

TECHNICAL SPECIFICATION



Optical backplanes – Product specification –
Part 2-1: Optical backplane using optical fibre circuit boards and multi-core right
angle optical connectors

PREVIEW
(standards.iteh.ai)
IEC TS 62661-2-1:2013
<https://standards.iteh.ai/catalog/standards/sist/598d6eb2-3a52-48b0-8912-122ef1231c3f/iec-ts-62661-2-1-2013>



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2013 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

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

Useful links:

IEC publications search - www.iec.ch/searchpub

The advanced search enables you to find IEC publications by a variety of criteria (reference number, text, technical committee,...).

It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

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

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing more than 30 000 terms and definitions in English and French, with equivalent terms in additional languages. Also known as the International Electrotechnical Vocabulary (IEV) on-line.

Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the

Customer Service Centre: csc@iec.ch.

<https://standards.iteh.ai/catalog/standards/sist/598d6eb2-3a52-48b0-8912-122ef1231c3f/iec-ts-62661-2-1-2013>

TECHNICAL SPECIFICATION



**Optical backplanes – Product specification –
Part 2-1: Optical backplane using optical fibre circuit boards and multi-core right
angle optical connectors**

STANDARD PREVIEW
(standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/598d6eb2-3a52-48b0-8912-122ef1231c3f/iec-ts-62661-2-1-2013>
IEC TS 62661-2-1:2013

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

PRICE CODE

W

ICS 33.180.99

ISBN 978-2-8322-1039-0

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
1 Scope.....	6
1.1 General.....	6
1.2 Product definition.....	6
1.3 Connection arrangement.....	6
1.4 Classification of connections.....	6
1.5 Operating environment.....	7
2 Normative references	7
3 Terms and definitions	8
4 Dimensional requirements	9
4.1 Dimension of a sub-rack	9
4.2 Dimension of optical wiring on optical backplane.....	9
4.3 Interconnection condition of connectors on optical backplane	11
4.4 Mounting position of connectors on optical backplane.....	11
4.5 Mounting position of connectors on daughter board	11
5 Requirements for dual-star optical circuits connection	12
5.1 Assignment of the name of an optical connection point.....	12
5.2 Specification of optical cable connection.....	13
6 Tests	20
6.1 Sample size	20
6.2 Test and measurement methods.....	20
6.3 Test sequence	20
6.4 Pass/fail criteria.....	20
7 Test report.....	20
8 Product qualification requirements.....	20
8.1 Optical performance requirements	20
8.1.1 Test 1: Attenuation, IEC 61300-3-4, Method C.....	20
8.1.2 Test 2: Return loss, IEC 61300-3-6, Method: branching devices.....	21
8.1.3 Test 3: Optical propagation delay (fibre length), IEC 60793-1-22, Method B	22
8.2 Mechanical performance requirements.....	22
8.2.1 Test 4: Mating durability, IEC 61300-2-2.....	22
8.2.2 Test 5: Vibration, IEC 61300-2-1.....	22
8.2.3 Test 6: Shock, IEC 61300-2-9.....	23
8.3 Environmental performance requirements	23
8.3.1 Test 7: Cold, IEC 61300-2-17	23
8.3.2 Test 8: Dry heat, IEC 61300-2-18	24
9 Reliability	24
9.1 General.....	24
9.2 Test 9: High temperature endurance, IEC 61300-2-18.....	24
9.3 Test 10: Damp heat, IEC 61300-2-19	24
9.4 Test 11: Change of temperature, IEC 61300-2-22	24
Annex A (normative) Mounting an optical backplane to zone 3 of the advanced telecommunication computing architecture (ATCA) backplane	26

