



BSI Standards Publication

Fibre optic interconnecting devices and passive components — Fibre optic WDM devices

Part 1: Generic specification

National foreword

This British Standard is the UK implementation of EN IEC 62074-1:2025. It is identical to IEC 62074-1:2025. It supersedes BS EN 62074-1:2014, which will be withdrawn on 31 August 2026.

The UK participation in its preparation was entrusted to Technical Committee GEL/86/3, Fibre optic systems and active devices.

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Date	Text affected
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English Version

Fibre optic interconnecting devices and passive components -
Fibre optic WDM devices - Part 1: Generic specification
(IEC 62074-1:2025)

Dispositifs d'interconnexion et composants passifs
fibroniques - Dispositifs MRL fibroniques - Partie 1:
Spécification générique
(IEC 62074-1:2025)

Lichtwellenleiter - Verbindungselemente und passive
Bauteile - Lichtwellenleiter-WDM-Bauteile - Teil 1:
Fachgrundspezifikation
(IEC 62074-1:2025)

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Europäisches Komitee für Elektrotechnische Normung

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European foreword

The text of document 86B/5031/FDIS, future edition 3 of IEC 62074-1, prepared by SC 86B "Fibre optic interconnecting devices and passive components" of IEC/TC 86 "Fibre optics" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 62074-1:2025.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2026-08-31 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2026-08-31 document have to be withdrawn

This document supersedes EN 62074-1:2014 and all of its amendments and corrigenda (if any).

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In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 60027 (series)	NOTE	Approved as EN 60027 (series)
IEC 60695-11-5	NOTE	Approved as EN 60695-11-5
IEC 61754 (series)	NOTE	Approved as EN 61754 (series)
IEC 61754-4	NOTE	Approved as EN IEC 61754-4
IEC 61978-1:2024	NOTE	Approved as EN IEC 61978-1:2024 (not modified)

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60050-731	-	International Electrotechnical Vocabulary - Chapter 731: Optical fibre communication	-	-
IEC 61300	series	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures	EN IEC 61300	series
IEC 61753	series	Fibre optic interconnecting devices and passive components - Performance standard	EN IEC 61753	series
IEC 62005	series	Reliability of fibre optic interconnecting devices and passive components	EN 62005	series
IEC/TS 62627-09	2016	Fibre optic interconnecting devices and passive components - Vocabulary for passive optical devices	-	-
ISO 129-1	-	Technical product documentation (TPD) - Presentation of dimensions and tolerances - Part 1: General principles	EN ISO 129-1	-
ISO 286-1	-	Geometrical product specifications (GPS) - ISO code system for tolerances on linear sizes - Part 1: Basis of tolerances, deviations and fits	EN ISO 286-1	-
ISO 1101	-	Geometrical product specifications (GPS) - Geometrical tolerancing - Tolerances of form, orientation, location and run-out	EN ISO 1101	-
ISO 8601-1	-	Date and time - Representations for information interchange - Part 1: Basic rules	-	-

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**Fibre optic interconnecting devices and passive components -
Fibre optic WDM devices -
Part 1: Generic specification**

FOREWORD

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IEC 62074-1 has been prepared by subcommittee SC 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics. It is an International Standard.

This third edition cancels and replaces the second 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) harmonization of terms and definitions with IEC TS 62627-09;
- b) simplified classification, documentation and standardization system in Clause 4, and moving interface style to Annex H.

The text of this International Standard is based on the following documents:

Draft	Report on voting
86B/5031/FDIS	86B/5074/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 62074 series, published under the general title *Fibre optic interconnecting devices and passive components – Fibre optic WDM devices*, 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn, or
- revised.

1 Scope

This part of IEC 62074 applies to fibre optic wavelength division multiplexing (WDM) devices. These have all of the following general features:

- they are passive, in that they contain no optoelectronic or other transducing elements; however they can use temperature control only to stabilize the device characteristics; they exclude any optical switching functions;
- they have three or more ports for either the entry or exit of optical power, or both, and share optical power among these ports in a predetermined fashion depending on the wavelength;
- the ports are optical fibres, or optical fibre connectors.

