

Specification for

**Flat non-wirable two-pole  
plugs, 2,5 A 250 V, with cord,  
for the connection of  
class II-equipment for  
household and similar  
purposes**

The European Standard EN 50075 : 1990 has the status of a  
British Standard

Fiche de prise de courant 2,5 A 250 V plate  
bipolaire non démontable, avec câble, pour la  
connexion des appareils de la classe II pour  
usages domestiques et analogues

Flache, nichtwiederanschließbare, zweipolige  
Stecker, 2,5 A 250 V, mit Leitung, für die  
Verbindung von Klasse II-Geräten für Haushalt  
und ähnliche Zwecke

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## National foreword

This British Standard has been prepared under the direction of the Power Electrical Engineering Standards Policy Committee, PEL/- and is the English language version of EN 50075 'Flat non-rewirable two-pole plugs 2,5 A 250 V with cord, for the connection of class II-equipment for household and similar purposes', published by the European Committee for Electrotechnical Standardization (CENELEC).

National appendix NA gives the constitution of the committees for UK participation in the preparation of this standard.

National appendix NB gives details of international standards quoted in this standard for which there is an identical or technically equivalent British Standard.

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 50075

July 1990

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Descriptors: Electrical accessory, household appliance, plug, specification, characteristic, construction, test

English version

Flat non-wirable two-pole plugs, 2,5 A 250 V, with cord,  
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Haushalt und ähnliche Zwecke

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

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## CENELEC

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

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## Introduction

This document has been prepared by CENELEC TC23X "Europlugs and socket-outlets", when at its meeting on 18th and 19th November 1986 decided to prepare an EN for the flat, non-rewirable plug 2,5A 250V for the connection of Class II equipment, to Standard Sheet XVI (Alternative II) of CEE Publication 7 (second edition, 1963, and Modifications 1, 2, 3 and 4) or Standard C 5 (Alternative II) of IEC 83.

This plug, also known as the "Europlug", has already been standardized in most European countries (except United Kingdom); the relevant national standards are either endorsements of CEE Publication 7 or based on this specification.

The Europlug has existed now for more than 25 years and is made by a large number of manufacturers. Many of these Europlugs have been tested for compliance with the requirements of CEE Publication 7 or the corresponding national standard by the testing laboratories of various European countries and have been approved.

As this EN shall be applicable to the existing, approved Europlugs (and also to new designs), this document is based mainly on the requirements of CEE Publication 7, but small alterations included in IEC Publications 884-1 have also been taken into account. If this EN had been based completely on IEC 884-1, there would be a risk that the existing plugs would not meet the requirements of this standard.

In this document, requirements are indicated by a vertical line in the margin, test specifications are not marked and explanatory matter (notes) has been typed indented.

The text of prEN 50075 (1st edition — 1989) was approved by all CENELEC members with the exception of Norway and Sweden on 11 September 1989 as a European Standard.

The following dates are applicable:

- latest date of announcement of the EN at national level (doa) : 1990-05-01
- date of latest publication of a new harmonized standard (dop) : 1991-03-01
- date of withdrawal of conflicting national standards(dow) : 1993-03-01

For products which have complied with the relevant national standard before 1993-03-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1998-03-01.

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## 1 Scope

This standard applies to flat non-rewirable two-pole plugs without earthing contact with a rated voltage of 250 V a.c. and a rated current of 2,5 A. They are supplied with a cord, for the connection of equipment of class II, for household and similar purposes, and having no special protection against ingress of water are intended for indoor use.

Plugs complying with this standard are suitable for use at ambient temperatures not normally exceeding 25 °C, but occasionally reaching 35 °C.

Plug portions of adaptors or equipment, such as razors or lamps with rechargeable batteries, plug-in transformers, etc., shall comply with the requirements of this standard as far as they reasonably apply.

## 2 Definitions

Where in this standard the term "plug" is used, plugs according to this standard are meant, unless otherwise specified.

Where in this standard the terms voltage and current are used, they imply r.m.s. values, unless otherwise specified.

