closures to be used in optical fibre communication systems — Product specifications*, is currently composed of the following parts:

— *Part 2: General and guidance for optical fibre cable joint closures, protected microduct closures, and microduct connectors*;

— *Part 2-2: Sealed pan fibre splice closures Type 1, for category S & A*;

— *Part 2-3: Sealed inline fibre splice closures Type 1, for category S & A*;

— *Part 2-4: Sealed dome fibre splice closures Type 1, for category S & A*;

— *Part 2-5: Sealed closures for air blown fibre microduct, type 1, for category S & A*;

— *Part 2-8: Microduct connectors, for air blown optical fibres, Type 1*;

— *Part 2-9: Non-sealed closures for air blown fibre microduct cable, for category S & A*;

— *Part 2-10: Sealed fibre splice closures type 2, category G, for FTTH optical distribution networks*;

— *Part 3-1: Fibre management system, splice wall box, for category C & G*;

— *Part 3-2: Singlemode mechanical fibre splice*;

— *Part 3-3: Singlemode optical fibre fusion splice protectors*;

— *Part 3-4: Fibre management system, modular splice and connector wall box, for category C & A* [currently at Enquiry stage];

— *Part 3-5: Wall outlet* [the present document];

— *Part 3-6: Multimode mechanical fibre splice for use in an outdoor protected environment (Cat U)*;

— *Part 3-8: Fibre management system, terminal equipment box type 1 for category C* [currently at Formal Vote stage];

— *Part 6-1: Unprotected microduct for category S and A*.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

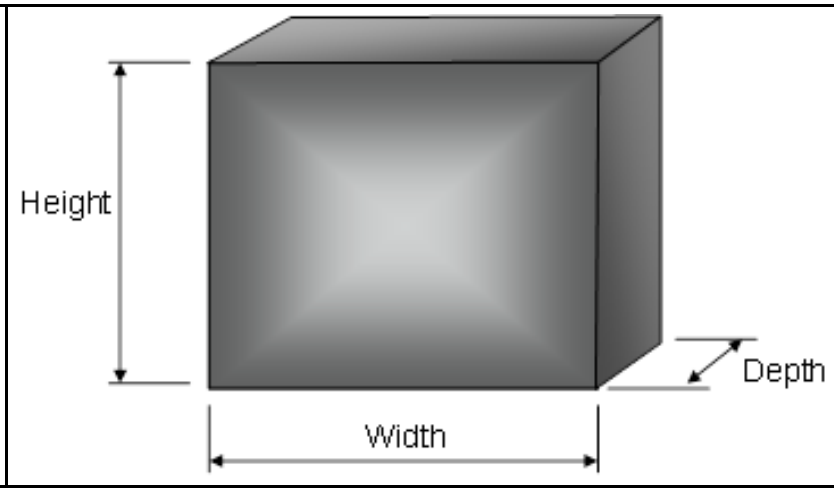
Fibre organisers and closures to be used in optical fibre communication systems – Product specifications

Part 3-5: Fibre management system, FTTH wall outlet, for category C

Description		**Performance**
Construction:	Wall /Flush/Trunking mounted outlet	**Applications:** Fibre line termination in FTTH networks for indoor controlled environments EN 61753-1 Category C
Cable Fixing:	Mechanical	**Sealing performance:** IP 40
Connector:	EN 50377 series EN 60603-7 series	
Fibre types:	EN 60793-2-50, B1 and B6	
Fibre management:	Integrated in wall outlet	

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**
	Width: 150 mm Height: 210 mm Depth: 60 mm

1 Scope

1.1 Product definition

This European Standard covers wall outlets for up to 4 SC foot-print adapters. Various connector types (e.g. SC, LC) can be implemented as long as the adapter fits in the SC foot-print dimensions.

A Wall Outlet is the passive end connection point of a fixed Single Mode fibre based FTTH network to the flexible network of service unit (CPE, ONT) indoor. Products defined by IEV 442-08-02 or IEV 723-09-22 can be considered as Wall Outlets. SI or ENTI are not part of this wall outlet specification.