A.1	General.....	26
A.2	Dimensional condition.....	26
A.2.1	Mounting position of an optical backplane.....	26
A.2.2	Dimensional condition of the daughter board.....	28
Annex B (normative)	Specification for compact right-angled optical board (CRO) connector.....	29
B.1	General.....	29
B.2	Description.....	29
B.3	Interfaces.....	29
Bibliography.....		38
Figure 1	– Sub-rack for optical back plane.....	9
Figure 2	– Area for optical wiring and positions of optical connectors on optical backplane.....	11
Figure 3	– 8 degree angle polish of ferrule.....	11
Figure 4	– Hole positions of low loss RAO connectors on optical backplane.....	12
Figure 5	– Hole positions to mount a RAO connector to a daughter board.....	12
Figure 6	– Assignment of connection points.....	13
Figure A.1	– Mounting position of optical backplane.....	27
Figure A.2	– Structure of optical daughter board.....	28
Figure B.1	– CRO connector configuration.....	30
Figure B.2	– CRO socket connector interface.....	31
Figure B.3	– CRO plug connector interface (1 of 2).....	32
Figure B.4	– Optical datum target location diagrams for 0,250 mm pitch fibre arrayed.....	34
Figure B.5	– Optical datum target location diagrams for 0,125 mm pitch fibre arrayed.....	35
Table 1	– Classification of ferrules.....	7
Table 2	– DS192 Optical backplane.....	14
Table 3	– DS384 Optical wiring backplane.....	16
Table B.1	– Dimensions of the CRO socket connector interface.....	36
Table B.2	– Dimensions of the CRO plug connector interface.....	37

INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL BACKPLANES – PRODUCT SPECIFICATION –**Part 2-1: Optical backplane using optical fibre circuit boards
and multi-core right angle optical connectors**

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.
<https://standards.iteh.ai/catalog/standards/sis/598d6cb2-3a52-48b0-8912-202401010000>
IEC TS 62661-2-1:2013
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 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.

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC 62661-2-1, which is a technical specification, has been prepared by IEC technical committee 86: Fibre optics.

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
86/439/DTS	86/452/RVC

Full information on the voting for the approval of this technical specification 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.

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

- transformed into an International Standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

iTeh STANDARD PREVIEW (standards.iteh.ai)

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

<https://standards.iteh.ai/catalog/standards/sist/598d6eb2-3a52-48b0-8912-122ef1231c3f/iec-ts-62661-2-1-2013>

OPTICAL BACKPLANES – PRODUCT SPECIFICATION –

Part 2-1: Optical backplane using optical fibre circuit boards and multi-core right angle optical connectors

1 Scope

1.1 General

This part of IEC 62661 gives guidelines for an optical backplane using optical fibre boards and multi-core right angle optical connectors with low bending loss multimode fibres (hereafter called low-loss RAO) to connect daughter boards to the optical backplane.

NOTE Low bending multimode fibres are currently under study.

1.2 Product definition

The structure of an optical backplane specified in this specification is as follows

- a) The optical backplane has the structure to fit to a sub-rack specified in IEC 60297-3-101 with a height of more than 3U (44,45 mm × 3).
- b) One optical backplane occupies a space of 100 mm (height) and 420 mm (width) in the optical backplane stated in item a).
- c) A multiple number of optical backplanes may be installed to a sub-rack specified in IEC 60297-3-101 if multiple spaces specified in item b) are available, that is, a height of 44,45 mm × N (N≥5).
- d) The backplane installs maximum of 14 front boards (daughter boards) with a pitch of 6HP (30,48 mm).
- e) New Type RAO connectors specified in Annex B are used in the optical backplane.
- f) Multimode optical fibres are used for optical wiring in the optical backplane. More specifically, the optical backplane is made of an optical fibre board specified in IEC 62496-3-1 using low bending loss optical fibres.

1.3 Connection arrangement

Connection arrangement for the optical backplane is as follows:

- a) The construction of optical connection specified in this document consists of using the compact right-angled optical board connectors specified in Annex B which are mounted on an optical backplane housed in a sub-rack specified in IEC 60297-3-101.
- b) The slots are assigned the following numerical designations in this specification: the slot on the left end is designated slot number 1, and the slot on the right end is designated slot number 14. The daughter board located at slot 7 or slot 8 is defined as daughter board B, while daughter boards located on any of the other slots are defined as daughter board A. This document specifies an optical dual star connection between daughter board A and daughter board B.

1.4 Classification of connections

Connections in this specification are classified as shown in Table 1.

