BS EN 61169-49:2014

BSI Standards Publication

Radio-frequency connectors

Part 49: Sectional specification for SMAA series R.F connectors

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National foreword

This British Standard is the UK implementation of EN 61169-49:2014. It is identical to IEC 61169-49:2014.

The UK participation in its preparation was entrusted to Technical Committee EPL/46, Cables, wires and waveguides, radio frequency connectors and accessories for communication and signalling.

A list of organizations represented on this committee 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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Foreword

The text of document 46F/259/FDIS, future edition 1 of IEC 61169-49, prepared by SC 46F, "R.F. and microwave passive components", of IEC TC 46, "Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61169-49:2014.

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)	2015-05-21
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2017-06-12

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 61169-49:2014 was approved by CENELEC as a European Standard without any modification.

IEC 61169-35	NOTE	Harmonised as EN 61169-35.

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 1 When an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60068-1	-	Environmental testing -- Part 1: General and guidance	EN 60068-1	-
IEC 61169-1	2013	Radio-frequency connectors -- Part 1: Generic specification - General requirements and measuring methods	EN 61169-1	2013
IEC 62037	series	Passive RF and microwave devices, intermodulation level measurement -- Part 1: General requirements and measuring methods	EN 62037	series

CONTENTS

RADIO-FREQUENCY CONNECTORS –

Part 49: Sectional specification for SMAA series R.F connectors

1 Scope

This part of IEC 61169, which is a sectional specification (SS) , provides information and rules for the preparation of detail specifications (DS) for type SMAA series thread mated coaxial connectors.

The connectors are normally used for micro wave applications, connecting with 50 Ω RF cables or microstrips in an operating range up to 27 GHz.

These connectors can be intermated with SMA (IEC 60169-15), 3,5 mm (IEEE 287-2007), 2,92 mm (IEC 61169-35) connectors.

It also prescribes mating face dimensions for high performance connectors grade 1, dimensional details of standard test connectors grade 0, for general purpose with gauging information and the mandatory tests selected from IEC 61169-1, applicable to all detail specifications relative to type SMAA connectors.

This specification indicates the recommended performance characteristics to be considered when writing a DS and covers all tests schedules and inspection requirements.

NOTE Metric dimension are original dimensions.

All undimensioned pictorial configurations are for reference purpose only.

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 61169-1:2013, *Radio frequency connectors – Part 1: Generic specification – General requirements and measuring methods*

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

IEC 62037 (all parts), *Passive RF and microwave devices, intermodulation level measurement*

3 Mating face and gauge information

3.1 Dimensions – High performance connectors – Grade 1

3.1.1 Connector with pin-centre contact

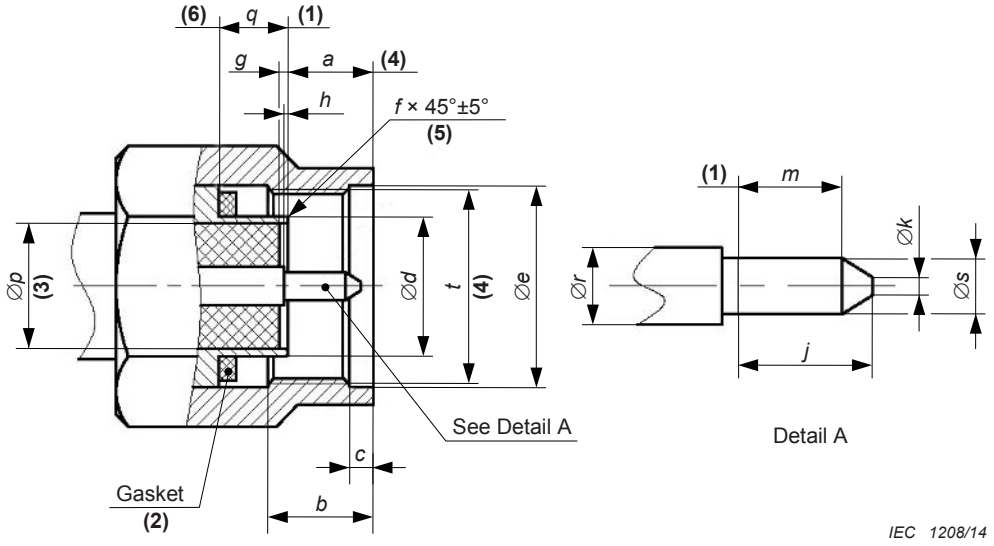

Figure 1 – Connector with pin-centre contact (for dimensions and notes, see Table 1)

