IEC 61169-35

Edition 1.0 2011-07

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Radio-frequency connectors – Part 35: Sectional specification for 2,92 series RF connectors

Connecteurs pour fréquences radioélectriques – Partie 35: Spécification intermédiaire pour les connecteurs RF série 2,92

IEC 61169-35:2011

IEC Central Office
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

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International Standard IEC 61169-35 has been prepared by subcommittee 46F: RF and microwave passive components, of IEC technical committee 46: Cables, wires, waveguides, R.F. connectors, R.F. and microwave passive components and accessories.

This first edition cancels and replaces IEC/PAS 61169-35, published in 2009, of which it constitutes a minor revision. The only change is that the PAS has been changed into and International Standard.

This bilingual version (2013-02) corresponds to the monolingual English version, published in 2011-07.

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

FDIS	Report on voting
46F/191/FDIS	46F/196/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts of the IEC 61169 series, under the general title: *Radio-frequency connectors* can be found on the IEC website.

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

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RADIO-FREQUENCY CONNECTORS –

Part 35: Sectional specification for 2,92 series RF connectors

1 Scope

This sectional specification provides information and rules for preparation of detail specification of 2,92 series RF coaxial connectors together with the pro-forma blank detail specification.

It also prescribes mating face dimensions for high performance connectors - grade 1, dimensional detail of standard test connectors - Grade 0, gauging information and tests selected from IEC 61169-1 applicable to all detail specifications relating to 2,92 series RF coaxial 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.

The 2,92 series coaxial connectors with characteristic impedance 50 Ω , 2,92 mm inner diameter of outer conductor and screw coupling, are used for millimeter wave applications, connecting with RF cables or microstrips. The operating frequency limit is up to 40 GHz.

Mating interface standards of the 2,92 series connectors are similar to IEEE std 287-2007 (2,92 mm) and MIL-std-348A (SMK). The 2,92 connectors can be inter-mated with SMA, and 3,5 mm connectors as per following standards: SMA: IEC 61169-35, MIL-PRF-39012D and MIL-STD-348A. 3,5 mm: IEC 60169-23, IEEE std 287-2007.

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 – High performance connectors – Grade 1

3.1.1 Connector with pin-centre contact

Inch dimensions are original dimensions.

All undimensioned pictorial configurations are for reference purpose only.

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[1] There exists a consolidated edition 1.2 (1998) that comprises IEC 61169-1:1992, its Amendment 1:1996 and its Amendment 2:1997.

