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INTERNATIONAL STANDARD

colour inside

Dynamic modules –
Part 3-3: Performance specification templates – Wavelength selective switches

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DYNAMIC MODULES –

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FOREWORD

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International Standard IEC 62343-3-3 has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision.

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

a) modification of the normative references;

b) modification of the terms and definitions.

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

FDIS	Report on voting
86C/1648/FDIS	86C/1655/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

A list of all parts in the IEC 62343 series, published under the general title *Dynamic modules,* can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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- withdrawn,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

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INTRODUCTION

A wavelength selective switch (WSS) is a dynamic module (DM), which is mainly used in a reconfigurable optical add-drop multiplexer (ROADM) system to switch a particular wavelength signal to any output ports in DWDM networks. The WSS ~~module~~ has one input port and a plurality of output ports (i.e. $1 \times N$ WSS) and can be used in reverse, with N input ports and one output port, depending on its application. It is controlled with software, which determines any wavelength signal among a DWDM signal from one input port to switch to a particular output port in case of $1 \times N$ application.

DYNAMIC MODULES –

Part 3-3: Performance specification templates – Wavelength selective switches

1 Scope

This part of IEC 62343 provides a performance specification template for wavelength selective switches. The object is to provide a framework for the preparation of detail specifications on the performance of wavelength selective switches.

Additional specification parameters ~~may be~~ are often included for detailed product specifications or performance specifications if necessary. However, specification parameters specified in this document ~~shall~~ are not ~~be~~ removed from the detail product specifications or performance specifications.

The technical information regarding wavelength selective switches and their applications in DWDM systems with single-mode fibres ~~will be~~ are described in IEC TR 62343-6-4~~, currently under consideration~~.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61290-7-1, *Optical amplifiers – Test methods – Part 7-1: Out-of-band insertion losses – Filtered optical power meter method*

IEC 61300-2-14, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-14: Tests – High optical power*

IEC 61300-3-2, *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: Examinations and measurements – Return loss*

IEC 61300-3-14, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-14: Examinations and measurements – ~~Accuracy~~ Error and repeatability of the attenuation settings of a variable optical attenuator*

IEC 61300-3-21, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-21: Examinations and measurements – Switching time ~~and bounce time~~*

IEC 61300-3-29, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-29: Examinations and measurements – ~~Measurement techniques for characterizing the amplitude of the spectral transfer function of DWDM components~~ Spectral transfer characteristics of DWDM devices*

IEC 61300-3-32, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-32: Examinations and measurements – Polarization mode dispersion measurement for passive optical components*

IEC 61300-3-38, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-38: Examinations and measurements – Group delay, chromatic dispersion and phase ripple*

IEC 61753-021-2, *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*

IEC 62074-1, *Fibre optic interconnecting devices and passive components – Fibre optic WDM devices – Part 1: Generic specification*

IEC 62343, *Dynamic modules – General and guidance*

IEC 62343-1, *Dynamic modules – Part 1: Performance standards – General conditions*

~~IEC 62343-4-1, *Dynamic modules – Part 4-1: Software and hardware interface standards – 1x9 wavelength selective switch* [1]~~

IEC 62343-5-2, *Dynamic modules – Part 5-2: Test methods – 1 x N fixed-grid WSS – Dynamic crosstalk measurement*

ITU-T Recommendation G.694.1, *Spectral grids for WDM applications: DWDM frequency grid*

~~ITU-T G.Sup39, *Optical system design and engineering considerations*~~

3 Terms and definitions

For the purpose of this document, the ~~following~~ terms and definitions given in IEC 62343 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

~~**3.1**~~
~~**wavelength selective switch**~~
~~WSS~~
~~dynamic module, which is mainly used in a reconfigurable optical add drop multiplexer (ROADM) system to switch all wavelength signals to their respective required output port in DWDM networks~~

~~Note 1 to entry: It is electrically controlled with software, which directs each wavelength signal among an input DWDM signal from one input port to the required output port for each wavelength signal.~~

~~[1] Under consideration.~~

3.2
operating wavelength range
specified range of wavelengths from λ_{imin} to λ_{imax} about a nominal operating wavelength λ_i, within which a dynamic optical module is designed to operate with a specified performance and generally corresponds to spectral bands for single-mode systems defined in ITU-T G.Sup39

3.3
port
optical fibre or optical fibre connector attached to a WSS module for the entry and/or exit of the optical signal (input and/or output)

3.4
channel
signal at wavelength, λ, that corresponds to ITU grid (ITU-T Recommendation G.694.1) within the range of operating wavelength range

3.5
channel spacing
centre-to-centre difference in frequency (or wavelength) between adjacent channels in a device

3.6
channel frequency range
frequency range within which a device is expected to operate with a specified performance

Note 1 to entry: For a particular nominal channel central frequency, f_{nomi}, this frequency range is from $f_{imin} = (f_{nomi} - \Delta f_{max})$ to $f_{imax} = (f_{nomi} + \Delta f_{max})$, where Δf_{max} is the maximum channel central frequency deviation.

Note 2 to entry: Nominal channel centre frequency and maximum channel centre frequency deviation are defined in ITU-T Rec. G.692.

3.7
insertion loss
IL
value defined in the equation below at the particular wavelength between two conducting ports

Note 1 to entry: It is the reduction in optical power between an input and output port of a module expressed in decibels.

$$IL = -10 \log (P_{out}/P_{in})$$

where

P_{in} is the optical power launched into input port;

P_{out} is the optical power received from the output port.

3.8
insertion loss uniformity
difference between the maximum and minimum insertion loss at the output for a specified set of input ports

3.9
insertion loss ripple
maximum peak-to-peak variation of the insertion loss within a channel frequency (or wavelength) range

3.10
***X*-dB passband width**
width of a channel centred about the channel central wavelength within which the optical attenuation is within X dB

Note 1 to entry: The terms "operating wavelength range" or "channel passband" are used and have the same meaning as passband for DWDM devices. The X-dB bandwidth is defined through the spectral dependence of a_{ij} (where $i \neq j$) as the minimum wavelength range centred about the operating wavelength λ_h within which the variation of a_{ij} is less than X dB. The minimum wavelength range is determined considering thermal wavelength shift, polarization dependence and long-term aging shift (refer to Figure 1 below).

Note 2 to entry: It is recommended that the passband width be specified as 0,5 dB, 1 dB and 3 dB (X = 0,5, 1 and 3).

