SLOVENSKI STANDARD
oSIST prEN IEC 62074-1:2024

01-april-2024

Optični spojni elementi in pasivne komponente - Optični elementi za WDM (valovni multipleks) - 1. del: Splošna specifikacija

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

Lichtwellenleiter - Verbindungselemente und passive Bauteile - Lichtwellenleiter-WDM-Bauteile - Teil 1: Fachgrundspezifikation

Dispositifs d'interconnexion et composants passifs à fibres optiques - Dispositifs WDM à fibres optiques - Partie 1: Spécification générique

Ta slovenski standard je istoveten z: **prEN IEC 62074-1:2024**

ICS:

33.180.20	Povezovalne naprave za optična vlakna	Fibre optic interconnecting devices

oSIST prEN IEC 62074-1:2024 **en**

86B/4853/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:	
IEC 62074-1 ED3	
DATE OF CIRCULATION:	CLOSING DATE FOR VOTING:
2024-02-09	**2024-05-03**
SUPERSEDES DOCUMENTS:	
86B/4767/CD, 86B/4785A/CC	

IEC SC 86B : FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS	
SECRETARIAT: Japan	SECRETARY: Mr Shigeru Tomita
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☐ SAFETY	
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TITLE:

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

PROPOSED STABILITY DATE: 2029

NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – FIBRE OPTIC WDM DEVICES –

Part 1: Generic specification

FOREWORD

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

This third edition cancels and replaces the second edition, published in 2014, and 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) change of Clause 4 regarding requirements.

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

FDIS	Report on voting
86B/xxxx/FDIS	86B/xxxx/RVD

170
171 Full information on the voting for the approval of this standard can be found in the report on
172 voting indicated in the above table.

173 The French version of this standard has not been voted upon.

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

175 A list of all parts in the IEC 62074 series, published under the general title *Fibre optic*
176 *interconnecting devices and passive components – Fibre optic wdm devices*, can be found on
177 the IEC website.

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

181 • reconfirmed,
182 • withdrawn,
183 • replaced by a revised edition, or
184 • amended.

185

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – FIBRE OPTIC WDM DEVICES –

Part 1: Generic specification

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 the entry and/or exit of optical power, 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, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60050-731*, International Electrotechnical Vocabulary – Chapter 731: Optical fibre communication*

IEC 60695-11-5, *Fire hazard testing – Part 11-5: Test flames – Needle-flame test method – Apparatus, confirmatory test arrangement and guidance*

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

ISO 129-1, *Technical drawings – Indication of dimensions and tolerances – Part 1: General principles*

ISO 286-1, *Geometrical product specifications (GPS) – ISO coding system for tolerances of linear sizes – Part 1: Bases of tolerances 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, as well as 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]

3.1.2
wavelength division multiplexing device
wavelength division multiplexer
WDM device
synonym for a 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
dense wavelength division multiplexing device
DWDM device
WDM device which is intended to operate for a channel spacing equal or less than 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
coarse wavelength division multiplexing device
CWDM device
WDM device which is intended to operate for channel spacing less than 50 nm and greater than 1 000 GHz

3.1.5
wide WDM device
WWDM
WDM device which is intended to operate for channel spacing equal to or greater than 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
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 λ_{imin} = ($\lambda_{nom} - \Delta\lambda_{max}$) to λ_{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 G 694.2.

