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INTERNATIONAL STANDARD

Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces –
Part 7: Type MPO connector family

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

Part 7: Type MPO connector family

FOREWORD

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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 MPO connectors.

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International Standard IEC 61754-7 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

This third edition cancels and replaces the second edition published in 2004. This third edition constitutes a technical revision.

Specific technical changes involve the addition of an aligned key adaptor interface definition to address all existing MPO applications.

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

CDV	Report on voting
86/2581/CDV	86/2672/RVC

Full information on the voting for the approval of this standard 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.

A list of all the parts in the IEC 61754 series, under the general title *Fibre optic interconnecting devices and passive components – fibre optic connector interfaces,* can be found on the IEC website.[1]

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

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

1 This new extended title will be applied to other parts of IEC 61754 as and when they are re-issued.

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

Part 7: Type MPO connector family

1 Scope

This part of IEC 61754 defines the standard interface dimensions for type MPO family of connectors.

2 Description

The parent connector for type MPO connector family is a multiway plug connector characterized by a rectangular ferrule normally 6,4 mm × 2,5 mm which utilizes two pins of 0,7 mm diameter as its alignment. It is applicable to a joint of multiple fibres up to 12 fibres by arraying them between two pin-positioning holes in the ferrule. Furthermore, it is capable of joining up to 24 fibres by arraying them with a two layer arrangement. The connector includes a push-pull coupling mechanism and a ferrule spring loaded in the direction of the optical axis. The connector 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.

Connector interfaces are configured using a female plug without pins, a male plug with pins fixed and an adaptor as shown in Figure 1. The female plug is intermateable with the male plug.

Moreover, connector interfaces between the female plug and the male plug are configured by applying a backplane housing and a printed board housing instead of the adaptor.

3 Interfaces

This standard contains the following standard interfaces:

Interface 7-1: MPO female plug connector angled interface – Push/pull consisting of:
- Interface 7-1-1 for 2 to 12 fibres
- Interface 7-1-2 for 16 to 24 fibres

Interface 7-2: MPO male plug connector angled interface – Push/pull consisting of:
- Interface 7-2-1 for 2 to 12 fibres
- Interface 7-2-2 for 16 to 24 fibres

Interface 7-3: MPO adaptor interface – Push/pull

Interface 7-4: MPO female plug connector flat interface – Push/pull consisting of:
- Interface 7-4-1 for 2 to 12 fibres
- Interface 7-4-2 for 16 to 24 fibres

Interface 7-5: MPO male plug connector flat interface – Push/pull consisting of:
- Interface 7-5-1 for 2 to 12 fibres
- Interface 7-5-2 for 16 to 24 fibres

Interface 7-6: MPO backplane housing interface – Self-retaining

Interface 7-7: MPO printed board housing interface – Self-retaining

Interface 7-8: MPO adaptor interface – Push/pull, aligned key configuration

The following standards are intermateable:

Female plugs	Adaptors/housings	Male plugs
7-1-1	7-3	7-2-1
7-1-2	7-3	7-2-2
7-4-1	7-3 and 7-8	7-5-1
7-4-2	7-3 and 7-8	7-5-2
7-1-1	7-6 and 7-7	7-2-1
7-1-2	7-6 and 7-7	7-2-2
7-4-1	7-6 and 7-7	7-5-1
7-4-2	7-6 and 7-7	7-5-2

NOTE Connector interfaces among 2 to 12 fibres will intermate and will correctly align the lower defined numbers of optical datum targets. Also connector interfaces among 16 to 24 fibres will intermate and will correctly align the lower defined numbers of optical datum targets.

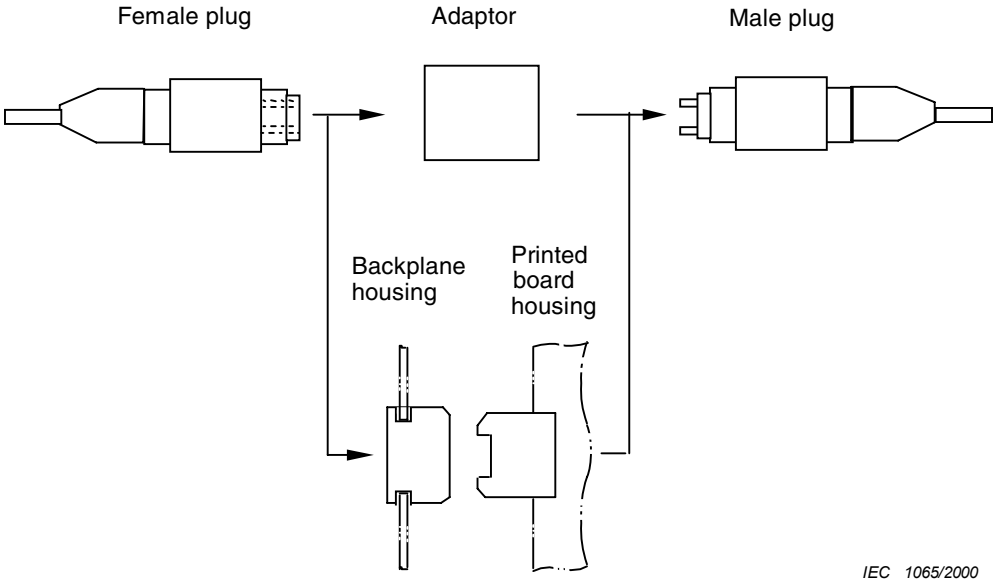


Figure 1 – MPO connector configurations

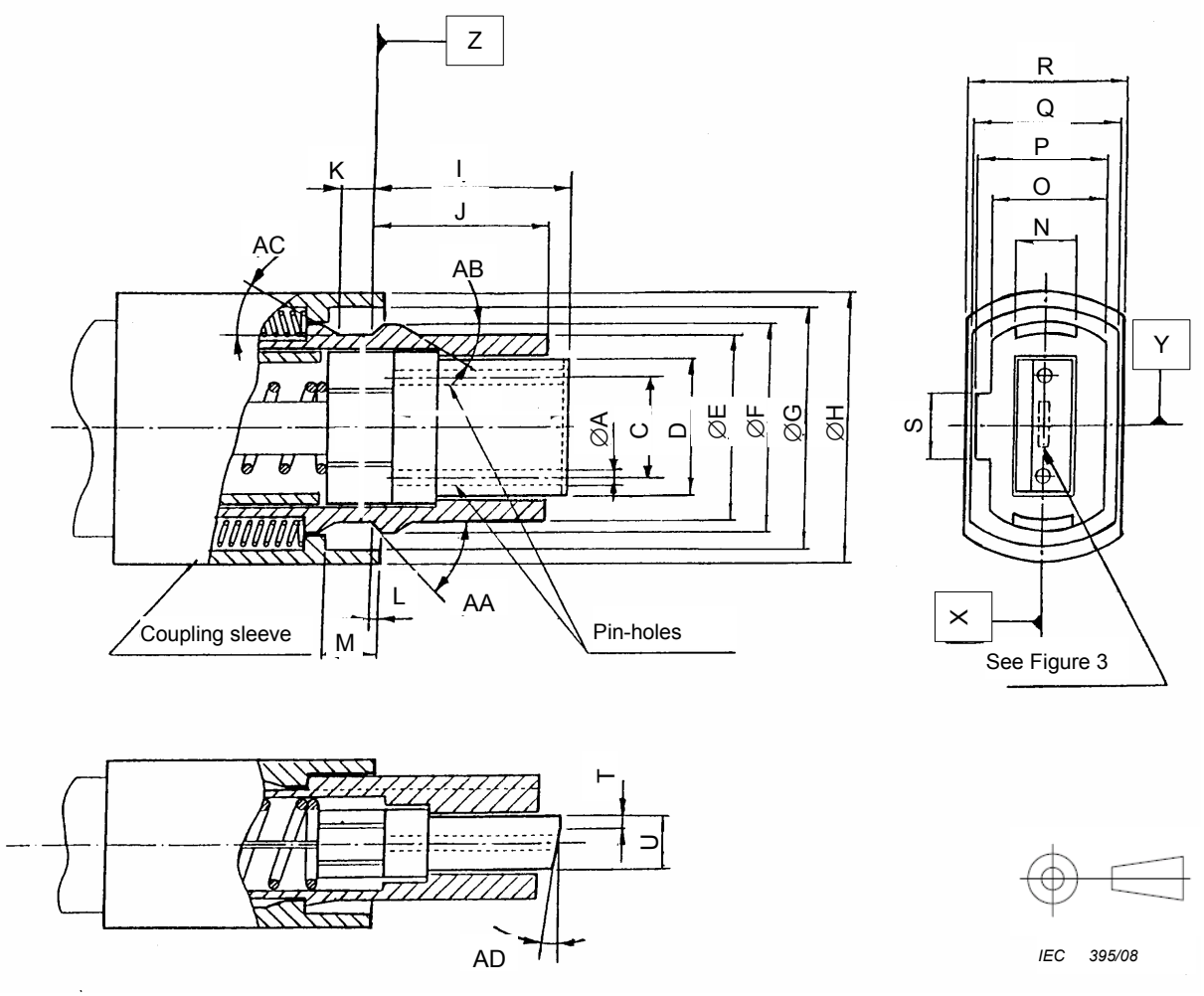


Figure 2 – MPO female plug connector angled interface

Table 1 – Dimensions of the MPO female plug connector angled interface

Reference	Dimensions		Notes
	Minimum	Maximum	
A	0,699 mm	0,701 mm	1
C	4,597 mm	4,603 mm	2
D	6,3 mm	6,5 mm	
E	8,34 mm	8,54 mm	
F	9,49 mm	9,59 mm	
G	10,85 mm	11,05 mm	
H	12,19 mm	12,59 mm	
I	8,8 mm	9,2 mm	3
J	7,9 mm	8,1 mm	
K	1,4 mm	–	
L	0,2 mm	0,8 mm	4 and 5
M	2,4 mm	2,6 mm	
N	2,8 mm	3,0 mm	
O	4,89 mm	4,99 mm	
P	5,59 mm	5,69 mm	
Q	5,7 mm	–	
R	–	7,7 mm	
S	2,9 mm	3,1 mm	
T	–	0,8 mm	
U	2,4 mm	2,5 mm	
AA	42°	45°	
AB	–	45°	
AC	–	45°	
AD	7,5°	8,5°	

