BS EN 62664-1-1:2013

BSI Standards Publication

Fibre optic interconnecting devices and passive components — Fibre optic connector product specifications

Part 1-1: LC-PC duplex multimode connectors terminated on IEC 60793-2-10 category A1a fibre

National foreword

This British Standard is the UK implementation of EN 62664-1-1:2013. It is identical to IEC 62664-1-1:2013.

BSI, as a member of CEN, is obliged to publish EN 62664-1-1 as a British Standard. However, attention is drawn to the fact that during the development of this European Standard, the UK committee voted against its approval as a European Standard.

Some parts of this standard are based upon sections of EN 50377-7-1:2004. Test methods 8 and 10 in Table 8 of EN 62664-1-1 make reference to Variations B01 and B02, which are not referenced in clause 4 (Variants) of this standard, but which do appear in Tables 2 and 3 of EN 50377-7-1:2004. Additionally, Figure 8 of EN 62664-1-1 is based upon Figure 3b in EN 50377-7-1:2004, however the UK committee noted that Figure 8 uses µm as a unit, rather than the nm unit that appears in the original.

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 subcommittee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Compliance with a British Standard cannot confer immunity from legal obligations.

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Fibre optic interconnecting devices and passive components - Fibre optic connector product specifications - Part 1-1: LC-PC duplex multimode connectors terminated on IEC 60793-2-10 category A1a fibre

(IEC 62664-1-1:2013)

Dispositifs d'interconnexion et composants passifs à fibres optiques - Spécifications de produits pour connecteurs à fibres optiques - Partie 1-1: Connecteurs multimodaux duplex LC-PC câblés sur une fibre de catégorie A1a selon la CEI 60793-2-10 (CEI 62664-1-1:2013)

Lichtwellenleiter - Verbindungselemente und passive Bauteile - Lichtwellenleiter - Steckverbinder Produktnormen - Teil 1-1: LC-PC-Duplex Mehrmoden-Steckverbinder zum Anschluss an Fasern der Kategorie A1a nach IEC 60793-2-10 (IEC 62664-1-1:2013)

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 86B/3550/FDIS, future edition 1 of IEC 62664-1-1, 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 62664-1-1:2013.

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)	2013-12-27
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2016-03-27

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 62664-1-1:2013 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 60794-2-11	NOTE	Harmonised as EN 60794-2-11.
IEC 60794-2-50	NOTE	Harmonised as EN 60794-2-50.
IEC 61300 series	NOTE	Harmonised in EN 61300 series.
IEC 61300-3-23	NOTE	Harmonised as EN 61300-3-23.
IEC 61300-3-35	NOTE	Harmonised as EN 61300-3-35.
IEC 61753-022-2	NOTE	Harmonised as EN 61753-022-2.
IEC 61754-20	NOTE	Harmonised as EN 61754-20.
ISO 8015	NOTE	Harmonised as EN ISO 8015.

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 60793-2-10	-	Optical fibres - Part 2-10: Product specifications - Sectional specification for category A1 multimode fibres	EN 60793-2-10	-
IEC 61300-2-1	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-1: Tests - Vibration (sinusoidal)	EN 61300-2-1	-
IEC 61300-2-2	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-2: Tests - Mating durability	EN 61300-2-2	-
IEC 61300-2-4	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-4: Tests - Fibre/cable retention	EN 61300-2-4	-
IEC 61300-2-6	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-6: Tests - Tensile strength of coupling mechanism	EN 61300-2-6	-
IEC 61300-2-12	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-12: Tests - Impact	EN 61300-2-12	-
IEC 61300-2-17	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-17: Tests - Cold	EN 61300-2-17	-
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	EN 61300-2-18	-
IEC 61300-2-19	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-19: Tests - Damp heat (steady state)	EN 61300-2-19	-
IEC 61300-2-22	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-22: Tests - Change of temperature	EN 61300-2-22	-

Publication	Year	Title	EN/HD	Year
IEC 61300-2-42	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-42: Tests - Static side load for connectors	EN 61300-2-42	-
IEC 61300-2-44	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 2-44: Tests - Flexing of the strain relief of fibre optic devices	EN 61300-2-44	-
IEC 61300-3-6	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-6: Examinations and measurements - Return loss	EN 61300-3-6	-
IEC 61300-3-28	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-28: Examinations and measurements - Transient loss	EN 61300-3-28	-
IEC 61300-3-34	-	Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-34: Examinations and measurements - Attenuation of random mated connectors	EN 61300-3-34	-
IEC 62614	-	Fibre optics - Launch condition requirements for measuring multimode attenuation	EN 62614	-
ISO/IEC 11801	-	Information technology - Generic cabling for customer premises	-	-

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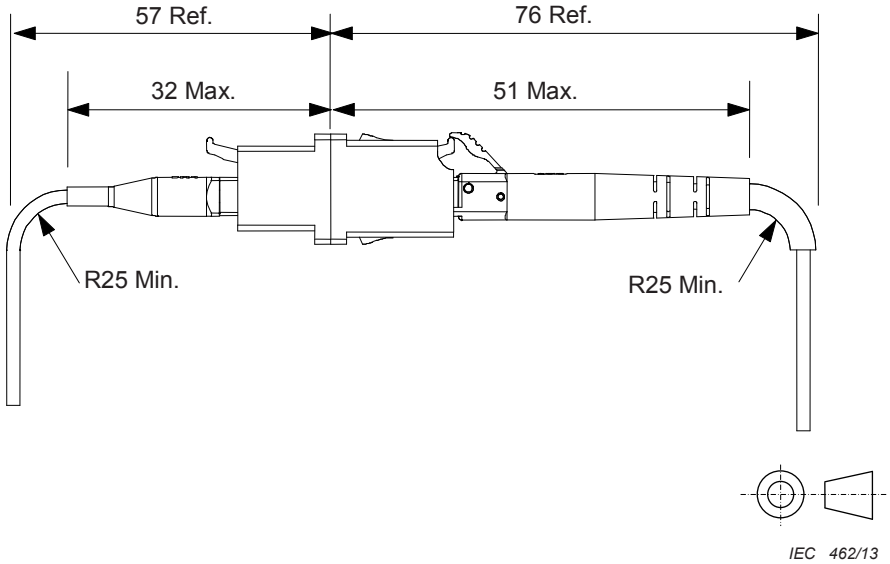
COVER SHEET

Connector sets and interconnect components to be used in optical fibre communication systems – Product specifications

Part 1-1: LC-PC duplex multimode terminated on IEC 60793-2-10 category A1a fibre

Description		Performance	
Coupling mechanism:	latch push-pull	Application:	For use in customer premises IEC category C environment
Configuration:	plug/adaptor/plug	Random mate attenuation:	Grade B_M: 0,60 dB for ≥ 97% and 0,35 dB mean @ 850 nm Grade C_M: 1,0 dB for ≥ 97% and 0.50 dB mean @ 850 nm
Fibre category:	IEC 60793-2-10, category A1a		
Cable type	see Clause 4	Random mate return loss:	≥ 20 dB

Outline and maximum dimensions:



IEC 462/13

FIBRE OPTIC INTERCONNECTING DEVICES AND PASSIVE COMPONENTS – FIBRE OPTIC CONNECTOR PRODUCT SPECIFICATIONS –

Part 1-1: LC-PC duplex multimode connectors terminated on IEC 60793-2-10 category A1a fibre

1 Scope

This International Standard contains the initial, start-of-life dimensional, optical, mechanical and environmental performance requirements which a terminated and assembled multimode resilient alignment sleeve LC-PC duplex connector set (plug/adaptor/plug) should meet in order for it to be categorized as an International Standard product.

