IEC 61753-091-02

Edition 1.0 2022-02

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – Performance standard –
Part 091-02: Non-connectorized 3-port incompletely circulated single-mode fibre optic circulators for category C – Controlled environments

Dispositifs d'interconnexion et composants passifs fibroniques – Norme de performance –
Partie 091-02: Circulateurs fibroniques à circulation partielle à 3 ports, non connectorisés et équipés de fibres optiques unimodales, pour la catégorie C – Environnements contrôlés

IEC 61753-091-02:2022-02(en-fr)

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

Part 091-02: Non-connectorized 3-port incompletely circulated single-mode fibre optic circulators for category C – Controlled environments

FOREWORD

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IEC 61753-091-02 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics. It is an International Standard.

This first edition cancels and replaces IEC 61753-091-2 published in 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC 61753-091-2:

a) change of title adding the 3-port incompletely circulated type;
b) harmonization of terms and definitions with those in IEC 61977 and IEC TS 62627-09;
c) harmonization of test items and their conditions with IEC 61753-1:2018 and IEC 61753-1:2018/AMD1:2020.

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The text of this International Standard is based on the following documents:

Draft	Report on voting
86B/4555/FDIS	86B/4578/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts of 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.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

Part 091-02: Non-connectorized 3-port incompletely circulated single-mode fibre optic circulators for category C – Controlled environments

1 Scope

This part of IEC 61753 contains the minimum test and measurement requirements and severities which a fibre optic circulator as specified by IEC 62077 is expected to satisfy in order to be categorized as meeting the requirements of circulators used in controlled environments as specified in IEC 61753-1:2018 and IEC 61753-1:2018/AMD1:2020. The requirements cover non-connectorized single-mode fibre 3-port incompletely circulated type optical circulators for category C used in controlled environments.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

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

IEC 60794-2-50, *Optical fibre cables – Part 2-50: Indoor cables – Family specification for simplex and duplex cables for use in terminated cable assemblies*

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

IEC 61300-2-4, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-4: Tests – Fibre or cable retention*

IEC 61300-2-5, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-5: Tests – Torsion*

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*

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

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

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

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

IEC 61300-2-42, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-42: Tests – Static side load for strain relief*

IEC 61300-2-44, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-44: Tests – Flexing of the strain relief of fibre optic devices*

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 61300-3-7, *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 61300-3-20, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-20: Examinations and measurements – Directivity of fibre optic branching devices*

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 61753-1:2018, *Fibre optic interconnecting devices and passive components – Performance standard – Part 1: General and guidance*
IEC 61753-1:2018/AMD1:2020

IEC 62077, *Fibre optic interconnecting devices and passive components – Fibre optic circulators – Generic specification*

IEC TS 62627-09, *Fibre optic interconnecting devices and passive components – Vocabulary for passive optical devices*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62077 and IEC TS 62627-09 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

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4 Test conditions

Unless otherwise specified, all test methods are in accordance with IEC 61300 series [1][1]. The samples shall be terminated onto single-mode fibres as per IEC 60793-2-50, category B-652.B, B-652.D or B-657 in either coated fibres (primary and secondary) or reinforced cable format as per IEC 60794-2-50. Single-mode fibre optic circulators used for each test are intended to be previously unstressed new samples but may also be selected from previously used samples if desired. All measurements shall be carried out under standard atmospheric conditions, unless otherwise stated. If the device is provided with an active temperature control, this shall be set at the set-point specified by the manufacturer.

The requirements apply to every combination of input and output port.

Table 1 is intended to provide guidance on the wavelength ranges of the various spectral bands. It is not intended for specification. Values of operating wavelength used in performance verification shall be specified between the customer and supplier, or shall be as defined in the manufacturer's specification.

Table 1 – Single-mode spectral bands

Band	Descriptor	Range nm
O-band	Original	1 260 to 1 360
E-band	Extended	1 360 to 1 460
S-band	Short wavelength	1 460 to 1 530
C-band	Conventional	1 530 to 1 565
L-band	Long wavelength	1 565 to 1 625
U-band	Ultralong wavelength	1 625 to 1 675
SOURCE: ITU-T G. Supplement 39 [2].		

5 Test report

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

6 Reference components

The test for these components does not require the use of reference components.

7 Performance requirements

7.1 Dimensions

Dimensions shall comply with those given in appropriate manufacturers' drawings.

7.2 Sample size

Sample sizes for the tests are defined in Annex A.

[1] Numbers in square bracket refer to the Bibliography.

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7.3 Test details and requirements

The test details and requirements are shown in Table 2. The requirements are given only for a non-connectorized 3-port incompletely circulated single-mode fibre optic circulators. A minimum length of fibre or cable of 2,0 m per port shall be included in all climatic and environmental test chambers.

Table 2 – Test details and requirements *(1 of 5)*

No	Tests	Requirements	Details	
1	Attenuation (insertion loss) IEC 61300-3-7	≤ 0,8 dB: O-band, C-band, L-band ≤ 1,0 dB: (C+L)-band	Launch fibre length: Polarization state: Measurement uncertainty:	≥ 2,0 m Any polarization 0,1 dB
2	Isolation IEC 61300-3-7	≥ 38 dB: O-band, C-band, L-band ≥ 30 dB: (C+L)-band	Launch fibre length: Polarization state: Measurement uncertainty: Other conditions:	≥ 2,0 m Any polarization 0,5 dB IEC 61300-3-7 defines the method to measure insertion loss. However, it can apply to the measurement of isolation, because in the case of a circulator, isolation is the insertion loss measured in the opposite direction to test no.1
3	Return loss IEC 61300-3-7	≥ 50 dB (grade U)	Launch fibre length: Polarization state: Measurement uncertainty: Other conditions:	≥ 2,0 m Any polarization 1 dB Ports not under test shall be optically terminated to avoid unwanted reflections contributing to the measurement
4	Directivity IEC 61300-3-20	≥ 50 dB	Launch fibre length: Polarization state: Measurement uncertainty:	≥ 2,0 m Any polarization 1 dB
5	Polarization dependent loss IEC 61300-3-2	≤ 0,10 dB: O-band, C-band, L-band ≤ 0,15 dB: (C+L)-band	Launch fibre length: Measurement uncertainty:	≥ 2,0 m 0,05 dB
6	Polarization mode dispersion IEC 61300-3-32	≤ 0,10 ps	Launch fibre length: Measurement uncertainty:	≥ 2,0 m 0,05 ps

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