BS EN 61169-54:2016

BSI Standards Publication

Radio-frequency connectors

Part 54: Sectional specification for coaxial connectors with 10 mm inner diameter of outer conductor, nominal characteristic impedance 50 Ω, series 4,3-10

bsi.

National foreword

This British Standard is the UK implementation of EN 61169-54:2016. It is identical to IEC 61169-54:2016.

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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Compliance with a British Standard cannot confer immunity from legal obligations.

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EUROPEAN STANDARD

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EN 61169-54

December 2016

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English Version

Radio-frequency connectors - Part 54: Sectional specification for coaxial connectors with 10 mm inner diameter of outer conductor, nominal characteristic impedance 50 Ω, series 4,3-10 (IEC 61169-54:2016)

Connecteurs pour fréquences radioélectriques - Partie 54: Spécification intermédiaire relative aux connecteurs coaxiaux avec diamètre intérieur du conducteur extérieur de 10 mm, impédance caractéristique nominale de 50 Ω, série 4,3-10 (IEC 61169-54:2016)

Hochfrequenz-Steckverbinder - Teil 54: Rahmenspezifikation für koaxiale Hochfrequenzsteckverbinder mit 10 mm Innendurchmesser des Außenleiters, Wellenwiderstand 50 Ω, Typ 4,3-10 (IEC 61169-54:2016)

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

European foreword

The text of document 46F/348/FDIS, future edition 1 of IEC 61169-54, prepared by SC 46F "RF and microwave passive components", of IEC/TC 46 "Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 61169-54:2016.

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) 2017-07-11
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2019-10-11

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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 61169-1	2013	Radio-frequency connectors - Part 1: Generic specification - General requirements and measuring methods	EN 61169-1	2013
IEC 62037-1	2012	Passive RF and microwave devices, intermodulation level measurement - Part 1: General requirements and measuring methods	EN 62037-1	2012

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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RADIO-FREQUENCY CONNECTORS –

Part 54: Sectional specification for coaxial connectors with 10 mm inner diameter of outer conductor, nominal characteristic impedance 50 Ω, series 4,3-10

FOREWORD

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International Standard IEC 61169-54 has been prepared by subcommittee 46F: RF and microwave passive components, of IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories.

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

FDIS	Report on voting
46F/348/FDIS	46F/354/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.

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 website under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

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INTRODUCTION

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning the design of these connectors given in 3.1.2.

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RADIO-FREQUENCY CONNECTORS –

Part 54: Sectional specification for coaxial connectors with 10 mm inner diameter of outer conductor, nominal characteristic impedance 50 Ω, series 4,3-10

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 coaxial connectors with 10 mm inner diameter of outer conductor, characteristic impedance 50 Ω, series 4,3-10 with screw type, hand screw type or quick-lock type coupling, for an upper operating frequency limit of 6 GHz, for use in wireless telecommunication and wireless network applications in conjunction with appropriate transmission line types for these applications.

It also describes mating face dimensions for general purpose connectors, gauging information and tests selected from IEC 61169-1, applicable to all detail specifications relating to 4,3-10 series connectors.

This specification indicates the 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.

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 62037-1:2012, *Passive RF and microwave devices, intermodulation level measurement – Part 1: General requirements and measuring methods*

3 Mating face and gauge information

3.1 Dimensions – General connectors – Grade 2

3.1.1 Connector with pin-centre contact (see Figure 1)

Metric dimensions are original dimensions. All un-dimensioned pictorial configurations are for reference purpose only.