This specification also covers the possibility of using hybrid (fibre/copper) wall outlets with 1 RJ-45 footprint.

Performance of copper cabling and connectivity is not in the scope of this document, but should be verified in line with EN 50346.

Wall outlets are placed in end user premises by installers and the contents are not intended to be user accessible. Wall outlets may be mounted using a number of techniques: surface mounted on a wall, patress boxes, trunking or raceway; flush mounted or between cable trunking. Cable entry points vary with mounting method: surface mounted or flush mounted boxes may require large holes at the rear of the wall outlet for cable entry requiring little or no strain relief, whereas boxes with cable entry visible to the end user will need cable sealing and strain relief.

Wall outlets covered in the product specification will include a fibre management system (FMS) for managing the incoming cables or fibres. The FMS may include trays for splicing pigtails to incoming cable/fibre.

This European Standard contains the initial, start of life dimensional, optical, mechanical and environmental performance requirements of an optical fibre wall outlet, in order for it to be categorized as an European Standard product.

1.2 Operating environment

The tests selected combined with the severity and duration is representative of indoor 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 recognized 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 recognized quality assurance programme.

1.5 Allowed fibre and cable types

All EN 60793-2-50 fibres can be stored in the Wall Outlet with a minimum storage radius of 20 mm (up to a storage 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 4.2). If hybrid cable is used then only the fibre portion is considered in this product specification.

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 specification*

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 61300-2-1:2009, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-1: Tests — Vibration (sinusoidal)(IEC 61300-2-1:2009)*

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 2-9: Tests — Shock (IEC 61300-2-9)*

EN 61300-2-12:2009, *Fibre optic interconnecting devices and passive components — Basic test and measurement procedures — Part 2-12: Tests — Impact (IEC 61300-2-12:2009)*

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 61300-3-3:2009, *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 61300-3-3:2009)*

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

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

3.1 Terms and definitions

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
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

For the purposes of this document, the following abbreviations apply.

MD Microduct

FMS Fibre Management System

FPFT Factory Polished Field Terminated

4 Description

4.1 Optical fibre wall outlet

The wall outlet provides:

— facilities for environmental protection,

— housing for a fibre management system,

— prevention of ingress of objects larger than 1 mm in diameter.

This European Standard is also applicable to wall outlets used for blowing microduct cable or fibre. The design of a wall outlet housing shall allow the jointing of a minimum of one incoming cable to the specified numbers of outputs.

It is desirable that the wall outlet can be re-opened when necessary without interruption or disturbance of the traffic of the live circuits.

Examples of typical wall outlet applications are given in Figure 1.

