BS EN 61754-20:2012

BSI Standards Publication

Fibre optic interconnecting devices and passive components — Fibre optic connector interfaces

Part 20: Type LC connector family

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National foreword

This British Standard is the UK implementation of EN 61754-20:2012. It is identical to IEC 61754-20:2012. It supersedes BS EN 61754-20:2002 which is withdrawn.

The UK participation in its preparation was entrusted by Technical Committee GEL/86, Fibre optics, to Subcommittee GEL/86/2, Fibre optic interconnecting devices and passive components.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 61754-20

August 2012

ICS 33.180.20

Supersedes EN 61754-20:2002

English version

Fibre optic interconnecting devices and passive components - Fibre optic connector interfaces - Part 20: Type LC connector family

(IEC 61754-20:2012)

Dispositifs d'interconnexion et composants passifs à fibres optiques - Interfaces de connecteurs pour fibres optiques - Partie 20: Famille de connecteurs de type LC (CEI 61754-20:2012)

Lichtwellenleiter - Verbindungselemente und passive Bauteile - Steckgesichter von Lichtwellenleiter- Steckverbindern - Teil 20: Steckverbinderfamilie der Bauart LC (IEC 61754-20:2012)

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Foreword

The text of document 86B/3343/FDIS, future edition 2 of IEC 61754-20, prepared by IEC/SC 86B "Fibre optic interconnecting devices and passive components" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61754-20:2012.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2013-02-10
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2013-05-10

This document supersedes EN 61754-20:2002.

EN 61754-20:2012 includes the following significant technical changes with respect to EN 61754-20:2002:

The changes are to reconsider the whole document and to add Interface IEC 61754-20-9 to IEC 61754-20-16 for plastic optical fibre (POF).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61754-20:2012 was approved by CENELEC as a European Standard without any modification.

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

IEC 60793-2-40	NOTE	Harmonised as EN 60793-2-40.
IEC 60794-2-50	NOTE	Harmonised as EN 60794-2-50.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 61755-3	Series	Fibre optic interconnecting devices and passive components - Fibre optic connector optical interfaces	EN 61755-3	Series

CONTENTS

INTRODUCTION

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning IEC 61754-20.

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FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – FIBRE OPTIC CONNECTOR INTERFACES –

Part 20: Type LC connector family

1 Scope

This International Standard defines the standard interface dimensions for the type LC family of connectors.

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 61755-3 series, *Fibre optic interconnecting devices and passive components – Fibre optic connector optical interfaces*

3 Description

The parent connector for type LC connector family is a simplex plug connector set of plug/adaptor/plug configuration which is characterized by:

- A 1,25 mm nominal diameter ferrule or, in the case of 1 mm OD POF, the fibre acts as the ferrule.
- The connector includes a single coupling latch and a ferrule spring loaded in the direction of the optical axis
- The plug has a single male key, which may be used to orient and limit the relative position between the connector and the component to which it is mated.
- The optical alignment mechanism of the connectors is a rigid bore sleeve or a resilient sleeve.

Drawings and dimensions provided consist of those minimum features that are functionally critical during the mating and unmating sequences of the plug with its adapter/receptacle counterpart component. The provided dimensions might cause intermateability problems with plugs not compliant to the standard.

4 Interfaces

This standard contains the following standard interfaces:

Interface 20-1: simplex plug connector interface – PC

Interface 20-2: simplex adaptor interface

Interface 20-3: simplex active device receptacle interface

Interface 20-4: duplex plug connector interface – PC

Interface 20-5: duplex adaptor interface

Interface 20-6: duplex active device receptacle interface

Interface 20-7: simplex plug connector interface – APC 8 °

Interface 20-8: duplex plug connector interface – APC 8 °

Interface 20-9: simplex plug connector interface – POF 1,25 mm jacketed OD

Interface 20-10: duplex plug connector interface – POF 1,25 mm jacketed OD

Interface 20-11: simplex plug connector interface – POF 1 mm

Interface 20-12: duplex plug connector interface – POF 1 mm

Interface 20-13: simplex adaptor interface – POF 1 mm

Interface 20-14: duplex adaptor interface – POF 1 mm

Interface 20-15: simplex active device receptacle interface – POF 1 mm

Interface 20-16: duplex active device receptacle interface – POF 1 mm

- The plug of interface IEC 61754-20-1 and interface IEC 61754-20-4 has a ferrule with a spherically polished endface (PC) shown in Figure 2a.
- The plug of interface IEC 61754-20-7 and interface IEC 61754-20-8 has a ferrule with a spherically polished angled endface (APC) shown in Figure 2c.
- The plug interfaces IEC 61754-20-9 through IEC 61754-20-12 have a flat smooth endface shown in Figure 2b (POF only).
- Plug interfaces IEC 61754-20-9 and IEC 61754-20-10 (POF 1,25 mm jacketed OD) have a POF fibre of up to 0.750 mm in a 1,25 mm OD ferrule.
- Plug interfaces IEC 61754-20-11 and IEC 61754-20-12 is the 1 mm POF without the use of a ferrule (see Table 3, Note f).
- The plug connector interfaces and associated details are given in Figures 1, 2, 3, 4, and 5 along with Tables 3 and 4.
- The adaptor interfaces and associated details are given in Figures 6, 7, and, 8 along with Table 5.
- The active device receptacle interfaces and associated details are given in Figures 9, 10, and 11 along with Tables 6, 7, and 8.
- The intermateability between plugs, adaptors, and receptacles are given in Table 1.
- The intermateability between the different plug interfaces are given in Table 2.

Table 1 – Plug to Adaptor/Receptacle Intermateability

Plug Interfaces IEC 61754	Adaptor/Active Device Receptacle Interfaces IEC 61754							
	20-2	20-3	20-5	20-6	20-13	20-14	20-15	20-16
20-1	Mate	Mate	Mate	Mate	Not mate	Not mate	Not mate	Not mate
20-4	Not mate	Not mate	Mate	Mate	Not mate	Not mate	Not mate	Not mate
20-7	Mate	Not mate	Mate	Not mate	Not mate	Not mate	Not mate	Not mate
20-8	Not mate	Not mate	Mate	Not mate	Not mate	Not mate	Not mate	Not mate
20-9	Mate	Mate	Mate	Mate	Not mate	Not mate	Not mate	Not mate
20-10	Not mate	Not mate	Mate	Mate	Not mate	Not mate	Not mate	Not mate
20-11	Not mate	Not mate	Not mate	Not mate	Mate	Mate	Mate	Mate
20-12	Not mate	Not mate	Not mate	Not mate	Not mate	Mate	Not mate	Mate

