IEC 61169-4

Edition 1.0 2008-04

INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Radio-frequency connectors –
Part 4: RF coaxial connectors with inner diameter of outer conductor 16 mm (0,63 in) with screw lock – Characteristic impedance 50 Ω (type 7-16)

Connecteurs pour fréquences radioélectriques –
Partie 4: Connecteurs coaxiaux pour fréquences radioélectriques de diamètre intérieur du conducteur extérieur de 16 mm (0,63 in) à verrouillage à vis – Impédance caractéristique 50 Ω (type 7-16)

IEC 61169-4:2008-04(EN-FR)

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International Standard IEC 61169-4 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 standard cancels and replaces IEC/PAS 61169-4 published in 2006. This first edition constitutes a technical revision.

This bilingual version (2014-01) corresponds to the monolingual English version, published in 2008-04.

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

FDIS	Report on voting
46F/60/FDIS	46F/71/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 IEC 61169 series, published 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 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

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RADIO-FREQUENCY CONNECTORS –

Part 4: RF coaxial connectors with inner diameter of outer conductor 16 mm (0,63 in) with screw lock – Characteristic impedance 50 Ω (type 7-16)

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 7-16 R.F. coaxial connectors with screw lock.

The connectors are normally used with 50 Ω flexible and semi-rigid r.f. cables for middle power applications in an operating frequency range up to 7,5 GHz.

It describes the interface dimensions for general purpose grade 2 connectors, dimensional details for standard test connectors, grade 0, together with gauging information and the mandatory tests selected from QC 22000 (IEC 61169-1), applicable to all DS relating to type 7-16 connectors.

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

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

IEC 62037, *RF connectors, connector cable assemblies, and cables - Intermodulation level measurement*

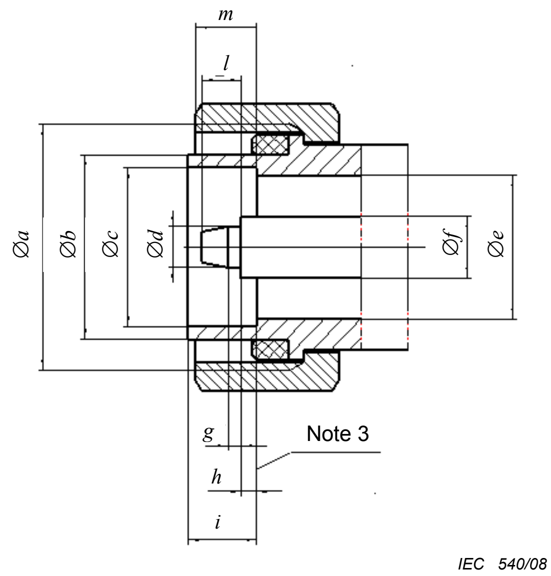
3 Mating face and gauge information

Metric dimension are original dimensions.

All undimensioned pictorial configurations are for reference purpose only.

3.1 Dimensions – General connectors – Grade 2

3.1.1 Connector with pin centre contact



NOTE For dimensions see Table 1.