The following definitions apply for the purpose of this standard:

**2.1** A plug is a device having pins designed to engage with the contacts of a socket-outlet and also incorporating means for the electrical connection and mechanical retention of a cord.

**2.2** A non-rewirable plug is a plug so constructed that it forms a complete unit with the cord after connection and assembly by the manufacturer (see also 9.1).

The manufacturer referred to in this definition is either the manufacturer of:

- the plug or the cord set,
- the cord,
- the appliance or equipment.

**2.3** A moulded-on plug is a non-rewirable plug the manufacture of which is completed by insulating material moulded around the pre-assembled component parts and the terminations.

## 3 General requirements

Plugs shall be so designed and constructed that in normal use, the performance is reliable and without danger to the user or surroundings.

In general, compliance is checked by carrying out all the relevant tests specified.

## 4 General notes on tests

**4.1** Tests according to this standard are type tests.

**4.2** For testing, plugs shall be provided with a cord appropriate to its intended purpose, the cord being at least 1 m long.

**4.3** Unless otherwise specified, the tests are carried out in the order of the clauses, at an ambient temperature of  $(20 \pm 5)$  °C.

**4.4** A set of three plugs is subjected to all the relevant tests, with the exception of those of 12.2, 12.3, 13.4 and 14.2.

A second set of three plugs is subjected to tests of 12.2, 13.4 and 14.2.

A third set of three plugs is required for the test of 12.3.

A total of nine plugs is thus required.

**4.5** Plugs are deemed not to comply with this standard if there are more failures than that of one plug in one of the tests. If one plug fails in a test, that test and those preceding, which may have influenced the result of that test, are repeated on another set of plugs of the number specified in 4.4, all of which shall then comply with the repeated tests.

In general, it will only be necessary to repeat the tests which caused the failure.

The applicant may submit, together with the number of plugs specified in 4.4, the additional sets of plugs which may be needed should one plug fail. The testing station will then, without further request, test the additional plugs and will only reject if a further failure occurs. If the additional sets of plugs are not submitted at the same time as the first sets a failure of one plug will entail a rejection.

## 5 Rating

Plugs according to this standard shall be rated 2,5 A 250 V a.c.

## 6 Marking

**6.1** Plugs shall be marked with:

- the rated current in amperes,
- the rated voltage in volts,
- the symbol for nature of supply: ~,
- either the name, trade mark or identification mark of the manufacturer or of the responsible vendor,
- the type reference, which may be a catalogue number.

**6.2** When symbols are used, they shall be as follows:

- amperes ..... A.
- volts ..... V.

The marking for rated current, rated voltage and nature of supply shall be made in one of the following ways:

$$2,5 \text{ A } 250 \text{ V } \sim \text{ or } 2,5/250 \sim \text{ or } \frac{2,5 \text{ A}}{250 \text{ V}} \sim \text{ or } \frac{2,5}{250} \sim$$

Lines formed by the construction of the tool are not considered as part of the marking.

**6.3** Plugs shall not be marked with the symbol for class II construction.

**6.4** Marking shall be durable and easily legible.

Compliance with the requirements of **6.1** to **6.4** is checked by inspection and by the following test.

The marking is rubbed by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

Marking made by moulding, pressing or engraving is not subjected to this test.

The petroleum spirit used should consist of a solvent hexane with a content of aromatics of maximum 0.1 volume percentage, a kauri-butanol value of 29, an initial boiling point of approximately 65 °C, a dry-point of approximately 69 °C and a density of approximately 0,68 g/cm<sup>3</sup>.

## 7 Dimensions

Plugs shall comply with Standard Sheet 1.

Compliance is checked by measurement and by means of the gauges shown in figures 1 and 2.

The use of the gauges shown in figure 1 for checking the diameter of the pins, is optional.

## 8 Protection against electric shock

**8.1** Live parts of plugs, with the exception of the bare metal parts of the pins, shall not be accessible.

Compliance is checked by the following test.

The standard test finger shown in figure 3 is applied in every possible position, except on the bare metal parts of the pins.