Table 2 – Plug to Plug Intermateability

Plug Interfaces IEC 61754	Plug Interface IEC 61754							
	20-1	**20-4**	**20-7**	**20-8**	**20-9**	**20-10**	**20-11**	**20-12**
20-1	Mate	Mate	Not mate	Not mate	Not Mate	Not Mate	Not mate	Not mate
20-4	Mate	Mate	Not mate	Not mate	Not Mate	Not Mate	Not mate	Not mate
20-7	Not mate	Not Mate	Mate	Mate	Not mate	Not mate	Not mate	Not mate
20-8	Not mate	Not mate	Mate	Mate	Not mate	Mot mate	Not Mate	Not mate
20-9	Not Mate	Not Mate	Not mate	Not mate	Mate	Mate	Not mate	Not mate
20-10	Not Mate	Not Mate	Not mate	Not mate	Mate	Mate	Not mate	Not mate
20-11	Not mate	Not mate	Not mate	Not mate	Not mate	Not mate	Mate	Mate
20-12	Not mate	Not mate	Not mate	Not mate	Not mate	Not mate	Mate	Mate

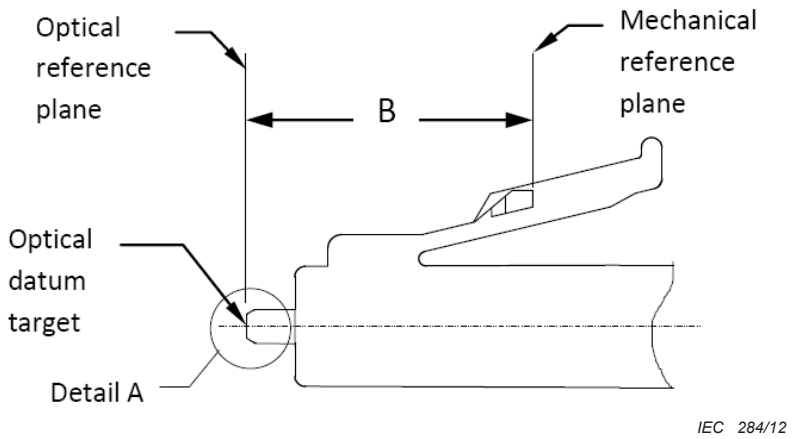
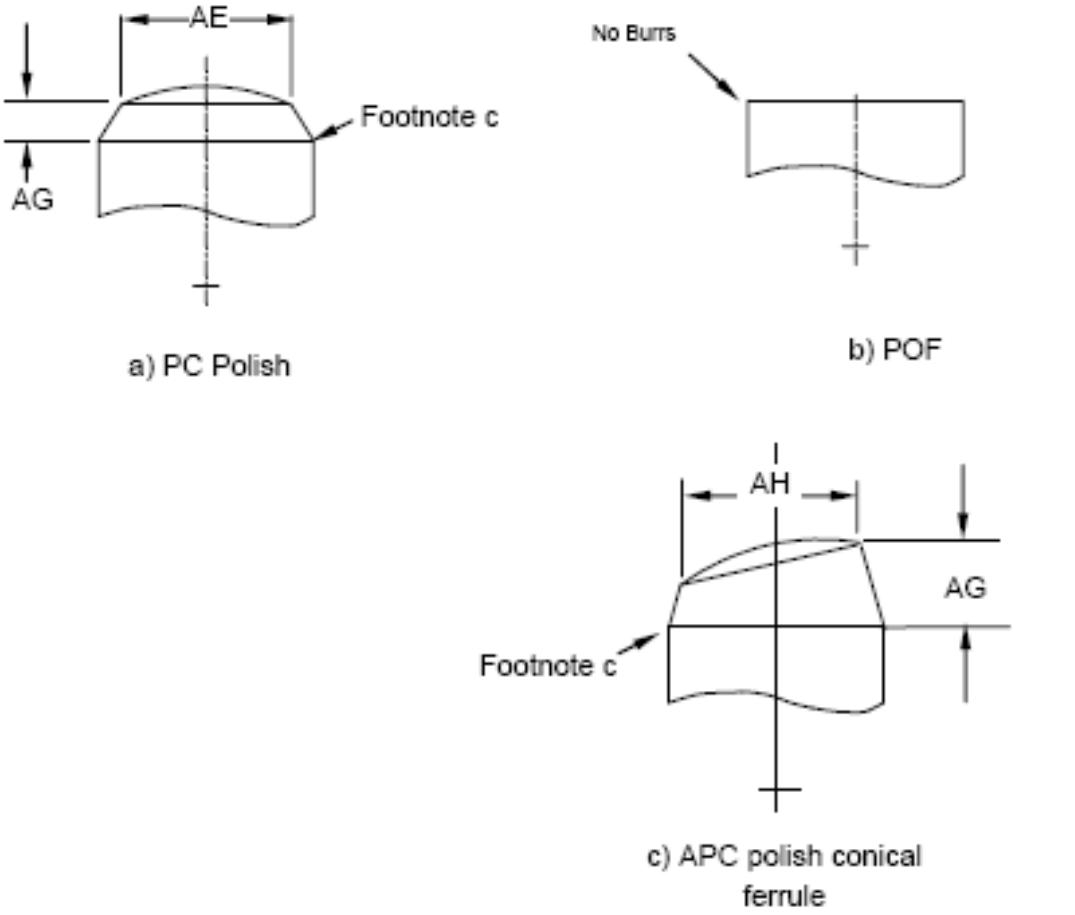


Figure 1 – Plug connector interface reference planes

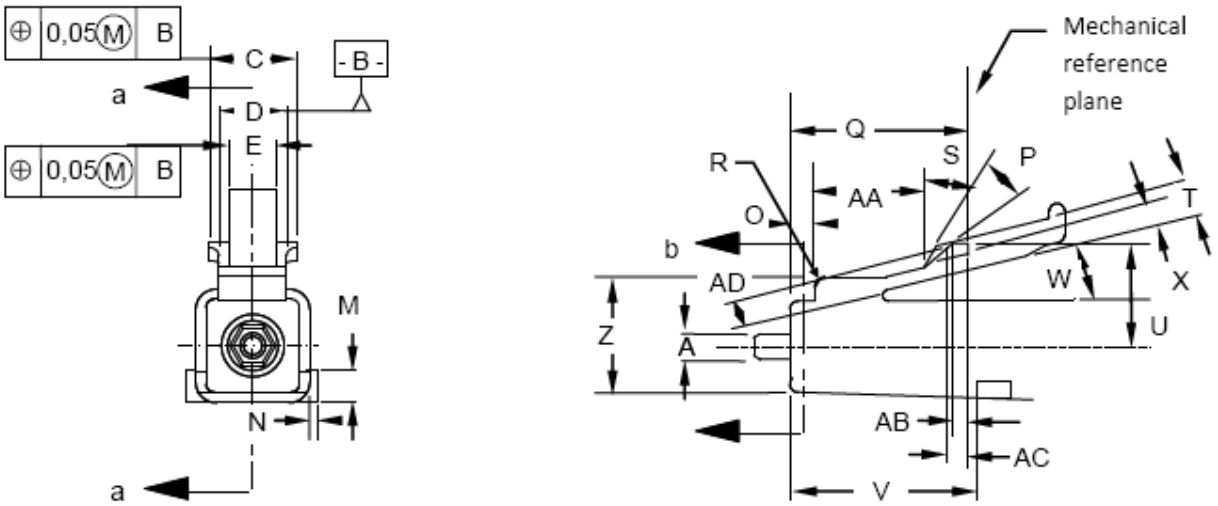


Key

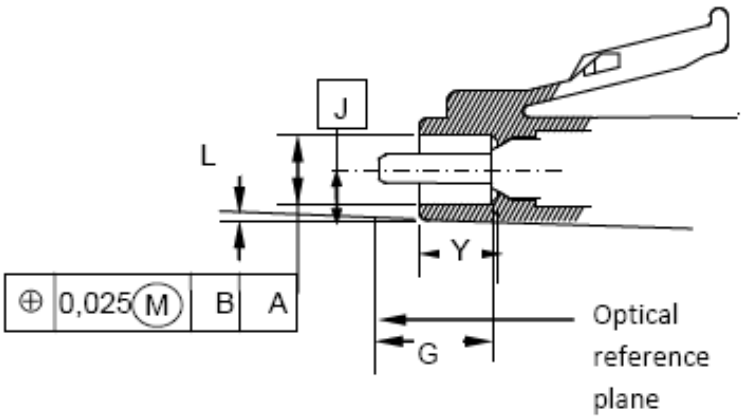
See Table 3.

