

ICS 29.120.30

**SANS 164-2:2006**

ISBN 0-626-17849-5

Edition 3

## **SOUTH AFRICAN NATIONAL STANDARD**

**Plug and socket-outlet systems for  
household and similar purposes for use  
in South Africa**

**Part 2: IEC system, 16 A 250 V a.c.**

**WARNING — Can only be read  
in conjunction with  
SANS 164-0.**

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Published by Standards South Africa  
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[www.stansa.co.za](http://www.stansa.co.za)  
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## SANS 164-2:2006

Edition 3

### Table of changes

| Change No. | Date | Scope |
|------------|------|-------|
|            |      |       |

### Abstract

Covers the rating and dimensions of the IEC 16 A 250 V a.c. plug and socket-outlet system and socket-outlet adaptors for household and similar purposes, for use in South Africa.

### Keywords

adaptors, dimensions, electric plugs, electric sockets, socket-outlets.

### Foreword

This South African standard was approved by National Committee StanSA SC 67C, *Electricity distribution systems and components – Electrical accessories*, in accordance with procedures of Standards South Africa, in compliance with annex 3 of the WTO/TBT agreement.

**This part of SANS 164, by reference in SANS 164-0, forms part of the compulsory specification for plugs, socket-outlets and socket-outlet adaptors, as published by Government Notice No. R442 (Government Gazette 18779) of 3 April 1998. Compliance with the dimensions of this part of SANS 164 will be deemed to be compliance with the said compulsory specification.**

This edition cancels and replaces edition 2.1(SANS 164-2:2005).

SANS 164 consists of the following parts, under the general title *Plug and socket-outlet systems for household and similar purposes for use in South Africa*:

*Part 0: General and safety requirements.*

*Part 1: Conventional system, 16 A 250 V a.c.*

*Part 2: IEC system, 16 A 250 V a.c.*

*Part 3: Conventional system, 6 A 250 V a.c.*

*Part 4: Dedicated system, 16 A 250 V a.c.*

*Part 5: Flat non-rewirable two-pole plugs, 2,5 A 250 V, with cord, for connection of class II equipment.*

*Part 6: Round two-pole system 10 A 250 V a.c. and 16 A 250 V a.c., for connection of class II equipment.*

Annexes A, B, C and D form an integral part of this part of SANS 164.

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# Plug and socket-outlet systems for household and similar purposes for use in South Africa

## Part 2:

IEC system, 16 A 250 V a.c.

### 1 Scope

This part of SANS 164 covers the rating and dimensions of the IEC 16 A 250 V a.c. plug and socket-outlet system and socket-outlet adaptors for household and similar purposes, for use in South Africa.

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of SANS 164. All standards are subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this part of SANS 164 are encouraged to take steps to ensure the use of the most recent editions of the standards indicated below. Information on currently valid national and international standards can be obtained from Standards South Africa.

IEC 60417-DB, *Graphical symbols for use on equipment*. Available from World Wide Web: <<http://domino.iec.ch/IEC60417>>.

ISO 1302, *Geometrical Product Specifications (GPS) – Indication of surface texture in technical product documentation*.

SANS 164-0, *Plug and socket-outlet systems for household and similar purposes for use in South Africa – Part 0: General and safety requirements*.

### 3 Definitions

For the purposes of this part of SANS 164, the definitions given in SANS 164-0 apply.

### 4 Requirements

**4.1** The requirements of SANS 164-0 apply.

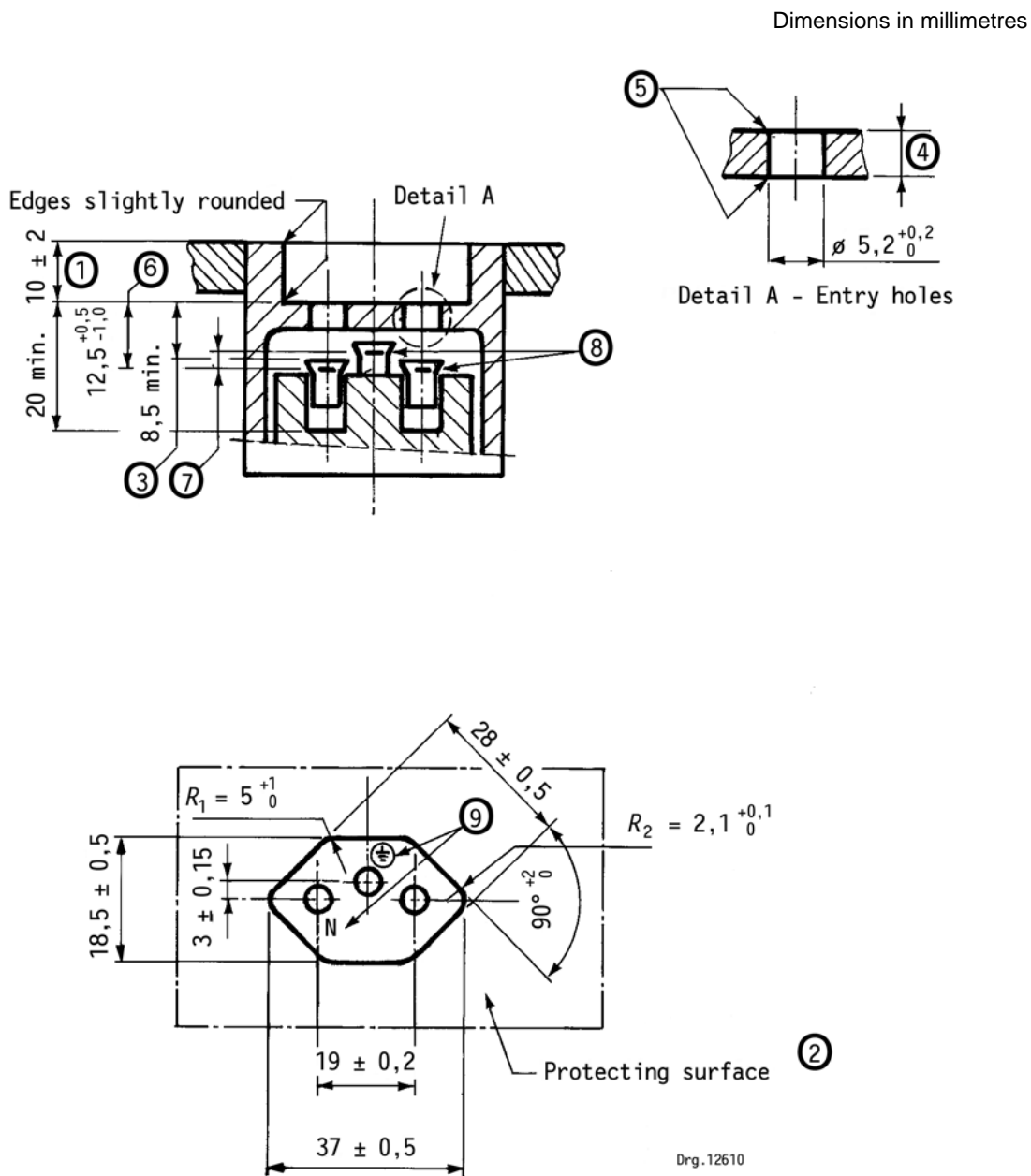
**4.2** Socket-outlets, socket-outlet adaptors and rewirable plugs shall be rated at 16 A and 250 V a.c.