Table 1 – Dimensions of connector with pin-centre contact

Ref.	mm		Figure footnotes
	Min.	Max.	
a	—	3,35	
b	2,54	—	
c	0,50	1,02	
d	4,52	4,59	
e	6,48	6,73	
f	—	0,08	**(5)**
g	0,00	0,13	
h	0,00	0,13	
j	—	2,54	
k	—	0,30	
m	1,27	—	**(1)**
p	—	—	**(3)**
q	—	—	**(6)**
r	1,27 (nominal value)		
s	0,902	0,935	
t	1/4-36UNS-2B		**(4)**

(1) Mechanical and electrical reference plane.

(2) Gasket possible on Grade 1 connectors.

(3) Diameter is chosen to obtain a normal impedance of 50 Ω ± 1 Ω.

(4) Coupling nut twists position.

(5) 0,08 mm max rounding chamfer, optional.

(6) Dimension *q* should ensure the reference plane superposition while satisfying the required environmental performance.

3.1.2 Connector with socket-centre contact

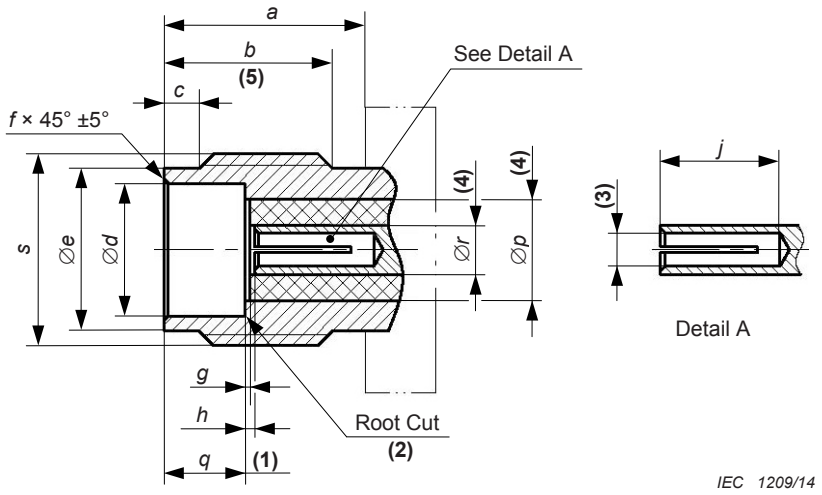

Figure 2 – Connector with socket-centre contact (for dimensions and notes, see Table 2)

Table 2 – Dimensions of connector with socket-centre contact

Ref.	mm		Figure footnotes
	Min.	Max.	
a	5,54	—	
b	4,32	—	**(5)**
c	0,50	1,02	
d	4,605	4,673	**(2)**
e	5,28	5,49	
f	0,00	0,13	
g	0,00	0,10	
h	0,00	0,10	
j	2,92	—	
p	—	—	
q	1,88	1,98	**(1)**
r	1,27 (nominal value)		**(4)**
s	1/4-36UNS-2A		
Detail A			**(3)**

(1) Mechanical and electrical reference plane.

(2) Design for root cut to be allowed.

(3) Design for slotting is optional. It is chosen to meet electrical and mechanical requirements, when mated with a Ø 0,902 mm to Ø 0,935 mm gauge pin.

(4) Diameter shall be chosen to obtain a normal impedance of 50 Ω ± 1 Ω.

(5) The shortest full thread length.