Figure 2 – Detail A of Figure 1 – Plug connector interface – Expanded view drawings not-to-scale

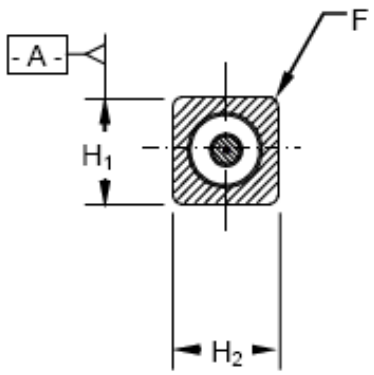
Refer to IEC 61755-3 series documents for information on the end-face geometry requirements of PC and APC interfaces, respectively.



a) Plug connector interface



b) Section a-a



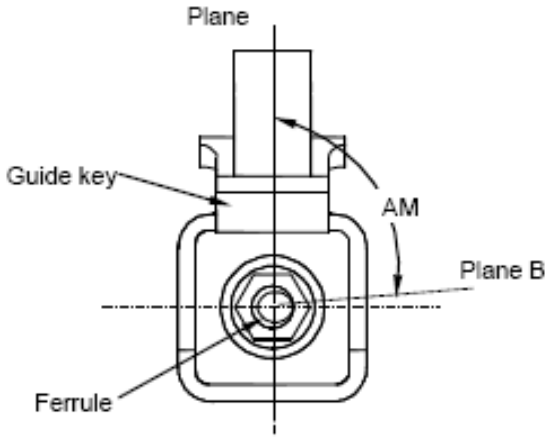
c) Section b-b

IEC 287/12

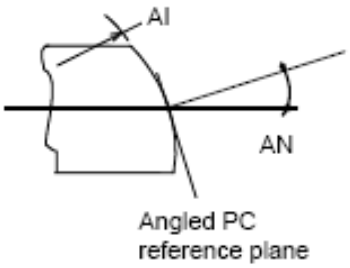
Key

See Table 3.

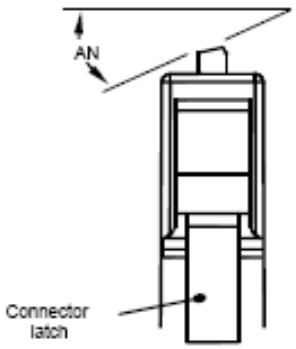
Figure 3 – Plug connector interface



a) – Expanded view from front



b) – APC ferrule endface geometry



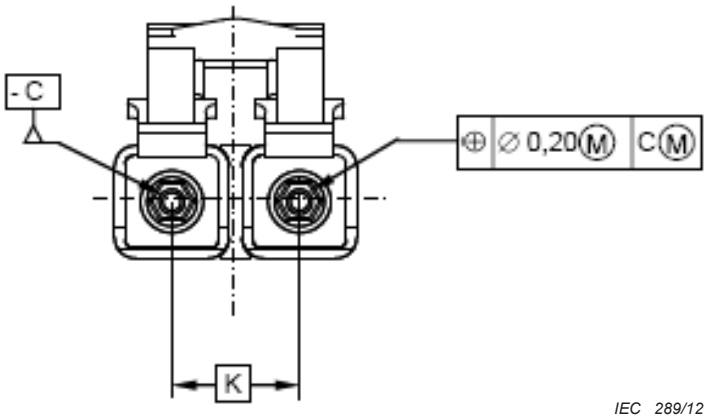
c) – Top view

IEC 288/12

Key

See Table 3.

Figure 4 – APC plug connector interface



Key

See Table 3.

Figure 5 – Duplex plug interface

Table 3 – Dimensions of the plug connector interface

Reference	Dimensions in millimeters		Remarks
	Minimum	Maximum	
A	-	-	Table 4 [f]
B [a]	10,3	10,5	
C	4,2	4,4	
D	3,2	3,35	
E	2,2	2,4	
F	0,3	0,5	Radius
G	4,88	5,00	Ferrule extension
H_1 [e]	4,42	4,52	
H_2 [e]	4,42	4,52	
I	3,0	3,2	Diameter
J	H/2	H/2	
K	6,25		Basic dimension
L [e]	–	0,2	Degrees
M	–	1,0	
N	–	0,5	
O	1,1	1,3	
P	21		Degrees, typical
Q	8,5	8,7	
R	0,4	0,6	Radius
S	30		Degrees, typical
T	1,4	1,6	
U	5,0	5,1	
V	12,1	–	

Table 3 – Dimensions of the plug connector interface *(continued)*

Reference	Dimensions in millimeters		Remarks
	Minimum	Maximum	
W	14		Degrees, typical
X	0,5	0,7	
Y	3,3	–	
Z	5,6	5,7	
AA	5,2	5,4	
AB	0,3	0,5	
AC	0,8	1.0	
AD	1,2	1,4	
AE	0,6	0,85	Pedestal diameter
AG	–	1,0	
AH	0,6	0,85	Pedestal diameter
AI [c]	5	12	Radius
AM [d]	90		Basic dimension, degrees [d]
AN	8		Basic dimension, degrees

[a] Dimension B is given for a plug endface when not mated. The ferrule is movable by a certain axial compression force, with direct contacting endface, and therefore dimension B is variable. Ferrule compression force shall be 5,0 N to 6,0 N when the position of the optical datum target, dimension B is moved to the range 9,8 mm to 10,0 mm. Forces are for buffered fibre only, different cord constructions can result in higher forces, see IEC 60794-2-50.

[b] A chamfer or radius is allowed to a maximum depth of 0,5 mm from the ferrule endface.

[c] These dimensional requirements apply to the finished ferrule, after all polishing procedures have been completed.

[d] Dimension AM is defined as an angle between two planes: One plane, plane A, passes through the axis of the ferrule and the axis of symmetry of the key of the angled endface connector plug. The other plane, plane B, passes through the axis of the ferrule and the plane normal to the angled PC reference plane.

