IEC 61753-021-2

Edition 2.0 2007-12

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Fibre optic interconnecting devices and passive components performance standard –
Part 021-2: Grade C/3 single-mode fibre optic connectors for category C – Controlled environment

Norme de qualité de fonctionnement des dispositifs d'interconnexion et composants passifs à fibres optiques –
Partie 021-2: Connecteurs à fibres optiques unimodales de classe C/3 pour la catégorie C – Environnement contrôlé

IEC 61753-021-2:2007

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS PERFORMANCE STANDARD –

Part 021-2: Grade C/3 single-mode fibre optic connectors for category C – Controlled environment

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International Standard IEC 61753-021-2 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2002 and constitutes a technical revision. The standard has been updated to reflect changes made to IEC 61753-1.

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

FDIS	Report on voting
86B/2602/FDIS	86B/2655/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.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS PERFORMANCE STANDARD –

Part 021-2: Grade C/3 single-mode fibre optic connectors for category C – Controlled environment

1 Scope

This part of IEC 61753 defines C/3 minimum initial test and measurement requirements and severities which a single-mode connector/cable assembly must satisfy in order to be categorized as meeting the IEC standard category C (controlled environment), as defined in Clause A.2 of IEC 61753-1.

2 Normative references

The following referenced documents are indispensable for the application 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 61300-2-1, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-1: Tests – Vibration (sinusoidal)*

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

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

IEC 61300-2-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-6: Tests – Tensile strength of coupling mechanism*

IEC 61300-2-12, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-12: Tests – Impact*

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*

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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 61300-3-1, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-1: Examinations and measurements – Visual examination*

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 61300-3-4, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-4: Examinations and measurements – Attenuation*

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

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 61300-3-34, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-34: Examinations and measurements – Attenuation of random mated connectors*

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

IEC 61754 (all parts), *Fibre optic connector interfaces*

IEC 61755 (all parts), *Fibre optic connector optical interfaces*

IEC 61755-3 (all parts) *Fibre optic connector optical interfaces – Part 3: Optical interface*

ISO 11801, *Information technology – Generic cabling for customer premises*

3 Terms and definitions

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

3.1
change in attenuation
peak-to-peak variation

3.2
sample
complete set of connector components required to provide demountable coupling between one or more pairs of optical fibres

3.3
pigtail assembly
two connector plugs mated with an adapter with unterminated leads, as shown in Figure 1.

NOTE Each of the unterminated leads should be at least 3 m long so that the splices may be located outside of the environmental test chamber.

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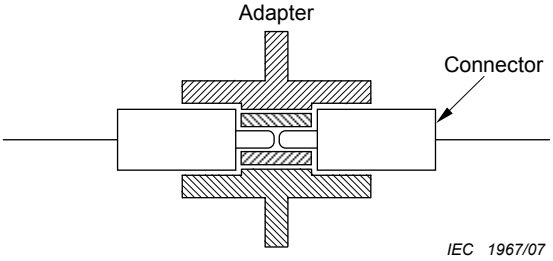

Figure 1 – Pigtail assembly

3.4
jumper cable assembly
jumper cable terminated with plugs on each end connected with adapters to two additional connector plugs with unterminated leads on either end, as shown in Figure 2. The jumper cable should be 5 m ± 0,5 m. Each of the unterminated leads should be long enough so that the splices may be located outside of the environmental test chamber.

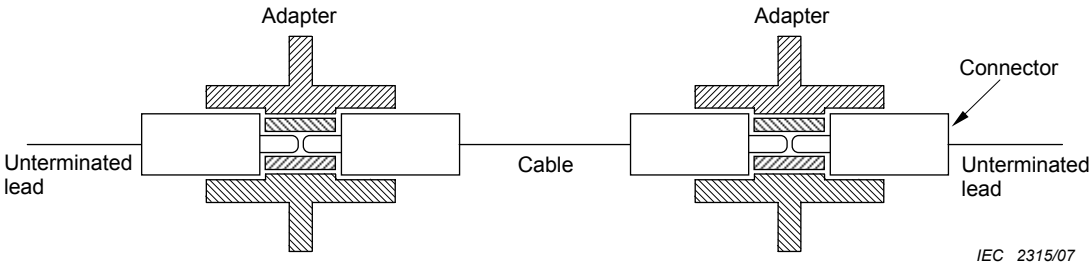

Figure 2 – Jumper cable assembly

4 Tests

All test methods are in accordance with the relevant parts of IEC 61300 as defined in 7.4 and 7.5.

The connectors under test shall be terminated onto single-mode fibre per type B1.1 or B1.3 of IEC 60793-2-50, in either secondary coated or cable format. The connector interface standard shall meet the dimensions of IEC 61754 and the connector optical interface standard shall meet the relevant requirements of IEC 61755.