3.2 Gauges

3.2.1 Gauge pins for socket-centre contact

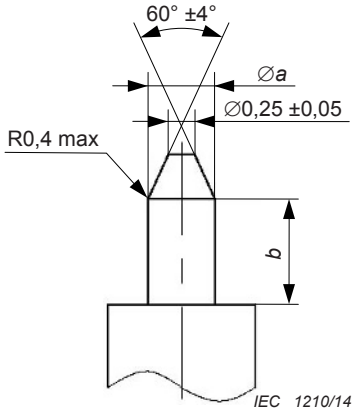

Figure 3 – Gauge pins for socket-centre contact (for dimensions and notes, see Table 3)

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

Ref.	Gauge A Maximum material for sizing purposes		Gauge B Minimum material for measurement of retention force Mass of gauge: 28 g +2 g	
	mm		mm	
	Min.	Max.	Min.	Max.
a	0,950	0,955	0,899	0,902
b	0,76	1,14	1,27	1,90
Material: steel, polished, surface roughness: *R*a=0,4 μm maximum.				

3.2.2 Test procedure

The gauge A shall be inserted into the socket-centre contact three times with a minimum depth of 0,76 mm. 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.

3.3 Dimensions – standard test connectors – Grade 0

3.3.1 Connector with pin-centre contact

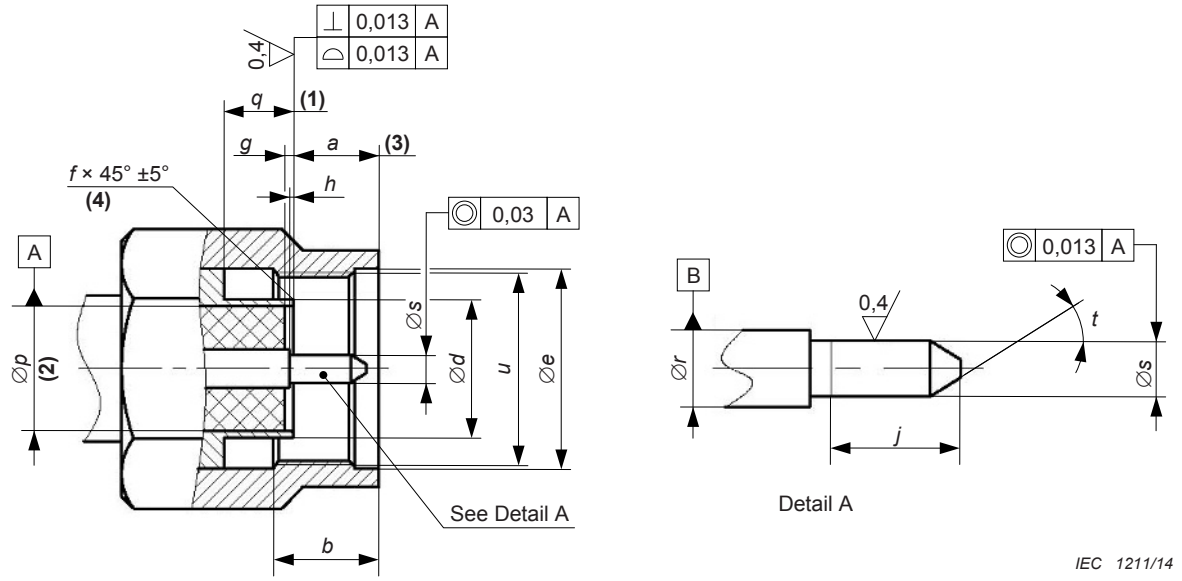

Figure 4 – Connector with pin-centre contact
(for dimensions and notes, see Table 4)

Table 4 – Dimensions of connector with pin-centre contact

Ref.	mm		Figure footnotes
	Min.	Max.	
a	2,590	3,350	
b	2,540	4,320	
d	4,521	4,592	
e	6,480	6,730	
f	—	0,080	**(4)**
g	0,000	0,050	
h	0,000	0,076	
j	2,030	2,290	
p	—	—	
q	2,030	—	**(1)**
r	1,270 (nominal value)		**(2)**
s	0,902	0,927	
t	42°	48°	
u	1/4-36UNS-2B		**(3)**

(1) Mechanical and electrical reference plane.
(2) Diameter shall be chosen to obtain a normal impedance of 50 Ω ± 0,25 Ω.
(3) Coupling nut twists position.
(4) 0,08 mm max. rounding chamfer, optional.