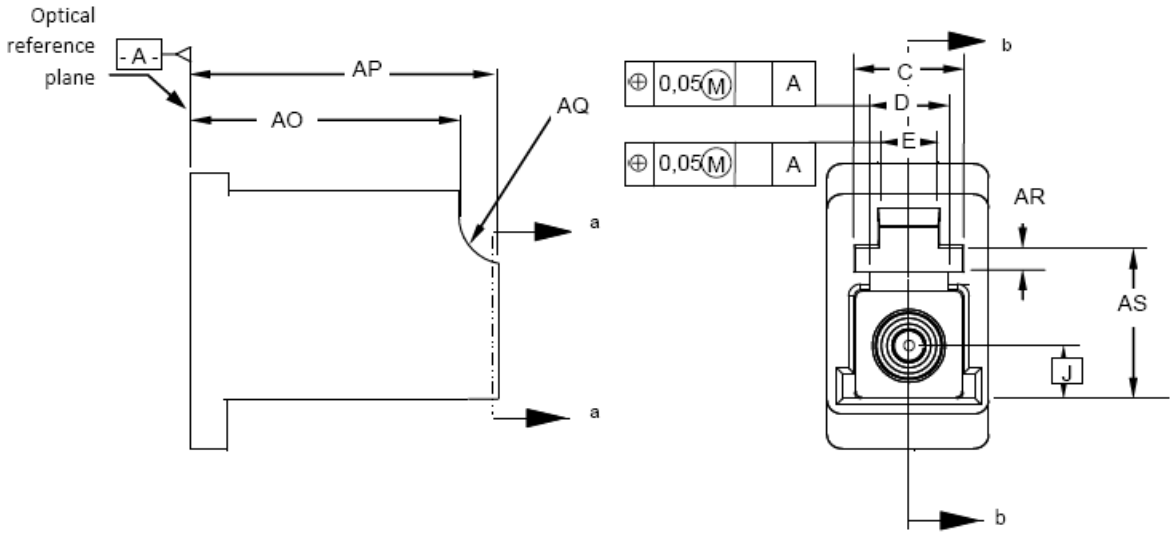
[e] Taper, dimension L, is applied to the surfaces associated with dimensions/features H_1 and H_2.

[f] For 1 mm POF and 1,25 mm jacketed POF the fibre or the fibre jacket will act as the connector ferrule/alignment feature.

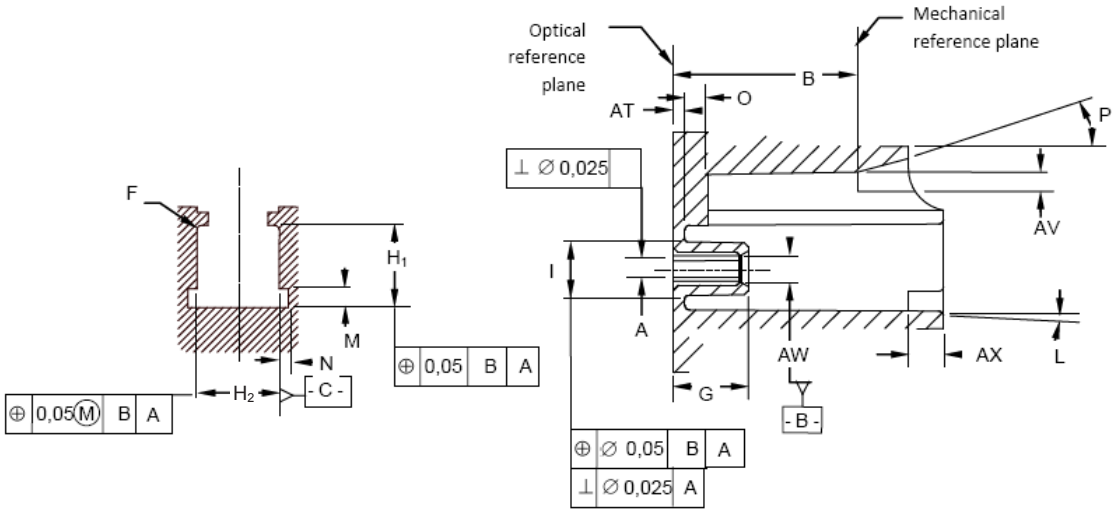
[g] Drawings and dimensions provided consist of those minimum features that are functionally critical during the mating and unmating sequences of the plug with its adapter/receptacle counterpart component. The provided dimensions might cause intermateability problems with plugs not compliant to the standard.

Table 4 – Plug connector interface – Ferrule grade

Grade	ØA Dimensions in millimeters		Remarks
	Minimum	Maximum	
1	1,2485	1,2495	
2	1,2483	1,2495	
3	1,2467	1,2495	
4	1,200	1,250	1,25 mm OD jacketed POF
5	0.90	1.00	1 mm OD POF

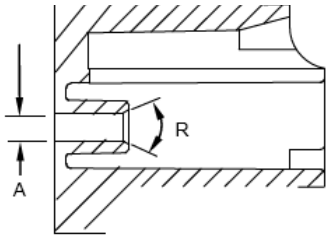


a) Simplex adapter interface dimensions



b) – Section a-a

c) – Section b-b

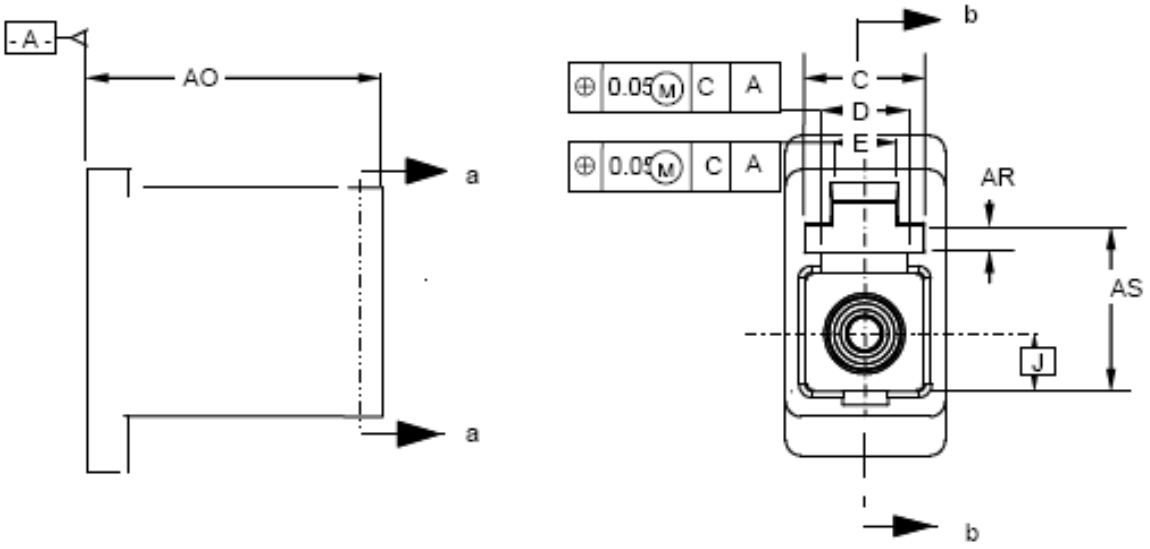


d) – Section b-b (POF Rigid bore)

