

PUBLICLY AVAILABLE SPECIFICATION

PRE-STANDARD

Radio-frequency connectors –
Part 19: Sectional specification for SSMB series R.F. coaxial connectors

With Norm
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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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PUBLICLY AVAILABLE SPECIFICATION

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**Radio-frequency connectors –
Part 19: Sectional specification for SSMB series R.F. coaxial connectors**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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RADIO-FREQUENCY CONNECTORS –

Part 19: Sectional specification for SSMB series R.F. coaxial 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
46F/96/PAS	46F/110/RVD

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RADIO-FREQUENCY CONNECTORS –

Part 19: Sectional specification for SSMB series R.F. coaxial connectors

1 Scope

This PAS is a sectional specification providing information and rules for preparation of detail specification of SSMB series R.F. connectors together with the pro forma blank detail specification.

The SSMB series connectors with characteristic impedance $50\ \Omega$ are one kind of low power miniature connectors with snap-on coupling mechanism and have the characteristics of light weight, small size, convenient connection and excellent characteristics. This connector range is suitable for the standard ranges of flexible and semi-rigid cables and is also available as a PCB mounted version. The connectors are usable up to a frequency of 3 GHz.

It also prescribes mating face dimensions for grade 2 general purpose connectors, dimensional detail of grade 0 standard test connectors, gauging information and tests selected from IEC 61169-1 applicable to all detail specifications relating to SSMB series RF connectors.

This specification indicates recommended performance characteristics to be considered when writing a detail specification and it covers test schedules and inspection requirements for assessment levels M and H.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61169-1:1992, *Radio-frequency connectors – Part 1: Generic specification – General requirements and measuring methods*¹⁾

Amendment 1 (1996)

Amendment 2 (1997)

3 Mating face and gauge information

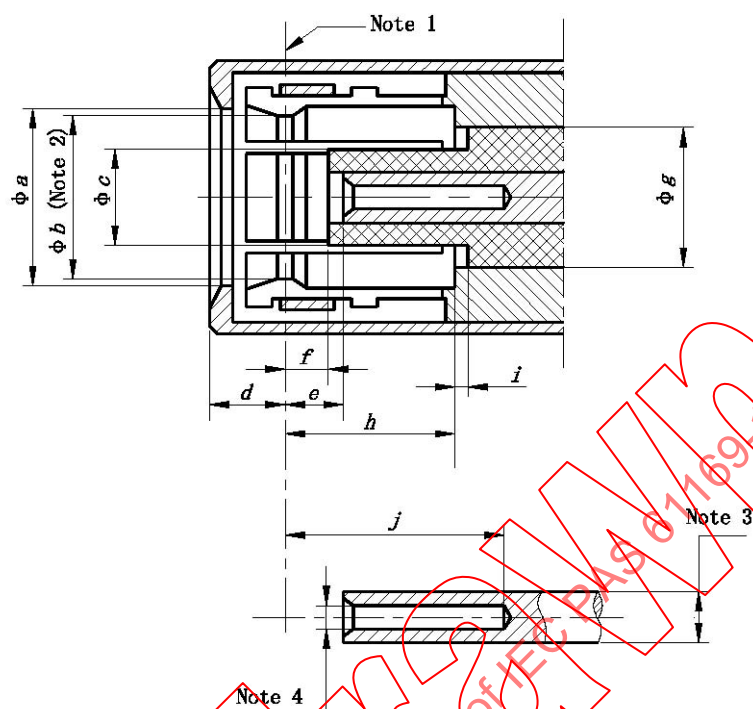
3.1 Dimensions – General purpose connectors – Grade 2

3.1.1 Connector with socket-centre contact

Inch dimensions are original dimensions.

All non-dimensioned pictorial configurations are for reference purpose only.

¹⁾ There exists a consolidated edition 1.2 (1998) that comprises IEC 61169-1, its Amendment 1 and its Amendment 2.



NOTE For dimensions and notes, see Table 1.

Figure 1 – Connector with socket- centre contact

Table 1 – Dimensions of connector with socket-centre contact

Ref.	mm		in	
	min	max	min	max
a	2,74	-	0,108	-
b	-	-	-	-
c	-	1,34	-	0,053
d	-	1,78	-	0,070
e	0,84	-	0,033	-
f	0,84	-	0,033	-
g	2,11 (nominal)		0,083 (nominal)	
h	3,10	-	0,122	-
i	0,00	-	0,00	-
j	2,77	-	0,109	-

