IEC 61753-061-2

Edition 1.0 2012-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – Performance standard –
Part 061-2: Non-connectorized single-mode fibre optic pigtailed isolators for category C – Controlled environments

Dispositifs d'interconnexion et composants passifs à fibres optiques – Norme de performance –
Partie 061-2: Isolateurs à fibres optiques unimodales munis de fibres amorces non connectorisées pour la catégorie C – Environnements contrôlés

IEC 61753-061-2:2012

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

COMMISSION ELECTROTECHNIQUE INTERNATIONALE

PRICE CODE
CODE PRIX

M

ICS 33.180.10

ISBN 978-2-83220-333-0

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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International Standard IEC 61753-061-2 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

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

CDV	Report on voting
86B/3362/CDV	86B/3446/RVC

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 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.

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- withdrawn,
- replaced by a revised edition, or
- amended.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

Part 061-2: Non-connectorized single-mode fibre optic pigtailed isolators 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 isolator as specified by IEC 61202-1 should satisfy in order to be categorized as meeting the requirements of isolators used in controlled environments as specified in IEC 61753-1. The requirements cover non-connectorized single-mode fibre optic pigtailed isolators for category C used in controlled environments.

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 60793-2-50:2008, *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/cable retention*

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

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

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*

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1 A new third edition is due to be published.

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

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*

3 Test

All test methods are in accordance with a specific IEC 61300 standard, of which parts applicable to this standard are mentioned in 5.2 (see Table 2).

The samples shall be terminated onto single-mode fibres as per IEC 60793-2-50:2008 category B1.1, B1.3 or B6 in either coated fibres (primary and secondary) or reinforced cable format as per IEC 60794-2-50.

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 Supplement 39 [1][2].		

4 Test report

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

2 Numbers in square brackets refer to the Bibliography

5 Performance requirements

5.1 Sample size

Sample sizes for the tests are defined in Annex A.

5.2 Test details and requirements

A minimum length of fibre or cable of 2,0 m per port shall be included in all climatic and environmental tests.

Table 2 – Test details and requirements

No	Tests	Requirements	Details	
1	Attenuation (insertion loss) IEC 61300-3-7	≤ 0,7 dB (single stage) ≤ 0,8 dB (double stage)	Launch fibre length: Polarization state Measurement uncertainty	≥ 2,0 m Any polarization ± 0,1 dB
2	Isolation IEC 61300-3-7	≥20 dB (single stage) ≥40 dB (double stage)	Launch fibre length: Polarization state Measurement uncertainty Note	≥ 2,0 m Any polarization ± 0,3 dB (single stage) ± 0,5 dB (double stage) 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 an isolator, isolation is the insertion loss measured in the opposite direction to test no. 1
3	Return loss IEC 61300-3-7	≥ 55 dB	Launch fibre length: Polarization state Measurement uncertainty Note	≥ 2,0 m Any polarization ± 1 dB All ports not under test shall be optically terminated to avoid unwanted reflections contributing to the measurement
4	Polarization dependent loss IEC 61300-3-2	≤ 0,10 dB (single stage) ≤ 0,15 dB (double stage)	Launch fibre length: Measurement uncertainty	≥2,0 m ± 0,02 dB
5	Polarization mode dispersion IEC 61300-3-32	≤0,20 ps (single stage) ≤0,10 ps (double stage)	Launch fibre length: Measurement uncertainty	≥ 2,0 m ± 0,05 ps

Table 2 (*2 of 4*)

No	Tests	Requirements	Details	
6	High optical power IEC 61300-2-14	Before and after the test, the limits of insertion loss, isolation and return loss of test no. 1, 2 and 3 shall be met. During the test, the insertion loss change is monitored. During and after the test, the insertion loss change shall be within ± 0,3 dB of the initial value. During the test, the isolation change is monitored. The sum of the initial value and the change of the isolation shall be within the value defined at test no. 2. During the test, the return loss change is monitored. The sum of the initial value and the change of the return loss shall be within the value defined at test no. 3	Optical power Wavelength Duration of the optical power exposure Temperature: Relative humidity: Note	300 mW 1 550 nm 30 min 60 °C ± 2° C 93 % $^{+2}_{-3}$ RH A different wavelength is acceptable when there is a negotiation between customer and supplier
7	Cold IEC 61300-2-17	Before and after the test, the limits of insertion loss, isolation and return loss of test no. 1, 2 and 3 shall be met. The insertion loss change after the test shall be within ± 0,3 dB of the initial value	Temperature: Duration of exposure:	-10° C ± 2° C 96 h
8	High temperature endurance IEC 61300-2-18	Before and after the test, the limits of insertion loss, isolation and return loss of test no. 1, 2 and 3 shall be met. The insertion loss change after the test shall be within ± 0,3 dB of the initial value	Temperature: Duration of exposure:	+60° C ± 2° C 96 h
9	Damp heat (steady state) IEC 61300-2-19	Before and after the test, the limits of insertion loss, isolation and return loss of test no. 1, 2 and 3 shall be met. During the test, the insertion loss change is monitored. During and after the test, the insertion loss change shall be within ± 0,3 dB of the initial value. During the test, the isolation change is monitored. The sum of the initial value and the change of the isolation shall be within the value defined at test no. 2	Temperature: Relative humidity: Duration of exposure:	+40 ± 2 °C 93 % $^{+2}_{-3}$ RH 96 h

Table 2 (*3 of 4*)

No	Tests	Requirements	Details	
10	Change of temperature IEC 61300-2-22	Before and after the test, the limits of insertion loss, isolation and return loss of test no. 1, 2 and 3 shall be met. During the test, the insertion loss change is monitored. During and after the test, the insertion loss change shall be within ± 0,3 dB of the initial value. During the test, the isolation change is monitored. The sum of the initial value and the change of the isolation shall be within the value defined at test no. 2	High temperature: Low temperature: Number of cycles: Duration at extreme temperature: Rate of change:	+60 ± 2 °C -10 ± 2 °C Cycles 5 60 min 1 °C/min
11	Vibration IEC 61300-2-1 IEC 61300-3-28	Before and after the test, the limits of insertion loss, isolation and return loss of test no. 1, 2 and 3 shall be met. During the test, the insertion loss change is monitored. During and after the test, the insertion loss change shall be within ± 0,3 dB of the initial value. During the test, the isolation change is monitored. The sum of the initial value and the change of the isolation shall be within the value defined at test no. 2	Frequency range: Number of axes: Number of sweeps: Sweep rate: Amplitude:	10 Hz - 55 Hz 3 orthogonal axes 15 /axis 1 octave/min 0,75 mm
12		Before and after the test, the limits of insertion loss, isolation and return loss of test no. 1, 2 and 3 shall be met. The insertion loss change after the test shall be within ± 0,3 dB of the initial value	Acceleration: Duration: Number of axis: Number of shocks:	5 000 m/s^2 1 ms, half sine pulse 3 axes in 2 directions 2 shocks per axis, 12 shock in total
13	Optical fibre cable flexing IEC 61300-2-44	Before and after the test, the limits of insertion loss, isolation and return loss of test no. 1, 2 and 3 shall be met. The insertion loss change after the test shall be within ± 0,3 dB of the initial value	Tensile force: Number of cycles:	2 N for reinforced cable 30 cycles ± 90°