NOTE 1 Each pin-hole must accept a gauge pin as shown in Figure 4 to a depth of 5,5 mm with a maximum force of 1,7 N. In addition, two pin-holes of a plug must accept a gauge as shown in Figure 5 to a depth of 5,5 mm with a maximum force of 3,4 N.

NOTE 2 Dimension C is defined as the distance between two pin-hole centres.

NOTE 3 Dimension I is given for a fibre endface centre of a plug end when not mated. It is noticed that a ferrule is movable by a certain axial compression force, and therefore dimension I is variable. Ferrule compression force must be 7,8 N to 11,8 N when a position of the fibre endface from the datum Z is in the range of 8,2 mm to 8,4 mm.

NOTE 4 Coupling sleeve must be movable by a certain axial compression force. Dimension L is given for a coupling sleeve end when not mated. Coupling sleeve compression force must be 2,9 N to 6,9 N when a position of the coupling sleeve endface from datum Z is in the range of 0 mm to 0,1 mm to the right or to the left of datum Z.

NOTE 5 An adaptor coupling part must be unlocked by a left-direction movement of a coupling sleeve, when it is separate from an adaptor. When the coupling sleeve is moved for unlocking, a position of the coupling sleeve endface must be larger than 2,0 mm in the left direction from the datum Z.

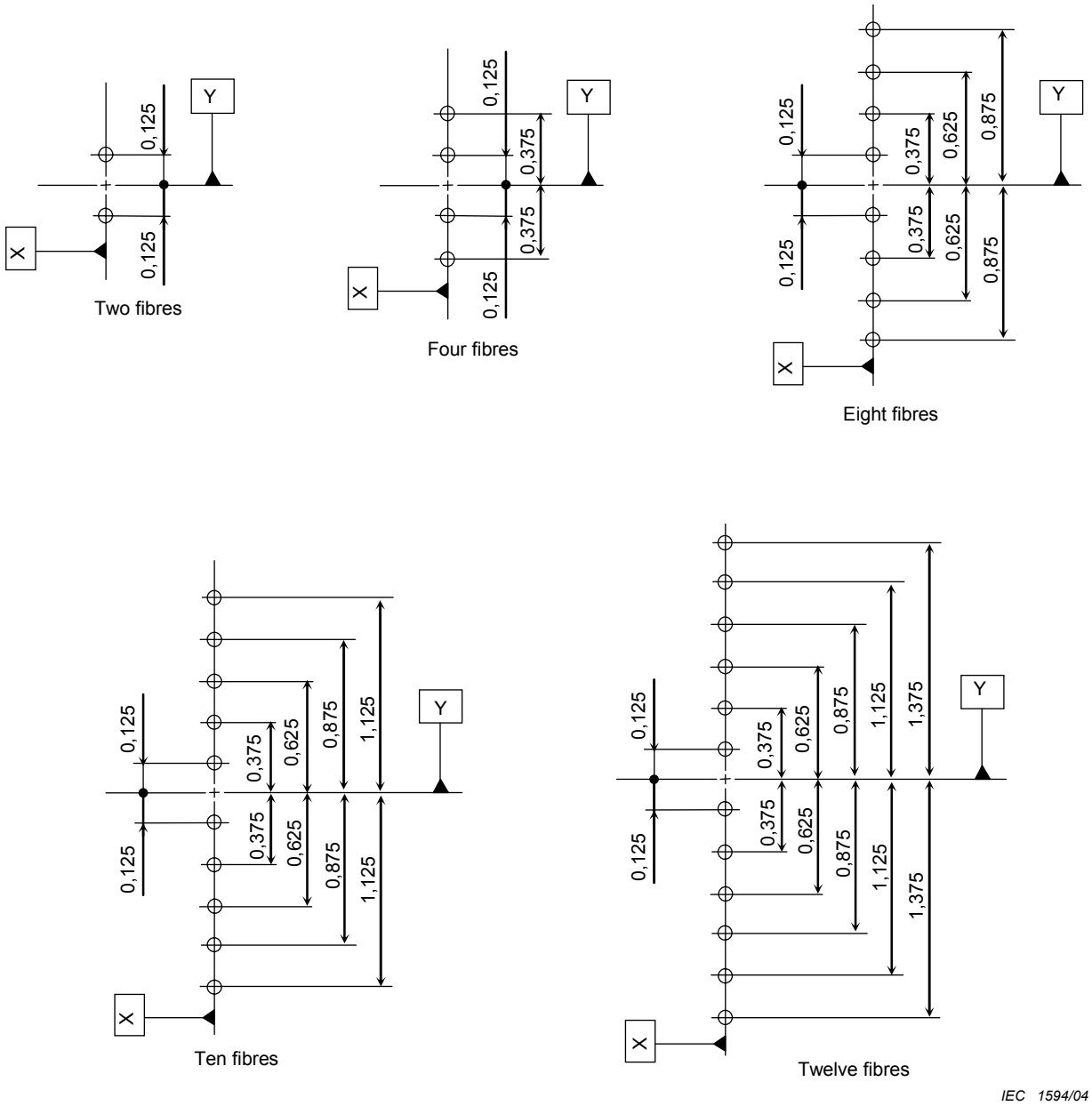
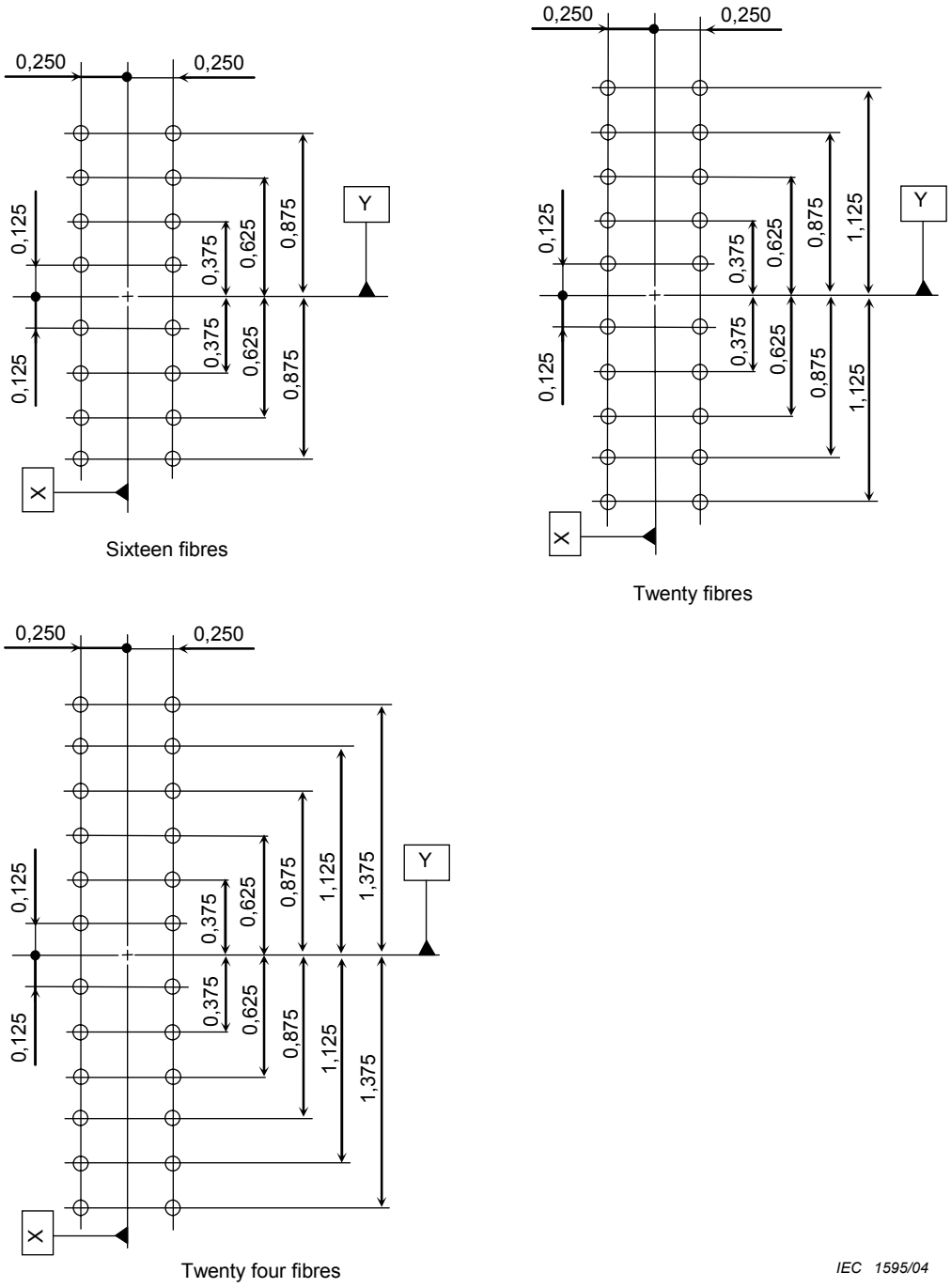
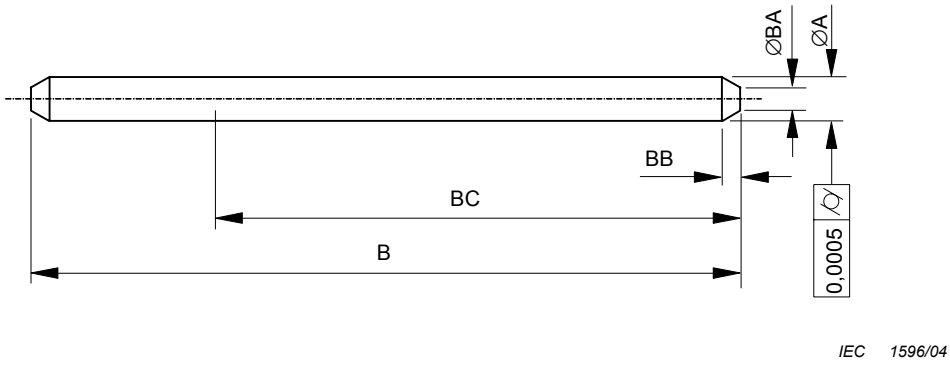


