

**Radio-frequency
connectors —
RF coaxial connectors
with inner diameter of
outer conductor 3 mm
(0,12 in) with screw
coupling —
Characteristic
impedance 50 ohms
(Type SMC)**

ICS 33.120.30

Committees responsible for this British Standard

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- AEA Technology
- BEAMA Electrical Cable and Conductor Accessory Manufacturers
- British Non-Ferrous Metals Federation
- British Telecommunications plc
- Federation of the Electronics Industry
- Ministry of Defence
- National Supervisory Inspectorate
- Society of Cable Television Engineers

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National foreword

This British Standard has been prepared by Subcommittee EPL/46/2 and is identical with IEC 169-9:1978 *Radio-frequency connectors — Part 9: R.F. coaxial connectors with inner diameter of outer conductor 3 mm (0.12 in) with screw coupling — Characteristic impedance 50 ohms (Type SMC)*, including Amendment 1:1996, published by the International Electrotechnical Commission (IEC). IEC 169-9, also designated QC 221400, is a harmonized specification within the IEC Q system for electronic components of assessed quality.

For ease of reproduction some of the text of the French version of this international standard has been retained. References to IEC page numbers in the text should be ignored.

Cross-references

Publication referred to ^a	Corresponding British Standard
IEC 68	BS EN 60068 <i>Environmental testing</i>
IEC 68-2	BS EN 60068-2 <i>Test methods</i>
IEC 68-2-1:1990	BS EN 60068-2-1:1993 <i>Tests A. Cold</i>
IEC 68-2-2:1974	BS EN 60068-2-2:1993 <i>Tests B. Dry heat</i> BS 2011 <i>Environmental testing</i> Part 2.1 <i>Tests</i>
IEC 68-2-3	Part 2.1. Ca:1977 <i>Test Ca. Damp heat, steady state</i>
IEC 68-2-11	Part 2.1 Ka:1982 <i>Test Ka. Salt mist</i>
IEC 68-2-13:1983	Part 2.1M:1984 <i>Test M. Low air pressure</i>
IEC 68-2-14	Part 2.1N:1985 <i>Test N. Change of temperature</i>
IEC 68-2-20	Part 2.1T:1981 <i>Test T. Soldering</i> BS 3041 <i>Radio-frequency connectors</i>
IEC 169-1	BS 3041-1:1977 <i>Specification for general requirements and measuring methods</i> BS EN 61169 <i>Radio-frequency connectors</i>
IEC 1169-1 (QC 220000)	BS EN 61169-1:1996 <i>Generic specification. General requirements and measuring methods</i>

^a Undated in text.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 36, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This standard concerns patterns for r.f. coaxial connectors which may preferably be used with r.f. cables 96 IEC 50-1 or 50-2 of IEC Publication 96-2, Radio-frequency Cables, Part 2: Relevant Cable Specifications.

These connector patterns are for low power. They have a screw type coupling mechanism and are commonly known as type "SMC".

2 IEC type designation

Connectors conforming to this standard shall be designated by:

- a) the reference to this standard: 169-9 IEC;
- b) the number of the grade:¹⁾
 - Grade 0 = standard test connector = G0;
 - Grade 1 = high performance connector = G1;
 - Grade 2 = general purpose connector,
- if Grade 2 is required, no grade designation is necessary;
- c) a serial number (see Clause 7);
- d) a group of figures specifying the climatic category (see Clause 4).

Example

169-9 IEC-G1-1 (40/85/21) denotes a free socket Grade 1 high performance connector belonging to climatic category 40/85/21 to be used with a r.f. coaxial cable 96 IEC 50-1-1/2/3.

NOTE The type designation used in this standard is provisional. A final type designation is under consideration.

3 Ratings

This standard specifies pin and socket connectors with screw type coupling mechanism with an inner diameter of the outer conductor of 3 mm (0.12 in). Cable mounting connectors will function within specification with appropriate cables (see Clause 7) up to a frequency of at least 6 GHz, and may be used at higher frequencies if a reflection coefficient greater than that specified can be tolerated.

The connectors have a maximum working voltage of 500 V²⁾ at sea level and of 100 V at 20 000 m (44 mbar). Connection of the cable may be made either by soldering or by crimping, depending upon design. The connectors may be provided with barrier and panel seals.