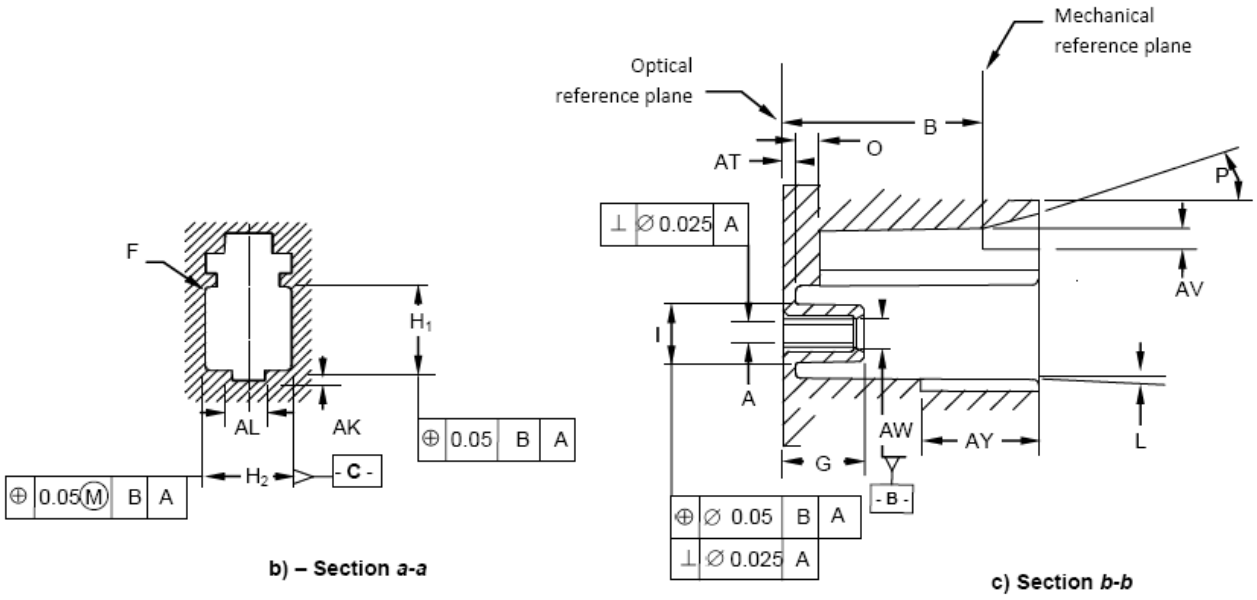
IEC 290/12

Key
See Table 5.

Figure 6 – Simplex adaptor interface



a) Junior adapter interface dimensions



b) – Section *a-a*

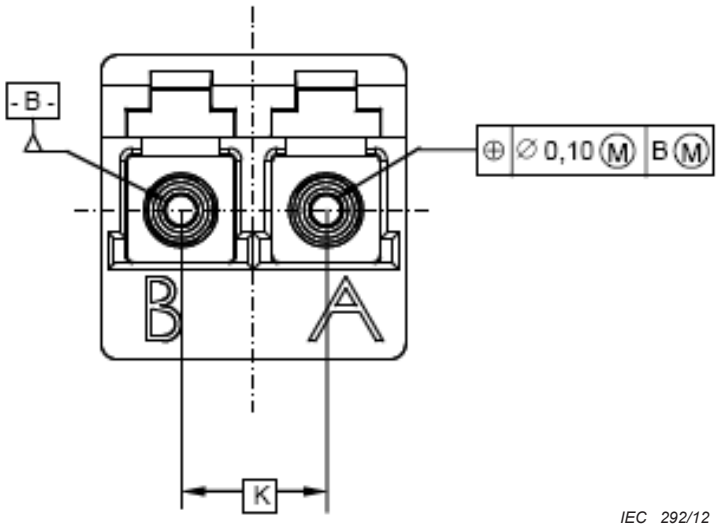
c) Section *b-b*

IEC 291/12

Key

See Table 5.

Figure 7 – Junior (Jr.) adaptor interface (optional – note g of Table 3)



Key

See Table 5.

Figure 8 – Duplex adaptor interface

Table 5 – Dimensions of the adaptor interface

Reference	Dimensions in millimeters		Remarks
	Minimum	Maximum	
A [a,b,c,d]	–	–	Diameter
B	9,9	10,0	
C	4,5	–	
D	3,4	3,5	
E	2,6	2,7	
F	0,2	0,3	Radius
G	4,0	4,1	
H_1	4,60	4,75	
H_2	4,60	4,75	
I	2,87	2,97	Diameter
J	2,29		Basic dimension
K	6,25		Basic dimension
L [e]	–	0,2	Degrees
M	1,0	1,1	
N	0,5	0,6	
O	–	1,3	
P	15		Degrees, typical
R	60		Degrees, typical
AK	0,5	0,6	
AL	1,7	1,8	
AO	11,0	12,8	
AP	14,5	14,7	

Reference	Dimensions in millimeters		Remarks
	Minimum	Maximum	
AQ	2,2	2,4	Radius
AR	1,1	1,2	
AS	6,6	6,8	
AT	0,6	0,7	
AV	1,0	1,1	
AW	1,4	1,5	Diameter
AX	1,9	–	
AY	5,3	5,4	

[a] The connector alignment feature is a resilient (split) alignment sleeve, and the sleeve may be either fixed or floating. Rigid bore for POF. For a fixed sleeve the positional tolerance of dimension I applies to both A and I dimensions. For a floating sleeve, a gauge pin inserted in the sleeve must be capable of moving freely into a position such that it is coincident with datum B. Dimension A defines the inner diameter of the alignment feature.

[b] The connector alignment feature is a resilient (split) alignment sleeve. The feature must accept a pin gauge to the centre of the adaptor with a force of 1,0 N to 2,5 N under the condition that another pin gauge is inserted into the feature from the other side until both pin gauges butt against each other. The pin gauge shall be 1,2490 mm as shown in Figure 11 and Table 8. The centre of the adaptor is defined by the left side position of dimension B.

[c] For POF the connector alignment feature is a rigid bore as depicted in Figure 6d. See Table 7 for gauge pin measurements of dimension A. All positional tolerances apply.