Table 1 – Classification of ferrules

Class	Total number of optical cables in optical backplane	Optical connections in daughter board A	MT ferrule in the connector in slot of daughter board A	MT ferrule in the connector in slot of daughter board B
DS 192 optical backplane	$96 \times 2 = 192$ lines	$8 \times 2 = 16$ lines	8 core MT ferrule	12 core MT ferrule
DS 384 optical backplane	$192 \times 2 = 384$ lines	$16 \times 2 = 32$ lines	16 core MT ferrule	24 core MT ferrule

The 16 core MT ferrule and the 24 core MT ferrule used on DS 384 optical backplane are 125 μm pitch high-density MT ferrules defined by Figure B.5.

1.5 Operating environment

The operating environment is specified in Table A.1 of IEC 62496-3:2011, Category C (temperature range of -10 °C to $+60$ °C).

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 60297-3-101, *Mechanical structures for electronic equipment – Dimensions of mechanical structures of the 482,6 mm (19 in) series – Part 3-101: Subracks and associated plug-in units*
IEC TS 62661-2-1:2013

IEC 60793-1-22, *Optical fibres – Part 1-22: Measurement methods and test procedures – Length measurement*
<https://standards.iteh.ai/catalog/standards/sist/598d6eb2-3a57-48b0-8912-122ef1231c37/iec-ts-62661-2-1-2013>

IEC 61300-1:2011, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 1: General and guidance*

IEC 61300-2-1, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-1: Tests – Vibration (sinusoidal)*

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

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

IEC 61300-2-17, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-17: Tests – Cold*

IEC 61300-2-18, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-18: Tests – Dry heat – High temperature endurance*

IEC 61300-2-19, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-19: Tests – Damp heat (steady state)*

IEC 61300-2-22, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-22: Tests – Change of temperature*

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

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

IEC 61754-25, *Fibre optic connector interfaces - Part 25: Type RAO connector family*

IEC 62496-3:2011, *Optical circuit boards – Part 3: Performance standards – General and guidance*

IEC 62496-3-1, *Optical circuit boards – Part 3-1: Performance standards –Flexible optical circuit boards using unconnectorized optical glass fibres*

3 Terms and definitions

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

3.1

optical backplane

optical circuit board on which optical connectors are mounted in parallel and the connectors are mutually connected by optical waveguides, which are physical lines of optical signals such as, but not limited to, an optical fibre, planar polymer waveguide, planar glass waveguide, and other optical circuit boards, which are called daughter boards, are assembled on the board vertically to construct a book-shelf like structure

Note 1 to entry: Daughter boards are mutually connected optically for the required functionality. Electrical connectors are usually also mounted on the backplane to supply electric power, static control signals or low-speed bus signals to daughter boards, if necessary. An optical backplane has the function of optical connections and also mechanical support of the daughter boards

3.2

daughter board

optical circuit board connected orthogonally to an optical backplane

Note 1 to entry: Multiple optical devices and electric/electronic devices are mounted on a daughter board, and the devices are connected optically and/or electrically.

3.2.1

daughter board A

daughter board connected to one of slot numbers 1 through 6 and 9 through 14

3.2.2

daughter board B

daughter board connected to either slot number 7 or 8

3.3

reference position of an optical backplane

positional reference point against which to determine positions of optical fibres and connectors installed in an optical backplane in this specification

3.4

reference position of an optical backplane to daughter board

positional reference point against which to determine positions of connectors installed in an optical backplane for insertion of daughter boards in this specification

3.5**dual star optical connection**

optical wiring pattern in which each daughter board A is optically connected to two daughter boards B arranged at the centre of the backplane

3.6**slot**

alignment structure in the backplane construction to hold daughter boards in the sub-rack, formed as a groove

3.7**standard daughter board for testing**

daughter board mounted with a master cord of an MT connector which has a sufficiently small confirmed interconnection loss and a sufficiently large confirmed return loss for the evaluation of optical characteristics of an optical backplane

3.7.1**standard daughter board A for testing**

daughter board to be inserted into slot numbers 1 through 6 and 9 through 14 for testing of optical characteristics of an optical backplane

3.7.2**standard daughter board B for testing**

daughter board to be inserted to slot numbers 7 and 8 for testing of optical characteristics of an optical backplane

4 Dimensional requirements**4.1 Dimension of a sub-rack**

The optical backplane is housed on the inside face of the back of a sub-rack with dimensions shown in Figure 1. The height and width shall comply with IEC 60297-3-101 and the condition specified in Figure 1. The depth (Dc) of the sub-rack shall be selected from the specification given in IEC 60297-3-101.