An electrical indicator with a voltage between 40 V and 50 V is used to show contact with the relevant part.

For plugs made of material that is likely to influence the requirement, the test is repeated at an ambient temperature of (35 ± 2) °C, the plugs being also at this temperature.

During this additional test, the plugs are subjected for (60<sup>+5</sup><sub>0</sub>) s to a force of (75<sup>+3</sup><sub>0</sub>) N, applied through the tip of a straight unjointed test finger of the same dimensions as the standard test finger shown in figure 3. The straight unjointed test finger is applied to all places where yielding of the insulating material could impair the safety of the plug.

During this test, the plug shall not deform to such an extent that those dimensions shown in the standard sheet which ensure safety are unduly altered and no live part shall be accessible.

**8.2** It shall not be possible to make connection between a pin of a plug and a live socket contact of a socket-outlet while the other pin is accessible.

Compliance is checked by means of the gauge shown in figure 4. For plugs with enclosures or bodies of thermoplastic material, the test is made at an ambient temperature of (35 ± 2) °C, the plug and the gauge both being at this temperature.

**8.3** External parts of plugs, with the exception of the pins, shall be of insulating material.

Compliance is checked by inspection.

Lacquer or enamel is not deemed to be an insulating material for the purpose of this sub-clause.

## 9 Construction

**9.1** Plugs according to this standard shall be non-rewirable, i.e. they shall be such that:

- the cord cannot be separated from the plug without making this permanently useless, and
- the plug cannot be opened by hand or by using a general purpose tool, e.g. a screwdriver.

A plug is considered to be permanently useless when, for re-assembling the plug, parts or materials other than the original are to be used.

Compliance is checked by inspection.

**9.2** Switches, fuses or lampholders shall not be incorporated in plugs.

Compliance is checked by inspection.

**9.3** Pins of plugs shall be solid and shall have adequate mechanical strength.

Compliance is checked by inspection and by the tests of clause 13.

**9.4** Pins of plugs shall be locked against rotation and adequately fixed into the body of the plug.

Compliance is checked by inspection, by manual test and by the tests of 13.1 and 13.4.

**9.5** Plugs shall be provided with soldered, welded, crimped or equally effective permanent connections; screwed or snap-on connections shall not be used.

Connections made by crimping a presoldered flexible conductor are not permitted, unless the soldered area is outside the crimping area.

Compliance is checked by inspection.

**9.6** Plugs shall be shaped in such a way and made of such a material that they can easily be withdrawn by hand from a socket-outlet.

In addition, the gripping surfaces shall be so designed that the plug can be withdrawn without having to pull the cord.

Compliance is checked by inspecting whether the plug has either:

- a usable length for gripping of at least 55 mm in axial direction, or
- such indent(s) that a ball with a diameter of  $(12 \pm 0,1)$  mm can penetrate radially into the body at least 2 mm from two opposite directions or at least 4 mm from one direction.

In case of non-compliance with the above requirements, a gripping test shall be performed.

The gripping test is under consideration.

## 10 Resistance to humidity

Plugs shall be proof against humidity which may occur in normal use.

Compliance is checked by the humidity treatment described below, followed immediately by the measurement of the insulation resistance and by the electric strength test specified in clause 11.

The humidity treatment is carried out in a humidity cabinet containing air with a relative humidity maintained between 91 % and 95 %. The temperature of the air, where plugs are placed, is maintained within  $\pm 1$  °C of any convenient value  $t$  between 20 °C and 30 °C. Before being placed in the humidity cabinet, the plugs are brought to a temperature between  $t$  and  $t + 4$  °C.

The plugs are kept in the cabinet for 48 h.

In most cases the plugs may be brought to the specified temperature by keeping them at this temperature for at least 4 h before the humidity treatment.

A relative humidity between 91 % and 95 % can be obtained by placing in the humidity cabinet a saturated solution of a sodium sulphate ( $\text{Na}_2\text{SO}_4$ ) or potassium nitrate ( $\text{KNO}_3$ ) in water having a sufficiently large contact surface with the air. In order to achieve the specified conditions within the cabinet, it is necessary to

ensure contact circulation of the air within and, in general, to use a cabinet which is thermally insulated.