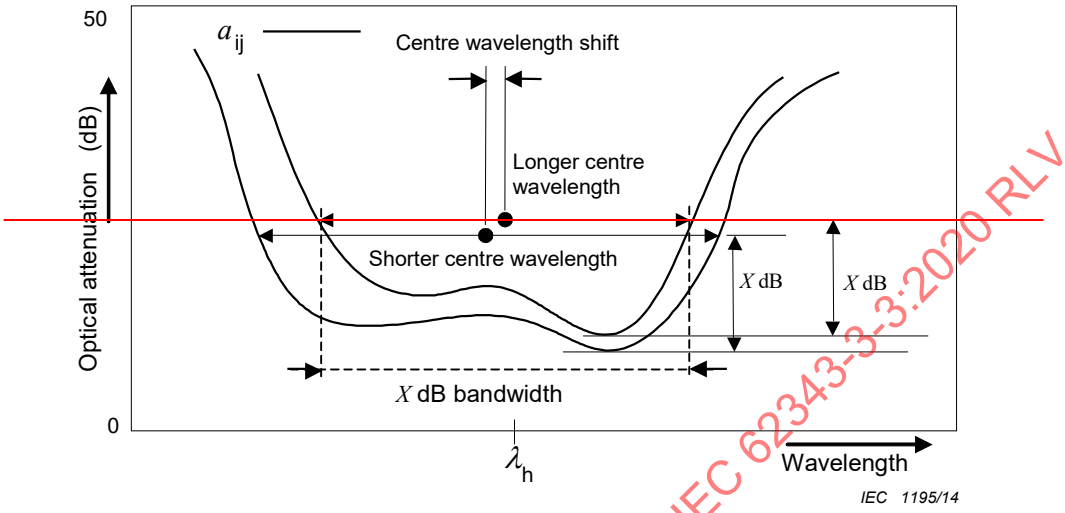


Figure 1 – Illustration of X-dB bandwidth

3.11
return loss
RL
fraction of input power that is returned from any port of a module expressed in decibels and defined in this equation at the particular wavelength between two conducting ports

$$RL = -10 \log (P_{refl}/P_{in})$$

where

P_{in} is the optical power launched into port;

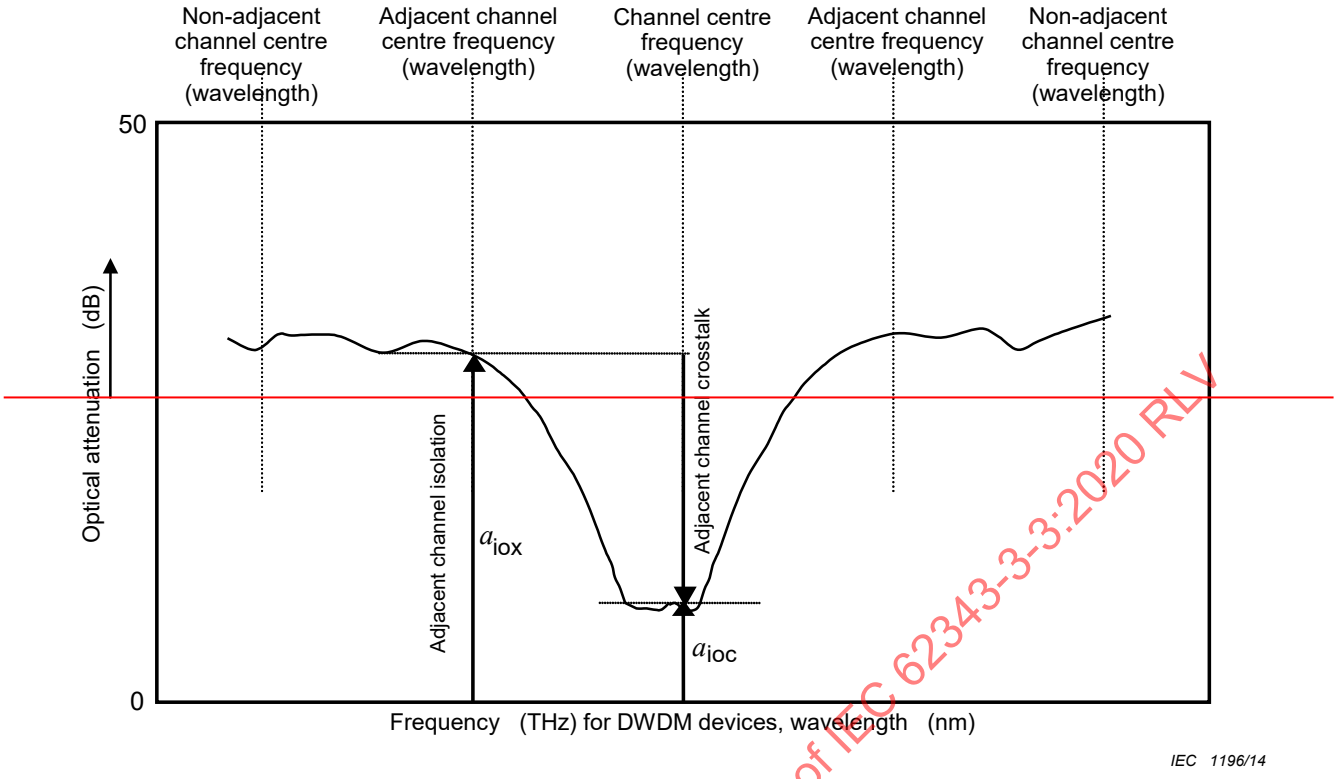
P_{refl} is the optical power received back from the same port.

3.12
adjacent channel crosstalk
adjacent channel isolation
crosstalk with the restriction that x, the isolation wavelength number, is restricted to the channels immediately adjacent to the (channel) wavelength number associated with output port

Note 1 to entry: Adjacent channel crosstalk is a negative value in dB (see Figure 2, below).

Note 2 to entry: The adjacent channel isolation is different from adjacent channel crosstalk. In Figure 2, an up-pointing arrow shows positive, a down-pointing arrow negative. Generally, there are two adjacent channel isolations for the shorter wavelength (higher frequency) side and a longer wavelength (lower frequency) side.

Note 3 to entry: The term crosstalk and isolation are often used with almost the same in meaning. Care should be taken not to confuse crosstalk and isolation. Crosstalk is defined so that for WDM devices, the value of the ratio between the optical power of the specified signal and the specified noise, is a negative value in dB. The crosstalk is defined for each output port. Crosstalk for WDM devices is defined for a DEMUX (1 × N WDM device). The crosstalk for port o to port j is the subtraction from the insertion loss of port i to o (conducting port pair) to the isolation of port j to o (isolated port pair). For WDM devices having three of more ports, the crosstalk should be specified as the maximum value of the crosstalk for each output port. On the other hand, isolation is the minimum value of a_{ij} (where $i \neq j$) within isolation wavelength range for isolated port pair. Isolation is positive value in dB.