This document establishes uniform requirements for the following:

- optical, mechanical and environmental properties.

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 60050-731, *International Electrotechnical Vocabulary (IEV) – Part 731: Optical fibre communication* (available at www.electropedia.org)

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

IEC 61753 (all parts), *Fibre optic interconnecting devices and passive components - Performance standard*

IEC 62005 (all parts), *Reliability of fibre optic interconnecting devices and passive components*

IEC TS 62627-09:2016, *Fibre optic interconnecting devices and passive components – Vocabulary for passive optical devices*

ISO 129-1, *Technical product documentation (TPD) — Presentation of dimensions and tolerances – Part 1: General principles*

ISO 286-1, *Geometrical product specifications (GPS) – ISO code system for tolerances on linear sizes – Part 1: Basis of tolerances, deviations and fits*

ISO 1101, *Geometrical product specifications (GPS) – Geometrical tolerancing – Tolerances of form, orientation, location and run-out*

ISO 8601-1, *Date and time – Representations for information interchange – Part 1: Basic rules*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-731 and IEC TS 62627-09 and the following apply.

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

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

3.1 Device terms

3.1.1

wavelength-selective branching device

passive device with three or more ports that shares optical power among its ports in a predetermined fashion, only depending on the wavelength, in the sense that at least two different wavelength ranges are nominally transferred between two different pairs of ports

[SOURCE: IEC TS 62627-09:2016, 3.3.12, modified – “wavelength multiplexer” and “wavelength demultiplexer” have been removed from the term, and in the definition “optical device (component)” has been replaced with “device”, “without any amplification or other active modulation but” has been removed.]

3.1.2

wavelength division multiplexing device

wavelength division multiplexer

WDM device

wavelength-selective branching device

Note 1 to entry: The term of wavelength-selective device is the contrast with the term of non-wavelength-selective branching device. The term of WDM device is frequently used.

3.1.3

DWDM device

dense wavelength division multiplexing device

WDM device which is intended to operate for a channel spacing $\leq 1\,000$ GHz

Note 1 to entry: The channel spacing is approximately 8 nm at 1 550 nm and 5,7 nm at 1 310 nm.

3.1.4

CWDM device

coarse wavelength division multiplexing device

WDM device which is intended to operate for channel spacing < 50 nm and $> 1\,000$ GHz

3.1.5

WWDM

wide WDM device

WDM device which is intended to operate for channel spacing ≥ 50 nm

3.1.6

wavelength multiplexer

MUX

WDM (DWDM, CWDM or WWDM) device which has n input ports and one output port, and whose function is to combine n different optical signals differentiated by wavelength from n corresponding input ports on to a single output port

3.1.7**wavelength demultiplexer****DEMUX**

WDM (DWDM, CWDM or WWDM) device which has one input port and n output ports, and whose function is to separate n different optical signals differentiated by wavelength from a single input port to n corresponding output ports

3.1.8**interleaver**

DWDM device which has three ports, and which function is to separate n different optical signals differentiated by wavelength from a common port and transmit an odd channel signal to one branching port and an even channel signal to the other branching port alternately

Note 1 to entry: An interleaver can operate as a wavelength multiplexer (OMUX) by reversing the demultiplexer.

3.2 Performance terms**3.2.1****operating wavelength**

nominal wavelength λ_h at which a WDM device operates with the specified performance

Note 1 to entry: The term "operating wavelength" includes the wavelength to be nominally transmitting, designated attenuating and isolated.

Note 2 to entry: Operating frequency is also used for DWDM devices.

3.2.2**operating wavelength range**

specified range of wavelengths including all operating wavelengths

Note 1 to entry: It includes all passbands and isolation wavelength ranges corresponding to all channels.

Note 2 to entry: The term "operating wavelength range" is defined for a WDM device, not for each channel or port.

