

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Radio-frequency connectors –

Part 17: Sectional specification for RF coaxial connectors with inner diameter of outer conductor 6,5 mm (0,256 in) with screw coupling – Characteristic impedance 50 ohms (Type TNC)

Connecteurs pour fréquences radioélectriques –

Partie 17: Spécification intermédiaire relative aux connecteurs RF coaxiaux à couplage à vis avec conducteur extérieur présentant un diamètre intérieur de 6,5 mm (0,256 in) – Impédance caractéristique de 50 ohms (type TNC)



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IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

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

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CONTENTS

FOREWORD	4
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Mating face and gauge information	7
4.1 General connectors – Grade 2	7
4.1.1 Connector with pin centre contact	7
4.1.2 Connector with socket centre contact	8
4.2 Gauges	10
4.2.1 Gauge pin for socket centre contact	10
4.2.2 Gauge for outer contact of connector with pin centre contact	10
4.3 Dimensions – Standard test connectors – Grade 0	11
4.3.1 Connectors with pin centre contact	11
4.3.2 Connector with socket centre contact	13
5 Quality assessment procedures	14
5.1 General	14
5.2 Ratings and characteristics	14
5.3 Test schedule and inspection requirements	17
5.3.1 Acceptance tests	17
5.3.2 Periodic tests	18
5.3.3 Procedures for the quality conformance	19
6 Instructions for preparation of detail specifications (DS)	19
6.1 General	19
6.2 Identification of the component	19
6.3 Performance	20
6.4 Marking, ordering information and related matters	20
6.5 Selection of tests, test conditions and severities	20
6.6 Blank detail specification pro-forma for TNC connectors	20
Bibliography	25
Figure 1 – Connector with pin centre contact (for dimensions, see Table 1)	7
Figure 2 – Connector with socket centre contact (for dimensions, see Table 2)	9
Figure 3 – Gauge pin for socket centre contact (for dimensions, see Table 3)	10
Figure 4 – Gauge for outer contact of connector with pin centre contact (for dimensions, see Table 4)	11
Figure 5 – Connector with pin centre contact (for dimensions, see Table 5)	12
Figure 6 – Connector with socket in centre contact (for dimensions, see Table 6)	13
Table 1 – Dimensions of connector with pin centre contact	8
Table 2 – Dimensions of connector with socket centre contact	9
Table 3 – Dimensions of gauge pin for socket centre contact	10
Table 4 – Dimensions of gauge for outer contact of connector with pin centre contact	11
Table 5 – Dimensions of connector with pin centre contact	12
Table 6 – Dimensions of connector with socket centre contact	14
Table 7 – Preferred climatic categories	15

Table 8 – Ratings and characteristics	15
Table 9 – Acceptance tests	17
Table 10 – Periodic tests	18

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RADIO-FREQUENCY CONNECTORS –

**Part 17: Sectional specification for RF coaxial connectors with inner diameter of outer conductor 6,5 mm (0,256 in) with screw coupling –
Characteristic impedance 50 ohms (Type TNC)**

FOREWORD

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The text of this International Standard is based on the following documents:

Draft	Report on voting
46F/603/FDIS	46F/615/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

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 document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

RADIO-FREQUENCY CONNECTORS –

Part 17: Sectional specification for RF coaxial connectors with inner diameter of outer conductor 6,5 mm (0,256 in) with screw coupling – Characteristic impedance 50 ohms (Type TNC)

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 series TNC RF coaxial connectors with threaded coupling with a characteristic impedance of 50 Ω .

This document prescribes mating face dimensions for high performance connectors – grade 2, dimensional details of standard test connectors – grade 0, gauging information and tests selected from IEC 61169-1, applicable to all detail specifications relating to series TNC RF connectors.

This document 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 series TNC connectors which are used with all kinds of RF cables and microstrips in microwave transmission systems. The operating frequency is up to 11 GHz.