~~Figure 2 – Illustration of adjacent channel crosstalk~~

~~3.13~~
~~non-adjacent channel crosstalk~~
~~non-adjacent channel isolation~~
~~crosstalk with the restriction that the isolation wavelength (frequency) is restricted to each of the channels not immediately adjacent to the channel associated with output port~~

~~Note 1 to entry: The non-adjacent channel crosstalk is different from non-adjacent channel isolation. In Figure 3, up-pointing arrow shows positive, down-pointing arrow negative.~~

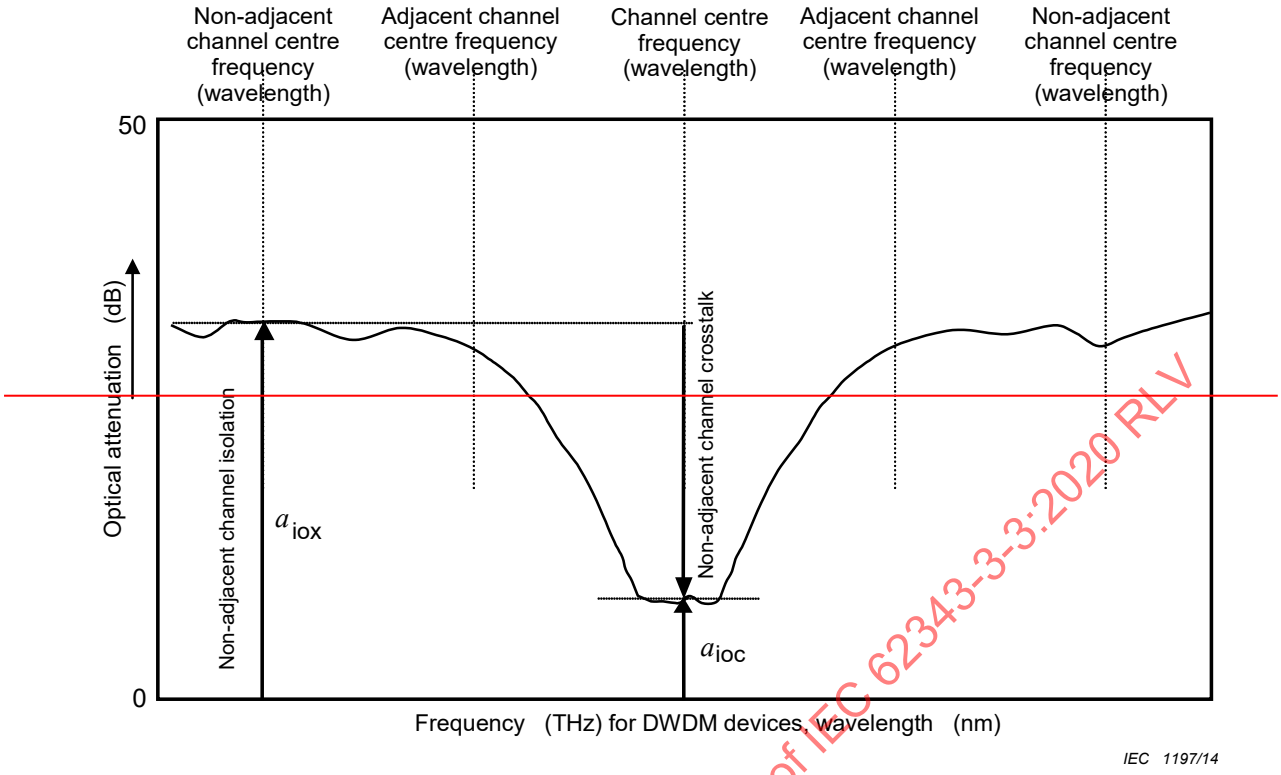


Figure 3 – Illustration of non-adjacent channel crosstalk

3.14
total channel crosstalk
total channel isolation
cumulative isolation due to the contributions at all the isolation wavelengths (frequencies) and transfer matrix coefficient for ports i and j, t_{ij} for any two ports i and j (where $i \neq j$). It is the ratio defined as

$$XT_{tot} = -10 \times \mathrm{Log}\left[\frac{t_{ij}(\lambda_h)}{\sum_{k(k\neq h)}^{N} t_{ij}(\lambda_k)}\right]$$

where

N is the number of channels of the device;

λ_h is the nominal operating wavelength (frequency) for the two of ports, i and j;

λ_k are the nominal isolation wavelengths (frequencies) for the same pair of ports.

Note 1 to entry: Total channel crosstalk is also expressed by total channel isolation as in the following equation:

$$XT_{tot} = a_{ij}(\lambda_h) - I_{tot}$$

Note 2 to entry: Total channel crosstalk is a negative value in dB. For a WDM device, total channel crosstalk shall be specified as the maximum value of total channel crosstalk of all channels.

3.15
transient crosstalk
transient isolation/transient directivity
crosstalk that is attributed to both channel crosstalk (due to same wavelength and/or other wavelengths) and port isolation, predicted to change during switching operation in WSS module

Note 1 to entry: Hitless operation means that there is no influence on other performance during switching operation.

3.16
channel blocking attenuation
attenuation value when a particular channel is set in the blocking state (possible maximum attenuation)

3.17
attenuation without power
attenuation value when electric power for driving the attenuation is not supplied

3.18
variable attenuation range
attenuation value that can be changed with channel-by-channel independently controlled by driving circuit with software

3.19
variable attenuation resolution
resolution of the setting of attenuation value

3.20
attenuation accuracy
precision of attenuation value when once set by driving circuit with software and includes the point of view of both repeatability and stability in the timeframe

Note 1 to entry: This is important when used in open loop operation.

3.21
response time for attenuation
elapsed time to change the attenuation value of any channel from an initial value to the desired value, measured from the time the actuation energy is applied

3.22
out-of-band attenuation
minimum attenuation (in dB) of channels that fall outside of the operating wavelength range

3.23
switching time
when switching from isolated state to conducting state, switching time (t_s) is defined as follows

$$t_s = t_l + t_f + t_b$$

where

t_l is latency time;

t_f is rise time;

t_b is bounce time.