Dimensions in millimetres

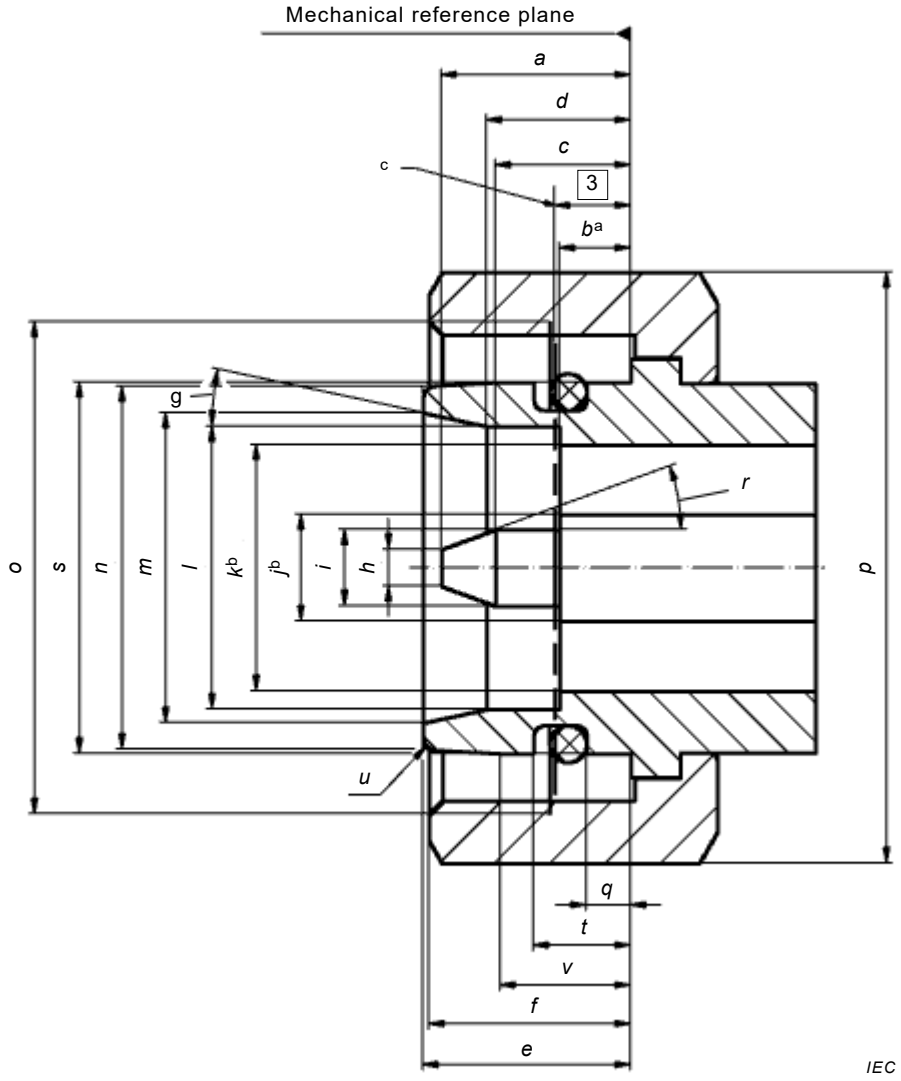


Figure 1 – Connector with pin-centre contact (for dimensions and key, see Table 1)

Table 1 – Dimensions of connector with pin-centre contact

Ref.	mm		Additional notes
	Min.	Max.	
a	–	8,0	
b	–	2,9	[a]
c	5,0	–	
d	4,4	–	
e	8,3	8,5	
f	8,0	8,5	
g	10°	14°	
h	–	2,3	diameter
i	3,07	3,13	diameter
j	4,35 nom.		diameter [b]
k	10,0 nom.		diameter [b]
l	11,47	11,53	diameter
m	12,5	–	diameter
n	14,7	14,8	diameter
o	M20 × 1	tolerance 6H	thread
p	22 nom.		wrench size
q	1,8	–	
r	20° nom.		
s	15,07	15,11	diameter
t	–	4,1	
u	0,5 nom.		radius
v	5,1	5,5	

[a] Applicable for inner and outer contact.

[b] For 50 Ω nominal impedance.

[c] Electrical reference plane.

3.1.2 Connector with socket-centre contact (see Figure 2)

Dimensions in millimetres

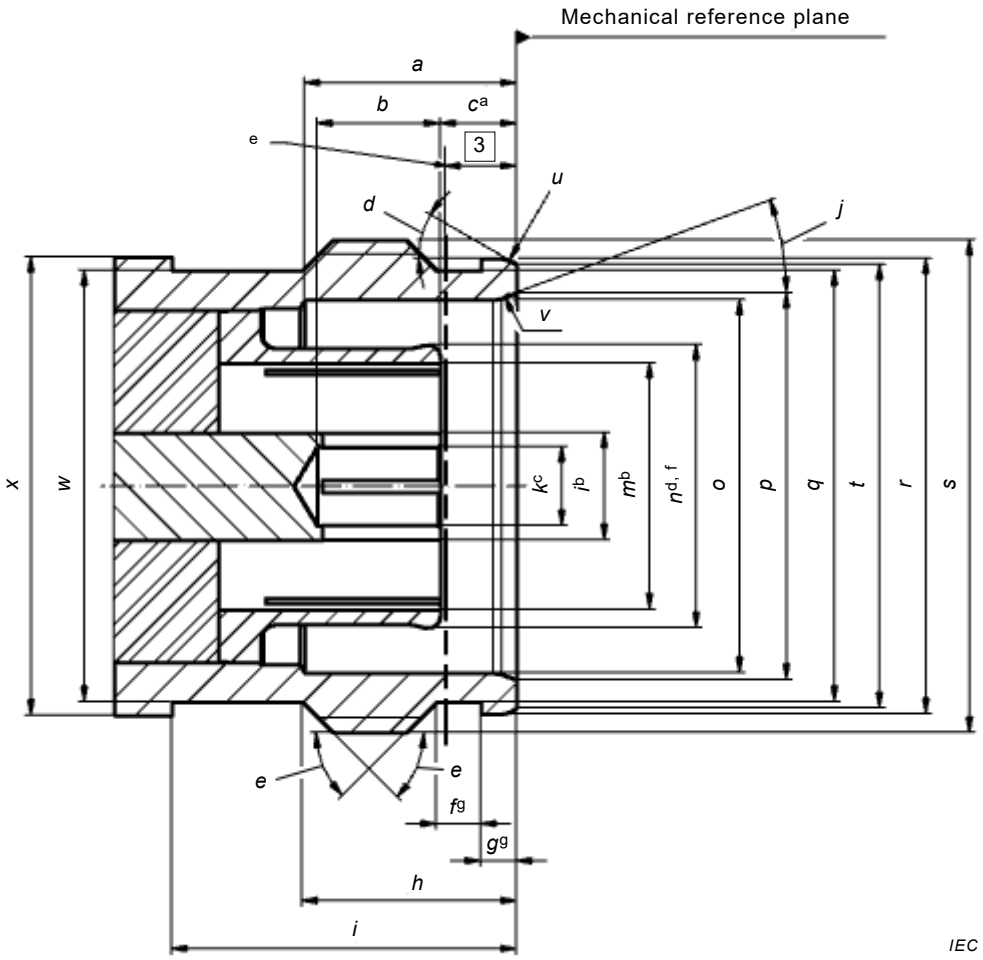


Figure 2 – Connector with socket-centre contact (for dimensions and key, see Table 2)

