

**Radio-frequency
connectors
RF coaxial connectors
with inner diameter of
outer conductor 5,6 mm
(0,22 in) —
Characteristic
impedance 75 ohms
(type 1,6/5,6) —
Characteristic
impedance 50 ohms
(type 1,8/5,6) with
similar mating
dimensions**

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 169-13:1976 *Radio-frequency connectors — Part 13: R.F. coaxial connectors with inner diameter of outer conductor 5,6 mm (0,22 in) — Characteristic impedance 75 ohms (Type 1,6/5,6) — Characteristic impedance 50 ohms (Type 1,8/5,6) with similar mating dimensions*, including Amendment 1:1996, published by the International Electrotechnical Commission (IEC). IEC 169-13, also designated QC 222400, 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

International standard ¹⁾	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>Test B. Dry heat</i>
	BS 2011 <i>Environmental testing</i>
	Part 2.1 <i>Tests</i>
IEC 68-2-3	Part 2.1Ca:1977 <i>Test Ca. Damp heat, steady state</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 British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 38, 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⁾ Undated in text.

Introduction

The different mounting and service conditions, even in one electronic unit, require, to a large extent, coaxial connectors the locking mechanisms of which meet these requirements, as for example connectors with thread or snap-on or push-pull devices or connectors which are suitable for slide-in rack and panel applications.

It is of particular advantage if these connectors, irrespective of their different locking systems, may be plugged together, for instance, for ease of measuring.

The connectors dealt with in this publication offer these facilities by having a uniform contact system and suitable design of the locking device.

The two types of connectors 75 Ω and 50 Ω have the same mating face and it is possible to connect the 1.6/5.6 type with the 1.8/5.6 type without damaging the connectors.

The type designation 1.6/5.6 and 1.8/5.6 under which these connectors are already known according to different national standards refers with Figure 1, page 10, to the nominal effective outer diameter of the inner conductor of the connector and with Figure 2, page 11, to the effective inner diameter of the outer conductor.

1 Scope

This standard concerns patterns of preferred types of r.f. coaxial connectors which may preferably be used

in the 75 Ω range with cables 96 IEC 75-4-1
and 96 IEC 75-4-2

and in the 50 Ω range with cables 96 IEC 50-2-2
and 96 IEC 50-3-1

of IEC Publication 96-2, Radio-frequency Cables, Part 2: Relevant cable specifications.

This specification refers to solder type connectors only.

Other versions, dimensions and cables are permissible if the connectors comply with Clause 1 to Clause 6 and Clause 9

In the case of such deviations, the required technical details and dimensions are to be specially agreed upon.

It is possible to connect 75 Ω type with the 50 Ω type without damaging the connectors.

2 IEC type designation

Connectors of this standard shall be designated by:

- a) the reference to this standard: 169-13 IEC;
- b) the characteristic impedance in ohms: 50 or 75;
- c) a serial number (see Clause 7);
- d) a letter corresponding to the climatic category (see Clause 4).

Example:

169-13 IEC-75-1 A denotes a free straight pin connector, 75 Ω , belonging to climatic category 40/85/21 to be used with a r.f. coaxial cable 96 IEC-75-4-1.

3 Ratings

This standard specifies only types of pin and socket connectors with soldered inner conductors with an inner diameter of outer conductor of 5.6 mm (0.22 in) for thread and snap-on or push-pull locking devices and for slide-in rack and panel applications. Cable-mounting connectors shall function properly to a frequency range of at least 1 GHz for 75 Ω and 10 GHz for 50 Ω , and may be used at higher frequencies if a reflection coefficient greater than 0.1 can be tolerated.

The connectors have a maximum working voltage of 330 V at sea-level.

All connectors may be used over a temperature range from -40°C to $+85^{\circ}\text{C}$. Special designs may be used over an increased temperature range from -40°C to $+155^{\circ}\text{C}$.

4 Climatic categories

Category	Designation letter ^a	Temperature range	Damp heat, long term
40/ 85/21	A	−40 °C to + 85 °C	21 days
40/155/21	B	−40 °C to +155 °C	21 days

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

5 Dimensions

Les dimensions en millimètres sont les dimensions originales. Toutes les configurations non cotées sont données uniquement à titre de référence.