Since different variants are permitted, product marking details are given in 3.6.

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 60793-2-10, *Optical fibres - Part 2-10: Product specifications – Sectional specification for category A1 multimode fibres*

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 61300-2-4, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-4: Tests – Fibre/cable retention*

IEC 61300-2-6, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-6: Tests – Tensile strength of coupling mechanism*

IEC 61300-2-12, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-12: Tests – Impact*

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 61300-2-42, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-42: Tests – Static side load for connectors*

IEC 61300-2-44, *Fibre optic interconnecting devices and passive components – Basic test and measurements procedures – Part 2-44: Tests – Flexing of the strain relief of fibre optic devices*

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 61300-3-28, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-28: Examinations and measurements – Transient loss*

IEC 61300-3-34, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-34: Examinations and measurements – Attenuation of random mated connectors*

IEC 62614, *Fibre optics – Launch condition requirements for measuring multimode attenuation*

ISO/IEC 11801, *Information technology – Generic cabling for customer premises*

3 Description

3.1 General

The LC-PC duplex connector is a single position plug connector set of plug/adaptor/plug configuration, characterized by cylindrical, spring loaded butting ferrules of 1,25 mm nominal diameter and a latched push-pull coupling mechanism. The optical alignment mechanism of the connectors is of a resilient sleeve style.

This standard contains the initial, start-of-life dimensional, optical, mechanical and environmental performance requirements which a terminated and assembled multimode resilient alignment sleeve LC-PC duplex connector set (plug/adaptor/plug) needs to meet in order for it to be categorized as an International Standard product.

3.1.1 Intermateability and interoperation

Although all products conforming to the requirements of this standard will inter-mate, the resulting level of random attenuation will be at a common level of performance i.e. the attenuation of a mated pair will be limited by the worst of the two connectors. This will be true, irrespective of the manufacturing source(s) of the product.

A simplex plug can be connected in a duplex adaptor without degrading the level of performance.

3.1.2 Operating environment

The tests selected combined with the severities and durations are representative of an indoor environment typically, but not limited to, that found in generic cabling on commercial premises as defined in ISO/IEC 11801 and specified as IEC category C.

3.1.3 Reliability

Whilst the anticipated service life expectancy of the product in this environment is 10years, compliance with this standard does not guarantee the reliability of the product. This should be predicted using a recognized reliability assessment programme.

3.1.4 Quality assurance

Compliance with this standard does not guarantee the manufacturing consistency of the product. This should be maintained using a recognized quality assurance programme.

3.2 Plug

The plug features a cylindrical zirconia ceramic ferrule and a latched push-pull mechanism. It has a single male key which is used to limit, and may be used to orientate the relative rotation between mated connectors.

A cover (dust cap) to protect the ferrule endface when the connector is in the unmated condition shall be provided.

Alternative materials may be used for the ferrule that have directly compatible material properties to zirconia but the endface and performance requirements shall be met under all conditions.

3.3 Adaptor

The adaptor has a resilient alignment sleeve. The mounting style is a duplex rectangular flange equipped with snap-latches.

Covers (dust caps) shall be provided to protect each port of the adaptor.

3.4 Materials

Materials which are not specified, or which are not specifically described, are left to the discretion of the manufacturer.

3.5 Dimensions

Outline dimensions and other dimensions necessary to ensure intermateability, or which affect performance, are specified. All other dimensions are left to the discretion of the manufacturer. Where the mating face limit dimensions are not in agreement with an IEC interface standard, this is clearly stated.

3.6 Colour and marking

Marking of the product shall be in the following order of precedence:

a) identification of manufacturer;

b) manufacturing date code: year/week;

c) manufacturer's part number;

d) variant identification number.

The colour scheme shown in Table 1 is preferred.

Table 1 – Preferred colour scheme

De-latch housing	Adaptor
Beige	Beige
Black	Black
NOTE The preferred Beige is RAL 1013 and the preferred Black is RAL 9005.	

4 Variants

4.1 Terminated plug

The defined fibre/cable variants are given in Table 2.

Table 2 – Plug fibre / cable variants with fibre category IEC 60793-2-10 Type A1a

Variant number	Fibre/cable mm	Structure	Remarks
A01	Ø 0,8 – 1,0	Buffered fibre	1 fibre
A02	Ø 1,6 – 2,8	Reinforced cable	1 fibre
A03	1,6 – 3,2	Reinforced zip twin cable [a]	2 fibres
[a] Zip twin cables are constructed with two simplex units joined together by a central web.			

4.2 Adaptor

The adaptor variants are given in Table 3.

Table 3 – Adaptor variants

Variant number	Format
A01	Rectangular flange – Duplex
A02	Rectangular flange – Duplex – SC simplex cutout

4.3 Identification of variants

The identification numbers for the fibre/cable variants and adaptor variants with fibre category IEC 60793-2-10 are given in Table 4 and the adaptor variants are given in Table 5.

Table 4 – Identification plug fibre/cable variants with fibre category IEC 60793-2-10

Variant number	Fibre type	Identification number
A01	A1a	IEC 62664-1-1-A01
A02	A1a	IEC 62664-1-1-A02
A03	A1a	IEC 62664-1-1-A03

Table 5 – Adaptor variants

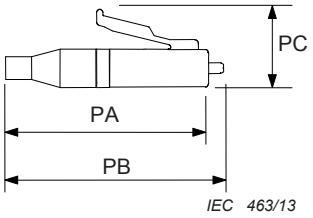
Variant number	Identification number
A01	IEC 62664-1-1 -A01
A02	IEC 62664-1-1 -A02

5 Dimensional requirements

5.1 Outline dimensions

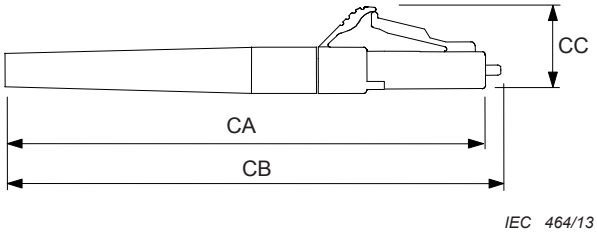
5.1.1 Plug variants

Figure 1 shows the outline dimensions for plug of variant number A01 and A02.