Table 2 – Dimensions of connector with socket-centre contact

Ref.	mm		Additional notes
	Min.	Max.	
a	8,5	–	
b	5,0	–	
c	3,1	3,5	[a]
d	30° nom.		
e	45° nom.		[g]
f	1,7	1,9	[g]
g	1,44	1,50	[g]
h	8,7	9,0	
i	13,9	14,1	
j	20° nom.		
k			[c]
l	4,35 nom.		diameter [b]
m	9,8	10,2	diameter [b]
n	–	12,3	[d] [f]
o	15,13	15,19	diameter
p	15,7	15,9	diameter
q	17,4	17,5	diameter [g]
r	18,44	18,5	diameter [g]
s	M20 × 1	tolerance 6g	thread
t	17,9	18,1	diameter
u	0,6 nom.		radius
v	1,0 nom.		radius
w	17,45	17,55	diameter
x	18,6	–	diameter

[a] Applicable for inner and outer contact.

[b] For 50 Ω nominal impedance.

[c] Resilient to meet the requirements with gauge pins for socket centre contact.

[d] Expand to meet the requirements with gauge rings for socket outer contact.

[e] Electrical reference plane.

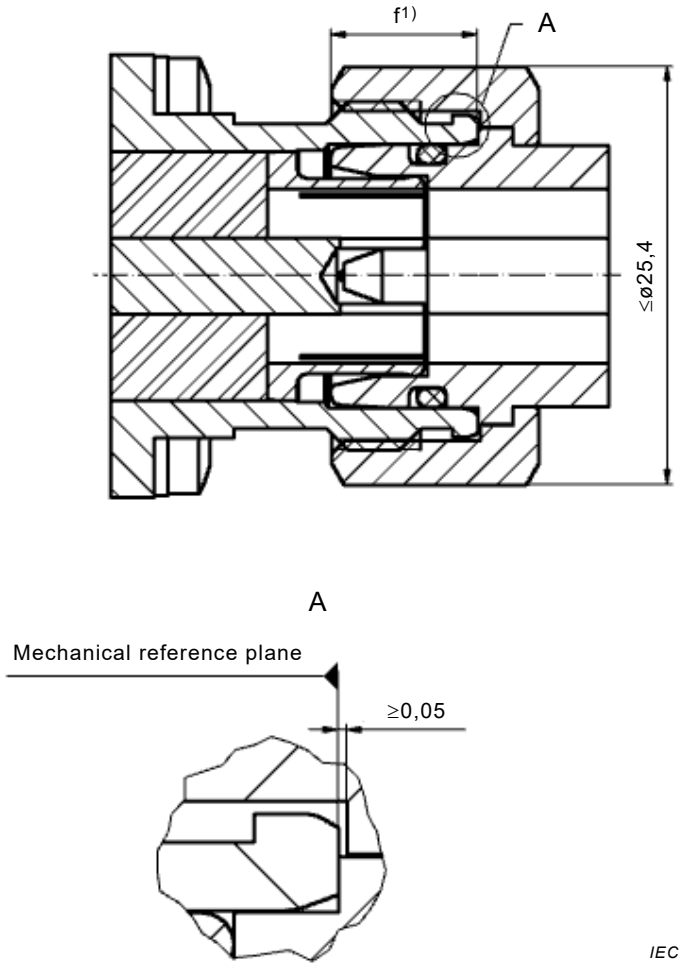
[f] In unmated condition.

[g] Rim and groove on socket front provided for quick lock attachment.

3.1.3 Presentation of possible coupling mechanisms

3.1.3.1 Screw type (see Figure 3)

Dimensions in millimetres

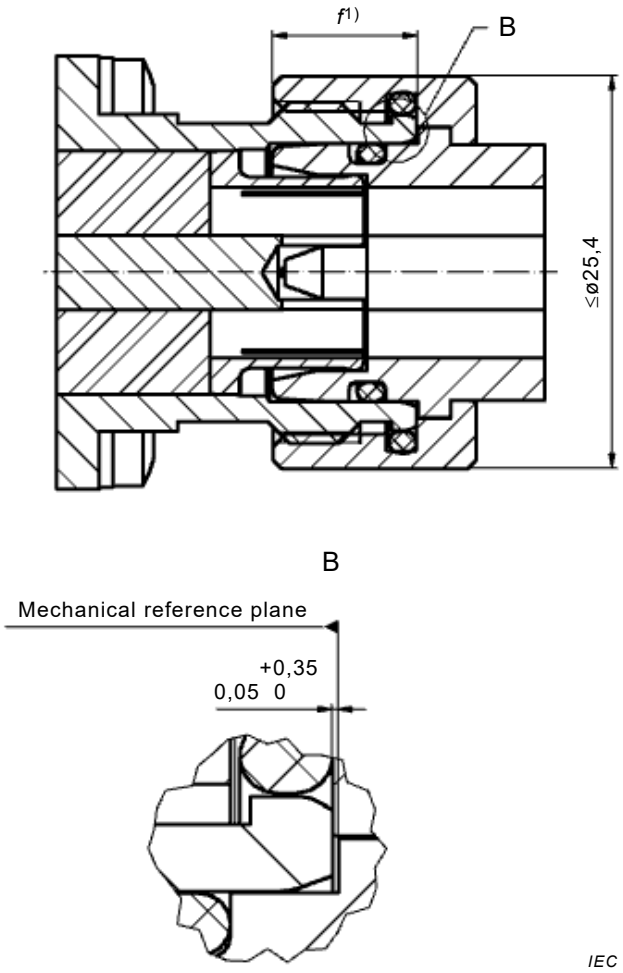


1) According to Table 1.

