

## PUBLICLY AVAILABLE SPECIFICATION PRE-STANDARD



**Connectors for electronic equipment – Product requirements –  
Part 3-122: Detail specification for rugged 8-way, shielded, free and fixed  
connectors**



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**Connectors for electronic equipment – Product requirements –  
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connectors**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

ICS 31.220.10

ISBN 978-2-8322-1981-2

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## CONTENTS

FOREWORD .....	4
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	6
4 Common features and typical connector pair .....	7
4.1 View showing typical fixed and free connectors .....	7
4.2 Mating information .....	7
4.2.1 General .....	7
4.2.2 Contacts – mating conditions .....	8
4.2.3 Fixed connector TYP I .....	9
4.2.4 Free connector TYP I .....	12
4.2.5 Fixed connector TYP II .....	14
4.2.6 Free connector TYP II .....	17
5 Characteristics .....	18
5.1 General .....	18
5.2 Pin and pair grouping assignment .....	18
5.3 Classification into climatic category .....	19
5.4 Electrical characteristics .....	19
5.4.1 Voltage proof .....	19
5.4.2 Current-temperature derating .....	19
5.4.3 Initial insulation resistance .....	20
5.5 Mechanical characteristics .....	20
5.5.1 Mechanical operation .....	20
5.5.2 Insertion and withdrawal forces .....	20
6 Tests and test schedule .....	20
6.1 General .....	20
6.2 Arrangement for contact resistance test .....	21
6.3 Arrangement for vibration test (test phase EP5) .....	22
6.4 Test procedures and measuring methods .....	22
6.5 Preconditioning .....	22
6.6 Test schedules .....	23
6.6.1 General .....	23
6.6.2 Basic (minimum) test schedule .....	23
6.6.3 Full test schedule .....	23
Figure 1 – View showing typical fixed and free connectors .....	7
Figure 2 – Contact interface dimensions with terminated free connector .....	8
Figure 3 – View of contact zone .....	9
Figure 4 – Section D-D .....	10
Figure 5 – Free connector Typ I .....	12
Figure 6 – View of contact zone .....	14
Figure 7 – Section D-D .....	15
Figure 8 – Free connector .....	17
Figure 9 – Fixed connector pin and pair grouping assignment (front view of connector) .....	19

Figure 10 – Connector de-rating curve .....	20
Figure 11 – Arrangement for contact resistance test .....	21
Figure 12 – Arrangement for vibration test .....	22
Table 1 – Dimensions for Figure 2 .....	8
Table 2 – Dimensions for Figures 3 and 4 .....	11
Table 3 – Dimensions for Figure 5 .....	13
Table 4 – Dimensions for Figures 6 and 7 .....	16
Table 5 – Dimensions for Figure 8 .....	18
Table 6 – Climatic categories – selected values .....	19
Table 7 – Test group P .....	23
Table 8 – Test group AP .....	24
Table 9 – Test group BP .....	25
Table 10 – Test group CP .....	26
Table 11 – Test group DP .....	27
Table 12 – Test group EP .....	28
Table 13 – Test group FP .....	29

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### CONNECTORS FOR ELECTRONIC EQUIPMENT – PRODUCT REQUIREMENTS –

#### Part 3-122: Detail specification for rugged 8-way, shielded, free and fixed connectors

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The text of this PAS is based on the following document:

This PAS was approved for publication by the P-members of the committee concerned as indicated in the following document

Draft PAS	Report on voting
48B/2401/PAS	48B/2408/RVD

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## CONNECTORS FOR ELECTRONIC EQUIPMENT – PRODUCT REQUIREMENTS –

### Part 3-122: Detail specification for rugged 8-way, shielded, free and fixed connectors

#### 1 Scope

This part of IEC 61076-3 covers 8-way unshielded free and fixed connectors, and is intended to specify the common dimensions, mechanical, electrical and environmental characteristics and tests for the family of IEC 61076-3 connectors.

These connectors are intermateable and interoperable with other IEC 61076-3 series 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 60050-581, *International Electrotechnical Vocabulary (IEV) – Chapter 581: Electromechanical components for electronic equipment*

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60512 (all parts), *Connectors for electronic equipment – Tests and measurements*

IEC 60512-1-100, *Connectors for electronic equipment – Tests and measurements – Part 1-100: General – Applicable publications*

IEC 61076-1:2006, *Connectors for electronic equipment – Product Requirements – Part 1: Generic specification*

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

#### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-581, IEC 61076-1, IEC 60512-1, and the following apply.

##### 3.1

##### **intermateability**

intermateability (level 2 of IEC 61076-1:2006) is ensured by application of the “Go” and “No-Go” gauge requirements in the standards that may be referenced, and adherence to the dimensional requirements within

##### 3.2

##### **interoperability**

interoperability of different IEC 61076-3 connectors is ensured by compliance with the specified interface dimensions