3.3.2 Connector with socket-centre contact

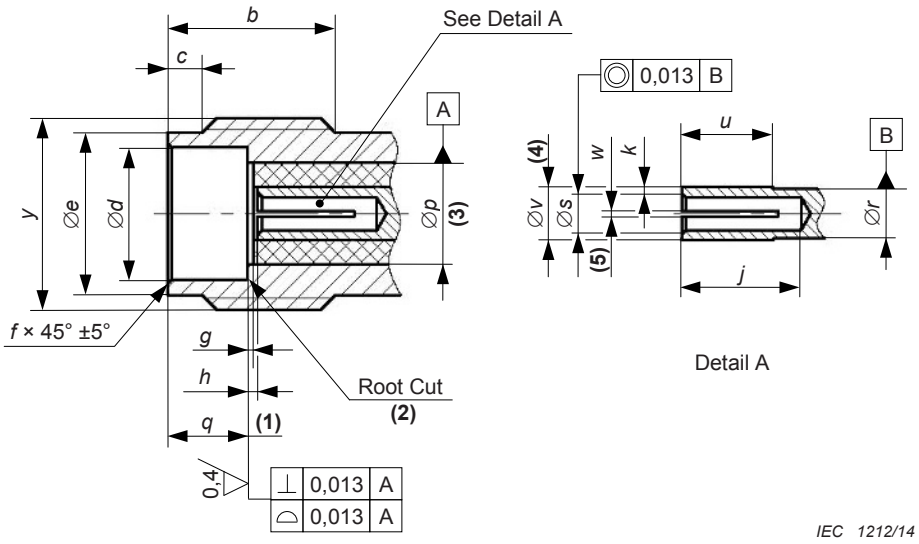

Figure 5 – Connector with socket-centre contact (for dimensions and notes, see Table 5)

Table 5 – Dimensions of connector with socket-centre contact

Ref.	mm		Figure footnotes
	Min.	Max.	
b	4,320	—	
c	0,510	1,020	
d	4,597	4,666	**(2)**
e	5,283	5,490	
f	—	0,150	
g	0,000	0,050	
h	0,000	0,076	
j	3,050	3,300	
k	0,080	—	
p	3,925	3,945	
q	1,880	1,980	**(1)**
r	1,260	1,270	**(3)**
s	0,965	0,990	
t	42°	48°	
u	1,650	1,800	
v	1,285	1,300	**(4)**
w	0,150	0,200	
y	1/4-36UNS-2A		

(1) Mechanical and electrical reference plane.

(2) Design for root cut to be allowed.

(3) Diameter shall be chosen to obtain a normal impedance of 50 Ω ± 0,25 Ω.

(4) Diameter *v* is for the unslotted dimensions.

(5) The slot width and the slot depth should be chosen to satisfy the requirement of mechanical and the electrical specification.

4 Quality assessment procedure

4.1 General

The following Subclauses 4.2 to 4.4 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 5 of IEC 61169-1:2013)

The values indicated below are recommended for SMAA 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.

Preferred climatic categories are given in Table 6.

Table 6 – Preferred climatic categories (see IEC 60068-1)

Category designation	Letter*	Temperature range °C	Steady damp heat
40/85/21	A	–40 to +85	21 days
55/155/56	B	–55 to +155	56 days
* To be included in the IEC type designation.			

Rating and characteristics are given in Table 7.