Ref.	Dimensions in millimetres		Remarks
	Min.	Max.	
PA	–	32	
PB	–	34	
PC	–	9,5	

Figure 1a – Variant number: A01



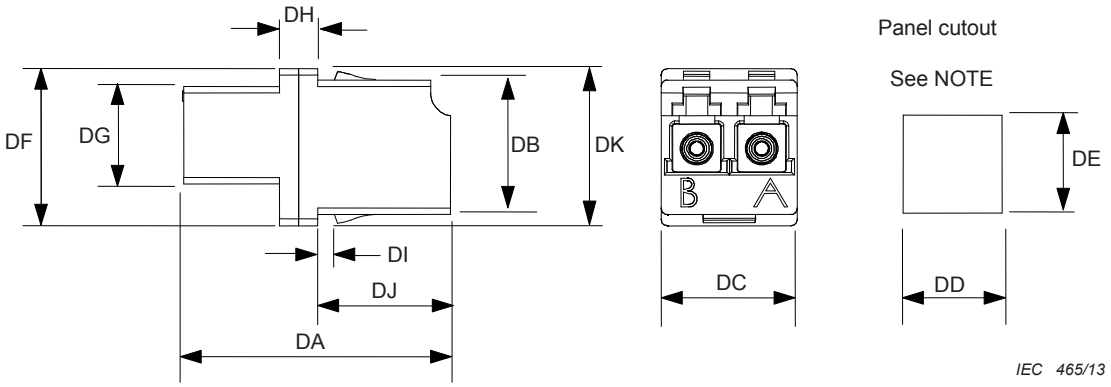
Ref.	Dimensions in millimetres		Remarks
	Min.	Max.	
CA	–	49	
CB	–	51	
CC	–	10,5	

Figure 1b – Variant number: A02, A03

Figure 1 – Outline dimensions – Plug

5.1.2 Adaptor variants

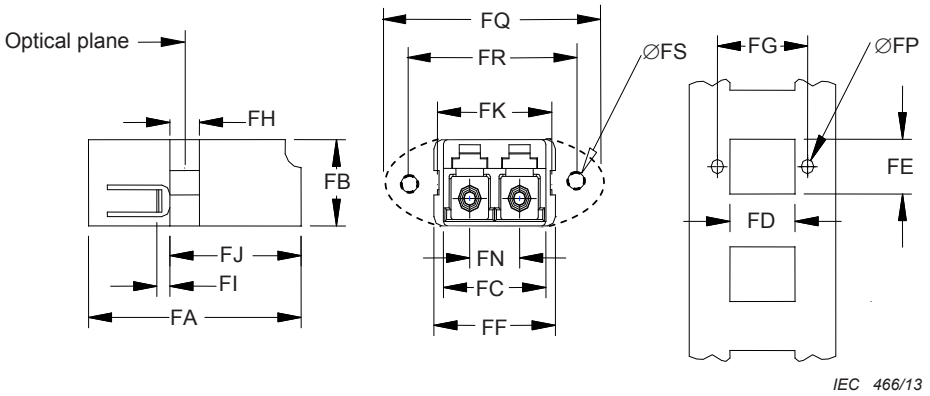
Figure 2 shows the dimensions for adopter of variant number A01.



Ref.	Dimensions in millimetres		Remarks
	Min.	Max.	
DA	25,0	30,0	
DB	13,0	13,1	
DC	13,0	13,1	
DD	13,2	13,4	
DE	13,2	13,4	
DF	–	15,3	
DG	–	10,1	
DH	–	3,8	
DI	1,7	2,0	
DJ	12,6	12,9	
DK	13,15	13,3	
NOTE Panel Cut Out: Panel thickness should be between 1,0 and 1,7mm.			

Figure 2 – Outline dimensions – Adaptor (variant number: A01)

Figure 3 shows the dimensions for duplex adaptor SC cutout of variant number A02.



Ref.	Dimensions in millimetres		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
FN	6.25		Basic dimension
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 cut out: Panel thickness should be between 1,0 mm and 1,7mm.			

Figure 3 – Duplex adaptor SC cutout – (variant number: A02)

5.2 Mating face and other limit dimensions

5.2.1 Plug

Figure 4 shows the reference planes for plug connector.

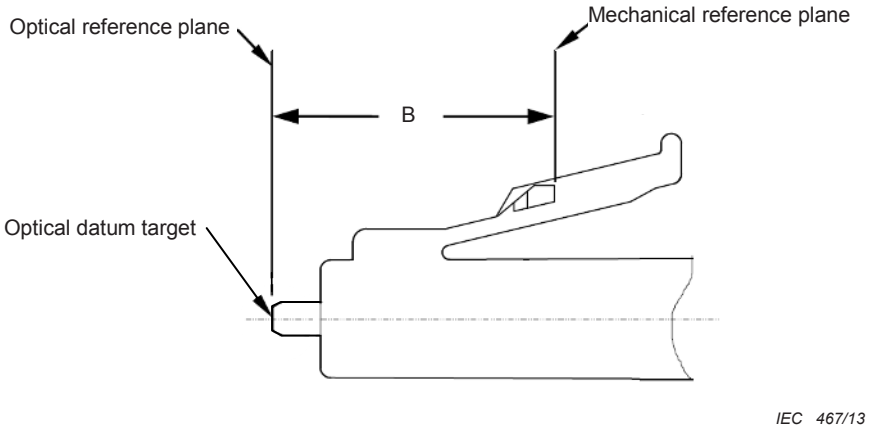


Figure 4 – Plug connector interface reference planes

Figure 5 shows simplex plug connector interface and Figure 6 shows duplex plug connector interface.