5.1 Connecteur mâle

5 Dimensions

Millimetre dimensions are original dimensions. An undimensioned pictorial configurations are for reference purposes only.

5.1 Pin connector

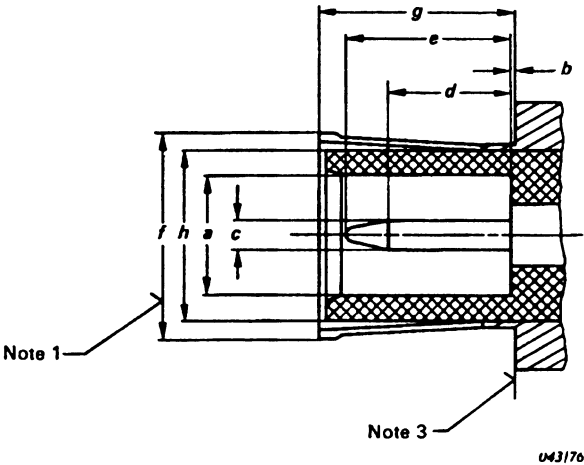


Figure 1 — Pin connector (dimensions, see table)

Réf. Ref.	mm		in		Note
	Min.	Max.	Min.	Max.	
a	4,00	—	0,157	—	2/diam.
b	—	0,15	—	0,0059	
c	0,97	1,03	0,0382	0,0406	2/diam.
d	3,9	4,3	0,1535	0,1693	
e	—	5,5	—	0,217	
g	6,4	6,6	0,2520	0,2598	
h	5,6		0,220		diam./ réf./ref.

NOTE 1 Le contact extérieur fendu doit satisfaire aux condition du calibre.

NOTE 2 Chaque diamètre doit être concentrique avec un axe commun situé dans la tolérance de $t/2$ où t est la tolérance totale de ce diamètre.

NOTE 3 Plan de référence mécanique.

NOTE 1 The slotted sleeve has to meet the requirements gauge retention force.

NOTE 2 Each diameter shall be concentric with a common axis within $t/2$, where t is the total tolerance of the diameter.

NOTE 3 Mechanical reference plane.

5.2 Connecteur femelle

5.2 Socket connector

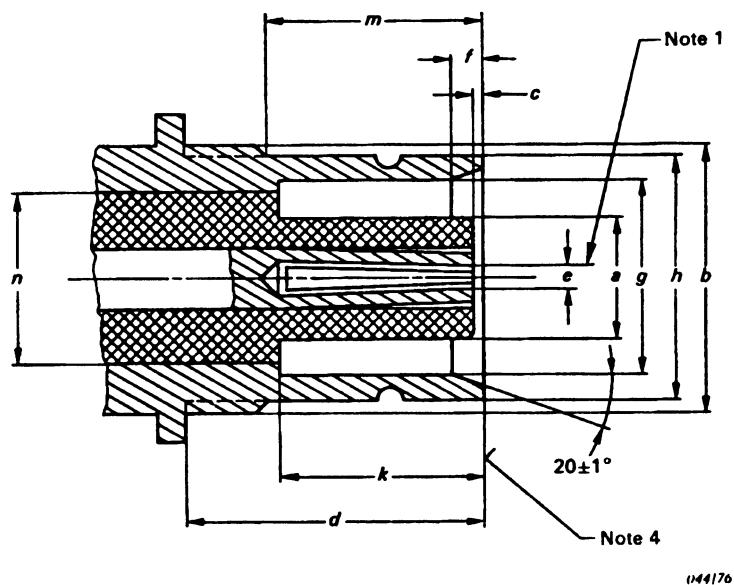


Figure 2 — Socket connector (dimensions, see table)

Réf. Ref.	mm		in		Note
	Min.	Max.	Min.	Max.	
a	—	3,8	—	0,150	3/diam.
b	M 9 × 0,5		M 9 × 0,5		2/5
c	0,25	—	0,0098	—	
d	9,7	—	0,382	—	
f	0,9	1,1	0,0354	0,0433	
g	6,6	6,69	0,2598	0,2634	3/diam.
h	8,1	8,25	0,3189	0,3248	3/diam.
k	6,7	—	0,264	—	
m	7,0	7,5	0,276	0,295	
n	5,6		0,220		diam./ réf./ref.

