

Connectors for optical fibres and cables —

Part 1: Generic specification

The European Standard EN 60874-1:2007 has the status of a
British Standard

ICS 33.180.20

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 60874-1:2007. It is identical with IEC 60874-1:2006. It supersedes BS EN 186000-1:1994 and BS EN 60874-1:1999, which are withdrawn.

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

A list of organizations represented on GEL/86/2 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.

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 28 February 2007

© BSI 2007

ISBN 978 0 580 50274 3

Amendments issued since publication

Amd. No.	Date	Comments

**Connectors for optical fibres and cables -
Part 1: Generic specification
(IEC 60874-1:2006)**

Connecteurs pour fibres
et câbles optiques -
Partie 1: Spécification générique
(CEI 60874-1:2006)

Steckverbinder für Lichtwellenleiter
und Lichtwellenleiterkabel -
Teil 1: Fachgrundspezifikation
(IEC 60874-1:2006)

This European Standard was approved by CENELEC on 2006-12-01. 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, Bulgaria, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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 86B/2370/FDIS, future edition 5 of IEC 60874-1, prepared by SC 86B, Fibre optic interconnecting devices and passive components, of IEC TC 86, Fibre optics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60874-1 on 2006-12-01.

This European Standard supersedes EN 186000-1:1993 and EN 60874-1:1999.

The specific technical changes from EN 60874-1:1999 include the introduction of new expressions for intermateability and performance, of optical performance standards into the standardization system, and updating the normative references.

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) | 2007-09-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2009-12-01 |

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60874-1:2006 was approved by CENELEC as a European Standard without any modification.

CONTENTS

1	Scope	4
2	Normative references.....	4
3	Terms and definitions	5
4	Requirements	8
4.1	Classification	8
4.2	Documentation	12
4.3	Standardization system.....	15
4.4	Design and construction	20
4.5	Quality.....	20
4.6	Performance.....	20
4.7	Identification and marking	20
4.8	Packaging	21
4.9	Storage conditions	21
4.10	Safety.....	21
5	Quality assessment procedures	22
5.1	Primary stage of manufacture	22
5.2	Structurally similar components	22
5.3	Qualification approval procedures	23
5.4	Quality conformance inspection	24
5.5	Certified records of released lots	26
5.6	Delayed deliveries	26
5.7	Delivery release before completion of group B tests	26
5.8	Alternative test methods	27
5.9	Unchecked parameters	27
Annex ZA (normative) Normative references to international publications with their corresponding European publications.....		29
Bibliography		28
Figure 1 – Standardization structure		19
Table 1 – Example of a typical connector set classification		9
Table 2 – Three-level specification structure.....		13
Table 3 - Standards interlink matrix		19

CONNECTORS FOR OPTICAL FIBRES AND CABLES –

Part 1: Generic specification

1 Scope

This part of IEC 60874 applies to fibre optic connectors sets and individual components (i.e. adaptors, plugs, sockets) for all types, sizes and structures of fibres and cables. It includes:

- connector set requirements;
- quality assessment procedures.

This part of IEC 60874 is divided into five clauses:

- Clauses 1 (Scope), 2 (Normative references) and 3 (Terms and definitions) contain general information pertaining to this generic specification;
- Clause 4 (Requirements) contains all the requirements to be met by connectors covered by this specification. This includes requirements for classification, the IEC specification system, documentation, materials, workmanship, quality, performance, identification, and packaging;
- Clause 5 (Quality assessment procedures) contains all of the procedures that must be followed for IEC quality assessment of products covered by this standard.

NOTE 1 Clauses 1 to 4 are applicable generally and refer to all connector standards while Clause 5 relates to IEC qualification alone.

NOTE 2 This part of IEC 60874 applies also to the connectors covered by IEC 61753, IEC 61754, and IEC 61755 series.

This standard does not cover test and measurement procedures, which are described in IEC 61300-1, IEC 61300-2 and IEC 61300-3.

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.

IECQ 001002-2:1998, *IEC Quality Assessment System for Electronic Components (IECQ) – Rules of procedure – Part 2: Documentation*

IECQ 001002-3:2005, *IEC Quality Assessment System for Electronic Components (IECQ) – Rules of procedure – Part 3: Approval procedures*

IEC 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60050-731, *International Electrotechnical Vocabulary (IEV) – Chapter 731: Optical fibre communication*

IEC 60410, *Sampling plans and procedures for inspection by attributes*

IEC 60617, *Graphical symbols for diagrams*

IEC 60695-11-5, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification, requirements and user's guide*

IEC 61300 (all parts), *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures*

IEC 61753-1: *Fibre optic interconnecting devices and passive components – Part 1: General and guidance for performance standards*¹⁾

IEC 61754 (all parts), *Fibre optic connector interfaces*

IEC 61755 (all parts), *Fibre optic connector optical interfaces*

IEC 61930, *Fibre optic graphic symbology*

IEC 61931, *Fibre optic terminology*

ISO 129, *Technical drawings – Indication of dimensions and tolerances – Part 1: General principles*

ISO 286-1, *ISO system of limits and fits – Part 1: Bases of tolerances, deviations and fits*

ISO 370:1975, *Toleranced dimensions – Conversion from inches into millimetres and vice versa*

ISO 1101, *Geometrical product specifications – Technical drawings – Geometrical tolerancing – Tolerances of form, orientation, location and run-out*

ISO 8601, *Data elements and interchange formats – Information interchange – Representation of dates and times*

3 Terms and definitions

For the purposes of this part of IEC 60874, the definitions contained in IEC 60050(731) and IEC 61931, as well as the following definitions, apply.