Note 1 to entry: When switching from conducting state to isolated state, switching time (t_s') is defined as follows:

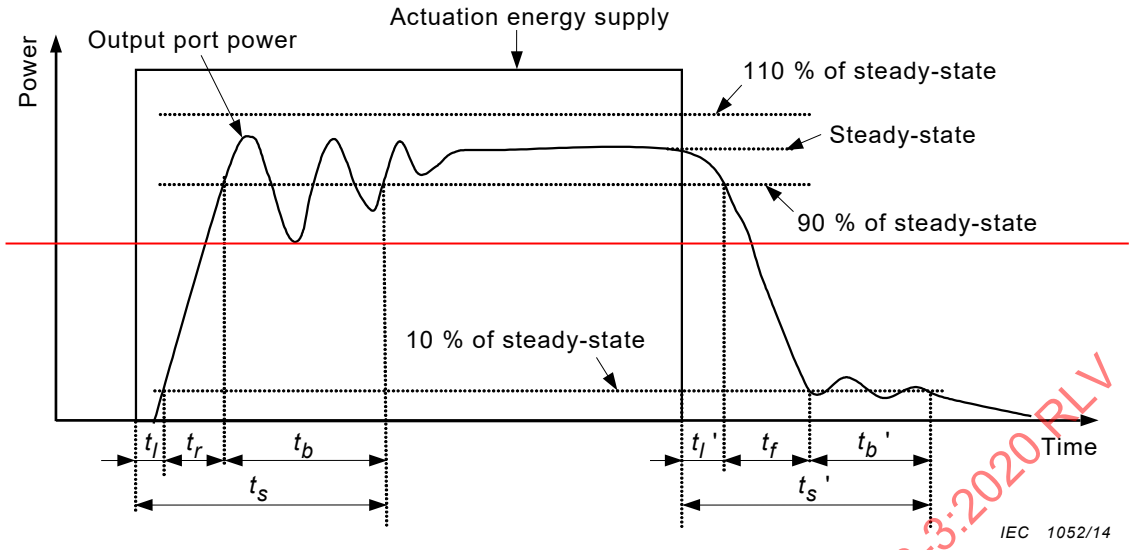
$$t_s' = t_l' + t_f + t_b'$$

where

t_l' is latency time;

t_f is fall time;

t_b' is bounce time.



where

t_s, t_s' is the switching time;

t_l, t_l' is the latency time;

t_r is the rise time;

t_f is the fall time;

t_b, t_b' is the bounce time.

Figure 4 – Illustration of latency time, rise time, fall time, bounce time, and switching time

Note 2 to entry: If, for any reason, the steady-state power of the isolated state is not zero, all the power levels leading to the definitions of latency time, rise time, fall time, bounce time, and thus of switching time, should be normalized subtracting from them the steady-state power of the isolated state, before applying such definitions.

3.24
polarization dependent loss
PDL
maximum variation of insertion loss due to a variation of the state of polarization (SOP) over all the SOPs

3.25
polarization mode dispersion
PMD
change in the shape and r.m.s. width of a pulse due to the average delay of the travelling time between the two principal states of polarization (PSP), differential group delay (DGD), and/or to the waveform distortion for each PSP

Note 1 to entry: PMD, together with polarization dependent loss (PDL) and polarization dependent gain (PDG), when applicable, may introduce waveform distortion leading to unacceptable bit error increase.

3.26
group delay ripple
maximum peak-to-peak variation of the group delay approximated by a desired function as wavelength (or frequency), typically a linear fit, within a channel wavelength (or frequency) range

3.27
phase ripple
maximum peak-to-peak variation in measured phase spectrum when compared to a quadratic fit within a channel wavelength (or frequency) range

~~Note 1 to entry: Phase ripple (unit: radian) is calculated as the product of a peak-to-peak group delay ripple (unit: s) and a period of group delay ripple (unit: Hz). Refer to IEC 61300-3-38.~~

~~**3.28**~~
~~**chromatic dispersion**~~
~~group delay difference between two closely spaced wavelengths inside an optical signal going through a pair of conducting ports of a DWDM device~~

~~Note 1 to entry: It corresponds to the difference between the arrival times of these two closely spaced wavelengths. Chromatic dispersion is defined as the variation (first order derivative) of this group delay over a range of wavelengths especially over the channel operating wavelength range at the given time, temperature, pressure and humidity. It is expressed in terms of units of ps/nm or ps/GHz and it is a predictor of the broadening of a pulse transmitted through the module.~~

~~**3.29**~~
~~**maximum input power (single channel)**~~
~~allowable optical power which causes no damage by the optical power such as degradation of adhesive or fibre fuse as for a particular channel~~

~~**3.30**~~
~~**maximum input power (single port)**~~
~~allowable optical power, which causes no damage by the optical power such as degradation of adhesive or fibre fuse as for a particular port~~

4 Test report

Fully documented test reports and supporting evidence shall be prepared and be available for inspections as evidence that the tests have been carried out and complied with.

~~5 Reference components~~

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

5 Performance requirements

5.1 Dimensions

Dimensions shall comply with either an appropriate IEC interface standard or with those given in the manufacturer's drawings where the IEC interface standard does not exist or cannot be used.

5.2 Sample size

The test sample size and sequencing requirements for the module components shall be defined in the relevant specification.

5.3 Test details and requirements

Requirements are given only for non-connectorized WSS devices. For connectorized components, the connector performances shall be in compliance with IEC 61753-021-2.

A minimum length of fibre or cable of 1,5 m per port shall be included in all ~~climatic and environmental~~ tests.

NOTE A minimum length of launch fibre or cable of 1,5 m is used in IEC 61753-083-2:2007 and IEC 61753-084-2:2007.

The channel spacings, unless otherwise specified, shall be in accordance with ITU-T Recommendation G.694-1. Environmental test shall be measured for a single input/output port combination.

The test details and requirements for performance standard are shown in Table 1.

Table 1 – Tests and requirements

No.	Test parameter/test method	Unit	Details
1	Operating wavelength	nm	
2	Number of ports		
3	Number of channels		
4	Channel spacing	GHz [a]	
5	Channel frequency range IEC 62074-1	GHz	Information (not test item). Channel central frequency: ITU-T grid or custom design. When there is no custom requirement, the channel central frequency shall be selected in accordance with ITU-T Recommendation G.694.1.
6	Insertion loss IEC 61300-3-29, IEC 62074-1	dB	Condition: the insertion loss shall be determined as the worst case over all states of polarization and over the operating wavelength range. Launch fibre length: ≥ 1,5 m. The test conditions shall provide loss measurement results with an ~~accuracy~~ uncertainty of ~~better~~ less than ~~±0,05~~ 0,1 dB over the operating wavelength range.
7	Insertion loss uniformity IEC 61300-3-29	dB	Condition: the insertion loss uniformity shall be determined as the worst case over all states of polarization including channel and port. Launch fibre length: ≥ 1,5 m. The test conditions shall provide loss measurement results with an ~~accuracy~~ uncertainty of ~~better~~ less than ~~±0,05~~ 0,1 dB over the operating wavelength range.
8	Insertion loss ripple IEC 61300-3-29	dB	Condition: the insertion loss ripple shall be determined as the worst case over all states of polarization. Launch fibre length: ≥ 1,5 m. The test conditions shall provide loss measurement results with an ~~accuracy~~ uncertainty of ~~better~~ less than ~~±0,05~~ 0,1 dB over the operating wavelength range.
9	X-dB passband width IEC 61300-3-29, IEC 62074-1	GHz	Condition: the X-dB passband width, which is measured at X-dB down ~~(defined in Figure 1)~~, shall be determined as the worst case over all states of polarization. It is recommended that the passband width be specified as 0,5 dB, 1 dB and 3 dB. Launch fibre length: ≥ 1,5 m
10	Return loss IEC 61300-3-6	dB	Condition: all ports not under test shall be terminated to avoid unwanted reflections contributing to the measurement. Launch fibre length: ≥ 1,5 m. The test conditions shall provide return loss measurement results with an ~~accuracy~~ uncertainty of ~~better~~ less than ~~±0,1~~ 0,2 dB over the operating wavelength range.
11	Adjacent channel crosstalk IEC 61300-3-29, IEC 62074-1	dB	Condition: the adjacent channel isolation shall be determined as the worst case over all states of polarization. Launch fibre length: ≥ 1,5 m. The test conditions shall provide isolation measurement results with an ~~accuracy~~ uncertainty of ~~better~~ less than ~~±0,1~~ 0,2 dB over the operating wavelength range.