Figure 3 – Optical datum target location diagrams *(1 of 2)*



NOTE The optical datum target location diagram is shown in the figure. Here, datum X is defined as the line passing through two pin-hole centres, and datum Y is defined as the line perpendicular to datum X and passing through the midpoint of two pin-hole centres.

Figure 3 *(2 of 2)*



IEC 1596/04

Figure 4 – Gauge pin

Table 2 – Dimensions of the gauge pin

Reference	Dimensions mm		Notes
	Minimum	Maximum	
A	0,698 5	0,699 0	1
B	10,8	11,2	2
BA	0,2	0,4	
BB	0,2	0,5	
BC	6,0	–	

NOTE 1 Surface roughness R_z = 0,1 µm for the length of dimension BC.

NOTE 2 Typical dimensions.

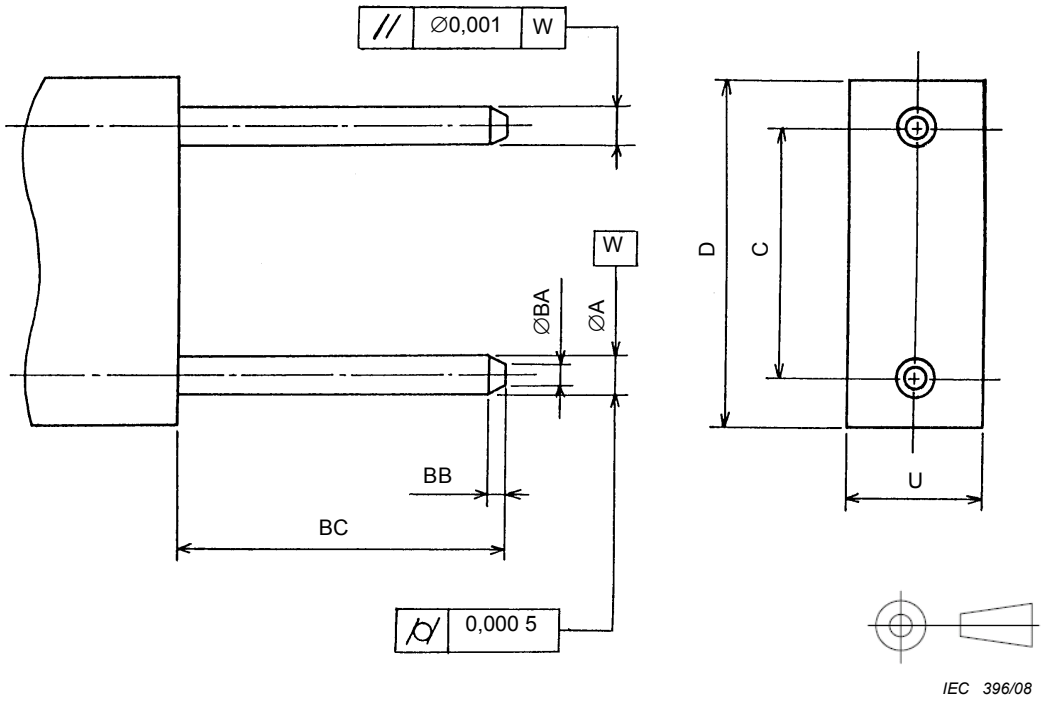


Figure 5 – Gauge for plug

Table 3 – Dimensions of the gauge for plug

Reference	Dimensions mm		Notes
	Minimum	Maximum	
A	0,698 5	0,699 0	For two pins, 1
C	4,599 5	4,600 5	
D	6,3	6,5	2
U	2,4	2,5	2
BA	0,2	0,4	
BB	0,2	0,5	
BC	6,0	6,5	
NOTE 1 Surface roughness R_z = 0,1 μm. NOTE 2 Typical dimensions.			