NOTE Patterns for crimping and sealed connectors are under consideration.

All connectors may be used over a temperature range of – 40 °C to + 85 °C. Special designs may be used from – 55 °C to + 155 °C.

4 Preferred climatic categories (see IEC Publication 68, Basic Environmental Testing Procedures)

Category ^a	Temperature range	Damp heat, steady state
40/85/21	– 40 °C to + 85 °C	21 days
55/155/21	– 55 °C to + 155 °C	21 days

^a To be included in the IEC type designation (see Clause 2).

¹⁾ *Standard test connector, Grade 0*

A standard test connector is a precisely made connector of a particular series, used as a standard connector to carry out reflection coefficient measurements on Grade 1 and Grade 2 connectors. Often, the standard test connector may be part of an inter-series adaptor which allows connection with a precision (hermaphroditic) connector forming part of the measuring equipment. The dimensions and tolerances are specified in the relevant standard.

High performance connector, Grade 1

A high performance connector (Grade 1) is a connector for which limits for the reflection coefficient are specified as a function of frequency in the relevant specification. No tighter tolerances than those applicable to Grade 2 are normally specified and the requirements may be agreed between manufacturer and user (specially for microwave applications).

General purpose connector, Grade 2

The general purpose connector (Grade 2) is a connector making use of the widest permitted tolerances so as still to guarantee good performance and intermateability. The requirement for the worst reflection coefficient may, or may not, be specified.

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, unless otherwise specified.

5 Dimensions — Connecteurs d’usage général (classe 2)

Les dimensions en inches sont les dimensions originales. Toutes les représentations non cotées sont données pour référence uniquement.

5.1 Connector with pin centre contact

5 Dimensions — General purpose connectors (Grade 2)

Inch dimensions are original dimensions. All undimensioned pictorial configurations are for reference purposes only.

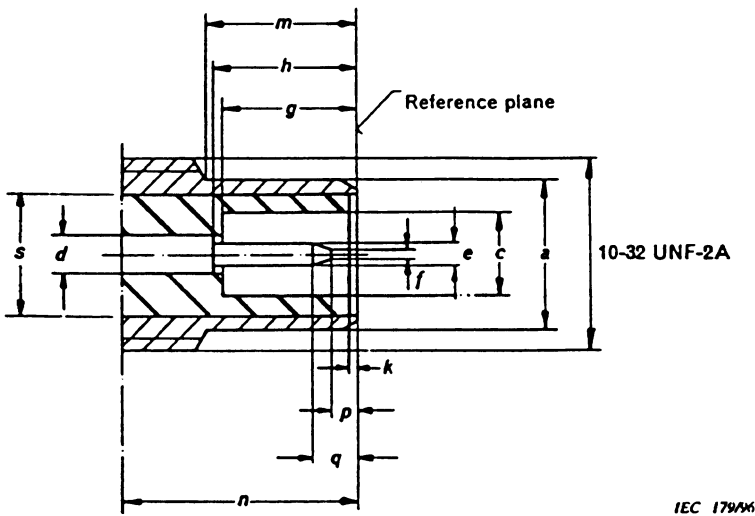


Figure 1

Reference	mm		inch		Note
	Min.	Max.	Min.	Max.	
<i>a</i>	—	3,71	—	0,146	diameter
<i>c</i>	2,08	—	0,082	—	diameter
<i>d</i>	—	—	—	—	2
<i>e</i>	0,48	0,53	0,019	0,021	diameter
<i>f</i>	—	0,25	—	0,010	
<i>g</i>	3,40	—	0,134	—	
<i>h</i>	3,40	—	0,134	—	
<i>k</i>	0,000	—	0,000	—	
<i>m</i>	3,12	3,38	0,123	0,133	
<i>n</i>	5,94	—	0,234	—	1
<i>p</i>	0,61	—	0,024	—	
<i>q</i>	—	2,13	—	0,084	
<i>s</i>	3,05		0,120		diameter nom.

NOTE 1 Thread gauge to go this minimum distance.
NOTE 2 Chosen diameter to give required 50 Ω impedance.