Table 7 – Rating and characteristics

Rating and characteristics	IEC 61169-1:2013 Subclause	Values	Remarks, deviations from standard test method
Electrical			
Nominal impedance		50 Ω	
Frequency range Grade1 connectors		DC to 27 GHz	Or upper frequency limit of cable
Reflection factor [a] Grade 1 connectors – straight styles – right-angle styles [h] – component mounting styles – solder bucket and PCB mounting styles	9.2.1	 DC to 27 GHz ≤0,030+0,005f (GHz) See DS See DS See DS	
Centre contact resistance[b] – initial – after conditioning	9.2.3	 ≤3,0 mΩ ≤5,0 mΩ	
Outer conductor continuity [b] – initial – after conditioning	9.2.3	 ≤2,5 mΩ ≤5,0 mΩ	
Insulation resistance [b] – initial – after conditioning	9.2.5	 ≥5 000 MΩ ≥200 MΩ	
Proof voltage at sea level [c,d] – uncabled styles – semi-rigid and semi-flexible 2,16 mm (0,086 in) diameter – semi-rigid and semi-flexible 1,19 mm (0,047 in) diameter	9.2.6	 750 V 750 V 500 V	86 kPa to 106 kPa
Proof voltage at 4,4 kPa [c,d] – uncabled styles – semi-rigid and semi-flexible 2,16 mm (0,086 in) diameter – semi-rigid and semi-flexible 1,19 mm (0,047 in) diameter	9.2.6	 150 V 150 V 100 V	4,4 kPa approximately equivalent to 20 km
Environmental test voltage at sea level[c,d] – uncabled styles – semi-rigid and semi-flexible 2,16 mm (0,086 in) diameter – semi-rigid and semi-flexible 1,19 mm (0,047 in) diameter	9.2.6	250 V 250 V 175 V	86 kPa to 106 kPa
Environmental test voltage at 4,4 kPa[c,d] – uncabled styles – semi-rigid and semi-flexible 2,16 mm (0,086 in) diameter – semi-rigid and semi-flexible 1,19 mm (0,047 in) diameter	9.2.6	 65 V 65 V 45 V	4,4 kPa approximately equivalent to 20 km
Screening effectiveness (straight cables only)[g]	9.2.7	≥100 dB at 1 GHz	Z_t≤1 mΩ,
Discharge test (corona effect)	9.2.8	See DS	Extinction voltage

Rating and characteristics	IEC 61169-1:2013 Subclause	Values	Remarks, deviations from standard test method
Mechanical			
Centre contact captivation – axial force – torque	9.3.5	 ≥22 N ≥0,03 N·m	 Maximum displacement 0,25 mm in each direction
Engagement and separation – coupling nut friction	9.3.6	 ≤0,23 N·m	 Can be carried out by hand
Coupling moment – normally moment – moment resistance	9.3.6	 0,8 N•m~1,1 N·m 1,.69 N·m	
Gauge retention force (resilient contacts) – centre – outer	9.3.4	 ≥0,28 N na	
Technical tests on cable fixing – cable rotation (nutation) – cable pulling – cable bending – cable torsion	 9.3.7 9.3.8 9.3.9 9.3.10	 See DS See DS See DS See DS	
Tensile strength of coupling mechanism	9.3.11	≥180 N	
Bending moment	9.3.12	na	
Vibration	9.3.3	100 m/s^2 10 Hz to 2 000 Hz	10 g_n acceleration
Shock	9.3.14	500 m/s^2 1/2 sine wave 11 ms	50 g_n acceleration
Environmental			
Climatic category		A:40/85/21 B:55/155/56	
Sealing non-hermetic	9.4.7	100 kPa·cm^3/h max.	100 kPa to 110 kPa pressure differential
Hermetic	9.4.8	na	
Salt mist	9.4.10	48 h	Duration of spraying
Endurance			
Mechanical	9.3.15	500 operations	
High temperature[e]	9.4.5	A: 85 h at 85 °C B: 1 000 h at 155 °C	

[a] These values apply to basic connectors. 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.

[b] Values for a single pair of connectors.

[c] Voltages are r.m.s values of a.c, at 40 Hz to 65 Hz, unless otherwise specified.

[d] Some cables usable with these connectors have ratings lower than the values given here.

[e] 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 cables are used, the upper temperature is limited to 115 °C maximum.

[f] na – not applicable.