NOTE 1 Les dimensions doivent être choisies pour satisfaire aux conditions de la force d'insertion et d'extraction spécifiée dans cette norme.

NOTE 2 M 9 × 0,5 signifie un filet au pas métrique (ISO) de diamètre nominal 9 mm (0,354 in) et de pas 0,5 mm (0,0197 in).

NOTE 3 Chaque diamètre doit être concentrique avec un axe commun situé dans la tolérance de $t/2$ où t est la tolérance totale de ce diamètre.

NOTE 4 Plan de référence mécanique.

NOTE 5 Si les connecteurs sont seulement utilisés pour des applications sur tiroir ou panneau ou avec des systèmes à encliqueter ou pousser-tirer, ce filetage peut être éliminé.

NOTE 1 Dimensions shall be chosen to meet the specified insertion/withdrawal force of this standard.

NOTE 2 M 9 × 0.5 indicates metric screw-thread (ISO) with nominal diameter 9 mm (0.354 in) and pitch 0.5 mm (0.0197 in).

NOTE 3 Each diameter shall be concentric with a common axis within $t/2$, where t is the total tolerance of that diameter.

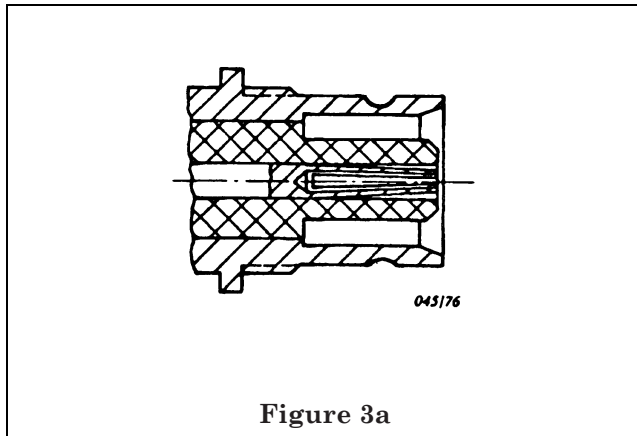
NOTE 4 Mechanical reference plane.

NOTE 5 If the connectors are used only for slide-in rack and panel applications or snap-on or push-pull devices, this thread can be deleted.

5.3 Systèmes de verrouillage

(Pour les dimensions, voir page 13.)

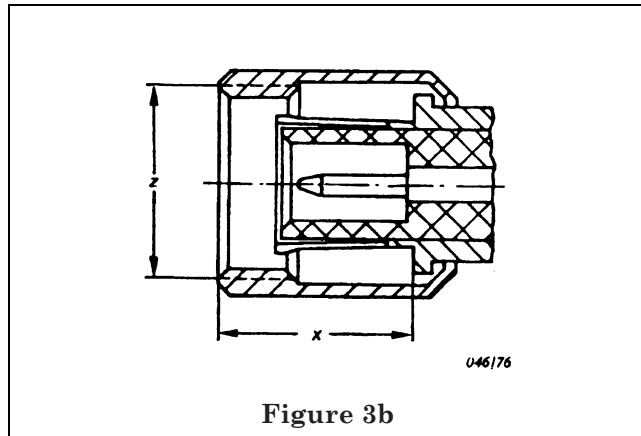
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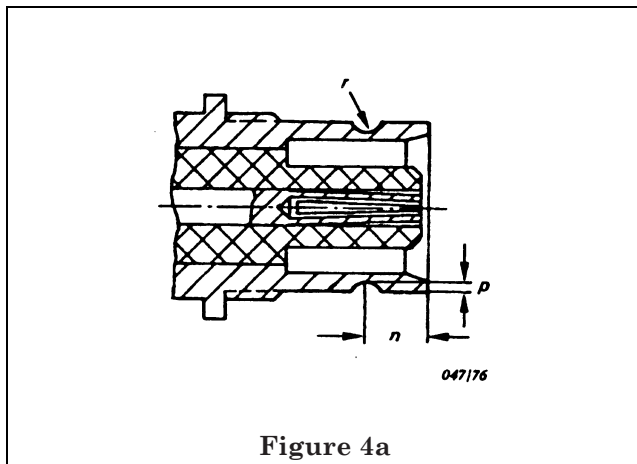
5.3 Locking devices

(For dimensions, see page 13.)

