

**Harmonized system of quality  
assessment for electronic components**

# **Family specification: Optical telecommunication cables to be used in ducts or direct buried application**

The European Standard EN 187101:1995 has the status of a  
British Standard

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# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee, EPL/86, Fibre optics, to subcommittee EPL/86/1, Optical fibres and cables, upon which the following bodies were represented:

- British Approvals Service for Cables
- British Cable Makers Confederation
- British Telecommunications plc
- Department of Trade and Industry (National Physical Laboratory)
- Federation of the Electronics Industry
- Ministry of Defence
- National Supervising Inspectorate (BSI PC)

This British Standard, having been prepared under the direction of the Electrotechnical Board, was published under the authority of the Standards Board and comes into effect on 15 October 1995

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# Contents

|                        | Page               |
|------------------------|--------------------|
| Committees responsible | Inside front cover |
| National foreword      | ii                 |
| Foreword               | 2                  |
| Text of EN 187101      | 3                  |
| List of references     | Inside back cover  |

# National foreword

This British Standard has been prepared by Subcommittee EPL/86/1 and is the English language version of EN 187101:1995 *Family Specification: Optical telecommunication cables to be used in ducts or direct buried application*, including the corrigendum: 1995, published by the Electronic Component Committee (CECC) of the European Committee for Electrotechnical Standardization (CENELEC).

## Cross-references

| Publication referred to                  | Corresponding British Standard                                                                                                                                                                                                                                                                                                                            |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EN 187000:1992                           | BS EN 187000:1994 <i>Generic specification for optical fibre cables</i>                                                                                                                                                                                                                                                                                   |
| EN 188000:1992                           | BS EN 188000:1994 <i>Generic specification for optical fibres</i>                                                                                                                                                                                                                                                                                         |
| EN 188101:1995                           | BS EN 188101:1995 <i>Family specification: Single-mode dispersion unshifted (B1.1) optical fibre</i>                                                                                                                                                                                                                                                      |
| HD 402 S2:1984<br>(IEC 304:1982)         | BS 6746C:1993 <i>colour chart for insulation and sheath of electric cables</i><br><br>BS 6469 <i>Insulating and sheathing materials of electric cables</i><br>Part 1 <i>Methods of test for general application</i>                                                                                                                                       |
| HD 505.1.1 S3:1991<br>(IEC 811-1-1:1985) | Section 1: 1992 <i>Measurement of thickness and overall dimensions. Tests for determining the mechanical properties</i>                                                                                                                                                                                                                                   |
| HD 505.4.2 S1:1992<br>(IEC 811-4-2:1990) | Part 4 <i>Methods of test specific to polyethylene and polypropylene compounds</i><br>Section 4.2:1992 <i>Elongation at break after pre-conditioning. Wrapping test after pre-conditioning. Wrapping test after thermal ageing in air. Measurement of mass increase. Long-term stability test. Test method for copper-catalysed oxidative degradation</i> |
| HD 505.5.1 S1:1992<br>(IEC 811-5-1:1990) | Part 5 <i>Methods of test specific to filling compounds</i><br>Section 5.1:1992 <i>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.</i>                                                                                                |

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## Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 26, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

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Descriptors: Family specification, quality, electronic components, optical telecommunication cables

English version

## Family Specification: Optical telecommunication cables to be used in ducts or direct buried application

Spécification de famille: Câbles à fibres optiques de télécommunication pour conduite ou directement enterrés

Familienspezifikation: LWL-Fernmelde-Erd- und Röhrenkabel

This European Standard was approved by CENELEC on 1994-12-28. 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, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, 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**

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Foreword

This standard has been produced in accordance with a specialized agreement on work repartition and cooperation for standardization concerning fibre optics and is part of the CEN/CENELEC/ETSI (European Telecommunications Standards Institute) cooperation agreement.

It complements the Sectional Specification already published as EN 60794-3 (EN 187100). It uses information provided by the ETSI on functional and system related aspects by means of the Interim European Telecommunications Standards (I-ETS):

I-ETS 300226: Single-mode optical fibre cables to be used in duct and for directly buried application, prepared by ETSI/TIM1/WG1, reviewed and completed by the CECC.

According to the CEN/CENELEC/ETSI cooperation agreement, this standard, in conjunction with EN 60794-3, supersedes the I-ETS document, automatically withdrawn at the date of publication of this standard.

