PD IEC/TS 62661-2-1:2013

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Optical backplanes — Product specification

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

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

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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.

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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- withdrawn,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.

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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.

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Table 1 – Classification of ferrules

Class	Total number of optical cables in optical backplane	Optical connect-ions 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 × 2 = 192 lines	8 × 2 = 16 lines	8 core MT ferrule	12 core MT ferrule
DS 384 optical backplane	192 × 2 = 384 lines	16 × 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 60793-1-22, *Optical fibres – Part 1-22: Measurement methods and test procedures – Length measurement*

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*

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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

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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 numbers1 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.

Dimensions in millimetres

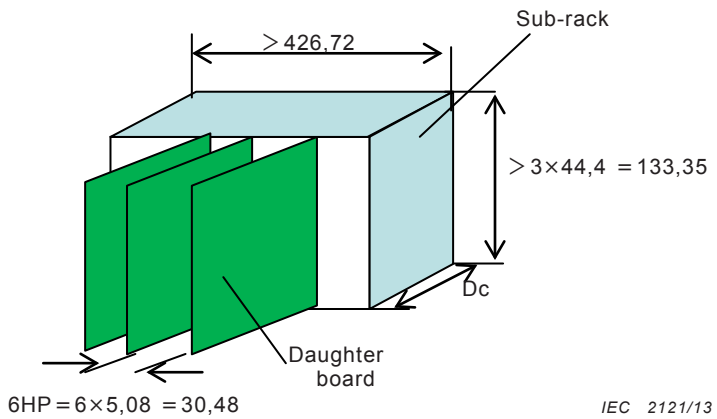

Figure 1 – Sub-rack for optical back plane

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 MT

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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.

