

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Radio-frequency connectors –

Part 21: Sectional specification for RF connectors with inner diameter of outer conductor 9,5 mm (0,374 in) with screw coupling – Characteristic impedance 50 ohms (Type SC)

Connecteurs pour fréquences radioélectriques –

Partie 21: Spécification intermédiaire relatives aux connecteurs RF avec conducteur extérieur de 9,5 mm (0,374 in) de diamètre intérieur à verrouillage à vis – Impédance caractéristique de 50 ohms (Type SC)



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2022 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

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

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

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 300 terminological entries in English and French, with equivalent terms in 19 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC - webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 300 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 19 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Radio-frequency connectors –

Part 21: Sectional specification for RF connectors with inner diameter of outer conductor 9,5 mm (0,374 in) with screw coupling – Characteristic impedance 50 ohms (Type SC)

Connecteurs pour fréquences radioélectriques –

Partie 21: Spécification intermédiaire relatives aux connecteurs RF avec conducteur extérieur de 9,5 mm (0,374 in) de diamètre intérieur à verrouillage à vis – Impédance caractéristique de 50 ohms (Type SC)

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 33.120.30

ISBN 978-2-8322-1079-6

Warning! Make sure that you obtained this publication from an authorized distributor.

Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

CONTENTS

FOREWORD.....	4
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	6
4 Mating face and gauge information	7
4.1 Dimensions – General connectors – Grade 2	7
4.1.1 Connector with pin-centre contact.....	7
4.1.2 Connector with socket-centre contact	9
4.2 Gauges.....	11
4.2.1 Pin connectors – outer contact	11
4.2.2 Socket connectors – centre contact	12
4.3 Standard test connectors – Grade 0.....	13
4.3.1 General	13
4.3.2 Standard test connector with pin-centre contact.....	13
4.3.3 Standard test connector with socket-centre contact	15
5 Quality assessment procedures	17
5.1 General.....	17
5.2 Ratings and characteristics	18
5.3 Test schedule and inspection requirements.....	20
5.3.1 Acceptance tests	20
5.3.2 Periodic tests.....	21
5.4 Procedures for the quality conformance	23
5.4.1 Quality conformance inspection	23
5.4.2 Qualification approval and its maintenance.....	23
6 Instructions for preparation of detail specifications (DS)	23
6.1 General.....	23
6.2 Identification of the component	24
6.3 Performances	24
6.4 Marking, ordering information and related matters	24
6.5 Selection of tests, test conditions and severities	24
6.6 Blank detail specification pro-forma for type SC connector.....	25
Figure 1 – Connector with pin-centre contact	8
Figure 2 – Connector with socket-centre contact.....	10
Figure 3 – Gauge for outer contact of pin connector.....	11
Figure 4 – Gauge for centre contact of socket connector	12
Figure 5 – Standard test connector with pin-centre contact	14
Figure 6 – Standard test connector with socket-centre contact.....	16
Table 1 – Dimensions of connector with pin-centre contact	9
Table 2 – Dimensions of connector with socket-centre contact.....	11
Table 3 – Dimensions of gauge for outer contact of pin connector	12
Table 4 – Dimensions of gauge for centre contact of socket connector	13
Table 5 – Dimensions of standard test connector with pin-centre contact.....	15
Table 6 – Dimensions of standard test connector with socket-centre contact	17

Table 7 – Rating and characteristics	18
Table 8 – Acceptance tests	21
Table 9 – Periodic tests	22

INTERNATIONAL ELECTROTECHNICAL COMMISSION

RADIO-FREQUENCY CONNECTORS –

Part 21: Sectional specification for RF connectors with inner diameter of outer conductor 9,5 mm (0,374 in) with screw coupling – Characteristic impedance 50 ohms (Type SC)

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 61169-21 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. It is an International Standard.

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

Draft	Report on voting
46F/601/FDIS	46F/613/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 21: Sectional specification for RF connectors with inner diameter of outer conductor 9,5 mm (0,374 in) with screw coupling – Characteristic impedance 50 ohms (Type SC)

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 SC threaded RF coaxial connectors with 50 Ω characteristic impedance. The connectors are used with flexible and semi-rigid cables. They are recommended for use in medium power and low reflection applications up to 11 GHz. The dielectric filled interface is especially beneficial in applications involving severe environmental exposure.