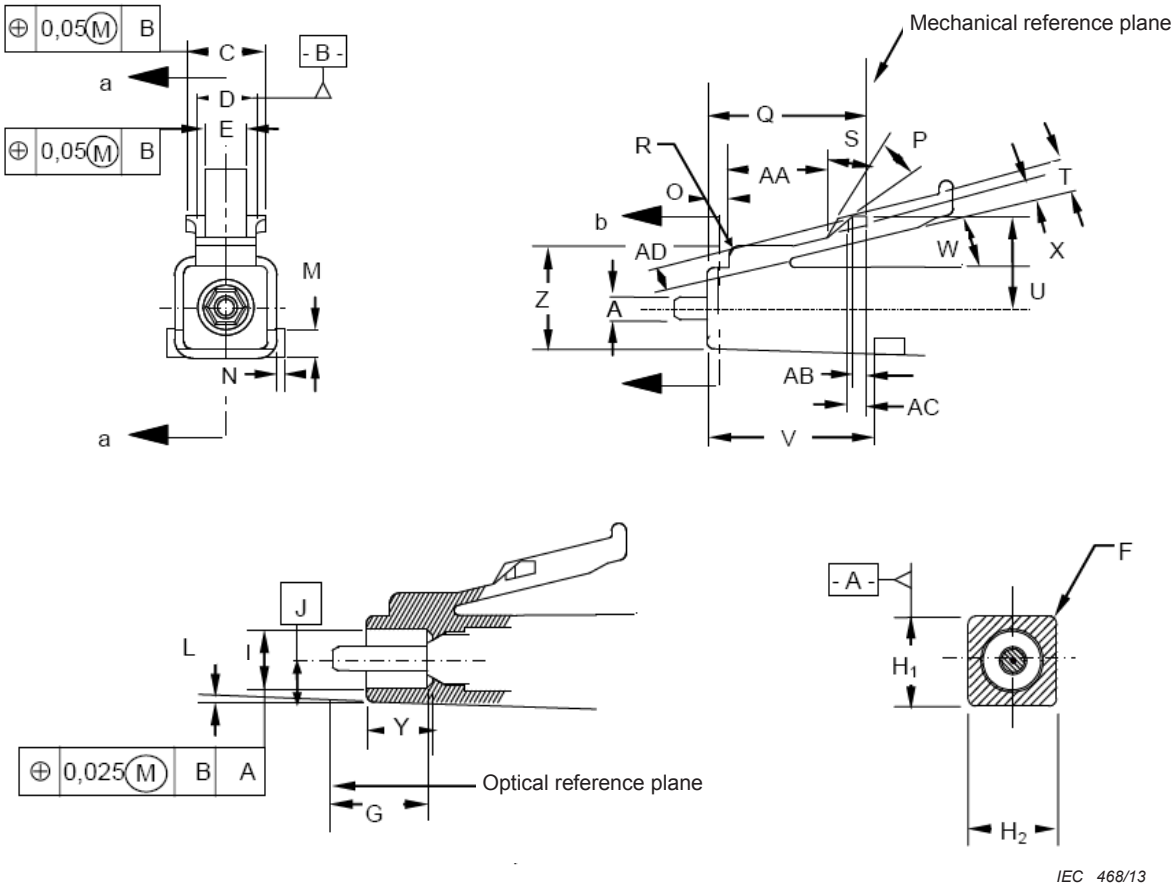


Figure 5 – Plug connector interface

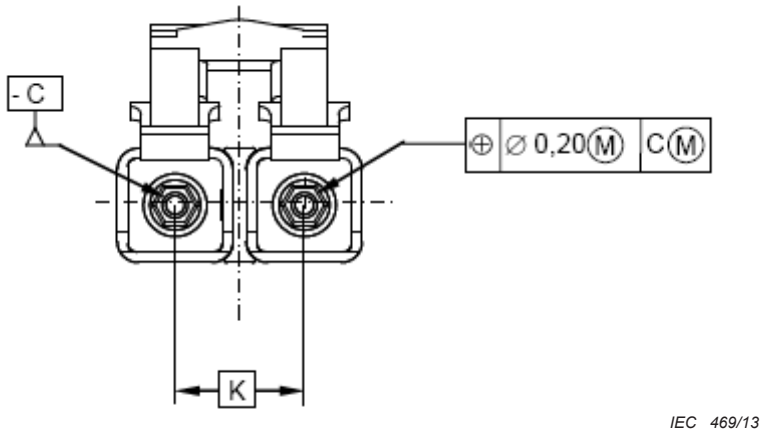


Figure 6 – Duplex plug interface

Table 6 shows the dimensions of the plug connector interface.

Table 6 – Dimensions of the plug connector interface

Ref.	Dimensions in millimetres		Remarks
	Min.	Max.	
A	1,2485	1,2495	Diameter
B	10,3	10,5	a)
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	4,42	4,52	d)
H_2	4,42	4,52	d)
I	3,0	3,2	Diameter
J	H/2		Basic dimension
K	6,25		Basic dimension
L[d]	–	0,2	Degrees d)
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	–	
W	14		Degrees, typical
X	0,5	0,7	
Y	3,3	–	

Ref.	Dimensions in millimetres		Remarks
	Min.	Max.	
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	

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.

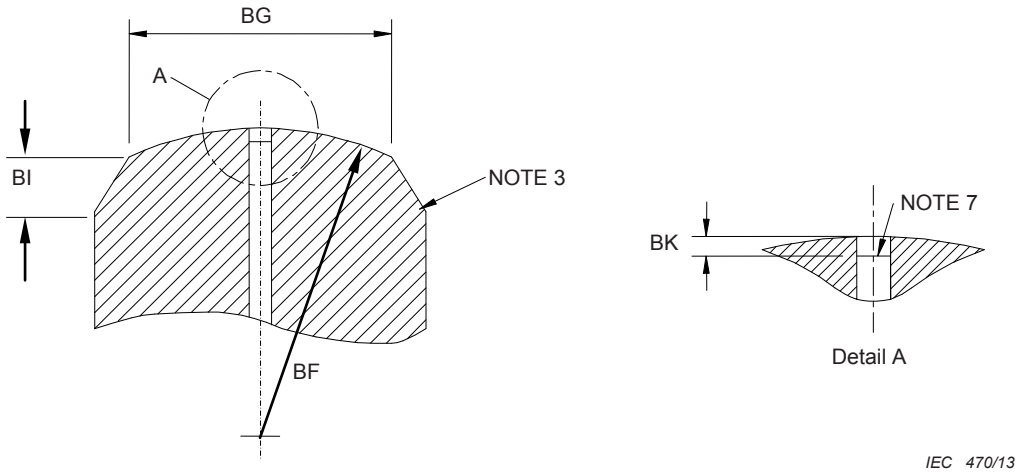
c) These dimensional requirements apply to the finished ferrule, after all polishing procedures have been completed.

d) Taper, dimension L, is applied to the surfaces associated with dimensions/features 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.

5.2.2 Ferrule endface geometry after termination

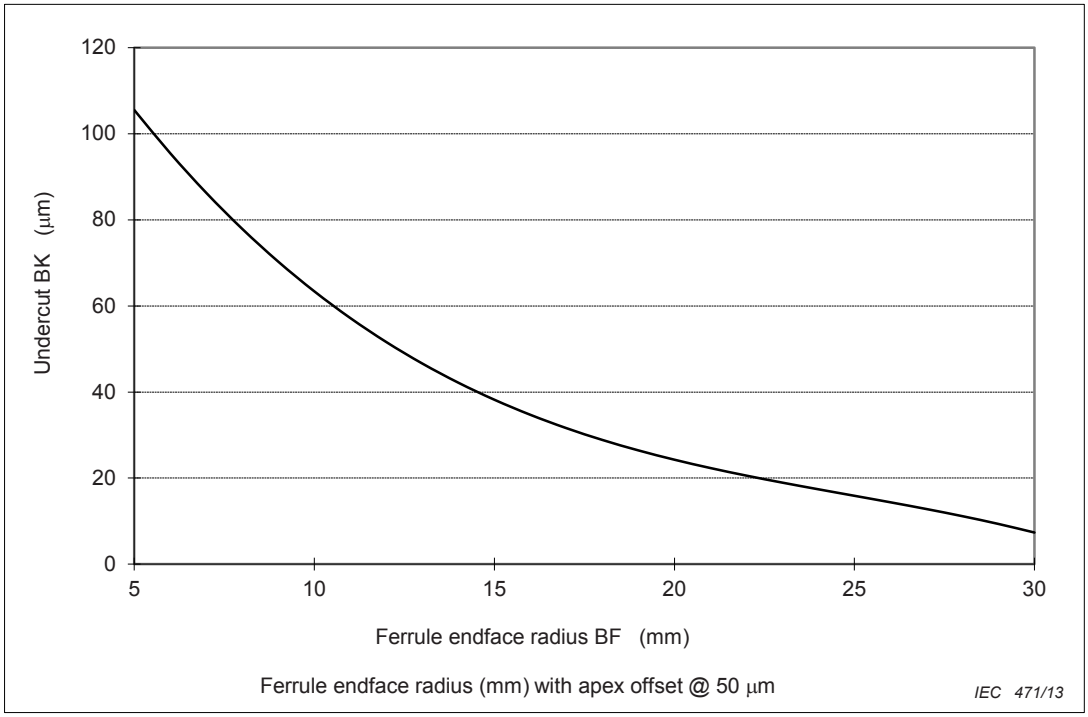
Figure 7 shows the ferrule endface geometry after termination.



