

INTERNATIONAL STANDARD

**Fibre optic interconnecting devices and passive components performance
standard –
Part 031-3: Non-connectorized single-mode 1×N and 2×N non-wavelength-
selective branching devices (NWBD) for Category U – Uncontrolled environment**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2009 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester.

If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

- Catalogue of IEC publications: www.iec.ch/searchpub

The IEC on-line Catalogue enables you to search by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, withdrawn and replaced publications.

- IEC Just Published: www.iec.ch/online_news/justpub

Stay up to date on all new IEC publications. Just Published details twice a month all new publications released. Available on-line and also by email.

- Electropedia: www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 20 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary online.

- Customer Service Centre: www.iec.ch/webstore/custserv

If you wish to give us your feedback on this publication or need further assistance, please visit the Customer Service Centre FAQ or contact us:

Email: csc@iec.ch
Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00



IEC 61753-031-3

Edition 1.0 2009-02

INTERNATIONAL STANDARD

**Fibre optic interconnecting devices and passive components performance standard –
Part 031-3: Non-connectorized single-mode 1×N and 2×N non-wavelength-selective branching devices (NWBD) for Category U – Uncontrolled environment**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE



ICS 33.180.10

ISBN 2-8318-1029-0

CONTENTS

FOREWORD.....	3
1 Scope.....	5
2 Normative references	5
3 Test.....	6
4 Test report.....	7
5 Performance requirements	7
5.1 Dimensions	7
5.2 Sample size	7
5.3 Test details and requirements	7
Annex A (informative) Examples of attenuation requirements of 1 × N and 2 × N branching devices.....	15
Annex B (normative) Sample size	16
Bibliography.....	17
Table 1 – Test details and requirements	8
Table A.1 – Attenuation and uniformity requirements of balanced bidirectional branching devices having the most common port configurations for class FBT.....	15
Table A.2 – Attenuation and uniformity requirements of balanced bidirectional branching devices having the most common port configurations for class PLC.....	15
Table A.3 – Attenuation requirements of 1 × 2 and 2 × 2 unbalanced branching devices having the most common port configurations	15
Table B.1 – Sample size for each test.....	16

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE
COMPONENTS PERFORMANCE STANDARD –**
**Part 031-3: Non-connectorized single-mode 1×N and 2×N
non-wavelength-selective branching devices (NWBD) for Category U –
Uncontrolled environment**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61753-031-3 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:

FDIS	Report on voting
86B/2789/FDIS	86B/2821/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.

A list of all the parts in the 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 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

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

A bilingual version of this publication may be issued at a later date.

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS PERFORMANCE STANDARD –

Part 031-3: Non-connectorized single-mode 1×N and 2×N non-wavelength-selective branching devices (NWBD) for Category U – Uncontrolled environment

1 Scope

This part of IEC 61753 contains the minimum initial tests and measurement requirements and severities which a non-wavelength selective branching device (NWBD) should satisfy in order to be categorized as meeting the requirements of Category U (uncontrolled environment) as defined in Annex A of IEC 61753-1.

This standard takes into account two technologies present on the market: the Fused Biconical Taper (FBT) and the Planar Lightwave Circuit (PLC). Requirements cover balanced, bidirectional, non-connectorized, single-mode $1 \times N$ and $2 \times N$ non-wavelength-selective branching devices for use in an IEC Category U environment (N is the number of output ports), especially for Passive Optical Network (PON) application. The specifications of unbalanced branching devices are limited to 1×2 and 2×2 devices because they are the most commonly used.

2 Normative references

The following normative 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: 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 61300-2-4, *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/Twist*

IEC 61300-2-9, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-9: Tests – Shock*

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

IEC 61300-2-14, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-14: Tests – Optical power handling and damage threshold characterization*

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 2-19: Tests – Change of temperature*

IEC 61300-2-42, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-19: Tests – Static side load for connectors*

IEC 61300-2-44, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-19: 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: Examinations and measurements – Polarization dependence of attenuation 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 61300-3-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-6: Examinations and measurements – 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*

IEC 61300-3-20, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-20: Examinations and measurements – Directivity of fibre optic branching devices*

IEC 61753-2-1: *Fibre optic interconnecting devices and passive components performance standard – Part 2-1: Fibre optic connectors terminated on single-mode fibre for category U – Uncontrolled environment*

3 Test

All test methods are selected from the IEC 61300 series of standards.

The samples for tests shall be terminated onto single-mode fibres according to type B1.1 of IEC 60793-2-50 in either coated fibres (primary and secondary) or reinforced cable format.