After this treatment the plugs shall show no damage within the meaning of this standard.

## 11 Insulation resistance and electric strength

The insulation resistance and the electric strength of plugs shall be adequate.

Compliance is checked by the following tests, which are made immediately after the test of clause 10, in the humidity cabinet or in the room in which the plugs are brought to the prescribed temperature.

**11.1** The insulation resistance is measured using a d.c. voltage of approximately 500 V, the measurement being made  $(60 \pm 5)$  s after application of the voltage.

The insulation resistance shall be not less than 5 M $\Omega$ .

The insulation resistance is measured consecutively between:

- the pins connected together and the body;
- each pin in turn and the other, the latter being connected to the body.

The term "body" means a metal foil in contact with the outer surface of the plug, other than the engagement face and the insulating sleeves.

While wrapping the metal foil round the outer surface, it is pressed against holes or grooves without any appreciable force by means of the straight unjointed test finger, having the same dimensions as the standard test finger shown in figure 3.

**11.2** A voltage of substantially sine-wave form, having a frequency of 50 Hz, is applied for 1 min between the parts indicated in 11.1. The test voltage shall be 2000 V.

Initially, not more than 1000 V is applied, then it is raised rapidly to the full 2000 V.

No flashover or breakdown shall occur during the test.

The high-voltage transformer used for the test shall be so designed that, when the output terminals are short-circuited after the output voltage has been adjusted to the appropriate test voltage, the output current is at least 200 mA.

The overcurrent relay shall not trip when the output current is less than 100 mA.

Care is taken that the r.m.s. value of the test voltage applied is measured within  $\pm 3$  %.

Glow discharges without drop in voltage are neglected.

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## 12 Flexible cords and their connection

**12.1** Plugs shall be provided with a two-core cord complying with either HD 21.5 or HD 22.4.

Flat tinsel cords and cords having a cross-sectional area of 0,5 mm<sup>2</sup> are allowed in lengths up to 2 m only.

A plug incorporated in a cord set is tested as specified in this standard and the connector is tested as specified in EN 60320, each device being tested individually.

Compliance is checked by inspection.

**12.2** Moulded-on plugs shall be so designed that the cores of the cord are relieved from strain where they are connected to the terminations. Plugs other than moulded-on plugs, shall be provided with a cord anchorage such that the cores of the cord are relieved from strain, including twisting, where they are connected to the terminations and that their insulation is protected from abrasion.

The sheath, if any, of the cord shall be clamped within the cord anchorage.

Compliance is checked by inspection and by the following test, made on new plugs of the second set.

The plug is placed in a test apparatus as shown in figure 5 so that the axis of the cord is vertical where it enters the plug.

The cord is then subjected 100 times to a pull of 50 N. The pulls are applied practically without jerks each time for 1 s.

Immediately afterwards the cord is subjected for 1 min to a torque of:

– 0,1 Nm if the cord connected has a nominal cross-sectional area of 0,5 mm<sup>2</sup>

– 0,15 Nm if the cord connected has a nominal cross-sectional area of 0,75 mm<sup>2</sup> or more.

Plugs with flat tinsel cords H03VH–Y are not subjected to this torque test.

After the test, the cord shall not have been displaced by more than 2 mm and there shall be no break in the electrical connections.

For the measurement of the longitudinal displacement, a mark is made on the cord while it is subjected to the pull, at a distance approximately 2 cm from the end of the plug, before starting the tests. If, for moulded-on plugs, there is no definite end to the plug, an additional mark is made on the body of the plug.

After the tests, the displacement of the mark on the cord in relation to the plug, or to the mark on the plug, is measured while the cord is subjected to the pull.

**12.3** Plugs shall be so designed that the cord is protected against excessive bending where it enters the plug.

Guards provided for this purpose shall be of insulating material and shall be fixed in a reliable manner.