5.2 Connector with socket centre contact

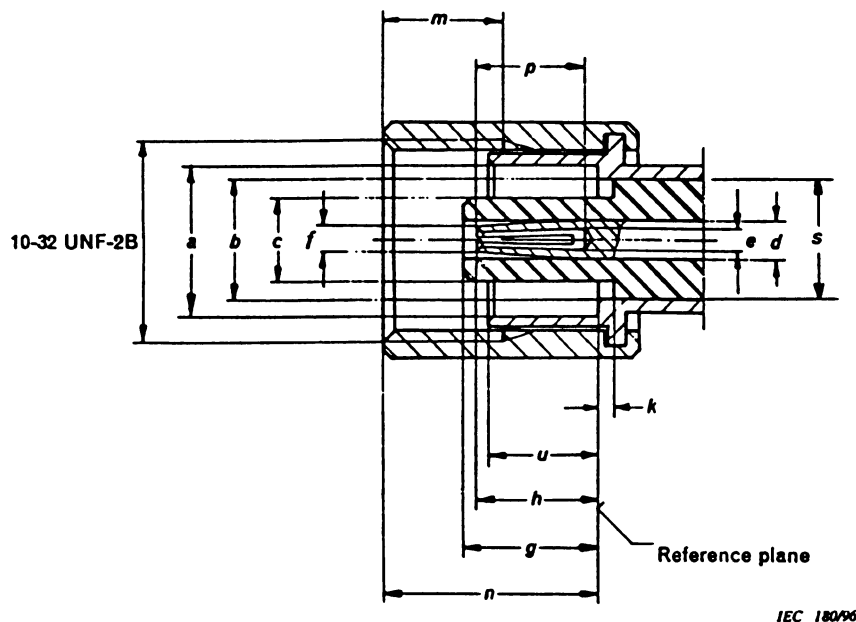


Figure 2

Reference	mm		inch		Note
	Min.	Max.	Min.	Max.	
<i>a</i>	3,73	—	0,147	—	diameter
<i>b</i>	—	3,07	—	0,121	5 diameter
<i>c</i>	—	2,06	—	0,081	diameter
<i>d</i>	—	—	—	—	4
<i>e</i>	—	—	—	—	3
<i>f</i>	—	—	—	—	1
<i>g</i>	—	3,40	—	0,134	
<i>h</i>	2,85	3,40	0,112	0,134	
<i>k</i>	0,00	—	0,000	—	
<i>m</i>	2,79	—	0,110	—	
<i>n</i>	—	5,92	—	0,233	2
<i>p</i>	2,79	—	0,110	—	
<i>u</i>	—	3,10	—	0,122	
<i>s</i>	3,05	—	0,120	—	diameter nom.

NOTE 1 Method of slotting optional. Closing of socket to give required electrical and mechanical performance.
 NOTE 2 Dimension when coupling nut biased forward.
 NOTE 3 Diameter of bore to meet electrical and mechanical requirements.
 NOTE 4 Diameter chosen to give 50 Ω impedance.
 NOTE 5 Applicable at the reference plane.

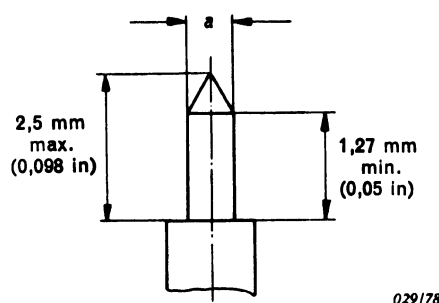


Figure 3 — Gauge pins for centre contact of socket connector

6. Calibres et connecteurs d'essai de référence (classe 0)

6.1 Calibres mécaniques

6.1.1 Connecteurs avec contact central femelle

6.1.1.1 Séquence d'essai

a) Une broche en acier (Figure 3) avec un diamètre minimal "a" de $0,546^{+0,005}_0$ mm

($0,0215^{+0,0002}_0$ in) doit être introduite dans le contact central électrique sur une distance minimale de 1,27 mm (0,05 in).

b) Une deuxième broche (Figure 3) avec un diamètre maximal "a" de $0,482^{+0,005}_0$ mm

($0,0190^{+0,0002}_0$ in) et une rugosité de $0,4 \mu\text{m}$

($16 \mu\text{in}$) doit avoir une force minimale de rétention de 0,28 N après insertion dans le contact central électrique.