The draft specification prEN 187101 was submitted to the CECC voting procedure and was approved as EN 187101 on 28-12-1994.

The following dates were fixed:

- latest date of publication of an identical national standard (dop) 1995-09-30
- latest date of withdrawal of conflicting national standards (dow) 1996-09-30

Contents

|                                                                                                                                                             | Page |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| Foreword                                                                                                                                                    | 2    |
| 1 Object                                                                                                                                                    | 3    |
| 2 General                                                                                                                                                   | 3    |
| 3 Normative references                                                                                                                                      | 3    |
| 4 Symbols                                                                                                                                                   | 4    |
| 5 Family specification for optical telecommunication cables to be used in ducts or buried application (Blank Detail Specification and minimum requirements) | 5    |
| 5.1 Cable description                                                                                                                                       | 5    |
| 5.2 Optical fibres                                                                                                                                          | 8    |
| 5.3 Cable element                                                                                                                                           | 9    |
| 5.4 Cable construction                                                                                                                                      | 10   |
| 5.5 Installation and operating conditions                                                                                                                   | 11   |
| 5.6 Mechanical and environmental tests                                                                                                                      | 12   |
| 5.6.1 Tests applicable                                                                                                                                      | 12   |
| 5.6.2 Family Requirements and Test Conditions for Optical Fibre Cable Tests                                                                                 | 12   |
| 5.7 Guidance for Preparation of Detail Specifications                                                                                                       | 15   |
| 6 Standard European optical telecommunication cables for ducts and direct buried application                                                                | 15   |
| Annex A (normative) Options for Standard European Optical Duct or Direct Buried Telecommunication Cables                                                    | 17   |

## 1 Object

This Family Specification covers Optical Telecommunication Cables to be used in ducts or direct buried application. Requirements of the Sectional Specification for Optical Telecommunication Cables are applicable to cables covered by this Standard.

The clause 5 of this Standard describes a Blank Detail Specification for Optical Telecommunication Cables to be used in ducts or direct buried application. It incorporates some minimum requirements common to all European Countries.

The clause 6 describes the different options following these minimum requirements accepted as European Standards.

The numerical values for these standard options existing in the different european countries have been provided under their own responsibility by each National Committee. The future updating and amendment of the table of clause 6 will be done on the same way.

Detail Specifications may be prepared based on this Family Specification following in particular requirements of clauses 5 and 6.

## 2 General

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 shall be interpreted with respect to this consideration. The total uncertainty of measurement for this Standard shall be less than or equal to 0,05 dB for attenuation.

The expression of no change in attenuation means that any change in measurement value either positive or negative, within the uncertainty of measurement shall be ignored.

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

## 3 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

|                               |        |                                                                                                                                                                                     |
|-------------------------------|--------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| EN 187000                     | 1992   | Generic specification: Optical fibre cables<br>NOTE EN 187000 largely corresponds to, but is not identical with IEC 794-1.                                                          |
| EN 60794-3<br>(EN 187100)     | 1994   | Optical fibre cables — Part 3: Telecommunication cables — Sectional specification                                                                                                   |
| EN 188000                     | 1993   | Generic specification: Optical fibres<br>NOTE EN 188000 largely corresponds to, but is not identical with IEC 793-1.                                                                |
| EN 188101                     | 1995   | Family specification: Single-mode dispersion unshifted (B.1.1) optical fibre                                                                                                        |
| EN 188102<br>(in preparation) | —      | Family specification: Single-mode dispersion shifted (B.2) optical fibre                                                                                                            |
| HD 402 S2                     | 1984   | Standard colours for insulation for low-frequency cables and wires<br>(IEC 304:1982)                                                                                                |
| HD 505.1.1 S3                 | 1991   | Common test methods for insulating and sheathing materials of electric cables — Part 1: Methods for general application — Section 1<br>(IEC 811-1-1:1985 + A1:1988 + A2:1989)       |
| HD 505.4.2 S1                 | 1992   | Common test methods for insulating and sheathing materials of electric cables — Part 4: Methods specific to polyethylene and polypropylene compounds — Section 2 (IEC 811-4-2:1990) |
| HD 505.5.1 S1                 | 1992   | Common test methods for insulating and sheathing materials of electric cables — Part 5: Methods specific to filling compounds — Section 1 (IEC 811-5-1:1990)                        |
| HD 624                        | series | Materials used in communication cables                                                                                                                                              |
| IEC 708-1                     | 1981   | Low-frequency cables with polyolefin insulation and moisture barrier                                                                                                                |
| A3                            | 1988   | sheath — Part 1: General design details and requirements                                                                                                                            |