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

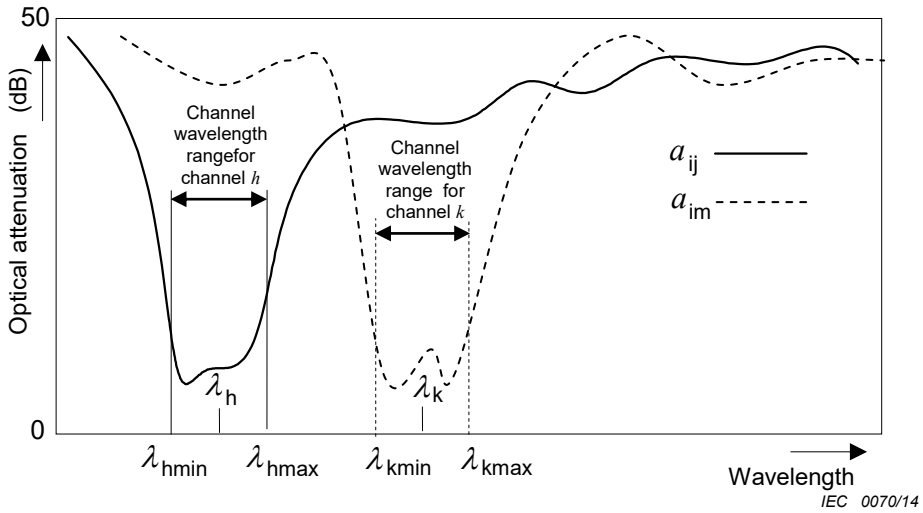


Figure 1 – Illustration of channel wavelength range

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 $f_{imin} = (f_{nomi} - \Delta f_{max})$ to $f_{imax} = (f_{nomi} + \Delta f_{max})$, 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
passband
channel passband
synonym for channel wavelength range (channel frequency range)

Note 1 to entry: Passband is frequently used.

Note 2 to entry: There are two or more passbands for WDM devices. Each passband is defined corresponding to each channel.

3.2.6
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:

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

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.

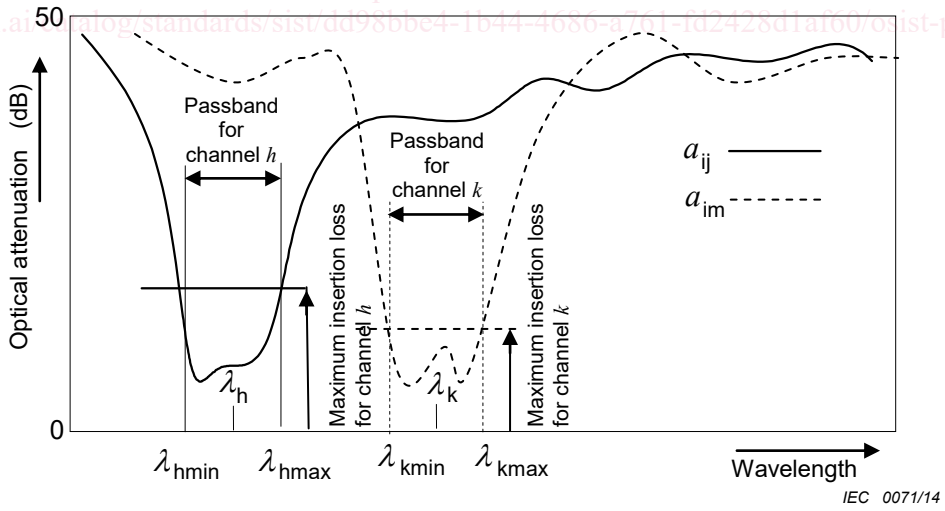


Figure 2– Illustration of insertion loss

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

3.2.7
channel insertion loss
insertion loss of the specific channel

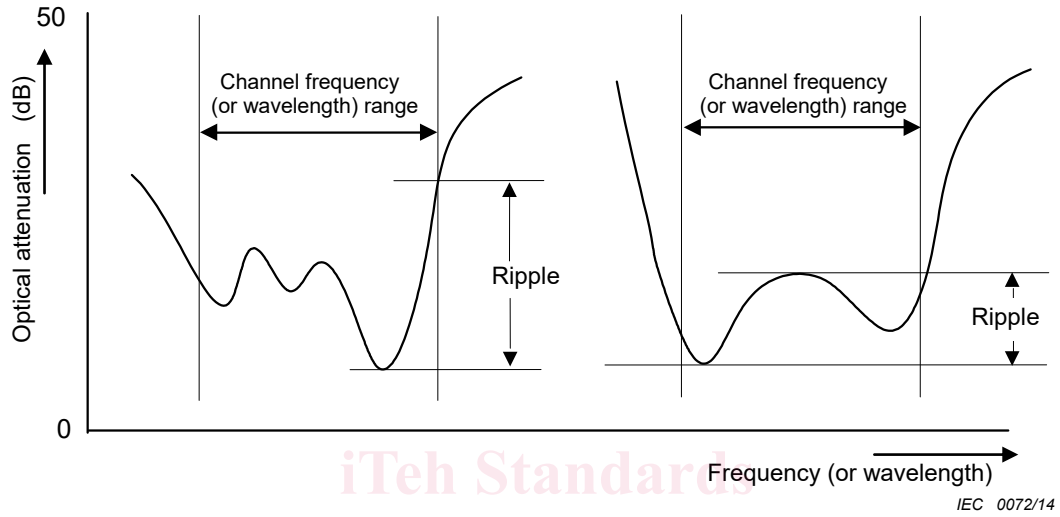
Note 1 to entry: The term of insertion loss is used both for a WDM device and channel insertion loss.