Il est recommandé que ce calibre ait une masse (poids) de 28 ± 1 g.

L'opération de calibrage du point a) peut seulement être effectuée si le contact femelle peut être retiré du connecteur.

S'il n'est pas possible d'effectuer l'opération de calibrage sur les connecteurs, les prescriptions du point b) doivent cependant être satisfaites.

6.2 Connecteurs d'essai de référence (classe 0)

Les connecteurs d'essai de référence sont principalement utilisés comme partie du raccord à l'équipement de mesure afin d'effectuer la mesure du coefficient de réflexion selon le paragraphe 14.1 de la Publication 169-1 de la CEI: Connecteurs pour fréquences radioélectriques, Première partie: Règles générales et méthodes de mesure.

6. Gauges and standard test connectors (Grade 0)

6.1 Mechanical gauges

6.1.1 Connector with socket centre contact

6.1.1.1 Test sequence

a) A steel test pin (Figure 3) with a minimum diameter "a" of $0.546^{+0.005}_0$ mm

($0.0215^{+0.0002}_0$ in) shall be inserted into the centre electrical contact a minimum distance of 1.27 mm (0.05 in).

b) A second steel test pin (Figure 3) with a maximum diameter "a" of $0.482^{+0.005}_0$ mm

($0.0190^{+0.0002}_0$ in) and a $0,4 \mu\text{m}$ ($16 \mu\text{in}$) finish

shall have a minimum withdrawal force of 0.28 N after insertion into the centre electrical contact.

It is recommended that this gauge should have a mass (weight) of 28 ± 1 g.

The sizing operation of item a) can only be carried out if the socket contact can be removed from the connector.

If it is not possible to carry out the sizing operation on connectors, the requirements of item b), however, have to be met.

6.2 Standard test connectors (Grade 0)

Standard test connectors are mainly used as part of the adaptor to the measuring equipment to carry out reflection coefficient measurement according to Sub-clause 14.1 of IEC Publication 169-1, Radio-frequency connectors, Part 1: General Requirements and Measuring Methods.

6.2.1 Connecteurs d'essai de référence avec contact central mâle

6.2.1 Standard test connector with pin centre contact

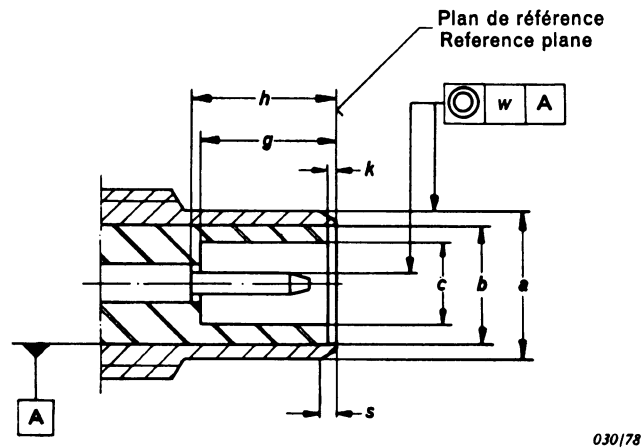


Figure 4

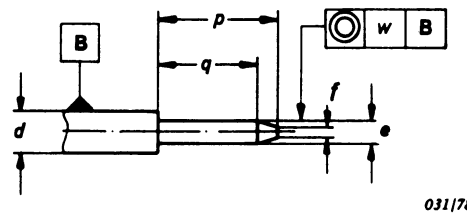


Figure 4a — Details of pin contact

Réf. Ref	mm		in		Note
	Min.	Max.	Min.	Max.	
a	3,658	3,708	0,144	0,146	diam.
b	3,048	3,073	0,120	0,121	diam.
c	2,083	2,159	0,082	0,085	diam.
d	—	—	—	—	1
e	0,495	0,521	0,0195	0,0205	diam.
f	—	0,25	—	0,010	diam.
g	3,404	3,607	0,134	0,142	
h	3,404	3,505	0,134	0,138	
k	0,00	0,127	0,000	0,005	
p	2,515	2,616	0,099	0,103	
q	1,524	1,626	0,060	0,064	
s	0,102	0,178	0,004	0,007	chamfer
w	—	0,075	—	0,003	

NOTE 1 Diamètre du conducteur central et longueur d'une section uniforme d'une ligne de transmission pour obtenir l'impédance caractéristique requise de $50,0 \pm 0,5 \Omega$.