[g] When interfaces are fully mated.

[h] The test item of this type of connectors is not recommended.

4.3 Test schedule and inspection requirements – Periodic tests

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

Table 8 describes the acceptance tests to be performed.

Table 8 – Acceptance tests

–	IEC 61169-1:2013	Assessment level M (higher)				Assessment level H (lower)			
	subclause	Test required	IL	AQL %	Period	Test required	IL	AQL %	Period
Group A1					Lot by Lot				Lot by Lot
Visual inspection	9.1.1	a	II	1		a	S3	1,5	
Group B1									
Outline dimension	9.1.2	a	S4	0,4		a	S3	4,0	
Mechanical compatibility	9.1.2.2	a	II	1		a	S3	1,5	
Engagement and separation	9.3.6	a	S4	0,4		a	S3	1,5	
Gauge retention (resilient contacts)	9.3.4	ia	II	1		ia	S3	1,5	
Sealing									
non hermetic	9.4.7	ia	II	0,65		ia	S3	1	
hermetic	9.4.8	ia	II	0,015		ia	S3	0,025	
Voltage proof	9.2.6	a	II	0,4		a	II	4,0	
Solderability (d)	9.3.2.2	ia	S4	0,4		ia	S3	4,0	
Insulation resistance	9.2.5	a	S4	0,4		a	S3	4,0	
For the tables, abbreviations and procedures, see the end of Table 10.									

Table 9 describes the periodic tests to be performed.

Table 9 – Periodic tests

	IEC 61169-1:2013 Subclause	Assessment level M (higher)				Assessment level H (lower)			
Group D1 (d)			**6**	**1**	**3 years**		**3**	**1**	**3 years**
Solderability connector assemblies	9.3.2.2	Ia				ia			
Resistance to soldering heat	9.3.2.3	ia				ia			
Mechanical tests on cable fixing									
cable rotation (nutation)	9.3.7	na				na			
cable pulling	9.3.8	ia				ia			
cable bending	9.3.9	ia				ia			
cable torsion	9.3.10	ia				ia			
Group D2 (d)			**6**	**1**	**3 years**		**3**	**1**	**3 years**
Contact resistance, outer conductor and screen continuity centre conductor continuity	9.2.3	a				a			
Vibration	9.3.3	a							
Damp heat, steady state	9.4.3	a				a			
Group D3 (d)			**1**	**1**	**3 years**		**1***	**1**	**3 years**
Dimensions piece-parts and materials	9.1.2	a				a			
Group D4 (d)			**6**	**1**	**3 years**		**3**	**1**	**3 years**
Mechanical endurance	9.3.15	a				a			
High temperature endurance	9.4.5	a				a			
Discharge test	9.2.8								
Climatic conditioning	9.4	na				na			
Group D5 (d)			**6**	**1**	**3 years**		**3**	**1**	**3 years**
Return loss	9.2.1	a				a			
Screening effectiveness	9.2.7	a				a			
Water immersion	9.4.9	ia				ia			
Group D6 (d)			**6**	**1**	**3 years**		**3**	**1**	**3 years**
Contact captivation	9.3.5	a				a			
Rapid change of temperature	9.4.4	na				na			
Climatic sequence	9.4.2	a				a			
Group D7 (d)			**1§**		**3 years**		**1§**		**3 years**
Salt mist	9.4.10	a							

a suggested as applicable
ia test suggested (if technically applicable)
na not applicable
IL inspection level
AQL acceptable quality level
* one set of piece-parts each style and variant, unless using common piece parts
# for quality conformance , a total of two failures only permitted for level H and 1 failure only for level M from groups D1 to D7
§ Group D7 – number of pairs for each solvent
(d) destructive tests – specimens shall not be returned to stock

4.4 Procedures for the quality conformance

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 Quality conformance and its maintenance – General procedure

This shall consist 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 (DS)

5.1 General

Detail specifications writers shall use the appropriate blank detail specification (BDS). The following pages comprise the BDS dedicated for use with type SMAA 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 series covered by the sectional specification;
b) the connector series designation.