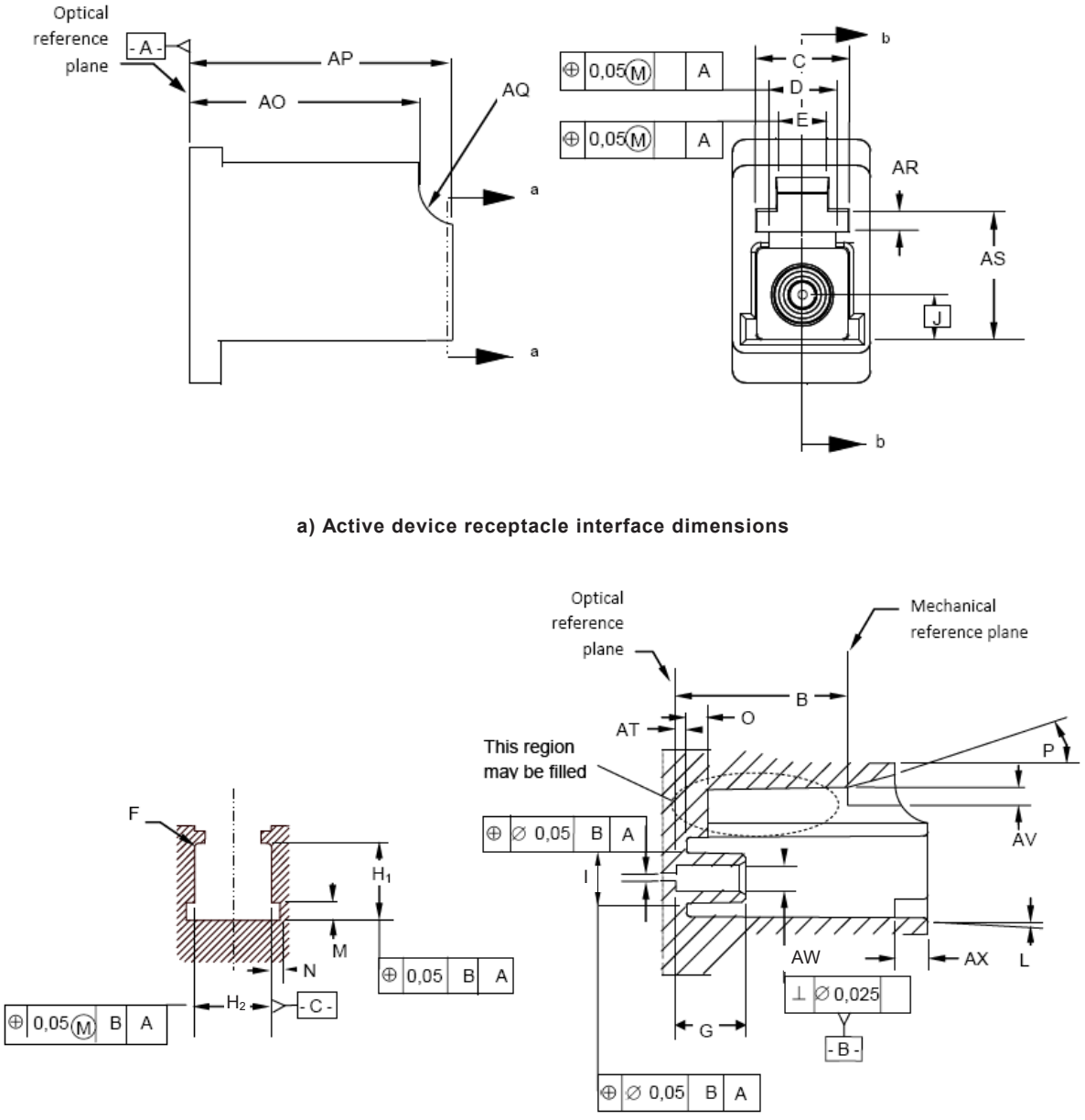
[d] Each of the units in the duplex adaptor shall comply with all of dimensions of Figures 6, Figure 7 and Figure 8

[e] Taper, dimension L, is applied to the surfaces associated with dimensions/features H1 and H2.

[f] Additional information for different port configurations, panel cut-outs and outside dimensions can be found in Informative Annex A, Figures A.1 to A.4 and Tables A.1 to A.4 of this document.

[g] The Jr. adaptor configuration is optional for one half of an adaptor. The distance from the optical plane to the mechanical plane (dimension B) is the same for all adaptors and receptacles. The Jr. configuration does not use feature/dimension AP. The Jr. side of the adaptor is ONLY for protected environments such as inside of a cabinet or shelf. The Jr. side of an adaptor shall NEVER protrude through to the “user” side of a panel.

[h] Drawings and dimensions provided consist of those minimum features that are functionally critical during the mating and unmating sequences of the plug with its adapter/receptacle counterpart component. The provided dimensions might cause intermateability problems with plugs not compliant to the standard.



a) Active device receptacle interface dimensions

b) – Section a-a

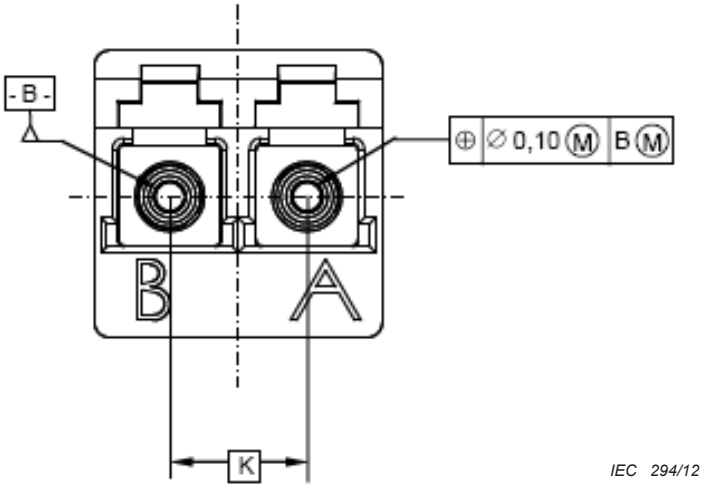
c) – Section b-b

IEC 293/12

Key

See Table 6.

Figure 9 – Active device receptacle interface



Key

See Table 6.

Figure 10 – Duplex active device receptacle interface

Table 6 – Dimensions of the active device receptacle

Reference	Dimensions in millimeters		Remarks
	Minimum	Maximum	
A [a, b, c]	–	–	Grade, Table 7
B	9,9	10,0	
C	4,5	–	
D	3,4	3,5	
E	2,6	2,7	
F	0,2	0,3	Radius
G	4,0	4,1	
H_1	4,60	4,75	
H_2	4,60	4,75	
I	2,87	2,97	Diameter
J	2,29		Basic dimension
K	6,25		Basic dimension
L [d]	–	0,2	Degrees
M	1,0	1,1	
N	0,5	0,6	
O	–	1,3	
P	15		Degrees, typical
AO	11,0	12,8	
AP	14,5	14,7	
AQ	2,2	2,4	Radius
AR	1,1	1,2	
AS	6,6	6,8	

Reference	Dimensions in millimeters		Remarks
	Minimum	Maximum	
AT	0,6	0,7	
AV	1,0	1,1	
AW	0,5	0,6	Grade, Table 7
AX	1,9	–	

[a] The connector alignment feature is a rigid bore sleeve or a resilient alignment sleeve. Dimension A defines the inner diameter of the alignment feature.

[b] The sleeve may be fixed or floating. For a fixed sleeve, the positional tolerance applies. For a floating sleeve, a gauge pin, as shown in Figure 11, inserted in the sleeve must be capable of moving freely into a position such that it is coincident with datum B.

[c] Each of the units in the duplex receptacle shall comply with all of dimensions of Figures 9 and 10.

[d] Taper, dimension L, is applied to the surfaces associated with dimension/feature H_1 and H_2.