NOTE Metric dimension are original dimensions. All undimensioned pictorial configurations are for reference purpose only.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61169-1:2013, *Radio frequency connectors – Part 1: Generic specification – General requirements and measuring methods*

IEC 62153-4-7, *Metallic cables and other passive components test methods – Part 4-7: Electromagnetic compatibility (EMC) – Test method for measuring of transfer impedance Z_T and screening attenuation a_s or coupling attenuation a_c of connectors and assemblies – Triaxial tube in tube method*

IEC 62037-3, *Passive RF and microwave devices, intermodulation level measurement – Part 3: Measurement of passive intermodulation in coaxial connectors*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

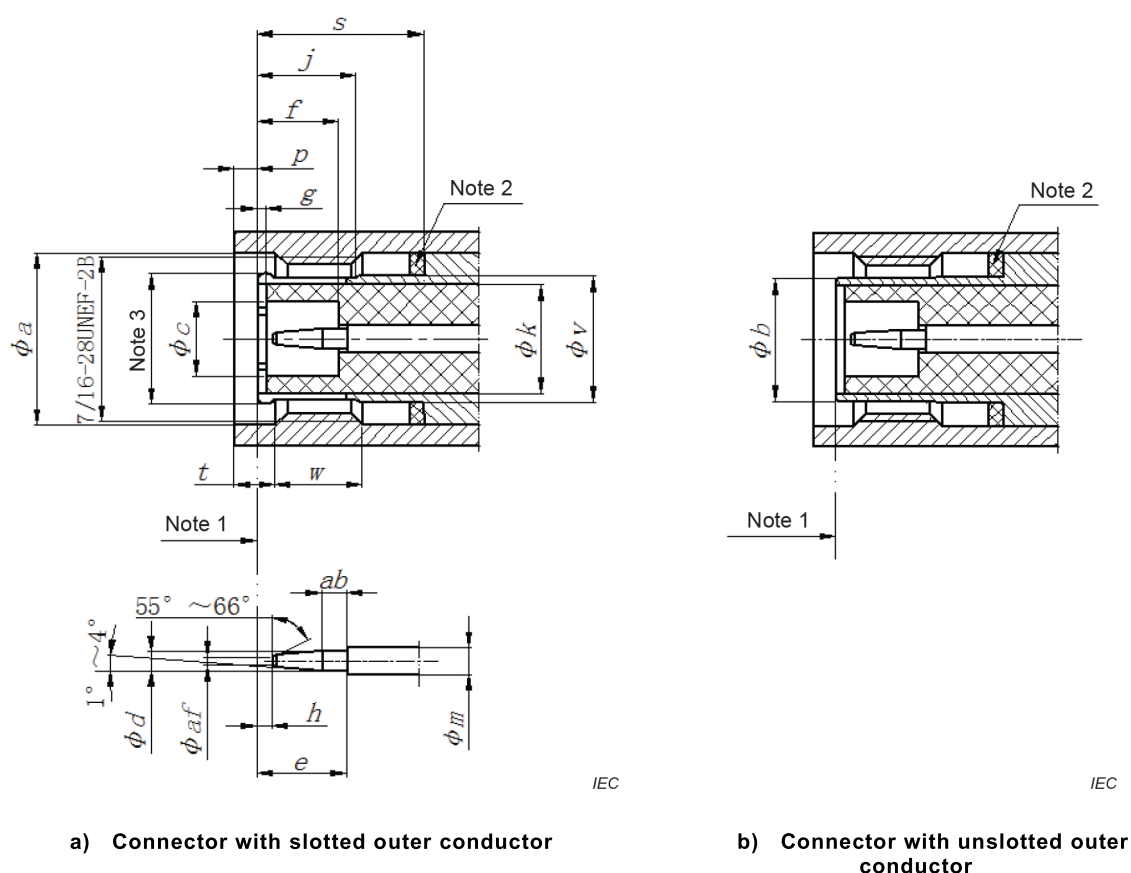
- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Mating face and gauge information

4.1 General connectors – Grade 2

4.1.1 Connector with pin centre contact

The mating face of a connector with pin centre contact is shown in Figure 1 and its dimensions are shown in Table 1.



NOTE 1 Mechanical and electrical reference plane.

NOTE 2 Sealing ring.

NOTE 3 Slot is optional. Slotted and flared to meet gauge requirements of 4.2.2.