This document specifies mating face dimensions, dimensional details, gauging information for general connectors – grade 2 and standard test connectors – grade 0 as well as test schedules and inspection requirements selected from IEC 61169-1, applicable to all detail specifications relating to type SC RF connectors. Type SC interface specified in this document is equivalent to type SC-B interface in IEC 60169-21:1985.

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.

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 61169-1-6, *Radio-frequency connectors – Part 1-6: Electrical test methods – RF power*

IEC 60169-21:1985, *Radio-frequency connectors – Part 21: Two types of radio-frequency connectors with inner diameter of outer conductor 9,5 mm (0,374 in) with different versions of screw coupling – Characteristic impedance 50 ohms (Types SC-A and SC-B)*

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*

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:

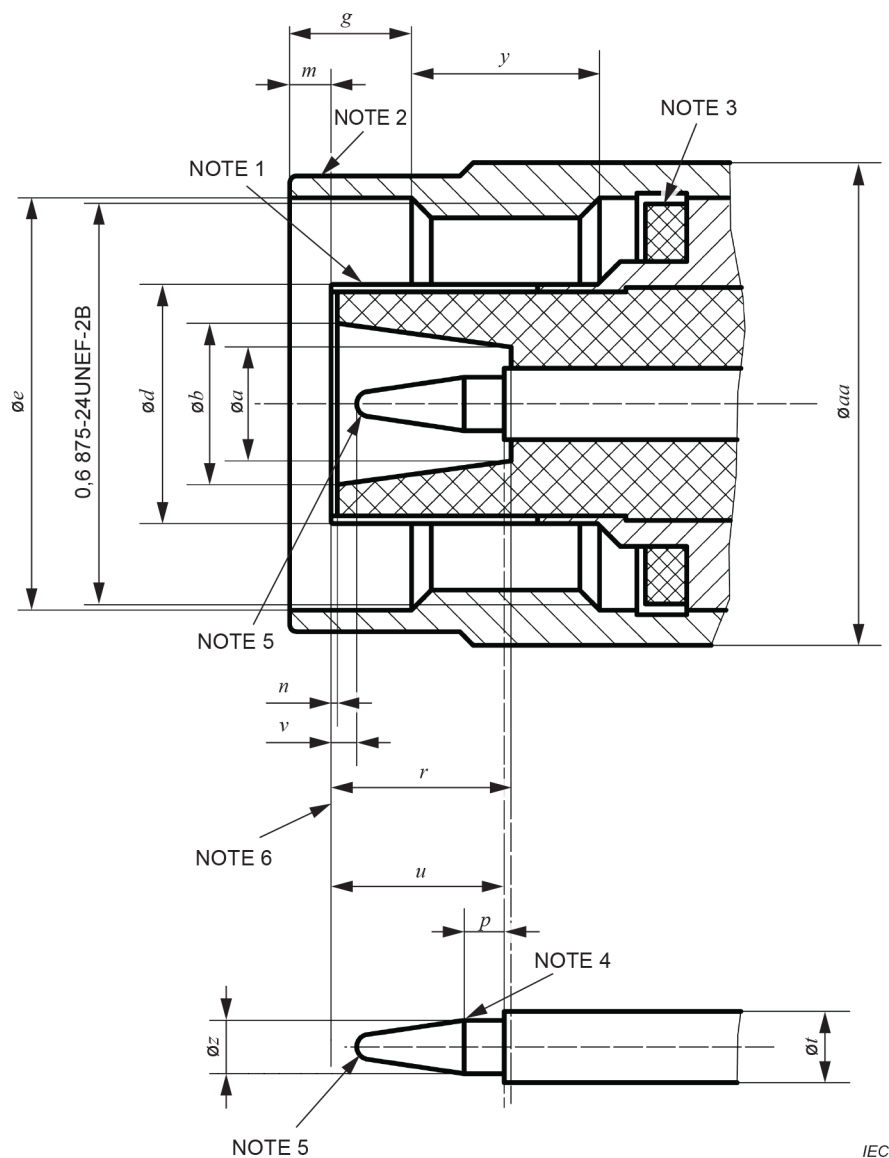
- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Mating face and gauge information

4.1 Dimensions – 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 Slot design is optional.

NOTE 2 Three holes with diameter of 0,69 mm (0,027 in) minimum equally spaced for safety wiring. Location on coupling nut is optional.

NOTE 3 Sealing gasket to give required environmental performance.