The specification writer should enter the details relating to the connector style to be covered as indicated. The numbers in brackets in the BDS correspond to the following indications, which shall be given.

5.2 Identification of the component

1) 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 marking: As applicable.

2) Enter details of assessment level and the climatic category.
3) 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.

4) 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.

5.3 Performance

5) Performance data listing the most important characteristics of the connectors in accordance with the requirements of the relevant sectional specification. Deviations from the minimum requirements shall be clearly indicated. Non-applicable parameters shall be marked 'na'.

5.4 Marking, ordering information and related matters

6) Insert marking and ordering information as appropriate, together with details or related documents and any invoked structural similarity.

5.5 Selection of tests, test conditions and severities

7) "na" shall be used to indicated 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.

5.6 Blank detail specification pro-forma for type SMAA connector

The following pages contain the complete BDS pro-forma

<table>
<tr><td colspan="3">(1)</td><td colspan="3">Page 1 of
(2)</td></tr>
<tr><td colspan="3">ELECTRONIC COMPONENT OF ASSESSED QUALITY IN ACCORDANCE WITH GENERIC SPECIFICATION IEC 61169-1
NATIONAL REFERENCE</td><td colspan="3">(3)
(4)</td></tr>
<tr><td colspan="4">(5) Detail specification for radio frequency coaxial connector of assessed quality</td><td colspan="2">Type</td></tr>
<tr><td colspan="3">Style</td><td colspan="3">Special features and markings</td></tr>
<tr><td colspan="2">Method of cable/wire+ attachment</td><td colspan="4">centre conductor – solder/crimp+
outer conductor – solder/clamp/crimp +
+ delete as appropriate</td></tr>
<tr><td colspan="2">(6) Assessment level.</td><td colspan="2">Characteristic impedance
50 Ω</td><td colspan="2">Climatic category..55/125./21./</td></tr>
<tr><td colspan="3">(7) Outline and maximum dimensions</td><td colspan="3">Panel piercing and mounting details</td></tr>
<tr><td colspan="6">(8) Variants</td></tr>
<tr><td>Variant No.

01</td><td>Description of variant</td><td>IEC 61196</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">Information about manufacturers who have components qualified under the IECQ Conformity Assessment System is available through the IECQ on-line certificate system.</td></tr>
</table>

(9) Performance (including limiting conditions of use)

Ratings and characteristics	Variant No. Designation	IEC 61169-1:2013 Subclause	Value	Remarks, including any deviations from standard test methods
Electrical				
Nominal impedance			50Ω	
Frequency range Reflection factor	**01**	9.2.1	0 GHz to 6 GHz GHz GHz GHz	Measurement frequency range
Centre contact resistance		9.2.3	≤ mΩ ≤ mΩ	Initial After conditioning
Centre conductor continuity	**01**	9.2.3	≤ mΩ ≤ mΩ ≤ mΩ ≤ mΩ	Resistance change due to conditioning
Outer contact continuity		9.2.3	≤ mΩ ≤ mΩ	Initial After conditioning
Insulation resistance		9.2.5	≥ GΩ ≥ GΩ	Initial After conditioning
+ Proof voltage at sea level	**01**	9.2.6	kV kV kV kV	86 kPa to106 kPa
+ Proof voltage at 4,4 kPa	**01**	9.2.6	kV kV kV kV	kPa (if not 4,4 kPa)
Screening effectiveness	**01**	9.2.7	dB at GHz	$Z_t \leq$.. mΩ
Discharge test (corona) at sea level	**01**	9.2.8	≥ V ≥ V ≥ V ≥ V	Extinction voltage
ADDITIONAL ELECTRICAL CHARACTERISTICS				
Intermodulation level	**01**	IEC 62037	dB at GHz	Under 2 carries of +43 dBm
+ Voltage values are r.m.s. values at 50 Hz to 60 Hz, unless otherwise specified.				