Dimensions in millimetres

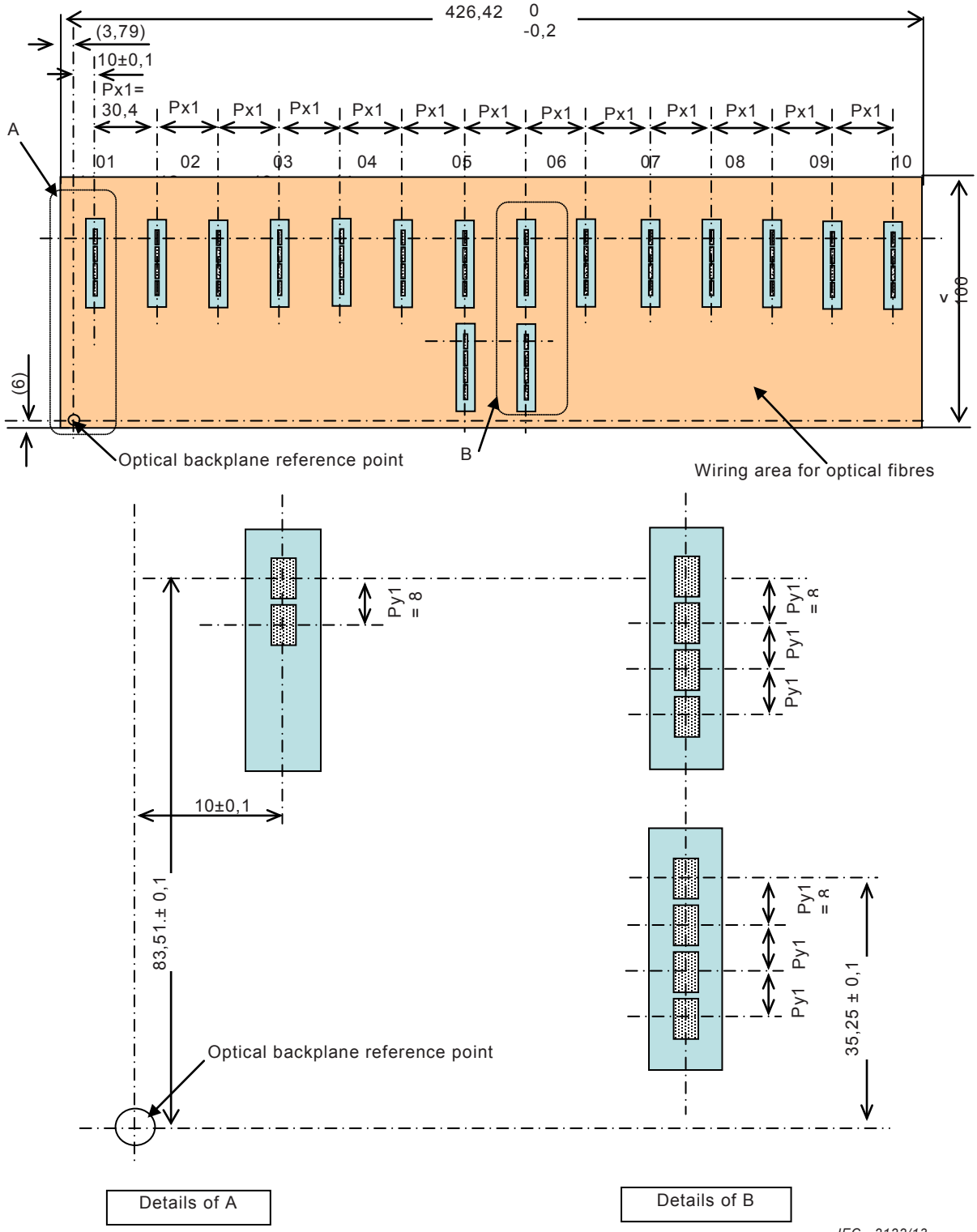

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Figure 2 – Area for optical wiring and positions of optical connectors on optical backplane

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.

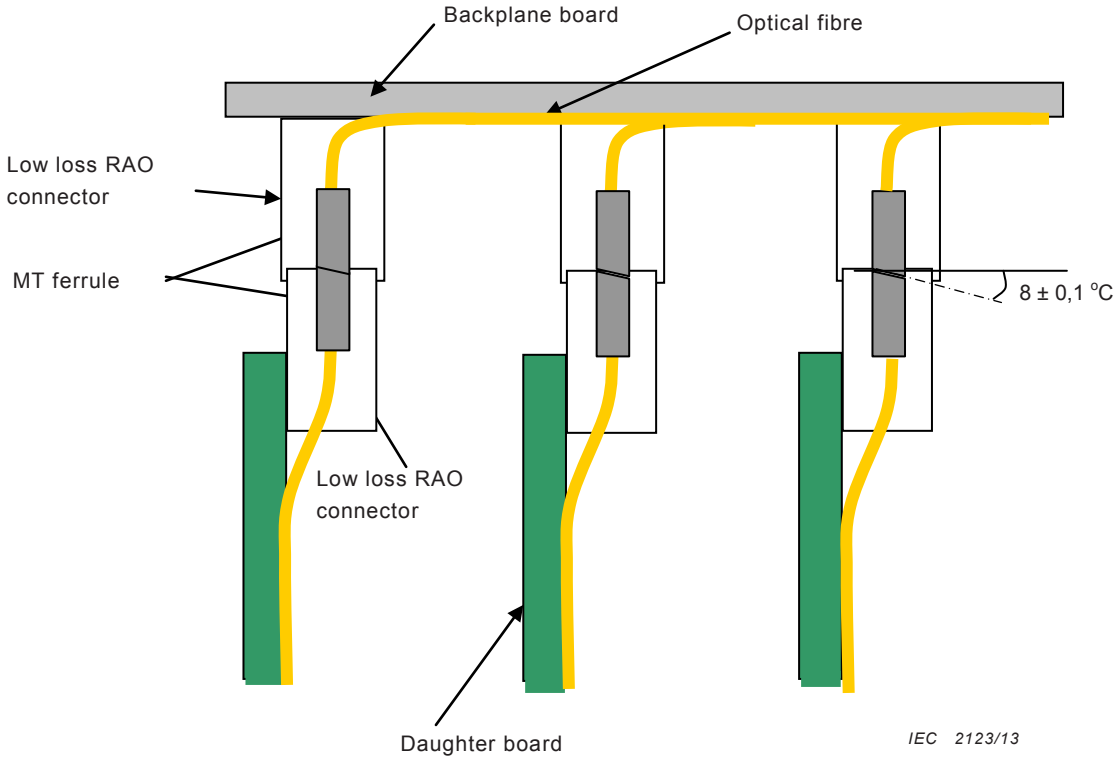

Figure 3 – 8 degree angle polish of ferrule

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.

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