NOTE 4 Taper of pin contact starts here.

NOTE 5 Spherical or chamfered.

NOTE 6 Mechanical and electrical reference plane.

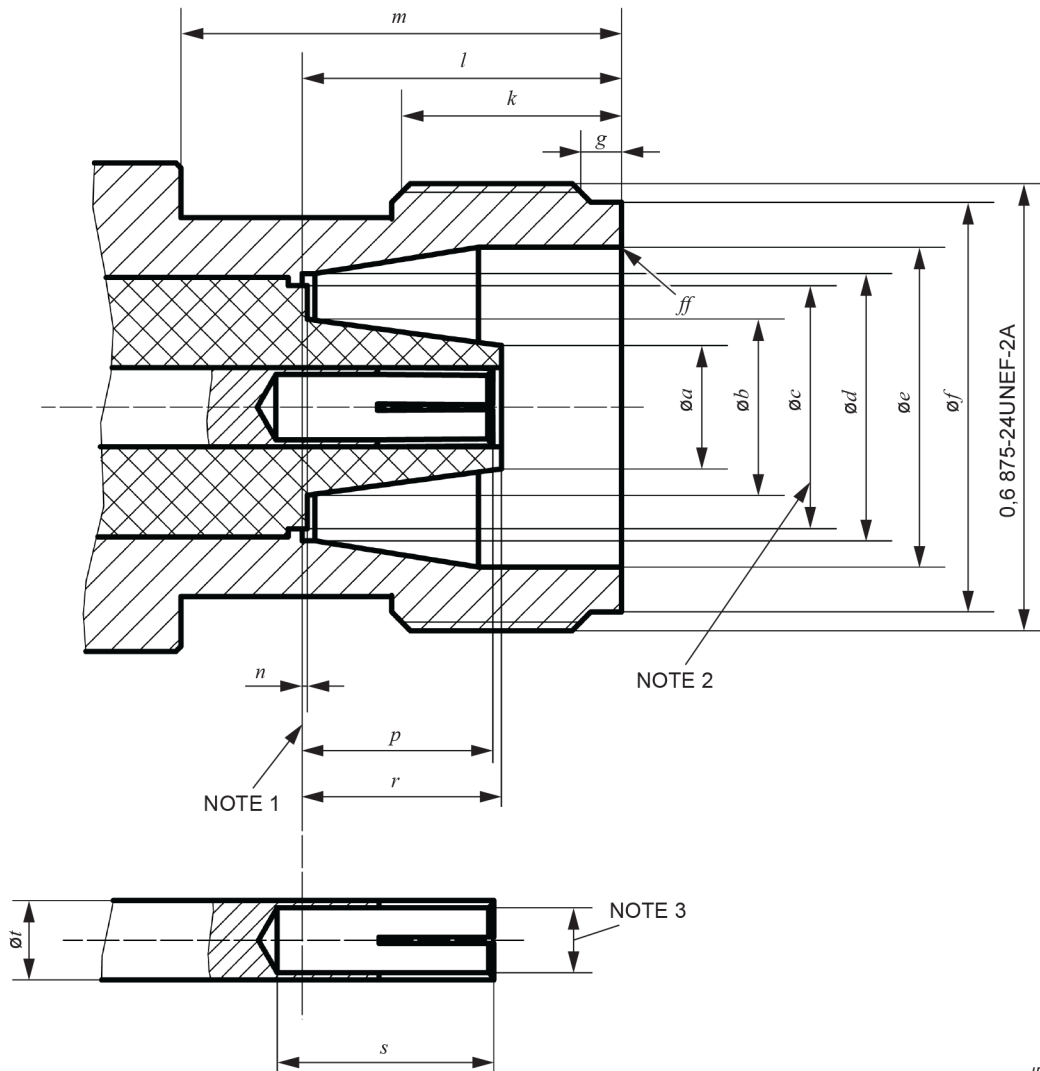
Figure 1 – Connector with pin-centre contact