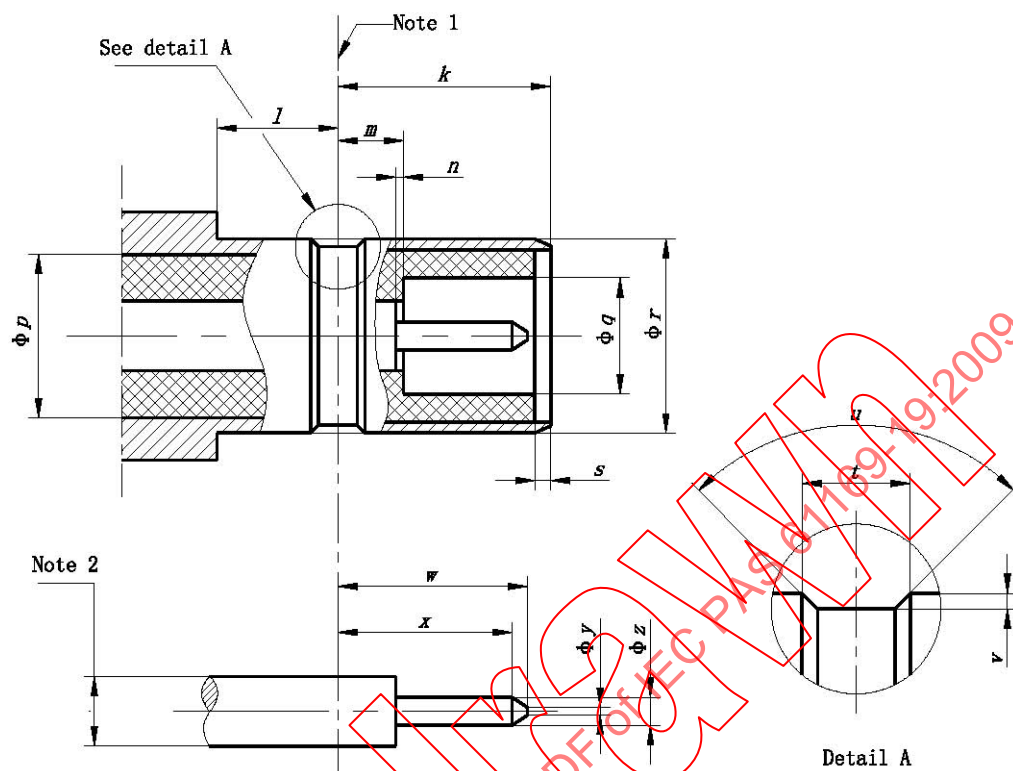
NOTE 1 Reference plane.

NOTE 2 The form and dimension of outer contact detent must meet electrical and mechanical performance requirements.

NOTE 3 The diameters are chosen upon the assumption that the PTFE dielectric has a dielectric constant of 2,02 to give an impedance of 50 Ω .

NOTE 4 Resilient contact may be closed or open entry, method of resilience is optional, provided that when a pin of 0,36 mm $\sim$ 0,38 mm (0,014 $\sim$ 0,015 in) diameter is inserted, VSWR mating and endurance performances are obtained.

3.1.2 Connector with pin-centre contact



NOTE For dimensions and notes, see Table 2.

Figure 2 – Connector with pin-centre contact

Table 2 – Dimensions of connector with pin-centre contact

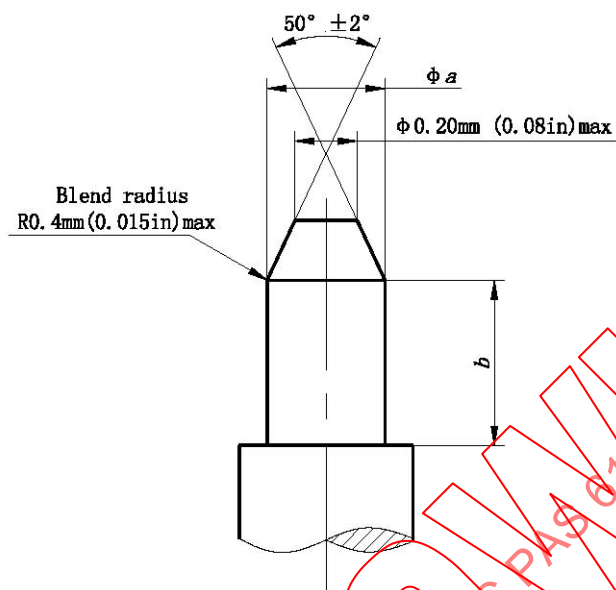
Ref.	mm		in	
	min	max	min	max
<i>k</i>		3,10	-	0,122
<i>l</i>	1,91	-	0,075	-
<i>m</i>		0,84	-	0,033
<i>n</i>	0,00	-	0,000	-
<i>p</i>	2,11 (nominal)		0,083 (nominal)	
<i>q</i>	1,37	-	0,054	-
<i>r</i>	-	2,67	-	0,105
<i>s</i>	0,00	-	0,000	-
<i>t</i>	0,71	0,74	0,028	0,029
<i>u</i>	88°~92°		88°~92°	
<i>v</i>	0,05	0,15	0,002	0,006
<i>w</i>	-	2,75	-	0,108
<i>x</i>	1,91	-	0,075	-
<i>y</i>	-	0,25	-	0,010
<i>z</i>	0,36	0,38	0,014	0,015

NOTE 1 Reference plane.