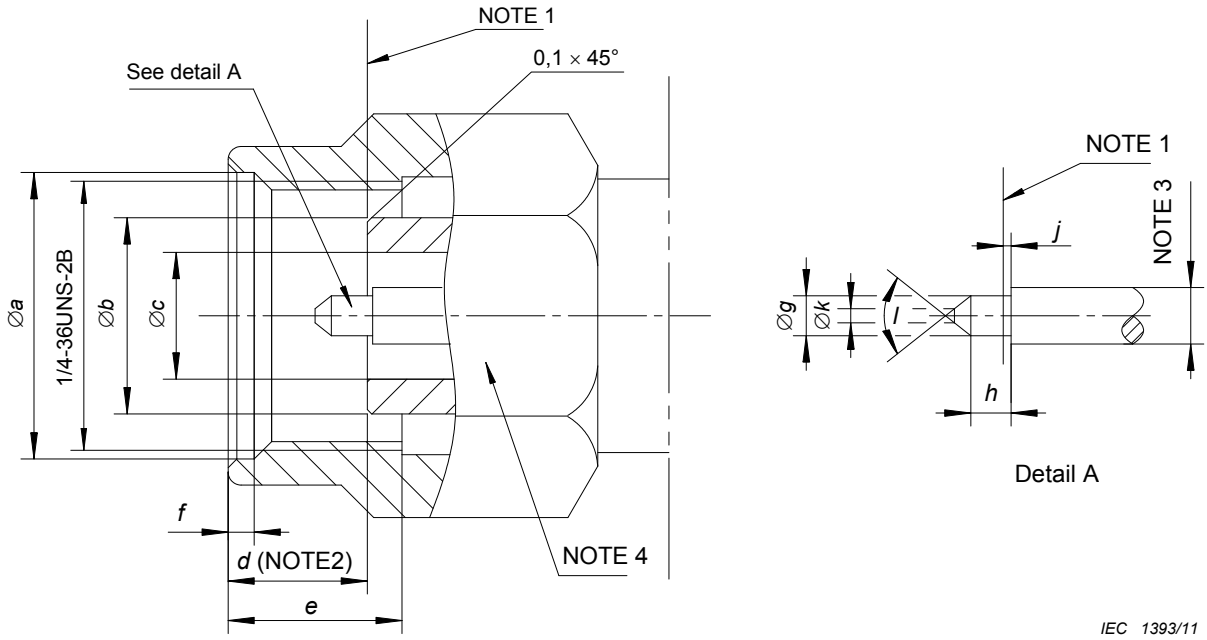

Figure 1 – Connector with pin-centre contact (for dimensions and notes, see Table 1)

Table 1 – Dimensions of connector with pin-centre contact

Ref.	mm		in	
	Min.	Max.	Min.	Max.
a	6,48	6,73	0,255	0,256
b	4,521	4,592	0,1780	0,1808
c	2,90	2,95	0,114	0,116
d	2,36	3,56	0,0929	0,1401
e	3,43	4,01	0,1351	0,1579
f	0,38	1,14	0,015	0,045
g	0,906	0,922	0,0357	0,0363
h	1,02	1,12	0,040	0,044
j	0,02	0,13	0,0008	0,0051
k	0,20	0,30	0,008	0,012
l	56°	64°	56°	64°

NOTE 1 Mechanical and electrical reference plane.

NOTE 2 Nut fully forward.

NOTE 3 Diameter is chosen to obtain a normal impedance of 50 Ω.

NOTE 4 Hexagon, width across two sides is 7,85 mm to 8,00 mm (0,309 in to 0,315 in), length of the plane is 3,18 mm (0,125 in) min.

3.1.2 Connector with socket-centre contact

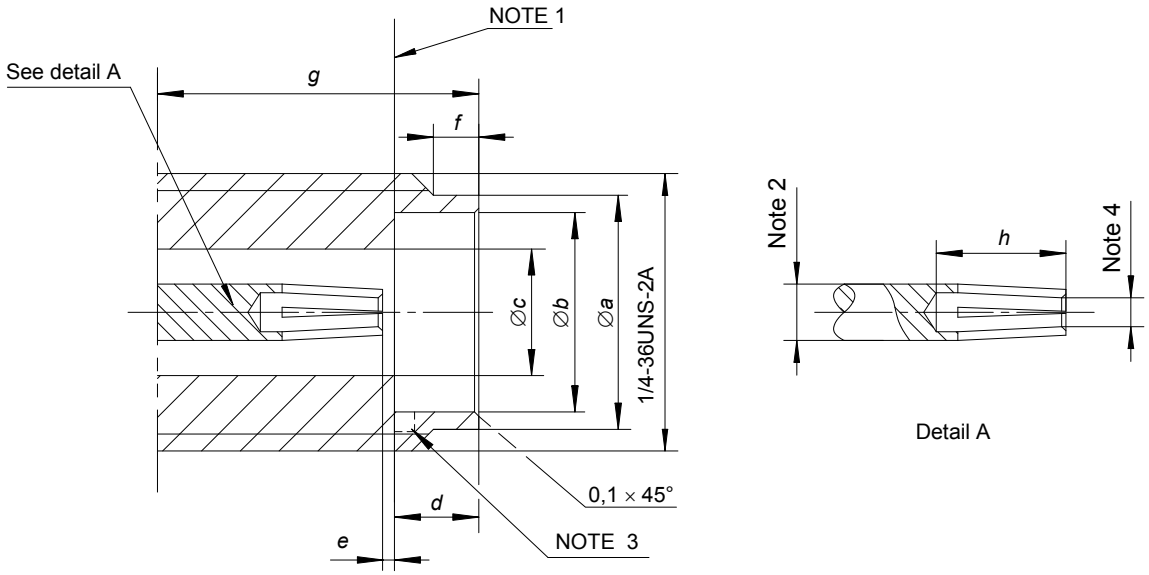

Figure 2 – Connector with socket-centre contact (for dimensions and notes, see Table 2)

Table 2 – Dimensions of connector with socket-centre contact

Ref.	mm		in	
	Min.	Max.	Min.	Max.
a	5,28	5,46	0,208	0,215
b	4,60	4,65	0,181	0,183
c	2,90	2,95	0,114	0,116
d	1,88	1,98	0,074	0,078
e	0,02	0,13	0,0008	0,0051
f	0,38	1,14	0,015	0,045
g	5,54	—	0,218	—
h	2,65	—	0,104	—

NOTE 1 Mechanical and electrical reference plane.