Figure 3 – Screw type

3.1.3.2 Hand screw type (see Figure 4)

Dimensions in millimetres

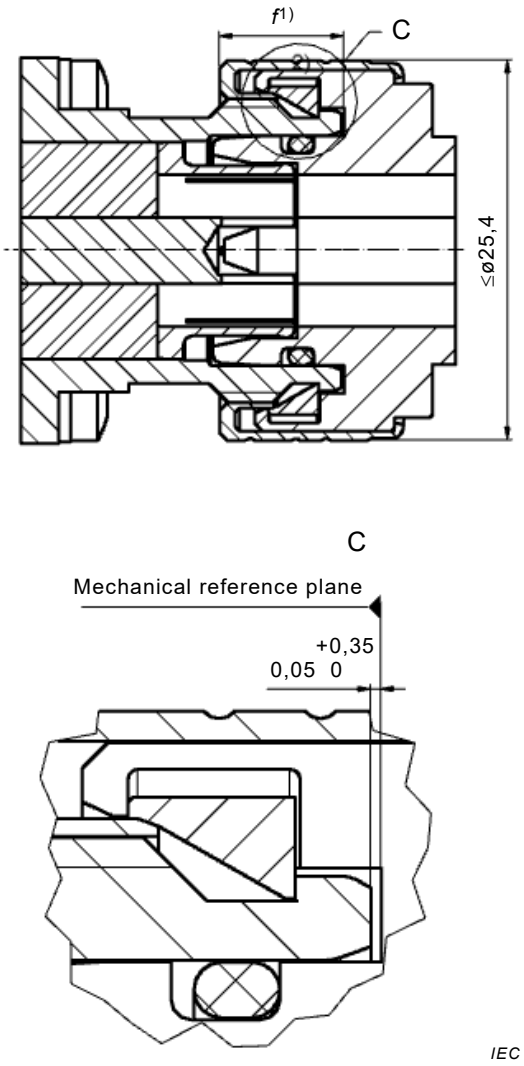


1) According to Table 1.

Figure 4 – Hand screw type

3.1.3.3 Quick lock type (see Figure 5)

Dimensions in millimetres



1) Max 13,5 mm for this variant.

Figure 5 – Quick lock type

3.2 Gauges

3.2.1 Gauge pins for socket-centre contact (see Figure 6)

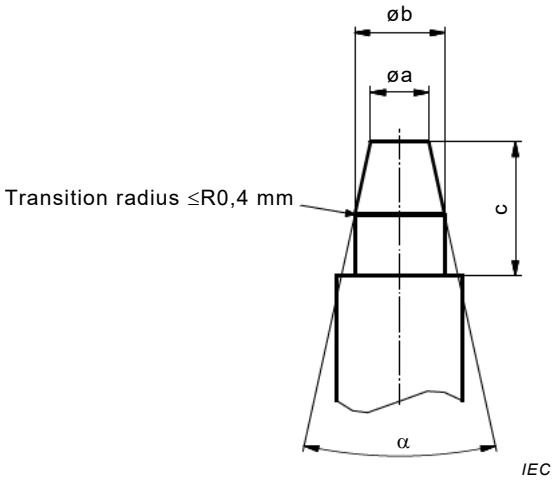


Figure 6 – Gauge pins for socket-centre contact (for dimensions, see Table 3)

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

Gauge A			Gauge B	
Ref.	**mm**		**mm**	
	Min.	Max.	Min.	Max.
a	2,27	2,33	2,27	2,33
b	3,13	3,137	3,063	3,07
c	4,8	5	4,8	5,0
α	44°	46°	36°	44°
Material: steel, polished, surface roughness: Ra=0,4 μm maximum.				

3.2.2 Test procedure

The gauge A shall be completely inserted three times into the socket centre contact. This is a sizing operation.

After sizing, gauge A shall be inserted into socket centre contact. The insertion force shall not exceed 20 N.

Separation force is measured with gauge B and shall require a minimum force of 1,5 N.

3.2.3 Gauge rings for plug outer contact (see Figure 7)

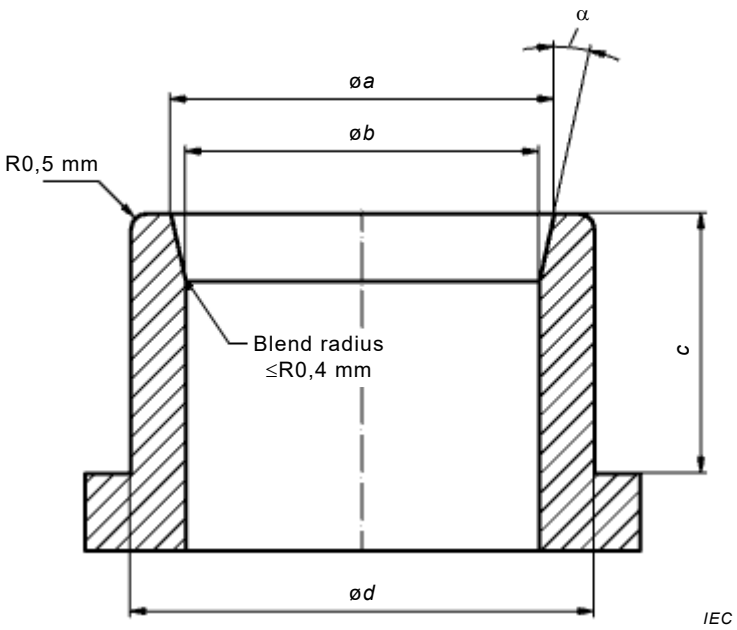


Figure 7 – Gauge rings for socket outer contact (for dimensions see Table 4)

Table 4 – Dimensions of gauge rings for socket outer contact

Gauge A			Gauge B	
Ref.	mm		mm	
	Min.	Max.	Min.	Max.
a	12,45	12,65	12,45	12,65
b	11,46	11,48	11,53	11,537
c	8,3	8,5	8,3	8,5
d	15,04	15,08	–	14,8
α	14°	15°	10°	14°
Material: steel, polished, surface roughness: Ra=0,4 μm maximum.				