NOTE 2 The diameters are chosen upon the assumption that the PTFE dielectric has a dielectric constant of 2,02 to give an impedance of 50 Ω.

3.2 Gauges

3.2.1 Gauge pins for socket-centre contact



NOTE For dimensions and notes, see Table 3.

Figure 3 – Gauge pins for socket-centre contact

Table 3 – Dimensions of gauge pins for socket-centre contact

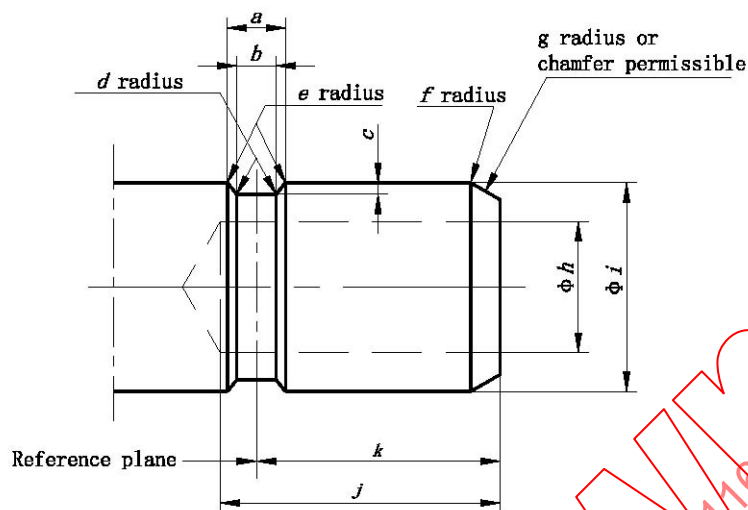
Gauge A					Gauge B			
Maximum material for sizing purposes					Minimum material for measurement of retention force			
					Mass of gauge: 16 g ± 1 g			
Ref.	mm		in		mm		in	
	min	max	min	max	min	max	min	max
<i>a</i>	0,381	0,384	0,015 0	0,015 1	0,353	0,356	0,013 9	0,014 0
<i>b</i>	1,70	1,80	0,067	0,071	1,70	1,80	0,067	0,071
Material: steel, polished, surface roughness: Ra=0,4 µm (16 µin) maximum.								

3.2.2 Test procedure

The gauge A shall be inserted into the socket-centre contact three times with a minimum depth of *b*. This is a sizing operation and should only be carried out when the socket-centre contact is removed from the connector.

After this, the gauge B shall be inserted into socket-centre contact. The contact shall retain the mass of the gauge in a vertical downward position. This test also shall be carried out on connector when the socket-centre contact is not removed.

3.2.3 Gauge for outer contact of socket-centre contact



NOTE For dimensions and notes, see Table 4.

Figure 4 – Outer contact sizing and retention force gauges A and B

Table 4 – Dimensions of gauge for outer contact

Ref.	Gauge A (maximum material for sizing purpose)				Gauge B (minimum material for measurement of gauge retention force)			
	mm		in		mm		in	
	min	max	min	max	min	max	min	max
a	0,74	0,75	0,029 1	0,029 5	0,58	0,64	0,022 8	0,025 2
b	0,48	0,51	0,018 9	0,020 0	0,43	0,46	0,016 9	0,018 1
c	0,14	0,15	0,005 5	0,005 9	0,075	0,125	0,003 0	0,004 9
d	-	0,08	-	0,003 1	-	0,08	-	0,003 1
e	0,08	0,18	0,003 1	0,007 1	0,08	0,18	0,003 1	0,007 1
f	0,2	0,4	0,007 9	0,015 7	0,2	0,4	0,007 9	0,015 7
g	-	0,38	-	0,015 0	-	0,38	-	0,015 0
h	1,68	-	0,066 1	-	1,68	-	0,066 1	-
i	2,672	2,675	0,105 2	0,105 3	2,667	2,670	0,105 0	0,105 1
k	3,05	3,10	0,120 1	0,122 0	3,05	3,10	0,120 0	0,122 0
j	3,50	-	0,137 8	-	3,50	-	0,137 8	-
Material: steel, polished, surface roughness: Ra=0,4 µm (16 µin) maximum.								