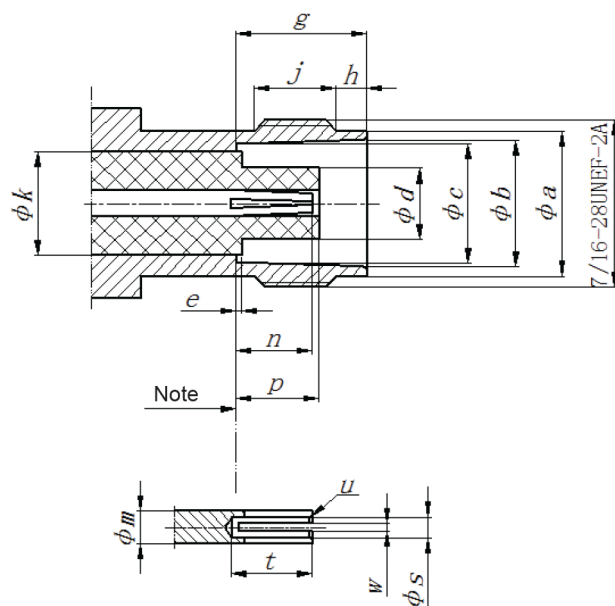
Figure 1 – Connector with pin centre contact (for dimensions, see Table 1)

Table 1 – Dimensions of connector with pin centre contact

Ref.	mm		in		Remarks
	min	max	min	max	
<i>a</i>	11,18	—	0,440	—	
<i>b</i>	7,98	8,08	0,314	0,318	
<i>c</i>	4,83	—	0,190	—	
<i>d</i>	1,32	1,37	0,052	0,054	
<i>e</i>	5,31	5,84	0,209	0,230	
<i>f</i>	5,28	5,79	0,208	0,228	
<i>g</i>	0,15	—	0,006	—	
<i>h</i>	0,08	1,02	0,003	0,040	
<i>j</i>	5,38	—	0,212	—	
<i>k</i> ^a	—	—	—	—	
<i>m</i>	2,14 (nom.)		0,084 (nom.)		
<i>p</i> ^b	—	1,98	—	0,078	
<i>s</i> ^c	—	—	—	—	
<i>t</i>	1,60	—	0,063	—	
<i>v</i>	—	8,18	—	0,322	
<i>w</i>	3,96	—	0,156	—	
<i>af</i>	—	0,64	—	0,025	
<i>ab</i>	1,98	—	0,078	—	
^a Dimension <i>k</i> depends on the dimension <i>m</i> and dielectric constant, and shall meet the requirement of 50 Ω characteristics. ^b Coupling nut in forward position. ^c Dimension <i>s</i> shall meet electrical and sealing performance requirements.					

4.1.2 Connector with socket centre contact

The mating face of a connector with socket centre contact is shown in Figure 2 and its dimensions are shown in Table 2.



IEC

NOTE Mechanical and electrical reference plane.

Figure 2 – Connector with socket centre contact (for dimensions, see Table 2)**Table 2 – Dimensions of connector with socket centre contact**

Ref.	mm		in		Remarks
	min	max	min	max	
<i>a</i>	9,60	9,68	0,378	0,381	
<i>b</i>	8,31	8,46	0,327	0,333	
<i>c</i>	8,10	8,15	0,319	0,321	
<i>d</i>	—	4,72	—	0,186	
<i>e</i>	—	0,15	—	0,006	
<i>f</i>	10,52	—	0,414	—	
<i>g</i>	8,31	8,51	0,327	0,335	
<i>h</i>	1,73	2,24	0,068	0,088	
<i>j</i>	4,75	—	0,187	—	
<i>k^a</i>	—	—	—	—	
<i>m</i>	2,14 (nom.)		0,084 (nom.)		
<i>n</i>	4,72	5,28	0,186	0,208	
<i>p</i>	4,78	5,28	0,188	0,208	
<i>s^b</i>	—	—	—	—	
<i>t</i>	4,95	—	0,195	—	
<i>u^c</i>	—	—	—	—	
<i>w^d</i>	—	—	—	—	
<i>rb</i>	0,15	0,30	0,006	0,012	Radius or chamfer

^a Dimension *k* depends on the dimension *m* and dielectric constant, and shall meet the requirement of characteristic impedance of 50 Ω.