Table 1 – Dimensions of connector with pin-centre contact

Ref.	mm		in	
	Min.	Max.	Min.	Max.
<i>a</i>	4,93	—	0,194	—
<i>b</i>	7,01	—	0,276	—
<i>d</i> ^a	—	—	—	—
<i>e</i>	17,53	—	0,690	—
<i>g</i> ^b	5,41	5,66	0,213	0,223
<i>m</i> ^b	0,64	2,16	0,025	0,085
<i>n</i>	0,18	—	0,007	—
<i>p</i>	2,36	—	0,093	—
<i>r</i>	7,85	—	0,309	—
<i>t</i>	3,02	3,15	0,119	0,124
<i>u</i>	7,80	8,56	0,307	0,337
<i>v</i>	0,08	1,02	0,003	0,040
<i>y</i> ^b	6,35	—	0,250	—
<i>z</i>	2,29	2,34	0,090	0,092
<i>aa</i>	—	21,03	—	0,828
^a Dimensions shall meet requirements of mating characteristics.				
^b Applicable when coupling nut is urged forward.				

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 1 Mechanical and electrical reference plane.

NOTE 2 Applies to dielectric extending beyond reference plane.

NOTE 3 Slot design optional. Contact is closed.

Figure 2 – Connector with socket-centre contact

Table 2 – Dimensions of connector with socket-centre contact

Ref.	mm		in	
	Min.	Max.	Min.	Max.
<i>a</i>	—	4,83	—	0,190
<i>b</i>	—	6,91	—	0,272
<i>c</i>	—	9,50	—	0,374
<i>d</i>	10,44	10,54	0,411	0,415
<i>e</i>	12,24	12,65	0,482	0,498
<i>f</i>	—	16,00	—	0,630
<i>g</i>	1,19	1,96	0,047	0,077
<i>k</i>	7,54	—	0,297	—
<i>l</i>	12,47	12,57	0,491	0,495
<i>m</i>	16,03	—	0,631	—
<i>n</i>	—	0,18	—	0,007
<i>p</i>	6,93	7,70	0,273	0,303
<i>r</i>	—	7,85	—	0,309
<i>s</i>	7,62	—	0,300	—
<i>t</i> ^a	3,02	3,15	0,119	0,124
<i>ff</i> ^b	0,25	—	0,010	—
^a Tolerance to be chosen so that the reflection factor requirement is met. ^b Fillet.				

4.2 Gauges

4.2.1 Pin connectors – outer contact

The gauge for outer contact of pin connector is shown in Figure 3 and its dimensions are shown in Table 3.

Dimensions in millimetres (inches)

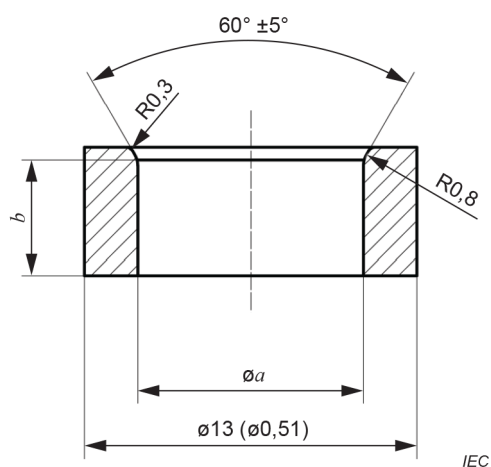
**Figure 3 – Gauge for outer contact of pin connector**

Table 3 – Dimensions of gauge for outer contact of pin connector

Ref.	Gauge A (For outer contacts)				Gauge B (For slotted outer contacts) Mass of gauge: 200 ⁺⁵ ₀ g			
	mm		in		mm		in	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
<i>a</i>	10,426	10,439	0,410 5	0,411 0	10,643	10,656	0,419 0	0,419 5
<i>b</i>	3,180	—	0,125 0	—	0,790	—	0,031 0	—

Material: polished steel with a 0,4 µm (16 µin) finish.

Test procedures are as follows:

- For outer contacts, a steel test ring A (Figure 3) with inner diameter "*a*" shall be pushed over the outer electrical contact of the connector. The insertion force shall not exceed 66 N when the outer contact inserts into the gauge A at a minimum distance of "*b*".
- For slotted outer contacts, a steel test ring B (Figure 3) with an inner diameter "*a*" shall be placed over the outer electrical contact of the connector. The test ring shall uniformly meet the outer electrical contact when pushed no more than 0,79 mm (0,031 in) over this contact.