3.2.3**channel wavelength range****passband****channel passband**

range within which a CWDM or WWDM device operates with less than or equal to a specified optical attenuation for the conducting port pair

Note 1 to entry: For a particular nominal channel centre wavelength, λ_{nom} , this wavelength range from $\lambda_{imin} = (\lambda_{nom} - \Delta\lambda_{max})$ to $\lambda_{imax} = (\lambda_{nom} + \Delta\lambda_{max})$, where $\Delta\lambda_{max}$ is the maximum channel centre wavelength deviation.

Note 2 to entry: For CWDM devices, channel centre wavelengths and maximum channel centre wavelength deviations are defined as nominal central wavelengths and wavelength deviations in ITU-T Recommendation G 694.2.

Note 3 to entry: An illustration of channel wavelength range is shown in Figure 1.

Note 4 to entry: Passband is frequently used.

Note 5 to entry: There are two or more passbands for WDM devices. Each passband is defined corresponding to each channel.

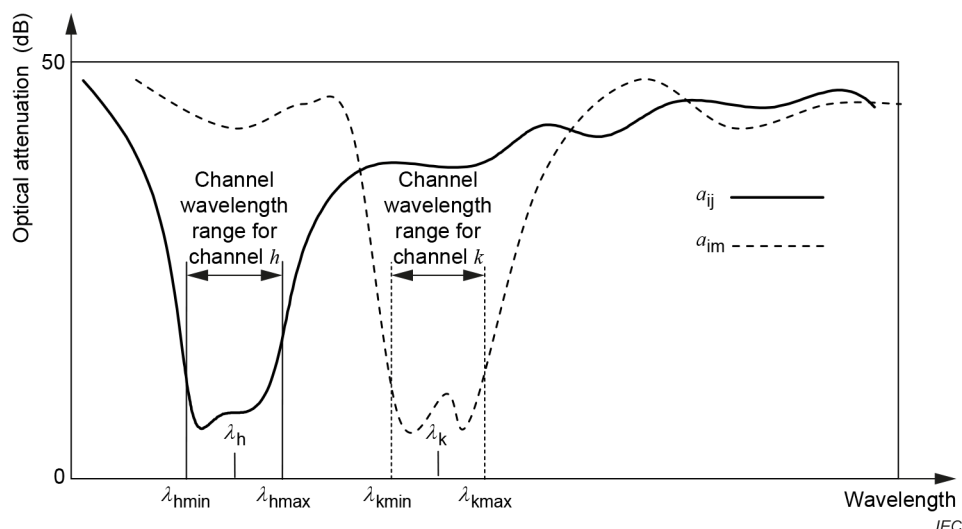


Figure 1 – Illustration of channel wavelength range

3.2.4

channel frequency range

frequency range within which a DWDM device is required to operate with less than or equal to a specified optical attenuation for the conducting port pair

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

Note 2 to entry: Nominal channel centre frequency and maximum channel centre frequency deviation are defined in ITU-T G.694.1.

3.2.5

insertion loss

maximum value of a_{ij} (where $i \neq j$) within the passband for conducting port pair

Note 1 to entry: It is the optical attenuation from a given port to a port which is another port of conducting port pair of the given port of a WDM device. Insertion loss is a positive value in decibels. It is calculated as:

$$IL = -10 \times \log_{10} \left(\frac{P_{\text{out}}}{P_{\text{in}}} \right)$$

where

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

P_{out} is the optical power received from the other port of the conducting port pair.

Note 2 to entry: An illustration of insertion loss is shown in Figure 2.