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**4.3** Plugs and socket-outlets shall comply with the dimensions given on the appropriate of standard sheets 2-1 to 2-7.

Use the gauges given in annexes A to D for checking the dimensions.



NOTE 1 An explanation of the encircled reference numbers on this standard sheet is given after standard sheet 2-3.

NOTE 2 The sketches are not intended to govern design, except as regards the dimensions shown.

NOTE 3 The socket-outlets may be used in various arrangements, such as multiple types.

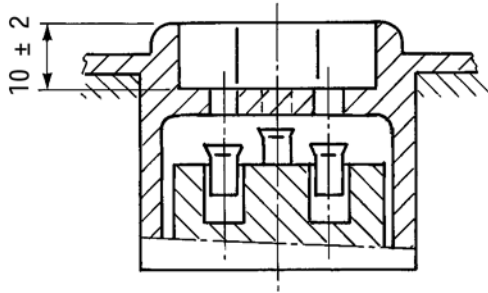
**Standard sheet 2-1 — 16 A 250 V Two-pole socket-outlet  
with earthing-contact flush-type socket-outlet**

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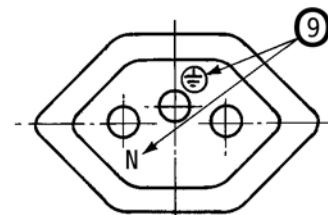
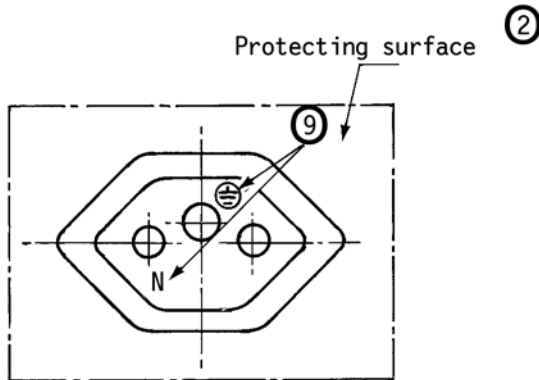
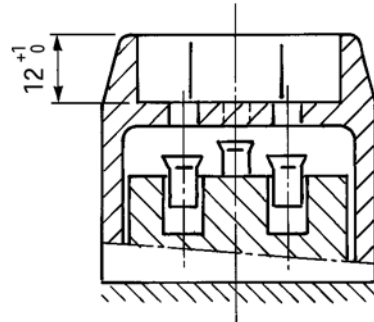
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Dimensions in millimetres

Semi-flush and surface-type socket-outlets **with** protecting surface



Semi-flush and surface type socket-outlets **without** protecting surface



Drg. 12611

NOTE 1 An explanation of the encircled reference numbers on this standard sheet is given after standard sheet 2-3.

NOTE 2 For dimensions not indicated, and for other details, see standard sheet 2-1.

NOTE 3 The sketches are not intended to govern design, except as regards the dimensions shown.

NOTE 4 The socket-outlets may be used in various arrangements, such as multiple types.