No.	Test parameter/test method	Unit	Details
12	Non-adjacent channel crosstalk IEC 61300-3-29, IEC 62074-1	dB	Condition: the non-adjacent channel isolation shall be determined as the worst case over all states of polarization. Launch fibre length: ≥ 1,5 m. The test conditions shall provide isolation measurement results with an ~~accuracy~~ uncertainty of ~~better~~ less than ~~±0,1~~ 0,2 dB over the operating wavelength range.
13	Total channel crosstalk IEC 61300-3-29, IEC 62074-1	dB	Condition: the minimum total channel isolation shall be determined as the worst case over all states of polarization. Launch fibre length: ≥ 1,5 m. The test conditions shall provide isolation measurement results with an ~~accuracy~~ uncertainty of ~~better~~ less than ~~±0,1~~ 0,2 dB over the operating wavelength range.
14	Transient crosstalk (transient isolation/transient directivity) IEC 62343-5-2	dB	~~Categorization, definition and measurement method are under consideration~~
15	Channel blocking attenuation IEC ~~61300-3-7~~ 61300-3-29	dB	Launch fibre length: ≥ 1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the ~~stability at the operating~~ measurement wavelength uncertainty shall be ~~better~~ less than ±0,05 dB over the measuring period of at least ~~within~~ 1 h. Waveband to meet the operating wavelength of WSS. Detector system: linearity ~~within ±0,05~~ less than or equal to 0,1 dB. Spectral response matched to source. Dynamic range within the attenuation values to be measured.
16	Attenuation without power IEC ~~61300-3-7~~ 61300-3-29	dB	Launch fibre length: ≥ 1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the ~~stability at the operating~~ measurement wavelength uncertainty shall be ~~better~~ less than ±0,05 dB over the measuring period of at least ~~within~~ 1 h. Waveband to meet the operating wavelength of WSS. Detector system: linearity ~~within ±0,05~~ less than or equal to 0,1 dB. Spectral response matched to source. Dynamic range within the attenuation values to be measured.
17	Variable attenuation range IEC ~~61300-3-7~~ 61300-3-29	dB	Launch fibre length: ≥ 1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the ~~stability at the operating~~ measurement wavelength uncertainty shall be ~~better~~ less than ±0,05 dB over the measuring period of at least ~~within~~ 1 h. Waveband to meet the operating wavelength of WSS. Detector system linearity ~~within ±0,05~~ less than or equal to 0,1 dB. Spectral response matched to source. Dynamic range within the attenuation values to be measured.
18	Variable attenuation resolution	dB	Method under consideration. ~~Same as measurement method of switching time defined in IEC 61300-3-21~~

No.	Test parameter/test method	Unit	Details
19	Attenuation accuracy IEC 61300-3-14	dB	Launch fibre length: ≥ 1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the ~~stability at the operating~~ measurement wavelength uncertainty shall be ~~better~~ less than ±0,05 dB over the measuring period of at least ~~within~~ 1 h. Waveband to meet the operating wavelength of WSS. Detector system: linearity ~~within ±0,05~~ less than or equal to 0,1 dB. Spectral response matched to source.
20	Response time for attenuation	ms	Method under consideration. Similar as measurement method of switching time defined in IEC 61300-3-21.
21	Out of band attenuation IEC 61290-7-1	dB	
22	Switching time IEC 61300-3-21	ms	
23	Polarization dependent loss IEC 61300-3-2, IEC 62074-1	dB	The allowable PDL combination applies to all combination of input and output ports. Launch fibre length: ≥ 1,5 m.
24	Polarization mode dispersion IEC 61300-3-32, IEC 62074-1	ps	The allowable PMD combination applies to all combination of input and output ports
25	Group delay ripple IEC 61300-3-38	ps	~~IEC 61300-3-38~~
26	Phase ripple IEC 61300-3-38	rad	~~IEC 61300-3-38~~
27	Chromatic dispersion IEC 61300-3-38	ps/nm	~~IEC 61300-3-38~~
28	Maximum input power (single channel) IEC 61300-2-14	dBm	Input port: single port
29	Maximum input power (single port) IEC 61300-2-14	dBm	Input port: single port
30	Storage temperature (range)	°C	IEC 62343-1 for reference
31	Storage relative humidity	RH %	IEC 62343-1 for reference
32	Operating case temperature	°C	Shall satisfy IEC 62343-1.
33	Operating relative humidity	RH %	Shall satisfy IEC 62343-1.
34	Temperature control		(equipped or not)
35	Supply voltage	V	
36	Power consumption	W	
37	Module size	mm × m m × mm	
38	Fibre type		For example, IEC 60793-2-50.
39	Pigtail fibre length	m	
40	Pigtail fibre buffer diameter	µm	
41	Optical connector		For example, IEC 61754 ~~series~~ (all parts).
42	Optical connector labelling		

No.	Test parameter/test method	Unit	Details
43	Electrical interface		Shall satisfy IEC 62343-4-1 for 1 × 9 WSS~~, under consideration~~.
44	Communication interfaces		IEC 62343-4-1 for reference~~, under consideration~~.
[a] 50 GHz and 100 GHz are commercially available.			