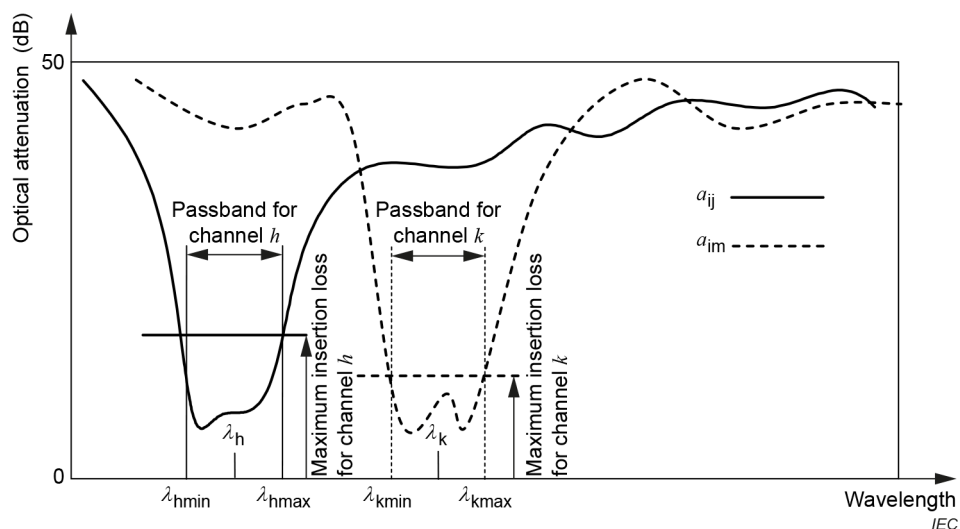


Figure 2 – Illustration of insertion loss

Note 3 to entry: For a WDM device, the insertion loss shall be specified as a maximum value of the insertion losses of all channels

3.2.6

channel insertion loss

maximum value of a_{ij} (where $i \neq j$) within the passband at the specific channel

3.2.7

passband ripple

maximum peak-to-peak variation of the insertion loss over the passband

Note 1 to entry: Insertion loss is expressed as a positive value.

Note 2 to entry: The term of passband is applied both for the unit of wavelength (WWDM and CWDM) and the unit of frequency (DWDM).

Note 3 to entry: Refer to Figure 3.

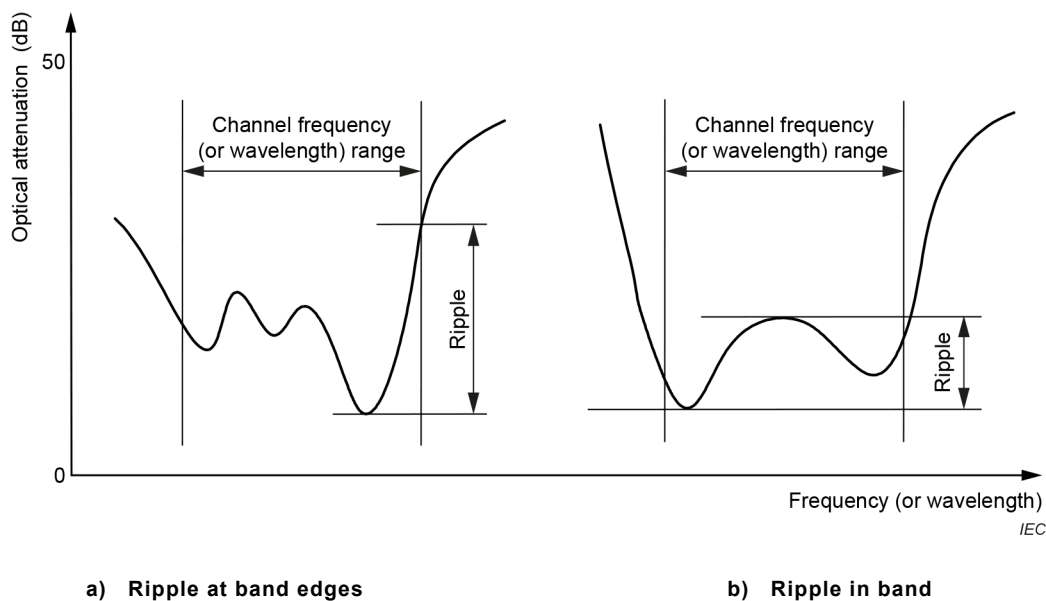


Figure 3 – Illustration of ripple

3.2.8**maximum channel insertion loss deviation within the passband**

maximum variation of the insertion loss

Note 1 to entry: Insertion loss is a positive value.