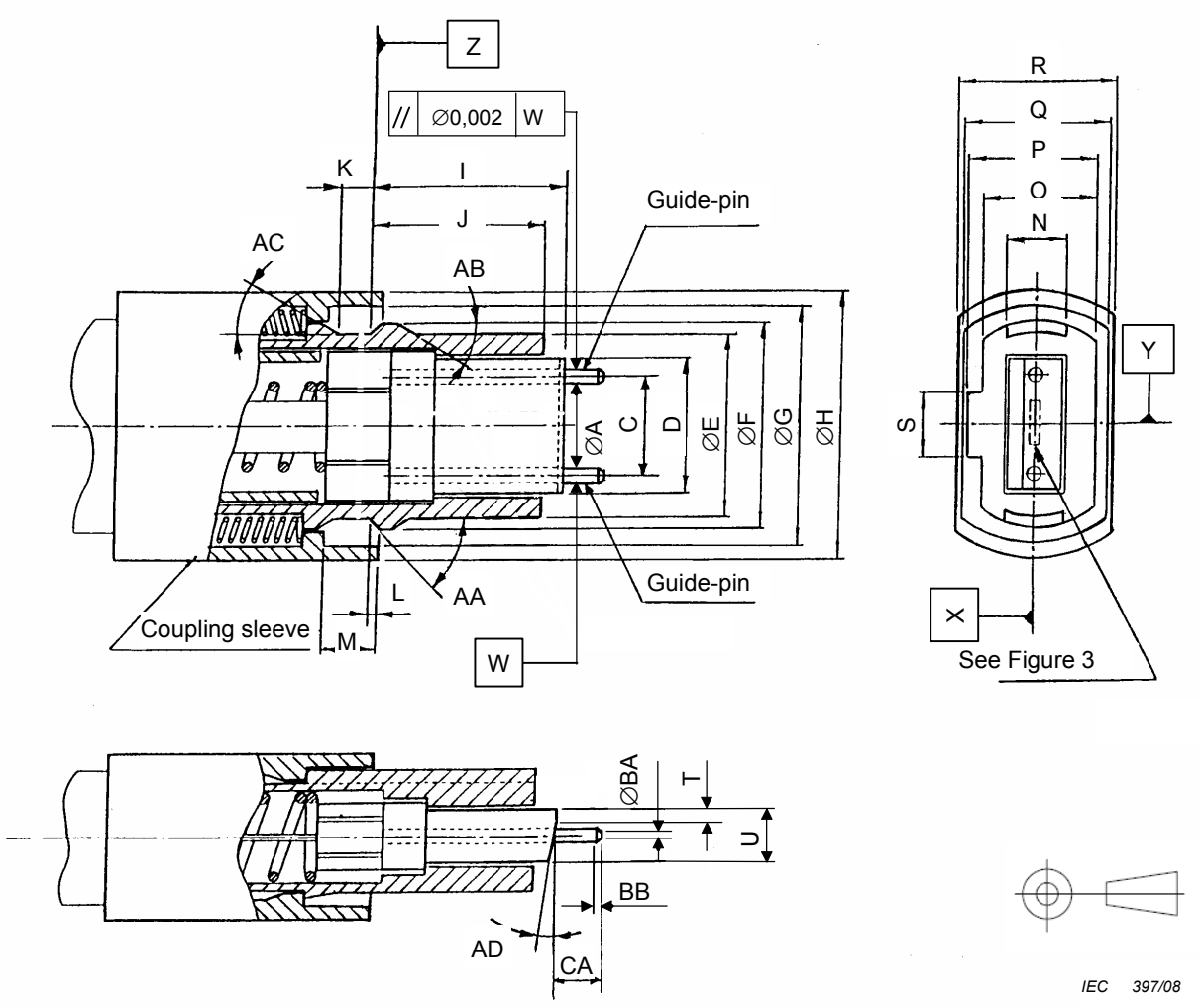


Figure 6 – MPO male plug connector angled interface

Table 4 – Dimensions of the MPO male plug connector angled interface

Reference	Dimensions		Notes
	Minimum	Maximum	
A	0,697 mm	0,699 mm	1
C	4,597 mm	4,603 mm	
D	6,3 mm	6,5 mm	2
E	8,34 mm	8,54 mm	
F	9,49 mm	9,59 mm	
G	10,85 mm	11,05 mm	
H	12,19 mm	12,59 mm	
I	8,8 mm	9,2 mm	
J	7,9 mm	8,1 mm	3
K	1,4 mm	–	
L	0,2 mm	0,8 mm	
M	2,4 mm	2,6 mm	4 and 5
N	2,8 mm	3,0 mm	
O	4,89 mm	4,99 mm	
P	5,59 mm	5,69 mm	
Q	5,7 mm	–	
R	–	7,7 mm	
S	2,9 mm	3,1 mm	
T	–	0,8 mm	
U	2,4 mm	2,5 mm	
AA	42°	45°	
AB	–	45°	
AC	–	45°	
AD	7,5°	8,5°	
BA	0,2 mm	0,4 mm	
BB	0,2 mm	0,5 mm	6
CA	1,6 mm	3,3 mm	

NOTE 1 Each guide pin must be retained with a minimum force of 19,6 N. Surface roughness R_z must be below 0,5 μm.

NOTE 2 Dimension C is defined as the distance between two guide-pin centres.

NOTE 3 Dimension I is given for a fibre endface centre of a plug end when not mated. It is noticed that a ferrule is movable by a certain axial compression force, and therefore the dimension I is variable. Ferrule compression force must be 7,8 N to 11,8 N when a position of the fibre endface from the datum Z is in the range of 8,2 mm to 8,4 mm.

NOTE 4 Coupling sleeve must be movable by a certain axial compression force. Dimension L is given for a coupling sleeve end when not mated. Coupling sleeve compression force must be 2,9 N to 6,9 N when a position of the coupling sleeve endface from datum Z is in the range of 0 mm to 0,1 mm to the right or to the left of datum Z.

NOTE 5 An adaptor coupling part must be unlocked by a left-direction movement of a coupling sleeve, when it is separate from an adaptor. When the coupling sleeve is moved for unlocking, a position of the coupling sleeve endface must be larger than 2,0 mm in the left direction from the datum Z.

NOTE 6 The top shape of guide-pin may be a round shape that is symmetrical about the guide-pin axis with a minimum radius of 0,15 mm.

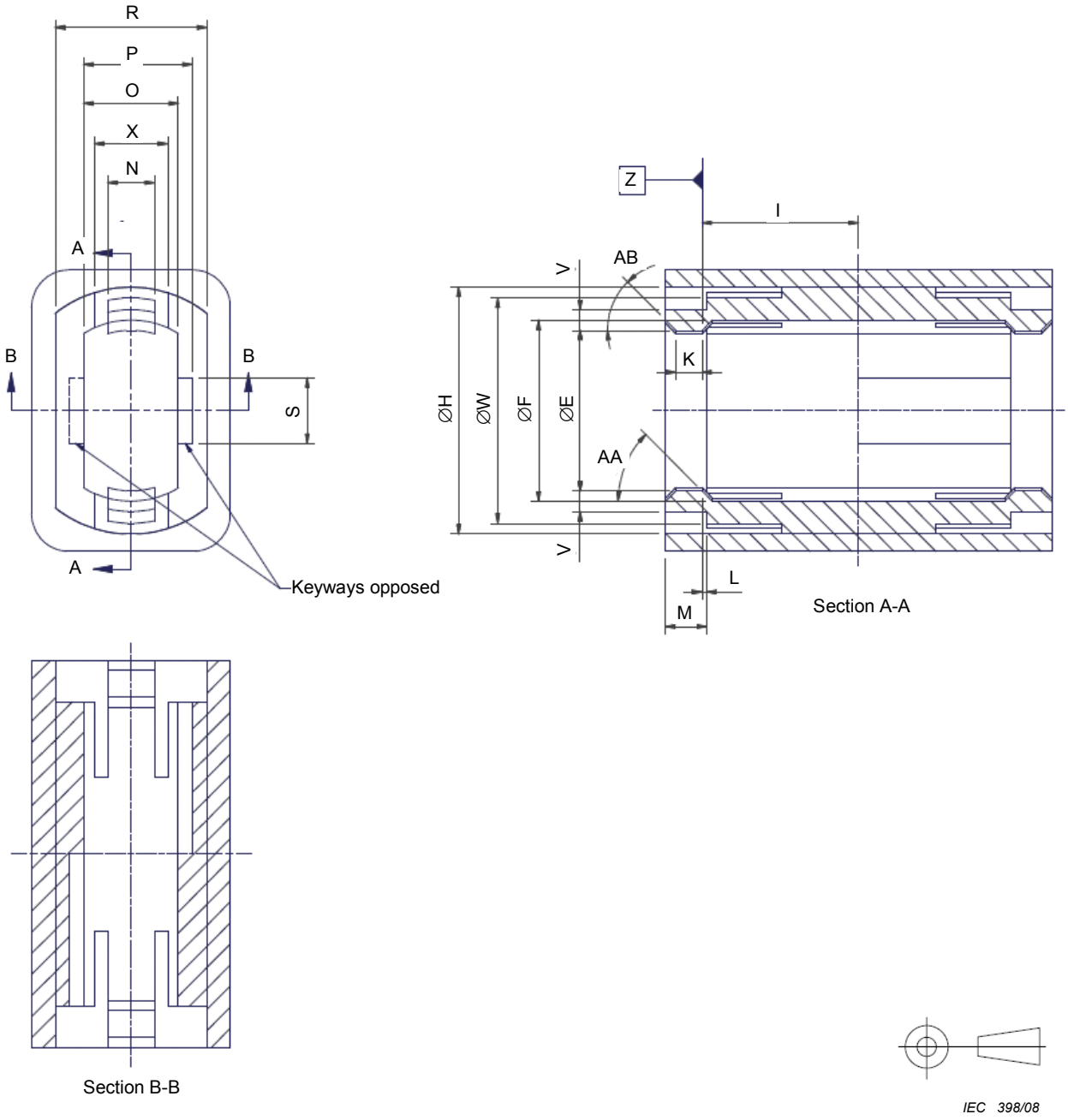


Figure 7 – MPO adaptor interface

Table 5 – Dimensions of the MPO adaptor interface

Reference	Dimensions mm		Notes
	Minimum	Maximum	
E	8,54 mm	8,74 mm	
F	9,6 mm	9,7 mm	
H	12,6 mm	–	
I	8,2 mm	8,4 mm	
K	–	1,39 mm	
L	0	0,1 mm	
M	1,6 mm	2,0 mm	
N	2,4 mm	2,6 mm	
O	5,0 mm	5,1 mm	1
P	5,7 mm	5,9 mm	
R	7,8 mm	–	
S	3,4 mm	3,6 mm	
V	0,95 mm	1,15 mm	
W	11,8 mm	12,2 mm	
X	3,4 mm	–	
AA	45°	48°	
AB	45°	50°	

NOTE 1 Dimension L is the distance from datum Z to a latch-ledge end. The latch-ledge end may be located to the right or to the left of datum Z.

