BS EN 50551-2:2013

BSI Standards Publication

Simplex and duplex cables to be used for cords

Part 2: Detailed specification and minimum requirements for a 3,0 mm simplex ruggedised single mode fibre cable to be used for patchcords/cords category U

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee GEL/86/1, Optical fibres and cables.

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

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English version

Simplex and duplex cables to be used for cords - Part 2: Detailed specification and minimum requirements for a 3,0 mm simplex ruggedised single mode fibre cable to be used for patchcords/cords category U

Câbles simplex et duplex destinés à être utilisés en tant que cordons - Partie 2: Spécifications particulières et exigences minimales relatives aux câbles à fibres optiques unimodales renforcés simplex de 3,0 mm pour usage en cordons / cordons de brassage, en Catégorie U

Simplex- und Duplex-Kabel, die in konfektionierten Leitungen benutzt werden - Teil 2: Bauartspezifikation und Mindestanforderungen für ein 3,0 mm-Simplex-Einmodenfaserkabel mit zusätzlichem Schutz für konfektionierte Kabel/Leitungen der Kategorie U

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Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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

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Contents

Page

Foreword

This document (EN 50551-2:2013) has been prepared by CLC/TC 86A "Optical fibres and optical fibre cables".

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)	2014-08-19
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2016-08-19

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EN 50551 is composed with the following parts:

- EN 50551-1, *Simplex and duplex cables to be used for cords — Part 1: Blank Detail Specification and minimum requirements*;

- EN 50551-2, *Simplex and duplex cables to be used for cords — Part 2: Detailed specification and minimum requirements for a 3,0 mm simplex ruggedised single mode fibre cable to be used for patchcords/cords category U*.

This European Standard was jointly prepared by the Technical Committee CLC/TC 86A "Optical fibres and optical fibre cables", and the Technical Committee CLC/TC 86BXA "Fibre optic interconnect, passive and connectorised components".

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1 Scope

This European Standard describes the minimum set of requirements that a simplex ruggedised single mode fibre cable shall meet in order to allow termination with a connector for use in category U (Uncontrolled Environment).

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 60793-1-20, *Optical fibres — Part 1-20: Measurement methods and test procedures — Fibre geometry (IEC 60793-1-20)*

EN 60793-1-21, *Optical fibres — Part 1-21: Measurement methods and test procedures — Coating geometry (IEC 60793-1-21)*

EN 60793-1-40, *Optical fibres — Part 1-40: Measurement methods and test procedures — Attenuation (IEC 60793-1-40)*

EN 60793-1-44, *Optical fibres — Part 1-44: Measurement methods and test procedures — Cut-off wavelength (IEC 60793-1-44)*

EN 60793-1-45, *Optical fibres — Part 1-45: Measurement methods and test procedures — Mode field diameter (IEC 60793-1-45)*

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

EN 60794-1 (all parts), *Optical fibre cables (IEC 60794-1, all parts)*

EN 60794-2 (all parts), *Optical fibre cables — Part 2: Indoor cables (IEC 60794-2, all parts)*

EN 60794-2-50:2008, *Optical fibre cables — Part 2-50: Indoor cables — Family specification for simplex and duplex cables for use in terminated cable assemblies (IEC 60794-2-50:2008)*

EN 60811-201, *Electric and optical fibre cables — Test methods for non-metallic materials — Part 201: General tests — Measurement of insulation thickness (IEC 60811-201)*

EN 60811-203, *Electric and optical fibre cables — Test methods for non-metallic materials — Part 203: General tests — Measurement of overall dimensions (IEC 60811-203)*

EN 61034-1, *Measurement of smoke density of cables burning under defined conditions — Part 1: Test apparatus (IEC 61034-1)*

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

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

IEC 60332-3-25, *Tests on electric and optical fibre cables under fire conditions — Part 3-25: Test for vertical flame spread of vertically-mounted bunched wires or cables — Category D*

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

IEC 60754-2, *Test on gases evolved during combustion of materials from cables — Part 2: Determination of acidity (by pH measurement) and conductivity*

3 Cable description

(1) Prepared by	CLC/TC 86A		(2) Document No : Issue : Date :	
(3) Available from :	(4)	Generic Specification	:	EN 60794-1
		Sectional Specification	:	EN 60794-2 (all parts)
		Family Specification	:	EN 60794-2-50
		Product Specification	:	-
(5) Additional references :				
(6) Cable description : Simplex ruggedised single mode cables to be used for patchcords/cords according to EN 61753-1 Category *U*				
(7) Cable construction :				
Optical fibres				B1.1, B1.3, B6a, B6b
Fibre count				1
Construction - Tight or semi-tight secondary coating - Strength Elements – non metallic - Strength Elements - metallic Lay-up: Buffer - Material - Nominal outer diameter Sheath - Material - Maximum diameter - Nominal thickness - Thickness tolerances - Colour Additional armouring (if required) - Non-metallic armouring - Metallic armouring Marking identification - Customer requirement				 tight buffer coated Strength Elements – aramid yarns - 900 μm LSZH (see fire requirements) 3,0 mm ± 0,2 mm Yellow recommended None