Note 2 to entry: The channel frequency range for a DWDM device or channel wavelength range for a coarse WDM (CWDM) and a wide WDM (WWDM) device can be used for passband.

Note 3 to entry: See Figure 4.

Note 4 to entry: Channel insertion loss deviation should not be confused with ripple defined in Figure 3 above.

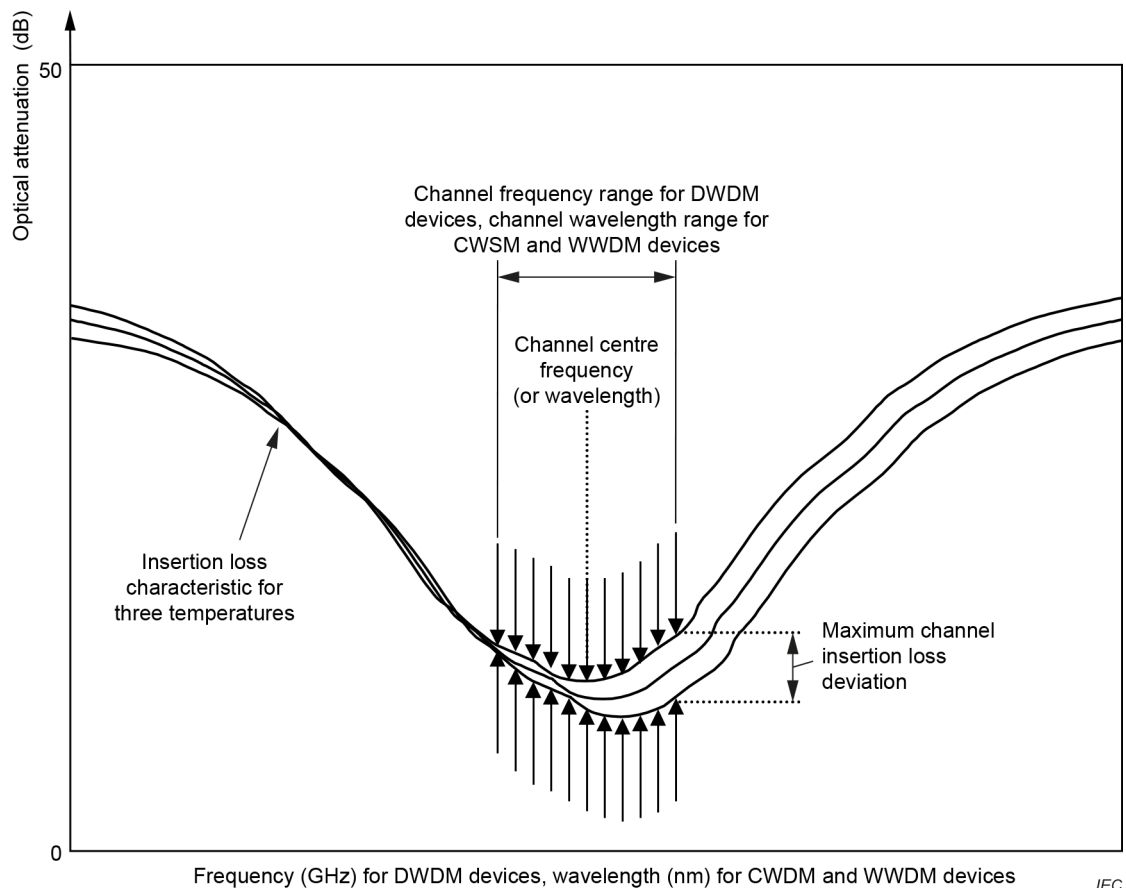


Figure 4 – Illustration of channel insertion loss variation

3.2.9**channel non-uniformity****insertion loss channel non-uniformity**

difference between the maximum and the minimum insertion loss at the common port for a specified set of branching ports

Note 1 to entry: Channel non-uniformity is defined for a MUX ($N \times 1$ WDM device) and a DEMUX ($1 \times N$ WDM device). Channel non-uniformity is a positive value and expressed in dB.