All tests shall be carried out to validate performance over the full wavelength range of the optical fibre, 1 260 nm to 1 650 nm. However, from an application and laser wavelength point of view, more limited bands can be considered in the test, such as:

- a) Spectral bands I:
 - 1 260 nm to 1 360 nm
 - 1 480 nm to 1 500 nm

b) Spectral bands II:

1 615 nm to 1 635 nm (1 625 nm OTDR band)

1 640 nm to 1 660 nm (1 650 nm OTDR band).

4 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.

5 Performance requirements

5.1 Dimensions

Dimensions shall comply with either an appropriate IEC interface standard or a relevant specification.

5.2 Sample size

Sample sizes for the tests are defined in Annex B.

5.3 Test details and requirements

Attenuation and return loss performances are given only for non-connectorized branching devices. For connectorized components the connector performances shall be in compliance with IEC 61753-2-1.

During the environmental tests where monitoring of the branching device is needed, all ports of the device shall be controlled.

Table 1 – Test details and requirements

No.	Tests	Requirements				Details		
		1xN		2xN				
1	Attenuation (A) IEC 61300-3-7	Configuration	FBT	PLC	FBT	PLC	Launch patchcord length: ≥ 2 m. Light source: unpolarized. Launch conditions: The wavelength of the source shall be longer than the cut-off wavelength of the fibre. Uncertainty: $\pm 0,05$ dB or lower. The measurement should be performed with any combination of input/output and output/input ports. The results should meet the requirements. See Tables A.1 and A.2 for examples	
		Technology						
		<i>Balanced NWBD</i>						
		Spectral band I	A [dB] $\leq 0,1 + 3,6 \log_2 N$	A [dB] $\leq 1,2 + 3,3 \log_2 N$	A [dB] $\leq 0,4 + 3,6 \log_2 N$	A [dB] $\leq 1,5 + 3,3 \log_2 N$		
		Spectral bands I and II	A [dB] $\leq 4 \log_2 N$	A [dB] $\leq 1,5 + 3,4 \log_2 N$	A [dB] $\leq 0,3 + 4 \log_2 N$	A [dB] $\leq 1,5 + 3,5 \log_2 N$		
		<i>Unbalanced NWBD</i>						
2	Uniformity (U) IEC 61300-3-7	Configuration	FBT	PLC	FBT	PLC	Same as above. See Table A.3 for example	
		Technology						
		<i>Balanced NWBD</i>						
		Spectral band I	U [dB] $\leq 0,1 + 0,55 \log_2 N$	U [dB] $\leq 0,3 \log_2 N$	U [dB] $\leq 0,4 + 0,55 \log_2 N$	U [dB] $\leq 0,1 + 0,65 \log_2 N$		
		Spectral bands I and II	U [dB] $\leq 0,3 + 0,9 \log_2 N$	U [dB] $\leq 0,65 + 0,2 \log_2 N$	U [dB] $\leq 0,6 + 0,9 \log_2 N$	U [dB] $\leq 0,7 + 0,6 \log_2 N$		
		<i>Unbalanced NWBD</i>						
		Spectral band I						
		Spectral bands I and II	A [dB] $\leq 22 - 10,8 \log_{10} P$ where P is the nominal percentage of power associated with one port					

Table 1 (continued)

No.	Tests	Requirements	Details
3	Directivity IEC 61300-3-20	≥55 dB	Same as in test No. 1. Source type : LD. Uncertainty: ± 1 dB or lower. All ports not under test shall be terminated to avoid unwanted reflections contributing to the measurement. The measurement should be made between any pair of input/output ports
4	Return loss IEC 61300-3-6	≥50 dB Grade U	Same as in test No. 1. Source type : LD. Uncertainty of ± 1 dB or lower. All ports not under test shall be terminated to avoid unwanted reflections contributing to the measurement
5	Polarization dependent loss IEC 61300-3-2	For balanced branching devices: ≤0,2 dB for N < 4 and ≤0,3 dB for N = 4 and ≤0,4 dB for N > 4 For unbalanced 1×2 and 2×2 branching devices and for both output ports: ≤0,7 – 0,25 log ₁₀ P where P is the nominal percentage of the power associated with one port	Launch patchcord length: ≥ 2m. Source type : LD. Uncertainty: ± 0,05 dB or lower. The test should be performed for all combinations of input and output ports

Table 1 (continued)