4.2.2 Socket connectors – centre contact

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

Dimensions in millimetres (inches)

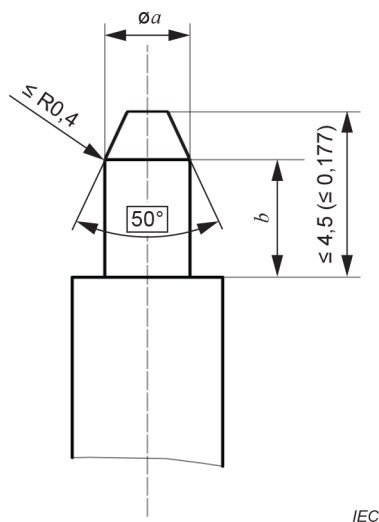
**Figure 4 – Gauge for centre contact of socket connector**

Table 4 – Dimensions of gauge for centre contact of socket connector

Ref.	Gauges A (For sizing purpose)				Gauges B (For retention test) Mass of gauge: 56 g			
	mm		in		mm		in	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
<i>a</i>	2,337	2,342	0,092 0	0,092 2	2,276	2,286	0,089 6	0,090 0
<i>b</i>	3,180	—	0,125 0	—	—	—	—	—
Material: polished steel with a 0,4 µm (16 µin) finish.								

Test procedures are as follows:

- A steel test pin A (Figure 4) with a diameter "*a*" shall be inserted into the centre contact at a minimum distance of 3,18 mm (0,125 in). This is a sizing operation.
- After completion of item a), a second steel test pin B (Figure 4) with a diameter "*a*" shall have a minimum withdrawal force of 0,56 N after insertion into the centre electrical contact.

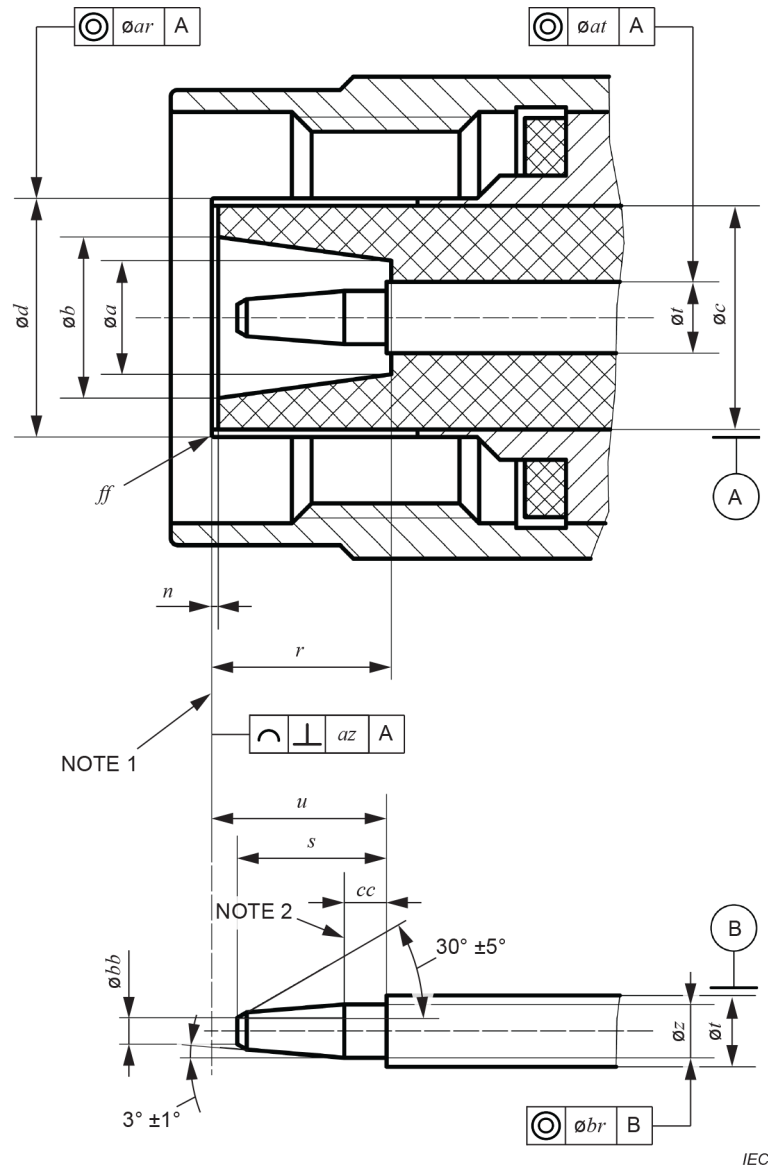
4.3 Standard test connectors – Grade 0

4.3.1 General

These dimensions are for standard test connector adapters for reflection factor testing.