Helical metal springs, whether bare or covered with insulating material, shall not be used as cord guards.

Compliance is checked by inspection and by a flexing test in an apparatus having an oscillating member similar to that shown in figure 6. The test is made on plugs of the third set. The plug is fixed to the oscillating member of the apparatus so that, when this is at the middle of its travel, the axis of the cord where it enters the plug, is vertical and passes through the axis of oscillation.

Plugs with flat cords are mounted so that the major axis of the section is parallel to the axis of oscillation.

The plug shall be fixed in the test apparatus by its pins.

The distance between the cord entry of the plug and the axis of oscillation is adjusted so that the weight makes the minimum lateral movement as the oscillating member moves over its full travel.

The cord is loaded with a mass so that the force applied is:

– 10 N for plugs with cords having a nominal cross-sectional area of 0,75 mm<sup>2</sup> or less,

– 20 N for plugs with other cords.

A current of (2,5<sup>+0,2</sup><sub>0</sub>) A is passed through the conductors, the voltage between them being (250 ± 15) V a.c.

The oscillating member is moved backwards and forwards through an angle of 90° (45° on either side of the vertical), the number of flexings being 10 000 and the rate of flexing 60 per minute.

A flexing is one movement, either backwards or forwards.

Plugs with circular-section cords are turned through 90° in the oscillating member after 5 000 flexings; plugs with flat cords are only bent in a direction perpendicular to the plane containing the axis of the cores.

During the test, there shall be no interruption of the test current and no short-circuit between conductors.

After the test, the plugs shall show no damage within the meaning of this standard, a guard, if any, shall not have separated from the body and the insulation of the cord shall show no sign of abrasion or wear and broken strands of the conductors shall not have pierced the insulation so as to become accessible.

A short-circuit between the conductors of the cord is considered to occur if the current attains a value of 5 A.

The voltage drop between a pin and the corresponding conductor shall not exceed 10 mV, when measured with a test current of:

- (1<sup>+0,1</sup><sub>0</sub>) A for plugs with flat tinsel cord H03VH-Y
- (2,5<sup>+0,2</sup><sub>0</sub>) A for plugs with another cord.

### 13 Mechanical strength

Plugs shall have adequate mechanical strength to withstand the stresses imposed during use.

Compliance is checked by the tests of 13.1 and 13.4.

**13.1** The plugs are pressed between two flat surfaces with a force of 150 N for 5 min, as shown in figure 7.

Fifteen minutes after removal of the force, the plug shall not show such deformation as would result in undue alteration of those dimensions shown in Standard Sheet 1 which ensure safety.

**13.2** The plugs are tested in a tumbling barrel as shown in figure 8. The cord is cut so that a free length of approximately 100 mm projects from the plug or the outer end of the guard.

The plugs fall from a height of 500 mm onto a steel plate, 3 mm thick, the number of falls being:

- 1000 if the mass of the plug without the cord does not exceed 100 g,
- 500 if the mass of the plug without the cord exceeds 100 g.

The barrel is turned at a rate of approximately five revolutions per minute, ten falls per minute thus taking place.

Plugs are tested individually in the tumbling barrel.

After the test, the plugs shall show no damage within the meaning of this standard. In particular:

- no part shall have become detached or loosened,
- the pins shall not have become so deformed that the plug cannot be introduced into the gauge of figure 2 and also fails to comply with the requirements of clause 7 and 8.2,
- the pins shall not turn when a torque of 0,4 Nm is applied, first in one direction for 1 min and then in the opposite direction for 1 min.

During the examination after the test, special attention is paid to the connection of the cord. Small pieces may be broken off without causing rejection provided that the protection against electric shock is not affected.

Damage to the finish and small dents which do not reduce the creepage distances and clearances below the values specified in clause 16 are neglected.

**13.3** The pins are subjected to the following test by means of an apparatus as shown in figure 9.

The test apparatus comprises a horizontally disposed beam, which is pivoted about its centre point. A short length of steel wire, (1 ± 0,02) mm in diameter and bent into a U-shape, the base of the U being straight, is rigidly attached, at both ends, to one end of the beam, so that the straight part projects below the beam and is parallel to the axis of the beam pivot.