3.2.4 Test procedure

The gauge A shall be completely inserted three times into the resilient outer contact. This is a sizing operation.

After sizing, gauge A shall be inserted into the resilient contact. The insertion force shall not exceed 35 N.

Separation force is measured with gauge B and shall require a minimum force of 4 N. All contact segments shall touch the diameter b in the region of the tips.

3.3 Dimensions – Standard test connectors – Grade 0

3.3.1 Connector with pin-centre contact (see Figure 8)

Dimensions in millimetres

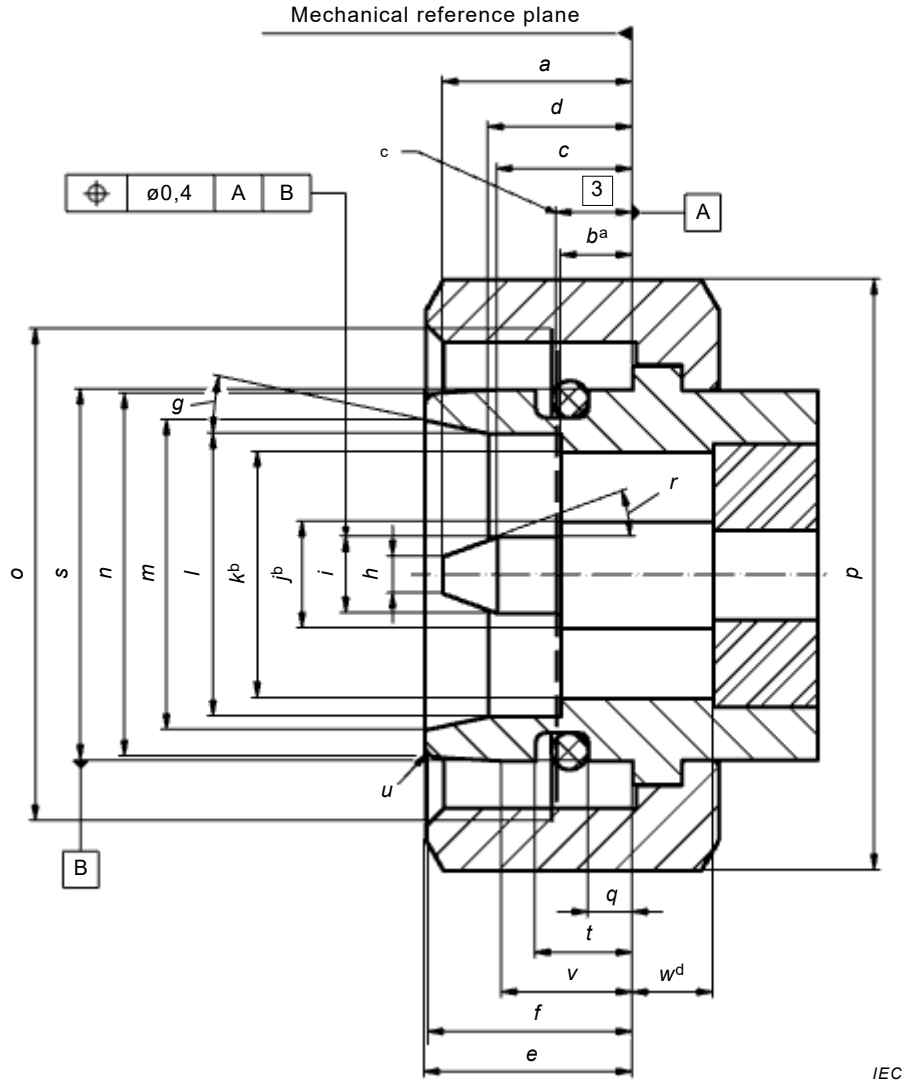


Figure 8 – Connector with pin-centre contact
(for dimensions and key, see Table 5)

Table 5 – Dimensions of connector with pin-centre contact

Ref.	mm		Additional notes
	Min.	Max.	
a	–	8,0	
b	2,8	2,9	[a]
c	5,0	–	
d	4,4	–	
e	8,3	8,5	
f	8,0	8,5	
g	10°	14°	
h	–	2,3	Diameter
i	3,085	3,115	Diameter
j	4,35 nom.		diameter [b]
k	9,98	10,02	diameter [b]
l	11,485	11,515	diameter
m	12,5	–	diameter
n	14,7	14,8	diameter
o	M20 × 1	tolerance 6H	thread
p	22 nom.		wrench size
q	1,8	–	
r	20° nom.		
s	15,07	15,11	diameter
t	–	4,1	
u	0,5 nom.		radius
v	5,1	5,5	
w	15	–	[d]

[a] Applicable for inner and outer contact.

[b] For 50 Ω ± 0,3 Ω impedance.

[c] Electrical reference plane.

[d] Minimum distance to insulating bead.