Bibliography

IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

IEC 60869-1, *Fibre optic interconnecting devices and passive components – Fibre optic passive power control devices – Part 1: Generic specification*

IEC 60876-1, *Fibre optic interconnecting devices and passive components – Fibre optic spatial switches – Part 1: Generic specification*

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

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

IEC 61300-3-20, *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 61753-1, *Fibre optic interconnecting devices and passive components performance standard – Part 1: General and guidance for performance standards*~~

IEC 61753-081-2, *Fibre optic interconnecting devices and passive components – Performance standard – Part 081-2: Non-connectorized single-mode fibre optic middle-scale 1 × N DWDM devices for category C – Controlled environments*

IEC 61753-083-2:2007, *Fibre optic interconnecting devices and passive components performance standard – Part 083-2: Non-connectorised single-mode fibre optic C-band/L-band WDM devices for category C – Controlled environment*

IEC 61753-084-2:2007, *Fibre optic interconnecting devices and passive components performance standard – Part 084-2: Non connectorised single-mode 980/1550 nm WWDM devices for category C – Controlled environment*

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

IEC 61754 (all parts), *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces*

IEC 61978-1, *Fibre optic interconnecting devices and passive components – Fibre optic passive chromatic dispersion compensators – Part 1: Generic specification*[2]

IEC 62343-4-1, *Dynamic modules – Part 4-1: Software and hardware interface – 1 × 9 wavelength selective switch*

IEC TR 62343-6-3, *Dynamic modules – Part 6-3: Round robin measurement results for group delay ripple of tunable dispersion compensators*

[2] ~~A third edition is under consideration.~~

IEC TR 62343-6-4, *Dynamic modules – Part 6-4: Design guides – Reconfigurable optical add/drop multiplexer ~~(ROADM)~~*[3]

IEC TS 62538, *Categorization of optical devices*

ITU-T Recommendation G.671, *Transmission characteristics of optical components and subsystems*

ITU-T Recommendation G.692, *Optical interfaces for multichannel systems with optical amplifiers*

ITU-T G.Sup39, *Optical system design and engineering considerations*

~~3 Under consideration.~~

IEC 62343-3-3

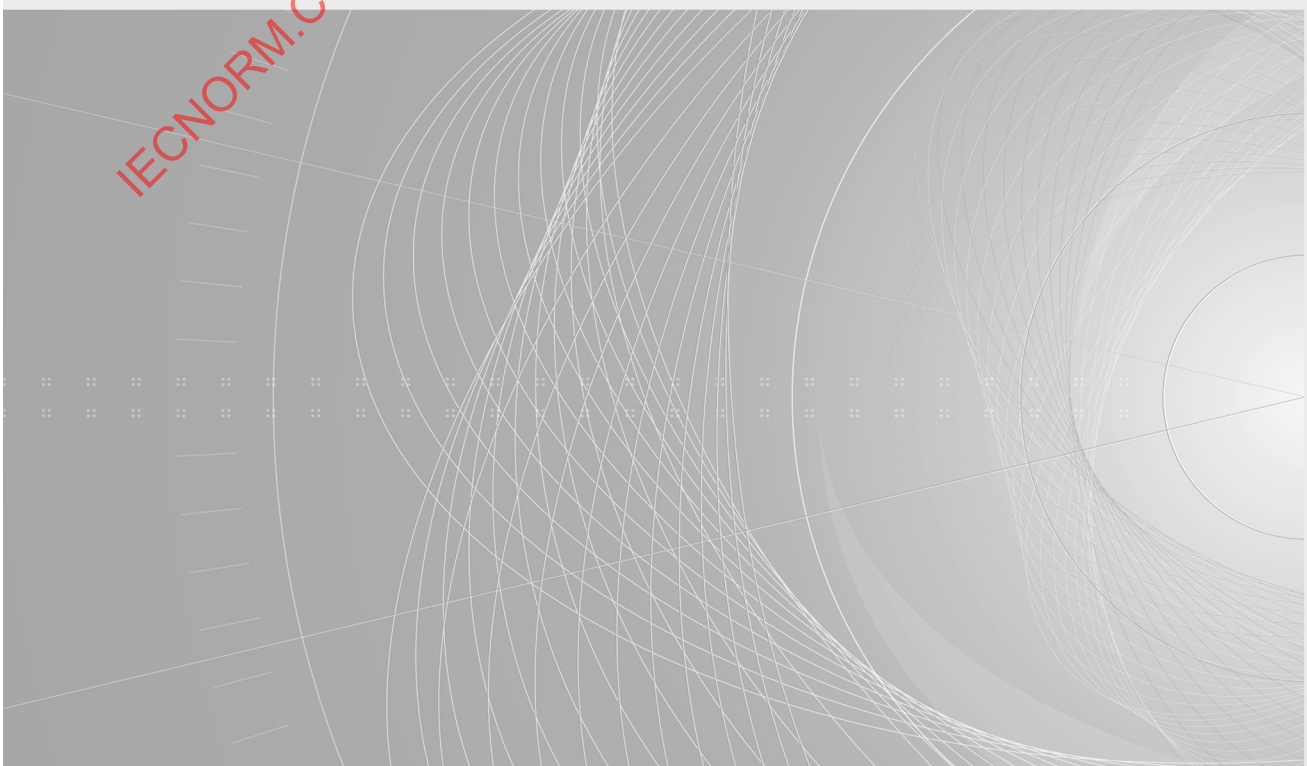
Edition 2.0 2020-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Dynamic modules –
Part 3-3: Performance specification templates – Wavelength selective switches

Modules dynamiques –
Partie 3-3: Modèles de spécification de performance – Commutateurs sélectifs en longueur d'onde



IEC 62343-3-3:2020-04(en-fr)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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DYNAMIC MODULES –

Part 3-3: Performance specification templates – Wavelength selective switches

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.
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International Standard IEC 62343-3-3 has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2014. This edition constitutes a technical revision.

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

a) modification of the normative references;
b) modification of the terms and definitions.

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

FDIS	Report on voting
86C/1648/FDIS	86C/1655/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

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

A list of all parts in the IEC 62343 series, published under the general title *Dynamic modules,* can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

INTRODUCTION

A wavelength selective switch (WSS) is a dynamic module (DM), which is mainly used in a reconfigurable optical add-drop multiplexer (ROADM) system to switch a particular wavelength signal to any output ports in DWDM networks. The WSS has one input port and a plurality of output ports (i.e. $1 \times N$ WSS) and can be used in reverse, with N input ports and one output port, depending on its application. It is controlled with software, which determines any wavelength signal among a DWDM signal from one input port to switch to a particular output port in case of $1 \times N$ application.

DYNAMIC MODULES –

Part 3-3: Performance specification templates – Wavelength selective switches

1 Scope

This part of IEC 62343 provides a performance specification template for wavelength selective switches. The object is to provide a framework for the preparation of detail specifications on the performance of wavelength selective switches.

Additional specification parameters are often included for detailed product specifications or performance specifications if necessary. However, specification parameters specified in this document are not removed from the detail product specifications or performance specifications.