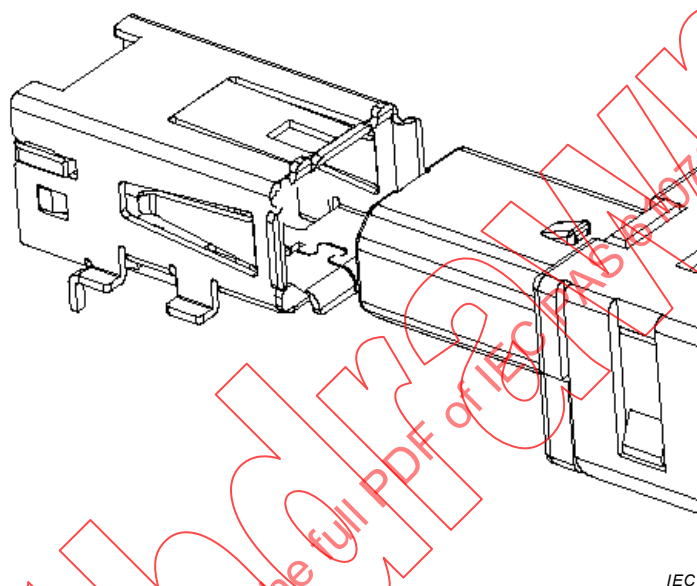
### 3.3

#### **category**

relevant level of transmission performance as given in ISO/IEC 11801

## **4 Common features and typical connector pair**

### **4.1 View showing typical fixed and free connectors**



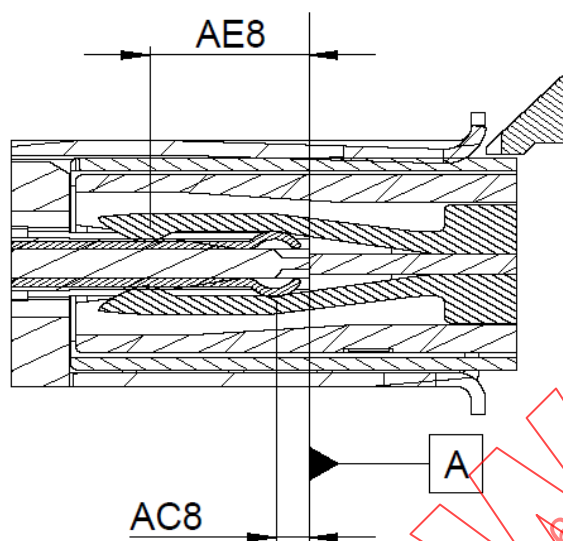
**Figure 1 – View showing typical fixed and free connectors**

### **4.2 Mating information**

#### **4.2.1 General**

Dimensions are given in millimetres. Drawings are shown in third-angle projection. The shape of connectors may deviate from those given in Figures 1 to 6 as long as the dimensions specified are not changed.

#### 4.2.2 Contacts – mating conditions



NOTE 1 Female contact of fixed connector. The mating information shown can only be achieved with a free connector with a cable attached.

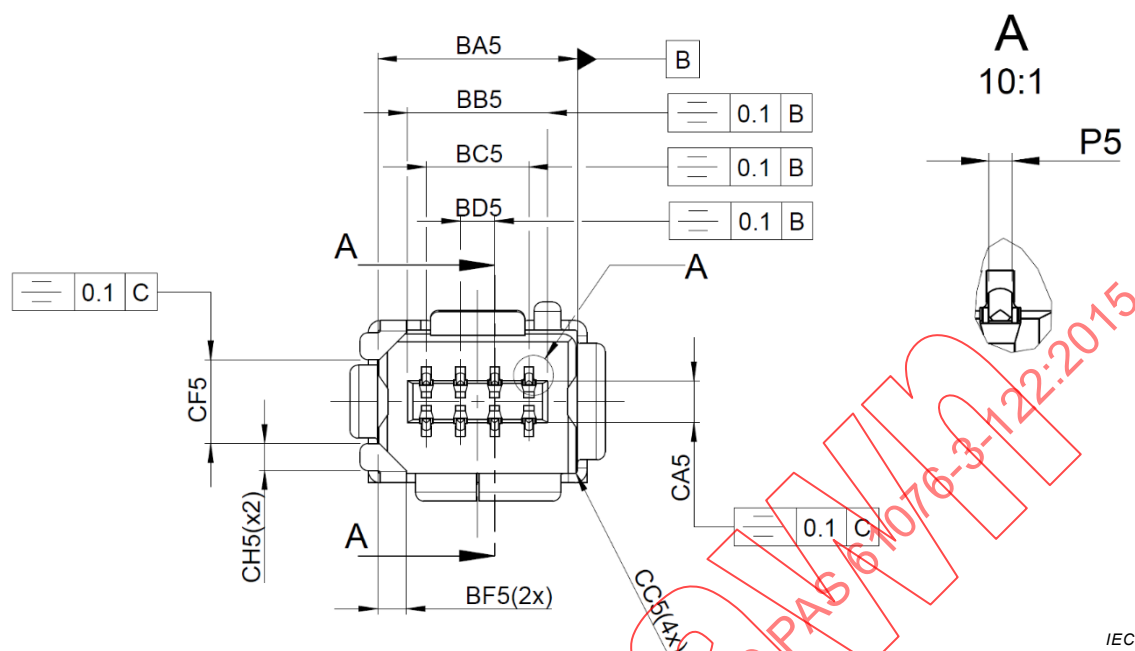
NOTE 2 Burrs shall not project above the top of the contact in this area, since it may be a contact area.