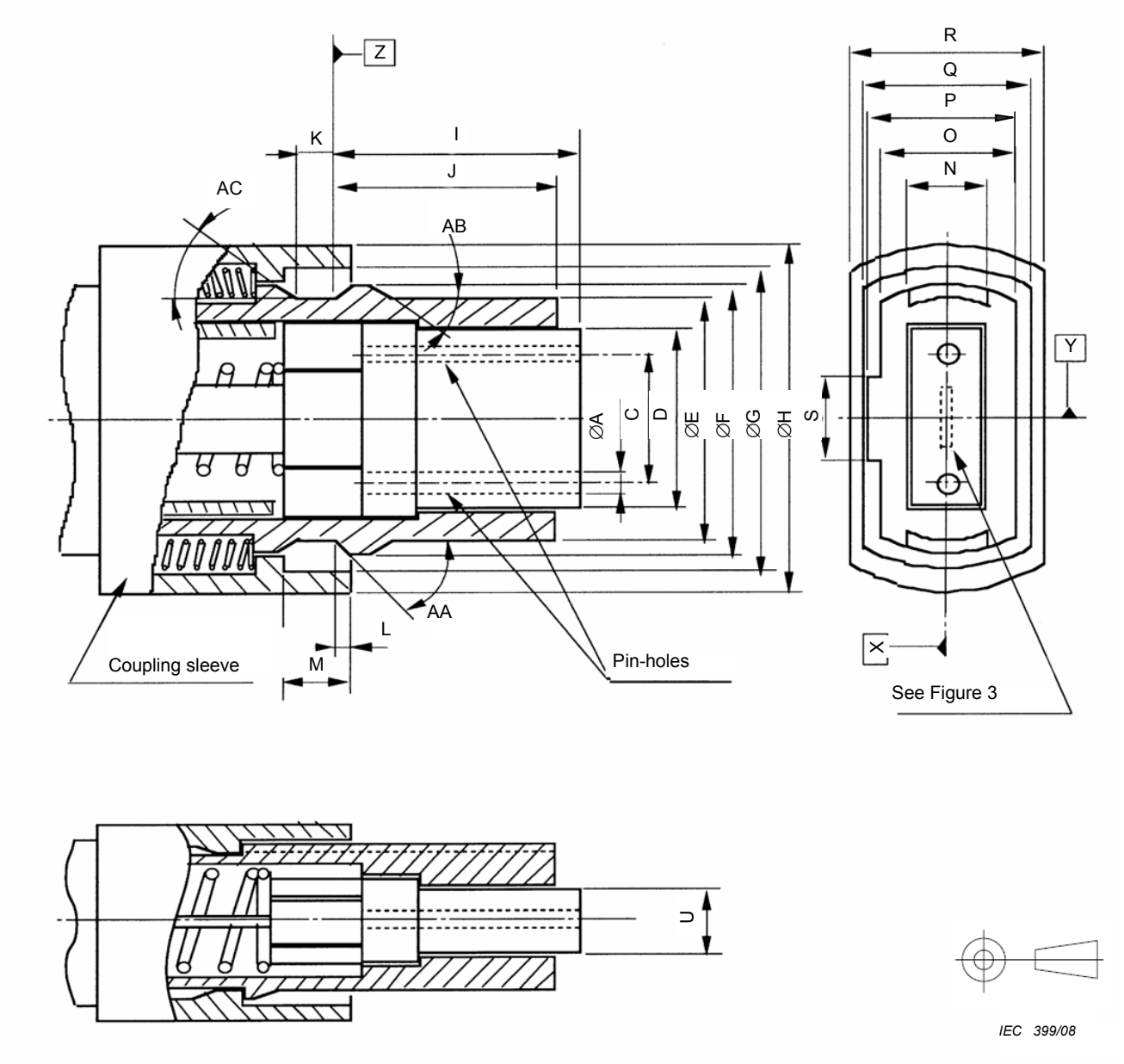


Figure 8 – MPO female plug connector flat interface

Table 6 – Dimensions of the MPO female plug connector flat interface

Reference	Dimensions		Notes
	Minimum	Maximum	
A	0,699 mm	0,701 mm	1
C	4,597 mm	4,603 mm	2
D	6,3 mm	6,5 mm	
E	8,34 mm	8,54 mm	
F	9,49 mm	9,59 mm	
G	10,85 mm	11,05 mm	
H	12,19 mm	12,59 mm	
I	8,8 mm	9,2 mm	3
J	7,9 mm	8,1 mm	
K	1,4 mm	–	
L	0,2 mm	0,8 mm	4 and 5
M	2,4 mm	2,6 mm	
N	2,8 mm	3,0 mm	
O	4,89 mm	4,99 mm	
P	5,59 mm	5,69 mm	
Q	5,7 mm	–	
R	–	7,7 mm	
S	2,9 mm	3,1 mm	
U	2,4 mm	2,5 mm	
AA	42°	45°	
AB	–	45°	
AC	–	45°	

NOTE 1 Each pin-hole must accept a gauge pin as shown in Figure 5 to a depth of 5,5 mm with a maximum force of 1,7 N. In addition, two pin-holes of a plug must accept a gauge as shown in Figure 6 to a depth of 5,5 mm with a maximum force of 3,4 N.

NOTE 2 Dimension C is defined as the distance between two pin-hole centres.

NOTE 3 Dimension I is given for a fibre endface centre of a plug end when not mated. It is noticed that a ferrule is movable by a certain axial compression force, and therefore the dimension I is variable. Ferrule compression force must be 7,8 N to 11,8 N when a position of the fibre endface from the datum Z is in the range of 8,2 mm to 8,4 mm.

NOTE 4 Coupling sleeve must be movable by a certain axial compression force. Dimension L is given for a coupling sleeve end when not mated. Coupling sleeve compression force must be 2,9 N to 6,9 N when a position of the coupling sleeve endface from datum Z is in the range of 0 mm to 0,1 mm to the right or to the left of datum Z.

NOTE 5 An adaptor coupling part must be unlocked by a movement away from the adaptor of a coupling sleeve, when it is separate from the adaptor. When the coupling sleeve is moved for unlocking, a position of the coupling sleeve endface must be larger than 2,0 mm in the left direction from the datum Z.

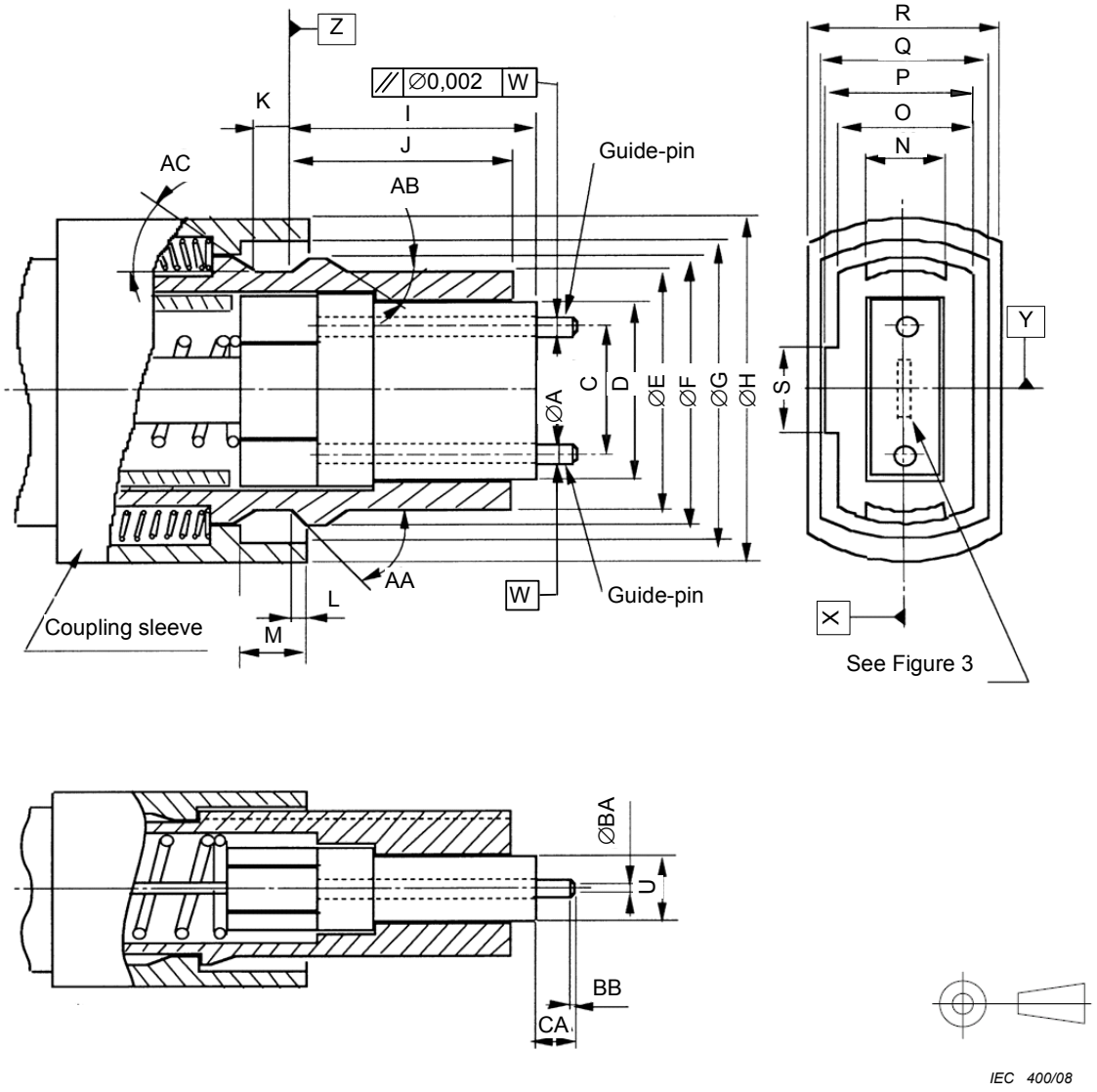


Figure 9 – MPO male plug connector flat interface

Table 7 – Dimensions of the MPO male plug connector flat interface

Reference	Dimensions		Notes
	Minimum	Maximum	
A	0,697 mm	0,699 mm	1
C	4,597 mm	4,603 mm	2
D	6,3 mm	6,5 mm	
E	8,34 mm	8,54 mm	
F	9,49 mm	9,59 mm	
G	10,85 mm	11,05 mm	
H	12,19 mm	12,59 mm	
I	8,8 mm	9,2 mm	3
J	7,9 mm	8,1 mm	
K	1,4 mm	–	
L	0,2 mm	0,8 mm	4 and 5
M	2,4 mm	2,6 mm	
N	2,8 mm	3,0 mm	
O	4,89 mm	4,99 mm	
P	5,59 mm	5,69 mm	
Q	5,7 mm	–	
R	–	7,7 mm	
S	2,9 mm	3,1 mm	
U	2,4 mm	2,5 mm	
AA	42°	45°	
AB	–	45°	
AC	–	45°	
BA	0,2 mm	0,4 mm	6
BB	0,2 mm	0,5 mm	
CA	1,6 mm	3,3 mm	

NOTE 1 Each guide-pin must be retained with a minimum force of 19,6 N. Surface roughness R_z must be below 0,5 μm.

