

INTERNATIONAL STANDARD

IEC 61169-16

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Radio-frequency connectors –

Part 16:

Sectional specification –

**RF coaxial connectors with inner diameter of outer
conductor 7 mm (0,276 in) with screw coupling –
Characteristics impedance 50 Ω (75 Ω) (type N)**

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

7.2.2 Grade 2 – General purpose connectors

This grade is preferably used with 7 mm braided coaxial cable 60096 IEC 50-7, but varieties are available for both larger and smaller cables and for semi-rigid cables. Connectors shall not introduce a reflection factor greater than 0,13 at frequencies up to 11 GHz, or approximately 80 % of the upper cutoff frequency of the cable, whichever is lower. The reflection factor shall be not more than 0,03 at 1 GHz.

7.2.3 Grade 1 – High performance connectors

Grade 1 connectors are intended particularly for use with semi-rigid cables and rigid lines, but may also be used with braided cables and microwave components. They will exhibit reflection factors less than the reflection factor of grade 2 connectors of the same configuration (pattern). The reflection factor and frequency range, which may be up to 18 GHz, shall be agreed between purchaser and manufacturer. The best achievable limit for the reflection factor is deemed to be defined by the equation $r_{max} = 0,005 + 0,003 \times f$, where f is the frequency in gigahertz.

7.2.4 Grade 0 – Standard test connector

This grade is preferably used with 7 mm rigid lines such as are recommended in the IEC 60457 series. It may also be possible, on rigid lines and other test equipment, to exchange connectors of this grade for connectors recommended in IEC 60457-2.

The maximum reflection factor of a connector at frequencies up to 18 GHz shall be not greater than $0,0015 + 0,001 \times f$, where f , is the frequency in gigahertz.

7.2.5 Climatic categories (see IEC 60068-1)

Under consideration.

Table 6 – Ratings and characteristics

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		Up to 18 GHz	
– Grade 1 connectors		Up to 11 GHz	
– Grade 2 connectors			
Reflection factor	9.2.1		
Grade 2 connectors			
– straight styles		≤ 0,13	
– right angle styles			
– below 9 GHz		≤ 0,15	
– 9 GHz to 11 GHz		≤ 0,20	
– component mounting styles		–	
– solder bucket and PCB mounting styles		–	
Grade 1 connectors			
– straight and right-angle styles		≤ 0,005 + 0,003 f	
Centre contact resistance	9.2.3		
– initial		≤ 1,5 mΩ	
– after conditioning		≤ 2,5 mΩ	
Outer conductor continuity ¹⁾	9.2.3		
– initial		≤ 1 mΩ	

Ratings and characteristics	IEC 61169-1 Subclause	Value	Remarks including any deviations from standard test methods
- after conditioning		$\leq 1,5 \text{ m}\Omega$	
Insulation resistance ¹⁾	9.2.5		
- initial		$\geq 5 \text{ G}\Omega$	
- after conditioning		$\geq 200 \text{ M}\Omega$	
Proof voltage at sea level ^{2) 3)}	9.2.6		
- cables 60098 IEC 50-7		2 500 V	
- cables 60098 IEC 50-3		1000 V	
Proof voltage at 4,4 kPa ^{2) 3)}	9.2.6		4,4 kPa approximately equivalent to 20 km
- cables 60098 IEC 50-7		450 V	
- cables 60098 IEC 50-3		180 V	
Screening effectiveness (straight cabled connectors only)	9.2.8	90 dB to 1 GHz	$Z_i \leq 3,2 \text{ m}\Omega$
Discharge test (Corona)	9.2.9	$\geq 500 \text{ V}$	Extinction voltage
- at 4,4 kPa (cable 60096 IEC 50-7)			
Mechanical			
Centre contact captivation axial force	9.3.5	28 N	Maximum displacement 0,25 mm each direction
- torque grade 1 connectors		-	
grade 1 connectors		-	
Engagement and separation force and torque	9.3.6		Shall be achievable by hand in a normal manner
- coupling nut friction			
Coupling torque			
- normal		0,7 Nm to 1,1 Nm	
- proof		1,7 Nm	
Gauge retention force (resilient contacts)	9.3.4		Slotted contacts only
- centre		0,58 N	
- outer		2 N	
Insertion force	9.3.4		Slotted contacts only
- centre		$\leq 9 \text{ N}$	
- outer		$\leq 113 \text{ N}$	
Mechanical tests on cable fixing cable pulling, force minimum	9.3.7		
- cables 60098 IEC 50-7		400 N	
- cables 60098 IEC 50-4		300 N	
- cables 60098 IEC 50-3		180 N	
Effectiveness of clamping device against torsion	9.3.10		
- cables 60098 IEC 50-7		0,5 Nm	
- cables 60098 IEC 50-4		0,4 Nm	
- cables 60098 IEC 50-3		0,3 Nm	
Tensile strength of coupling mechanism	9.3.11	450 N	
Bending moment (and shearing force)	9.3.12	-	
Vibration	9.3.3	100 m/s^2 (10 to 500) Hz	10 g_n
Bump	9.3.13	-	
Shock	9.3.14	500 m/s^2 $\frac{1}{2}$ sin 11 ms	50 g_n
Environmental			
Climatic category ⁴⁾		55/155/21	
Sealing - non-hermetic	9.4.5.1	1 cm^3/h max. (100 to 110) kPa differential	

Ratings and characteristics	IEC 61169-1 Subclause	Value	Remarks including any deviations from standard test methods
Sealing – hermetic	9.4.5.2	1 Pa cm ² /s (10 ⁻⁵ bar cm ² /s) (100 to 110) kPa differential	
Salt mist	9.4.6	Duration of spraying: 48 h	
Endurance Mechanical High temperature ⁴⁾	9.5	500 operations 1 000 h at 155 °C	

¹⁾ These values apply to basic connectors. They depend on the cable used. Relevant values are given in the DS.
²⁾ Voltage values are r.m.s. values at (50 to 60) Hz, unless otherwise specified.
³⁾ Cables used with these connectors may have values of lower performance than those given in this Table.
⁴⁾ For certain connectors, the upper temperature limit is restricted by the cable characteristics. Reference should be made to the relevant cable specification.

7.3 Test schedule and inspection requirements

7.3.1 Acceptance tests

NOTE For details of symbols, abbreviations and procedures, see 7.4.2.

Table 7 – Acceptance tests

	Test method IEC 61169-1 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		a	S3	1,5	
Group B1									
Outline dimensions	9.1.3.1	a	S4	0,4		a	S3	4,0	
Mechanical compatibility	9.1.3.3	a	II	1,0		a	S3	1,5	
Engagement and separation	9.3.6	a	S4	0,40	Lot	a	S3	1,5	Lot
Gauge retention (resilient contact)	9.3.4	ia	II	1,0		ia	S3	1,5	
Sealing, non-hermetic	9.4.5.1	ia	II	0,65	by	ia	S3	1,0	by
Sealing, hermetic	9.4.5.2	ia	II	0,015		ia	S3	0,025	
Voltage proof	9.2.6	a	S4	0,40	lot	a	II	4,0	lot
Solderability piece parts	9.3.2.1.1	ia	S4	0,40		ia	S3	4,0	
Insulation resistance	9.2.5	a	S4	0,40		a	S3	4,0	

7.3.2 Periodic tests

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

NOTE For details of symbols, abbreviations and procedures, see Table 8.