The plug is held in a suitable clamp in such a position that the straight part of the steel wire rests on the plug pin, at right angles to it. The pin slopes downwards at an angle of between 5° and 10° to the horizontal. The beam is loaded so that the wire exerts a force of (4<sup>0</sup><sub>-0,1</sub>) N on the pin. The plug is caused to move backwards and forwards in a horizontal direction in the plane of the axis of the beam, so that the wire rubs along the pin. The length of pin thus abraded is approximately 9 mm, of which approximately 7 mm is over the insulating sleeve. The number of movements is 20 000 (10 000 in each direction) and the rate of operation is 25 to 30 movements per minute.

The test is made on one pin of each plug.

After the test, the pins shall show no damage which may affect safety or impair the further use of the plug, in particular, the insulating sleeve shall not have punctured or rucked up.

**13.4** The plugs are placed on a rigid steel plate having two holes of (5,2 ± 0,2) mm diameter at a centre distance of (18,6 ± 0,3) mm, the pins inserted in the holes so that the engagement face of the plug rests on the plate. The test is made on plugs of the second set. A pull of (40<sup>+1</sup><sub>0</sub>) N is applied, without jerks, for (60<sup>+5</sup><sub>0</sub>) s on each pin in turn, in the direction of the longitudinal axis of the pin. The pull is applied within a heating cabinet at a temperature of (70 ± 2) °C, (60<sup>+5</sup><sub>0</sub>) min after the plug has been placed in the heating cabinet. After the test, the plug is allowed to cool down to ambient temperature. Any pin shall not have displaced in the body of the plug more than 1 mm.

### 14 Resistance to heat and to ageing

**14.1** Plugs shall be sufficiently resistant to heat.

Compliance is checked by the tests of 14.1.1 and 14.1.2, as applicable.

**14.1.1** Plugs other than moulded-on plugs, are kept for 1 h in a heating cabinet at a temperature of (100 ± 2) °C.

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During the test, they shall not undergo any change impairing their further use.

After the test, the plugs are allowed to cool down to approximately room temperature.

The marking shall still be legible.

Discolouration or blisters are disregarded, provided that safety is not impaired within the meaning of this standard.

**14.1.2** Plugs are subjected to a pressure test by means of an apparatus similar to that shown in figure 10, the test being made in a heating cabinet at a temperature of  $(80 \pm 2) ^\circ\text{C}$ .

The apparatus comprises two steel jaws, having a cylindrical face of approximately 25 mm radius, a width of  $(15 \pm 0,1)$  mm and a length of  $(50 \pm 0,3)$  mm. The corners are rounded with a radius of approximately 2,5 mm.

The plug is clamped between the jaws in such a way that these press against it in the area where the plug is gripped in normal use, the centre line of the jaws coinciding as nearly as possible with the centre of this area.

The force applied through the jaws is  $(20^{+1}_0)$  N.

After  $(60^{+5}_0)$  min, the jaws are removed and the plugs shall show no damage within the meaning of this standard.

**14.2** Plugs shall be resistant to ageing.

Compliance is checked by suspending plugs of the second set freely in a heating cabinet with an atmosphere having the composition and pressure of the ambient air and ventilated by natural circulation. The temperature in the cabinet is  $(70 \pm 2) ^\circ\text{C}$ .

The plugs are kept in the cabinet for 168 h.

The use of an electrically heated cabinet is recommended. Natural circulation may be provided by holes in the walls of the cabinet.

The plugs are then removed from the cabinet and kept at room temperature for at least 96 h.

After the test, the plugs shall show no crack visible with normal or corrected vision without additional magnification, nor shall the material have become sticky or greasy, this being judged as follows.

With the forefinger wrapped in a dry piece of rough cloth the plug is pressed with a force of 5 N. No traces of the cloth shall remain on the plug and the material of the plug shall not stick to the cloth.