4.3.2 Standard test connector with pin-centre contact

The mating face of a standard test connector with pin-centre contact is shown in Figure 5 and its dimensions are shown in Table 5.



NOTE 1 Mechanical and electrical reference plane.

NOTE 2 Taper of pin contact starts here.

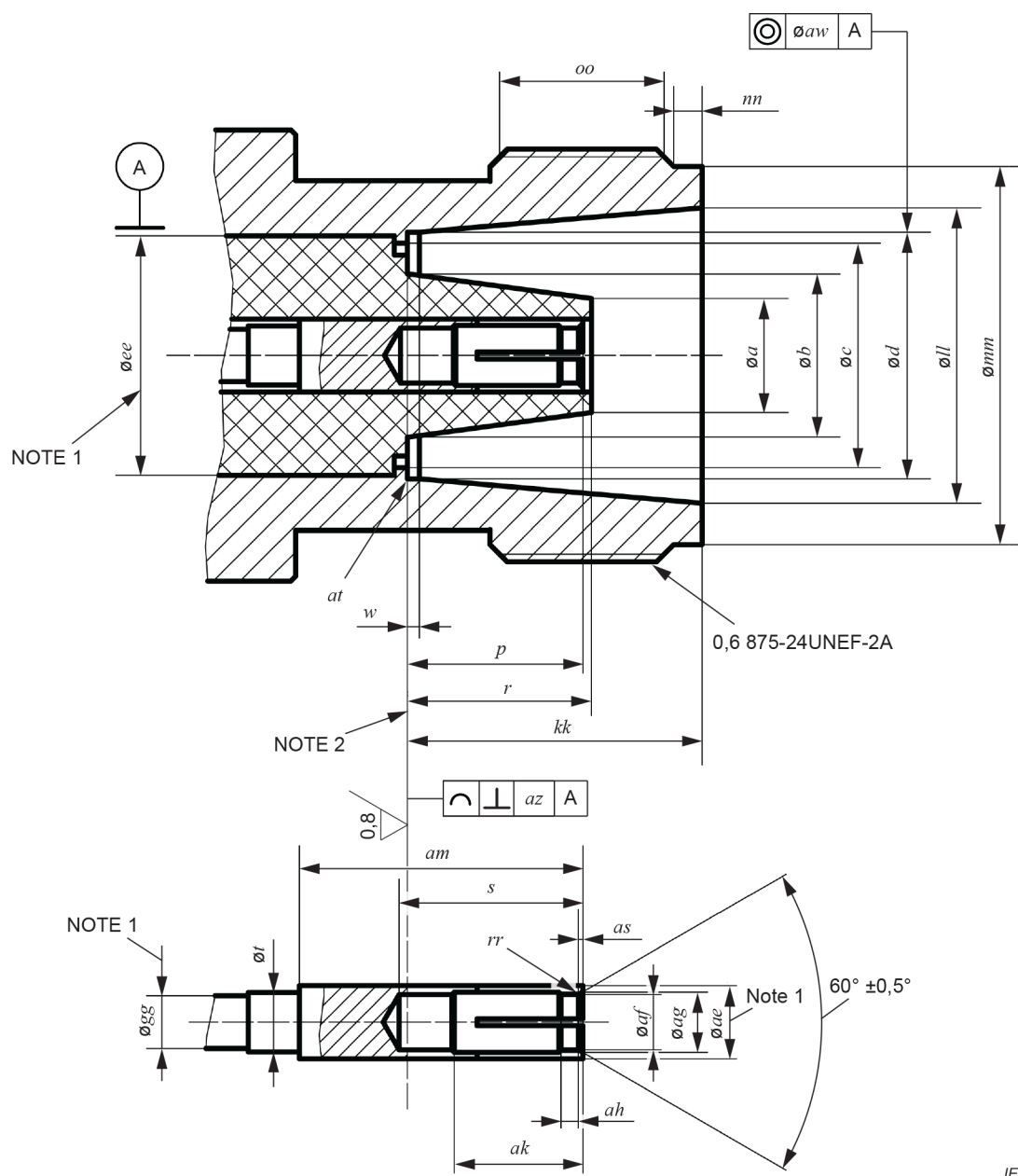
Figure 5 – Standard test connector with pin-centre contact