3.1

adaptor

a component in which two or more ferrules are aligned

3.2

alignment pins

cylindrical rods used for alignment in some types of connectors. Typically they are used in pairs and inserted into specific guide holes in the two plugs (usually for multifibre connectors) to provide the alignment

¹⁾ To be published.

3.3**APC connector**

connector with angled convex end-face ferrule capable of making an angled physical contact between the fibres

3.4**butting optical coupling**

coupling in which the optical ports are in contact with each other

3.5**expanded beam optical coupling**

coupling in which the optical ports use lens technology

3.6**ferrule**

precise part of the plug, usually aligned in the sleeve of an adaptor. It confines the end(s) of a single or of multiple optical fibres

3.7**fully intermateable connector set**

connector sets from different sources are considered fully intermateable when connector components from one source will mate with complementary components from other sources without mechanical damage and with optical properties maintained within specified limits

3.8**interchangeable connector set**

connector sets are considered to be interchangeable when they share common installation geometry and have the same functional performance

3.9**mating face dimension**

dimension of the features which determine the mating fit between components of an optical connector set

3.10**mechanical intermateable connector set**

connector sets from different sources are considered mechanical intermateable when connector components from one source will mate with complementary components from other sources without mechanical damage but without regard to optical properties

3.11**mechanical reference plane (datum plane)**

the plane of a plug or adaptor which is perpendicular to the fibre axis and is located on a physical feature of the component. It is the datum plane from which all features of the component are measured in the direction of the fibre axis

NOTE The mechanical reference planes of the plug and the adaptor should coincide when the two components are properly mated. Accordingly, each should be located on the feature that fixes or establishes the relative position of the two components when they are properly mated.

3.12**non-butting optical coupling**

coupling in which the ports are not in contact with each other

3.13

optical datum target

theoretical datum point on a connector interface where the optical fibre core centre should be positioned by the plug or by the adaptor receptacle

3.14

optical fibre connector

component normally attached to an optical cable or piece of apparatus, for the purpose of providing frequent optical interconnection/disconnection of optical fibres or cables. This usually consists of two plugs mated together in an adaptor

3.15

optical fibre connector set

complete assembly of components (plug-adaptor-plug) required to provide demountable coupling between two or more optical fibre cables

3.16

optical fibre connector set kit

series of components necessary to make a complete connector set

3.17

optical fibre patchcord or jumper

length of optical fibre or cable, permanently terminated at both ends with two plugs

3.18

optical fibre pigtail

length of optical fibre or cable, permanently terminated at one end with a plug

3.19

PC connector

connector with convex end-face ferrule capable of making a physical contact between the fibres

3.20

plug

male-type part of a connector

3.21

plug-adaptor-plug configuration

configuration in which two plugs mate through an adaptor. The mechanical coupling takes place between the plugs and the adaptor

3.22

plug-receptacle configuration

configuration in which a plug mates in a receptacle

3.23

receptacle

structure for interfacing a plug with an active component. Typically it is formed by a semi-adaptor and a structure containing and aligning the active component

3.24**reference connector component**

tighter toleranced or selected connector component (e.g. plug, adaptor, etc.) which is used for measuring purposes

NOTE Test and measurement methods may refer to it. The characteristics or the selection procedure are given in the relevant specification.

3.25**sleeve**

precision part of the adaptor used to mechanically align two ferrules

3.26**small form factor connector (SFF)**

an optical fibre connector with a ferrule with an outside diameter of less than 2.0 mm or a connector designed to accommodate two or more optical fibres with at least the same mounting density as the RJ-45 connector. SFF connectors have a smaller cross-sectional area, about one-half that of traditional connectors.

3.27**socket**

the female part of a two part connector

4 Requirements

The requirements for connectors covered by this generic specification are specified in this clause and in the detail specification.

4.1 Classification

Fibre optic connector sets are classified, either totally or in part, according to the following categories (see Table 1):

- type;
- arrangement;
- style;
- interface standard;
- standardization system;
- variant;
- assessment level;
- normative reference extensions.

See Table 1 for an example of a complete connector set classification.

4.1.1 Type

Connector set types shall be defined by four elements: the type name, the configuration, the coupling mechanism and the mating face dimensions.

Examples of type names:

- type SC;
- type LC.

Examples of configurations:

- plug-adaptor-plug configuration;
- plug-receptacle configuration.

Examples of coupling mechanisms:

- screw thread;
- bayonet;
- push-pull.

Table 1 – Example of a typical connector set classification

Type	– Name: type SC – Configuration: plug-adaptor-plug – Coupling: push -pull – Mating face dimensions: plug: see Figure 2^a adaptor: see Figure 4 ^a
Arrangement	– Kit
Style	– Fibre retention: adhesive – Cable retention: crimp – Optical coupling: PC – Alignment: resilient bushing
Variants	– Twelve plug permutations of: • fibre diameters 0,125 mm • cable jacket diameters 2,4 mm 3,0 mm • coupling styles: push –pull plastic housing. – Two adaptor variants: • non-mountable (in-line) • four-hole flange mount
^a Indicates figures in a hypothetical detail specification	