

Optical fibre cables —

Part 3-10: Outdoor cables — Family specification for duct and directly buried optical telecommunication cables

The European Standard EN 60794-3-10:2002 has the status of a
British Standard

ICS 33.180.10

National foreword

This British Standard is the official English language version of EN 60794-3-10:2002. It was derived by CENELEC from IEC 60794-3-10:2002. It supersedes BS EN 187101:1995 which is withdrawn.

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by common modification tags  .

The UK participation in its preparation was entrusted by Technical Committee GEL/86, Fibre optics, to Subcommittee GEL/86/1, Optical fibres and cables, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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English version

Optical fibre cables
Part 3-10: Outdoor cables -
Family specification for duct and directly buried
optical telecommunication cables
(IEC 60794-3-10:2002, modified)

Câbles à fibres optiques
Partie 3-10: Câbles extérieurs -
Spécification de famille pour les câbles
optiques de télécommunication
destinés à être installés dans des conduites
ou à être directement enterrés
(CEI 60794-3-10:2002, modifiée)

Lichtwellenleiterkabel
Teil 3-10: Außenkabel -
Familienspezifikation
für LWL-Fernmelde-Erd- und Röhrenkabel
(IEC 60794-3-10:2002, modifiziert)

This European Standard was approved by CENELEC on 2002-03-05. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 86A/749/FDIS, future edition 1 of IEC 60794-3-10, prepared by SC 86A, Fibres and cables, of IEC TC 86, Fibre optics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60794-3-10 on 2002-03-05.

A draft amendment, prepared by the Technical Committee CENELEC TC 86A, Optical fibres and optical fibre cables, was submitted to the formal vote and was approved by CENELEC for inclusion in EN 60794-3-10 on 2002-03-05.

This European Standard supersedes EN 187101:1995

The following dates were fixed:

- latest date by which the EN has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2003-01-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2005-03-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60794-3-10:2002 was approved by CENELEC as a European Standard with agreed common modifications.

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OPTICAL FIBRE CABLES –

Part 3-10: Outdoor cables – Family specification for duct and directly buried optical telecommunication cables

1 Scope

This part of IEC 60794 is a family specification that covers optical telecommunication cables to be used in ducts or direct buried applications. Requirements of the sectional specification IEC 60794-3 for duct, buried and aerial cables are applicable to cables covered by this standard.

Clause 5 describes a blank detail specification for optical telecommunication cables to be used in ducts or direct buried application. It incorporates some minimum requirements.

Detail specifications may be prepared on the basis of this family specification.

The parameters specified in this standard may be affected by measurement uncertainty arising either from measurement errors or calibration errors due to lack of suitable standards. Acceptance criteria should be interpreted with respect to this consideration (see IEC 60794-3, clause 9).

The number of fibres tested is representative of the cable design and should be agreed between the user and the manufacturer.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60304:1982, *Standard colours for insulation for low-frequency cables and wires*

IEC 60793-1-20:2001, *Optical fibres – Part 1-20: Measurement methods and test procedures – Fibre geometry*

IEC 60793-1-40:2001, *Optical fibres – Part 1-40: Measurement methods and test procedures – Attenuation*

IEC 60793-1-44:2001, *Optical fibres – Part 1-44: Measurement methods and test procedures – Cut-off wavelength*

IEC 60793-2:1998, *Optical fibres – Part 2: Product specifications*

IEC 60794-1-1:2001, *Optical fibre cables – Part 1-1: Generic specification – General*

IEC 60794-1-2:1999, *Optical fibre cables – Part 1-2: Generic specification – Basic optical cable test procedures*

IEC 60794-3:2001, *Optical fibre cables – Part 3: Sectional specification – Outdoor cables*

IEC 60811-1-1:1993, *Common test methods for insulating and sheathing materials of electric cables and optical cables – Part 1-1: Methods for general application – Measurement of thickness and overall dimensions – Tests for determining the mechanical properties*

IEC 60811-5-1:1990, *Common test methods for insulating and sheathing materials of electric cables – Part 5: Methods specific to filling compounds. Section one – Drop-point – Separation of oil – Lower temperature brittleness – Total acid number – Absence of corrosive components – Permittivity at 23 °C – D.C. resistivity at 23 °C and 100 °C*

3 Symbols

For the purposes of this part of IEC 60794 the following symbols apply.