3.3.2 Connector with socket-centre contact (see Figure 9)

Dimensions in millimetres

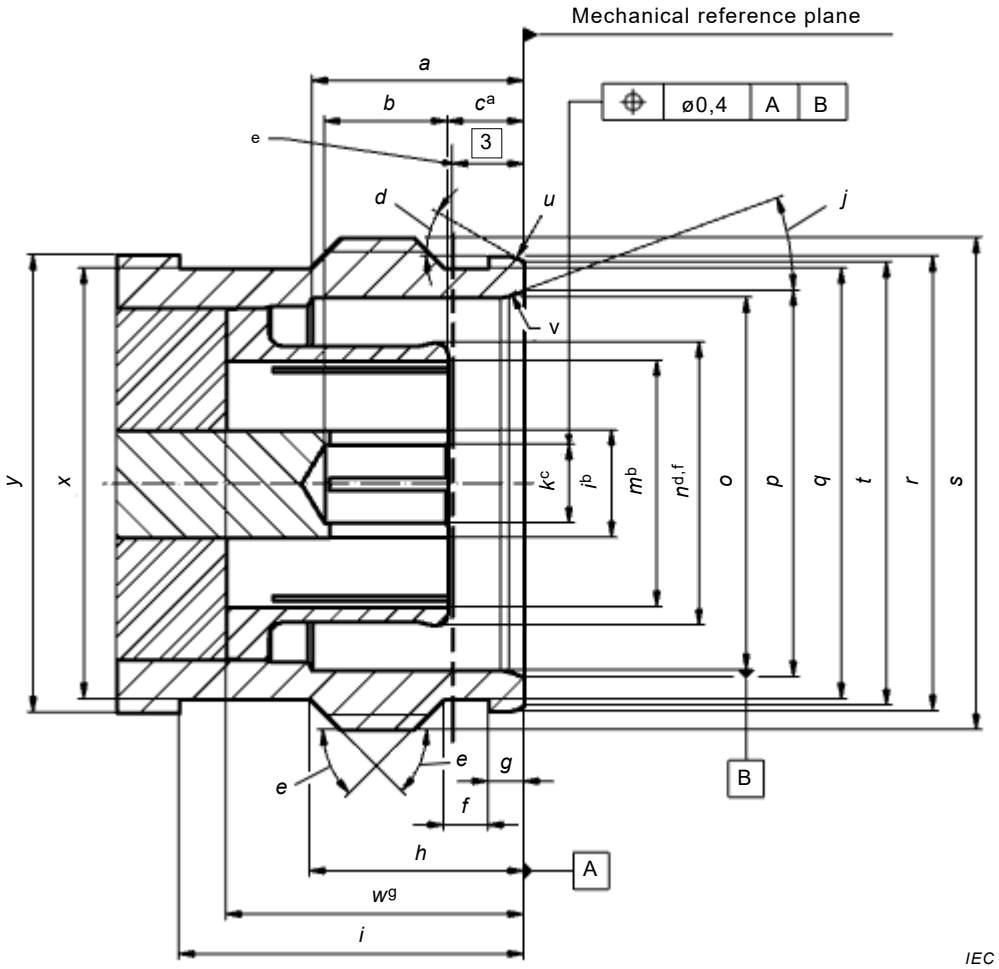


Figure 9 – Connector with socket-centre contact (for dimensions and key, see Table 6)

Table 6 – Dimensions of connector with socket-centre contact

Ref.	mm		Additional notes
	Min.	Max.	
a	8,5	–	
b	5,0	–	
c	3,1	3,2	[a]
d	30° nom.		
e	45° nom.		
f	1,7	1,9	
g	1,44	1,50	
h	8,7	9,0	
i	13,9	14,1	
j	20° nom.		
k			[c]
l	4,35 nom.		diameter [b]
m	9,98	10,02	diameter [b]
n	–	12,3	[d] [f]
o	15,13	15,17	diameter
p	15,7	15,9	diameter
q	17,4	17,5	diameter
r	18,44	18,5	diameter
s	M20 × 1	tolerance 6g	thread
t	17,9	18,1	diameter
u	0,6 nom.		radius
v	1,0 nom.		radius
w	15	–	[g]
x	17,45	17,55	diameter
y	18,6	–	diameter

[a] Applicable for inner and outer contact.

[b] For 50 Ω Ω ± 0,3 Ω impedance.

[c] Resilient to meet the requirements with gauge pins for socket centre contact.

[d] Expand to meet the requirements with gauge rings for socket outer contact.

[e] Electrical reference plane.

[f] In unmated condition.

[g] Minimum distance to insulating bead.

4 Quality assessment procedure

4.1 General

Subclauses 4.2 to 4.4 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 in Tables 7 and 8 are recommended for type 4,3-10 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.

Table 7 – Climatic categories

Category designation	Letter	Temperature range	Damp heat steady state
40/85/21		–40 °C to +85 °C	