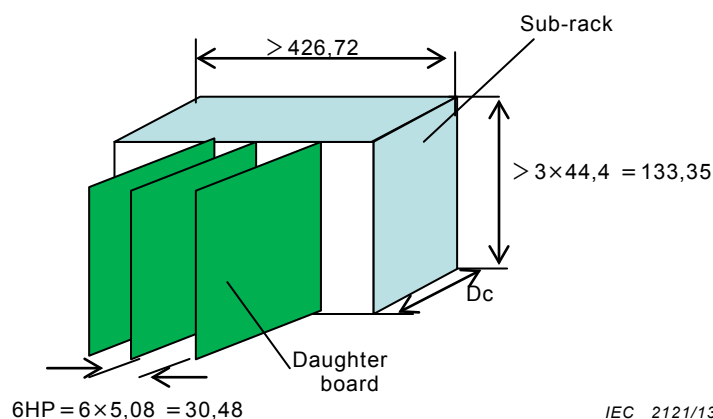


Figure 1 – Sub-rack for optical back plane

4.2 Dimension of optical wiring on optical backplane

The area for optical wiring and the position of optical connectors mounted on an optical backplane are shown in Figure 2. The reference position on an optical backplane is determined first; the dimensions to other parts on the backplane are determined by the distance from the reference position. The position of an optical fibre as connected to an optical connector is defined by the connecting position of an MT ferrule of a low-loss RAO

connector specified by IEC 61754-25. The position of a ferrule is specified by the centre of the ferrule.

The optical wiring pattern is formed on the optical fibre board at the connecting position corresponding to the holes for fibres in an MT ferrule. The size of the optical fibre board is 420 mm × 100 mm. The optical wiring pattern is formed on the board avoiding the positions to which low-loss RAO connectors are to be mounted. The positions for electric connectors are designed based on the reference position on the optical backplane when both optical and electric connectors are needed on the board.