## 4 Symbols

For the purposes of this Standard the following symbols apply.

|                |                                                                                                                                                                                  |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| $\lambda_{cc}$ | Cabled fibre cut-off wavelength                                                                                                                                                  |
| d              | Nominal outer diameter of the cable                                                                                                                                              |
| DS             | Detail specification                                                                                                                                                             |
| W              | Weight of 1 km length of cable                                                                                                                                                   |
| $T_0$          | Threshold below which no attenuation and/or fibre strain increase should occur in the “Tensile performance test”.                                                                |
| $T_M$          | The acceptable amount of transient stress 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 temperature limits according to EN 187 000, test method 601.                                                                                            |
| $T_{A2}$       |                                                                                                                                                                                  |
| $T_{B1}$       |                                                                                                                                                                                  |
| $T_{B2}$       |                                                                                                                                                                                  |
| $t_1$          | Temperature cycling test dwell time.                                                                                                                                             |

## 5 Family specification for optical telecommunication cables to be used in ducts or buried application (Blank Detail Specification and minimum requirements)

### 5.1 Cable description

|                                            |                                                                              |                                     |
|--------------------------------------------|------------------------------------------------------------------------------|-------------------------------------|
| (1) Prepared by                            |                                                                              | (2) Document N°:<br>Issue:<br>Date: |
| (3) Available from:                        | (4) Generic specification: EN 187 000<br>Sectional specification: EN 187 100 |                                     |
| (5) Additional references:                 |                                                                              |                                     |
| (6) Cable description:                     |                                                                              |                                     |
| (7) Cable construction:                    |                                                                              |                                     |
| <u>OPTICAL FIBRES</u>                      |                                                                              |                                     |
| <u>RANGE OF FIBRE COUNT</u>                |                                                                              |                                     |
| <u>MODULARITY</u>                          |                                                                              |                                     |
| <u>CONSTRUCTION</u>                        |                                                                              | Additional remarks                  |
| — Single coloured fibre                    | S-c-f                                                                        |                                     |
| — Loose tube — filled                      | F-l-t                                                                        |                                     |
| — Loose tube — unfilled                    | U-l-t                                                                        |                                     |
| — Slotted core — filled                    | F-s-c                                                                        |                                     |
| — Slotted core — unfilled                  | U-s-c                                                                        |                                     |
| — Tight secondary coating                  | T-s-c                                                                        |                                     |
| — Ribbon in slotted core                   | R-s-c                                                                        |                                     |
| — Ribbon in loose tube                     | R-l-t                                                                        |                                     |
| — Central (strength) member — metallic     | M-c-m                                                                        |                                     |
| — Central (strength) member — non metallic | N-m-c-m                                                                      |                                     |
| — Core filling — continuous                | C-f                                                                          |                                     |
| — Core filling — regular water blocking    | R-b                                                                          |                                     |
| <u>Lay-up</u>                              |                                                                              |                                     |
| — Stranding (helical or SZ)                | Str                                                                          |                                     |
| — Single unit                              | S-u                                                                          |                                     |
| — Hybrid configuration                     | H-c                                                                          |                                     |
| .....                                      |                                                                              |                                     |

|                                   |                    |  |
|-----------------------------------|--------------------|--|
| 7) Cable construction (continued) | Additional remarks |  |
| Conductors                        |                    |  |
| .....                             |                    |  |
| Inner Sheath                      |                    |  |
| .....                             |                    |  |
| Peripheral strength member        |                    |  |
| — Metallic                        | M-p-m              |  |
| — Non-metallic                    | N-m-p-m            |  |
| .....                             |                    |  |
| Moisture Barrier                  |                    |  |
| — Coated aluminium tape           | C-a-t              |  |
| — Double coated aluminium tape    | D-c-a-t            |  |
| — Double coated steel tape        | D-c-s-t            |  |
| .....                             |                    |  |
| Outer Sheath                      |                    |  |
| .....                             |                    |  |
| Additional armouring              |                    |  |
| — Non-metallic armouring          | N-m-a              |  |
| — Metallic armouring              | M-a                |  |
| Additional outer sheath           |                    |  |
| .....                             |                    |  |
| Marking Identification            |                    |  |
| — customer requirement            |                    |  |
| — identification of manufacturer  |                    |  |