

INTERNATIONAL STANDARD



**Fibre optic interconnecting devices and passive components – Performance standard –
Part 057-2: Single mode fibre plug-receptacle style optical fuse for category C –
Controlled environment**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC INTERCONNECTING DEVICES
AND PASSIVE COMPONENTS –
PERFORMANCE STANDARD –**

**Part 057-2: Single mode fibre plug-receptacle
style optical fuse for category C –
Controlled environment**

FOREWORD

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International Standard IEC 61753-057-2 has been prepared by subcommittee SC86B: Fibre optic interconnecting devices and passive components, of IEC technical committee TC86: Fibre optics.

The text of this standard is based on the following documents:

FDIS	Report on voting
86B/3501/FDIS	86B/3545/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 61753 series, published under the general title *Fibre optic interconnecting devices and passive components – Performance standard*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
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INTRODUCTION

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning optical fuse.

IEC takes no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he/she is willing to negotiate licences either free of charge or under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with IEC. Information may be obtained from:

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ISO (www.iso.org/patents) and IEC (<http://patents.iec.ch>) maintain on-line data bases of patents relevant to their standards. Users are encouraged to consult the data bases for the most up to date information concerning patents.

US patent US-7162,114 B2 "Optical Energy switching device and method", granted January 9,2007.

Japan patent 4376632 "Optical Energy switching device and method", granted September 18, 2009

The optical fuse is a passive device, designed to protect equipment and fibre cables from damage due to optical overpower, spikes and surges. The optical fuse produces a controlled, permanent, signal blocking at a predetermined power threshold in an optical fibre transmission line. The optical fuse is wavelength independent over its entire specified spectral range. IEC 60869-1 contains the generic information of the optical fuse. The optical fuse has a maximum allowed power input $P_{in\ max}$ that is allowed. Beyond this power it is dysfunctional and can let light through. Numerical values for $P_{in\ max}$ are given in Annex B.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

Part 057-2: Single mode fibre plug-receptacle style optical fuse for category C – Controlled environment

1 Scope

This part of IEC 61753 contains the minimum initial test and measurement requirements and severities which a fibre optical fuse satisfies in order to be categorised as meeting the requirements of single mode fibre plug-receptacle style optical fuse used in controlled environments. Optical performance specified in this document relate to plug-receptacle style configuration fuses only.

2 Normative references

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

IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

IEC 60869-1, *Fibre optic interconnecting devices and passive components – Fibre optic passive power control devices – Part 1: Generic specification*¹

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

IEC 61300-2-1, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-1: Tests – Vibration (sinusoidal)*

IEC 61300-2-2, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-2: Tests – Mating durability*

IEC 61300-2-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-6: Tests – Tensile strength of coupling mechanism*

IEC 61300-2-9, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-9: Tests – Shock*

IEC 61300-2-14, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-14: Tests – High optical power*¹

IEC 61300-2-17, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-17: Tests – Cold*

¹ To be published.

IEC 61300-2-18, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-18: Tests – Dry heat – High temperature endurance*

IEC 61300-2-19, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-19: Tests – Damp heat (steady state)*

IEC 61300-2-22, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-22: Tests – Change of temperature*

IEC 61300-3-2, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-2: Examinations and measurements – Polarization dependent loss in a single-mode fibre optic device*

IEC 61300-3-3, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-3: Examinations and measurements – Active monitoring of changes in attenuation and return loss*

IEC 61300-3-4, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-4: Examinations and measurements – Attenuation*

IEC 61300-3-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-6: Examinations and measurements – Return loss*

IEC 61300-3-7, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-7: Examinations and measurements – Wavelength dependence of attenuation and return loss of single mode components*

IEC 61300-3-28, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-28: Examinations and measurements – Transient loss*

IEC 61300-3-32, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-32: Examinations and measurements – Polarization mode dispersion measurement for passive optical components*

IEC 61754 series, *Fibre optic connector interfaces*

IEC 61755 series, *Fibre optic connector optical interfaces*

IEC/TR 62627-02:2010, *Fibre optic interconnecting devices and passive components – Part 02: Report of round robin test results on SC plug style fixed attenuators*

3 Tests

All test methods are in accordance with the IEC 61300 series.

Some tests require the use of reference connector plugs and reference connector adaptors. These are specified in Annex C. It is essential and recommended that all connector, plugs and reference connector adaptors be inspected and cleaned if dirty and checked again, according to manufacturers' instructions, prior to every mating in all tests.

All tests are to be carried out to validate performance over the required operating wavelength and power range. As a result, single or multiple spectral bands may be chosen for the qualification in addition to threshold power.

4 Test reports

Fully documented test reports and supporting evidence shall be prepared and shall be available for inspection as evidence that the tests have been carried out and complied with.

5 Performance requirements

5.1 Sample size, sequencing and grouping

Sample sizes for the tests are defined in Annex A.

5.2 Dimensions

Dimensions of mechanical interface for mating, plug and receptacle size, shall comply with IEC optical connector interface standard IEC 61754 series and IEC optical interface standard IEC 61755 series. Other dimensions shall comply with those given in appropriate manufacturer's drawings.

When implementing this standard be aware that there have been problems when using a rigid interface component with SC plug style adaptors and plugs. See Clause 6 of IEC/TR 62627-02:2010.

5.3 Test details and requirements

Table 1 specifies the optical, environment and mechanical performance requirements and related test methods for optical fuses.

Compliance to this standard requires demonstration of the ability to meet the performance requirement in Table 1.

Table 1 – Performance requirements for optical fuses (1 of 8)

No.	Test	Requirement	Details	
1	Insertion loss	<p>Operating wavelength range: 1 520 nm to 1 625 nm</p> <p>Insertion loss $\leq 1,5$ dB</p> <p>Insertion loss is measured with input power ≤ -5 dBm</p>	<p>Method:</p> <p>Launch patchcord length:</p> <p>Other requirements:</p> <p>Launch conditions:</p> <p>Source power stability:</p> <p>Wavelength range:</p> <p>Total uncertainty</p>	<p>IEC 61300-3-7, Method B2.1, test sample configuration according to IEC 61300-3-4 substitution method</p> <p>≥ 2 m. Only the fundamental mode shall propagate at the fuse interface and at the detector.</p> <p>This test shall be performed against a reference plug^{1,2} and reference adaptor.</p> <p>The wavelength of the source shall be longer than cut-off wavelength of the fibre.</p> <p>$\leq \pm 0,05$ dB over the measuring period or at least 1 h</p> <p>1 520 nm to 1 625 nm</p> <p>$\leq \pm 0,05$ dB</p>