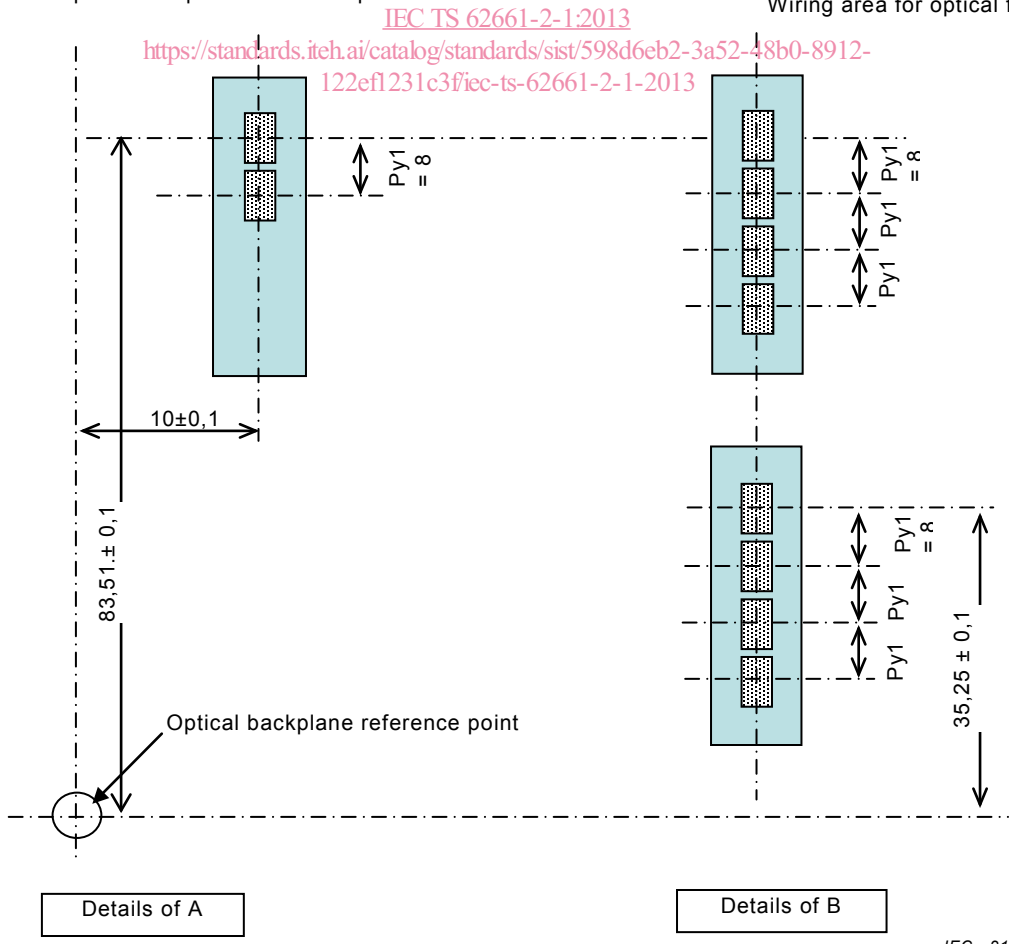
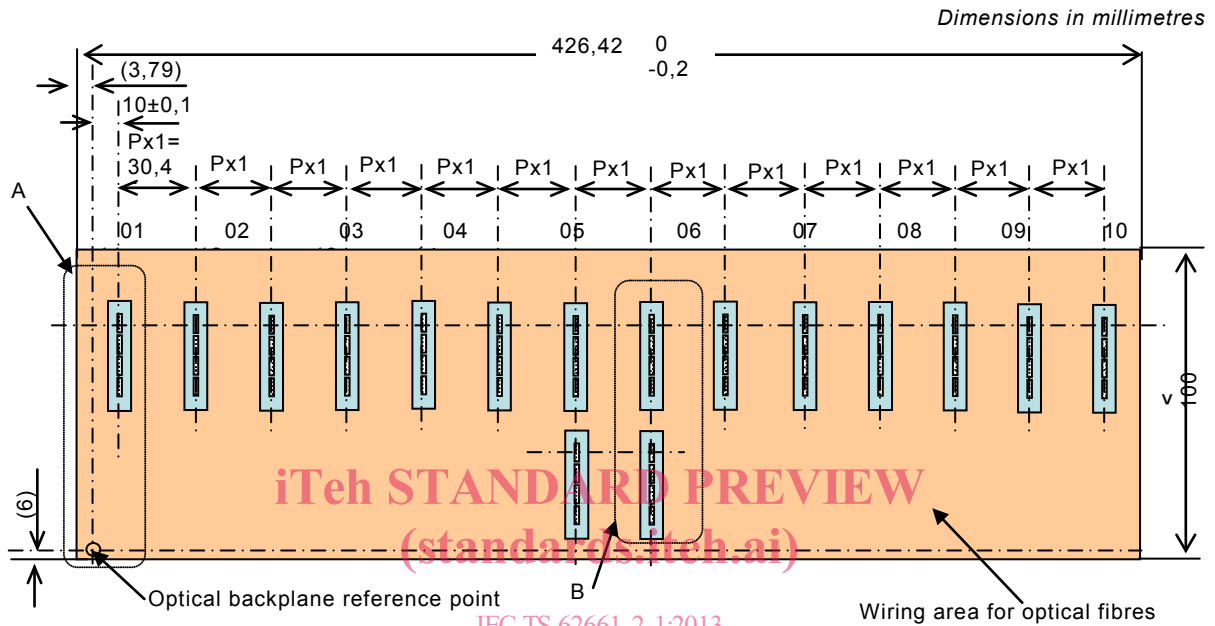


Figure 2 – Area for optical wiring and positions of optical connectors on optical backplane

4.3 Interconnection condition of connectors on optical backplane

Connectors used in the optical backplane are the low loss RAO connector specified in Annex B. The ferrule used in the low loss RAO connector is compatible with Annex B with a surface polished at an 8° angle. The direction of angle polish is shown in Figure 3.