**Figure 2 – Contact interface dimensions with terminated free connector**

**Table 1 – Dimensions for Figure 2**

Letter	Maximum mm	Minimum mm	Nominal mm
AC8	0,9	0,7	0,8
AE8	3,9	3,7	3,8

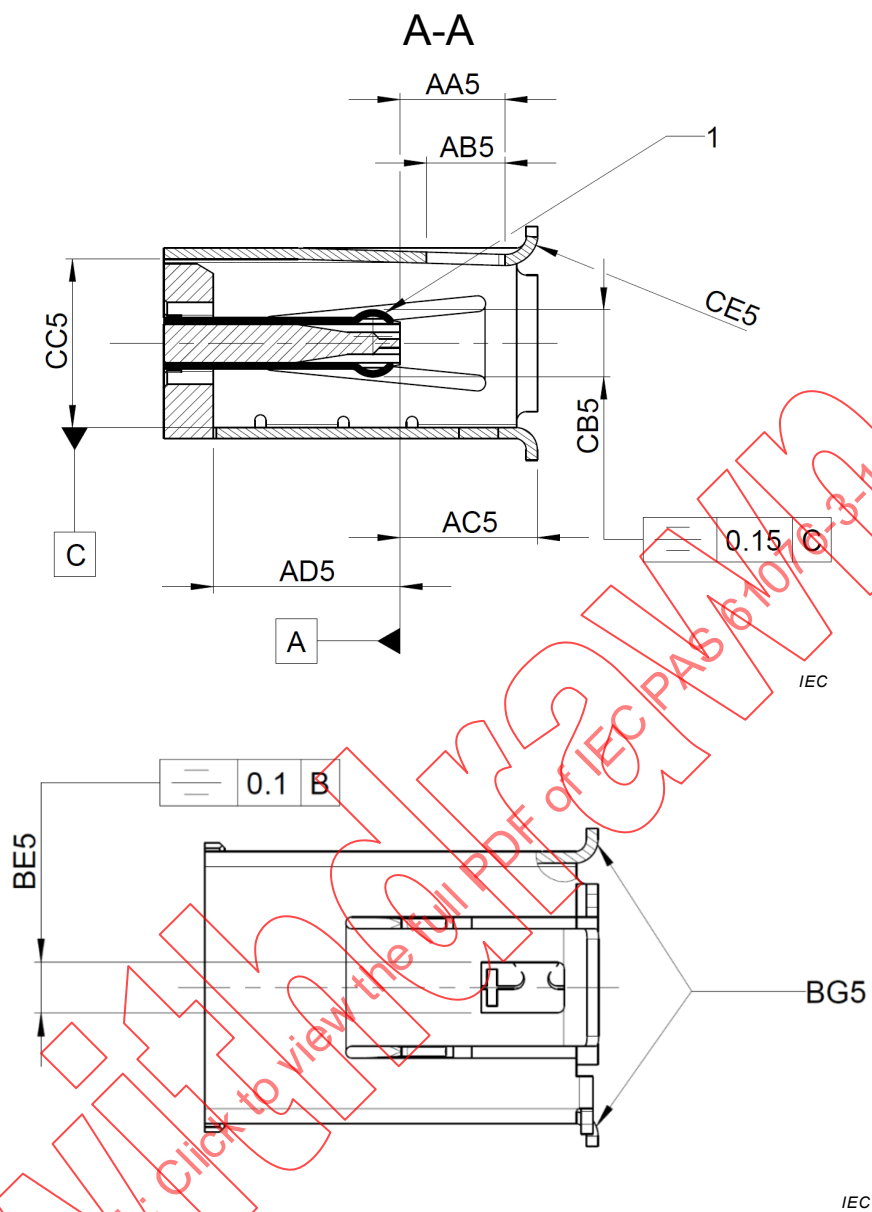
#### 4.2.3 Fixed connector TYP I



NOTE 1 Contact zone. Contacts shall be completely within their individual contact zone in the area indicated.

NOTE 2 Section A-A: see Figure 4.

**Figure 3 – View of contact zone**



**Key**

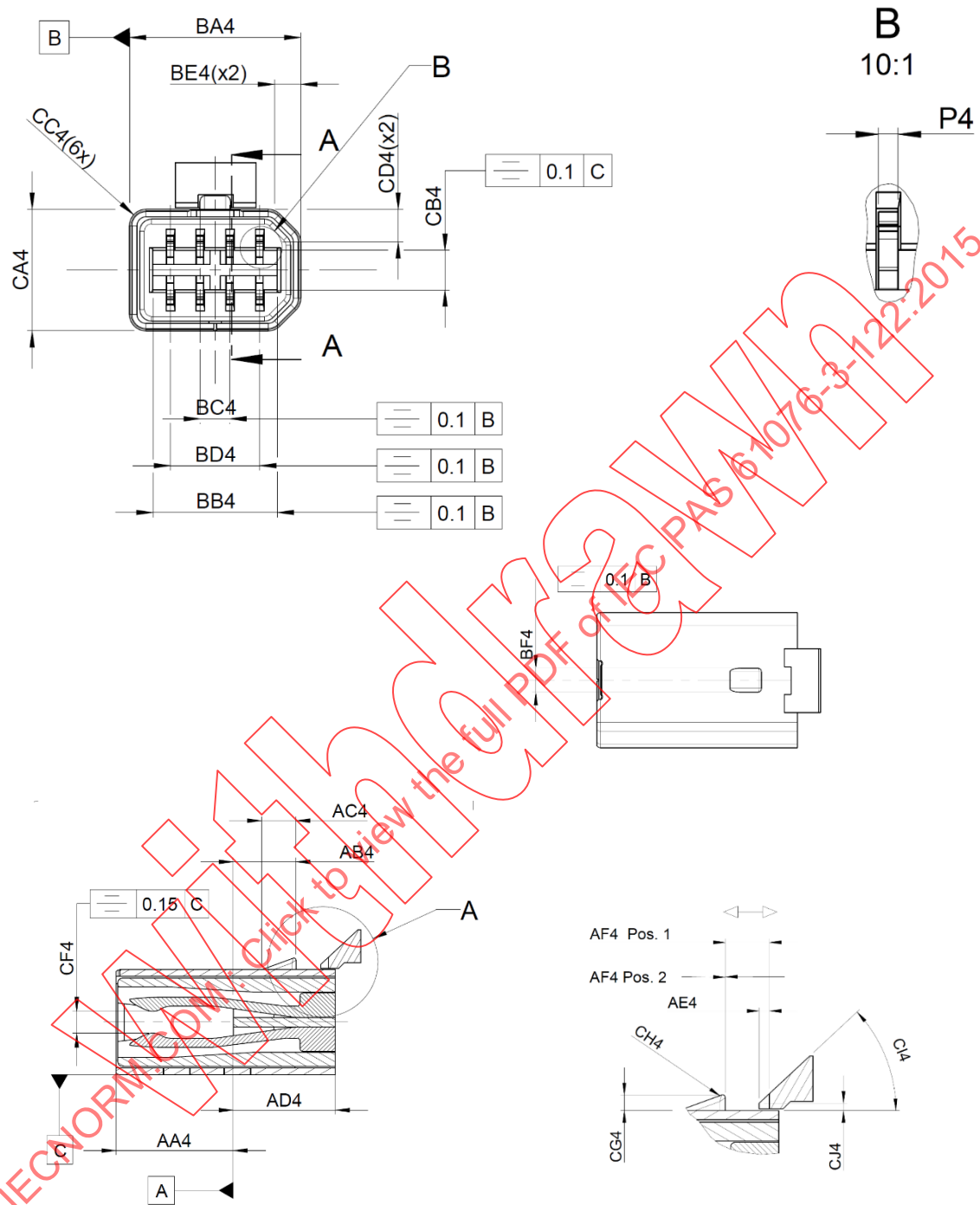
- 1 Preferred free connector stop.