Table 5 – Dimensions of standard test connector with pin-centre contact

Ref.	mm		in	
	Min.	Max.	Min.	Max.
<i>a</i>	4,930	5,030	0,194 0	0,198 0
<i>b</i>	7,010	7,110	0,276 0	0,280 0
<i>c</i> ^a	9,880	9,898	0,388 9	0,389 7
<i>d</i>	10,340	10,390	0,407 0	0,409 0
<i>n</i>	0,180	0,330	0,007 0	0,013 0
<i>r</i>	7,850	8,080	0,309 0	0,318 0
<i>s</i>	7,650	7,770	0,301 0	0,306 0
<i>t</i> ^a	3,030	3,050	0,119 2	0,120 2
<i>u</i>	7,800	7,900	0,307 0	0,311 0
<i>z</i>	2,286	2,339	0,090 0	0,092 1
<i>bb</i>	1,040	1,300	0,041 0	0,051 0
<i>cc</i>	2,360	2,620	0,093 0	0,103 0
<i>ff</i> ^b	—	0,100	—	0,004 0
<i>ar</i>	—	0,076	—	0,003 0
<i>at</i>	—	0,102	—	0,004 0
<i>az</i>	—	0,010	—	0,000 5
<i>br</i>	—	0,076	—	0,003 0
^a These diameters are for PTFE insulation with dielectric constant 2,02. Characteristic impedance shall be $(50 \pm 0,2) \Omega$. ^b Fillet or chamfer.				

4.3.3 Standard test 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.



NOTE 1 Mechanical and electrical reference plane.

NOTE 2 Tolerance chosen so that reflection factor requirements are met.

Figure 6 – Standard test connector with socket-centre contact

Table 6 – Dimensions of standard test connector with socket-centre contact

Ref.	mm		in		Note
	Min.	Min.	Min.	Min.	
<i>a</i>	4,780	4,830	0,188 0	0,190 0	
<i>b</i>	6,810	6,910	0,268 0	0,272 0	
<i>c</i>	8,990	9,040	0,354 0	0,356 0	
<i>d</i>	10,440	10,540	0,411 0	0,415 0	
<i>p</i>	7,540	7,750	0,297 0	0,305 0	
<i>r</i>	7,700	7,850	0,303 0	0,309 0	
<i>s</i>	7,770	—	0,306 0	—	
<i>t</i> ^a	3,030	3,050	0,119 2	0,120 2	
<i>w</i>	0,510	1,020	0,020 0	0,040 0	straight section
<i>ae</i> ^b	3,188	3,213	0,125 5	0,126 5	
<i>af</i>	2,461	2,517	0,096 9	0,099 1	
<i>ag</i>	2,790	3,000	0,110 0	0,118 0	
<i>ah</i>	0,380	0,890	0,015 0	0,035 0	
<i>ak</i>	2,620	—	0,103 0	—	
<i>am</i>	8,560	Nominal	0,337 0	Nominal	
<i>as</i>	0,200	0,300	0,007 9	0,001 2	
<i>rr</i>	0,300	0,500	0,001 2	0,019 7	radius
<i>at</i>	—	0,100	—	0,004 0	radius
<i>ee</i>	9,880	Nominal	0,389 0	Nominal	
<i>gg</i>	—	—	—	—	
<i>kk</i>	12,470	12,570	0,491 0	0,495 0	
<i>ll</i>	12,240	12,650	0,482 0	0,498 0	
<i>mm</i>	—	16,000	—	0,630 0	
<i>nn</i>	1,190	1,960	0,047 0	0,077 0	
<i>oo</i>	6,350	—	0,250 0	—	
<i>aw</i>	—	0,750	—	0,003 0	
<i>az</i>	—	0,010	—	0,000 5	
^a These diameters are for PTFE insulation with dielectric constant 2,02. Characteristic impedance shall be $(50 \pm 0,2) \Omega$. ^b With pin gauge 2,309 mm min. (0,090 9 in min.) 2,314 mm max. (0,0911 in max.) diameter inserted 1,14 mm (0,045 in) deep.					

5 Quality assessment procedures

5.1 General

Subclauses 5.1 to 5.4 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 inspection sampling, together with the pro-forma blank detail specification (BDS) and instructions for the preparation of a detail specification.