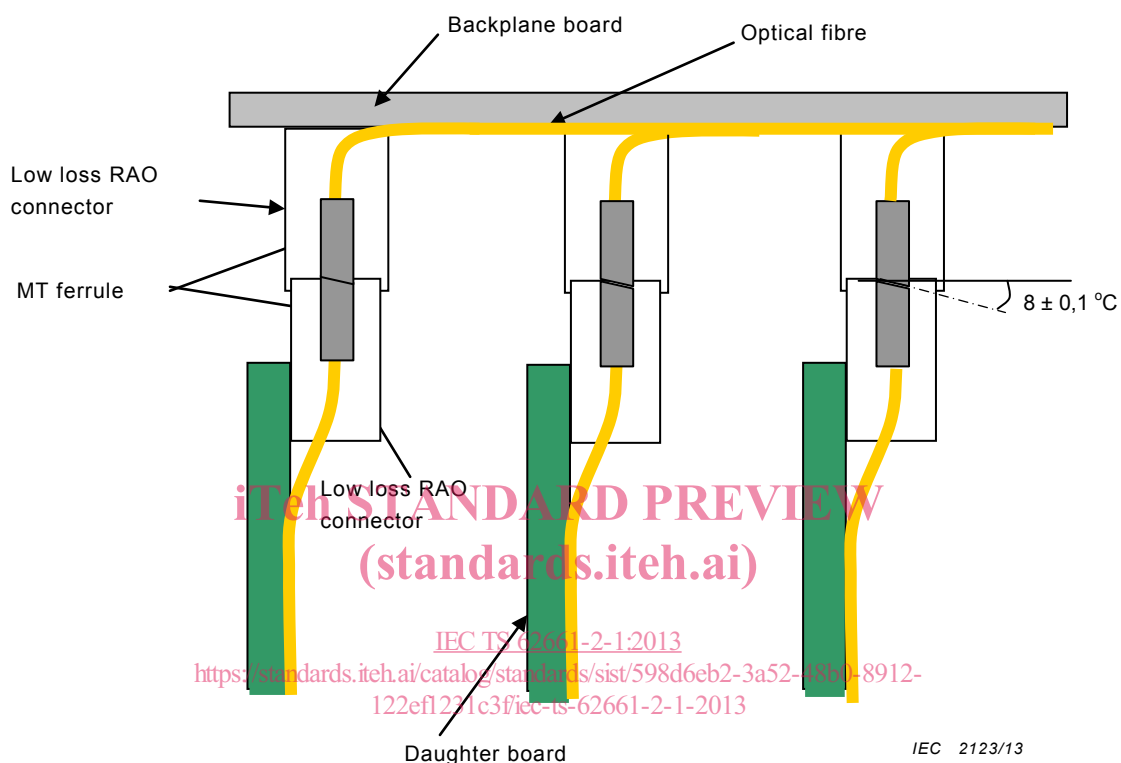


Figure 3 – 8 degree angle polish of ferrule

4.4 Mounting position of connectors on optical backplane

Mounting condition of the low loss RAO connectors on an optical backplane is shown in Figure 4. Positions of the holes to mount the RAO connectors are defined by the relative distance from the reference position on the optical backplane. The area for mounting of connectors is also defined as the area C in Figure 4. Optical fibres are not allowed to be installed in this area. An actual example of the relation of distance from the reference point of the optical backplane to the position of electric connectors is described in Annex A.

4.5 Mounting position of connectors on daughter board

Mounting condition of the low loss RAO connectors on a daughter board is shown in Figure 5. The highest hole position in the mounting holes of the RAO connector to be mounted on the highest position on the daughter board is defined as the reference position on the daughter board. This position shall also be used as the reference position of an electrical/electronic connector to be mounted. The distance to the edge of a daughter board is approximately illustrated in the Figure (distance shown in the figure with parentheses). An actual example of mounting of RAO connectors to a daughter board is given in Annex A.