

Fibre optic isolators —

Part 1: Generic specification

The European Standard EN 61202-1:2000 has the status of a British Standard

ICS 33.180.20

National foreword

This British Standard is the official English language version of EN 61202-1:2000. It is identical with IEC 61202-1:2000.

The UK participation in its preparation was entrusted by Technical Committee GEL/86, Fibre optics, to Subcommittee GEL/86/2, Interconnecting devices and passive components, which has the responsibility to:

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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Summary of pages

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(IEC 61202-1:2000)

Isolateurs à fibres optiques
Partie 1: Spécification générique
(CEI 61202-1:2000)

Lichtwellenleiter-Isolatoren
Teil 1: Fachgrundspezifikation
(IEC 61202-1:2000)

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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/1269/FDIS, future edition 2 of IEC 61202-1, prepared by IEC TC 86, Fibre optics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61202-1 on 2000-02-01.

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) 2000-11-01
- latest date by which the national standards conflicting
with the EN have to be withdrawn (dow) 2003-02-01

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 61202-1:2000 was approved by CENELEC as a European Standard without any modification.

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INTRODUCTION

This part of IEC 61202 is divided into three clauses.

The first clause is entitled “General” and contains general information pertaining to this generic specification.

The second clause is entitled “Requirements” and contains all the requirements to be met by isolators covered by this standard, i.e. requirements for classification, the IEC specification system, documentation, materials, workmanship, quality, performance, identification, and packaging.

The third clause is entitled “Quality assessment procedures” and contains all of the procedures which need to be followed for proper quality assessment of products covered by this standard.

NOTE Test and measurement procedures are described in IEC 61300-1, IEC 61300-2 and IEC 61300-3.

FIBRE OPTIC ISOLATORS – Part 1: Generic specification

1 General

1.1 Scope

This part of IEC 61202 applies to isolators used in the field of fibre optics, all exhibiting the following features:

- they are non-reciprocal optical devices, in which each port is either an optical fibre or optical fibre connector;
- they are passive components containing no opto-electronic or other transducing elements;
- they have two optical ports for directionally transmitting optical power.

This standard establishes uniform requirements for the following points:

- fibre optic isolator requirements;
- quality assessment procedures.

1.2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61202. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of IEC 61202 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC Guide 102, *Electronic components – Specification structures for quality assessment (Qualification approval and capability approval)*

IEC QC 001001:1998, *IEC Quality Assessment System for Electronic Components (IECQ) – Basic Rules*

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

IEC QC 001002-3:1998, *Rules of Procedure of the IEC Quality Assessment System for Electronic Components (IECQ) – Part 3: Approval Procedures*

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

IEC 60050(731):1991, *International Electrotechnical Vocabulary (IEV) – 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 60825-1:1998, *Safety of laser products – Part 1: Equipment, classification, requirements and user's guide*

IEC 61300-1:1995, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 1: General and guidance*

IEC 61300-2 (all parts), *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2: Tests*

IEC 61300-3 (all parts), *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3: Examinations and measurements*

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

ISO/DIS 1101, *Geometrical Product Specifications (GPS) – Geometrical tolerancing – Generalities, definitions, symbols, indication on drawings*

ISO 8601:1988, *Data elements and interchange formats – Information interchange – Representation of dates and times*

1.3 Definitions

For the purposes of this part of IEC 61202, the definitions given in IEC 60050(731) apply, together with the following definitions:

1.3.1

fibre optic isolator

non-reciprocal optical device intended to suppress backward reflections along an optical fibre transmission line while having minimum insertion loss in the forward direction

NOTE Fibre optic isolators are commonly used to avoid reflections back into laser diodes and optical amplifiers, which can make the laser and amplifiers oscillate unstably, and cause noise in the fibre optic transmission system.

1.3.2

bulk isolator based on magneto-optic effect

type of isolator with discrete components including a suitable magneto-optic crystal (ferromagnetic crystal or paramagnetic glass, diamagnetic glass, etc.), of which the fundamental principle is based on magneto-optic effect

EXAMPLE For instance, it consists of the following discrete components: a polarizer, a 45° Faraday rotator and an analyser. The azimuthal angle between the polarizer and the analyser is set at 45°. It also has its own magnetic circuit, coupling devices, etc. The incident light, with linear polarization, will produce a 45° rotation with respect to its polarization plane in the rotator element and pass through the isolator with lower insertion loss while the backward light is blocked regardless of its polarization state.

1.3.3

all-fibre isolator

type of isolator in which the magneto-optic effect is produced in the optical fibre itself

1.3.4

integrated optical waveguide isolator

type of isolator with thin epitaxial magneto-optic crystal layers or electro-optic crystal layers on a suitable substrate to obtain non-reciprocal mode conversion between TE-modes and TM-modes

NOTE The configuration of this type of isolator is compatible with the waveguide structures of the laser diode and other integrated optical waveguide devices and transmission lines.

1.3.5

polarization-dependent/independent optical isolator

- polarization-dependent optical isolator: type of isolator not designed to have performance independent of the state of the polarization of the incident beam
- polarization-independent optical isolator: type of isolator in which the optical performance characteristics are independent of the polarization state of the incident light

1.3.6

single-stage/double-stage isolator

- single-stage isolator: type of isolator composed of a basic isolator unit such as a set of polarizer, Faraday rotator and analyser
- double-stage isolator: type of isolator composed of two basic isolator units connected in tandem for the purpose of obtaining more backward loss

1.3.7

port

optical fibre or optical fibre connector attached to a passive component for the entry and/or exit of the optical power

1.3.8

input port, output port

port designated for the ingress or egress respectively of an optical power

NOTE As a non-reciprocal device the isolator is a directional one. The input and output port shall be clearly marked.

1.3.9

forward direction of an optical isolator

operational direction in which the power of the optical source launches into the input port of an isolator

NOTE In this direction, the isolator has minimum insertion loss. The backward direction is opposite to the forward direction.

1.3.10

forward attenuation of an optical isolator (insertion loss)

measure of the decrease in optical power (decibels) resulting from the insertion of an optical isolator in its forward direction within a length of optical fibre or optical path. It is defined as follows:

$$a_f = -10 \log (P_o/P_i) \quad (\text{dB})$$

where

P_o is the optical power received from the output port of the isolator;