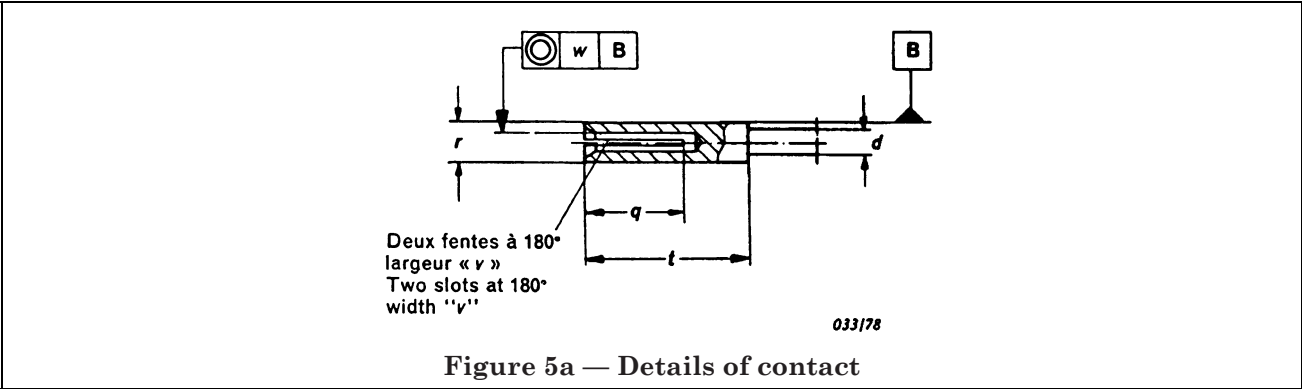
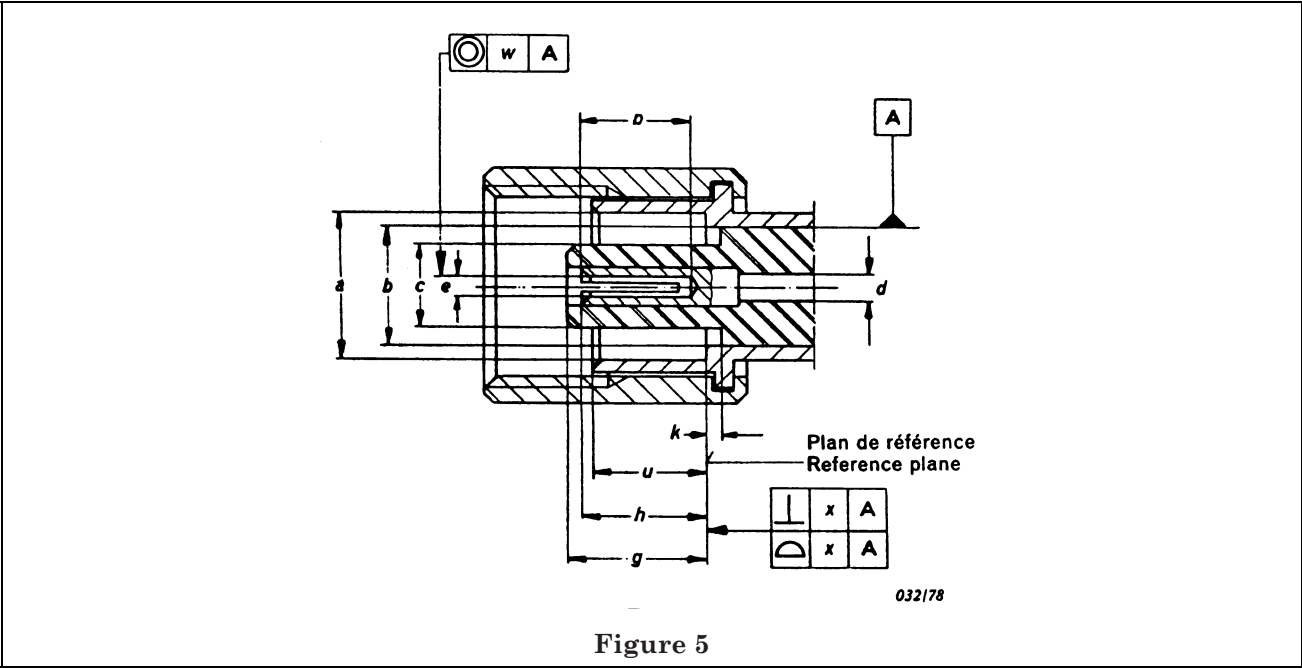
Les dimensions non indiquées dans ce tableau sont incluses dans le tableau du paragraphe 5.1.