3.2.4 Test procedure

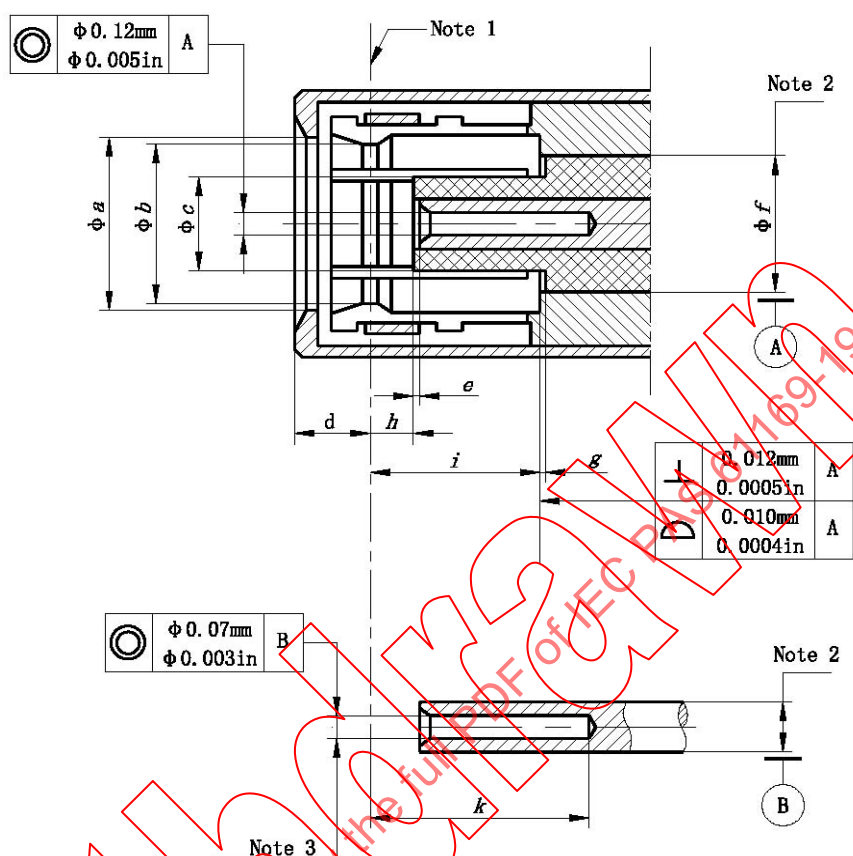
The gauge A shall be inserted into the outer contact of the socket-centre contact three times. This is a sizing operation.

After this, the gauge B shall be inserted into the outer contact of the socket-centre contact. The contact shall support the mass of the gauge in a vertical downward position.

NOTE Additional test: Following the sizing operation, the force necessary to insert gauge A into the outer contact of the socket-centre contact shall be measured. When this test is required, the maximum permitted insertion force is then specified and is smaller than 27 N.

3.3 Dimensions – Standard test connectors – Grade 0

3.3.1 Connector with socket-centre contact



NOTE For dimensions and notes, see Table 5.

