IEC 61753-052-3

Edition 2.0 2016-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – Performance standard –
Part 052-3: Single-mode fibre non-connectorized fixed attenuator – Category U in uncontrolled environment

Dispositifs d'interconnexion et composants passifs fibroniques – Norme de performance –
Partie 052-3: Affaiblisseur fixe non connectorisé à fibres unimodales – Catégorie U dans un environnement non contrôlé

IEC 61753-052-3:2016-07(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

Part 052-3: Single-mode fibre non-connectorized fixed attenuator – Category U in uncontrolled environment

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International Standard IEC 61753-052-3 has been prepared by subcommittee SC86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This bilingual version (2018-01) corresponds to the monolingual English version, published in 2016-07.

This second edition cancels and replaces the first edition published in 2001. This edition constitutes a technical revision.

This edition includes the following significant technical change with respect to the previous edition:

- reconsideration of performance requirements.

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

FDIS	Report on voting
86B/3994/FDIS	86B/4009/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.

The French version of this standard has not been voted upon.

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.

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 publication will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

Part 052-3: Single-mode fibre non-connectorized fixed attenuator – Category U in uncontrolled environment

1 Scope

This part of IEC 61753 contains the minimum initial test and measurement requirements and severities which a fibre optic attenuator satisfies in order to be categorised as meeting the requirements of single-mode fibre non-connectorized fixed attenuator devices used in uncontrolled environments. IEC 60869-1 contains the generic specification of the optical attenuator.

Optical performances specified in this document relate only to non-connectorized configurations optical attenuators.

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 specifications 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 61300-2-5, *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 – High temperature* endurance

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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 61300-2-26, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-26: Tests – Salt mist*

IEC 61300-2-27, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-27: Tests – Dust – Laminar flow*

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 61300-2-46, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-46: Tests – Damp heat, cyclic*

IEC 61300-3-2, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-2: Examination 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 61300-3-28, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-28: Examinations and measurements – Transient loss*

3 Test

All test methods are in accordance with the IEC 61300 series. Tests validate performance over the required operating wavelength and power range. The samples shall be terminated onto single-mode fibres as per IEC 60793-2-50, type B1.1 or B1.3 or B6 in either coated fibres (primary and secondary) or reinforced cable format as per IEC 60794-2-50.

4 Test report

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

The sample size to be used for the tests shall be as defined in Annex A.

5.2 Dimensions

Dimensions shall comply with those given in appropriate manufacturer's drawings.

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5.3 Test details and requirements

Table 1 defines the performance requirements and test details for single-mode non-connectorized fixed attenuators, category U.

Table 1 – Test details and requirements

No.	Tests	Requirements	Details	
1	Attenuation IEC 61300-3-7	Operating wavelength range: 1 260 nm to 1 360 nm and/or 1 460 nm to 1 625 nm. For nominal values ≤ 5 dB, the tolerance shall be ≤ ± 0,5 dB around the nominal insertion loss value. For nominal values > 5 dB, the tolerance shall be ≤ ± 10 % around the nominal insertion loss value.	Method: Launch patchcord length: Launch conditions: Optical source wavelength: Source power stability: Total uncertainty:	Method B2.1 ≥ 2 m. Only the fundamental mode shall propagate at the limiter interface and at the detector. The wavelength of the source shall be longer than cut-off wavelength of the fibre. Tunable narrowband non polarized source. 1 260 nm to 1 360 nm and 1 460 to 1 660 nm. Within ± 0,05 dB over the measuring period or at least 1 h. ≤ ± 0,1 dB
2	Return loss IEC 61300-3-7	≥ 50 dB Grade U	Method: Optical source wavelength: Other requirements: Total uncertainty:	Measurement method 1 OCWR 1 310 nm ± 10 nm, 1 550 nm ± 10 nm and/or 1 625 nm ± 10 nm Test every sample with the three wavelengths. This test shall be performed twice, reversing the sample. Both measurements shall be within the specified limits. ≤ ± 1 dB
3	Polarization dependent loss IEC 61300-3-2	≤ 0,3 dB at 1 550 nm The samples shall be terminated onto single-mode fibres as per IEC 60793-2-50,	Optical source Wavelength: Total uncertainty:	1 310 nm ± 10 nm, 1 550 nm ± 10 nm and/or 1 625 nm ± 10 nm ≤ ± 0,05 dB over the dynamic range to be measured
4	High optical power IEC 61300-2-14	Before, during and after the test, the insertion loss shall meet the requirements of test No. 1. Before, during and after the test, the return loss shall meet the requirements of test No. 2. During the test, the change in insertion loss and return loss shall be measured by test method IEC 61300-3-3	Test temperature: Optical source wavelength: Test duration: Power increments:	60 °C ± 2 °C 1 310 nm ± 10 nm, 1 550 nm ± 10 nm and/or 1 625 nm ± 10 nm 1 h at each power level For nominal insertion loss ≤ 5 dB: start at 0 dBm and go up to maximum allowed power input in 100 mW increments of CW source input For nominal insertion loss > 5 dB: 10 mW continuous power increments The above increments are applied up to the maximum allowed power input of 100 mW

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No.	Tests	Requirements	Details	
5	Vibration (sinusoidal) IEC 61300-2-1	Before and after the test, the insertion loss shall meet the requirements of test No. 1. Before and after the test, the return loss shall meet the requirements of test No. 2. During the test, the change in insertion loss shall be ≤ ± 0,5 dB.	Metohd: Frequency range: Constant vibration amplitude: Number of cycles: Number of axes: Sweep rate: Optical source wavelength: Specimen optically functioning:	During the test, the change in insertion loss shall be measured by transient loss test method IEC 61300-3-28. 10 Hz to 55 Hz 0,75 mm 15 3 orthogonal 1 octave/min 1 310 nm ± 10 nm, 1 550 nm ± 10 nm and/or 1 625 nm ± 10 nm Yes
6	Cold IEC 61300-2-17	During the test, the maximum allowed change in insertion loss is: ≤ ± 0,5 dB for attenuator ≤ 5 dB. ≤ ± 10 % for attenuators > 5 dB. Before and after the test, the insertion loss requirements of test No. 1 shall be met. Before and after the test, the return loss requirement of test No. 2 shall be met.	Method: Temperature: Duration of the exposure: Optical source wavelength: Maximum sampling interval during the test: Specimen optically functioning:	During the test, the change in insertion loss shall be measured by test method IEC 61300-3-3. –25 °C ± 2 °C 96 h 1 310 nm ± 10 nm, 1 550 nm ± 10 nm and/or 1 625 nm ± 10 nm Before and after the test, the samples will be measured with three wavelengths. During the test, the samples will be measured with one wavelength. 1 h Yes
7	Dry heat – High temperature endurance IEC 61300-2-18	During the test, the maximum allowed change in insertion loss is: ≤ ± 0,5 dB for attenuator ≤ 5 dB ≤ ± 10% for attenuators > 5 dB Before and after the test, the insertion loss requirements of test No. 1 shall be met Before and after the test, the return loss requirement of test No. 2 shall be met	Method: Temperature: Duration of the exposure: Optical source wavelength: Maximum sampling interval during the test: Specimen optically functioning:	During the test, the change in insertion loss shall be measured by test method IEC 61300-3-3. + 70 °C ± 2 °C 96 h 1 310 nm ± 10 nm, 1 550 nm ± 10 nm and/or 1 625 nm ± 10 nm Before and after the test, the samples will be measured with three wavelengths. During the test, the samples will be measured with one wavelength. 1 h Yes

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