NOTE 2 Diameter is chosen to obtain a normal impedance of 50 Ω.

NOTE 3 Design for root cut to be allowed. Chamfer not to be allowed.

NOTE 4 Design of centre contact is optional, but should meet electrical and mechanical performance requirements when mating with Ø 0,906 mm to Ø 0,922 mm (Ø 0,0357 in ~ Ø 0,0363 in) gauge pin.

3.2 Gauges

3.2.1 Gauge pins for socket-centre contact

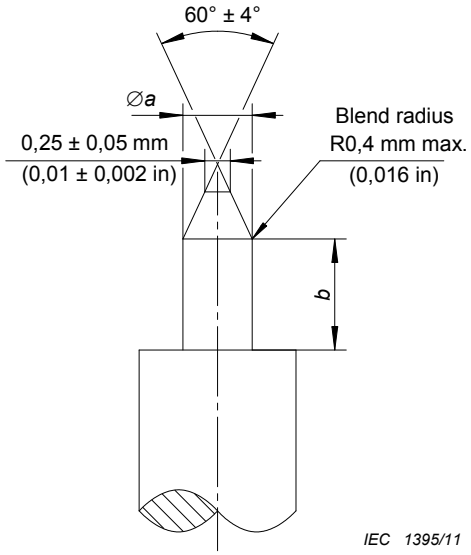

Figure 3 – Gauge pins for socket-centre contact
(for dimensions and notes, see Table 3)

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

Gauge A Maximum material for sizing purposes					Gauge B Minimum material for measurement of retention force Mass of gauge: 40 g ± 1 g			
Ref.	mm		in		mm		in	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
a	0,9360	0,9385	0,0369	0,0370	0,917	0,9195	0,0361	0,0362
b	0,76	1,14	0,0299	0,0449	1,27	1,90	0,0500	0,0748
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 one time with a minimum depth of 0,76 mm (0,0299 in). 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

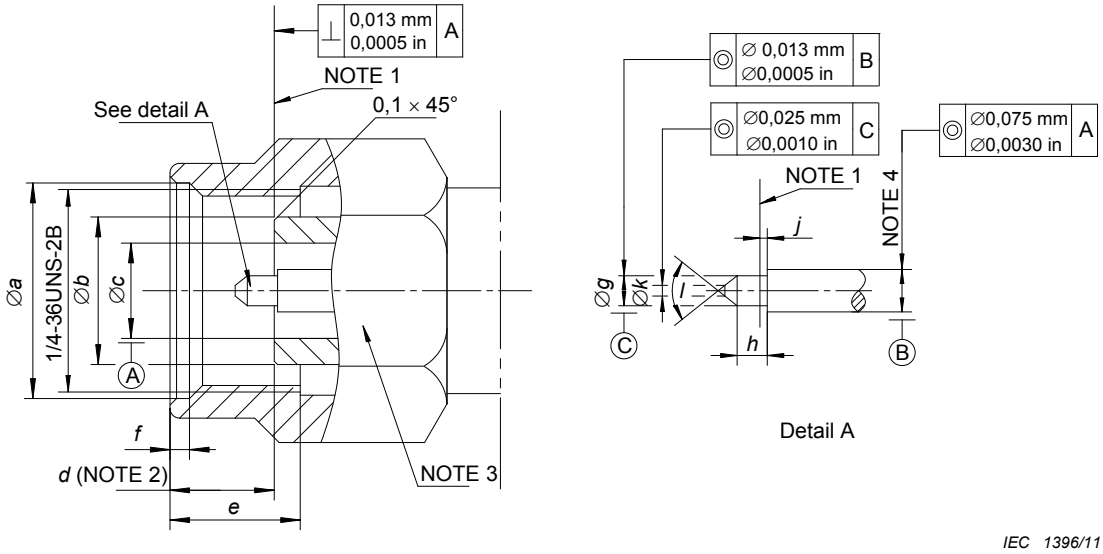

Figure 4 – Connector with pin-centre contact (for dimensions and notes, see Table 4)