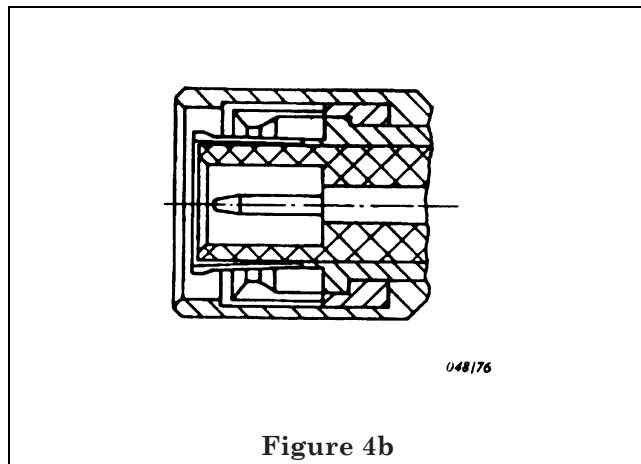
Thread



A encliquetage ou pousser-tirer

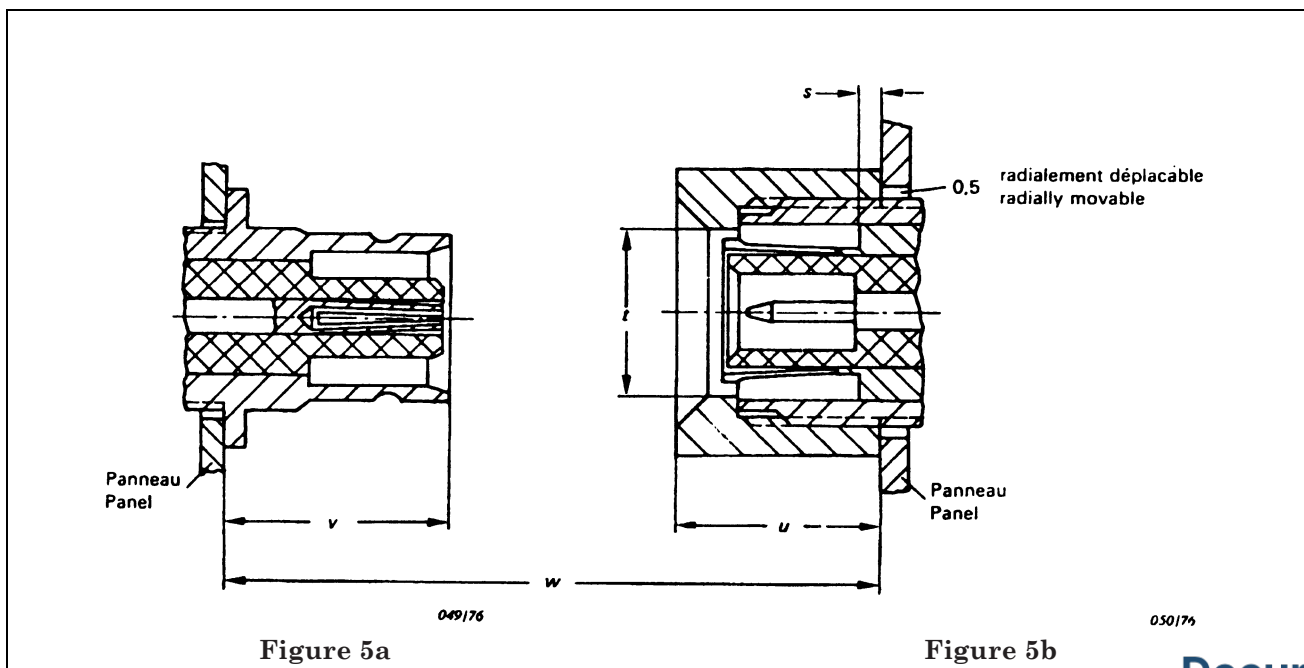


Snap-on or push-pull



Applications: tiroir et panneau

Slide-in rack and panel applications



Réf. Ref.	mm		in		Fig.	Note
	Min.	Max.	Min.	Max.		
<i>n</i>	2,9	3,1	0,1142	0,122	4a	
<i>p</i>	0,40	0,45	0,0157	0,0177	4a	
<i>r</i>	0,8		0,0315		4a	rad.
<i>s</i>	1,00	1,25	0,0394	0,0492	5b	
<i>t</i>	8,30	8,39	0,3268	0,3303	5b	diam.
<i>u</i>	—	9,8	—	0,386	5b	
<i>v</i>	10,4	10,6	0,4094	0,4173	5a	
<i>w</i>	11,9	13,6	0,469	0,535	5a/b	1
<i>x</i>	—	9,2	—	0,362	3b	
<i>z</i>	M 9 × 0,5		M 9 × 0,5		3b	2

NOTE 1 Distance entre panneaux lors de l'accouplement total.

NOTE 2 M 9 × 0,5 signifie un filet au pas métrique (ISO) de diamètre nominal 9 mm (0,354 in) et de pas 0,5 mm (0,0197 in).

NOTE 1 Separation of panels when fully mated.

NOTE 2 M 9 × 0.5 indicates metric screw-thread (ISO) with nominal diameter 9 mm (0.354 in) and pitch 0.5 mm (0.0197 in).

6 Calibres et connecteurs de référence

6.1 Calibres mécaniques