No.	Tests	Requirements	Details
6	Active monitoring of changes in attenuation and return loss IEC 61300-3-3	<p>1) <u>For climatic tests:</u></p> <p>During and on completion of the test the attenuation of balanced branching devices shall be within $\pm 0,3$ dB for $N \leq 4$ and within $\pm 0,5$ dB for $N > 4$ of the original value under ambient conditions.</p> <p>For unbalanced branching devices, the attenuation limits shall be within $\pm 0,3$ dB for $P \% > 2 \%$ and $\pm 0,5$ dB for $P \% \leq 2 \%$ during the test.</p> <p>After the test, the return loss limits of test No. 4 shall be met.</p> <p>2) <u>For mechanical tests:</u></p> <p>On completion of the test, the attenuation of balanced branching devices shall be within $\pm 0,3$ dB for $N \leq 4$ and within $\pm 0,5$ dB for $N > 4$ of the original value.</p> <p>For unbalanced branching devices, the attenuation limits shall be within $\pm 0,3$ dB for $P \% > 2 \%$ and $\pm 0,5$ dB for $P \% \leq 2 \%$ during the test.</p> <p>After the test, the return loss limits of test No. 4 shall be met</p>	Uncertainty: $\pm 0,05$ dB or lower for attenuation. Uncertainty: ± 1 dB or lower for return loss. Other details: same as in Test Nos. 1 and 4
7	Optical power handling and damage threshold characterization IEC 61300-2-14	<p>$P_{max} = 500$ mW (+27 dBm) per port only one at a time.</p> <p>During the test, the attenuation limits of test No. 1 shall be met. Moreover, during and on completion of the test, the attenuation shall be within $\pm 0,3$ dB of original value under ambient conditions.</p> <p>After the test, the return loss limits of test No. 4 shall be met</p>	Same as test no.1. Test wavelengths: 1 310 nm \pm 20 nm, 1 550 nm \pm 20 nm, 1 625 nm \pm 20 nm. Power increments: 3 dB. Duration of the optical power exposure at each level: 30 min. Attenuation test: Uncertainty = $\pm 0,05$ dB or lower. Return loss test: Uncertainty = ± 1 dB or lower
8	Cold IEC 61300-2-17	See requirement 1) of test No. 6	Temperature: -25 °C. Duration of exposure: 96 h. Length of the cable on each side of the device: $>1,5$ m. Specimens shall be optically functioning: attenuation and return loss shall be measured before the test, during the test at a maximum interval of 1 h and after the test by means of the monitoring set-ups defined in test No. 6. Preconditioning procedure: before test, specimens shall be maintained at room temperature for 2 h. Recovery procedure: after test, specimens shall be maintained at room temperature for 2 h

Table 1 (continued)

No.	Tests	Requirements	Details
9	Dry heat – High temperature endurance IEC 61300-2-18	See requirement 1) of test No. 6	Temperature: +70 °C. Duration of exposure: 96 h. Length of the cable on each side of the device: >1,5 m. Specimens shall be optically functioning: attenuation and return loss shall be measured before the test, during the test at a maximum interval of 1 h and after the test by means of the monitoring set-ups defined in test No. 6. Preconditioning procedure: before test, specimens shall be maintained at room temperature for 2 h. Recovery procedure: after test, specimens shall be maintained at room temperature for 2 h
10	Damp heat (steady state) IEC 61300-2-19	See requirement 1) of test No. 6	Temperature: (+40 ± 2) °C. Relative humidity: (93 ± 2) %. Duration of exposure: 96 h. Length of the cable on each side of the device: >1,5 m. Specimens shall be optically functioning: attenuation and return loss shall be measured before the test, during the test at a maximum interval of 1 h and after the test by means of the monitoring set-ups defined in test No. 6. Preconditioning procedure: before test, specimens shall be maintained at room temperature for 2 h. Recovery procedure: after test, specimens shall be maintained at room temperature for 2 h
11	Damp heat (cyclic) IEC 61300-2-46	See requirement 1) of test No. 6	High temperature: +55 °C. Low temperature: +25 °C. Relative humidity: (93 ± 3) % except for the first and the last 15 min of each cycle that shall be between 90 % and 100 %. Number of cycles: 10. Specimens shall be optically functioning: attenuation and return loss shall be measured before the test, during the test at a maximum interval of 10 min and after the test by means of the monitoring set-ups defined in test No. 6. Preconditioning procedure: before test, specimens shall be maintained at room temperature for 2 h. Recovery procedure: after test, specimens shall be maintained at room temperature for 2 h

Table 1 (continued)