Table 4 – Dimensions of connector with pin-centre contact

Ref.	mm		in	
	Min.	Max.	Min.	Max.
a	6,38	6,73	0,251	0,256
b	4,547	4,577	0,179	0,1802
c	2,91	2,93	0,1145	0,1153
d	2,36	3,56	0,0929	0,1401
e	3,43	4,01	0,1351	0,1579
f	0,38	1,14	0,015	0,045
g	0,906	0,922	0,0357	0,0363
h	1,02	1,12	0,040	0,044
j	0,02	0,076	0,0008	0,003
k	0,20	0,30	0,008	0,012
l	56°	64°	56°	64°

NOTE 1 Mechanical and electrical reference plane, surface roughness: Ra = 0,4 μm (16 μin) maximum.

NOTE 2 Nut fully forward.

NOTE 3 Hexagon, width across two sides is 7,85 mm to 8,00 mm (0,309 in to 0,315 in), length of the plane is 3,18 mm (0,125 in) min.

NOTE 4 Diameter is chosen to obtain a normal impedance of 50 Ω ± 0,5 Ω.

3.3.2 Connector with socket-centre contact

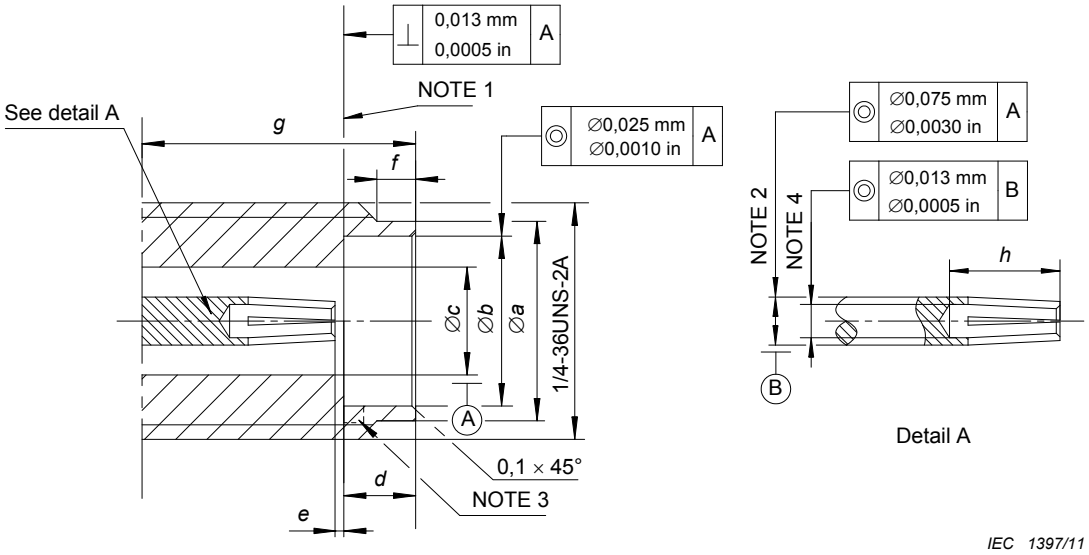

Figure 5 – Connector with socket-centre contact (for dimensions and notes, see Table 5)

Table 5 – Dimensions of connector with socket-centre contact

Ref.	mm		in	
	Min.	Max.	Min.	Max.
a	5,28	5,46	0,208	0,215
b	4,60	4,63	0,181	0,1822
c	2,91	2,93	0,1145	0,1153
d	1,88	1,98	0,074	0,078
e	0,02	0,076	0,0008	0,003
f	0,38	1,14	0,015	0,045
g	5,54	—	0,218	—
h	2,65	—	0,104	—

NOTE 1 Mechanical and electrical reference plane, surface roughness: Ra = 0,4 μm (16 μin) maximum,

NOTE 2 Diameter is chosen to obtain a normal impedance of 50 Ω ± 0,5 Ω,

NOTE 3 Design for root cut to be allowed, chamfer not to be allowed.