Table 8 – Ratings and characteristics

Ratings and characteristics	Test method IEC 61169-1:2013 subclause	Value	Remarks, deviation from standard test method
Electrical			
Nominal impedance		50 Ω	
Frequency range		DC to 6 GHz	Or upper frequency limit of cable
Reflection factor[a]	9.2.1		
Straight styles			
– Interface only		≤0,015	Up to 4 GHz
		≤0,025	4 GHz to 6 GHz
Flexible cables		See DS	
– Right angle styles		See DS	
Semi rigid/semi flexible cables		See DS	
Solder bucket and PCB mounting style		See DS	
– Component mounting styles		See DS	
Insertion loss		<0,05 × √ f (GHz) in dB	The test method is under consideration
Centre contact resistance[b]	9.2.3		
– initial		≤ 1,0 mΩ	
– after tests		≤ 1,5 mΩ	
Outer contact continuity[b]	9.2.3		
– initial		1,0 mΩ	
– after tests		1,5 mΩ	
Insulation resistance	9.2.5		
– initial		5 000 MΩ	
– after tests		200 MΩ	
Proof voltage [cd]			
– at sea level	9.2.6	2 500 Vrms	
– at 4,4 kPa	9.2.6	450 Vrms	
Screening effectiveness[e]	9.2.7	≥ 90 dB, up to 3 GHz	
Handscrew & quick-lock interfaces		≥ 70 dB, 3 GHz to 6 GHz	
Screw type interfaces		≥ 110 dB, up to 6 GHz	
Intermodulation level[f]	9.2.9	–160 dB	0,4 GHz to 4 GHz 2 carriers +46 dBm
RF-power handling	9.2.2	500 W at 2 GHz (3 000 m altitude, 90 °C ambient, 155 °C inner contact temperature)	peak power: 15 kW (ambient temperature 90 °C max.)
Mechanical			
Centre contact captivation	9.3.5		Maximum displacement of 0,25 mm in axial direction
– axial force		30 N	

Ratings and characteristics	Test method IEC 61169-1:2013 subclause	Value	Remarks, deviation from standard test method
Engagement and separation force	9.3.6		
– axial force (engagement)		Typically 100 N	Push pull
– axial force (separation)		Typically 80 N	Push pull
– torque		≥ 5 Nm	Screw type (coupling torque)
Gauge retention force	9.3.4		
– centre contact		≥ 1,5 N	
– outer contact		≥ 4 N	
– torque		N.m	
Mechanical tests on cable fixing			
– cable rotation (nutation)	9.3.7	See DS	
– cable pulling	9.3.8	See DS	
– cable bending	9.3.9	See DS	
– cable torsion	9.3.10	See DS	
Tensile strength of coupling mechanism	9.3.11	≥ 450 N	
Bending moment of coupling mechanism	9.3.12	na	
Vibration	9.3.3	100 m/s^2 2 Hz to 200 Hz	10 gn
Shock	9.3.14	981 m/s^2 half-sine wave 6 ms	100 gn
Endurance			
Mechanical endurance	9.3.15	100 operations	
High temperature endurance	9.4.5	250 h at 85 °C	
Environmental			
Climatic sequence			
– storage	9.4.2	40/85/21	
Sealing	9.4.7	IP X8 2,5 bar, 1 h	
Salt mist	9.4.10	48 h spray	
Sulphur dioxide test	9.4.12		
Change of temperature	9.4.4		
– dry heat		+85 °C	
– cold		–40 °C	
– damp heat	9.4.3		

Upper temperature limit can be restricted by the cable characteristics. Reference should be applied according the relevant cable specification.

[a] Characteristics indicated are those that can be applied to basic connector. Intrinsic limitations of the cable can diminish the performance of the assembly and reference should always be made to the actual values given in the detail specification.

[b] Values for a single pair of connectors.

[c] Voltage are r.m.s. values of AC from 40 Hz to 65 Hz, unless otherwise specified.

[d] Values are depending also of the cable type.

[e] Applicable in fully mated position. Depending on cable type values for a single pair of connectors.

[f] To obtain an accurate intermodulation measurement, the PIM floor should be 10 dB lower than the connector PIM requirement (see IEC 62037-1:2012, Clause 5). This maintains an accuracy of 3 dB. The accuracy will worsen as the connector PIM requirement gets closer to instrument setup PIM floor (see IEC 62037-1:2012, Figure 3).

4.3 Test schedule and inspection requirements

4.3.1 Acceptance tests

Table 9 describes the acceptance tests to be performed.

Table 9 – 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 examination	9.1.1	a	II	1		a	S3	1,5	
Group B1									
Outline dimension	9.1.2	a	S4	0,4		a	S3	4	
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)	9.3.5	ia	II	1		ia	S3	1,5	
Insertion retention force (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	
Water immersion	9.4.9	ia	II	0,015		ia	S3	0,025	
Voltage proof	9.2.6	a	II	0,4		a	II	4	
Solderability *(d)*	9.3.2.2	ia	S4	0,4		ia	S3	4	
Insulation resistance	9.2.5	a	S4	0,4		a	S3	4	

For the symbols, abbreviations and procedures, see the end of Table 10.

4.3.2 Periodic tests

There are no group C tests for levels H and M. Table 10 lists the periodic tests to be performed.

Table 10 – 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 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 of each style and variant, unless using common piece parts
# = for Qualification Approval (QA), 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 quality conformance

4.4.1 Quality conformance inspection

This shall consist of test group A1 and B1 on a lot-by-lot basis.

4.4.2 Quality conformance and its maintenance

4.4.2.1 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 group D tests.

4.4.2.2 Procedure for quality conformance involving structural similarity

During the initial procedure, the declared structurally similar styles and variants may be included by merely subjecting the distinguishing piece-part(s) to subgroup D3 testing.

When structurally similar styles or variants are to be added to an existing conformance document, they shall be assembled and subject to group A1 and group B1 testing and any appropriate group D tests. The distinguishing piece-parts shall be subjected to subgroup D3 testing before inclusion of the additional style or variant on the conformance document.

It should be noted that:

a) connector styles and variants of styles may be qualified by invoking structural similarity when applicable;
b) it may not always be considered necessary to assemble and test all structurally similar styles and variants as complete connectors.

4.5 Test and measurement procedures

4.5.1 General

The related clauses cover the majority of tests and measuring procedures required for the qualification approval and conformance inspection of RF connectors. However,

- not all the tests are applicable to all sectional and detail specifications;
- the sectional specification shall prescribe the tests (and any additional tests) applicable to a particular connector type;
- detail specifications shall identify which of the non-mandatory tests prescribed in the relevant sectional specification are applicable to a particular style/variant of connector;
- any additional test methods shall be clearly identified as such.