Ref.	Dimensions in millimetres		Remarks
	Min.	Max.	
BG	0,60	0,85	Diameter
BI	–	1,0	
BK	-0,000 1	Figure 8	1,3
BF	5,0	30,0	

Figure 7 – Ferrule endface geometry – After termination

Figure 8 shows Allowable undercut BK versus ferrule end face radius BF after termination of the ferrule end face geometry.



NOTE 1 For the value of BF from 5 mm ≤ BF ≤ 30 mm the undercut BK is BK = –0,007 6(BF^3) + 0,567(BF^2) – 15,603(BF) + 170,33.

NOTE 2 Dome eccentricity of the spherically polished endface is less than 50 μm.

NOTE 3 The negative dimension refers to fibre protrusion.

NOTE 4 Dimension BK is measured in accordance with IEC 61300-3-23.

NOTE 5 Visual examination is in accordance with IEC 61300-3-35.

Figure 8 – Ferrule endface geometry – Allowable undercut BK versus ferrule endface radius BF (after termination)

5.2.3 Adaptor

Figure 9 shows the adaptor interface.

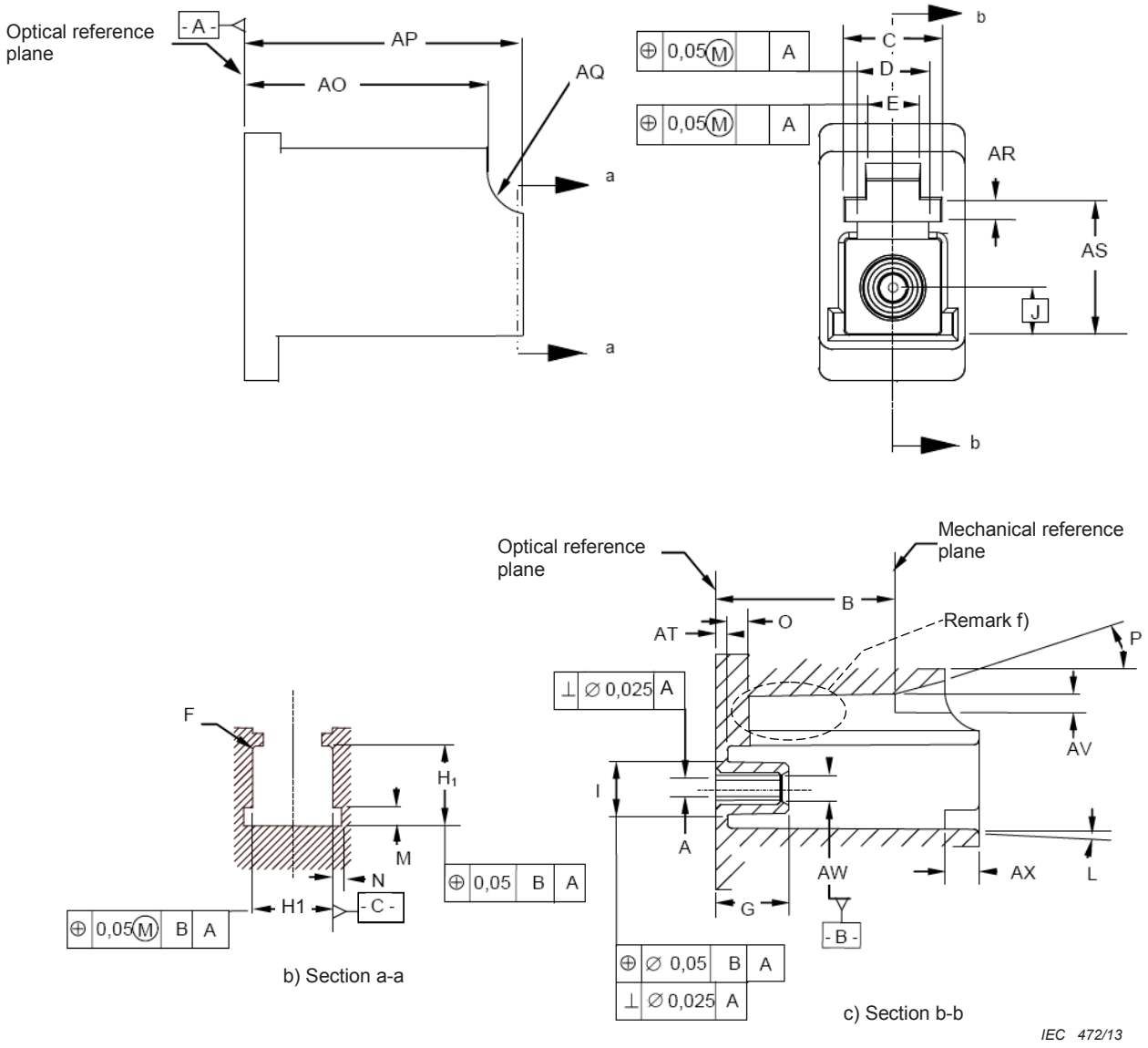


Figure 9 – Adaptor interface

Figure 10 shows the junior (Jr) adaptor interface.