Figure 1 – Connector with pin centre contact

Table 1 – Connector with pin centre contact

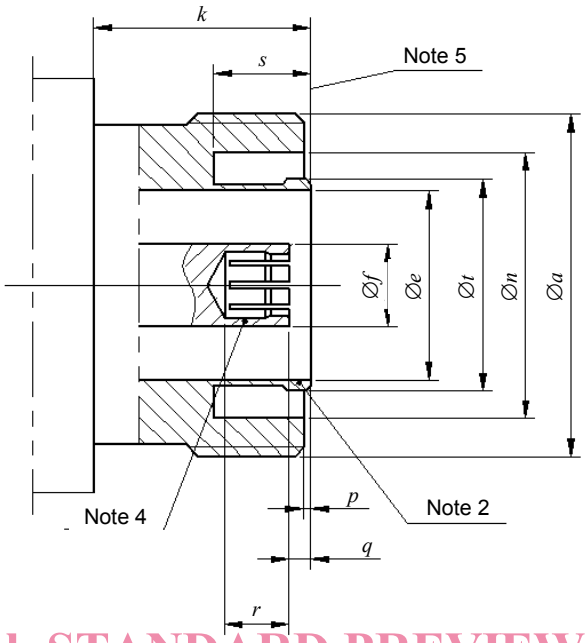
Reference	Millimetres		Inches		Notes
	Minimum	Maximum	Minimum	Maximum	
a	M29×1,5		M29×1,5		2
b	20,6	21,4	0,811	0,843	
c	18,03	18,21	0,7098	0,7169	
d	4,96	5,04	0,1953	0,1984	
e	15,85	16,25	0,6240	0,6398	
f	7 (nominal)		0,276 (nominal)		1
g	1,4	1,6	0,0551	0,0630	
h	1,47	1,77	0,0579	0,0697	
i	7,00	8,00	0,276	0,315	
l	-	4,5	-	0,177	
m	7,00	9,00	0,276	0,354	

NOTE 1 The tolerance on this dimension is determined by the tolerance of characteristic impedance.

NOTE 2 M29×1,5 indicates metric screw thread with nominal diameter 29 mm（1,141 in）and pitch 1,5 mm（0,059 in）.

NOTE 3 Mechanical and electrical reference plane (see Figure 1).

3.1.2 Connector with socket centre contact



NOTE For dimensions see Table 2.

Figure 2 – Connector with socket centre contact

Table 2 – Connector with socket centre contact

Reference	Millimetres		Inches		Note
	Minimum	Maximum	Minimum	Maximum	
a	M29×1,5		M29×1,5		3
e	15,85	16,25	0,6240	0,6398	
f	7(nominal)		0,276(nominal)		1
k	10	-	0,394	-	
n	22,1	22,9	0,870	0,902	
p	0,5	0,7	0,0197	0,0276	
q	1,77	2,07	0,0697	0,0815	
r	5	-	0,197	-	
s	8,1	-	0,319	-	
t	17,84	18,02	0,7024	0,7094	2

NOTE 1 The tolerances on this dimensions is determined by the tolerance of characteristic impedance.

NOTE 2 Standard is a non-slotted outer contact. If a slotted outer contact is required, the slotting should be bent outwards to 18,5 mm (0,728 in) maximum. The slotted sleeve should meet the gauge retention force (see Figure 2).

NOTE 3 M29×1,5 indicates metric screw thread with nominal diameter 29 mm (1,141 in) and pitch 1,5 mm (0,59 in).

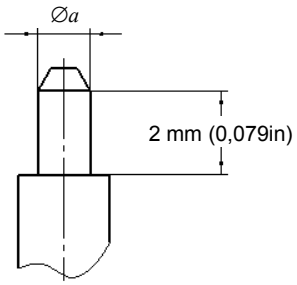
NOTE 4 Slot design optional. Contact to be closed to meet the gauge retention force (see Figure 2).

NOTE 5 Mechanical and electrical reference plane (see Figure 2).

3.2 Gauges for general purpose connectors – Grade 2

3.2.1 Gauges for connector with socket centre contact

3.2.1.1 Centre contact



IEC 542/08

Figure 3 – Gauge pin for socket centre contact

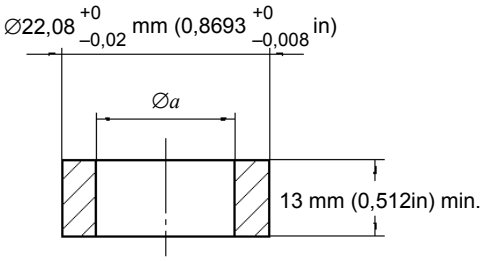
Test procedure

a) A steel test pin (Figure 3) with a diameter a of $5{,}1^{+0}_{-0{,}01}$ mm ($0{,}2008^{+0}_{-0{,}0004}$ in) and a 0,4 µm (16 µin) maximum finish shall be inserted once into the centre contact a minimum distance of 2 mm (0,079 in).

b) A second steel test pin (Figure 3) with a diameter a of $4{,}96^{+0}_{-0{,}01}$ mm ($0{,}1953^{+0}_{-0{,}0004}$ in) and a 0,4 µm (16 µin) maximum finish shall have a minimum retention force of 6 N after insertion into the centre contact.