^b Design of slotting is optional. It is chosen to meet return loss (RL), mating characteristics, and connector durability requirements, when mated with a 1,32 mm to 1,37 mm (0,052 in to 0,054 in) gauge pin.

^c Spherical or chamfered.

^d Dimension *w* shall meet the requirements of 4.2.1.

4.2 Gauges

4.2.1 Gauge pin for socket centre contact

The gauge pin for a socket centre contact is shown in Figure 3 and its dimensions are shown in Table 3.

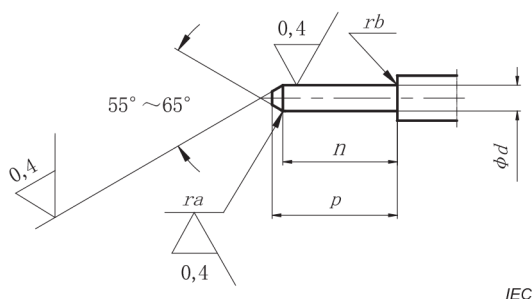


Figure 3 – Gauge pin for socket centre contact (for dimensions, see Table 3)

Table 3 – Dimensions of gauge pin for socket centre contact

Gauge A (For sizing purpose)					Gauge B (For insertion purpose)				Gauge C (For retention purpose) Mass of gauge: 57 g ± 1 g			
Ref.	mm		in		mm		in		mm		in	
	min	max	min	max	min	max	min	max	min	max	min	max
<i>d</i>	1,38	1,460	0,0543	0,0575	1,370	1,375	0,0539	0,0541	1,308	1,321	0,0515	0,0520
<i>n</i>	3,17	—	0,125	—	3,17	—	0,125	—	3,17	—	0,125	—
<i>p</i>	—	4	—	0,157	—	4	—	0,157	—	4	—	0,157
<i>ra</i>	0,10	0,30	0,004	0,012	0,10	0,30	0,004	0,012	0,10	0,30	0,004	0,012
<i>rb</i>	—	0,20	—	0,008	—	0,20	—	0,008	—	0,20	—	0,008

Material: steel, polished.

The test procedure is as follows:

a) Sizing test

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

b) Insertion test

After the sizing test, the standard gauge B should be inserted into the socket-centre contact. The insertion depth should not be less than 3,17 mm and the insertion force should not be more than 8,9 N.

c) Retention test

After the sizing test, the gauge C shall be inserted into socket-centre contact. The contact shall retain the mass of the gauge B in a vertical downward position.

4.2.2 Gauge for outer contact of connector with pin centre contact

The gauge for outer contact of a connector with pin centre contact is shown in Figure 4 and its dimensions are shown in Table 4.

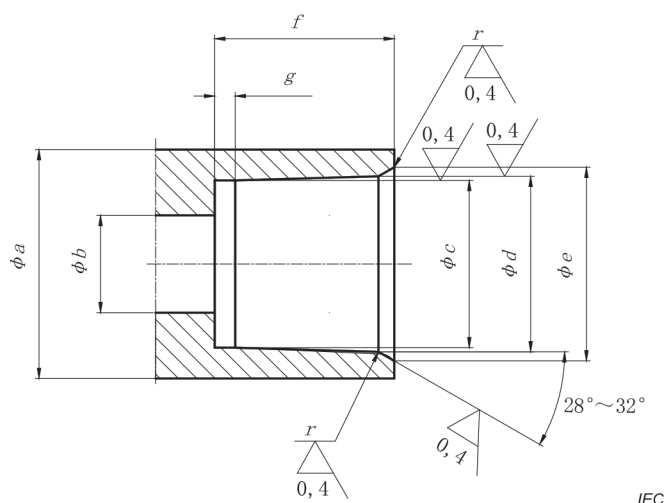


Figure 4 – Gauge for outer contact of connector with pin centre contact (for dimensions, see Table 4)

Table 4 – Dimensions of gauge for outer contact of connector with pin centre contact