6.1.1 Connecteurs avec contact central mâle

Contact extérieur

Diamètre extérieur

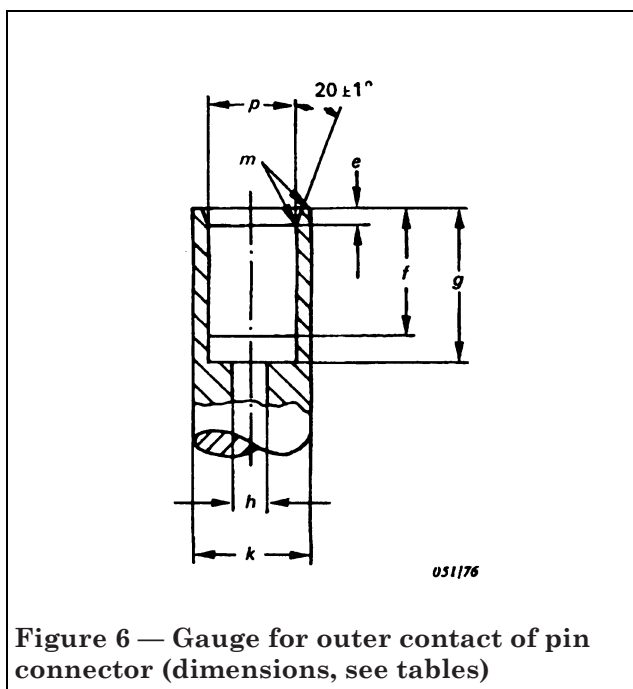
6 Gauges and reference connectors

6.1 Mechanical gauges

6.1.1 Connectors with pin centre contact

Outer contact

Outer diameter



Réf. Ref.	mm		in	
	Min.	Max.	Min.	Max.
<i>e</i>	1,00	1,10	0,0394	0,0433
<i>f</i>	9,00		0,354	
<i>g</i>	11,00		0,433	
<i>h</i>	2,50		0,098	
<i>k</i>	7,91	8,00	0,3114	0,3150
<i>m</i>	0,2 R		0,008 R	

Note. — *f* = longueur de pénétration
f = length of introduction

Calibre A (pour calibrage) Gauge A (for sizing purposes)					Calibre B (pour mesure de la force de rétention du calibre du conducteur extérieur) Masse (poids) du calibre: 170 g Gauge B (for measurement of gauge retention force for outer conductor) Mass (weight) of gauge: 170 g			
Réf. Ref.	mm		in		mm		in	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
p Ø	6,600	6,609	0,25984	0,26020	6,690	6,699	0,26339	0,26374
Matériau: acier poli; rugosité Ra - 0,1 µm (4 µin) max.					Material: steel, polished; surface roughness Ra - 0.1 µm (4 µin) max.			