Figure 5 – Connector with socket-centre contact

Table 5 – Dimensions of connector with socket-centre contact

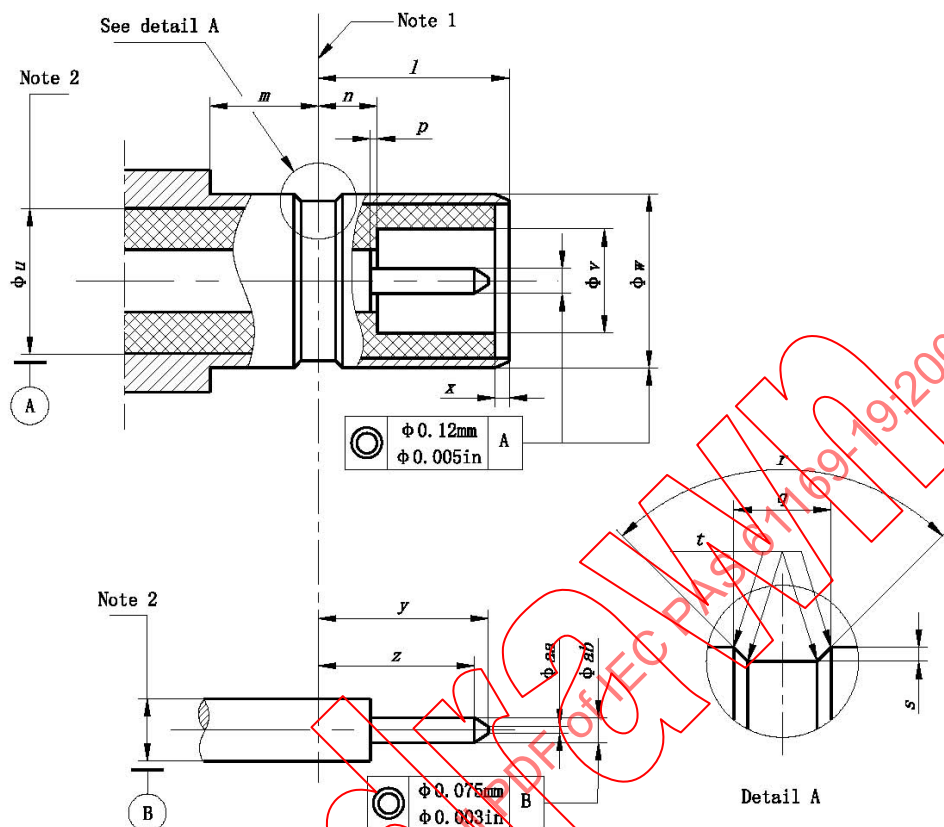
Ref.	mm		in	
	min	max	min	max
a	2,740	2,840	0,107 9	0,111 8
b	2,464	2,514	0,097 0	0,099 0
c	1,295	1,340	0,051 0	0,052 8
d	-	1,780	-	0,070 1
e	0,000	0,127	0,000 0	0,005 0
f	2,110 (nominal)		0,0830 (nominal)	
g	0,000	0,127	0,000 0	0,005 0
h	0,840	0,942	0,033 1	0,037 1
i	3,100	3,150	0,122 0	0,124 0
k	2,770	-	0,109 1	-

NOTE 1 Reference plane.

NOTE 2 The diameters are chosen upon the assumption that the PTFE dielectric has a dielectric constant of 2,02 to give an impedance of $50 \Omega \pm 0,5 \Omega$.

NOTE 3 Resilient contact may be closed or open entry, method of resilience optional, provided that when a pin of 0,36 mm ~ 0,38 mm (0,014 in ~ 0,015 in) diameter is inserted, VSWR mating and endurance performances are obtained.

3.3.2 Connector with pin-centre contact



NOTE For dimensions and notes, see Table 6.

Figure 6 – Connector with pin-centre contact

Table 6 – Dimensions of connector with pin-centre contact

Ref.	mm		in	
	min	max	min	max
<i>l</i>	3,050	3,100	0,120 1	0,122 0
<i>m</i>	1,905	-	0,075 0	-
<i>n</i>	0,740	0,840	0,029 1	0,033 1
<i>p</i>	0,000	0,127	0,000 0	0,005 0
<i>q</i>	0,710	0,740	0,028 0	0,029 1
<i>r</i>	89°~91°		89°~91°	
<i>s</i>	0,120	0,150	0,004 7	0,005 9
<i>t</i>	0,080 radius		0,003 0 radius	
<i>u</i>	2,110 (nominal)		0,083 0 (nominal)	
<i>v</i>	1,370	1,420	0,053 9	0,055 9
<i>w</i>	2,620	2,670	0,103 1	0,105 1
<i>x</i>	0,000	0,050	0,000 0	0,002 0
<i>y</i>	-	2,750	-	0,108 3
<i>z</i>	1,910	-	0,075 2	-
<i>aa</i>	-	0,250	-	0,010 0
<i>ab</i>	0,360	0,380	0,014 2	0,015 0

NOTE 1 Reference plane.

NOTE 2 The diameters are chosen upon the assumption that the PTFE dielectric has a dielectric constant of 2,02 to give an impedance of $50 \Omega \pm 0,5 \Omega$.

4 Quality assessment procedures

4.1 General

The following subclauses provide recommended rating, performance and test conditions to be considered when writing a detail specification. They also provide an appropriate schedule of tests with minimum levels of conformance inspection sampling, together with the pro forma blank detail specification (BDS) and instructions for the preparation of a detail specification.

4.2 Rating and characteristics (see Clause 6 of IEC 61169-1)

The values indicated below are recommended for SSMB series RF connectors and are given for the writer of the detail specification. They are applicable for the condition when the connectors are fully mated.

Certain tests are listed without any recommended values being given. These tests will usually not be required. When these tests are required, appropriate values shall be entered in the detail specification at the discretion of the specification writer.