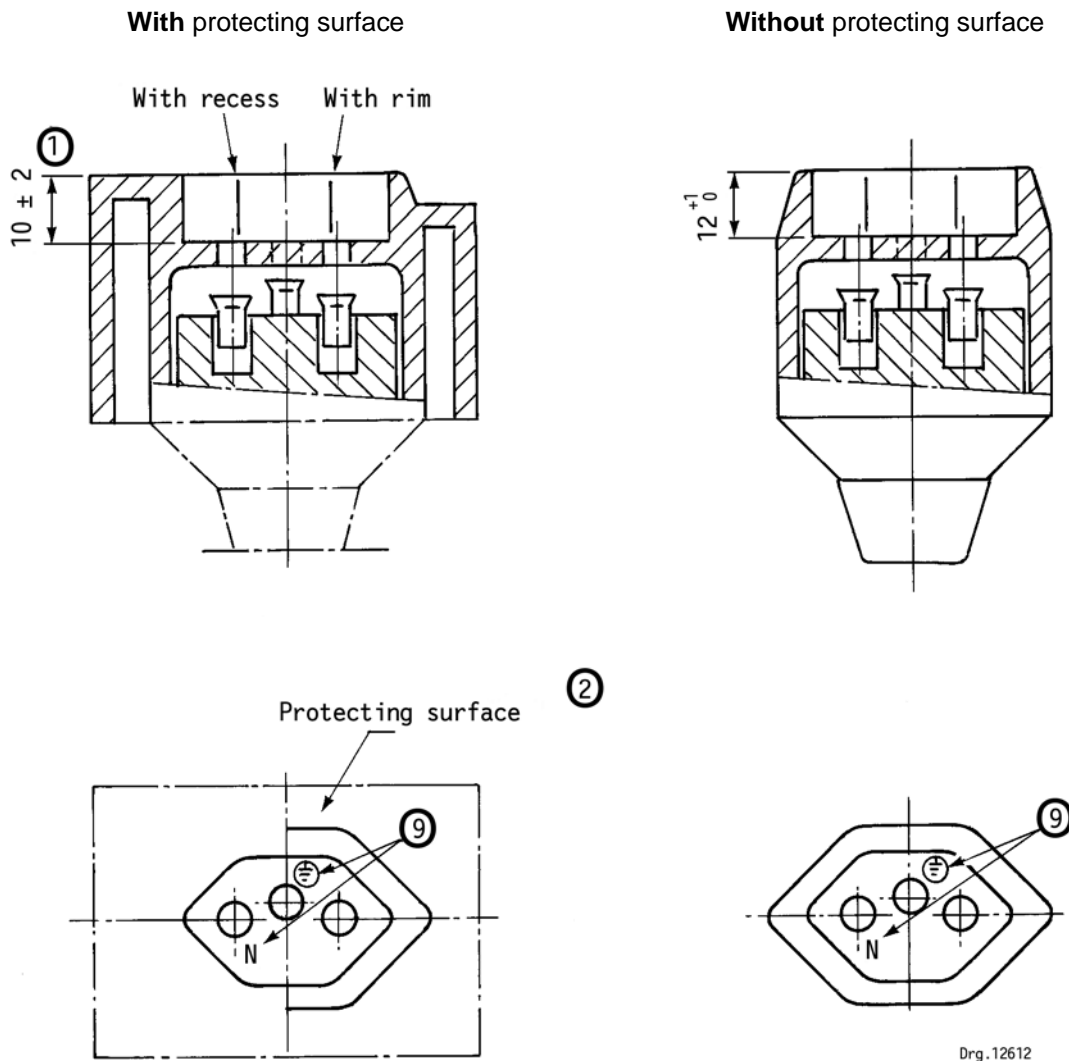
**Standard sheet 2-2 — 16 A 250 V Two-pole socket-outlet with earthing-contact semi-flush and surface-type socket-outlets**

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Dimensions in millimetres

These socket-outlets may be rewirable or non-rewirable



NOTE 1 An explanation of the encircled reference numbers on this standard sheet is given on the following page.

NOTE 2 For dimensions not indicated, and for other details, see standard sheet 2-1.

NOTE 3 The sketches are not intended to govern design, except as regards the dimensions shown.

NOTE 4 The socket-outlets may be used in various arrangements, such as multiple types.

**Standard sheet 2-3 — 16 A 250 V Two-pole portable socket-outlet with earthing contact**



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**Explanation of reference numbers on standard sheets 2-1, 2-2 and 2-3**

**1** A recess for flush types, a rim for surface and portable types or a combination of the two for semi-flush types shall be provided. For all types, prevention of single-pole insertion of a plug is checked by means of a gauge (see annex B).

**2** The gauge in annex B shall be used to check that single-pole insertion is not possible.

NOTE With regard to the possibility of using shutters as the only means of preventing single-pole insertion, see SANS 60884-1.

**3** This dimension is for the cover-plate, for the guidance of pins and, if any, for the shutter mechanism. Shutters are optional. There is no need to provide space for them in non-shuttered types.

**4** Within this thickness, the guidance for the pins shall be of length at least 1,5 mm at the specified diameter.

**5** Slight chamfer or radius.

**6** The points of first contact with current-carrying socket contacts are checked by means of the gauges referred to in annex A.

**7** The gauge referred to in annex C shall be used to ensure that

a) when the plug is inserted, the earth connection is made before the current-carrying pins of the plug become live, and

b) when the plug is withdrawn, both current-carrying pins separate from their socket contacts before the earth connection is broken.

**8** Socket contacts shall be resilient between 3,5 mm and 4,8 mm. They may have a shape other than tubular.

A suitably shaped entry, such as a chamfer or a radius, is necessary to prevent damage to the socket contacts when the plug is introduced at its most unfavourable angle.

The suitability of the contacts is checked by carrying out all the tests specified and by means of the gauge referred to in annex D, while shutters, if any, are opened.