The technical information regarding wavelength selective switches and their applications in DWDM systems with single-mode fibres are described in IEC TR 62343-6-4.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61290-7-1, *Optical amplifiers – Test methods – Part 7-1: Out-of-band insertion losses – Filtered optical power meter method*

IEC 61300-2-14, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-14: Tests – High optical power*

IEC 61300-3-2, *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: Examinations and measurements – Return loss*

IEC 61300-3-14, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-14: Examinations and measurements – Error and repeatability of the attenuation settings of a variable optical attenuator*

IEC 61300-3-21, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-21: Examinations and measurements – Switching time*

IEC 61300-3-29, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-29: Examinations and measurements – Spectral transfer characteristics of DWDM devices*

IEC 61300-3-32, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-32: Examinations and measurements – Polarization mode dispersion measurement for passive optical components*

IEC 61300-3-38, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-38: Examinations and measurements – Group delay, chromatic dispersion and phase ripple*

IEC 61753-021-2, *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*

IEC 62074-1, *Fibre optic interconnecting devices and passive components – Fibre optic WDM devices – Part 1: Generic specification*

IEC 62343, *Dynamic modules – General and guidance*

IEC 62343-1, *Dynamic modules – Part 1: Performance standards – General conditions*

IEC 62343-5-2, *Dynamic modules – Part 5-2: Test methods – 1 x N fixed-grid WSS – Dynamic crosstalk measurement*

ITU-T Recommendation G.694.1, *Spectral grids for WDM applications: DWDM frequency grid*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in IEC 62343 apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4 Test report

Fully documented test reports and supporting evidence shall be prepared and be available for inspections 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 with those given in the manufacturer's drawings where the IEC interface standard does not exist or cannot be used.

5.2 Sample size

The test sample size and sequencing requirements for the module components shall be defined in the relevant specification.

5.3 Test details and requirements

Requirements are given only for non-connectorized WSS devices. For connectorized components, the connector performances shall be in compliance with IEC 61753-021-2.

A minimum length of fibre or cable of 1,5 m per port shall be included in all tests.

NOTE A minimum length of launch fibre or cable of 1,5 m is used in IEC 61753-083-2:2007 and IEC 61753-084-2:2007.

The channel spacings, unless otherwise specified, shall be in accordance with ITU-T Recommendation G.694-1. Environmental test shall be measured for a single input/output port combination.

The test details and requirements for performance standard are shown in Table 1.

Table 1 – Tests and requirements

No.	Test parameter/test method	Unit	Details
1	Operating wavelength	nm	
2	Number of ports		
3	Number of channels		
4	Channel spacing	GHz [a]	
5	Channel frequency range IEC 62074-1	GHz	Information (not test item). Channel central frequency: ITU-T grid or custom design. When there is no custom requirement, the channel central frequency shall be selected in accordance with ITU-T Recommendation G.694.1.
6	Insertion loss IEC 61300-3-29, IEC 62074-1	dB	Condition: the insertion loss shall be determined as the worst case over all states of polarization and over the operating wavelength range. Launch fibre length: ≥ 1,5 m. The test conditions shall provide loss measurement results with an uncertainty of less than 0,1 dB over the operating wavelength range.
7	Insertion loss uniformity IEC 61300-3-29	dB	Condition: the insertion loss uniformity shall be determined as the worst case over all states of polarization including channel and port. Launch fibre length: ≥ 1,5 m. The test conditions shall provide loss measurement results with an uncertainty of less than 0,1 dB over the operating wavelength range.
8	Insertion loss ripple IEC 61300-3-29	dB	Condition: the insertion loss ripple shall be determined as the worst case over all states of polarization. Launch fibre length: ≥ 1,5 m. The test conditions shall provide loss measurement results with an uncertainty of less than 0,1 dB over the operating wavelength range.
9	X-dB passband width IEC 61300-3-29, IEC 62074-1	GHz	Condition: the X-dB passband width, which is measured at X-dB down, shall be determined as the worst case over all states of polarization. It is recommended that the passband width be specified as 0,5 dB, 1 dB and 3 dB. Launch fibre length: ≥ 1,5 m
10	Return loss IEC 61300-3-6	dB	Condition: all ports not under test shall be terminated to avoid unwanted reflections contributing to the measurement. Launch fibre length: ≥ 1,5 m. The test conditions shall provide return loss measurement results with an uncertainty of less than 0,2 dB over the operating wavelength range.

No.	Test parameter/test method	Unit	Details
11	Adjacent channel crosstalk IEC 61300-3-29, IEC 62074-1	dB	Condition: the adjacent channel isolation shall be determined as the worst case over all states of polarization. Launch fibre length: ≥ 1,5 m. The test conditions shall provide isolation measurement results with an uncertainty of less than 0,2 dB over the operating wavelength range.
12	Non-adjacent channel crosstalk IEC 61300-3-29, IEC 62074-1	dB	Condition: the non-adjacent channel isolation shall be determined as the worst case over all states of polarization. Launch fibre length: ≥ 1,5 m. The test conditions shall provide isolation measurement results with an uncertainty of less than 0,2 dB over the operating wavelength range.
13	Total channel crosstalk IEC 61300-3-29, IEC 62074-1	dB	Condition: the minimum total channel isolation shall be determined as the worst case over all states of polarization. Launch fibre length: ≥ 1,5 m. The test conditions shall provide isolation measurement results with an uncertainty of less than 0,2 dB over the operating wavelength range.
14	Transient crosstalk (transient isolation/transient directivity) IEC 62343-5-2	dB	
15	Channel blocking attenuation IEC 61300-3-29	dB	Launch fibre length: ≥ 1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the measurement wavelength uncertainty shall be less than ±0,05 dB over the measuring period of at least 1 h. Waveband to meet the operating wavelength of WSS. Detector system: linearity less than or equal to 0,1 dB. Spectral response matched to source. Dynamic range within the attenuation values to be measured.
16	Attenuation without power IEC 61300-3-29	dB	Launch fibre length: ≥ 1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the measurement wavelength uncertainty shall be less than ±0,05 dB over the measuring period of at least 1 h. Waveband to meet the operating wavelength of WSS. Detector system: linearity less than or equal to 0,1 dB. Spectral response matched to source. Dynamic range within the attenuation values to be measured.
17	Variable attenuation range IEC 61300-3-29	dB	Launch fibre length: ≥ 1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the measurement wavelength uncertainty shall be less than ±0,05 dB over the measuring period of at least 1 h. Waveband to meet the operating wavelength of WSS. Detector system linearity less than or equal to 0,1 dB. Spectral response matched to source. Dynamic range within the attenuation values to be measured.
18	Variable attenuation resolution	dB	Method under consideration.