No.	Tests	Requirements	Details
12	Change of temperature IEC 61300-2-22	See requirement 1) of test No. 6	High temperature: +70 °C. Low temperature: –25 °C. Duration at extreme temperature: 1 h. Temperature rate of change: 1 °C/min. Number of cycles: 12. Specimens shall be optically functioning: attenuation and return loss shall be measured before the test, during the test at a maximum interval of 10 min and after the test by means of the monitoring set-ups defined in test No. 6. Preconditioning procedure: before test, specimens shall be maintained at room temperature for 2 h. Recovery procedure: after test, specimens shall be maintained at room temperature for 2 h
13	Vibration (sinusoidal) IEC 61300-2-1	See requirement 2) of test No. 6	Frequency range: 10 Hz – 55 Hz. Duration per axis: 0,5 h. Number of axes: 3 orthogonal. Rate of change: 1 octave/min. Number of sweeps (10 Hz – 55 Hz – 10 Hz): 15. Vibration amplitude: 0,75 mm. Specimens shall be optically functioning: attenuation and return loss shall be measured before and after the test by means of the monitoring set-ups defined in test No. 6. Method of mounting: the device shall be mounted rigidly to the mounting fixture together with the assembling tray or organizer
14	Static side load ^a IEC 61300-2-42	See requirement 2) of test No. 6	1 N for 1 h for reinforced cables. 0,2 N for 5 min for secondary coated fibres. Static side load shall be applied in two mutually perpendicular directions as permitted by the product design. Specimens shall be optically functioning: attenuation and return loss shall be measured before and after the test by means of the monitoring set-ups defined in test No. 6

Table 1 (continued)

No.	Tests	Requirements	Details
15	Fibre/cable retention ^a IEC 61300-2-4	See requirement 2) of test No. 6	<p>Magnitude and rate of application of the tensile load:</p> <p>10 N ± 5 N at a speed of 5 N/s for reinforced cable;</p> <p>5 N ± 0,5 N at a speed of 0,5 N/s for secondary coated fibres;</p> <p>2 N ± 0,2 N at a speed of 0,5 N/s for primary coated fibres.</p> <p>Point of application of tensile load: 0,3 m from the end of the device.</p> <p>Duration of the test (maintaining the load): 120 s at 100 N and 60 s at 5 N</p> <p>Sampling rate:</p> <p>losses shall be measured at least once after the load has reached its maximum level and been maintained for a minimum period of 30 s.</p> <p>Specimens shall be optically functioning: attenuation and return loss shall be measured before and after the test by means of the monitoring set-ups defined in test No. 6</p>
16	Optical fibre cable flexing ^a IEC 61300-2-44	See requirement 2) of test No. 6	<p>5 N for reinforced cable.</p> <p>Cycle: ± 90°.</p> <p>Number of cycles: 30.</p> <p>Specimens shall be optically functioning: attenuation and return loss shall be measured before and after the test by means of the monitoring set-ups defined in test No. 6</p>
17	Torsion/twist ^a IEC 61300-2-5	See requirement 2) of test No. 6	<p>Magnification and rate of application of the tensile load:</p> <p>5 N at a speed of 0,1 N/s for a reinforced cable terminated device;</p> <p>2 N at a speed of 0,1 N/s for a coated fibre terminated device.</p> <p>Point of application of the load: 0,2 m from the end of the device.</p> <p>Duration of the test: 10 cycles ± 180°</p> <p>Sampling rate:</p> <p>losses shall be measured at least once every five cycles.</p> <p>Specimens shall be optically functioning: attenuation and return loss shall be measured before and after the test by means of the monitoring set-ups defined in test No. 6</p>

Table 1 (continued)

No.	Tests	Requirements	Details
18	Impact IEC 61300-2-12	See requirement 2) of test No. 6.	Method A. Number of drops: 5. Drop height: 1,5 m. Sampling rate: losses shall be measured after each drop. Specimens shall be optically functioning: attenuation and return loss shall be measured before and after the test by means of the monitoring set-ups defined in test No. 6
19	Shock (If the product is normally mounted in a shock resistant mounting then it shall be tested in this configuration) IEC 61300-2-9	See requirement 2) of test No. 6.	Acceleration forces: 500 gn. 0,125 kg ≤ module mass ≤ 0,225 kg: 200 gn 0,225 kg ≤ module mass ≤ 1kg: 50 gn. Nominal 1 ms duration, half sine pulse. 3 axes in 2 directions, 2 shocks per axis, 12 shocks total. Specimens shall be optically functioning: attenuation and return loss shall be measured before and after the test by means of the monitoring set-ups defined in test No. 6
^a These tests shall be applicable to branching devices that incorporate fibre or fibre cable pigtails in their product design.			