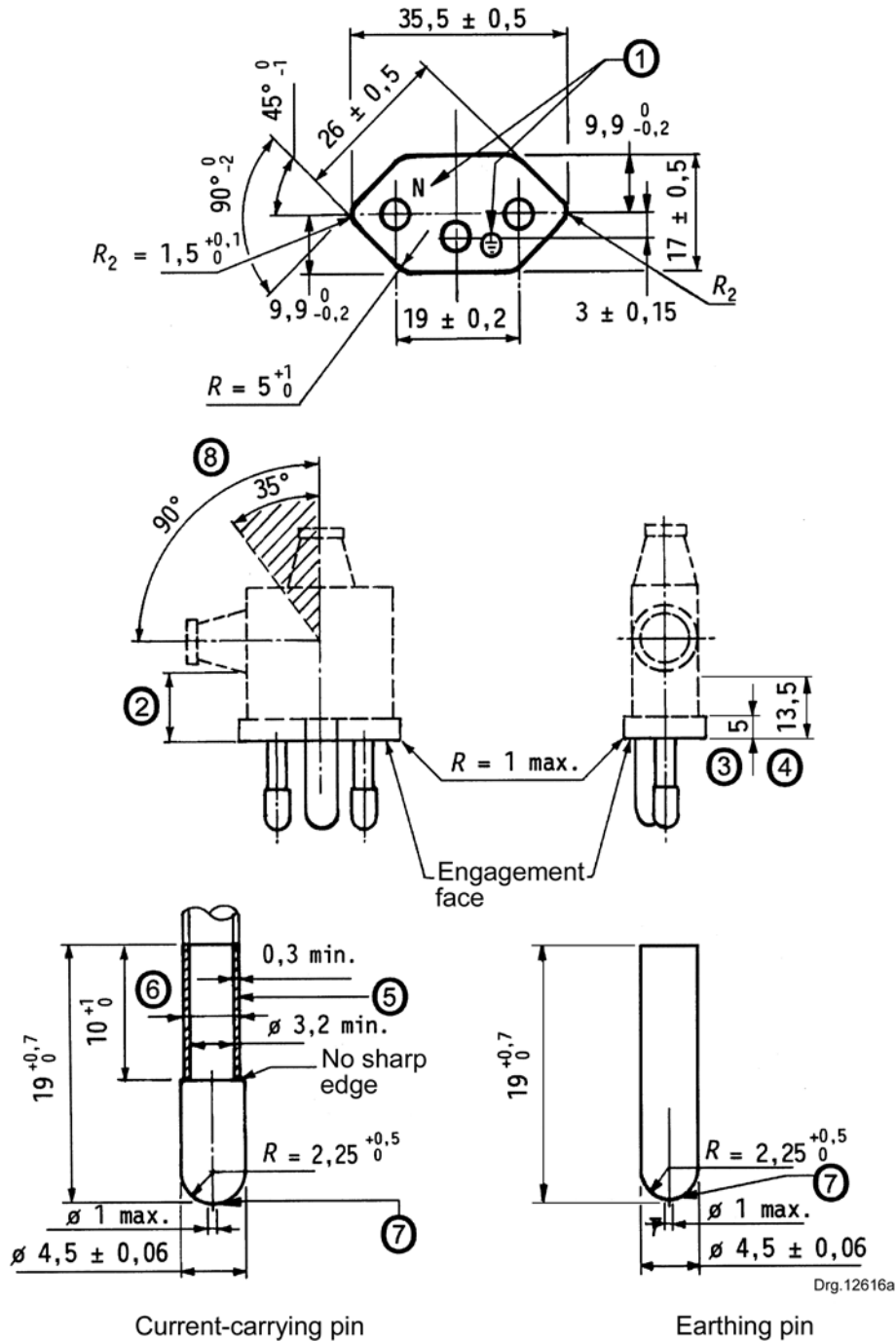
**9** The earthing terminal shall be indicated by symbol No. 5019 of IEC 60417-DB. Indication of the other terminals is optional. The indications shall be placed near the terminals. There is no need to mark the terminals of non-rewirable types.

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This plug may be rewirable or non-rewirable

Dimensions in millimetres



NOTE 1 An explanation of the encircled reference numbers on this standard sheet is given on the following page.

NOTE 2 The sketches are not intended to govern design, except as regards the dimensions shown.

**Standard sheet 2-4 — 16 A 250 V Two-pole plug with earthing contact (for class I equipment)**

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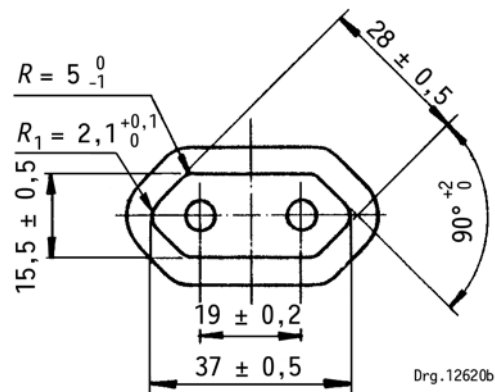
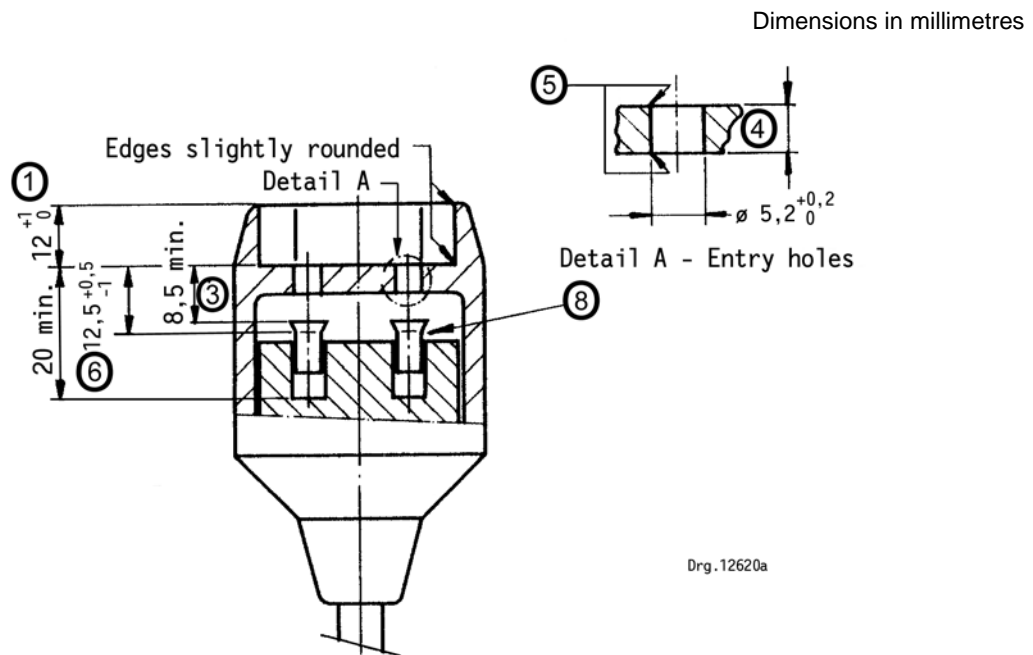
### **Explanation of reference numbers on standard sheet 2-4**

- 1** The earthing terminal shall be indicated by symbol No. 5019 of IEC 60417-DB. Indication of the other terminals is optional. The indications shall be placed inside the body, near the terminals. There is no need to mark the terminals of non-rewirable types.
- 2** The distance between the engagement face and, if any, the cord or cord guard, shall be at least 14 mm.
- 3** Within the distance indicated, the outline shall be not smaller than the engagement face.
- 4** Within the distance indicated, the outline shall be not larger than the engagement face.
- 5** Insulating sleeves on the current-carrying pins are mandatory. If the insulating sleeves are separate parts, they shall penetrate the engagement face by at least 3 mm.
- 6** The external diameter of the insulating sleeves shall not exceed the diameter of the uninsulated part of the pins.
- 7** To avoid damage to shutters, the ends of the pins shall have neither sharp edges nor burrs. They shall be of rounded shape as shown.
- 8** The angle of 90° represents the maximum permissible area for the orientation of the entry of the flexible cable or cord. The angle of 35° represents the recommended area.