**Figure 4 – Section A-A**

**Table 2 – Dimensions for Figures 3 and 4**

Letter	Maximum mm	Minimum mm	Nominal mm
AA5	3,3	3,1	3,2
AB5	2,5	2,3	2,4
AC5	4,4	4,2	4,3
AD5	5,9	5,7	5,8
BA5	7,5	7,35	7,4
BB5	5,3	5,1	5,2
BC5	395	3,88	3,9
BD5	1,3	1,15	1,2
BE5	1,6	1,4	1,5
BF5	1,05	0,95	1,1
BG5	R 0,65	R 0,75	R 0,7
CA5	1,55	1,45	1,5
CB5	2,2	2	2,1
CC5	5,35	5,25	5,3
CE5	R 1,05	R 0,9	R 1,0
CD5	1,15	1,05	1,1
CF5	3,2	3	3,1
P5	0,35	0,25	0,3

#### 4.2.4 Free connector TYP I



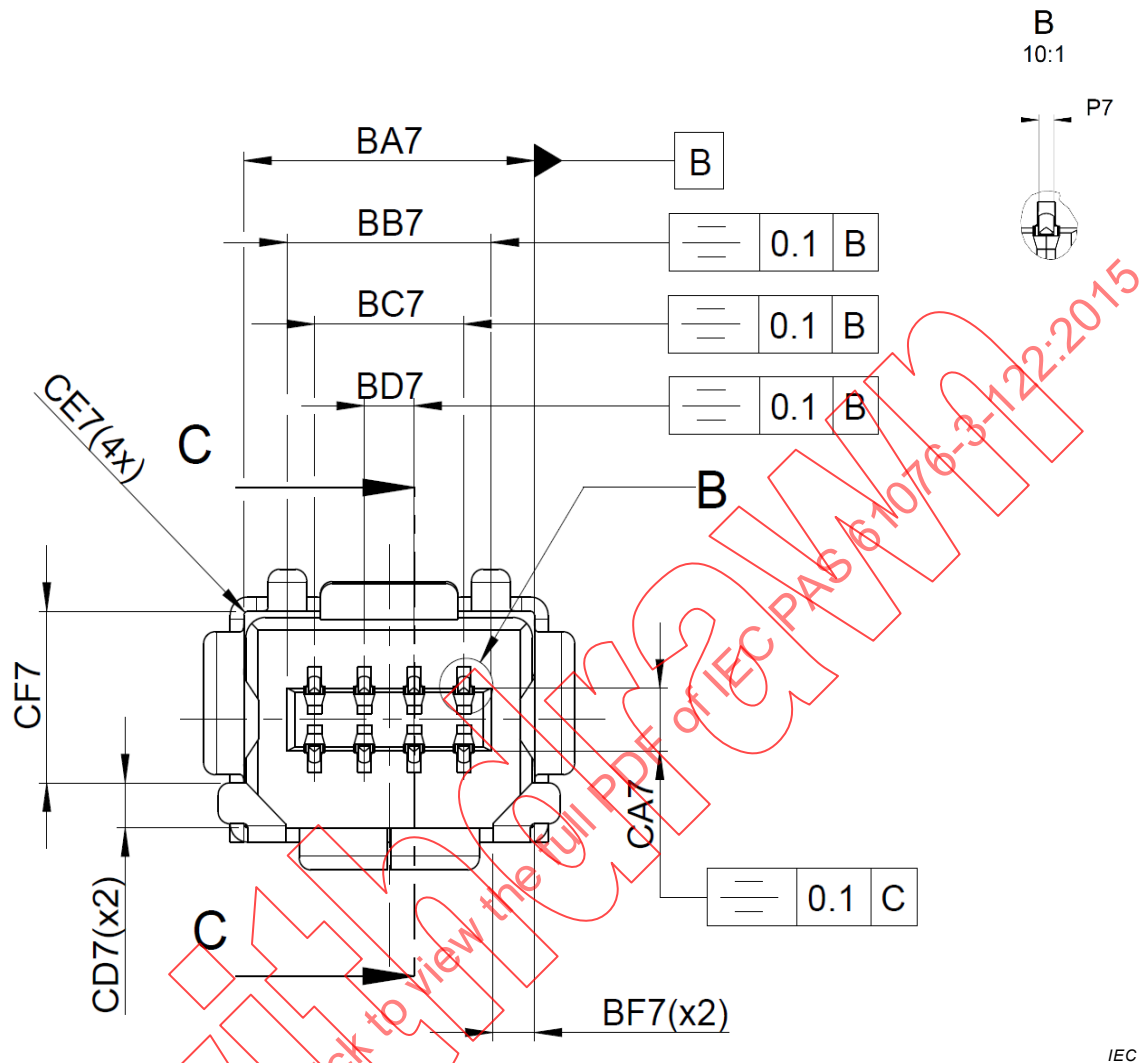
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Figure 5 – Free connector Typ I

**Table 3 – Dimensions for Figure 5**

Letter	Maximum mm	Minimum mm	Nominal mm
AA4	5,9	5,7	5,8
AB4	3,1	2,9	3
AC4	1,8	1,6	1,7
AD4	5,1	4,9	5
AE4	0,35	0,25	0,35
AF4	0	1,6	0, 1,6
CA4	5,23	5,15	5,1
CB4	1,7	1,65	1,7
CC4	R 0,7	R 0,65	R 0,7
CD4	1,4	1,25	1,3
CF4	1,1	1	1
CG4	0,55	0,45	0,5
CH4	R 0,15	R 0,05	R 0,1
CI4	45°	41°	43°
CJ4	0,25	0,17	0,2
BA4	7,34	7,24	7,3
BB4	5,33	5,27	5,3
BC4	1,3	1,22	1,27
BD4	3,9	3,7	3,8
BE4	1,13	1,07	1,1
BF4	1,4	1,2	1,3
P4	0,35	0,25	0,3