The optical connector requirements shall be met in order to be in accordance with IS0 11801.

Each test defines the number of samples to be evaluated. The sample set used for the first test is to be composed of randomly selected and previously unstressed new samples.

The optical criteria for each test shall be as defined in 7.4.

5 Test report

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

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6 Reference components

No reference components are required to perform the tests in this standard.

7 Performance requirements

7.1 Dimensions

Dimensions shall comply with the appropriate IEC interface standard as defined in IEC 61754.

7.2 Sample size, test sequencing and grouping

For the purposes of this standard, a sample is composed of pigtail assemblies and jumper cable assemblies (see Clause 3). The sample sizes to be used for the tests shall be as defined in Annex A. There is no defined sequence or grouping in which the tests shall be run. Samples for the first test (attenuation) are to be randomly selected and randomly mated new products. Samples for the second test (return loss) are the same plugs selected and mated for the first test. Samples for subsequent tests may be randomly selected and randomly mated new products or the same plugs.

7.3 Endface geometry

The connector endface shall comply with the endface geometry requirements of the applicable IEC optical interface standard as defined in 61755-3. Compliance with the appropriate optical interface standard shall be confirmed on all samples before the start of testing and after all of the tests have been completed. Non-compliance with the endface geometry requirements of the applicable optical interface standard on any connector tested results in a failure of this performance standard.

7.4 Performance criteria

The optical performance levels shall meet the requirements of Grade C/3 as defined in Table A.12 of IEC 61753-1. See Table.1

Table 1 – Performance levels

Performance level	Test name	Initial	During and after test
C/3	Attenuation IEC 61300-3-34	≤0,25 dB mean ≤0,50 dB max. for ≥97 % of samples	
	Return loss IEC 61300-3-6	≥35 dB	Return loss ≥35 dB during and after test
	Monitoring change in attenuation and in return loss (multiple path IEC 61300-3-3)		Maximum variation ≤0,2 dB during and after test for pigtails Maximum variation ≤0,5 dB during and ≤0,4 dB after test for patchcords

7.5 Performance details

Performance details are specified in Table 2.

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Table 2 – Performance details

No	Test	Requirements	Details
1	Attenuation (Method C)	Grade C performance level: Mean ≤ 0,25 Maximum = 0,50 dB Test wavelengths: 1 310 nm ± 30 nm and 1 550 nm ± 30 nm (launch condition S4 and S5)	IEC 61300-3-4 Device under test (DUT) type 5, Insertion method (C) Launch mode conditions: only the fundamental mode shall propagate at the connector interface and at the detector. Source characteristics reference to IEC 61300-3-4 (attenuation) Specimen shall be optically functioning. Preconditioning procedure: clean plug and adapter according to manufacturer's instructions.
2	Return loss	Grade 3 performance level: Minimum > 35 dB Test wavelengths: 1 310 nm ± 20 nm and 1 550 nm ± 20 nm	IEC 61300-3-6 Method branching devices Launch fibre length: L > 2 m Source stability: ±0,20 dB over the measuring period or at least 1 h Detector linearity: within 5 % of the power levels to be measured Directivity: >65 dB Specimen shall be optically functioning. Preconditioning procedure: clean plug and adapter according to manufacturer's instructions. Alternative method: IEC 61300-3-6 Method OTDR Launch fibre length: $L1$ ≥ 500 m, $L2$ ≥ 6 m, $L3$ ≥ 6 m Pulse duration: ≤10 ns Specimen shall be optically functioning. Preconditioning procedure: clean plug and adapter according to manufacturer's instructions.
3	Vibration (sinusoidal)	Attenuation: All attenuation measurements shall meet the criteria specified in 7.4. Return loss: All return loss measurements shall meet the criteria specified in 7.4. Test wavelengths: 1 550 nm ± 20 nm	IEC 61300-2-1 Frequency range: 10 Hz to 55 Hz Change in frequency: 1 oct/min Endurance duration per axis: 0,5 h Number of axes: three orthogonal Number of sweeps per axis: 15 Vibration amplitude: 0,75 mm Sampling rate: before, during and after each axis. The measurement interval during the test shall be < 2 ms and transient monitoring shall be performed according to IEC 61300-3-28. Sampling rate note: Attenuation and return loss decrease is the difference between any measurement and the initial measurement, and applies to all measurements. Maximum attenuation and return loss criteria apply to all measurements. Method of mounting: an adapter shall be mounted rigidly to the mounting fixture. Specimen shall be optically functioning. Preconditioning procedure: clean plug and adapter according to manufacturer's instructions. The connector samples shall not be uncoupled or cleaned anytime during the test.

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