IEC 61753-042-2

Edition 1.0 2014-08

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – Performance standard –
Part 042-2: Plug-pigtail-style and plug-receptacle-style OTDR reflecting devices for category C – Controlled environments

Dispositifs d'interconnexion et composants passifs à fibres optiques – Norme de performance –
Partie 042-2: Dispositifs de réflexion pour OTDR de modèle à fiche-fibre amorce et modèle à fiche-embase pour catégorie C – Environnements contrôlés

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IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

Part 042-2: Plug-pigtail-style and plug-receptacle-style OTDR reflecting devices for category C – Controlled environments

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International Standard IEC 61753-042-2 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/3709/CDV	86B/3785/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.

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – PERFORMANCE STANDARD –

Part 042-2: Plug-pigtail-style and plug-receptacle-style OTDR reflecting devices for category C – Controlled environments

1 Scope

This part of IEC 61753 contains the minimum initial performance, test and measurement requirements and severities which plug-pigtail style and plug-receptacle style OTDR reflecting devices need to satisfy in order to be categorized as meeting the requirements of category C-Controlled environments, as defined in Annex A of IEC 61753-1:2007 [1][1]. They are for out-of-band OTDR testing of an optical fibre system.

Annex B of this standard provides information concerning this device.

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 61300 (all parts), *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures*

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 61300-2-4, *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, *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*

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

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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 61300-2-42, *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*

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 61300-3-7, *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*

3 Terms, definitions and abbreviations

For the purposes of this document, the following terms and definitions apply.

3.1 Terms and definitions

3.1.1
OTDR reflecting device
optical filter having two ports that light from the signal wavelength ranges transmits from the first port to the second port and OTDR light from the OTDR wavelength range launched into one port is (partly) reflected back to that launch port

Note 1 to entry: It is used for out of band testing of optical fibre systems.

3.2 Abbreviations

FBG	Fibre Bragg grating
PDL	Polarisation dependent loss
ONU	Optical network unit
OTDR	Optical time-domain reflectometer
TFF	Thin-film filtre

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4 Test

Unless otherwise specified, all test methods are in accordance with the IEC 61300 series. Each test defines the number of samples to be evaluated. The samples used for each test are intended to be previously unstressed new samples but may also be selected from previously used samples if desired. The plug-pigtail style samples shall be terminated onto single-mode fibres as per IEC 60793-2-50 category B1.1, B1.3 or B6 in either coated fibres (primary and secondary) or reinforced cable format. For plug-receptacle style samples fibres as per IEC 60793-2-50 category B1.1, B1.3 or B6 shall be used. All measurements shall be carried out at standard atmosphere condition defined in IEC 61300-1, unless otherwise stated.

All tests shall be carried out over the operating wavelength range: the signal wavelength ranges of 1 260 nm to 1 360 nm, 1 480 nm to 1 500 nm and 1 550 nm to 1 560 nm, and the OTDR wavelength of 1 620 nm to 1 630 nm or 1 645 nm to 1 655 nm, unless otherwise specified.

NOTE 1 310 nm, 1 490 nm and 1 550 nm are the nominal or centre wavelengths, stated for the ranges 1 260 nm to 1 360 nm, 1 480 nm to 1 500 nm and 1 550 nm to 1 560 nm as defined in ITU-T Recommendations G.983.3 [2], G.984.2 [3] and IEEE standard 802.3ah-2004 [4].

5 Test report

Fully documented test reports and supporting evidences shall be prepared and be available for inspections 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 either an appropriate IEC interface standard or with those given in appropriate manufacturers drawings, where the IEC interface standard does not exist or cannot be used.

7.2 Sample size

Sample sizes for the test are defined in Annex A.

7.3 Test details and requirements

Test details and requirements are shown in Table 1 for plug-pigtail style and Table 2 for plug-receptacle style.

Table 1 – Test details and requirements for plug-pigtail style *(1 of 4)*

No	Tests	Requirements	Details	
1	Attenuation (Insertion loss) IEC 61300-3-7	≤1,0 dB (Class A) ≤1,5 dB (Class B) Insertion loss shall include connector loss. Insertion loss shall be met over the passband	Launch fibre length: Polarization state of light source: Measurement uncertainty:	≥2,0 m Unpolarized ±0,1 dB

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Table 1 *(2 of 4)*

No	Tests	Requirements	Details	
2	Wavelength Isolation IEC 61300-3-7	≥20 dB (Class A) ≥40 dB (Class B) Wavelength isolation between passband wavelength range and reflection-band wavelength range	Launch fibre length: Polarization state of light source: Measurement uncertainty:	≥2,0 m Unpolarized ±1 dB
3	Return loss IEC 61300-3-7	Grade S1: ≥22 dB for signal wavelength range(s) for both input and output ports and ≤12 dB for OTDR wavelength range for input port only. Grade S2: ≥22 dB for operating signal range(s) for both input and output ports and ≤1,5 dB for OTDR wavelength range for input port only. Grade T1: ≥35 dB for signal wavelength range(s) for both input and output ports and ≤5 dB for OTDR wavelength range for input port only. Grade T2: ≥35 dB for signal wavelength range(s) for both input and output ports and ≤1,0 dB for OTDR wavelength range for input port only	Polarization state of light source: Measurement uncertainty: Measurement uncertainty:	≥2,0 m Unpolarized ±0,05 dB for RL <1,0 dB ±0,2 dB for RL <1,5 dB ±0,5 dB for RL <5 dB ±1 dB for RL ≥5 dB
4	Polarisation dependent loss (PDL) IEC 61300-3-2	≤0,5 dB Polarisation dependent loss shall be met over the passband wavelength range	Launch fibre length: Measurement uncertainty:	≥2,0 m ±0,05 dB
5	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 wavelength 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: Measurement uncertainty:	300 mW 1 550 nm 1 650 nm 30 min for each wavelength 60 °C ± 2° C (93^{+2}_{-3}) % RH ±0,1 dB for insertion loss measurement) ±0,05 dB for RL <1,0 dB ±0,2 dB for RL <1,5 dB ±0,5 dB for RL <5 dB ±1 dB for RL ≥5 dB

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Table 1 *(3 of 4)*

No	Tests	Requirements	Details	
6	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
7	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
8	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 and after the test, the insertion loss change is monitored. 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 °C ± 2 °C (93^{+2}_{-3}) % RH 96 h
9	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 and after the test, the insertion loss change is monitored. 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 °C ± 2 °C –10 °C ± 2 °C 5 cycles 60 min 1 °C/min
10	Vibration IEC 61300-2-1	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	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
11	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°

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Table 1 *(4 of 4)*

No	Tests	Requirements	Details	
12	Fibre/cable retention IEC 61300-2-4	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	Magnitude and rate of application: Duration of the test: Point of application of tensile load: Method of mounting:	(10 ± 1) N at 5 N/s for reinforced cables (5,0 ± 0,5) N at 0,5 N/s for secondary coated fibres (2,0 ± 0,2) N at 0,5 N/s for primary coated fibres 120 s duration at 10 N 60 s duration at 2 N or 5 N 0,3 m from the exit point of the fibre/cable from the specimen. The sample shall be rigidly mounted such that the load is only applied to the fibre/cable retention mechanism
13	Static side load IEC 61300-2-42	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	Magnitude and duration of the tensile load: Direction of application:	1 N for 1 h for reinforced cable 0,2 N for 5 min for secondary coated fibres Two mutually perpendicular directions
14	Shock IEC 61300-2-9	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:	Components: 5 000 m/s^2 1 ms, half sine pulse 3 axes in 2 directions 2 shocks per axis, 12 shock in total

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