#### 4.2.5 Fixed connector TYP II

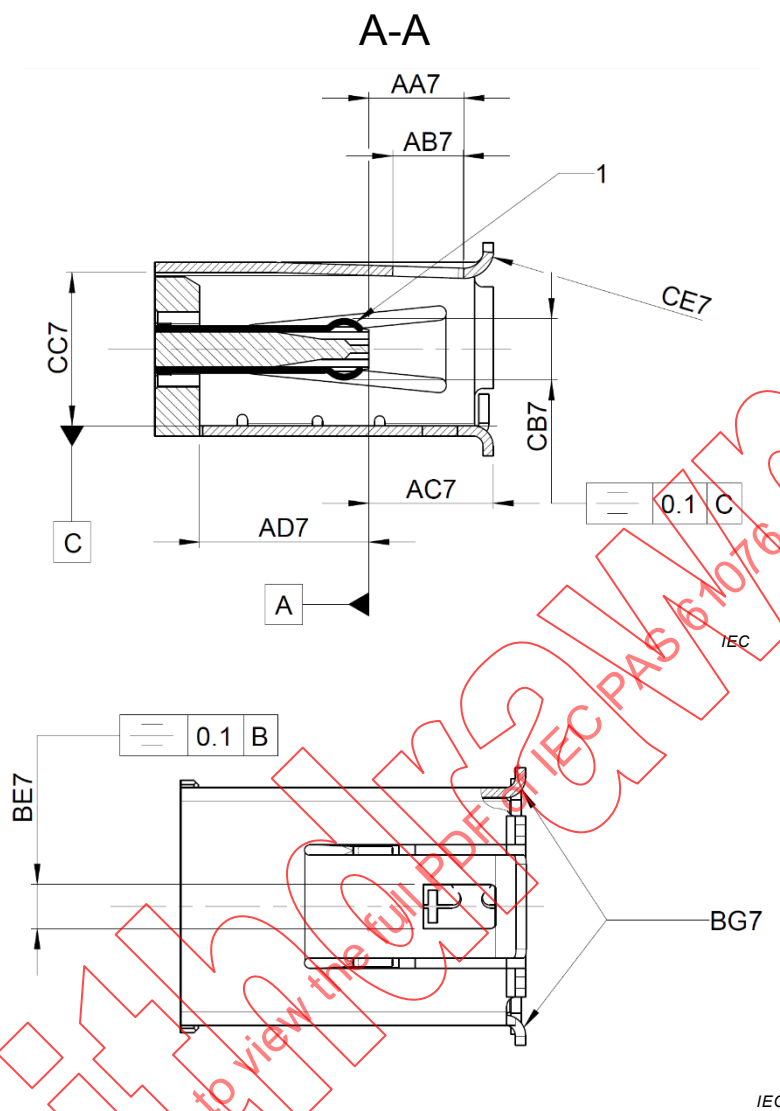


NOTE 1 Contact zone. Contacts shall be completely within their individual contact zone in the area indicated.

NOTE 2 Section A-A: see Figure 4.

**Figure 6 – View of contact zone**





**Key**

- 1 Preferred free connector stop.

**Figure 7 – Section D-D**

**Table 4 – Dimensions for Figures 6 and 7**

Letter	Maximum mm	Minimum mm	Nominal mm
AA7	3,3	3,1	3,2
AB7	2,5	2,3	2,4
AC7	4,4	4,2	4,3
AD7	5,9	5,7	5,8
BA7	7,5	7,35	7,4
BB7	5,3	5,1	5,2
BC7	395	3,88	3,9
BD7	1,3	1,15	1,2
BE7	1,6	1,4	1,5
BF7	1,05	0,95	1,1
BG7	R 0,65	R 0,75	R 0,7
CA7	1,55	1,45	1,5
CB7	2,2	2	2,1
CC7	5,35	5,25	5,3
CE7	R 1,05	R 0,9	R 1,0
CD7	1,15	1,05	1,1
CF7	4,1	4,3	4,2
P7	0,35	0,25	0,3