Gauge D (For sizing purpose)					Gauge E (For retention purpose)			
					Mass of gauge: 225 g ± 5 g			
Ref.	mm		in		mm		in	
	min.	max.	min.	max.	min.	max.	min.	max.
<i>a</i>	9,63	9,68	0,379	0,381	9,63	9,68	0,379	0,381
<i>b</i>	—	5,08	—	0,200	—	5,08	—	0,200
<i>c</i>	8,08	8,10	0,318	0,319	8,15	8,18	0,321	0,322
<i>d</i>	8,31	8,36	0,327	0,329	8,41	8,46	0,331	0,333
<i>e</i>	8,79 (nom.)		0,346 (nom.)		8,79 (nom.)		0,346(nom.)	
<i>f</i>	8,41	8,46	0,331	0,333	8,36	8,41	0,329	0,331
<i>g</i>	4,00	—	0,157	—	4,00	—	0,157	—
<i>r</i> ^a	0,50	0,80	0,020	0,031	0,50	0,80	0,020	0,031
Material: steel, polished.								
^a Radius.								

The test procedure is as follows:

a) Sizing test

The outer contact shall be inserted into the gauge D once. This is a sizing operation.

b) Retention test

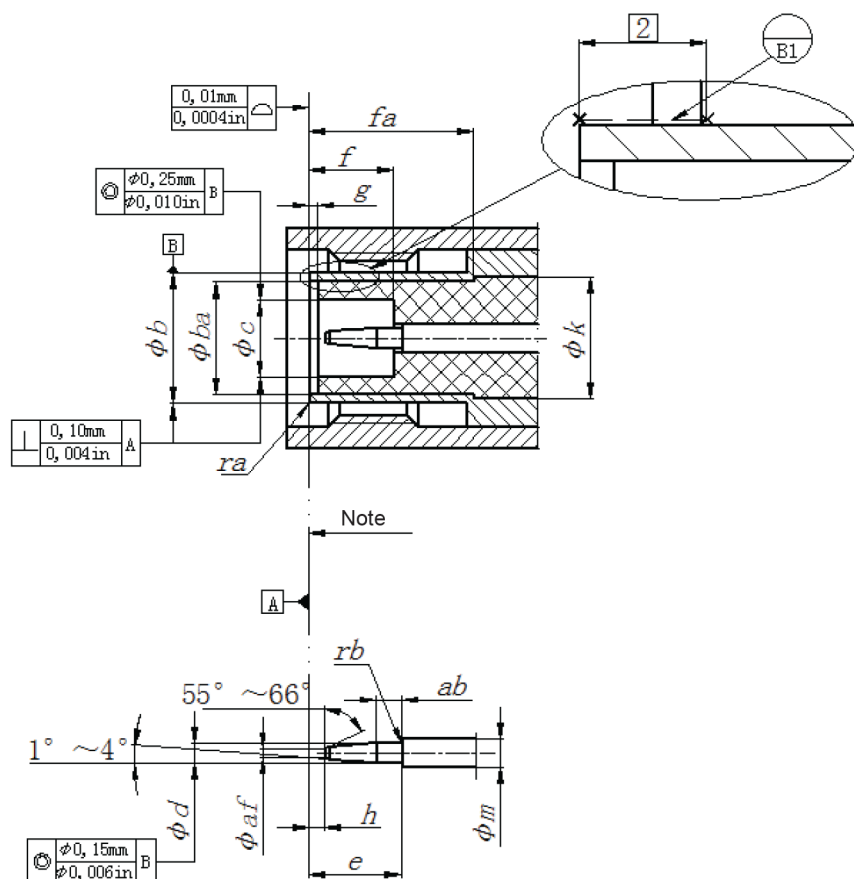
After the sizing test, the outer contact shall be inserted into the gauge E. The outer contact shall retain the gauge in a vertical downward direction.

This test may also be carried out on the connector with the insulator unremoved.

4.3 Dimensions – Standard test connectors – Grade 0

4.3.1 Connectors with pin centre contact

The interface of a connector with pin centre contact is shown in Figure 5, and its dimensions are shown in Table 5.



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NOTE Mechanical and electrical reference plane.