λ_{cc}	Cabled fibre cut-off wavelength
d	Nominal outer diameter of the cable
DS	Detail specification
T_O	Threshold tensile load below which no attenuation and/or fibre strain increase should occur in the tensile performance test
T_M	The acceptable amount of short-term tensile load that can be applied to the cable without permanent degradation of the characteristics of the fibres in the tensile performance test
T_{A1}	Temperature cycling test low-temperature limit according to IEC 60794-1-2, Method F1
T_{A2}	Temperature cycling test low-temperature limit according to IEC 60794-1-2, Method F1
T_{B1}	Temperature cycling test high-temperature limit according to IEC 60794-1-2, Method F1
T_{B2}	Temperature cycling test high-temperature limit according to IEC 60794-1-2, Method F1
t_1	Temperature cycling test dwell time
$n \times d$	A value times cable outer diameter used for bends, mandrels, etc.

4 Family specification for optical telecommunication cables to be used in ducts or buried application (blank detail specification and minimum requirements)

4.1 Cable description

(1) Prepared by		(2) Document No: Issue: Date:
(3) Available from:	(4) Generic specifications: Sectional specification:	IEC 60794-1-1 and IEC 60794-1-2 IEC 60794-3
(5) Additional references:		
(6) Cable description:		
(7) Cable construction:		
Optical fibres		
Range of fibre count		
Modularity		
Construction – Single-coloured fibre – Tube – filled – Tube – unfilled – Slotted core – filled – Slotted core – unfilled – Tight secondary coating – Ribbon in slotted core – Ribbon in tube Tube in tube – Central member – metallic – Central member – non-metallic – Core filling – jelly – Core filling – water swellable materials Lay-up – Stranding (helical or SZ) – Single unit – Hybrid configuration Insulated copper conductors Inner sheath Peripheral strength member – Metallic – Non-metallic Moisture barrier – Single-coated aluminium tape – Double-coated aluminium tape – Double-coated steel tape – Hermetic barrier (metal tube) Outer sheath Additional armouring – Non-metallic armouring – Metallic armouring Additional outer sheath Marking identification – Customer requirement – Identification of manufacturer		Additional remarks

(8) Application information:	
Application (duct or direct buried)	
Maximum outer diameter (d)	mm
Rated maximum tensile load	N
Minimum bending radius for no-load bending	mm or $n \times d$
Minimum bending radius for rated-load bending	mm or $n \times d$
Temperature range:	
– Transport and storage	°C
– Installation	°C
– Operation	°C
Manufacturing cable length	
– Typical	m
– Nominal/tolerances:	–0 +1%

4.2 Optical fibres

4.2.1 Single-mode dispersion unshifted (B1.1) optical fibre

Characteristics (9)	IEC 60794-3 Clause (10)	Family requirements (11)	Test methods (12)	Remarks (13)
Uncabled optical fibre	5	IEC 60793-2		
Attenuation coefficient (cabled fibres) at 1 310 nm at 1 550 nm and at 1 6XX nm, etc.	5.2.1	According to DS $\leq 0,40$ dB/km $\leq 0,35$ dB/km $\leq 0,40$ dB/km	IEC 60793-1-40 methods A, B or C	Note: XX $\leq$ 25 nm
Attenuation discontinuities at 1 310 and 1 550 nm	5.2.2.1	$\leq 0,10$ dB	IEC 60793-1-40 Method C	
Cabled fibre cut-off wavelength	5.3	$\lambda_{cc} < \lambda$ operational	IEC 60793-1-44 Method B	
Fibre colouring	5.4	IEC 60304	Visual inspection	
Outer diameter including colouring	8.2.1.1	IEC 60793-2	IEC 60793-1-20 Method D	