## 4.2.6 Free connector TYP II

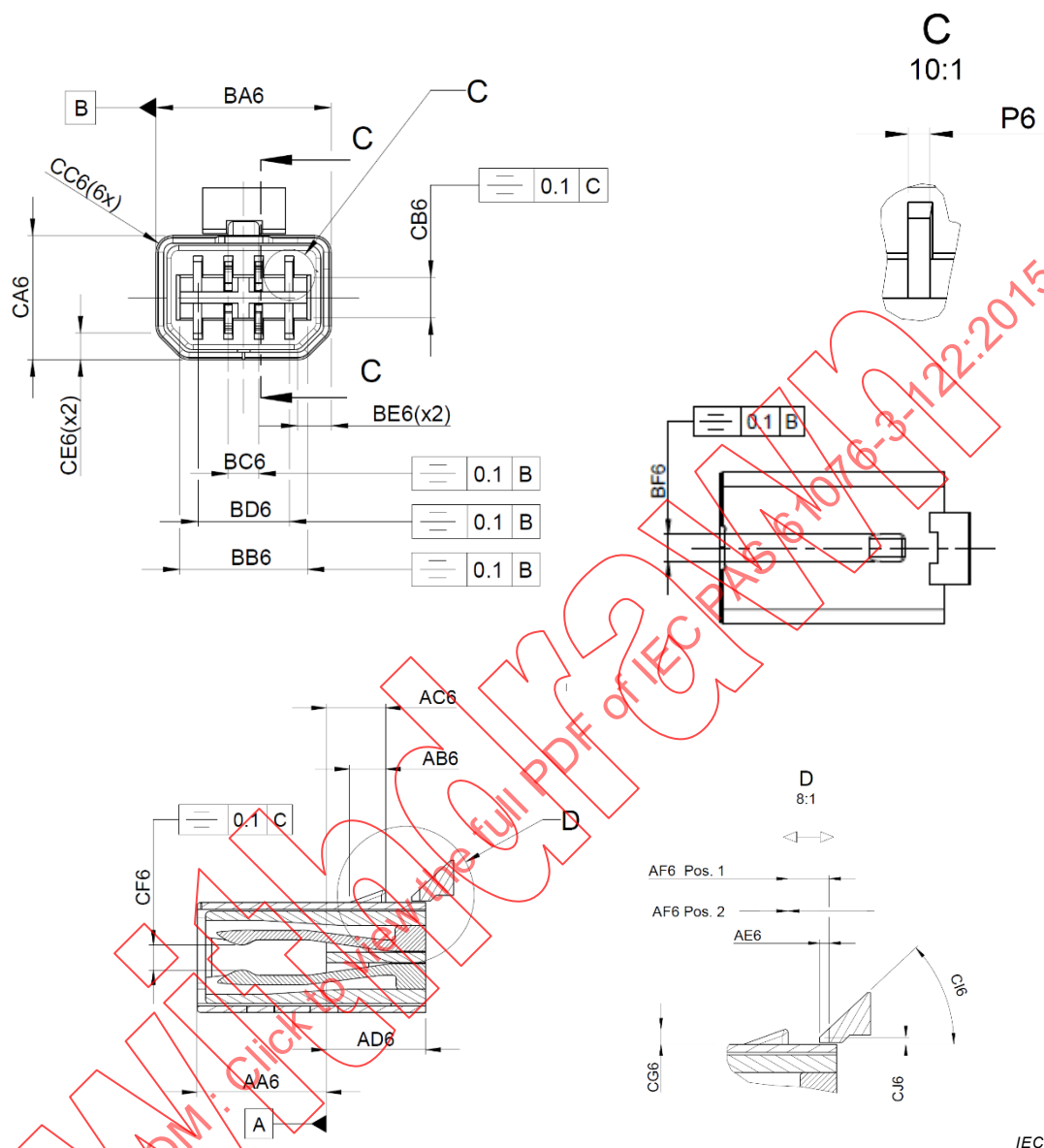


Figure 8 – Free connector

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**Table 5 – Dimensions for Figure 8**

Letter	Maximum mm	Minimum mm	Nominal mm
AA6	5,9	5,7	5,8
AB6	3,1	2,9	3
AC6	1,8	1,6	1,7
AD6	5,1	4,9	5
AE6	0,35	0,25	0,3
AF6	0	1,6	0, 1,6
CA6	5,23	5,15	5,1
CB6	1,7	1,65	1,7
CC6	R 0,7	R 0,65	R 0,7
CD6	1,4	1,25	1,3
CE6	1,2	1	1,1
CF6	1,1	1	1
CG6	0,55	0,45	0,5
CH6	R 0,15	R 0,05	R 0,1
CI6	45°	41°	43°
CJ6	0,25	0,17	0,2
BA6	7,34	7,24	7,3
BB6	5,33	5,27	5,3
BC6	1,3	1,22	1,27
BD6	3,9	3,7	3,8
BE6	1,13	1,07	1,1
BF6	1,4	1,2	1,3
P6	0,35	0,25	0,3

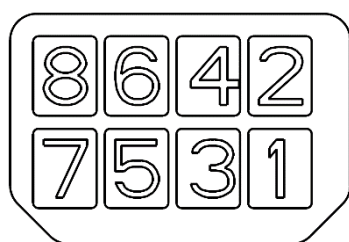
## 5 Characteristics

### 5.1 General

Compliance to the test schedules is intended to ensure the reliability of all performance parameters, including transmission parameters, over the range of operating climatic conditions. Stable and compliant contact resistance is a good indication of the stability of transmission performance.

### 5.2 Pin and pair grouping assignment

For those specifications where pin and pair groupings are relevant, the pin and pair grouping assignments shall be as shown in Figures 6 and 7, unless otherwise specified.



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**Figure 9 – Fixed connector pin and pair grouping assignment  
(front view of connector)**

### 5.3 Classification into climatic category

The lowest and highest temperatures and the duration of the damp-heat steady-state test should be selected from the preferred values stated in 2.3 of IEC 61076-1:2006. The connectors are classified into climatic categories in accordance with the general rules given in IEC 60068-1. The temperature range and severity of the damp heat, steady state test given in Table 6 are compatible with ISO/IEC 11801 classification of an office environment.

**Table 6 – Climatic categories – selected values**

Climatic category	Lower temperature °C	Upper temperature °C	Damp heat, steady state days
40/070/21	–40	70	21

### 5.4 Electrical characteristics

#### 5.4.1 Voltage proof

Conditions: IEC 60512, Test 4a, Standard atmospheric conditions

Mated connectors

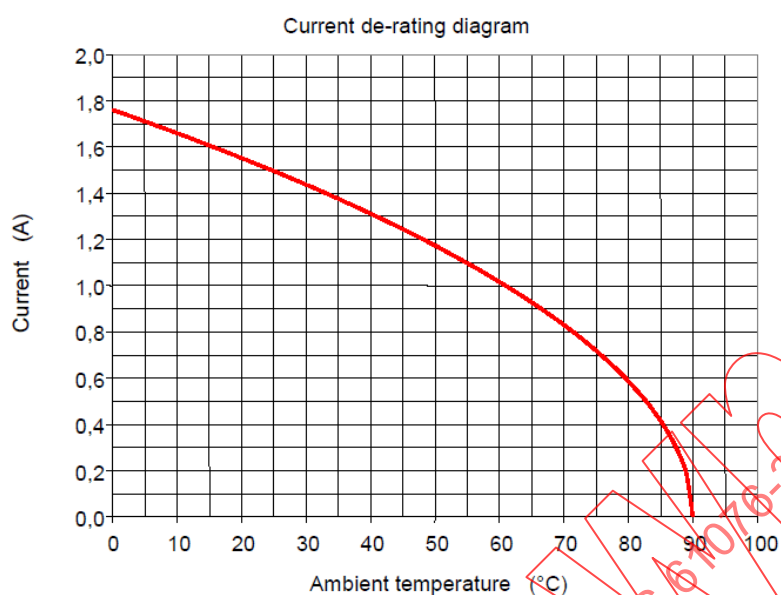
All variants: 500 V d.c. peak; one contact to all other contacts connected together.  
2 250 V d.c. peak; between bridged signal contacts on plug and board side and ground shield.