NOTE 2 Dimension C is defined as the distance between two guide-pin centres.

NOTE 3 Dimension I is given for a fibre endface centre of a plug end when not mated. It is noticed that a ferrule is movable by a certain axial compression force, and therefore the dimension I is variable. Ferrule compression force must be 7,8 N to 11,8 N when a position of the fibre endface from the datum Z is in the range of 8,2 mm to 8,4 mm.

NOTE 4 Coupling sleeve must be movable by a certain axial compression force. Dimension L is given for a coupling sleeve end when not mated. Coupling sleeve compression force must be 2,9 N to 6,9 N when a position of the coupling sleeve endface from datum Z is in the range of 0 mm to 0,1 mm to the right or to the left of datum Z.

NOTE 5 An adaptor coupling part must be unlocked by a movement away from the adaptor of a coupling sleeve, when it is separate from the adaptor. When the coupling sleeve is moved for unlocking, a position of the coupling sleeve endface must be larger than 2,0 mm in the left direction from the datum Z.

NOTE 6 The top shape of guide-pin may be a round shape that is symmetrical about the guide-pin axis with a minimum radius of 0,15 mm.

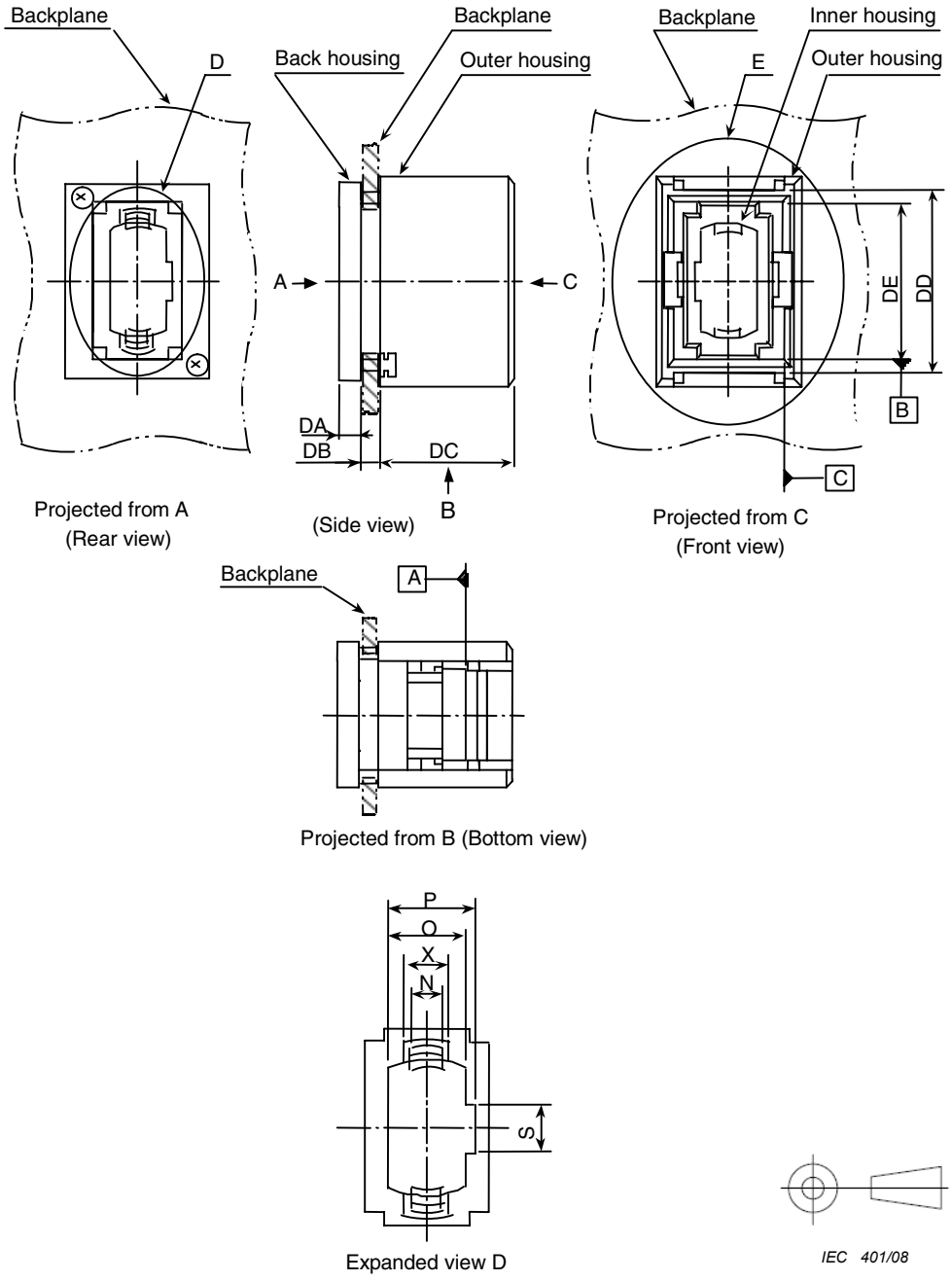
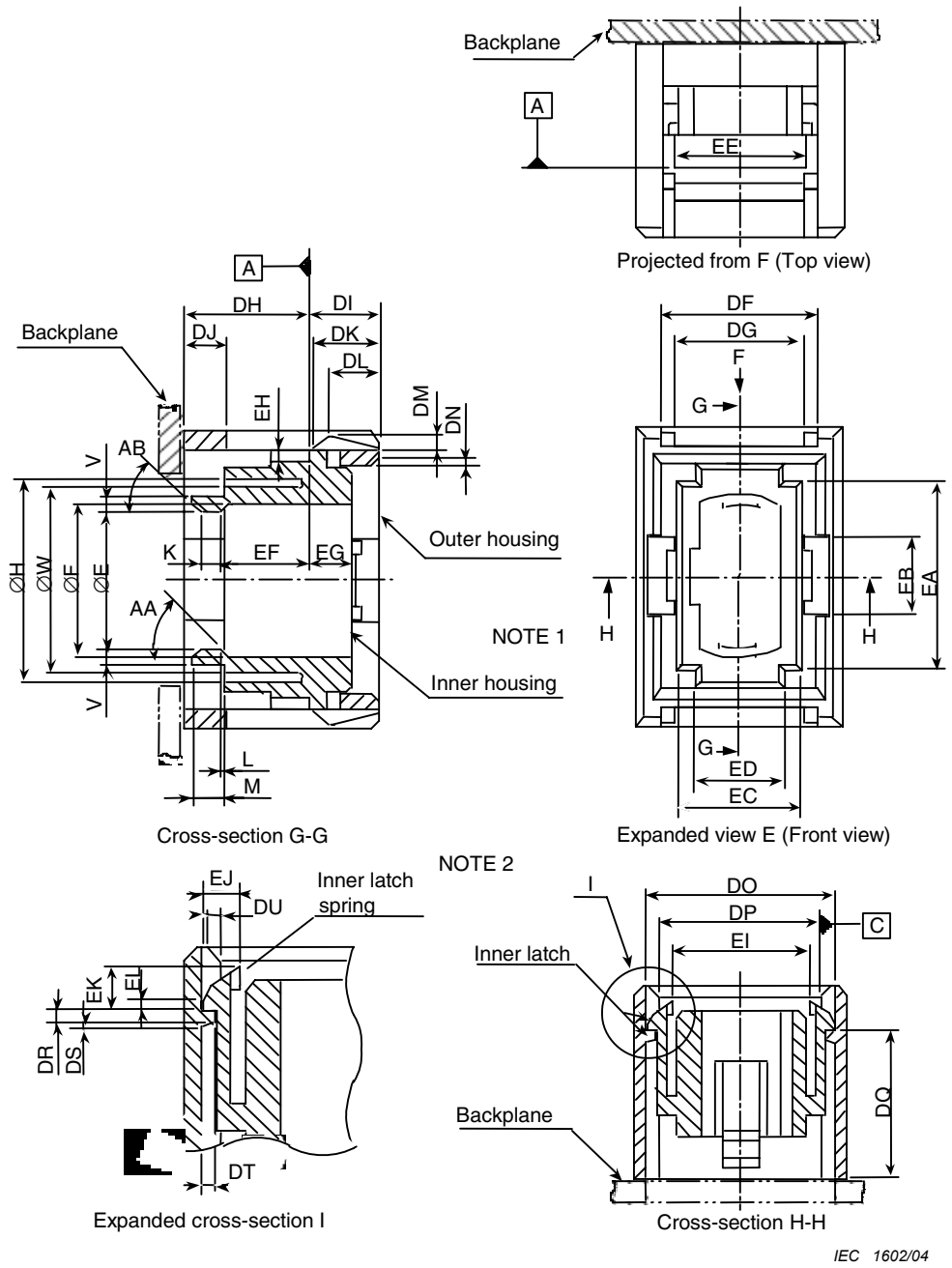


Figure 10 – MPO backplane housing interface *(1 of 2)*



NOTE 1 In the figure of cross-section G-G, the inner housing must be movable to the right at least 0,9 mm under the condition that the inner latch is completed. In addition, the inner housing must be movable at least 2 mm to the left when the inner latch is released.