[e] Drawings and dimensions provided consist of those minimum features that are functionally critical during the mating and unmating sequences of the plug with its adapter/receptacle counterpart component. The provided dimensions might cause intermateability problems with plugs not compliant to the standard.

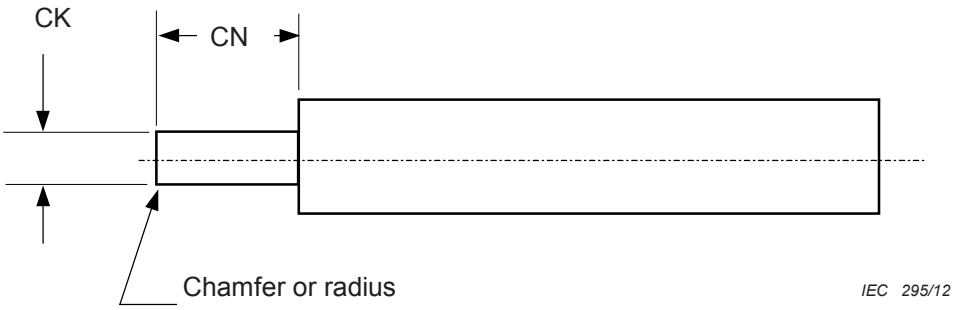
Table 7 – Active device receptacle interface – Alignment sleeve grade

Grade	Reference A Dimensions in millimeters		Remarks
	Minimum	Maximum	
1	1,251	1,252	Rigid bore sleeve [a, b]
2	1,251	1,254	
3	1,251	1,257	
4 (POF 1,25 mm jacketed OD)	1,251	1,265	
5 (POF 1mm)	1,070	1,200	
6			Resilient alignment sleeve [b, c]

[a] The connector alignment feature is a rigid bore sleeve. The dimension A shall be tested using two pin gauges. One pin gauge has the pin gauge grade number 1 μm larger than the maximum value of dimension A, the other pin gauge has the pin gauge grade number 1 μm smaller than the minimum value of dimension A. The appropriate pin gauge shall be selected from the pin gauge grade table.

[b] The connector alignment feature is a resilient (split) alignment sleeve. The feature must accept a pin gauge completely to the left side of dimension G with a force of 1,0 N to 2,5 N. Insert the pin gauge completely, from only one side, the connector side of the active device receptacle interface. The pin gauge is defined in Table 8

[c] Add grade number to the interface reference number.



Key

See Table 8.

Figure 11 – Pin gauge for active device receptacle

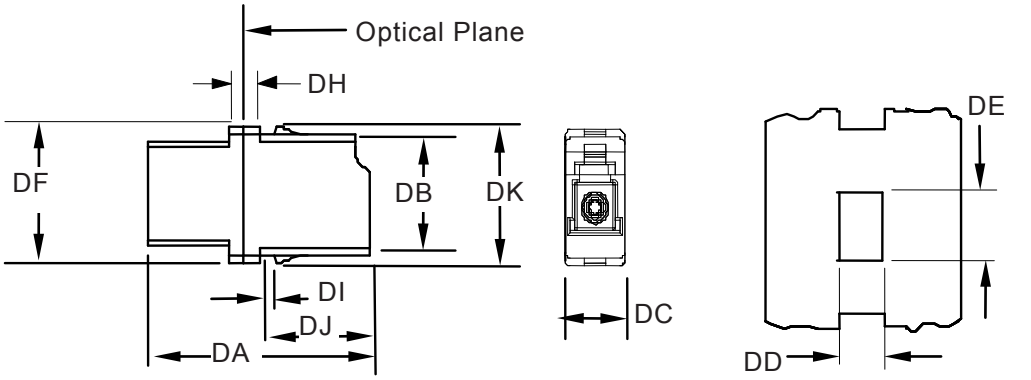
Table 8 – Pin gauge grade

Pin gauge grade	CK diameter Dimensions in millimeters		CN Dimensions in millimeters		Remarks
	Minimum	Maximum	Minimum	Maximum	
1,249	1,2488	1,2492	4,2	15	Resilient sleeve [a]

[a] Surface roughness should be < 0,2 μm Ra; cylindricity is less than 0,5 μm.

Annex A
(informative)

Additional adaptor dimensional information



a) Simplex adaptor dimensions **b) Panel cutout**

IEC 296/12

Key

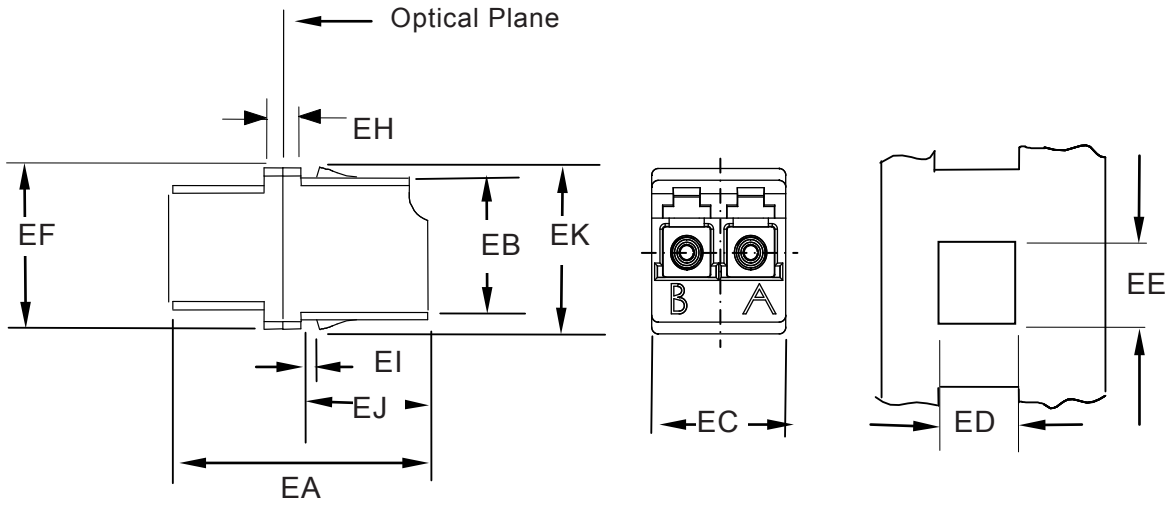
See Table A.1.