NOTE 4 Design of centre contact is optional, but should meet electrical and mechanical performance requirements, when mating with Ø 0,906 mm to Ø 0,922 mm (Ø 0,0360 in to Ø 0,0368 in) gauge pin.

4 Quality assessment procedure

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 2,92 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 6 – Rating and characteristics

Rating and characteristics	IEC 61169-1 Subclause	Values	Remarks, deviations from standard test method
Electrical			
Nominal impedance		50 Ω	
Frequency range Grade 1 connectors		DC~ 40 GHz	Or upper frequency limit of cable
Reflection factor[a] General connectors - straight styles - right-angle styles - component mounting styles - solder bucket and PCB mounting styles	9.2.1	 DC~18 GHz: 0,0501 max. 18 GHz to 26,5 GHz 0,0631 max 26,5 GHz to 40 GHz 0,1259 max. See DS See DS See DS	
Centre contact resistance[b] - initial - after conditioning	9.2.3	 ≤ 3,0 mΩ ≤ 4,0 mΩ	
Outer conductor continuity [b] - initial - after conditioning	9.2.3	 ≤ 2,0 mΩ ≤ 3,0 mΩ	
Insulation resistance - initial - after conditioning	9.2.5	 ≥ 5 000 MΩ ≥ 200 MΩ	
Proof voltage at sea-level [c,d] - uncabled styles - semi-rigid 0,118 in diameter - semi-rigid and semi-flexible 0,086 in diameter - semi-rigid and semi-flexible 0,047 in diameter	9.2.6	 750 V 750 V 750 V 500 V	
Proof voltage at 4,4 kPa [c,d] - uncabled styles - semi-rigid 0,118 in diameter - semi-rigid and semi-flexible 0,086 in diameter - semi-rigid and semi-flexible 0,047 in diameter	9.2.6	 150 V 150 V 150 V 100 V	4,4 kPa approximately equivalent to 20 km

Rating and characteristics	IEC 61169-1 Subclause	Values	Remarks, deviations from standard test method
Environmental test voltage at sea level [c,d] - uncabled styles - semi-rigid 0,118 in diameter - semi-rigid and semi-flexible 0,086 in diameter - semi-rigid and semi-flexible 0,047 in diameter	9.2.6	 250 V 250 V 250 V 175 V	
Environmental test voltage at 4,4 kPa [c,d] - uncabled styles - semi-rigid 0,118 in diameter - semi-rigid and semi-flexible 0,086 in diameter - semi-rigid and semi-flexible 0,047 in diameter	9.2.6	 65 V 65 V 65 V 45 V	4,4 kPa approximately equivalent to 20 km
Screening effectiveness (straight cables only)[g]	9.2.8	≥ 100 dB at 1 GHz	
Discharge test (corona effect)	9.2.9	See DS	Extinction voltage
Mechanical			
Gauge retention force (resilient contacts) - centre	 9.3.4	 ≥ 0,4 N	
Centre contact captivation - axial force - torque	9.3.5	 20 N 0,01 N•m min	Maximum displacement 0,076 mm in each direction
Engagement and separation - coupling nut friction	9.3.6	≤ 0,23 N•m	Can be carried out by hand
Coupling torque - standard torque - Nm-proof torque	9.3.6	 0,8 ~1,1 N•m 1,69 N•m	
Technical tests on cable fixing - cable rotation (nutation) - cable pulling - cable bending - cable torsion	 9.3.7.2 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	≥ 100 N	
Bending torque	9.3.12	Na[f]	
Vibration	9.3.3	150 m/s^2 10～2 000 Hz	15 g_n
Shock	9.3.14	500 m/s^2 1/2 sine wave 11 ms	50 g_n
Environmental			
Climatic category	9.4.2	A:40/085/21 B:55/125/21	
Sealing non-hermetic	9.4.5.1	≤ 100 kPa•cm^3/h	100 kPa to 110 kPa differential
Hermetic	9.4.5.2	≤ 10^{-3} Pa•cm^3/s	100 kPa to 110 kPa differential
Salt mist	9.4.6	48 h spray	