NOTE 1 Diameter of centre conductor and length of uniform section of transmission line to give required characteristic impedance of $50.0 \pm 0.5 \Omega$.

Dimensions not indicated in this table are included in the table of Sub-clause 5.1.

6.2.2 Connecteur d'essai de référence avec contact central femelle

6.2.2 Standard test connector with socket centre contact



Réf. Ref.	mm		in		Note
	Min.	Max.	Min.	Max.	
<i>a</i>	3,734	3,810	0,147	0,150	1 3 diam.
<i>b</i>	3,048	3,073	0,120	0,121	
<i>c</i>	2,007	2,057	0,079	0,081	
<i>d</i>	—	—	—	—	
<i>e</i>	—	—	—	—	
<i>g</i>	3,302	3,404	0,130	0,134	
<i>h</i>	3,226	3,404	0,127	0,134	
<i>k</i>	0,00	0,152	0,000	0,006	
<i>p</i>	2,79	—	0,110	—	
<i>q</i>	1,52	1,78	0,060	0,070	
<i>r</i>	1,0058	1,0262	0,0396	0,0404	2
<i>t</i>	3,366	3,493	0,1325	0,1375	
<i>u</i>	3,048	3,099	0,120	0,122	
<i>v</i>	0,127	0,229	0,005	0,009	
<i>w</i>	—	0,07	—	0,003	
<i>x</i>	—	0,127	—	0,005	

NOTE 1 Diamètre du conducteur central et de la section uniforme de la ligne de transmission pour obtenir l'impédance caractéristique requise de $50,0 \pm 0,5 \Omega$.

NOTE 2 S'applique avec le calibre mâle de diamètre 0,508 mm (0,020 in) introduit.

NOTE 3 Le diamètre intérieur doit être tel que lorsqu'une broche de diamètre 0,508 mm (0,020 in) est introduite le diamètre extérieur "r" soit dans les tolérances.

Les dimensions non indiquées dans ce tableau sont incluses dans le tableau du paragraphe 5.2.

NOTE 1 Diameter of centre conductor and of uniform section of transmission line to give required characteristic impedance of $50,0 \pm 0,5 \Omega$.

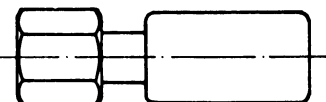
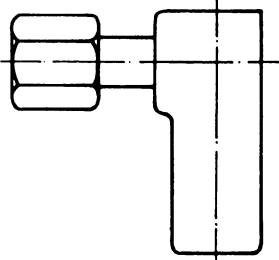
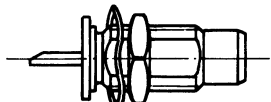
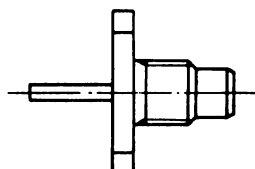
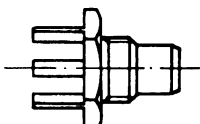
NOTE 2 Applies with 0,508 mm (0,020 in) diameter gauge pin inserted.

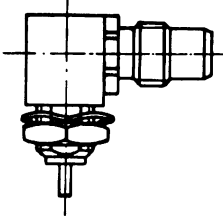
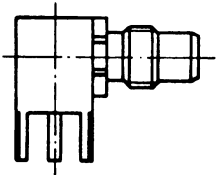
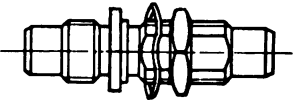
NOTE 3 Internal diameter to be such that when inserting a pin with diameter 0,508 mm (0,020 in) the outer diameter "r" is within the tolerance.