It is recommended that this gauge should have a mass of 600 g.

3.2.1.2 Outer contact



IEC 543/08

Figure 4 – Gauge ring for socket outer contact

a) For non-slotted outer contacts, a steel test ring (Figure 4) with inner diameter a of $18{,}03^{0}_{-0.01}$ mm ($0{,}7098^{0}_{-0.0004}$ in) and a 0,4 µm(16 µin) maximum finish shall be pushed over the outer contact of connector. The force required to push this test ring on to the connector a minimum distance of 8 mm(0,315 in) shall not exceed 40 N.

b) For slotted outer contacts, a steel test ring (Figure 4) with inner diameter a of $18{,}23^{+0{,}02}_{0}$ mm($0{,}7177^{+0{,}0008}_{0}$ in) and a 0,4 µm (16 µin)max finish shall be placed over the outer contact of the connector. The test ring shall uniformly meet the outer contact when pushed no more than 3 mm (0,12 in) over this contact.

The retention force for the gauge ring shall be 15 N min.

3.3 Dimensions – standard test connectors – Grade 0

In order to carry out the reflection coefficient measurement according to 9.2.1 of IEC 61169-1, the measure equipment should be provided with the standard test connector. The standard test connector with the tolerances specified in 3.3.1and 3.3.2 guarantee an accuracy of characteristic impendance of ±0,75 Ω.

3.3.1 Standard test connector with pin centre contact

The dimensions of the standard test connector with pin centre contact shall be as specified in 3.1.1, but with the tolerance given in Table 3:

Table 3 – Tolerance for the standard connector with pin centre contact.

Dimension	Millimetres		Inches	
	Minimum	Maximum	Minimum	Maximum
d	4,99	5,00	0,196 46	0,196 85
e	16,05	16,07	0,631 89	0,632 68
f	6,971	6,981	0,274 45	0,274 84
h	1,73	1,75	0,068 11	0,068 90

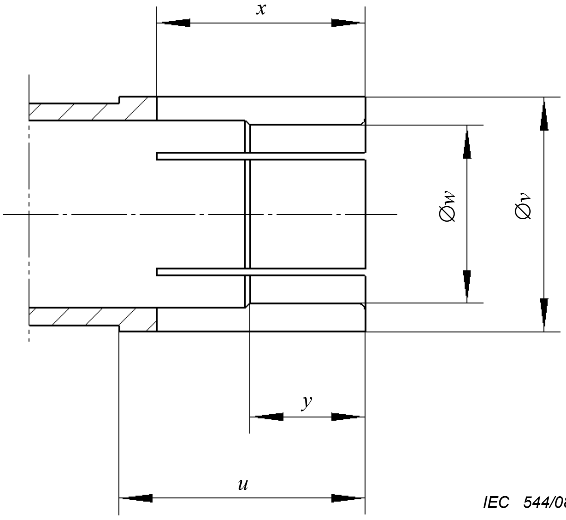
3.3.2 Standard test connector with socket centre contact

The dimensions of the standard test connector with socket centre contact shall be as specified in 3.1.2, but with the tolerance given in Table 4:

Table 4 – Tolerance for the standard connector with socket centre contact

Dimension	Millimetres		Inches	
	Minimum	Maximum	Minimum	Maximum
e	16,05	16,07	0,63189	0,63268
f	6,971	6,981	0,27445	0,27484
q	1,79	1,81	0,07047	0,07126

Additionally, dimensions of the slotted centre contact (Figure 5) shall be as follows:



IEC 544/08

NOTE For dimensions see Table 5.