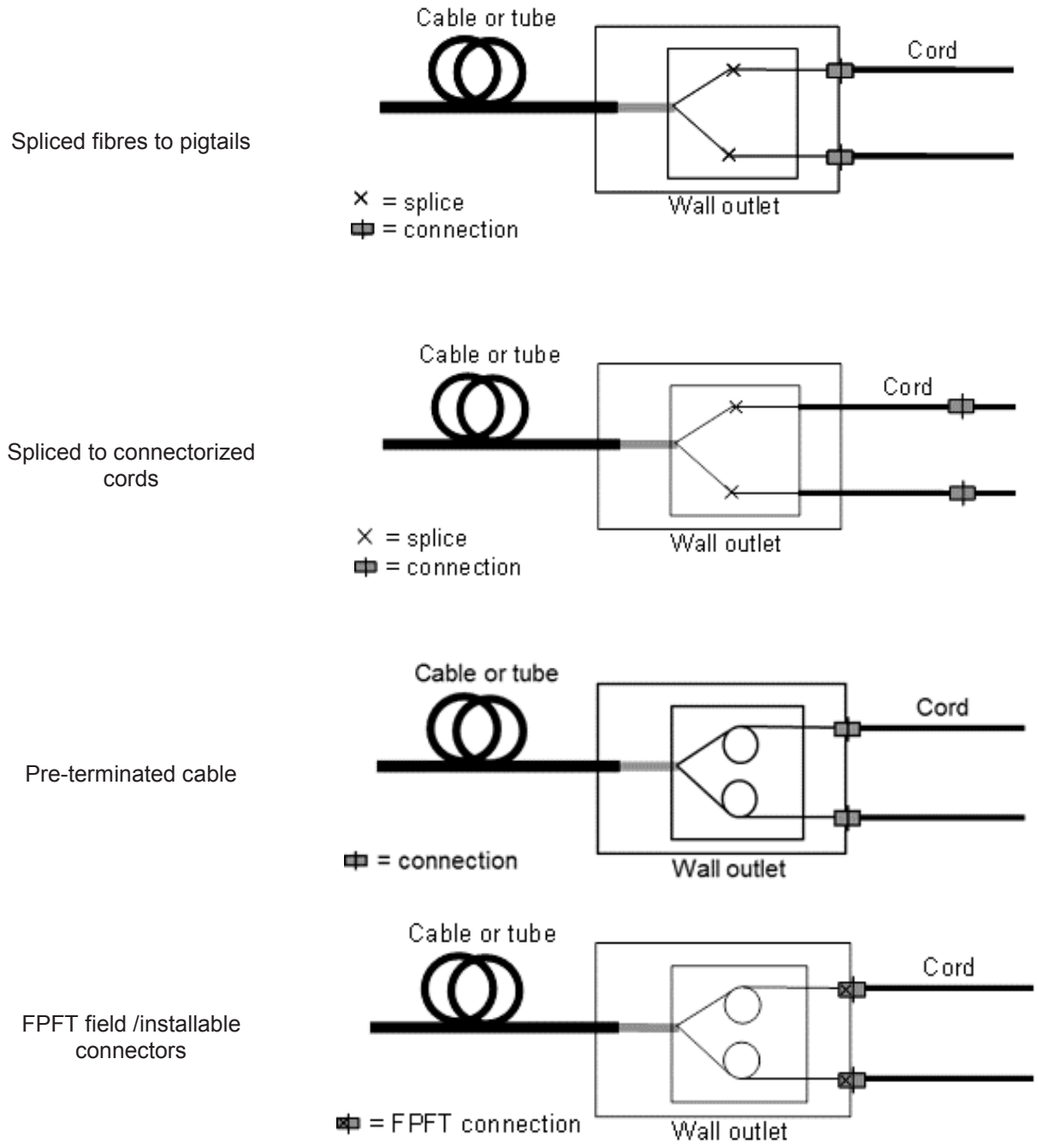


Figure 1 — Examples of wall outlet applications

4.2 Optical fibre minimum storage and bending radius

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 G.657. 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.

4.3 Cable fixing

Cable or microduct fixing shall be secured by means of mechanical attachment commensurate with the type of wall outlet. If the wall outlet cable entry is through microduct, then axial movement of the fibre with respect to the microduct shall be taken into account.

4.4 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.

4.5 Materials

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

Wall outlet 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, for example, white spirit or isopropyl alcohol.

4.6 Laser safety

Laser safety shall be in accordance with EN 60825-2. Flying leads should have protective caps fitted when not in use.

4.7 Marking and identification

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

a) identification of supplier;

b) manufacturing date code: year / month.

5 Variants

Table 1 — Optical fibre wall outlet Type 1, for category C – variants
EN 50411-3-5– C- X_1 – X_2 –X X_3 – X_4 – X_5 – X_6

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
V	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 only
20	20 mm storage radius for B1.1, B1.3 and B6

Variant No. X_4	Splice tray
0	No splice capability
1	Splice tray capability

Variant No. X_5	Number of ports
0	No adapter (up to 4 pigtails)
1	1 SC footprint
2	2 SC footprints
4	4 SC footprints