Table 7 – Rating and characteristics

Rating and characteristics	Test method IEC 61169-1 subclause	Values	Remarks including any deviations from standard test method
Electrical			
Nominal impedance		50 Ω	
Frequency range		Up to 3 GHz	
Reflection factor ¹⁾	9.2.4		
Grade 2 connectors			
- straight styles		$\leq 0,1$	Up to 1GHz
- right-angle styles		$\leq 0,15$	Up to 3GHz
- component mounting styles		$\leq 0,2$	Up to 1GHz
- solder bucket and PCB mounting styles		$\leq 0,24$	Up to 3GHz
Centre contact resistance ²⁾	9.2.3		
- initial		$\leq 5,0 \text{ m}\Omega$	
- after conditioning		$\leq 15,0 \text{ m}\Omega$	
Outer conductor continuity ²⁾	9.2.3		
- initial		$\leq 2,5 \text{ m}\Omega$	
- after conditioning		$\leq 7,5 \text{ m}\Omega$	
Insulation resistance ¹⁾	9.2.5		
- initial		$\geq 1\,000 \text{ M}\Omega$	
- after conditioning		$\geq 200 \text{ M}\Omega$	
Proof voltage at sea-level ³⁾⁴⁾	9.2.6	500 V	
Proof voltage at 4,4 kPa ³⁾⁴⁾	9.2.6	100 V	4,4 kPa approximately equivalent to 20 km
Environmental voltage at sea level ³⁾⁴⁾		250 V	
Environmental voltage at 4,4 kPa ³⁾⁴⁾		85 V	4,4 kPa approximately equivalent to 20 km
Screening effectiveness (straight cables only) ⁶⁾	9.2.8	$\geq 40 \text{ dB at } 1 \text{ GHz}$	

Rating and characteristics	Test method IEC 61169-1 subclause	Values	Remarks including any deviations from standard test method
Mechanical Gauge retention force (resilient contacts) - centre contact - outer contact	9.3.4	$\geq 0,15 \text{ N}$ $\geq 4,5 \text{ N}$	
Centre contact captivation - axial force	9.3.5	$\geq 8,9 \text{ N}$	Maximum displacement 0,25 mm in each direction
Engagement and separation - separation force - insertion force	9.3.6	$\geq 4,5 \text{ N}$ $\leq 27 \text{ N}$	
Mechanical tests on cable fixing - cable rotation (nutation)	9.3.7.2	See DS	
- cable pulling	9.3.8	See DS	
- cable bending	9.3.9	See DS	
- cable torsion	9.3.10	See DS	
Bending moment	9.3.12	See DS	
Vibration	9.3.3	100 m/s^2 10 Hz ~ 500 Hz	10 g _n
Shock	9.3.14	See DS	
Environmental Climatic category	9.4.2	A:55/125/21 B:40/085/21	
Sealing non-hermetic	9.4.5.1	$\leq 100 \text{ kPa} \cdot \text{cm}^3/\text{h}$	100 kPa to 110 kPa differential
Hermetic	9.4.5.2	$\leq 10^{-3} \text{ Pa} \cdot \text{cm}^3/\text{s}$	100 kPa to 110 kPa differential
Salt mist	9.4.6	48 h spray	
Endurance Mechanical endurance High temperature endurance ⁵⁾	9.5 9.6	500 operations Category A: 250 h at 125 °C Category B: 250 h at 85 °C	
1) These values apply to basic connector. In practice, these may be influenced by the cable used and reference should always be made to the actual values given in the detail specification. 2) Values for a single pair of connectors. 3) Voltages are r.m.s. values of AC at 40 Hz to 65 Hz, unless otherwise specified. 4) Some cables usable with these connectors have ratings lower than the values given here. 5) For certain connectors, the upper temperature limit is restricted by the cable characteristics. Reference should be made to the relevant cable specification. When semi-rigid and semi-flexible cables are used, the upper temperature is limited to 115 °C maximum. 6) When interfaces are fully mated.			

4.3.1 Acceptance tests

Table 8 – Acceptance tests

	Test method IEC61169-1 subclause	Assessment level M (higher)				Assessment level H (lower)			
		Test required	IL	AQL %	Period	Test required	IL	AQL %	Period
Group A1 Visual examination	9.1.2	a	II	1.0	Lot By Lot	a	S-3	1,5	Lot By Lot
Group B1 Outline dimension	9.1.3.1	a	S-4	0.40		a	S-3	4,0	
Mechanical compatibility	9.1.3.3	a	II	1.0		a	S-3	1,5	
Engagement and separation	9.3.6	a	S-4	0.40		a	S-3	1,5	
Gauge retention (resilient contacts)	9.3.4	ia	II	1.0		ia	S-3	1,5	
Sealing non-hermetic	9.4.5.1	ia	II	0.65		ia	S-3	1,0	
hermetic	9.4.5.2	ia	II	0.015		ia	II	0,025	
Voltage proof	9.2.6	a	S-4	0.40		a	II	4,0	
Solderability (d)	9.3.2.1.1	ia	S-4	0.40		ia	S-3	4,0	
Insulation resistance	9.2.5	a	S-4	0,40		a	S-3	4,0	

For the symbols, abbreviations and procedures, see the end of Table 8.

