IEC 61753-089-2

Edition 1.0 2013-03

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components – Performance standard –
Part 089-2: Non-connectorized single-mode bidirectional OTDR monitoring WWDM devices for category C – Controlled environment

Dispositifs d'interconnexion et composants passifs à fibres optiques – Norme de performance –
Partie 089-2: Dispositifs WWDM de contrôle de type OTDR, bidirectionnels, unimodaux, non connectorisés pour la catégorie C – Environnement contrôlé

IEC 61753-089-2:2013-03(en-fr)

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International Standard IEC 61753-089-2 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components of IEC technical committee 86: Fibre optics.

This bilingual version (2016-01) corresponds to the monolingual English version, published in 2013-03.

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

CDV	Report on voting
86B/3454/CDV	86B/3529/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.

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 of IEC 61753 series, 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- withdrawn,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 089-2: Non-connectorized single-mode bidirectional OTDR monitoring WWDM devices for category C – Controlled environment

1 Scope

This part of IEC 61753 contains the minimum initial performance, test and measurement requirements and severities which a fibre optic pigtailed wide wavelength division multiplexing (WWDM) device for monitoring passive optical networks (PON) using an optical time-domain reflectometer (OTDR) satisfies in order to be categorized as meeting the requirements of category C (controlled environments), as defined in Annex A of IEC 61753-1:2007.

Annex B of this standard provides information concerning the principle and function of the OTDR monitoring WWDM.

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 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*

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

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

IEC 61753-1:2007, *Fibre optic interconnecting devices and passive components performance standard – Part 1: General and guidance for performance*

3 Terms and definitions

For the purposes of this document, the following terms and definitions, as well as those given in IEC 62074-1, apply.

3.1
OTDR monitoring WWDM device
WWDM device for monitoring PON using an OTDR that has three ports

Note 1 to entry: Signal wavelengths are transmitted between the common port and the optical line terminal (OLT) port. OTDR wavelengths are transmitted between the common port and the OTDR port

Note 2 to entry: Annex B of this standard provides information concerning the function of the OTDR monitoring WWDM device.

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 samples shall have pigtails of single-mode fibres as per IEC 60793-2-50, category B 1.1, B 1.3 or B 6 in either coated fibres (primary and secondary) or reinforced cable format. 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 signal wavelength ranges of 1 260 nm to 1 360 nm, 1 480 nm to 1 500 nm, 1 550 nm to 1 560 nm, and over the OTDR wavelength range, 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 [1] [1] and G.984.2 [2] and IEEE standard 802.3ah-2004 [3].

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

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 Performance requirements

6.1 Reference components

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

6.2 Dimensions

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

6.3 Sample size

Sample sizes for the tests are defined in Annex A.

6.4 Test details and requirements

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

No.	Test	Requirement	Details	
1	**Insertion loss (attenuation)** IEC 61300-3-7	≤ 0,8 dB Insertion loss shall be met between common port and OLT port for the signal wavelength range and between common port and OTDR port for the OTDR wavelength range	Launch patchcord length: Source: Launch conditions: Measurement uncertainty:	≥ 2 m Unpolarized. The wavelength of the source shall be longer than cut-off wavelength of the fibre. Test results shall be obtained under measurement uncertainty of ± 0,1 dB
2	**Wavelength Isolation** IEC 61300-3-7	≥ 20 dB Wavelength isolation shall be met between common port and OLT port for the OTDR wavelength range and between common port and OTDR port for the signal wavelength range	Launch patchcord length: Source: Launch conditions: Measurement uncertainty:	≥ 2 m Unpolarized. The wavelength of the source shall be longer than cut-off wavelength of the fibre. Test results shall be obtained under measurement uncertainty of ± 1 dB
3	**Directivity** IEC 61300-3-20	≥ 50 dB Grade U between OLT port and OTDR port. Directivity shall be met over the specified wavelength ranges.	Source type: Measurement uncertainty: Other requirements:	Laser diode (LD) Test results shall be obtained under measurement uncertainty of ± 1 dB All ports not under test shall be terminated to avoid unwanted reflections contributing to the measurement