Variant No. X_6	RJ45 port
0	No RJ45 port
1	One RJ45 port

6 Dimensional requirements

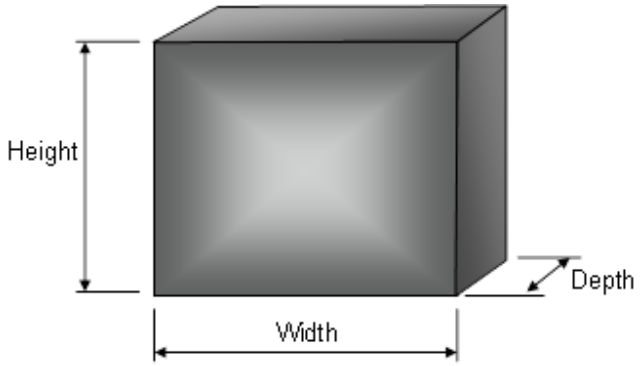


Figure 2 — Wall outlet outline dimensions

Table 2 — Maximum outline dimensions for Wall Outlet

Width (in mm)	Height (in mm)	Depth (in mm)
150	210	60

7 Tests

7.1 Test sample size

Separate test samples for intrusion performance and optical evaluation may be used. For the purposes of this standard, an intrusion performance test sample is defined as a wall outlet 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.

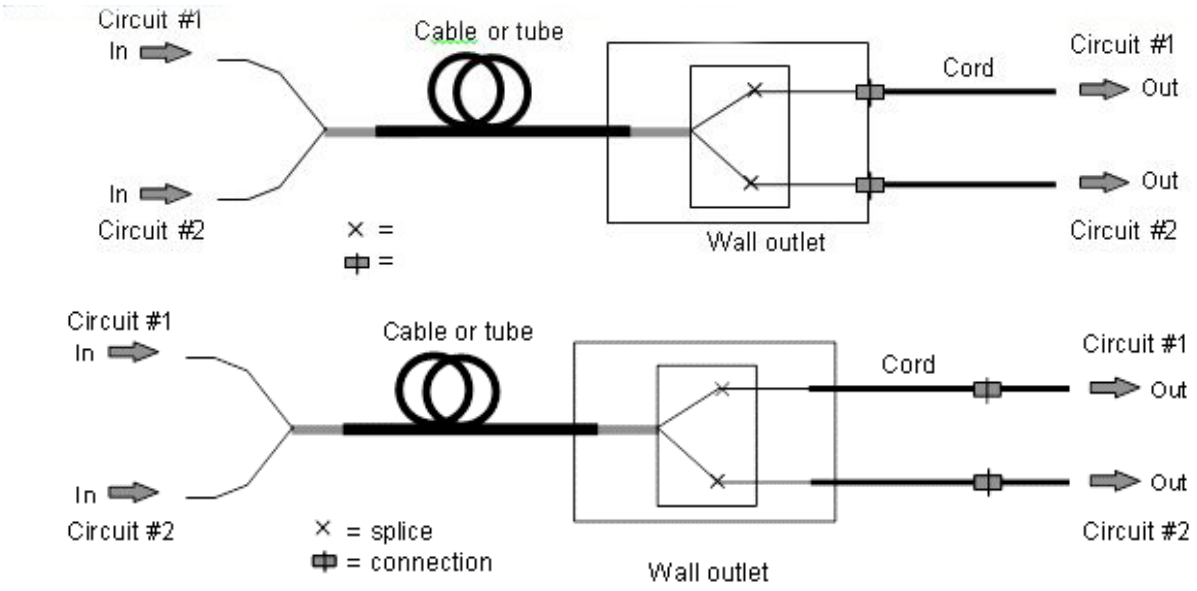
The minimum recommended sample sizes are given in Annex B.

7.2 Test sample preparation

Intrusion performance test samples shall be installed with cables and/or tubes. The length of the cables and 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 a wall outlet. The fibres for the optical test samples with 20 mm fibre storage radius are EN 60793-2-50 B1.3 (information given in Annex A, 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 Annex A, Table A.2).

Optical test sample constructions:



Key

x Splice can be fusion or mechanical splice. Alternatively, factory terminated connectors or field installable connectors can be used.

Figure 3 — Wall outlet optical test sample construction

Cords shall be compliant with the EN 50377 series. When applicable at least 2 circuits shall be built, each circuit containing one fibre splice and one connection.