Dimensions not indicated in this table are included in the table of 5.2.

7. Revue de modèles

7. Survey of patterns

Classe d'essai Test class	Description Description	Contact central Centre contact	Modèle Pattern	Désignation de type ^a Type designation ^a
1	Prise (droite) Free connector (straight)	Femelle Socket		169-9 IEC-1 169-9 IEC-2
1	Prise à écrou (fixation centrale, avec sortie par câble pour fréquences radioélectriques) Fixed connector (single hole panel mounting with entry for r.f. cable)	Mâle Pin		169-9 IEC-3 169-9 IEC-4
1	Fiche coudée (angle droit) Free connector (right angle)	Femelle Socket		169-9 IEC-5 169-9 IEC-6
3	Prise à écrou (fixation centrale avec cosse à souder) Fixed connector (single hole panel mounting with solder bucket)	Mâle Pin		169-9 IEC-7
3	Embase (fixation par quatre trous avec cosse à souder) Fixed connector (four-hole panel mounting with solder bucket)	Mâle Pin		169-9 IEC-8
2	Prise à écrou (droite) pour montage sur circuit imprimé Fixed connector printed circuit mounting (straight)	Mâle Pin		169-9 IEC-9

Classe d'essai Test class	Description Description	Contact central Centre contact	Modèle Pattern	Désignation de type ^a Type designation ^a
3	Prise coudée (angle droit) fixation centrale avec cosse à souder Fixed connector (right angle, single hole panel mounting with solder bucket)	Mâle Pin		169-9 IEC-10
2	Prise coudée (angle droit) pour montage sur circuit imprimé Fixed connector printed circuit mounting (right angle)	Mâle Pin		169-9 IEC-11
2	Raccord avec écrou (fixation centrale) Fixed adaptor (single hole panel mounting)	Mâle- mâle Pin-pin		169-9 IEC-12
^a Désignation finale de type à l'étude.		^a Final type designation under consideration.		

Pour les modèles 169-9 IEC-1/3/5, type de câble à utiliser: 96 IEC 50-1-1/2/3 selon la Publication 96-2 de la CEI.

Pour les modèles 169-9 IEC-2/4/6, type de câble à utiliser: 96 IEC 50-2-1/2/3/4 selon la Publication 96-2 de la CEI.

NOTE Si nécessaire, le fabricant doit spécifier le type de câble à utiliser pour effectuer les essais sur un type particulier de connecteur selon les prescriptions de la norme utilisée.

Dans le tableau précédent les classes d'essai applicables aux différents modèles de connecteurs sont indiqués.

Une classe d'essai comprend tous les connecteurs pour lesquels les mêmes essais sont applicables, bien que dans certains cas les prescriptions d'essais puissent différer partiellement.

Classe d'essai 1: Connecteurs équipés de câbles.

Classe d'essai 2: Raccords avec face d'accouplement aux deux extrémités.

Classe d'essai 3: Connecteurs pour lesquels les mesures du coefficient de réflexion ne sont pas applicables.

D'autres constructions ou l'usage d'autres câbles sont admissibles si les dimensions selon l'article 5 sont respectées à la fois avec les prescriptions de calibrage de l'article 6 et les conditions d'essai applicables de l'article 9.

For patterns 169-9 IEC-1/3/5 type of cable to be used: 96 IEC 50-1-1/2/3 according to IEC Publication 96-2.

For patterns 169-9 IEC-2/4/6 type of cable to be used: 96 IEC 50-2-1/2/3/4 according to IEC Publication 96-2.

NOTE Where appropriate the manufacturer shall specify the type of cable to be used for carrying out the tests on a particular type of connector in accordance with the current standard.

In the preceding table the test classes applicable to the various connector patterns are indicated.

A test class comprises all connectors to which the same tests are applicable although in some cases the test requirements may differ in part.

Test Class 1: Connectors attached to cables.

Test Class 2: Adaptors with mating faces at both ends.

Test Class 3: Connectors to which the reflection coefficient measurements do not apply.

Other constructions or the use of other cables are permissible if the dimensions according to Clause 5 are met together with the gauging requirements of Clause 6 and applicable test conditions of Clause 9.