Figure A.1 – Simplex adaptor

Table A.1 – Dimensions of simplex adaptor

Ref.	Dimensions in millimeters		Remarks
	Min.	Max.	
DA	25,5	27,5	
DB	11,5	11,6	
DC	6,9	7,0	
DD	7,1	7,2	
DE	11,7	11,8	
DF	–	13,3	
DH	–	3,8	
DI	1,7	2,0	
DJ	12,6	12,9	
DK	13,0	13,4	

NOTE Panel cutout: panel thickness should be between 1,0 and 1,5 mm.



a) Duplex square flange adaptor dimensions **b) Panel cutout**

IEC 297/12

Key

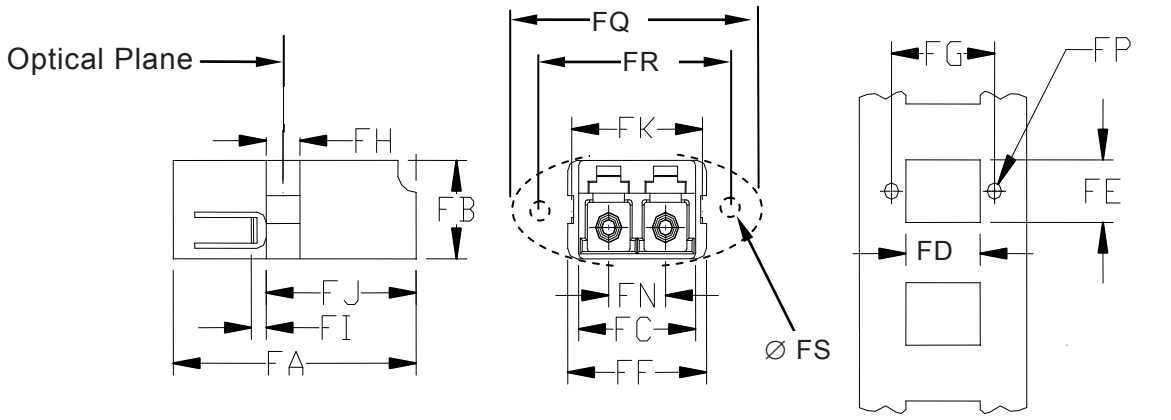
See Table A.2.

Figure A.2 – Duplex square flange adaptor

Table A.2 – Dimensions of duplex square flange adaptor

Ref.	Dimensions in millimeters		Remarks
	Min.	Max.	
EA	25,5	27,5	
EB	13,0	13,15	
EC	13,0	13,15	
ED	13,2	13,4	
EE	13,2	13,4	
EF	–	15,3	
EH	–	3,8	
EI	1,7	2,0	
EJ	12,6	12,9	
EK	14,5	15,3	

NOTE Panel cutout: panel thickness should be between 1,0 and 1,5 mm.



a) Duplex rectangular flange adaptor dimensions **b) Panel cutout**

IEC 298/12

Key

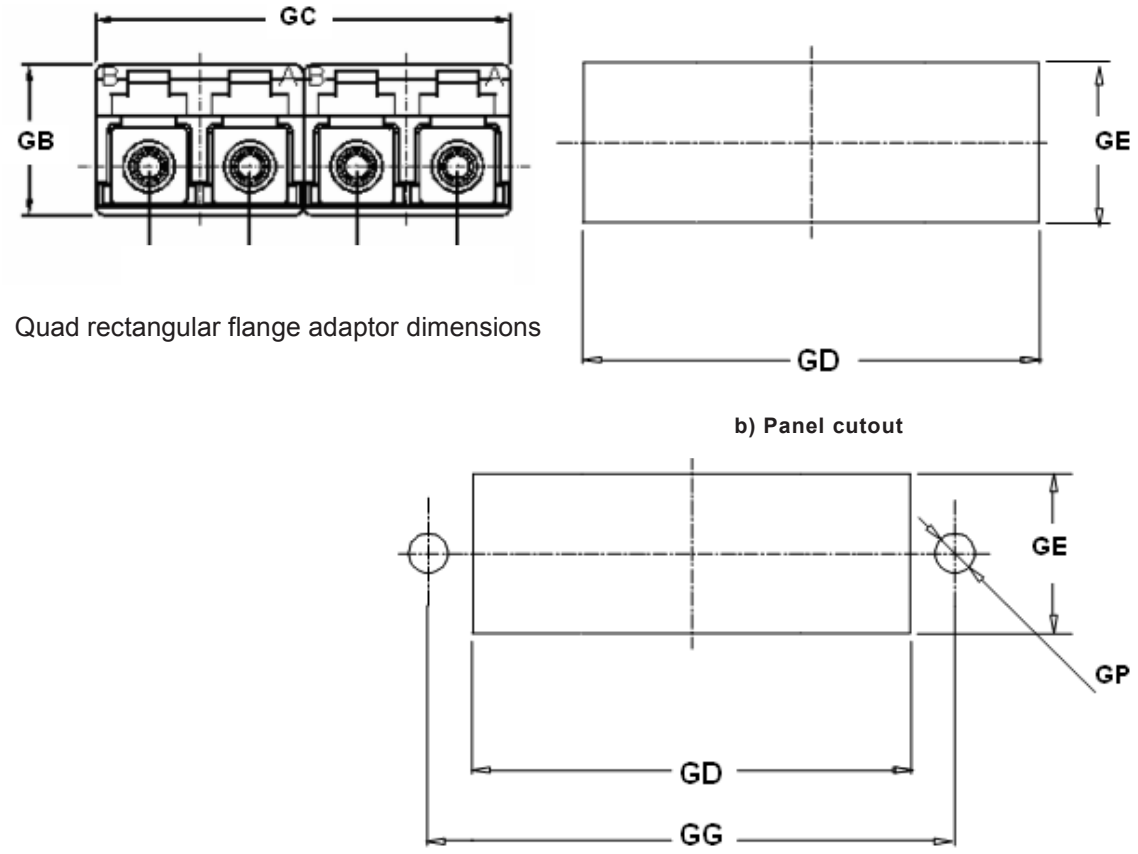
See Table A.3.

Figure A.3 – Duplex rectangular flange adaptor

Table A.3 – Dimensions of duplex rectangular flange adaptor

Ref.	Dimensions in millimeters		Remarks
	Min.	Max.	
FA	25,5	27,5	
FB	9,2	9,45	
FC	12,6	13,0	
FD	13,1	13,5	
FE	9,5	10,0	
FF	-	15,6	
FG	17,9	18,1	
FH	2,8	3,2	
FI	1,7	2,0	
FJ	15,95	16,6	
FK	14,5	14,9	Dimension over latches
FP	2,4	2,6	Holes optional
FQ	21,5	22,5	Flange Optional
FR	17,5	18,5	Flange Optional
FS	2,2	2,5	Flange Optional

NOTE Panel cutout: panel thickness should be between 1,0 and 1,5 mm.



a) Quad rectangular flange adaptor dimensions

Key
See Table A.4.

Figure A.4 –Quad rectangular flange adaptor

Table A.4 – Dimensions for quad rectangular flange adaptor

Ref.	Dimensions in millimeters		Remarks
	Min.	Max.	
GB	9,35	9,45	
GC	25,6	25,9	
GD	26,0	26,5	
GE	9,5	10,0	
GG	30,6	30,8	
GP	2,39	2,59	Holes optional

NOTE 1 Dimensions same as duplex rectangular flange adaptors (A.3) except as noted. Flange not shown.

NOTE 2 Panel cutout: panel thickness should be between 1,0 and 1,5 mm.

Bibliography

IEC 60793-2-40, *Optical fibres – Part 2-40: Product specifications – Sectional specification for category A multimode fibres*

IEC 60794-2-50, *Optical fibre cables – Part 2-50: Indoor cables – Family specification for simplex and duplex cables for use in terminated cable assemblies*

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