4.3.2 Periodic tests

There are no group C tests for levels H and M.

Table 9 – Periodic tests

	Test method IEC61169-1 subclause	Assessment level M (higher)				Assessment level H (lower)			
		Test required	Number of specimens	Permitted failures per group ¹⁾	Period	Test required	Number of specimens	Permitted failures per group ¹⁾	Period
Group D1 (d)									
Solderability - connector assemblies	9.3.2.1.1	ia	6	1	3 years	ia	3	1	3 years
Resistance to soldering heat	9.3.2.1.2	ia				ia			
Mechanical tests on cable fixing									
-cable rotation (nutation)	9.3.7.2	ia				ia			
-cable pulling	9.3.8	ia				ia			
-cable bending	9.3.9	ia				ia			
-cable torsion	9.3.10	ia				ia			
Bending moment	9.3.12	a	6	1	3 years	a	3	1	3 years
Strength of coupling mechanism	9.3.11	ia				ia			
Group D2 (d)									
Contact resistance	9.2.3	a				a	3	1	3 years
Outer con- ductor and screen con- tinuity	9.2.3								
Centre conductor continuity									
Bump	9.3.13	na				na			
Vibration	9.3.3	a				a			
Shock	9.3.14	a				a			
Damp heat, steady state	9.4.3	a	6	1	3 years	a			
Salt mist	9.4.6	a				a			
Group D3									
Dimensions piece part and materials	9.1.3.2	a	1 ²⁾	1	3 years	a	1 ²⁾	1	3 years

	Test method IEC61169-1 subclause	Assessment level M (higher)				Assessment level H (lower)			
		Test required	Number of specimens	Permitted failures per group ¹⁾	Period	Test required	Number of specimens	Permitted failures per group ¹⁾	Period
Group D4 (d) Mechanical endurance	9.5	a	6	1	3 years	a	3	1	3 years
High temperature endurance	9.6	a				a			
Sulphur dioxide	9.4.8	na				na			
Group D5 (d) Reflection factor	9.2.1	a	6	1	3 years	a	3	1	3 years
Screening effectiveness	9.2.8	a				a			
Water Immersion	9.2.7	ia				ia			
Group D6 (d) Contact captivation	9.3.5	ia	6	1	3 years	ia	3	1	3 years
Discharge test (corona effect)	9.2.9	a				a			
Rapid change of temperature	9.4.4	a				a			
Climatic sequence	9.4.2	a				a			
Group D7 (d) Resistance to solvents and contaminating fluids	9.7	na	1 ³⁾	1	3 years	na	1 ³⁾	1	3 years

1) For qualification approval, a total of 2 failures only permitted for level H and 1 failure only permitted for level M from groups D1 to D7.

2) One set of piece parts each style and variant unless using common piece parts.

3) Group D7 -number of pairs for each solvent.

ABBREVIATIONS:

a - applicable.

na - not applicable.

ia - test required (if technically applicable).

(d) - destructive test - specimens shall not be returned to stock.

IL-inspection level.

AQL- acceptable quality level.

4.4 Procedures

4.4.1 Quality conformance inspection

This shall consist of test group A1 and B1 on a lot-by-lot basis and test group D1 to D7 on a periodic basis.

4.4.2 Qualification approval and its maintenance

This still consists of three consecutive lots passing test groups A1 and B1 followed by selection of specimens from the lots as appropriate. These specimens shall successfully pass the specified periodic D tests.

5 Instructions for preparation of detail specifications

5.1 General

Detail specifications (DS) writers shall use the appropriate BDS pro-forma. The following pages comprise the pro-forma BDS dedicated for use with 50 Ω type SSMA connectors. As such, it will already have entered on it information relating to

- a) the basic specification number applicable to all the detail specifications covering connector styles of the type covered by the sectional specification,
- b) the connector series designation.

The specification writer should enter the details relating to the connector style/variant(s) to be covered as indicated. The numbers in brackets on the BDS pro-forma correspond to the following indications which shall be given.

5.1 Identification of the component

(5) Enter the following details:

Style: The style designation of the connector including type of fixing and sealing, if applicable.