(8) Application information	
Application (work area cord, equipment cord, patchcord, etc.)	Work area cord, equipment cord, patchcord
Maximum tensile load (short term load for installation)	≥ 150 N Max fibre strain 0,45 % at max tensile load
Number of repeated bending	500 cycles
Minimum bending radius for operation	30 mm
Minimum bending radius for installation	60 mm because of bending and tension at the same time (dynamic)
Temperature range :	
- Transport and storage	-45 °C to +70 °C
- Installation	-5 °C to +45 °C
- Operation	-25 °C to +70 °C
Fire performance	IEC 60332-3-25 EN 61034-1/-2 and IEC 60754-1/-2 or according to local regulations

4 Optical fibres — Single mode optical fibre

(9) Characteristics	Family specification (10)	Requirements (11)	Test methods (12)	Remarks (13)
Uncabled optical fibre	EN 60793-2-50, B1.1, B1.3, B6a, B6b	EN 60793-2-50, B1.3		
Attenuation coefficient (cabled fibres) at 1 310 nm at 1 383 nm at 1 550 nm and at 1 625 nm, etc. Attenuation Discontinuities at 1 310 nm and 1 550 nm		 0,4 dB/km 0,4 dB/km 0,3 dB/km 0,4 dB/km None	 EN 60793-1-40 EN 60793-1-40	
Cabled fibre cut-off wavelength, λ_{cc}		≤ 1 260 nm	EN 60793-1-44	
Nominal mode field diameter Mode field diameter tolerance - at 1 310 nm		9,2 μm ±0,3 μm	EN 60793-1-45	
Core/cladding concentricity		< 0,6 μm	EN 60793-1-20	
Cladding non-circularity		< 1 %	EN 60793-1-20	
Cladding diameter		125 μm	EN 60793-1-20	
Cladding diameter tolerance		± 0,7 μm	EN 60793-1-20	
Primary coating nominal diameter		245 μm	EN 60793-1-21	
Primary coating nominal diameter tolerance		± 10 μm	EN 60793-1-21	

5 Buffer

(10) Characteristics	Family specification EN 60794-2-50 :2008, Clause	Requirements	Test methods	Remarks
Construction: - tight - semi-tight	4.3	 -Tight		
Filler	-	None		
Strippability: - tight - semi-tight	4.3	 Tight tube 50 mm – one pass with a force of up to 15 N	 EN 60794-2-50, E21	
Shrinkage: - tight - semi-tight	-	 N/A		

6 Cable construction

6.1 General

(11) Characteristics	EN 60794-2-50:2008 Subclause	Requirements			Test methods	Remarks
Lay-up	-				Visual inspection	
Cable core	-					
Strength member - under the sheath - in the sheath	4.5	under the sheath			Visual inspection	
Outer cable sheath Material Local minimum sheath thickness Outer diameter Optional protection	4.6 - 4.6 4.6 -	0,5 mm 3,0 mm ± 0,2 mm			EN 60811-201 EN 60811-203	
Sheath marking Configuration, dimensions	4.7 -				Visual inspection	
Sheath marking abrasion resistance	4.7	Steel needle diameter d = 1,0 mm load: 4 N			EN 60794-1-2, Method E2B, Method 1	
Sheath shrinkage	5.3.2	Class 3 < 2%	Class 2 < 1 %	Class 1 < 0,5%	EN 60794-1-22, F11	
Buffered fibre movement in compression	5.2.10	1 mm distance with a force of 1 N at 0,4 mm (each sample to be tested before and after aging at 70 °C for 24 h, 1 cycle)			EN 60794-2-50:2008, Annex D (no attenuation measurement is needed)	
Sheath pull-off force		1 N for 50 mm			EN 60794-2-50:2008, Annex B	
Sheath abrasion resistance	4.6	Steel needle diameter d = 1,0 mm load: 4 N			EN 60794-1-2, E2A	

6.2 Mechanical and environmental tests

(12) Characteristics	EN 60794-2-50:2008, Clause	Requirements	Test methods	Remarks
General	5			Wavelength for all tests: 1 550 nm
Tensile performance	5.2.1	150 N	EN 60794-1-2, Method E1A and E1B	Attenuation variation < 0,1 dB during test
Installation capability (selection from the following)	-			
- bending under tension	-		EN 60794-1-2, Method E18	Attenuation variation < 0,1 dB after test
- repeated bending	5.2.4	500 cycles	EN 60794-1-2, Method E6	Attenuation variation < 0,1 dB after test
- impact	5.2.3	1 J, R = 12,5 mm, 3 at different location 500 mm apart	EN 60794-1-2, Method E4	Attenuation variation < 0,1 dB after test
- kink	5.2.8	10 mm	EN 60794-1-2, Method E10	No residual damage or kinks after test
Torsion	5.2.6	25 N at 1 N/s 25 cycles ± 180 degrees 250 mm length	EN 60794-1-2, Method E7	Attenuation variation < 0,1 dB during test. No mechanical damage
Cable bend	5.2.5	30 mm radius 6 turns of helix and 3 cycles	EN 60794-1-2, Method E11A	Attenuation variation < 0,1 dB during test
Crush	5.2.2	500 N	EN 60794-1-2, Method E3	Attenuation variation < 0,1 dB during test
Temperature cycling	5.3.1	Length 10 m -25 °C to +70 °C	EN 60794-1-22, Method F12	Attenuation variation < 0,1 dB during test

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