Séquence d'essais:

6.1.1.1 Le calibre A doit être placé une fois sur le contact extérieur du connecteur. C'est une opération de calibrage; celle-ci doit être effectuée uniquement quand l'isolant est retiré du connecteur.

6.1.1.2 Après cela, le calibre B doit être placé sur le conducteur extérieur en position verticale. Le calibre doit être retenu.

Cet essai peut également être effectué lorsque l'isolant n'est pas retiré.

6.1.2 Connecteurs avec contact central jemeue

Contact central
Diamètre intérieur

Test sequence:

6.1.1.1 Gauge A shall be placed over the outer contact of the connector once. This is a sizing operation and should only be carried out when the insulator removed from the connector.

6.1.1.2 After this, gauge B shall be placed over the outer contact in a vertical position. The gauge shall be retained.

This test can also be carried out on connectors when the insulator is not removed.

6.1.2 Connectors with socket centre contact

Centre contact
Inner diameter

Réf. Ref.	mm		in	
	Min.	Max.	Min.	Max.
a	1,3 réf. ref.		0,051 réf. ref.	
b	5,00	5,10	0,197	0,2008

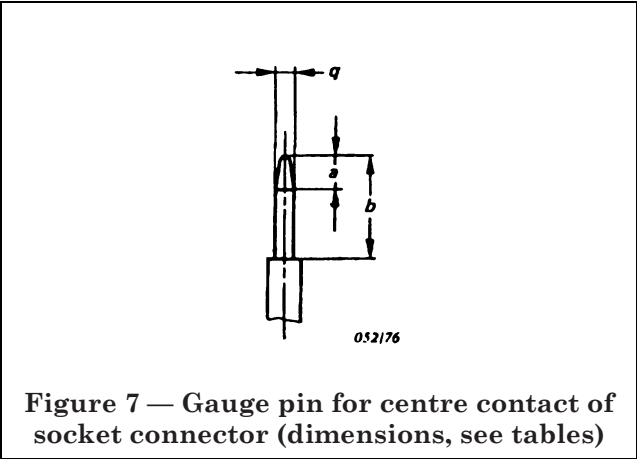


Figure 7 — Gauge pin for centre contact of socket connector (dimensions, see tables)

Calibre C (pour calibrage) Gauge C (for sizing purposes)					Calibre D (pour mesure de la force de rétention du calibre du conducteur intérieur) Masse (poids) du calibre: 50 g Gauge D (for measurement of gauge retention force for inner conductor) Mass (weight) of gauge: 50 g			
Réf. Ref.	mm		in		mm		in	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
$q \varnothing$	1,026	1,030	0,040 394	0,040 551	0,966	0,970	0,038 031	0,038 189
Matériau: acier poli; rugosité Ra - 0,1 μm (4 μin) max.					Material: steel, polished; surface roughness Ra - 0.1 μm (4 μin) max.			

Séquence d'essais:

6.1.2.1 Un calibre d'essai C doit être introduit une fois dans le contact central sur une distance minimale 5,00 mm (0,197 in). C'est une opération de calibrage et celle-ci doit être effectuée uniquement quand l'isolant est retiré du connecteur.

6.1.2.2 Après cela, le calibre D doit être introduit et retenu en position verticale. Le calibre doit être maintenu.

Cet essai peut également être effectué sur des connecteurs lorsque l'isolant n'est pas retiré.

6.2 Force d'insertion et d'extraction

Pour cet essai, on doit utiliser les connecteurs correspondant aux paragraphes 5.1 et 5.2. Force connue spécifiée au paragraphe 9.5.