No.	Test parameter/test method	Unit	Details
19	Attenuation accuracy IEC 61300-3-14	dB	Launch fibre length: ≥ 1,5 m. Launch conditions: the wavelength of the source shall be longer than cut-off wavelength of the fibre. Source: the measurement wavelength uncertainty shall be less than ±0,05 dB over the measuring period of at least 1 h. Waveband to meet the operating wavelength of WSS. Detector system: linearity less than or equal to 0,1 dB. Spectral response matched to source.
20	Response time for attenuation	ms	Method under consideration. Similar as measurement method of switching time defined in IEC 61300-3-21.
21	Out of band attenuation IEC 61290-7-1	dB	
22	Switching time IEC 61300-3-21	ms	
23	Polarization dependent loss IEC 61300-3-2, IEC 62074-1	dB	The allowable PDL combination applies to all combination of input and output ports. Launch fibre length: ≥ 1,5 m.
24	Polarization mode dispersion IEC 61300-3-32, IEC 62074-1	ps	The allowable PMD combination applies to all combination of input and output ports.
25	Group delay ripple IEC 61300-3-38	ps	
26	Phase ripple IEC 61300-3-38	rad	
27	Chromatic dispersion IEC 61300-3-38	ps/nm	
28	Maximum input power (single channel) IEC 61300-2-14	dBm	Input port: single port
29	Maximum input power (single port) IEC 61300-2-14	dBm	Input port: single port
30	Storage temperature (range)	°C	IEC 62343-1 for reference
31	Storage relative humidity	RH %	IEC 62343-1 for reference
32	Operating case temperature	°C	Shall satisfy IEC 62343-1.
33	Operating relative humidity	RH %	Shall satisfy IEC 62343-1.
34	Temperature control		(equipped or not)
35	Supply voltage	V	
36	Power consumption	W	
37	Module size	mm × m m × mm	
38	Fibre type		For example, IEC 60793-2-50.
39	Pigtail fibre length	m	
40	Pigtail fibre buffer diameter	μm	
41	Optical connector		For example, IEC 61754 (all parts).
42	Optical connector labelling		
43	Electrical interface		Shall satisfy IEC 62343-4-1 for 1 × 9 WSS.

No.	Test parameter/test method	Unit	Details
44	Communication interfaces		IEC 62343-4-1 for reference.
[a] 50 GHz and 100 GHz are commercially available.			

Bibliography

IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

IEC 60869-1, *Fibre optic interconnecting devices and passive components – Fibre optic passive power control devices – Part 1: Generic specification*

IEC 60876-1, *Fibre optic interconnecting devices and passive components – Fibre optic spatial switches – Part 1: Generic specification*

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

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

IEC 61300-3-20, *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 61753-081-2, *Fibre optic interconnecting devices and passive components – Performance standard – Part 081-2: Non-connectorized single-mode fibre optic middle-scale 1 × N DWDM devices for category C – Controlled environments*

IEC 61753-083-2:2007, *Fibre optic interconnecting devices and passive components performance standard – Part 083-2: Non-connectorised single-mode fibre optic C-band/L-band WDM devices for category C – Controlled environment*

IEC 61753-084-2:2007, *Fibre optic interconnecting devices and passive components performance standard – Part 084-2: Non connectorised single-mode 980/1550 nm WWDM devices for category C – Controlled environment*

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

IEC 61754 (all parts), *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces*

IEC 61978-1, *Fibre optic interconnecting devices and passive components – Fibre optic passive chromatic dispersion compensators – Part 1: Generic specification*

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IEC TR 62343-6-3, *Dynamic modules – Part 6-3: Round robin measurement results for group delay ripple of tunable dispersion compensators*

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IEC TS 62538, *Categorization of optical devices*

ITU-T Recommendation G.671, *Transmission characteristics of optical components and subsystems*

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ITU-T G.Sup39, *Optical system design and engineering considerations*

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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MODULES DYNAMIQUES –

Partie 3-3: Modèles de spécification de performance – Commutateurs sélectifs en longueur d'onde

AVANT-PROPOS

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La Norme internationale IEC 62343-3-3 a été établie par le sous-comité 86C: Systèmes et dispositifs actifs à fibres optiques, du comité d'études 86 de l'IEC: Fibres optiques.

Cette deuxième édition annule et remplace la première édition publiée en 2014. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

a) modifications des références normatives;
b) modification des termes et définitions.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
86C/1648/FDIS	86C/1655/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette Norme internationale.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 62343, publiées sous le titre général *Modules dynamiques,* peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "http://webstore.iec.ch" dans les données relatives au document recherché. A cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

INTRODUCTION

Un commutateur sélectif en longueur d'onde (WWS) est un module dynamique (DM), qui est principalement utilisé dans un système de multiplexage optique d'insertion-extraction reconfigurable (ROADM) pour commuter un signal de longueur d'onde particulière vers tout port de sortie dans des réseaux DWDM. Le WSS a un port d'entrée et plusieurs ports de sortie (par exemple $1 \times N$ WSS) et il peut être utilisé de manière inverse, avec N ports d'entrée et un seul port de sortie, en fonction de son application. Il est commandé par un logiciel, qui discrimine un signal de n'importe quelle longueur d'onde parmi un signal DWDM provenant d'un port d'entrée pour le commuter vers un port de sortie particulier dans le cas d'une application $1 \times N$.

MODULES DYNAMIQUES –

Partie 3-3: Modèles de spécification de performance – Commutateurs sélectifs en longueur d'onde

1 Domaine d'application

La présente partie de l'IEC 62343 présente un modèle de spécification de performance pour les commutateurs sélectifs en longueur d'onde. Il est destiné à fournir un cadre pour l'établissement de spécifications particulières sur les performances des commutateurs sélectifs en longueur d'onde.

Des paramètres de spécification supplémentaires sont souvent inclus pour les spécifications détaillées de produit ou les spécifications de performances, si nécessaire. Toutefois, les paramètres de spécification stipulés dans le présent document ne sont pas retirés des spécifications particulières de produit ou de performances.

Les informations techniques concernant les commutateurs sélectifs en longueur d'onde et leurs applications dans des systèmes DWDM avec fibres unimodales sont décrites dans l'IEC TR 62343-6-4.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 61290-7-1, *Amplificateurs optiques – Méthodes d'essai – Partie 7-1: Pertes d'insertion hors-bande – Méthode par puissance-mètre optique filtré*

IEC 61300-2-14, *Dispositifs d'interconnexion et composants passifs à fibres optiques – Méthodes fondamentales d'essais et de mesures – Partie 2-14: Essais – Puissance optique élevée*

IEC 61300-3-2, *Dispositifs d'interconnexion et composants passifs à fibres optiques – Méthodes fondamentales d'essais et de mesures – Partie 3-2: Examen et mesures – Perte en fonction de la polarisation dans un dispositif pour fibres optiques unimodales*

IEC 61300-3-6, *Dispositifs d'interconnexion et composants passifs à fibres optiques – Méthodes fondamentales d'essais et de mesures – Partie 3-6: Examens et mesures – Affaiblissement de réflexion*

IEC 61300-3-14, *Dispositifs d'interconnexion et composants fibroniques – Procédures fondamentales d'essais et de mesures – Partie 3-14: Examens et mesures – Erreur et répétabilité des positions d'affaiblissement d'un affaiblisseur optique variable*

IEC 61300-3-21, *Dispositifs d'interconnexion et composants passifs fibroniques – Procédures fondamentales d'essais et de mesures – Partie 3-21: Examens et mesures – Temps de commutation*