7.3 Test and measurement methods

All tests and measurements have been selected from 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 for the environmental optical tests, and at 1 550 nm ± 25 nm and 1 625 nm ± 25 nm for the mechanical optical tests.

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

There is no defined sequence in which tests 5 to 16 shall be run.

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 has to be redone completely.

8 Test report

A fully documented test report and supporting data shall be prepared and must 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 4.7 and Clause 6 and shall be measured using the appropriate European Standard test method.

9.2 Ingress, optical and appearance performance criteria

Table 4 — Ingress, optical and appearance performance criteria

No.	Test	Requirement	Details	
1	Ingress resistance	IP 40 No ingress of objects or wires with diameter larger than 1,0 mm	Method: Test temperature: Pre-conditioning procedure:	EN 60529 23 °C ± 3 °C Sample should be conditioned to room temperature for at least 4 h.
2	Visual appearance	No defects which would affect functionality of the wall outlet	Method: Examination:	EN 61300-3-1 Product shall be checked with no magnification.
3	Change in attenuation (NOTE)	Excursion losses: δIL ≤ 0,2 dB at 1 310 nm and 1 550 nm per incoming fibre during test δIL ≤ 0,5 dB at 1 625 nm per incoming fibre during test Residual losses: δIL ≤ 0,2 dB at 1 310 nm, 1 550 nm and 1 625 nm per incoming fibre 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 (NOTE)	Transient losses: δIL ≤ 0,5 dB at 1 550 nm per active circuit during test δIL ≤ 1 dB at 1 625 nm per active circuit during test Residual losses: δIL ≤ 0,2 dB at 1 550 and 1 625 nm per active circuit after test	Method: Wavelengths: Source stability: Detector linearity: Measurements required: Active circuit:	EN 61300-3-28 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 2 incoming fibres in series
NOTE 1 This performance criterion is for the parts accessible when the box is mounted. NOTE 2 All optical losses indicated are referenced to the initial attenuation at the start of the test.				

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 61300-2-1:2009
			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 61300-2-12:2009 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 largest surface, typically the cover
			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: Extreme temperatures: Dwell time: Rate of change Number of cycles: Recovery procedure:	EN 61300-2-22 -10 °C ± 2 °C and +60 °C ± 2 °C 4 h 1 °C/min 5 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 61300-2-1:2009 +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

No	Test	Requirement	Details	
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, remove connector. Resplice and reinstall connector. Install new cord; 4. close box 1 live circuit containing 2 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: Low temperature: High temperature: Duration at temperature extreme: Rate of change of temperature: Number of cycles: Measurements required: Recovery procedure:	EN 61300-2-22 -10 °C ± 2 °C +60 °C ± 2 °C 4 h 1 °C/min 5 Before, during (max. interval 10 min) and after the test 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

Annex B
(normative)

Sample size and product sourcing requirements

Table B.1 — Minimum sample size requirements

No.	Test	Sample size		
		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 other mechanical or environmental tests (6 to 13). Tests 14 to 16 are material tests.

Annex C
(informative)

Relationship of EN 50346 with other copper cabling standards

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 the EN 50173 series.