Table 1 *(2 of 5)*

No.	Test	Requirement	Details	
4	**Return loss** IEC 61300-3-6	≥ 50 dB Grade U Return loss shall be met over the specified wavelength ranges	Source type: Measurement uncertainty: Other requirements:	Laser diode (LD) Test results shall be obtained under measurement uncertainty of ± 1 dB. All ports not under test shall be terminated to avoid unwanted reflections contributing to the measurement
5	**Polarization dependent loss (PDL)** IEC 61300-3-2	≤ 0,2 dB Polarization dependent loss shall be met over the specified wavelength ranges	Launch patchcord length: Source type: Measurement uncertainty:	≥ 2 m Laser diode (LD) Test results shall be obtained under measurement uncertainty of ± 0,05 dB
6	**High optical power** IEC 61300-2-14	≥ 300 mW (max. power at the single wavelength on the wavelength ranges, at the same time). During and on completion of the test the insertion loss limits of test No. 1 shall be met. After the test the wavelength isolation limits of test No. 2 shall be met. During and on completion of the test the return loss limits of test No. 4 shall be met	Source type: Max. power to be applied at wavelength 1 550 nm and wavelength range 1 620 nm to 1630 nm (1 650 nm to 1 660 nm): Max. power to be applied at wavelength 1 490 nm and 1 310 nm: Temperature:	Laser diode (LD) 300 mW (+ ~25 dBm) 10 mW (+ 10 dBm) 60 °C ± 2° C
			Measurement uncertainty:	Test results shall be obtained under insertion loss measurement uncertainty of ± 0,1 dB. Test results shall be obtained under return loss measurement uncertainty of ± 1 dB
7	**Cold** IEC 61300-2-17	After the test the insertion loss limits of test No. 1 shall be met. In addition the insertion loss during the test shall be within ± 0,3 dB from the initial value. After the test the wavelength isolation limits of test No. 2 shall be met. During and on completion of the test the return loss limits of test No. 4 shall be met	Temperature: Duration of the exposure: Maximum sampling interval during the test: Measurements required:	- 10 °C ± 2 °C 96 h 1 h Insertion loss shall be measured before, during and after the test. Return loss shall be measured before, during and after the test

Table 1 *(3 of 5)*

No.	Test	Requirement	Details	
8	**Dry heat – High temperature endurance** IEC 61300-2-18	After the test the insertion loss limits of test No. 1 shall be met. In addition the insertion loss during the test shall be within ± 0,3 dB from the initial value. After the test the wavelength isolation limits of test No. 2 shall be met. During and on completion of the test the return loss limits of test No. 4 shall be met	Temperature: Duration of the exposure: Maximum sampling interval during the test: Measurements required:	+ 60 °C ± 2 °C 96 h 1 h Insertion loss shall be measured before, during and after the test. Return loss shall be measured before, during and after the test
9	**Change of temperature** IEC 61300-2-22	After the test the insertion loss limits of test No. 1 shall be met. In addition the insertion loss during the test shall be within ± 0,3 dB from the initial value. After the test the wavelength isolation limits of test No. 2 shall be met. During and on completion of the test the return loss limits of test No. 4 shall be met	High temperature:: Low temperature: Number of cycles: Rate of temperature change: Duration at extreme temperatures: Maximum sampling interval during the test: Measurements required:	+ 60 °C ± 2 °C - 10 °C ± 2 °C 5 1 °C/min 1 h 0,5 h Insertion loss shall be measured before, during and after the test. Return loss shall be measured before, during and after the test
10	**Damp heat (steady state)** IEC 61300-2-19	After the test the insertion loss limits of test No. 1 shall be met. In addition the insertion loss during the test shall be within ± 0,3 dB from the initial value. After the test the wavelength isolation limits of test No. 2 shall be met. During and on completion of the test the return loss limits of test No. 4 shall be met	Temperature: Humidity: Duration of the exposure: Maximum sampling interval during the test: Measurements required:	+ 40 °C ± 2 °C 93 % RH + 2 % RH, -3 % RH 96 h 1 h Insertion loss shall be measured before, during and after the test. Return loss shall be measured before, during and after the test.

Table 1 *(4 of 5)*

No.	Test	Requirement	Details	
11	**Vibration** IEC 61300-2-1	After the test the insertion loss limits of test No. 1 shall be met. After the test the wavelength isolation limits of test No. 2 shall be met. After the test the return loss limits of test No. 4 shall be met	Frequency range:	10 Hz – 55 Hz
			Constant vibration amplitude:	0,75 mm
			Number of cycles (10 Hz - 55 Hz - 10 Hz):	15
			Frequency change:	1 octave/min
			Number of axes:	3 orthogonal
			Measurements required:	Insertion loss shall be measured before and after the test. Return loss shall be measured before and after the test
12	**Shock** IEC 61300-2-9	After the test the insertion loss limits of test No. 1 shall be met. After the test the wavelength isolation limits of test No. 2 shall be met. After the test the return loss limits of test No. 4 shall be met	Acceleration force:	5 000 m/s²
			Number of axes:	3 main axes, perpendicular to each other
			Duration shock:	1 ms
			Pulse:	Half sine
			Number of shocks:	2 per axis
			Measurements required:	Insertion loss shall be measured before and after the test. Return loss shall be measured before and after the test
13	**Fibre/cable retention** IEC 61300-2-4	After the test the insertion loss limits of test No. 1 shall be met. After the test the wavelength isolation limits of test No. 2 shall be met. After the test the return loss limits of test No. 4 shall be met	Magnitude of the load:	10 N ± 1 N for reinforced cable. 5,0 N ± 0,5 N for secondary coated fibre. 2,0 N ± 0,2 N for primary coated fibre.
			Load application point:	0,3 m from the end of device.
			Load rate:	5 N/s for reinforced cable. 0,5 N/s for coated fibre.
			Duration of the load:	120 s at 10 N 60 s at 5 N and 2 N
			Measurements required:	Insertion loss shall be measured before and after the test. Return loss shall be measured before and after the test