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These socket-outlets may be rewirable or non-rewirable



NOTE 1 An explanation of the encircled reference numbers on this standard sheet is given after standard sheet 2-6.

NOTE 2 The sketches are not intended to govern design, except as regards the dimensions shown.

NOTE 3 The socket-outlets may be used in various arrangements, such as multiple types.

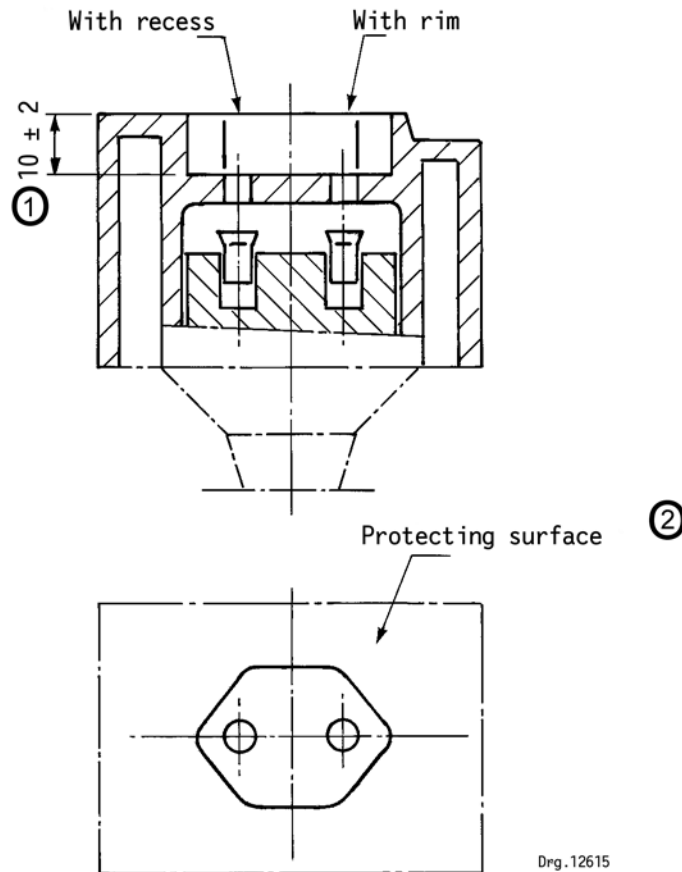
**Standard sheet 2-5 — 16 A 250 V Two-pole portable socket-outlet  
without earthing contact (for class II equipment)**

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These socket-outlets may be rewirable or non-rewirable

Dimensions in millimetres



NOTE 1 An explanation of the encircled reference numbers on this standard sheet is given on the following page.

NOTE 2 For dimensions not indicated, and for other details, see standard sheet 2-5.

NOTE 3 The sketches are not intended to govern design, except as regards the dimensions shown.

NOTE 4 The socket-outlets may be used in various arrangements, such as multiple types.

**Standard sheet 2-6 — 16 A 250 V Two-pole portable socket-outlet without earthing contact but with protecting surface**

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### **Explanation of reference numbers on standard sheets 2-5 and 2-6**

NOTE These standard sheets are also intended to cover socket-outlets for incorporation into equipment.

**1** A rim for types without a protecting surface or a recess (or, for types with a protecting surface, a combination of a rim and recess) shall be provided. For all types, in all cases, prevention of single-pole insertion of a plug is checked by means of a gauge (see annex B).

**2** The gauge in annex B shall be used to check that single-pole insertion is not possible.

NOTE With regard to the possibility of using shutters as the only means of preventing single-pole insertion, see SANS 60884-1.

**3** This dimension is for the cover-plate, for the guidance of pins and, if any, for the shutter mechanism. Shutters are optional. There is no need to provide space for them in non-shuttered types.

**4** Within this thickness, the guidance for the pins shall be of length at least 1,5 mm at the specified diameter.

**5** Slight chamfer or radius.

**6** The points of first contact with current-carrying socket contacts are checked by means of the gauges referred to in annex A.

**7** Non-used reference.

**8** Socket contacts shall be resilient between 3,5 mm and 4,8 mm. They may have a shape other than tubular.

A suitably shaped entry, such as a chamfer or a radius, is necessary to prevent damage to the socket contacts when the plug is introduced at its most unfavourable angle.