#### 5.4.2 Current-temperature derating

Conditions: IEC 60512, Test 5b

All contacts, connected in series

The current-carrying capacity of connectors in accordance with the requirements of 2.5 of IEC 61076-1:2006 shall comply with the de-rating curve given in Figure 8.



NOTE 1 The maximum permissible current for a given ambient temperature (t) is:  $I_{(t)} = 1,76 \cdot \left(1 - \frac{t}{90}\right)^{0,5}$

NOTE 2 For ambient temperatures lower than 0 °C, the maximum permissible current per conductor is 1,76 A.

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**Figure 10 – Connector de-rating curve**

### 5.4.3 Initial insulation resistance

Conditions: IEC 60512, Test 3a  
 Method A  
 Mated connectors  
 Test voltage: 500 V d.c.  
 All types: 500 MΩ minimum

## 5.5 Mechanical characteristics

### 5.5.1 Mechanical operation

Conditions: IEC 60512, Test 9a  
 Speed: 10 mm/s maximum  
 Rest: 1 s minimum (mated and unmated)  
 250 operations

### 5.5.2 Insertion and withdrawal forces

Conditions: IEC 60512, Test 13b  
 Speed: maximum rate of 12,7 mm per minute.  
 All types, insertion and withdrawal: 20,02 N maximum

## 6 Tests and test schedule

### 6.1 General

This IEC PAS states the test sequence (in accordance with this standard) and the number of specimens for each test sequence.

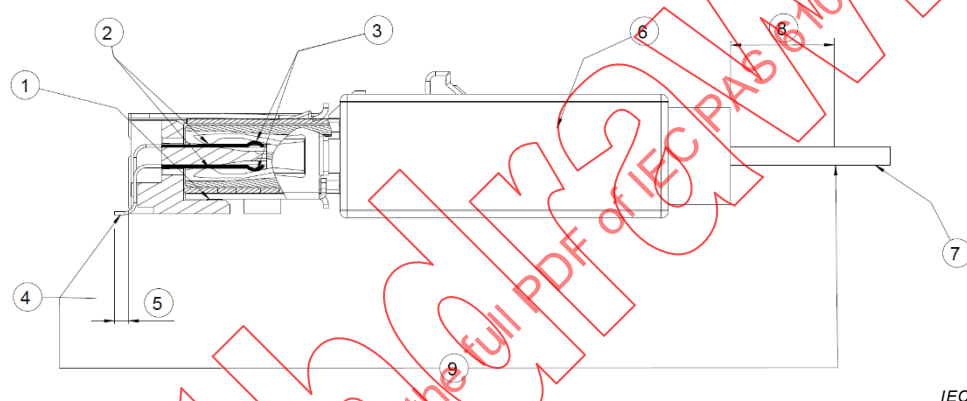
Individual variants may be submitted to type tests for approval of those particular variants.

It is permissible to limit the number of variants tested to a selection representative of the whole range for which approval is required (which may be less than the range covered by the detail specification), but each feature and characteristic shall be validated against the dimensional requirements and test sequences specified in this standard.

The connectors shall have been processed in a careful and workmanlike manner, in accordance with good current practice.

Unless otherwise specified, mated sets of connectors shall be tested. For contact resistance measurements, care shall be taken to keep a particular combination of connectors together during the complete test sequence; that is, when un-mating is necessary for a certain test, the same connectors shall be mated for subsequent tests.

## 6.2 Arrangement for contact resistance test



### Key

- 1 Fixed connector.
- 2 Point P1.
- 3 Point P2.
- 4 Point A. Measure the DC resistance across each of the 8 signal pins.
- 5 As short as practical (except for vibration test EP5, see 5.6.2.6).
- 6 Free connector.
- 7 Point C.
- 8 As short as practical (except for vibration test EP5, see 5.6.2.6).
- 9 Contact resistance measurement points.

**Figure 11 – Arrangement for contact resistance test**

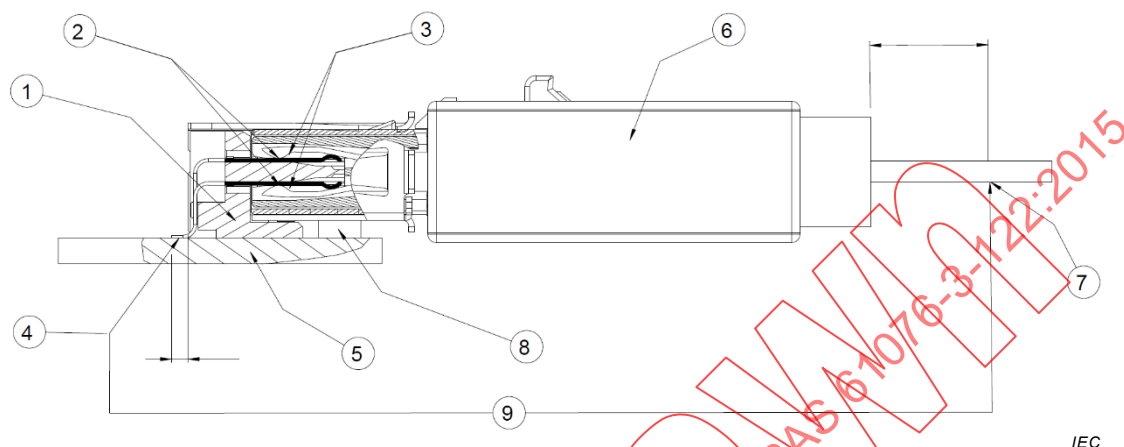
The test procedure is as follows.