NOTE 2 In the figure of expanded cross-section I, the inner latch spring must be moved by more than 0,65 mm to the right when the inner latch is released or latched.

Figure 10 *(2 of 2)*

Table 8 – Dimensions of the MPO backplane housing

Reference	Dimensions		Notes
	Minimum	Maximum	
E	8,54 mm	8,74 mm	A part of diameter
F	9,6 mm	9,7 mm	A part of diameter
H	12,6 mm	–	A part of diameter
K	1,19 mm	1,39 mm	
L	0	0,1 mm	
M	1,6 mm	2,0 mm	
N	2,4 mm	2,6 mm	
O	5,0 mm	5,1 mm	
P	5,7 mm	5,9 mm	
S	3,4 mm	3,6 mm	
V	0,95 mm	1,15 mm	
W	11,8 mm	12,2 mm	A part of diameter
X	3,4 mm	–	
AA	45°	48°	
AB	45°	50°	
DA			See Table 9
DB			See Table 9
DC	12,25 mm	12,35 mm	
DD	16,5 mm	16,6 mm	
DE	14,3 mm	14,4 mm	
DF	9,91 mm	10,01 mm	
DG	8,2 mm	8,4 mm	
DH	7,9 mm	8,1 mm	See note
DI	4,15 mm	4,45 mm	See note
DJ	2,65 mm	2,75 mm	
DK	4,1 mm	4,3 mm	
DL	3,35 mm	3,45 mm	
DM	0,9 mm	1,0 mm	
DN	0,55 mm	0,65 mm	
DO	11,55 mm	11,65 mm	
DP	9,91 mm	10,01 mm	
DQ	9,15 mm	9,25 mm	
DR	0,35 mm	0,45 mm	
DS	0,25 mm	0,35 mm	
DT	0,55 mm	0,65 mm	
DU	0,55 mm	0,70 mm	
EA	12,14 mm	12,2 mm	
EB	4,95 mm	5,05 mm	
EC	7,94 mm	8,00 mm	
ED	5,6 mm	5,8 mm	
EE	8,15 mm	8,25 mm	
EF	5,55 mm	5,65 mm	
EG	2,55 mm	2,65 mm	
EH	0,85 mm	0,95 mm	
EI	8,6 mm	8,7 mm	
EJ	1,45 mm	1,55 mm	
EK	1,9 mm	2,0 mm	
EL	0,35 mm	0,45 mm	

NOTE These dimensions are given when the inner housing is moved in its most left-side position under the condition that the inner latch is engaged.

Table 9 – Grade

Grade	Reference	Dimensions mm		Notes
		Minimum	Maximum	
1	DA DB	2,0 2,65	2,1 2,75	Backplane thickness 2,4 mm (see note)
1	DA DB	2,0 3,45	2,1 3,55	Backplane thickness 3,2 mm (see note)
NOTE Add grade number to the interface reference number.				