Ratings and characteristics		IEC 61169-1:2013 Subclause	Value	Remarks, including any deviations from standard test methods
Mechanical				
Soldering – bit size		9.3.2		
Gauge retention resilient contacts – inner contact – outer contact		9.3.4	 N N	 See Figure 7 and Table 3 See Figure 8 and Table 4
Centre contact captivation – axial force – permitted displacement each direction – torque		9.3.5	 N mm Nm	
Engagement and separation – axial force		9.3.6		Achievable by hand
Strength of coupling mechanism		9.3.11	N	
Effectiveness of cable fixing against – cable rotation		9.3.7	Rotations	
– cable pulling		9.3.8	 N N N N	Point of application and duration mm s mm s mm s mm s
– cable bending		9.3.9	 Cycles Cycles Cycles Cycles	Length of cable and mass mm mm mm mm
– cable torsion		9.3.10	 Nm Nm Nm Nm	Duration of applied torque s s s s
Bending moment		9.3.12	Nm	Relative to reference plane
Bumps total		9.3.13	m/s^2 to Hz	(g_n acceleration)
Vibration		9.3.3	m/s^2 to Hz	(g_n acceleration)
Shock		9.3.14	m/s^2 Shape ms	(g_n acceleration)
ADDITIONAL MECHANICAL CHARACTERISTICS				

Ratings and characteristics		IEC 61169-1:2013 Subclause	Value	Remarks including any deviations from standard test methods
Environmental				
Climatic category				
Sealing non-hermetically sealed connectors		9.4.7	cm^3/h	100 kPa to 110 kPa pressure differential
Sealing hermetically sealed connectors		9.4.8	10^{-5} $bar/cm^3/h$	100 kPa to 110 kPa pressure differential
Water immersion		9.4.9		
Salt mist		9.4.10	h	Duration of spraying
ADDITIONAL ENVIRONMENTAL CHARACTERISTICS				
ENDURANCE				
Mechanical		9.3.15	operations	
High temperature		9.4.5	h at °C	
ADDITIONAL ENDURANCE CHARACTERISTICS				
CHEMICAL CONTAMINATION				
Resistance to solvents and contaminating fluids to be used. Applicable fluids		9.4.11		
Sulphur dioxide		9.4.12	days	

(10) Supplementary information

– **Marking of the component: in accordance with 11.1 of IEC 61169-1:2013 in the following order of procedure**
1) Identity of manufacture
2) Manufacturing date code year /week
Component identification variant No./designation Identification
– Marking and contents of package: in accordance with 11.2 of IEC 61169-1:2013
1) Information prescribed in 11.1 of IEC 61169-1:2013 detailed above
2) Nominal characteristic impedance Ω
3) Assessment level code letter
4) Any additional marking required
– Ordering information:
1) Number of the detail specification/variant code
2) Assessment level code letter
3) Body finish (if more than one listed)
4) Any additional information or special requirements
– Related documents (if not included in IEC 61169-1:2013 or sectional specification): . .
– Structural similarity in accordance with 10.2.2 of IEC 61169-1:2013
Relevant information on a basic style should be entered as variant 01.

6 Marking

6.1 Marking of component

Each component shall be legibly and durably marked, where space permits and in the following order of precedence, with:

a) identity code of the manufacturer;

b) manufacturer’s connector identification code or IEC connector designation.

6.2 Marking and contents of package

The package shall be marked with the information prescribed in 6.1 and, in addition, the following information shall be given:

a) nominal characteristic impedance;

b) manufacturing date code;

c) any additional marking required by the relevant specification.

When required by the relevant specification, the package shall also include instructions for assembling the connector(s) and instructions for the use of any special tools or materials, as necessary.

Bibliography

[1] IEC 60169-15, *Radio-frequency connectors – Part 15: R.F. coaxial connectors with inner diameter of outer conductor 4.13 mm (0.163 in) with screw coupling – Characteristic impedance 50 ohms (Type SMA)*

[2] IEEE 287-2007, *IEEE Standard for Precision Coaxial Connectors (DC to 110 GHz)*

[3] IEC 61169-35, *Radio-frequency connectors – Part 35: Sectional specification for 2,92 series RF connectors*

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