6.3 Connecteurs de référence

Les connecteurs de référence pour la mesure du coefficient de réflexion doivent avoir des dimensions et des tolérances identiques à celles qui sont spécifiées aux paragraphes 5.1 et 5.2.

7 Revue de modèles

D'autres versions, dimensions et câbles sont admissibles si les connecteurs satisfont aux exigences des articles 1 à 6 et à l'article 9. Dans le cas de telles modifications, il doit y avoir un accord entre les parties sur les détails techniques et les dimensions.

7.1 L'étanchéité (air, eau) des types de connecteurs s'accouplant aux connecteurs spécifiés dans cette norme sont à l'étude.

Test sequence:

6.1.2.1 A test pin gauge C shall be inserted into the centre contact a minimum distance of 5.00 mm (0,197 in) once. This is a sizing operation and should be carried out only when the insulator is removed from the connector.

6.1.2.2 After this, gauge D shall be then inserted and held in the vertical position. The gauge shall be retained.

This test can also be carried out on connectors when the insulator is not removed.

6.2 Force to engage and disengage

For this test, connectors according to Sub-clauses 5.1 and 5.2 should be used. Force as specified in Sub-clause 9.5.

6.3 Reference connectors

The reference connectors for reflection coefficient measurement shall have the same dimensions and tolerances as specified under Sub-clauses 5.1 and 5.2.

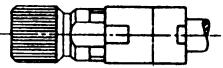
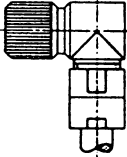
7 Survey of patterns

Other versions, dimensions and cables are permissible if the connectors comply with Clauses 1 to 6 and Clause 9. In the case of such deviations, the required technical details and dimensions are to be specially agreed upon.

7.1 Pressure-tight and water-proof connector types mating with the connectors specified in this standard are under consideration.

7.2 Connecteurs mâles pour systèmes de verrouillage à vis

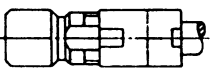
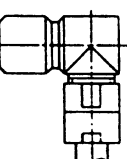
7.2 Pin connectors for thread locking devices

Classe d'essai Test class	Description	Contact	Modèle Pattern	Désignation de type 75 Ω (type 1,6/5,6) Type designation 75 Ω (Type 1.6/5.6)	Note	Désignation de type 50 Ω (type 1,8/5,6) Type designation 50 Ω (Type 1.8/5.6)	Note
1	Fiche (droite) Free connector (straight)	Mâle Pin		169-13 IEC-75-1	1	169-13 IEC-50-1	3
				169-13 IEC-75-2	2	169-13 IEC-50-2	4
1	Fiche (coudée à angle droit) Free connector (right angle)	Mâle Pin		169-13 IEC-75-3	1	169-13 IEC-50-3	3
				169-13 IEC-75-4	2	169-13 IEC-50-4	4

For notes, see page 11

7.3 Connecteurs mâles pour systèmes de verrouillage à encliqueter ou pousser-tirer

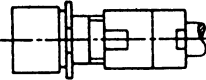
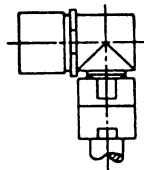
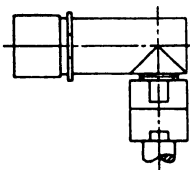
7.3 Pin connectors for snap-on or push-pull locking devices

Classe d'essai Test class	Description	Contact	Modèle Pattern	Désignation de type 75 Ω (type 1,6/5,6) Type designation 75 Ω (Type 1.6/5.6)	Note	Désignation de type 50 Ω (type 1,8/5,6) Type designation 50 Ω (Type 1.8/5.6)	Note
1	Fiche (droite) Free connector (straight)	Mâle Pin		169-13 IEC-75-5	1	169-13 IEC-50-5	3
				169-13 IEC-75-6	2	169-13 IEC-50-6	4
1	Fiche (coudée à angle droit) Free connector (right angle)	Mâle Pin		169-13 IEC-75-7	1	169-13 IEC-50-7	3
				169-13 IEC-75-8	2	169-13 IEC-50-8	4