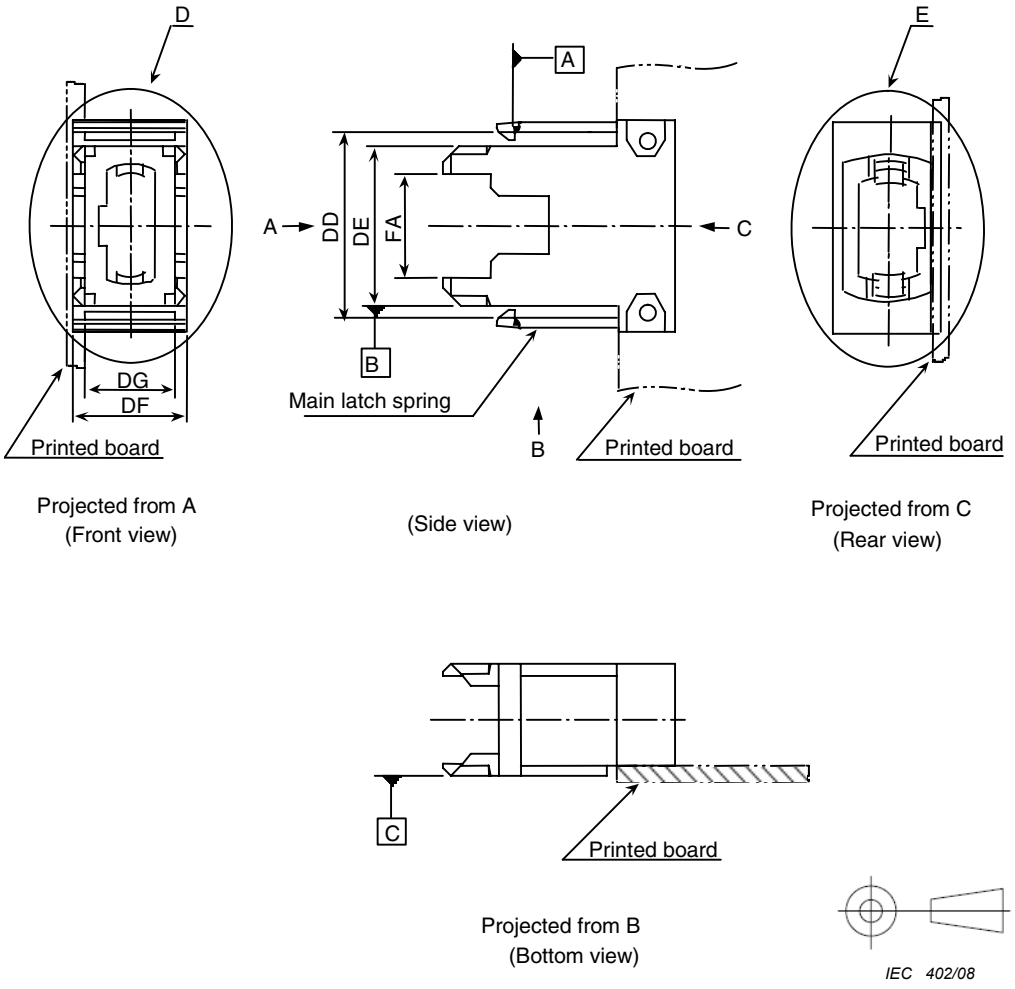


Figure 11 – MPO printed board housing interface *(1 of 2)*

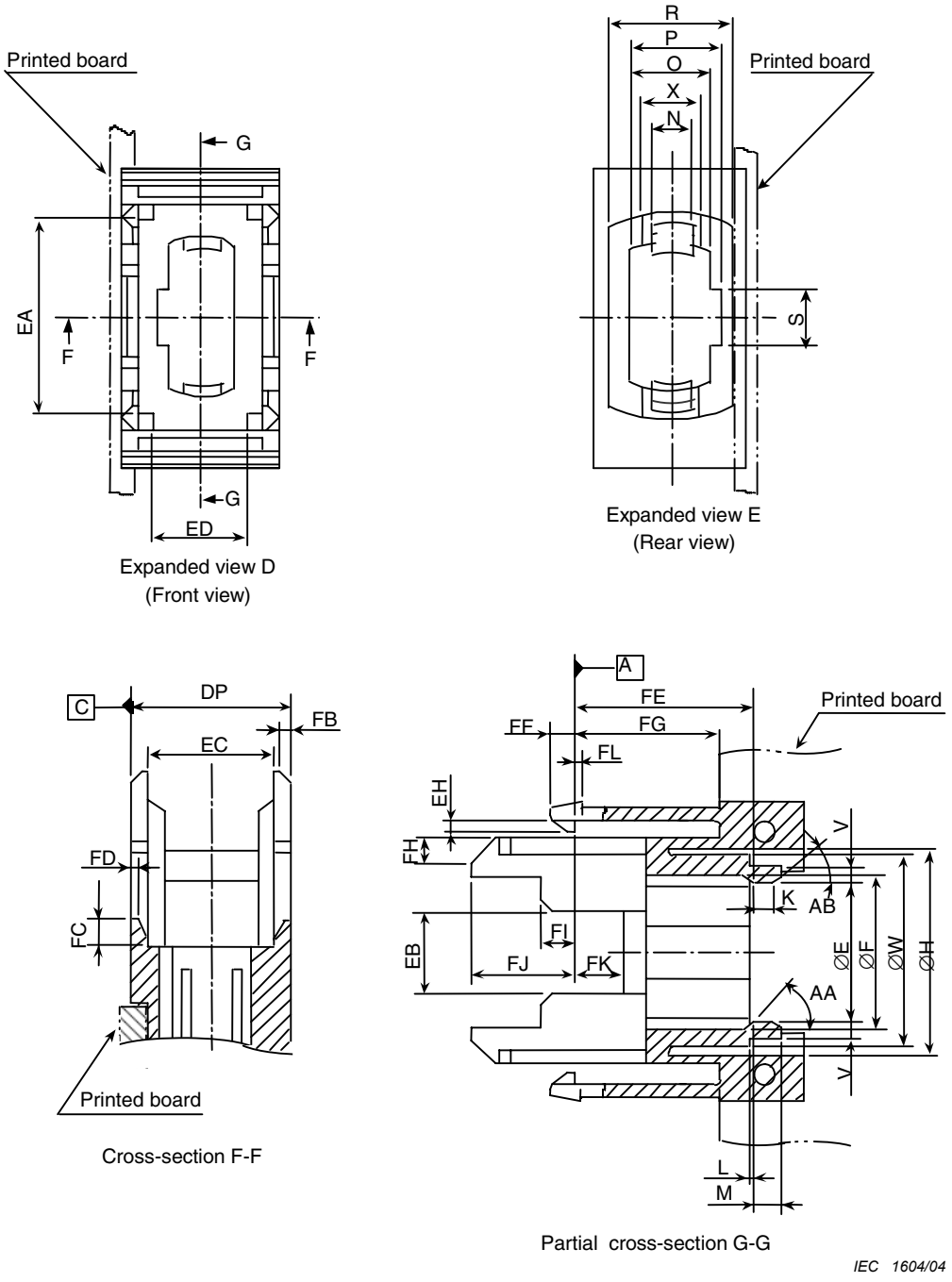


Figure 11 *(2 of 2)*

Table 10 – Dimensions of the MPO printed board housing interface

Reference	Dimensions		Notes
	Minimum	Maximum	
E	8,54 mm	8,74 mm	A part of diameter
F	9,6 mm	9,7 mm	A part of diameter
H	12,6 mm	–	A part of diameter
K	1,19 mm	1,39 mm	
L	0	0,1 mm	
M	1,6 mm	2,0 mm	
N	2,4 mm	2,6 mm	
O	5,0 mm	5,1 mm	
P	5,7 mm	5,9 mm	
R	7,8 mm	–	
S	3,4 mm	3,6 mm	
V	0,95 mm	1,15 mm	
W	11,8 mm	12,2 mm	A part of diameter
X	3,4 mm	–	
AA	45°	48°	
AB	45°	50°	
DD	16,5 mm	16,6 mm	See note
DE	14, 05 mm	14,15 mm	
DF	9,8 mm	9,9 mm	
DG	7,9 mm	8,1 mm	
DP	9,8 mm	9,9 mm	
EA	12,21 mm	12,27 mm	
EB	5,1 mm	5,2 mm	
EC	8,01 mm	8,07 mm	
ED	5,9 mm	6,1 mm	
EH	0,75 mm	0,85 mm	
FA	9,1 mm	9,3 mm	
FB	0,6 mm	0,8 mm	
FC	1,35 mm	1,65 mm	
FD	0,25 mm	0,35 mm	
FE	11,05 mm	11,15 mm	
FF	1,55 mm	1,65 mm	
FG	8,9 mm	9,0 mm	
FH	1,4 mm	1,6 mm	
FI	1,9 mm	2,2 mm	
FJ	6,35 mm	6,55 mm	
FK	2,9 mm	3,0 mm	
FL	0,35 mm	0,45 mm	

NOTE The dimension DD is defined at the top of the main latch spring. The dimension DD must become greater than 18,6 mm when the printed board housing is coupled to, or removed from, a backplane housing.

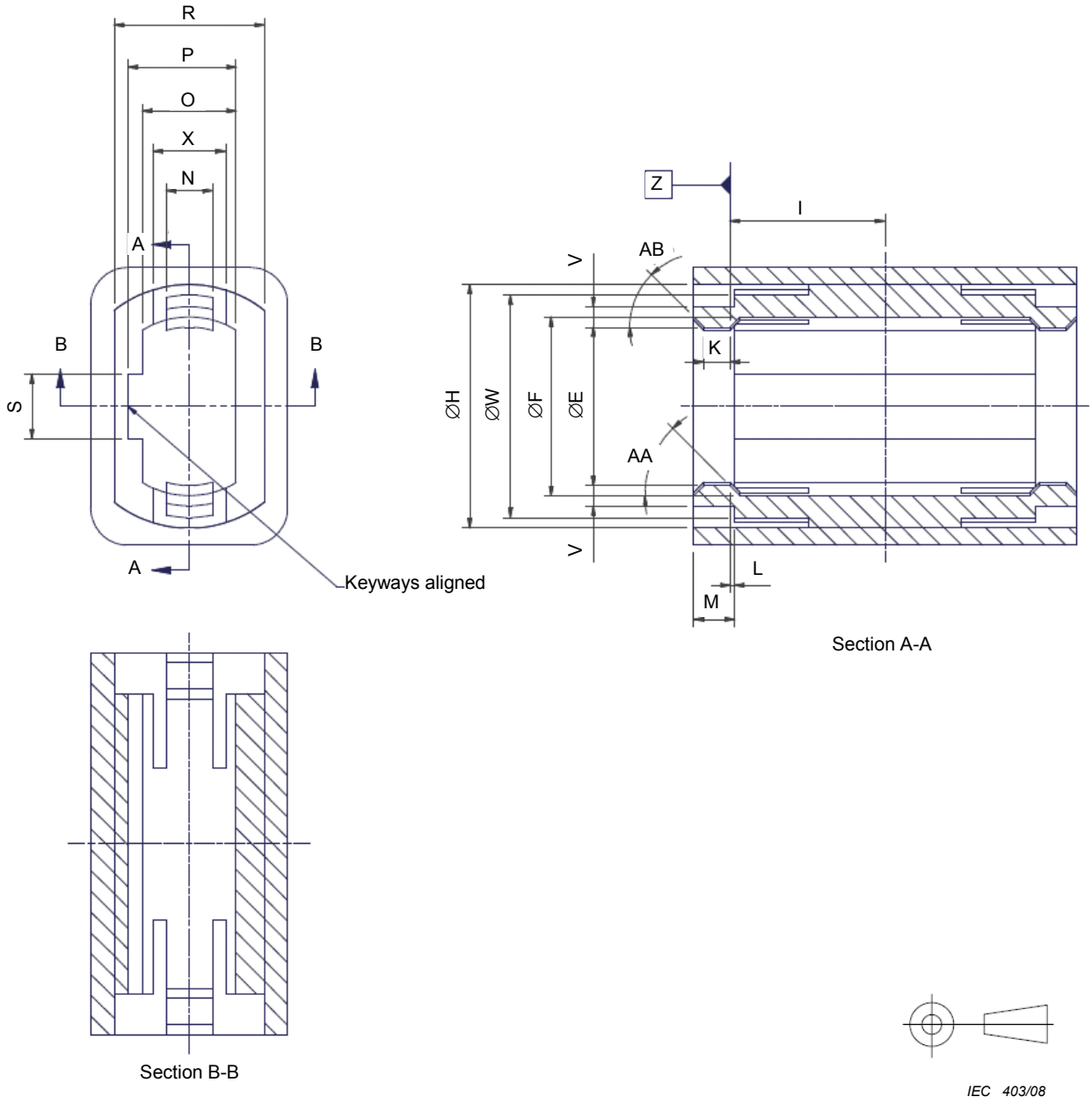


Figure 12 – MPO aligned key adaptor interface

Table 11 – Dimensions of the MPO aligned key adaptor interface

Reference	Dimensions		Notes
	Minimum	Maximum	
E	8,54 mm	8,74 mm	
F	9,6 mm	9,7 mm	
H	12,6 mm	–	
I	8,2 mm	8,4 mm	
K	–	1,39 mm	
L	0	0,1 mm	
M	1,6 mm	2,0 mm	
N	2,4 mm	2,6 mm	
O	5,0 mm	5,1 mm	1
P	5,7 mm	5,9 mm	
R	7,8 mm	–	
S	3,4 mm	3,6 mm	
V	0,95 mm	1,15 mm	
W	11,8 mm	12,2 mm	
X	3,4 mm	–	
AA	45°	48°	
AB	45°	50°	

NOTE 1 Dimension L is the distance from datum Z to a latch-ledge end. The latch-ledge end may be located to the right or to the left of datum Z.

NOTE 2 The keyways for each MPO plug are aligned on the same side of the adaptor. Dimension I is the distance from datum Z to the adaptor centreline.

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