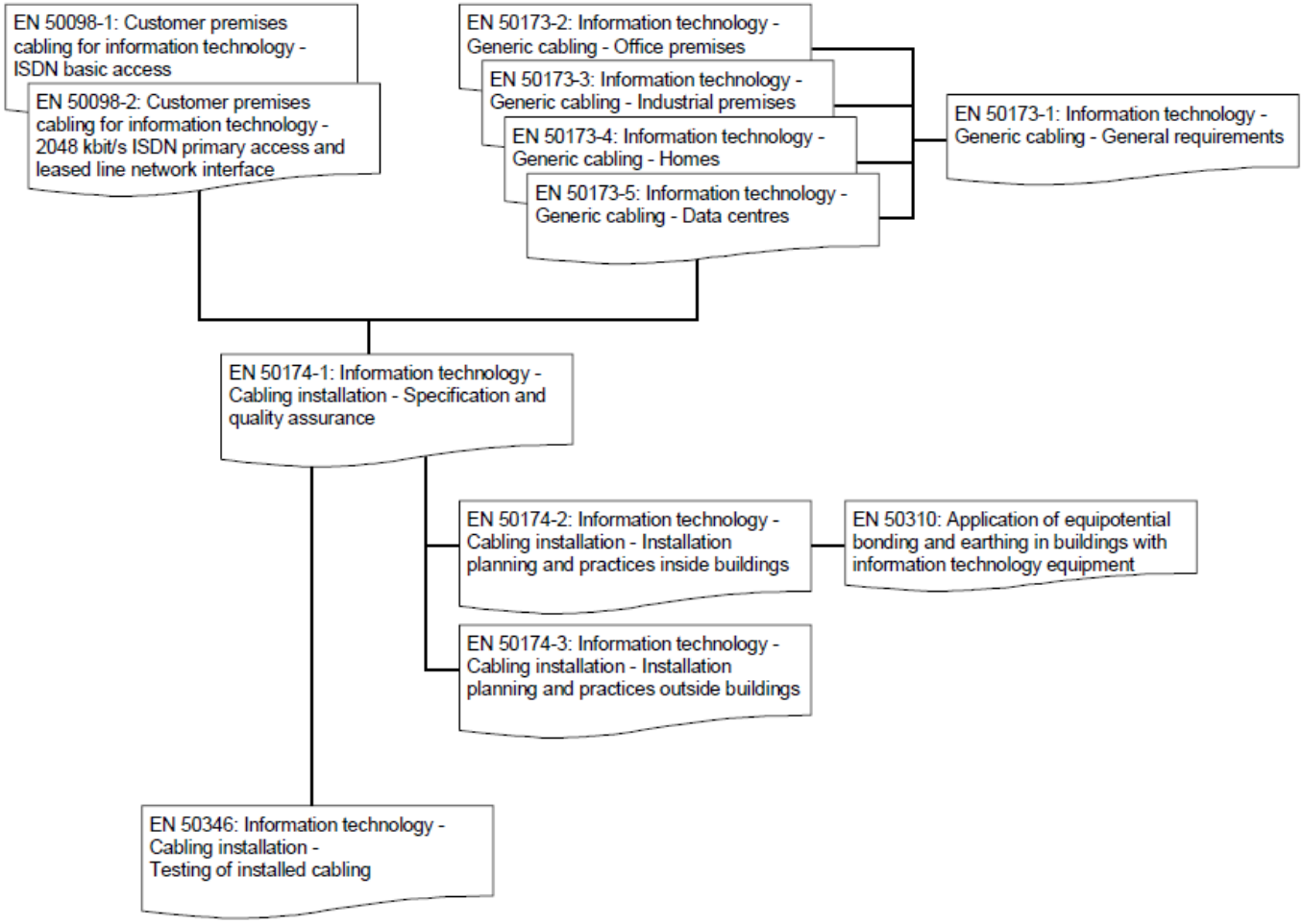


Figure C.1 — Relationship of EN 50346 with other copper cabling standards

Bibliography

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[2] EN 50173-1, *Information technology — Generic cabling systems — Part 1: General requirements*

[3] EN 50173-2, *Information technology — Generic cabling systems — Part 2: Office premises*

[4] EN 50173-3, *Information technology — Generic cabling systems — Part 3: Industrial premises*

[5] EN 50173-4, *Information technology — Generic cabling systems — Part 4: Homes*

[6] EN 50173-5, *Information technology — Generic cabling systems — Part 5: Data centres*

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

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

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

[10] 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*

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

[12] EN 60794-2-50, *Optical fibre cables — Part 2-50: Indoor cables — Family specification for simplex and duplex cables for use in terminated cable assemblies (IEC 60794-2-50)*

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

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

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

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

[18] IEC/TR 62721, *Reliability of devices used in fibre optic systems — General and guidance*

[19] IEC/TR 62785, *Guidance on the environmentally conscious design of fibre optics related products and subsystems*

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

[21] ITU-T G.657 *Fibres, Bend-insensitive single-mode fibres for access networks and customer premises*

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