3.2.8
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.



a) – Ripple at band edges **b) – Ripple in band**

Figure 3 – Illustration of ripple

3.2.9
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 to be confused with ripple defined in Figure 3 below.

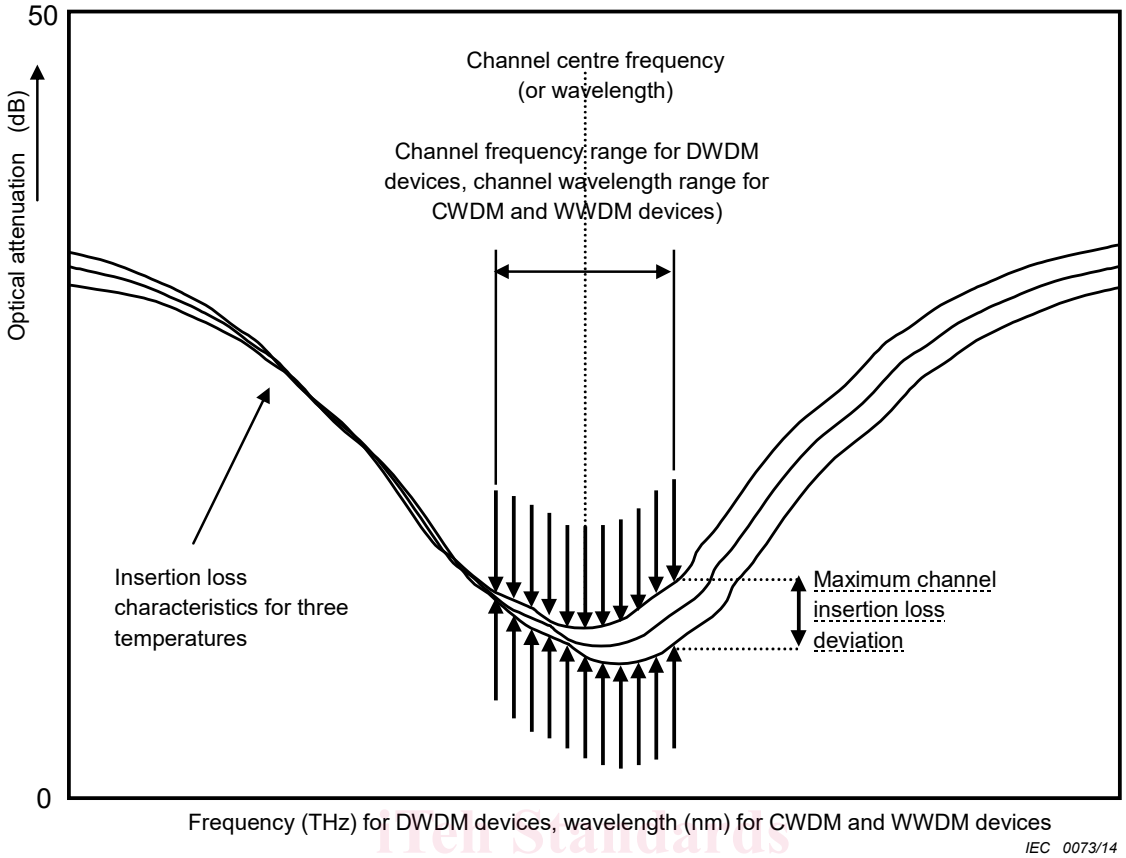


Figure 4 – Illustration of channel insertion loss variation

3.2.10
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 × 1 WDM device) and a DEMUX (1 × 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.

3.2.11
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.

3.2.12
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 × 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