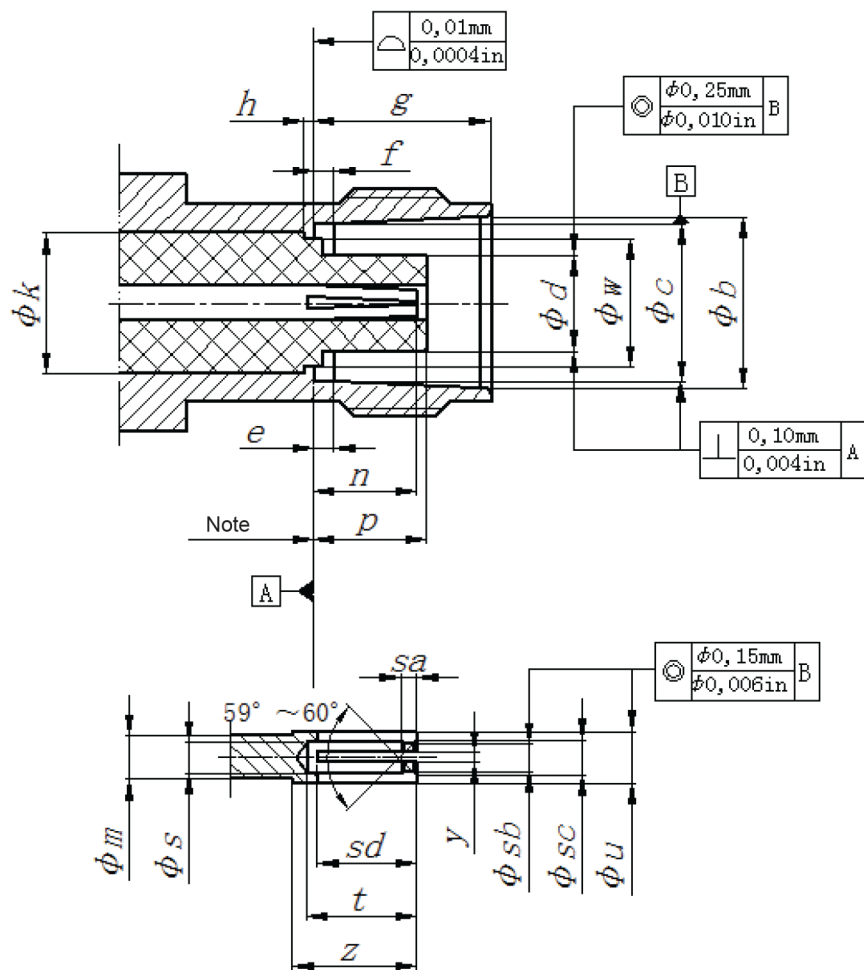
Figure 5 – Connector with pin centre contact (for dimensions, see Table 5)

Table 5 – Dimensions of connector with pin centre contact

Ref.	mm		in		Note
	min.	max.	min.	max.	
<i>b</i>	8,06	8,09	0,3173	0,3185	
<i>ba</i>	6,72	6,74	0,265	0,266	
<i>c</i>	4,88	4,93	0,192	0,194	
<i>k</i>	6,99	7,01	0,275	0,276	
<i>fa</i>	5,31	5,36	0,209	0,211	
<i>e</i>	5,31	5,38	0,209	0,212	
<i>h</i>	0,08	1,02	0,003	0,040	
<i>g</i>	0,15	0,30	0,006	0,012	
<i>f</i>	5,38	5,54	0,212	0,218	
<i>d</i>	1,35	1,37	0,053	0,054	
<i>m</i> ^a	2,14 (nom.)		0,084 (nom.)		
<i>ra</i>	0,10	0,30	0,004	0,012	radius
<i>rb</i>	—	0,13	—	0,005	radius
<i>ab</i>	1,98	—	0,078	—	
<i>af</i>	—	0,64	—	0,025	
NOTE Dimensions not specified in this table, see 4.1.1.					
^a Dimension <i>m</i> depends on the dimension <i>k</i> and dielectric constant, and shall meet the requirements of characteristic impedance of 50 Ω ± 0,5 Ω.					

4.3.2 Connector with socket centre contact

The mating face of a standard test connector with socket centre contact is shown in Figure 6 and its dimensions are shown in Table 6.



IEC

NOTE Mechanical and electrical reference plane.