- a) Determine the bulk resistance of the fixed connector between points A and P1 of Figure 11 by calculation or by measurement. This resistance is noted and recorded as  $R_{AP1}$ .
- b) Determine the bulk resistance of the free connector between points P2 and C of Figure 11 by calculation or by measurement. This resistance is noted and recorded as  $R_{AC}$ .
- c) Measure the total mated connector resistance between points A and C, following the requirements and procedures of IEC 60512, Test 2a. This resistance is noted and recorded as  $R_{AC}$ .
- d) Calculate the contact resistance by subtracting the sum of the bulk resistance of the fixed and free connectors from the total mated connector resistance.

$$\text{Contact resistance} = R_{AC} - (R_{AP1I} + R_{P2CI})$$

where, I, indicates initial value.

### 6.3 Arrangement for vibration test (test phase EP5)



#### Key

- 1 Fixed connector vibration feature.
- 2 Contact point P1.
- 3 Contact point P2.
- 4 Point A: secure to the non-vibrating member. Measure the DC resistance across each of the 8 signal pins.
- 5 Mounting plate.
- 6 Free connector.
- 7 Point C: secure to the non-vibrating member.
- 8 Fixed connector rigidly fixed to the mounting plate.
- 9 Contact resistance measurement point.

**Figure 12 – Arrangement for vibration test**

### 6.4 Test procedures and measuring methods

The test methods specified and given in the relevant standards are the preferred methods but not necessarily the only ones that can be used. In case of dispute, however, the specified method shall be used as the reference method.

Unless otherwise specified, all tests shall be carried out under standard atmospheric conditions for testing as specified in IEC 60068-1.

Where approval procedures are involved and alternative methods are employed, it is the responsibility of the manufacturer to satisfy the authority granting approval that any alternative methods which he may use give results equivalent to those obtained by the methods specified in this standard.

### 6.5 Preconditioning

Before the tests are made, the connectors shall be preconditioned under standard atmospheric conditions for testing as specified in IEC 60068-1 for a period of 24 h, unless otherwise specified by the detail specification.



## 6.6 Test schedules

### 6.6.1 General

The test parameters required shall not be less than those listed in 6.6.3.

### 6.6.2 Basic (minimum) test schedule

Not applicable.

### 6.6.3 Full test schedule

#### 6.6.3.1 General

The following tests specify the characteristics to be checked and the requirements to be fulfilled.

For a complete test sequence, 25 specimens are needed (Test groups P, AP, BP, CP and FP shall each consist of 3 specimens. Test group DP shall consist of 6 specimens. Test groups FP consist of 4 specimens).

Contact resistance tests apply only to the interface (see 6.2).

#### 6.6.3.2 Test group P – preliminary

All specimens shall be subjected to the following tests. All the test group specimens shall be subjected to the preliminary group P tests in the following sequence; see Table 9.

The specimens shall then be divided into the appropriate number of groups. All connectors in each group shall undergo the following tests as described in the sequence given.

**Table 7 – Test group P**

Test phase	Test			Measurement to be performed		
	Title	IEC Test no	Severity or condition of test	Title	IEC Test no	Requirements
P1	General examination			Visual examination		There shall be no defects that would impair normal operation
				Examination of dimensions and mass		The dimensions shall comply with those specified in the detail specification
P2	Contact resistance		All contacts/ specimens	Low level contact resistance		Max. 80 milliohms initial, 100 milliohms final
P3			500 V DC, 1 min hold	Insulation resistance		500 megohms minimum
P4			Contact/contact	Withstanding voltage		Subject specimens to 250 V DC between adjacent contacts

### 6.6.3.3 Test group AP

**Table 8 – Test group AP**

Test phase	Test			Measurement to be performed		
	Title	IEC Test no	Severity or condition of test	Title	IEC Test no	Requirements
AP1	General examination			Visual examination		There shall be no defects that would impair normal operation
				Examination of dimensions and mass		The dimensions shall comply with those specified in the detail specification
AP2	Contact resistance		All contacts/ specimens	Low level contact resistance		Max. 80 milliohms initial, 100 milliohms final
AP3	Mating / unmating force		Measure the force necessary to mate / unmate the specimens at a max. rate of 12,5 mm per minute			30 N max. for mating and for unmating
AP4	Contact resistance		All contacts/ specimens	Low level contact resistance		Max. 80 milliohms initial, 100 milliohms final
AP5	Temperature life		Subject mated specimens to a temperature of 85 °C during 315 h			Meet visual requirements, show no physical damage.
AP6	Contact resistance		All contacts/ specimens	Low level contact resistance		Max. 80 milliohms initial, 100 milliohms final
AP7	Durability		Mate and unmate the specimens for 50 cycles at a max. rate of 200 cycles/hour			Meet visual requirements, show no physical damage
AP8	Contact resistance		All contacts/ specimens	Low level contact resistance		Max. 80 milliohms initial, 100 milliohms final
AP9	Mating / unmating force		Measure the force necessary to mate / unmate the specimens at a max. rate of 12,5 mm per minute			30 N max. for mating and for unmating
AP10	Contact resistance		All contacts/ specimens	Low level contact resistance		Max. 80 milliohms initial, 100 milliohms final

**6.6.3.4 Test group BP****Table 9 – Test group BP**

Test phase	Test			Measurement to be performed		
	Title	IEC Test no	Severity or condition of test	Title	IEC Test no	Requirements
BP1	General examination			Visual examination		There shall be no defects that would impair normal operation
				Examination of dimensions and mass		The dimensions shall comply with those specified in the detail specification
BP2	Contact resistance		All contacts/ specimens	Low level contact resistance		Max. 80 milliohms initial, 100 milliohms final
BP3	Thermal shock		Subject mated specimens to 10 cycles between –55 °C and 85 °C with 30 min dwell at temp. extremes and 1 min transition between temperatures			Meet visual requirements, show no physical damage.
BP4	Contact resistance		All contacts/ specimens	Low level contact resistance		Max. 80 milliohms initial, 100 milliohms final
BP5	Humidity/temperature cycling		Subject mated specimens to 10 cycles (10 days) between 25 °C and 60 °C at 80 % to 100 % RH			Meet visual requirements, show no physical damage.
BP6	Contact resistance		All contacts/ specimens	Low level contact resistance		Max. 80 milliohms initial, 100 milliohms final