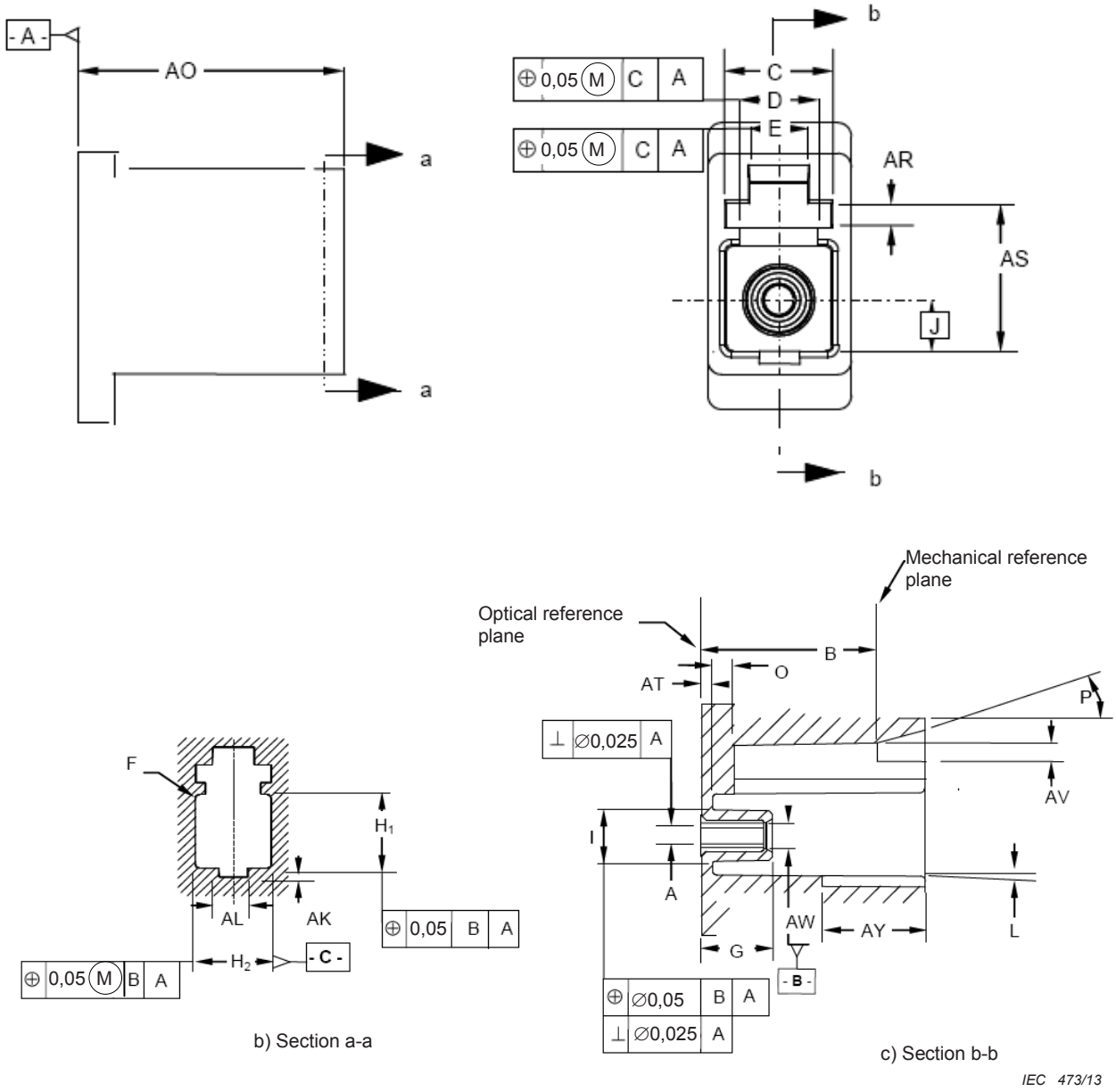


Figure 10 – Junior (Jr) Adaptor interface (optional – Note e) of Table 7)

Figure 11 shows the duplex adaptor interface.

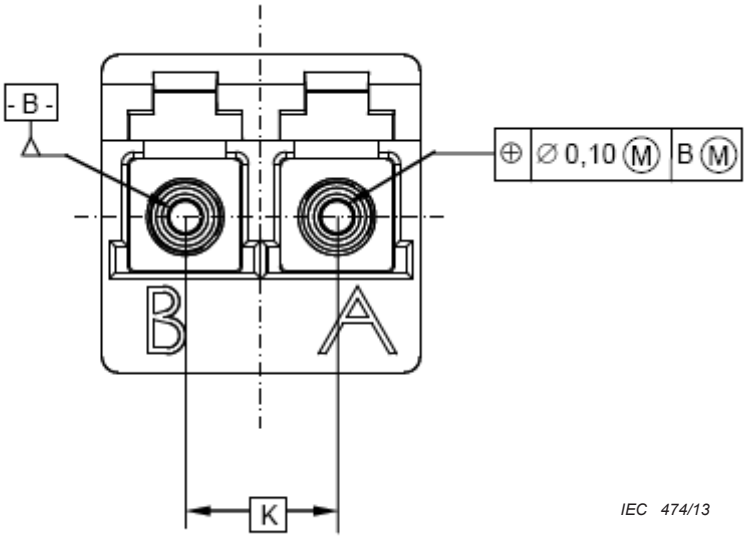


Figure 11 – Duplex adaptor interface

Table 7 shows the dimensions of the adaptor connector interface.

Table 7 – Dimensions of the adaptor connector interface *(1 of 2)*

Ref.	Dimensions in millimetres		Remarks
	Min.	Max.	
A	–	–	Diameter [a), b), c)]
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	–	0,2	Degrees [d)]
M	1,0	1,1	
N	0,5	0,6	
O	–	1,3	
P	15		Degrees, typical
AK	0,5	0,6	
AL	1,7	1,8	
AO	11,1	12,8	
AP	14,5	14,7	
AQ	2,2	2,4	Radius
AR	1,1	1,2	
AS	6,6	6,8	

Table 7 *(2 of 2)*

Ref.	Dimensions in millimetres		Remarks
	Min.	Max.	
AT	0,6	0,7	Diameter
AV	1,0	1,1	
AW	1,4	1,5	
AX	1,9	–	
AY	5,3	5,4	

a) The connector alignment feature is a resilient (split) alignment sleeve that can either be fixed or floating. 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 shall 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 shall accept a pin gauge to the centre of the adaptor with a force of 1,0 N to 2,5 N, on 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 1,249 0 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) Each of the units in the duplex adaptor shall comply with all of dimensions of Figures 9, 10,and 11

d) Taper, dimension L, is applied to the surfaces associated with dimensions/features H_1 and H_2.

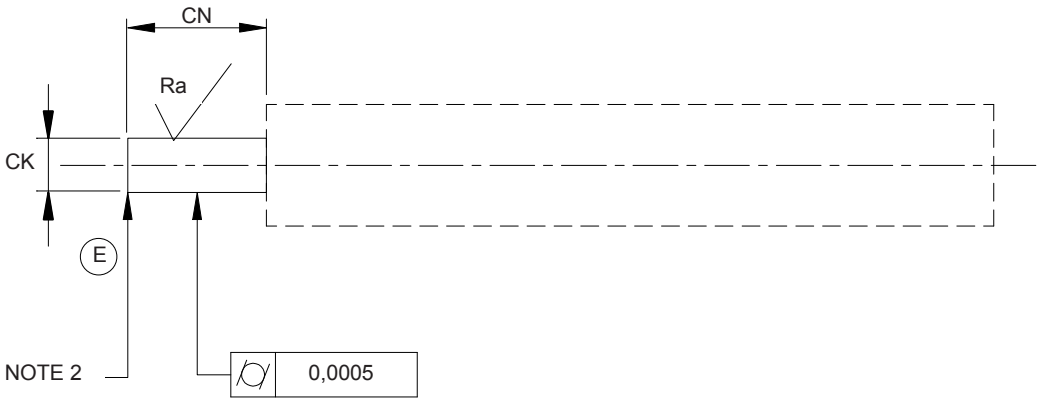
e) The Jr. adaptor configuration is optional for one half of an adaptor. The distance from the optical plane to the mechanical plane (dimension B) is the same for all adaptors and receptacles. The Jr. configuration does not use feature/dimension AP. The Jr. side of the adaptor is ONLY for protected environments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

f) This area may be filled in some adaptors, receptacles, attenuators and other devices.