Figure 6 – Connector with socket in centre contact (for dimensions, see Table 6)

Table 6 – Dimensions of connector with socket centre contact

Ref.	mm		in		Note
	min.	max.	min.	max.	
<i>b</i>	8,31	8,46	0,327	0,333	
<i>c</i>	8,10	8,15	0,319	0,321	
<i>d</i>	4,67	4,72	0,184	0,186	
<i>e</i>	0,00	0,15	0,000	0,006	
<i>f</i>	0,51	1,02	0,020	0,040	
<i>g</i>	8,36	8,46	0,329	0,333	
<i>h</i>	0,79	0,84	0,031	0,033	
<i>m</i> ^a	2,14 (nom.)		0,084(nom.)		
<i>k</i>	6,99	7,01	0,275	0,276	
<i>n</i>	5,21	5,28	0,205	0,208	
<i>p</i>	5,08	5,23	0,200	0,206	
<i>s</i>	1,52	1,63	0,060	0,064	
<i>t</i>	5,21	—	0,205	—	
<i>u</i>	2,16	2,18	0,085	0,086	
<i>w</i>	6,58	6,68	0,259	0,263	
<i>y</i> ^b	0,18	0,23	0,007	0,009	
<i>z</i>	6,05	6,10	0,238	0,240	
<i>sa</i>	0,38	0,89	0,015	0,035	
<i>sb</i>	1,356	1,361	0,053	0,054	
<i>sc</i>	1,52	1,58	0,060	0,062	
<i>sd</i>	4,62	4,88	0,182	0,192	
NOTE Dimensions not specified in this table, see 4.1.2.					
^a Dimension <i>m</i> depends on the dimension <i>k</i> and dielectric constant, and shall meet the requirements of characteristic impedance of $50\ \Omega \pm 0,5\ \Omega$. ^b Design for slotting is optional. It is chosen to meet electrical and mechanical requirements, when mated with a 1,35 mm (0,0531 in) to 1,37 mm (0,0539 in) pin contact.					

5 Quality assessment procedures

5.1 General

Subclauses 5.2 to 5.3 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 inspection sampling, together with the pro-forma blank detail specification (BDS) and instructions for the preparation of a detail specification.

5.2 Ratings and characteristics

Preferred climatic categories are given in Table 7.

The values indicated below are recommended for TNC 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. Ratings and characteristics are given in Table 8.

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 – Preferred climatic categories

Climate series	Grade*	Temperature range	Steady damp heat
40/85/21	A	–40 °C to +85 °C	21 days
55/125/21	B	–55 °C to +125 °C	21 days
55/155/56	C	–55 °C to +155 °C	56 days
* To be included in the IEC series designation.			

Table 8 – Ratings and characteristics

Ratings and characteristics	IEC 61169-1:2013 Subclause	Value	Remarks including any deviations from standard test methods
Dimensions	9.1.2	See DS	Including parts and materials and mechanical interchangeability
Electrical			
Nominal impedance		50 Ω	
Frequency range ^a		DC to 11 GHz	
Return loss ^a Grade 2 connectors	9.2.1		
– straight styles		≥17,692 dB	
– right-angle styles		See DS	
– component mounting styles		See DS	
– solder bucket and PCB mounting styles		See DS	
Centre contact resistance ^b	9.2.3		
– initial		≤1,5 mΩ	
– after conditioning		≤2,5 mΩ	
Outer conductor resistance ^b	9.2.3		
– initial		≤0,4 mΩ	
– after conditioning		≤1,2 mΩ	
Insulation resistance	9.2.5		
– initial		≥5 000 MΩ	
– after conditioning		≥200 MΩ	
Voltage proof at sea level ^{c,d}	9.2.6	1 500 V	(86 to 106) kPa
Voltage proof at 4,4 kPa ^{c,d}	9.2.6	300 V	4,4 kPa approximately equivalent to 20 km
Environmental test voltage at sea level ^{c,d}		500 V	(86 to 106) kPa
Environmental test voltage at 4,4 kPa ^{c,d}		100 V	
Screening effectiveness ^e (straight cabled connectors only)	IEC 62153-4-7	≥90 dB, at 1 GHz to 3 GHz	
Discharge test (corona effect)	9.2.8	375 V	Extinction voltage at 4,4 kPa
PIM	IEC 62037-3	≤–150 dBc (1 800 MHz)	Test power (2 × 20) W