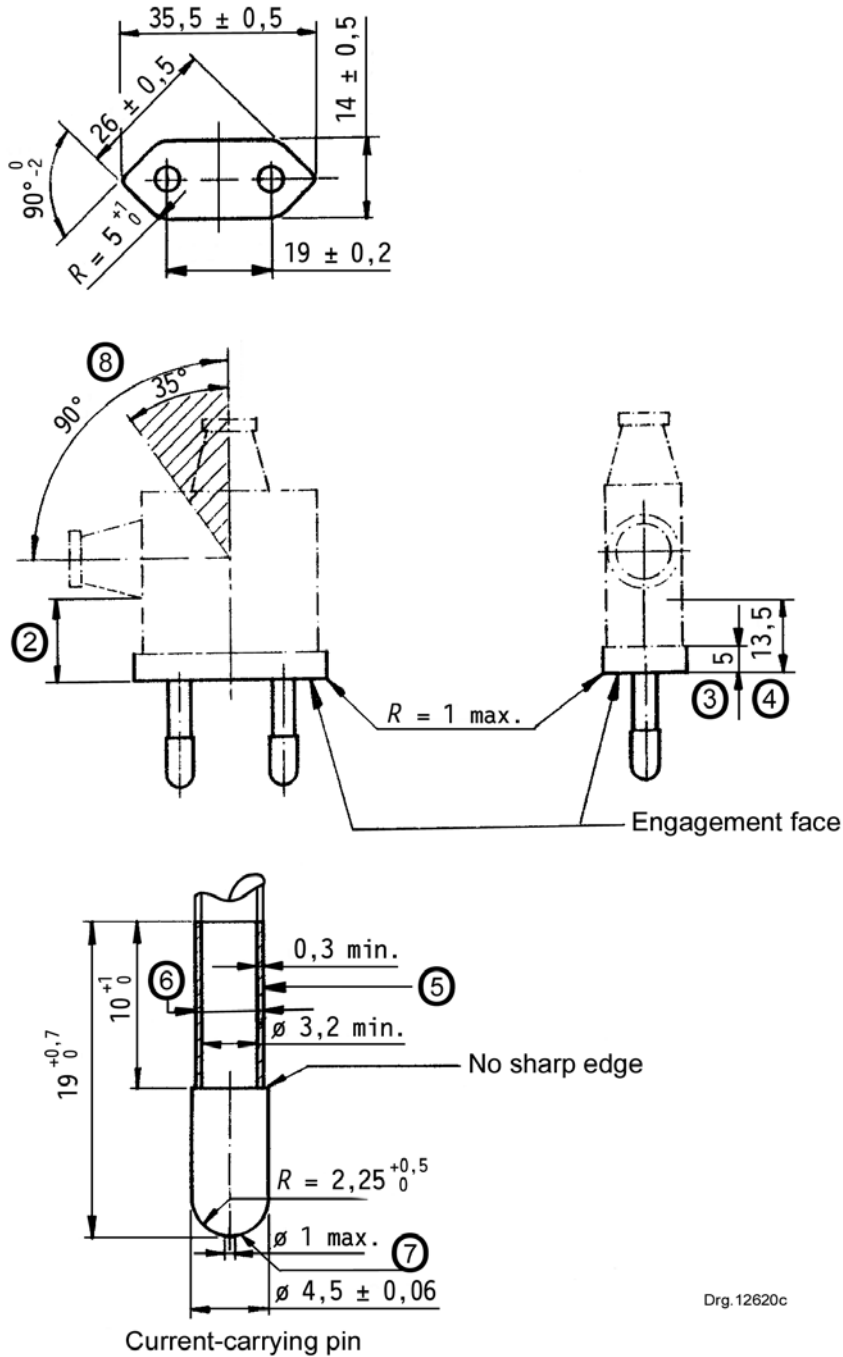
The suitability of the contacts is checked by carrying out all the tests specified and by means of the gauge referred to in annex D, while shutters, if any, are opened.

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This plug shall be non-rewirable

Dimensions in millimetres



NOTE 1 An explanation of the encircled reference numbers on this standard sheet is given on the following page.

NOTE 2 The sketches are not intended to govern design, except as regards the dimensions shown.

**Standard sheet 2-7 — 16 A 250 V Two-pole plug without earthing contact (for class II equipment)**

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### **Explanation of reference numbers on standard sheet 2-7**

- 1** Non-used reference.
- 2** The distance between the engagement face and, if any, the cord or cord guard, shall be at least 14 mm.
- 3** Within the distance indicated, the outline shall be not smaller than the engagement face.
- 4** Within the distance indicated, the outline shall be not larger than the engagement face.
- 5** Insulating sleeves on the current-carrying pins are mandatory. If the insulating sleeves are separate parts, they shall penetrate the engagement face by at least 3 mm.
- 6** The external diameter of the insulating sleeves shall not exceed the diameter of the insulated part of the pins.
- 7** To avoid damage to shutters, the ends of the pins shall have neither sharp edges nor burrs. They shall be of rounded shape as shown.
- 8** The angle of 90° represents the maximum permissible area for the orientation of the entry of the flexible cable or cord. The angle of 35° represents the recommended area.