4.5.2 Schedule of basic test groupings for acceptance and periodic tests

4.5.2.1 General

Unless otherwise prescribed in the sectional specification (SS), the schedule below shall provide the basis for qualification approval and quality conformance inspection tests to be included in each SS.

Details of any deviations necessary from the standard test method and/or conditions are to be indicated. Tests are to be carried out in the order shown unless otherwise prescribed.

4.5.2.2 Sampling and lot-by-lot system

One of the following procedures is to be used.

a) Fixed quantity sample procedure

This shall consist of the appropriate fixed quantity sample 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.

b) Lot-by-lot

This shall consist of three consecutive lots passing test groups A1 and B1 followed by the selection of specimens from the lots as appropriate. These specimens shall successfully pass the specified periodic group D tests.

4.6 Specifications

4.6.1 Specification structures

The relationship between the generic, general blank detail, sectional and detail specifications is detailed hereafter.

4.6.2 Sectional specification (SS)

Each sectional specification relates only to a particular series or type of RF connector, e.g. type SMA, type N, type BNC, etc.

It prescribes:

- mating face dimensions for general purpose and for test connectors;
- gauging information – particularly that applicable to resilient contacts;
- performance parameters common to all connector styles within the series;
- mandatory tests, indicated by "a" for applicable in the test schedule, and levels of conformance inspection for two levels of quality assessment to be observed when writing an associated detail specification.

The SS also provides recommended ratings, performance characteristics and test conditions to be considered when writing a DS together with any general deviations from the test conditions.

4.6.3 Detail specification (DS)

Detail specifications for levels M and H shall normally be prepared using the blank detail specification provided in 4.6.5 and periodicity of certain specialized tests is dependent upon the physical and electrical characteristics of the individual connector style/variant(s) covered by the DS.

The detail specification, when completed, shall provide the user, manufacturer, test house and certification body with all the necessary information for the approval testing and quality conformance inspection relating to a connector style and any variants within a specific series of RF connectors.

4.6.4 Blank detail specification

4.6.4.1 General

Detail specifications (DS) writers shall use the appropriate blank detail specification (BDS). The following pages comprise the BDS dedicated for use with 50 Ω type 4,3-10 connectors. As such, it will have already entered on it information in relation 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.

4.6.4.2 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 feathers and marking: as applicable
   - Series designation: in bold characters/digits approximately 15 mm high.
2) Enter detail 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.
4) Any maximum panel thickness limitation for fixed connectors shall be stated.
5) Particulars of all variants covered by the DS. As appropriate, the information shall include:
   - cable type (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.

4.6.4.3 Performance

6) Performance data listing the most important characteristics of the connector in accordance with the requirements of the relevant sectional specification. Deviations from the minimum requirements shall be clearly indicated. Non applicable shall be marked “na”.

4.6.4.4 Marking, ordering information and related matters

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

4.6.4.5 Selection of tests, test conditions and severities

8) “na” shall be used to indicate 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 of the relevant sectional specification. Any additional test 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 conditions, including any relevant deviations given in the test schedule of the sectional specification.

4.6.5 Blank detail specification pro-forma for 50 Ω type 4,3-10 connectors

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 61169-1:2013

NATIONAL REFERENCE</td><td colspan="3">ISSUE
(3) .
(4) .</td></tr>
<tr><td colspan="4">(5) Detail specification for radio frequency coaxial connector of assessed quality</td><td colspan="2">Type 4,3-10</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
… Ω</td><td colspan="2">Climatic category…./…/…/</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.</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			Ω	
Frequency range Return loss		9.2.1	GHz GHz GHz GHz	Measurement frequency range
Centre contact resistance		9.2.3	≤ mΩ ≤ mΩ	Initial After conditioning
Centre conductor continuity		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		9.2.6	kV kV kV kV	86 kPa to 106 kPa
+ Proof voltage at 4,4 kPa		9.2.6	kV kV kV kV	kPa (if not 4,4 kPa)
Screening effectiveness		9.2.7	dB at GHz	Z_t ≤ mΩ
Discharge test (corona) at sea level		9.2.8	≥ V ≥ V ≥ V ≥ V	Extinction voltage
ADDITIONAL ELECTRICAL CHARACTERISTICS				
+ Voltage values are r.m.s. values at 50 Hz to 60 Hz, unless otherwise specified.				

Ratings and characteristics	Variant No. Designation	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	
Centre contact captivation – axial force – permitted displacement in each direction – torque		9.3.5	 N mm Nm	
Engagement and separation – axial force		9.3.6		
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	
– cable bending		9.3.9	cycles	Length of cable and mass
– cable torsion		9.3.10	Nm	
Bending moment		9.3.12	Nm	Relative to reference plane
Bumps total		9.3.13	m/s^2 to Hz	(gn acceleration)
Vibration		9.3.3	m/s^2 to Hz	(gn acceleration)
Shock		9.3.14	m/s^2 Shape ms	(gn acceleration)
ADDITIONAL MECHANICAL CHARACTERISTICS				

Ratings and characteristics	**Variant No. Designation**	**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
3)	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.	

5 Marking

5.1 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.

If the nominal impedance of a connector is to be indicated by colour coding, the following convention shall be used:

50 Ω: no additional colouring 75 Ω: yellow or black band.

5.2 Marking and contents of package

The package shall be marked with the information prescribed in 5.1 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.

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