Note 2 to entry: For CWDM and DWDM devices, channel non-uniformity should be defined as the differences between the maximum and the minimum insertion loss at nominal wavelengths (frequencies) of all channels.

3.2.10**centre wavelength deviation**

difference between the centre wavelength and nominal wavelength (frequency) of the specified channel for DWDM devices

Note 1 to entry: The centre wavelength is defined as the centre of the wavelength range which is x dB less than the minimum optical attenuation for the specified passband (channel).

Note 2 to entry: 0,5, 1 or 3 are generally used for x .

3.2.11**crosstalk**

ratio of the noise power in the specified channel(s) versus the signal power in the specified channel

Note 1 to entry: Crosstalk is a negative value given in dB. The crosstalk is defined for each output port. Crosstalk for WDM devices is defined for a DEMUX ($1 \times N$ WDM device). The crosstalk for port o to port j is subtraction from the insertion loss of port i to o (conducting port pair) to the isolation of port j to o (isolated port pair). Crosstalk for WDM devices is defined for a DEMUX ($1 \times N$ WDM device). For an $M \times N$ WDM device, crosstalk can be defined to as expanding M of a $1 \times N$ WDM device.

Note 2 to entry: For WDM devices with three or more ports, the crosstalk should be specified as the maximum value of the crosstalk for each output port.

Note 3 to entry: Care should be taken not to confuse crosstalk and isolation.

3.2.12**isolation**

minimum value of a_{ij} (where $i \neq j$) within an isolation wavelength range for an isolated port pair

Note 1 to entry: Isolation is a positive value expressed in dB.

3.2.13**isolation wavelength**

for a pair of ports i and j (where $i \neq j$), that are conducting port pair at a wavelength λ_h , nominal wavelength λ_k (where $\lambda_h \neq \lambda_k$), that is an operating wavelength for a different pair of ports, at which i and j are isolated port pair

Note 1 to entry: Refer to Figure 5.

Note 2 to entry: Isolation frequency is also used for DWDM device.