For notes, see page 11

7.4 Connecteurs mâles pour applications sur tiroir et panneau

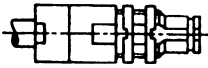
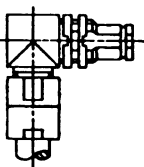
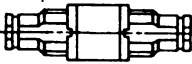
7.4 Pin connector for slide-in rack and panel applications

Classe d'essai Test class	Description	Contact	Modèle Pattern	Désignation de type 75 Ω (type 1,6/5,6) Type designation 75 Ω (Type 1.6/5.6)	Note	Désignation de type 50 Ω (type 1,8/5,6) Type designation 50 Ω (Type 1.8/5.6)	Note
1	Fiche (droite) Fixed connector (straight)	Mâle Pin		169-13 IEC-75-9	1	169-13 IEC-50-9	3
				169-13 IEC-75-10	2	169-13 IEC-50-10	4
1	Fiche (coudée à angle droit) Fixed connector (right angle)	Mâle Pin		169-13 IEC-75-11	1	169-13 IEC-50-11	3
				169-13 IEC-75-12	2	169-13 IEC-50-12	4
1	Fiche (coudée à angle droit, grande dimension) Fixed connector (right angle, long size)	Mâle Pin		169-13 IEC-75-13	1	169-13 IEC-50-13	3
				169-13 IEC-75-14	2	169-13 IEC-50-14	4

For notes, see page 11

7.5 Connecteurs femelles et raccord

7.5 Socket connectors and adaptor

Classe d'essai Test class	Description	Contact	Modèle Pattern	Désignation de type 75 Ω (type 1,6/5,6) Type designation 75 Ω (Type 1,6/5,6)	Note	Désignation de type 50 Ω (type 1,8/5,6) Type designation 50 Ω (Type 1.8/5.6)	Note
1	Prise (droite, fixation au panneau par un seul trou) Panel jack (straight, single hole panel mounting)	Femelle		169-13 IEC-75-15	1	169-13 IEC-50-15	3
		Socket		169-13 IEC-75-16	2	169-13 IEC-50-16	4
1	Prise (coudée à angle droit, fixation au panneau par un seul trou) Panel jack (right angle, panel mounting)	Femelle		169-13 IEC-75-17	1	169-13 IEC-50-17	3
		Socket		169-13 IEC-75-18	2	169-13 IEC-50-18	4
3	Embase (fixation au panneau par un seul trou avec cosse à souder) Fixed connector (single hole panel mounting with solder terminations)	Femelle Socket		169-13 IEC-75-19	—	169-13 IEC-50-19	—
2	Raccord Free adaptor	Femelle-femelle Socket-socket		169-13 IEC-75-20	—	169-13 IEC-50-20	—

NOTE 1 A utiliser avec les câbles pour fréquences radioélectriques:

96 IEC 75-4-1 — 96 IEC 75-4-3 — 96 IEC 75-4-4
— 96 IEC 75-4-5.

NOTE 2 A utiliser avec les câbles pour fréquences radioélectriques:

96 IEC 75-4-2.

NOTE 3 A utiliser avec les câbles pour fréquences radioélectriques:

96 IEC 50-2-2 — 96 IEC 50-2-3.

NOTE 4 A utiliser avec les câbles pour fréquences radioélectriques:

96 IEC 50-3-1 — 96 IEC 50-3-3 — 96 IEC 50-3-4.

Note générale Si nécessaire, le constructeur doit spécifier le type de câble à utiliser pour effectuer l'essai sur un type particulier de connecteur en accord avec la norme en vigueur.

NOTE 1 To be used with r.f. cables:

96 IEC 75-4-1 — 96 IEC 75-4-3 — 96 IEC 75-4-4.
— 96 IEC 75-4-5.

NOTE 2 To be used with r.f. cable:

96 IEC 75-4-2.

NOTE 3 To be used with r.f. cables:

96 IEC 50-2-2 — 96 IEC 50-2-3.

NOTE 4 To be used with r.f. cables:

96 IEC 50-3-1 — 96 IEC 50-3-3 — 96 IEC 50-3-4.

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