Annex A (informative)

Examples of attenuation requirements of $1 \times N$ and $2 \times N$ branching devices

Table A.1 – Attenuation and uniformity requirements of balanced bidirectional branching devices having the most common port configurations for class FBT

No.	$1 \times N$				$2 \times N$			
	Spectral band I		Spectral bands I and II		Spectral band I		Spectral bands I and II	
	A_{\max} (dB)	U_{\max} (dB)	A_{\max} (dB)	U_{\max} (dB)	A_{\max} (dB)	U_{\max} (dB)	A_{\max} (dB)	U_{\max} (dB)
2	3,7	0,7	4,0	1,2	4,0	1,0	4,3	1,5
3	5,8	1,0	6,3	1,7	6,1	1,3	6,6	2,0
4	7,3	1,2	8,0	2,1	7,6	1,5	8,3	2,4
6	9,4	1,5	10,3	2,6	9,7	1,8	10,6	2,9
8	10,9	1,8	12,0	3,0	11,2	2,1	12,3	3,3
12	13,0	2,1	14,3	3,5	13,3	2,4	14,6	3,8
16	14,5	2,3	16,0	3,9	14,8	2,6	16,3	4,2
24	16,6	2,6	18,3	4,4	16,9	2,9	18,6	4,7
32	18,1	2,9	20,0	4,8	18,4	3,2	20,3	5,1

Table A.2 – Attenuation and uniformity requirements of balanced bidirectional branching devices having the most common port configurations for class PLC

No.	$1 \times N$				$2 \times N$			
	Spectral band I		Spectral bands I and II		Spectral band I		Spectral bands I and II	
	A_{\max} (dB)	U_{\max} (dB)	A_{\max} (dB)	U_{\max} (dB)	A_{\max} (dB)	U_{\max} (dB)	A_{\max} (dB)	U_{\max} (dB)
2	4,5	0,3	4,9	0,85	4,8	0,75	5,0	1,3
3	6,4	0,5	6,9	1,1	6,7	1,1	7,0	1,7
4	7,8	0,6	8,3	1,3	8,1	1,4	8,5	1,9
6	9,7	0,8	10,3	1,4	10,0	1,8	10,5	2,3
8	11,1	0,9	11,7	1,6	11,4	2,1	12,0	2,5
12	13,0	1,1	13,7	1,7	13,3	2,4	14,0	2,9
16	14,4	1,2	15,1	1,9	14,7	2,7	15,5	3,1
24	16,3	1,4	17,1	2,0	16,6	3,1	17,5	3,5
32	17,7	1,5	18,5	2,2	18,0	3,4	19,0	3,7

Table A.3 – Attenuation requirements of 1×2 and 2×2 unbalanced branching devices having the most common port configurations

Coupling ratio $P_1 \% / P_2 \%$	$A_1 \max. / A_2 \max.$ dB
40/60	4,7/2,8
30/70	6,0/2,1
20/80	7,9/1,4
10/90	11,2/0,9
5/95	14,5/0,6

Annex B
(normative)

Sample size

All samples shall be subjected to Tests 1 to 5. All other tests shall be carried out in any of the following order. Consecutive testing on the same optical sample is allowed, but in case of failure during the consecutive testing, a new sample shall be prepared and the failed test shall be redone.

Table B.1 – Sample size for each test

Test number	Test	Sample size
1	Attenuation	12
2	Uniformity	12
3	Directivity	12
4	Return loss	12
5	Polarization dependent loss	12
7	Optical power handling and damage threshold characterization	4
8	Cold	4
9	Dry heat – High temperature endurance	4
10	Damp heat (steady state)	4
11	Damp heat (cyclic)	4
12	Change of temperature	4
13	Vibration	4
14	Static side load	4
15	Fibre/cable retention	4
16	Optical fibre cable flexing	4
17	Torsion/twist	4
18	Impact	4
19	Shock	4

Bibliography

IEC 60875-1: *Non-wavelength-selective fibre optic branching devices – Part 1: Generic specification*

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

LICENSED TO MECON Limited. - RANCHI/BANGALORE
FOR INTERNAL USE AT THIS LOCATION ONLY, SUPPLIED BY BOOK SUPPLY BUREAU.

LICENSED TO MECON Limited. - RANCHI/BANGALORE
FOR INTERNAL USE AT THIS LOCATION ONLY, SUPPLIED BY BOOK SUPPLY BUREAU.

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

3, rue de Varembé
PO Box 131
CH-1211 Geneva 20
Switzerland

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