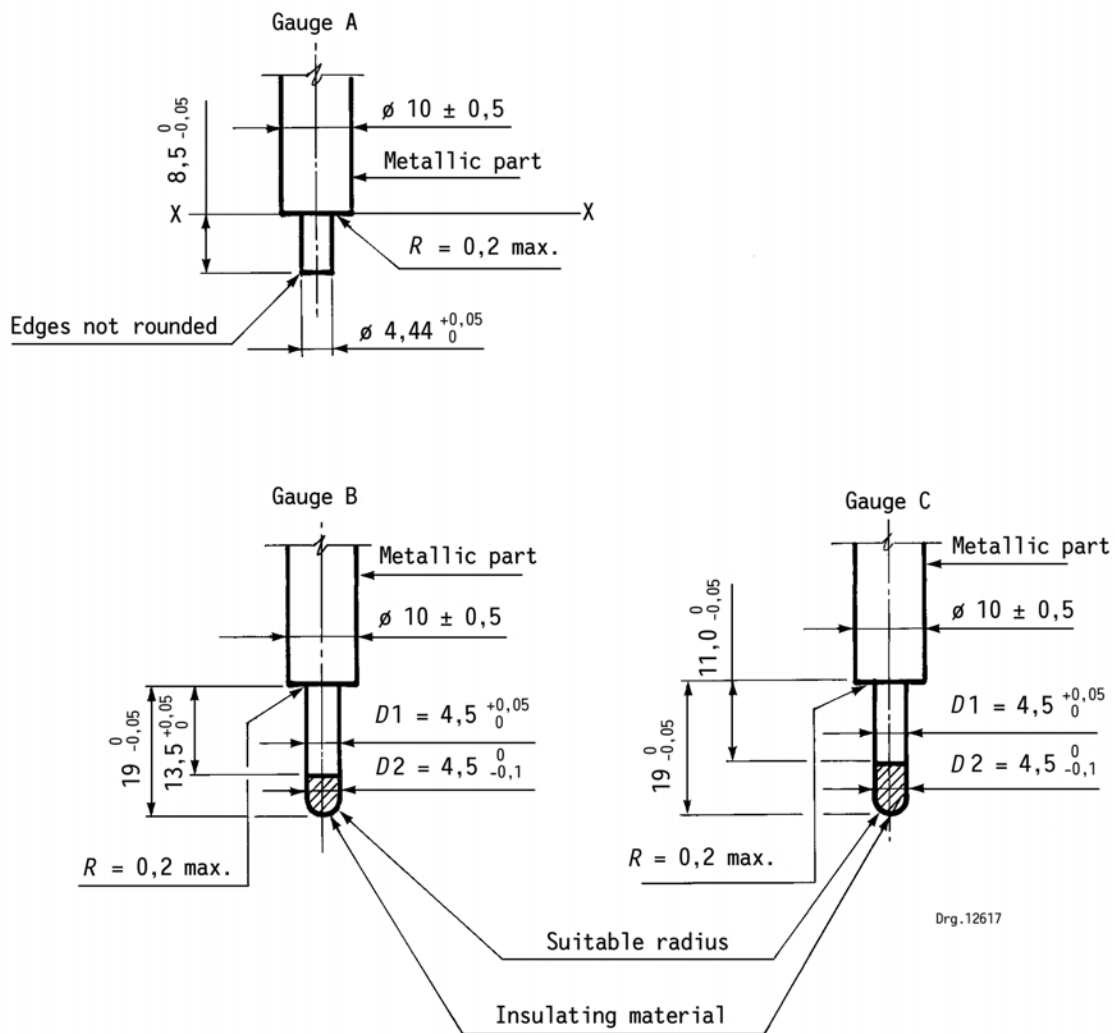


**Annex A**

(normative)

**Gauges for checking the distance from the engagement face to the points of first contact with current-carrying contact tubes (reference number 6 of standard sheets 2-1, 2-2, 2-3, 2-5 and 2-6)**

Dimensions in millimetres



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The metallic parts of gauges A, B and C are made of a hard corrosion-resistant metal (for example, stainless steel). An electrical indicator with a voltage of not less than 40 V and not more than 50 V is used to show contact. Gauge A shall be introduced in every possible position through the entry holes of current-carrying contacts until the face XX is fully in contact with the engagement face.

The indicator shall not light.

The pins of gauges B and C shall be completely inserted. In this situation,

- a) for gauge B, the indicator shall light, and
- b) for gauge C, the indicator shall not light.

During the test, shutters, if any, shall be opened.

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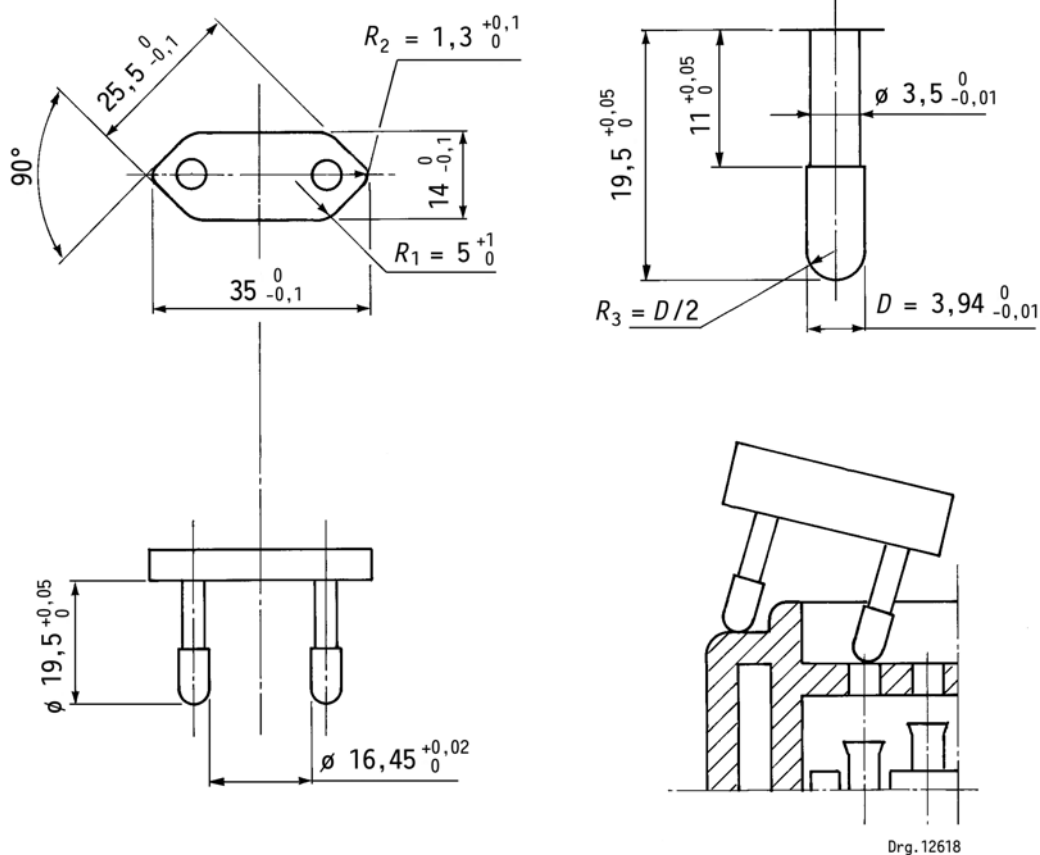
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**Annex B**

(normative)

**Gauge for proving that a single-pole insertion of a plug is not possible  
(reference numbers 1 and 2 of standard sheets  
2-1, 2-2, 2-3, 2-5 and 2-6)**

Dimensions in millimetres



The test is carried out with the engagement face of the socket-outlet horizontal. The gauge is applied under its own weight in every possible position. It shall not be possible to touch current-carrying contact tubes with one gauge pin only; an electrical indicator with a voltage of not less than 40 V and not more than 50 V is used to show contact. The total mass of the gauge shall be  $200 \text{ g} \pm 5 \text{ g}$  and it shall be made of hard corrosion-resistant metal that provides sufficient rigidity (for example, stainless steel).

During the test, shutters, if any, of the socket-outlet shall be opened.