Attachment: By deletion of the inapplicable options of cable/wire: given for centre and outer conductors.

Special features and markings: As applicable.

(6) Enter details of assessment level and the climatic category.

(7) A reproduction of the outline drawing and details of the panel piercing, if applicable. It shall provide the maximum envelope dimensions, also the position of the reference plane and, in the case of a fixed connector, the position of the mounting plane(s) relative to the front face of the connector.

Any maximum panel thickness limitations for fixed connectors shall be stated.

(8) Particulars of all variants covered by the DS. As appropriate, the information shall include:

- cable types (or sizes) applicable to each variant;
- alternative plated or protective finishes;
- details of alternative mounting flanges having either tapped or plain mounting holes;
- details of alternative solder spills or solder buckets including, when applicable, those for use with microwave integrated circuit (MIC) components.

5.2 Performance

(9) Performance data listing the most important characteristics of the connector taking into account the recommended values in 4.2 of this specification. Deviations from the minimum requirements shall be clearly indicated. Non-applicable parameters shall be marked 'na'.

5.3 Marking, ordering information and related matters

- (10) Insert marking and ordering information as appropriate, together with details of related documents and any invoked structural similarity.

5.4 Selection of tests, test conditions and severities

- (11) 'na' shall be used to indicate non-applicable tests. All tests marked 'a' by the detail specification writer shall be mandatory.

When using the normal procedure with a dedicated BDS, the letter 'a' – for applicable – shall be entered in the 'Test required' column against each of the tests indicated as being mandatory in the test schedule as in 4.3 of this specification. Any additional tests required at the discretion of the specification writer shall also be indicated by an 'a'.

The specification writer shall also indicate, when necessary, details of deviations from the standard test methods and test conditions, including any relevant deviations given in the test schedule of the sectional specification.

The qualification approval and conformance inspection shall be such that the national supervising inspectorate (NSI) shall be satisfied that they are appropriate and in line with those for other connectors within the system providing a reasonably comparable service.

5.5 Blank detail specification pro-forma for type SSMB connector

The following pages contain the complete BDS pro-forma.

(1)		Page 1 of 10			
ELECTRONIC COMPONENT OF ASSESSED QUALITY IN ACCORDANCE WITH GENERIC SPECIFICATION IEC 61169-1 SECTIONAL SPECIFICATION IEC 61169-19 NATIONAL REFERENCE		(4) ISSUE			
(5) Detail specification for Radio frequency coaxial connector of assessed quality			type SSMB		
Style:.....		Special features and markings			
Method of cable/wire+ attachment		centre conductor – solder/crimp+ outer conductor – solder/clamp/crimp + + delete as appropriate			
(6) Assessment level.....	Characteristic impedance 50 Ω	Climatic category...../...../.....			
(7) Outline and maximum dimensions		Panel piercing and mounting details			
(8) Variants					
Variant No.	Description of variant	61196 IEC			
01.....					
.....					
.....					
.....					
.....					
.....					
.....					
.....					
.....					
Information about manufacturers who have components qualified to this detail specification is available through IECQ on-line certificate system.					

(9) Performance (including limiting conditions of use)

Ratings and characteristics		IEC 61169-1 subclause	Value	Remarks including any deviations from standard test methods
<i>Electrical</i>				
Nominal impedance			50 Ω	
Frequency range			0 GHz -3 GHz	Measurement frequency range
Reflection factor		9.2.1		
	Variant No. Designation 01.....			
Centre contact resistance		9.2.3	$\leq$m Ω $\leq$m Ω	Initial After conditioning
Centre conductor continuity	01.....	9.2.3	m Ωm Ωm Ωm Ω	Resistance change due to conditioning
Outer contact continuity		9.2.3	$\leq$m Ω $\leq$m Ω	Initial After conditioning
Insulation resistance		9.2.5	$\geq$G Ω $\geq$G Ω	Initial After conditioning
#+ Proof voltage at sea level	01.....	9.2.6	kVkVkVkV	86 kPa - 106 kPa
#+ Proof voltage at 4,4 kPa	01.....		VVVV	kPa (if not 4,4 kPa)
#+ Environment test voltage at sea level	01.....		VVVV	86 kPa - 106 kPa
Environment test voltage at 4,4 kPa	01.....		VVVV	kPa (if not 4,4 kPa)
Screening effectiveness	01.....	9.2.8	$\geq$ dB at....GHz	$Z_t \leq$ Ω
ADDITIONAL ELECTRICAL CHARACTERISTICS				
+ Voltage values are r.m.s. values at 50 Hz-60 Hz, unless otherwise specified.				