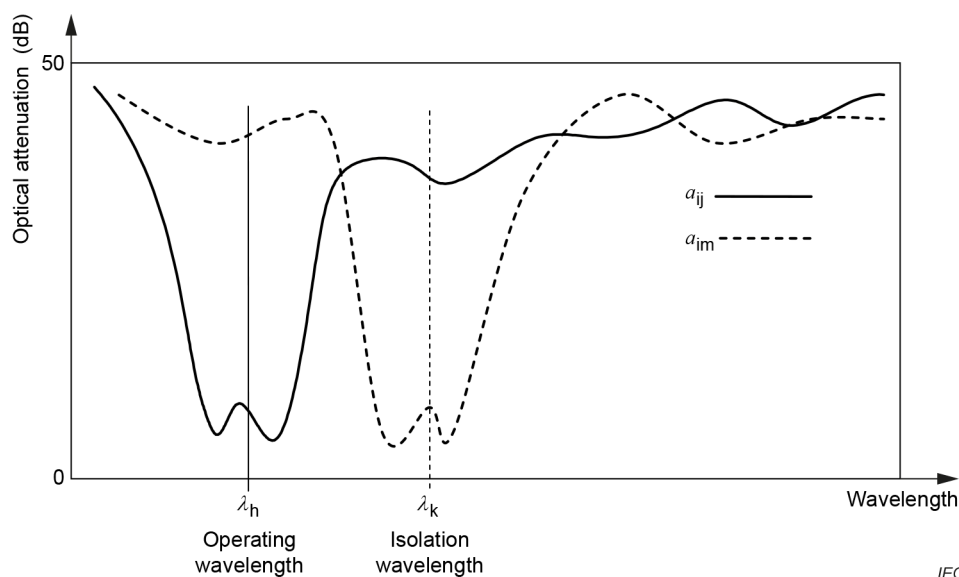


Figure 5 – Illustration of isolation wavelength

3.2.14**isolation wavelength range**

for a pair of ports i and j that are a conducting port pair at wavelength λ_h , range of wavelengths from λ_{kmin} to λ_{kmax} centred about an operating wavelength λ_k that is an operating wavelength for a different pair of ports but at which i and j are an isolated port pair

Note 1 to entry: Refer to Figure 6.

Note 2 to entry: Isolation frequency range is also used for DWDM devices.

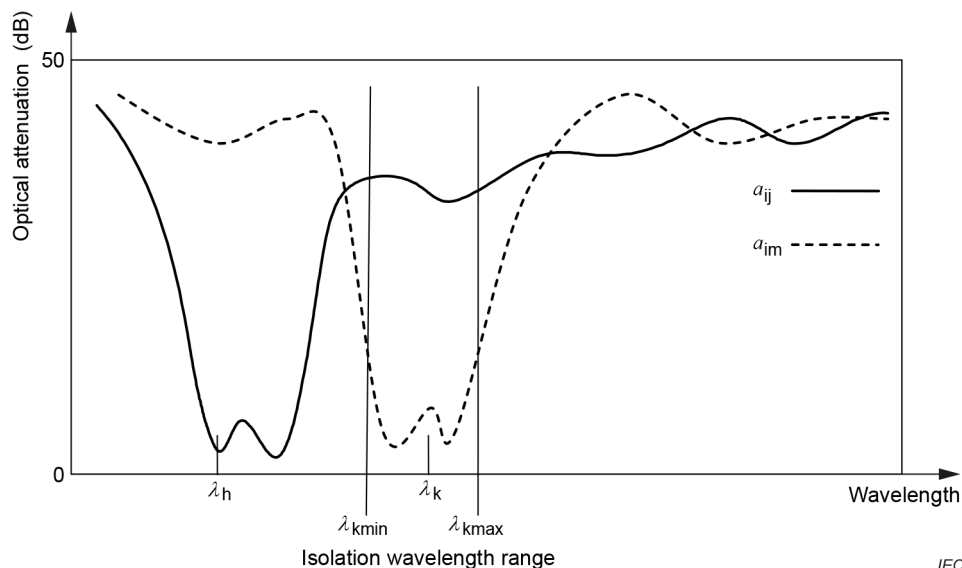


Figure 6 – Illustration of isolation wavelength range

3.2.15**wavelength isolation**

value of a_{ij} (where $i \neq j$) in the isolation wavelength range

Note 1 to entry: The wavelength isolation shall be defined as the minimum value of wavelength isolation over the isolation wavelength range.

3.2.16**adjacent channel isolation**

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

Note 1 to entry: Adjacent channel isolation is a positive value expressed in dB.

Note 2 to entry: This is illustrated in Figure 7 below. The adjacent channel isolation is different from adjacent channel crosstalk. In Figure 7, the upward-pointing arrow indicates a positive value, and the downward-pointing arrow indicates a negative value. Generally, there are two adjacent channel isolations for the shorter wavelength (higher frequency) side and the longer wavelength (lower frequency) side.

3.2.17**adjacent channel crosstalk**

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

Note 1 to entry: Adjacent channel crosstalk is a negative value expressed in dB.

Note 2 to entry: This is illustrated in Figure 7 below. Adjacent channel crosstalk is different from adjacent channel isolation. In Figure 7, the upward-pointing arrow indicates a positive value, and the downward-pointing arrow indicates a negative value. Generally, there are two adjacent channel crosstalks for the shorter wavelength (higher frequency) side and the longer wavelength (lower frequency) side.