NOTE 1 Owing to the fact that the plug rated at 2,5 A 250 V in IEC/TR 60083, C5, alternative II, is compatible with the socket-outlet referred to on standard sheets 2-1, 2-2, 2-3, 2-5 and 2-6, the gauge is used to check single-pole insertion of the plug.

NOTE 2 In the case of a socket-outlet of material such as rubber or PVC, see the requirements for protection against electric shock in SANS 60884-1.

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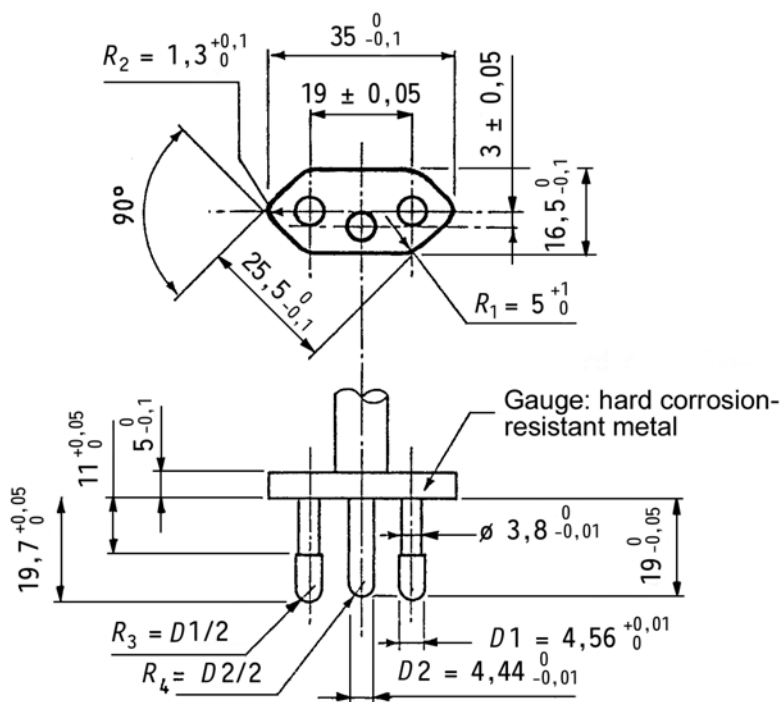
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**Annex C**

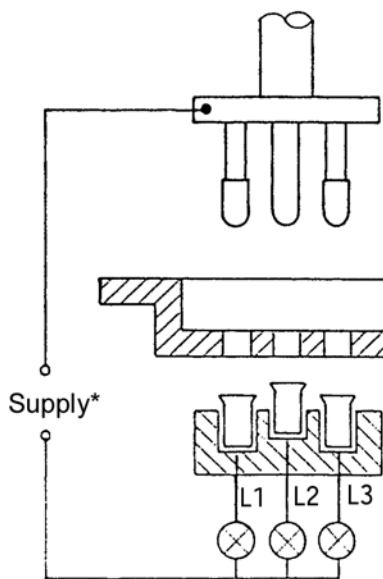
(normative)

**Gauge for checking that the earth pin makes contact before the current-carrying pins (reference number 7 of standard sheets 2-1, 2-2 and 2-3)**

Dimensions in millimetres



Drg. 12619



The gauge, when inserted without undue force but at any possible angle into the socket-outlet, shall cause lamp L2 to light before lamps L1 and L3. The gauge, when withdrawn, shall cause the lamps L1 and L3 to go out before lamp L2.

During the test, shutters, if any, shall be opened.

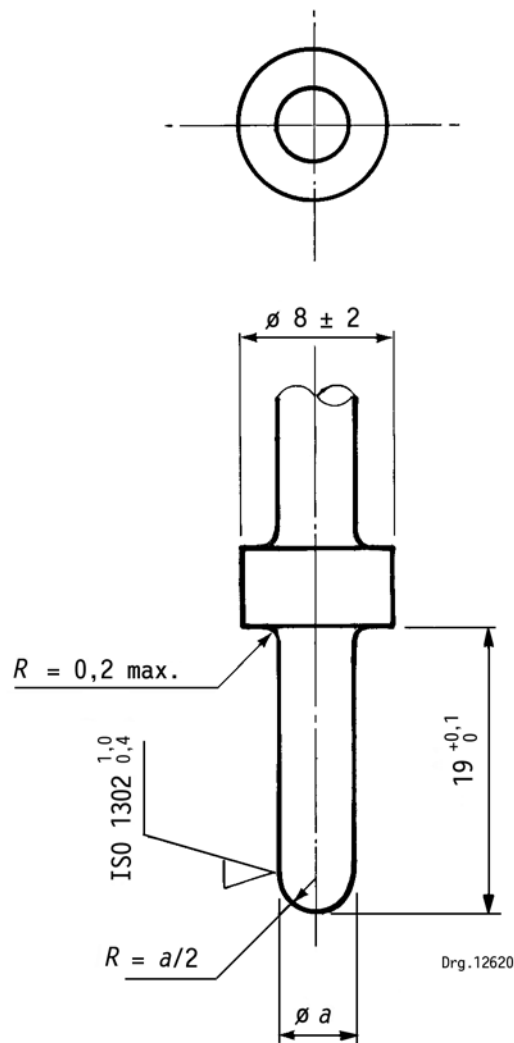
\*40 V min., 50 V max.

**Annex D**

(normative)

**Gauge for checking the resilience of socket contacts  
(reference number 8 of standard sheets  
2-1, 2-2, 2-3, 2-5 and 2-6)**

Dimensions in millimetres



| 1                 | 2                      | 3                            |
|-------------------|------------------------|------------------------------|
| <b>Test pin</b>   | <b>Diam. "a"</b><br>mm | <b>Withdrawal force</b><br>N |
| Largest test pin  | < 4,85                 | > 20,5                       |
| Smallest test pin | > 3,75                 | < 3,87                       |

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### **Annex E**

(normative)

### **Bibliography**

IEC/TR 60083, *Plugs and socket-outlets for domestic and similar general use standardized in the member countries of IEC.*

SANS 60884-1, *Plugs and socket-outlets for household and similar purposes – Part 1: General requirements.*

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