Figure 5 – Slotted centre contact

Table 5 – Slotted centre contact

Dimension	**Millimetres**		**Inches**		**Note**
	Minimum	Maximum	Minimum	Maximum	
u	7,2	7,4	0,2835	0,2913	
v	6,997	7,003	0,275473	0,275709	1
w	To fulfil requirements of dimension v				
x	6,9	7,1	0,2717	0,2795	2
y	1,2		0,0472		
NOTE 1 When pin gauge Ø 4,99 mm (0,19646 in) min. Ø 5,00 mm (0,19685 in) max. is inserted to 2 mm depth.					
NOTE 2 Six slots spaced 60° apart 0,3 mm (0,0118 in) wide.					

4 Quality assessment procedures

4.1 General

The following subclauses provide recommended ratings, performance and test conditions to be considered when writing a detail specification (DS). They also provide an appropriate schedule of tests with minimum levels of conformance

4.2 Ratings and characteristics

The values indicated below are recommended for type 7-16 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 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.

The connectors have a maximum working voltage of 4 k V at sea level (350 V at 44 mbar/ 20 000 m altitude). Connection to the cable may be made either by crimping or soldering, depending upon design.

NOTE 2 All voltages specified in this standard are r.m.s. values of a.c. voltages. All test voltages are a.c. voltages of 50 Hz to 60 Hz.

NOTE 3 For details of symbols, abbreviations and procedures, see 7.3.2.

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

Category	Designation letter*	Temperature range	Damp heat, steady state
40/85/21	A	–40 °C to +85 °C	21 days
55/155/56	B	–55 °C to +155 °C	56 days
* To be included in the IEC type designation (see Clause 3).			

Table 7 – Ratings and characteristics

Ratings and characteristics	IEC 61169-1 subclause	Value	Remarks including any deviations from standard test methods
Electrical			
Nominal impedance		50 Ω	
Frequency range – Grade 2 connectors		Up to 7,5 GHz	
Reflection factor	9.2.1		
– straight styles [1]		≤ 0,1	
– right angle styles		As specified in the DS	
– component mounting styles		As specified in the DS	
– solder bucket and PCB mounting styles		As specified in the DS	
Centre contact resistance	9.2.3		
– initial		≤ 0,4 mΩ	
– after conditioning		≤ 0,8 mΩ	
Outer conductor continuity [1]	9.2.3		
– initial		≤ 1,5 mΩ	
– after conditioning		≤ 1,9 mΩ	
Insulation resistance [1]	9.2.5		
– initial		≥ 10 GΩ	
– after conditioning		≥ 100 MΩ	
Proof voltage at sea level [2, 3]	9.2.6	3000 V	
Proof voltage at 4,4 kPa [2, 3]	9.2.6	350 V	4,4 kPa approximately equivalent to 20 km
Screening effectiveness (straight cabled connectors only)	9.2.8	110 dB at 1 GHz	Z_t ≤ 0,02 mΩ applied torque 25 Nm
Discharge test (corona) – at sea level (cable 60096 IEC 50-3)	9.2.9	≥ 2 800 V	Extinction voltage
Intermodulation level	IEC 62037	Over -155 dBc	Test power 20 W
Mechanical			
Centre contact captivation – axial force – torque	9.3.5	200 N, 1 min Na	Maximum displacement 0,25 mm each direction
Engagement and separation force and torque, – axial force – torque	9.3.6	≤ 28 N < 30 Nm.	
Gauge retention force (resilient contacts) – centre – outer	9.3.4	>10 N <20 N >15 N < 45 N	Only for slotted contacts
Mechanical tests on cable fixing cable pulling, force minimum	9.3.7	500 N climatic category A 500 N climatic category B	
Cable bending	9.3.9	300 N climatic category A 150 N climatic category B	Bending number 10 Bending angle 90°
Cable torsion	9.3.10	5 Nm climatic category A 2,5 Nm climatic category B	