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 with this standard.

5.2.4 Pin gauge for adaptor

Figure 12 shows the dimensions of the pin gauge for adaptor.



Ref.	Dimensions in millimetres		Remarks
	Min.	Max.	
CK	1,248 8	1,249 2	Diameter, a)
CN	4,2	15	
Ra	–	0,000 20	

a) A chamfer or radius is allowed to a maximum depth of 0,5 mm from the gauge endface.

b) Envelope condition in accordance with ISO 8015.

Figure 12 – Pin gauge for adaptor

6 Tests

6.1 Sample size

For the purpose of this document a specimen is defined as a duplex plug/adaptor/plug connector set.

All specimens shall be randomly selected.

The sample size and product sourcing requirements are given in Annex B.

The length of cable (or fibre) on each side of the connector set shall be at least 3 m.

6.2 Test and measurement methods

All tests and measurements have been selected from IEC 61300 series.

Attenuation change is defined as the difference between the maximum and minimum values of attenuation measured during the test.

No deviation from the specified test method is allowed.

6.3 Test sequence

All products shall be subjected to endface geometry and tests 1 and 2 following which there is no defined sequence in which tests 2 to 15 (see Annex B) should be run. All adaptors shall be subject to test 0 (see Annex B).

6.4 Pass/fail criteria

A product will have met the requirements of this standard provided no failures occur in any test. In the event of a failure occurring, the test shall be re-run using a sample size double that of the original. Each test may only be repeated once. In case a test has to be repeated twice, the product fails to meet the requirements of this standard.

7 Test report

A fully documented test report and supporting data of all original and re-run tests shall be available for inspection as evidence that the tests described in Clause 8 have been carried out in accordance with this standard.

8 Performance requirements

8.1 Dimensional and marking requirements

Dimensions and marking, including any associated spring and gauge force, of the product shall be in accordance with the requirements of 3.6 and Clause 5, and shall be measured using the appropriate IEC test method.

8.2 Performance requirements

Table 8 shows the optical, mechanical and environmental performance requirements. Test Nos. 0 to 2 are the tests for optical performance requirements. Test Nos. 3 to No.11 are the tests for mechanical performance requirements. Test Nos.12 to No.15 are the tests for environmental performance requirements.

Table 8 – Performance requirements *(1 of 6)*

No.	Test	Requirement	Details	
0	Adaptor attenuation	≤ 0,1 dB	Method:	IEC 61300-3-42: measured with sleeve in 8 positions between 2 reference connectors
1	Attentuation (random mate)	97 % ≤ 0,60 dB Mean ≤ 0,35 dB	Method: Peak wavelength: Source stability: Detector linearity: Launch fibre length: Modal condition: Pre-conditioning procedure:	IEC 61300-3-34 (850 ± 30) nm Source output power shall not vary more than ± 0,02 dB from its initial power over the measuring period or at least 1 h. Within ≤ ± 0,02 dB over the dynamic range to be measured. ≥ 3 m In accordance with Annex C In accordance with Annex C. Clean plug and adaptor according to manufacturer's instructions
2	Return loss (random mate)	≥ 20 dB	Method: Source type: Peak wavelength: Source stability: Detector linearity: Launch fibre length: Pre-conditioning procedure:	IEC 61300-3-6, Method 2 LD (850 ± 30) nm Source output power shall not vary more than ± 0,1 dB from its initial power over the measuring period or at least 1 h. Within ≤ ± 0,1 dB over the dynamic range to be measured. ≥ 3 m Clean plug and adaptor according to manufacturer's instructions

Table 8 *(2 of 6)*

No.	Test	Requirement	Details	
3	Strength of coupling mechanism	Attenuation: Initial and final attenuation: ≤ 0,75 dB Max. change during Test: ≤ 0,20 dB Max. change before and after test: ≤ 0,20 dB Return loss: During test: ≥ 20 dB	Method: Magnitude of load: Duration of the load: Rate of application of the load: Point of application of the load: Specimen optically functioning: Measurements required: Sampling rate: Pre-conditioning procedure:	IEC 61300-2-6 40 N 1 min Max. 2 N/s 0,2 m from rear of plug. Yes Before, during and after the test (5 min recovery period). Measurements shall be made after the load has been maintained at its max. level for at least 30 s. Clean plug and adaptor according to manufacturer's instructions
4	Mating durability	Attenuation: Initial and final attenuation: ≤ 0,75 dB Max. change during test: ≤ 0,20 dB Max. change before and after test: ≤ 0,20 dB Return loss: During test: ≥ 20 dB	Method: Mechanism to be cycled: Number of cycles: Specimen optically functioning: Measurements required: Pre-conditioning procedure:	IEC 61300-2-2 Plug-adaptor 500 Yes After every mating. Clean plug and adaptor according to manufacturer's instructions as necessary but not more than 25 times
5	Vibration (sinusoidal)	Attenuation: Initial and final attenuation: ≤ 0,75 dB Max. change during test: ≤ 0,20 dB Max. change before and after test: ≤ 0,20 dB Return loss: During test: ≥ 20 dB	Method: Frequency range: Vibration Amplitude: Duration/axis: No. of axes: Specimen optically functioning: Measurements required: Pre-conditioning procedure:	IEC 61300-2-1 10 – 55 Hz at 1octave/min 0,75 mm 30 min 3, orthogonal Yes Before, during and after test (Max. sampling interval shall be 2 ms according 61300-3-28 transient loss). Clean plug and adaptor according to manufacturer's instructions

Table 8 *(3 of 6)*

No.	Test	Requirement	Details	
6	Flexing of strain relief of fibre optic device	Attenuation: Initial and final attenuation: ≤ 0,75 dB Max. change during test: ≤ 0,20 dB Max. change before and after test: ≤ 0,20 dB Return loss: During test: ≥ 20 dB	Method: Magnitude of the load Point of application of the load: Method of mounting: Number of flex cycles Direction of flex: Specimen optically functioning: Measurements required: Sampling rate: Pre-conditioning procedure:	IEC 61300-2-44 2 N 0,5 m from rear of plug. An adapter shall be mounted rigidly to the mounting fixture. 100 X and Y direction Yes Before, during (continuous) and after the test. Maximum sampling interval shall be 2 ms by means of transient loss 61300-3-28. Clean plug and adapter according to manufacturer's instructions
7	Impact	Attenuation: Initial and final attenuation: ≤ 0,75 dB Max. change before and after test: ≤ 0,20 dB Return loss: During test: ≥ 20 dB	Method: Number of drops: Drop height: Specimen optically functioning: Measurements required: Pre-conditioning procedure:	IEC 61300-2-12, Method A 5 1,5 m No (specimen shall be unmated during impact test) Before and after the test. Fit dust cap. Clean plug and adaptor according to manufacturer's instructions.

