

Fibre optic filters — Generic specification

The European Standard EN 61977:2002 has the status of a
British Standard

ICS 33.180.99

National foreword

This British Standard is the official English language version of EN 61977:2002. It is identical with IEC 61977:2001.

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

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This British Standard, having been prepared under the direction of the Electrotechnical Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 2 May 2002

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**Fibre optic filters –
Generic specification
(IEC 61977:2001)**

Filtres à fibres optiques –
Spécification générique
(CEI 61977:2001)

Lichtwellenleiterfilter -
Fachgrundspezifikation
(IEC 61977:2001)

This European Standard was approved by CENELEC on 2002-03-01. 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.

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CENELEC

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

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Foreword

The text of document 86B/1603/FDIS, future edition 1 of IEC 61977, 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 61977 on 2002-03-01.

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) 2002-12-01
- 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with the EN have to be withdrawn (dow) 2005-03-01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 is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61977:2001 was approved by CENELEC as a European Standard without any modification.

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INTRODUCTION

This standard is divided into three elements.

The first element, made up of clauses 1 to 3, contains general information which pertains to this standard.

The second element, consisting of clause 4, Requirements, contains all requirements which should be met by fibre optic filters covered by this standard. Requirements for classification, the IEC specification system, documentation, materials, workmanship, quality, performance, identification, and packaging are covered.

The third element, composed of clause 5, Quality assessment procedures, contains all of the procedures which must be followed for proper quality assessment of products covered by this standard.

FIBRE OPTIC FILTERS – Generic specification

1 Scope

IEC 61977 applies to the family of fibre optic filters. These components have all of the following general features:

- they are passive for the reason that they contain no optoelectronic or other transducing elements which can process the optical signal launched into the input port;
- they modify the spectral intensity distribution in order to select some wavelengths and inhibit others;
- they are fixed, i.e. the modification of the spectral intensity distribution is fixed and can not be tuned;
- they have a maximum of two ports for the transmission of optical power; the ports are optical fibre or optical fibre connectors;
- they differ according to their characteristics. They can be divided into the following categories:
 - short-wave pass (only wavelengths lower than or equal to a specified value are passed);
 - long-wave pass (only wavelengths greater than or equal to a specified value are passed);
 - band-pass (only an optical window is allowed);
 - notch (only an optical window is inhibited).

It is also possible to have a combination of the above categories.

This standard establishes uniform requirements for the following:

- optical, mechanical and environmental properties;
- measurement and test procedures for quality assessment.

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 001001:2000, *IEC Quality Assessment System for Electronic Components (IECQ) – Basic Rules*

IECQ 001002 (all parts), *IEC Quality Assessment System for Electronic Components (IECQ) – Rules of Procedure*

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

IEC 60050(731):1991, *International Electrotechnical Vocabulary – Chapter 731: Optical fibre communication*

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*

IEC 60617 (all parts), *Graphical symbols for diagrams*

IEC 60695-2-2:1991, *Fire hazard testing – Part 2: Test methods – Section 2: Needle-flame test*

IEC 60825-1:1993, *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*

ISO 129:1985, *Technical drawings – Dimensioning – General principles, definitions, methods of execution and special indications*

ISO 286-1:1988, *ISO system of limits and fits – Part 1: Bases of tolerances, deviations and fits*

ISO 1101:1983, *Technical drawings – Geometrical tolerancing – Tolerancing of form, orientation, location and run-out – Generalities, definitions, symbols, indications on drawings*

ISO 8601:2000, *Data elements and interchange formats – Information interchange – Representation of dates and times*

3 Definitions

For the purposes of this standard the definitions given in IEC 60050(731) and the following apply.

3.1

fibre optic filter

a passive component used in fibre optic transmission to modify the spectral intensity distribution of a signal in order to pass some wavelengths and block some others

3.2

port

an optical fibre or optical fibre connector attached to a passive component for the entry and/or exit of the optical power (input and/or output port)

3.3

unidirectional fibre optic filter

a fibre optic filter whose specified filtering action is in one direction only or requires designation of its input and output ports

3.4

bidirectional fibre optic filter

a fibre optic filter in which each port may be used either as an input or output port

3.5

transmitting type fibre optic filter

a fibre optic filter in which the input and output ports are different

3.6

reflecting type fibre optic filter

a fibre optic filter in which the input and output ports are coincident

3.7

operating wavelength

a nominal wavelength λ_h , at which a fibre optic filter operates with the specified performances

3.8 operating wavelength range, bandpass

the specified range of wavelengths from λ_{hmin} to λ_{hmax} around the operating wavelength λ_h , within which a fibre optic filter operates with the specified performances

3.9 isolation wavelength

a nominal wavelength λ_k (where $\lambda_h \neq \lambda_k$), that is nominally suppressed by a fibre optic filter

3.10 isolation wavelength range, stopband

the specified range of wavelengths from λ_{kmin} to λ_{kmax} around the isolation wavelength λ_k , that are nominally suppressed by a fibre optic filter

3.11 attenuation

the reduction of optical power, when transmitted between the ports of a two-port fibre optic filter expressed in decibels. It is defined as:

$$a = -10 \log (P_{out}/P_{in})$$

where

P_{in} is the optical power launched into one of the two ports;

P_{out} is the optical power received from the other port.

The attenuation is a function of wavelength

3.12 transmittance

the percentage of optical power transmitted by the filter at the operating wavelength

3.13 return loss

the fraction of input power that is returned from a port of a fibre optic filter expressed in decibels. It is defined as:

$$RL = -10 \log (P_{refl}/P_{in})$$

where

P_{in} is the optical power launched into the port;

P_{refl} is the optical power received back from the same port.

The return loss is a function of wavelength

3.14 reflectance

the percentage of optical power reflected by the filter at the operating wavelength

3.15 X dB-bandwidth

a) for transmitting-type fibre optic filters: defined through the spectral dependence of the attenuation as the minimum wavelength range about the operating wavelength λ_h within which the variation of the attenuation is less than "X" dB; the minimum wavelength range is determined considering the worst case shift due to temperature operating range and polarisation;