Table 8 *(4 of 6)*

No.	Test	Requirement	Details	
8	Fibre/cable retention	Attenuation: Initial and final attenuation: ≤ 0,75 dB Max. change during test: ≤ 0,20 dB Max. change before and after test: ≤ 0,20 dB Return loss: During test: ≥ 20 dB	Method: Magnitude and rate of application of the tensile force: Point of application of the load: Duration of max. load: Specimen optically functioning: Measurements required: Pre-conditioning procedure:	IEC 61300-2-4 Var. A01 / B01: 5 N ± 0,5 N at 0,5 N/s Var. A02 – A03 / B02 – B03: 50 N ± 2 N at 5 N/s Var. A01 / B01: 0,3 m from plug. Var. A02 – A03 / B02 – B03: On strength member 0,3 m from plug. The connector shall be rigidly mounted such that the load is applied to the fibre/cable retention mechanism and not to the coupling mechanism. 2 min at 50 N 1 min at 5 N Yes Before, during (continuous) and after the test (5 min recovery period). Measurements shall be made after the load has been maintained at its max. level for at least 30 s. Clean plug and adaptor according to manufacturer's instructions
9	Static side load	Attenuation: Initial and final attenuation: ≤ 0,75 dB Max. change during test: ≤ 0,20 dB , Max. change before and after test: ≤ 0,20 dB Return loss: During test: ≥ 20 dB	Method: Magnitude of the load: Point of application of the load: Method of mounting: Duration of load: Specimen optically functioning: Measurements required: Pre-conditioning procedure:	IEC 61300-2-42 1 N (90° to plug axis) 0,2 m behind rear of plug. The socket shall be mounted rigidly to the mounting fixture. 60 min Yes Before, during (< 3 min) and after the test. Clean plug and adaptor according to manufacturer's instructions
10	Ferrule compression force	5,0 ≤ Force ≤ 6.0 N Values for buffered fibres only, different cord constructions can result in higher forces	Method: Dimension B is moved to the range 9,8 mm to 10,0 mm while the force is monitored. Point of application of the load: Method of mounting: Specimen optically functioning:	IEC 61300-3-22 Var. A01 / B01 only: Tip of ferrule The plug shall be mounted rigidly to the tensile tester. No

Table 8 *(5 of 6)*

No.	Test	Requirement	Details	
11	Ferrule withdrawal force	1,0 ≤ Force ≤ 2,5 N	Method: Gauge pins are inserted to touch in the middle of the sleeve Withdrawal force is monitored. Point of application of the load: Method of mounting: Specimen optically functioning: Pre conditioning:	IEC 61300-3-33 Between the 2 gauges Swivel joints to apply load to sample. No Clean inside of sleeve and outside of gauges with lint free wipes
12	Cold	Attenuation at (850 ± 30) nm: ≤ 0,20 dB change (peak to peak) Return loss: During test: ≥ 20 dB	Method: Temperature: Duration of exposure: Specimen optically functioning: Measurements required: Pre-conditioning procedure: Recovery procedure:	IEC 61300-2-17 –10 °C 96 h Yes Before, during (Max. interval 1 h) and after the test. Clean plug and adaptor according to manufacturer's instructions. 2 h at normal ambient conditions
13	Dry heat	Attenuation at (850 ± 30) nm: ≤ 0,20 dB change (peak to peak) Return loss: During test: ≥ 20 dB Strength of coupling mechanism (Test 3 shall be performed on completion of test after recovery procedure).	Method: Temperature: Duration of exposure: Specimen optically functioning: Measurements required: Pre-conditioning procedure: Recovery procedure:	IEC 61300-2-18 +60 °C 96 h 96 h Yes Before, during (Max. interval 1 h) and after the test. Clean plug and adaptor according to manufacturer's instructions. 2 h at normal ambient conditions.

Table 8 *(6 of 6)*

No.	Test	Requirement	Details	
14	Damp heat (steady state)	Attenuation at (850 ± 30) nm: ≤ 0,20 dB change (peak to peak) Return loss: During test: ≥ 20 dB	Method: Temperature: Relative humidity: Duration of exposure: Specimen optically functioning: Measurements required: Pre-conditioning procedure: Recovery procedure:	IEC 61300-2-19 +40 °C 93 % 96 h Yes Before, during (Max. interval 1 h) and after the test. Clean plug and adaptor according to manufacturer's instructions. 2 h at normal ambient conditions
15	Change of temperature	Attenuation initial and final attenuation at (850 ± 30) nm: ≤0.75dB max change in attenuation during the test: ≤ 0,20 dB change (peak to peak) for pigtails ≤ 0,50 dB change (peak to peak) for patchcords Return loss: During test: ≥ 20 dB	Method: Low temperature: High temperature: Duration at temperature extreme: Rate of change of temperature: Number of cycles: Specimen optically functioning: Measurements required: Pre-conditioning procedure: Recovery procedure:	IEC 61300-2-22 - 10 °C + 60 °C 1 h 1 °C/min 5 Yes Before, during (Max. interval 10 min) and after the test. Clean plug and adaptor according to manufacturer's instructions. 2 h at normal ambient conditions.

Annex A
(informative)

Reference connector details

Table A.1 shows the details for reference connector.

Table A.1 – Details for reference connector

Items	Parameter
Ferrule outer diameter	1,249 0 ± 0,000 5
Eccentricity of fibre core centre of ferrule centre	≤ 2,3 μm
Eccentricity of spherically polished ferrule endface	≤ 50 μm
Visual examination of fibre endface with ≥ 200 magnification	No defects in core zone
Attenuation between two reference plugs	≤ 0,1 dB

Annex B
(normative)

Sample size and product sourcing requirements

Table B.1 gives sample size and product sourcing requirements.

Table B.1 – Sample size and product sourcing requirements

No.	Test	Sample size		Source
		Plug	Adaptor	
N/A	Endface geometry	All		New and after all tests are completed
N/A	Dimensional	10	10	New
0	Adaptor attenuation (between matched reference)	NA	20	New
1	Attenuation (random mate)	40	20	New
2	Return loss (random mate)	20	10	Test 1
3	Vibration (sinusoidal)	4	2	Test 1
4	Durability	4	2	Test 1
5	Fibre/cable retention	4	2	Test 1
6	Strength of coupling mechanism	4	2	Test 1
7	Impact	4	2	Test 1
8	Flexing of strain relief of fibre optic device	4	2	
9	Static side load	4	2	Test 1
10	Ferrule compression force	4		
11	Gauge retention force		4	Test 1
12	Cold	4	2	Test 1
13	Dry Heat – High temperature endurance	4	2	Test 1
14	Damp heat (steady state) – Pigtails	4	2	Test 1
15	Change of temperature – pigtails – patch cords	 4 2	 2 4	Test 1

The tests described in Table B.1 are intended to be performed individually in any order on produced sources as defined. Products from previous tests may be used, in which case the quantity of samples in test 1 will be reduced.

Annex C
(normative)

Requirements of the launch modal condition

The measured encircled flux of the launch modal condition at the output of the “reference” connector during the attenuation measurements shall be within the upper and lower bounds as specified in Table C.1.

Table C.1 – Normative EF requirements for 50 μm core fibre at 850 nm

EF tolerance range – 50μm, 850 nm, 2X+5X			
Radial offset μm	**EF lower bound**	**Target**	**EF upper bound**
20	0,894 8	0,909 7	0,924 7
22	0,964 5	0,970 6	0,976 7

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