After the test the plugs shall show no damage which would lead to non-compliance with this standard.

The force of 5 N can be obtained in the following way:

The plug is placed on one of the pans of a balance and the other pan is loaded with a mass equal to the mass of the plug plus 500 g.

Equilibrium is then restored by pressing the plug with the forefinger wrapped in a dry piece of rough cloth.

## 15 Current-carrying parts and connections

**15.1** Connections, electrical and mechanical, shall withstand the mechanical stresses occurring in normal use.

Compliance is checked by inspection.

**15.2** Electrical connections shall be so designed that contact pressure is not transmitted through insulating material, unless there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage or yielding of the insulating material.

This requirement does not preclude designs with flat tinsel cord H03VH-Y where the contact pressure is obtained from insulating parts having such properties as to ensure reliable and permanent contact under all conditions of normal use, especially in view of shrinking, ageing or cold flow of the insulating part.

Connections made by insulation piercing of flat tinsel cord H03VH-Y shall be reliable.

Compliance is checked by inspection and, for the last requirement by a test which is under consideration.

The suitability of the material is considered in respect of the stability of the dimensions.

**15.3** Current-carrying parts shall be either of:

- copper,
- an alloy containing at least 58 % copper for parts made from rolled sheet (in cold condition) or at least 50 % copper for other parts, or
- other metals having a mechanical strength, an electrical conductivity and a resistance to corrosion adequate for their intended use.

Current-carrying parts which may be subjected to mechanical wear, shall not be made of steel provided with an electroplated coating.

Compliance is checked by inspection and, if necessary, by chemical analysis.

Examples of suitable metals, other than copper or copper alloy, when used within the permissible temperature range and under normal conditions of chemical pollution, are:

- stainless steel containing at least 13 % chromium and not more than 0,09 % carbon;
- steel provided with an electroplated coating of zinc according to ISO 2081, the coating having a thickness of at least 5 µm;
- steel provided with an electroplated coating of nickel and chromium according to ISO 1456, the coating having a thickness of at least 20 µm;
- steel provided with an electroplated coating of tin according to ISO 2093, the coating having a thickness of at least 12 µm.

## 16 Creepage distances, clearances and distances through insulation

Creepage distances and clearances between live parts of different polarity or between live parts and accessible external surfaces shall be not less than 3 mm.

For moulded-on plugs the distance through insulating material between live parts and accessible surfaces with the exception of the engagement face and insulating sleeves, shall be not less than 1,5 mm.

Distances through slots or openings in external parts of insulating material are measured to metal foil in contact with the accessible surface other than the engagement face; the foil is pushed into corners and the like by means of the straight unjointed test finger as described in 8.1, but is not pressed into openings.

The contribution to the creepage distance of any groove less than 1 mm wide is limited to its width.

Any airgap less than 1 mm wide is ignored in computing the total clearance.

## 17 Resistance of insulating material to abnormal heat and to fire

Parts of insulating material which might be exposed to thermal stresses due to electric effects and the deterioration of which may impair the safety of the plug, shall not be unduly affected by abnormal heat and by fire.

Compliance is checked by means of the glow-wire test according to clauses 4 to 10 of HD 444.2.1, the test being made at a temperature of:

- 750 °C for parts of insulating material necessary to retain current-carrying parts in position;
- 650 °C for other parts.

The test is made on one plug. In case of doubt, the test shall be repeated on two further plugs, both of which shall then withstand the repeated test.

The test is made by applying the glow-wire once.

The plug shall be so positioned during the test that the surface tested is in a vertical position.

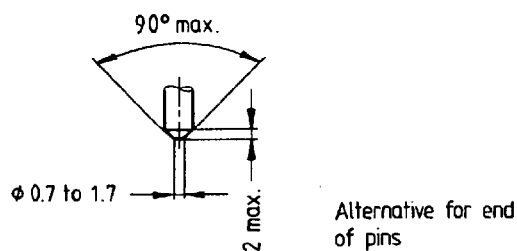
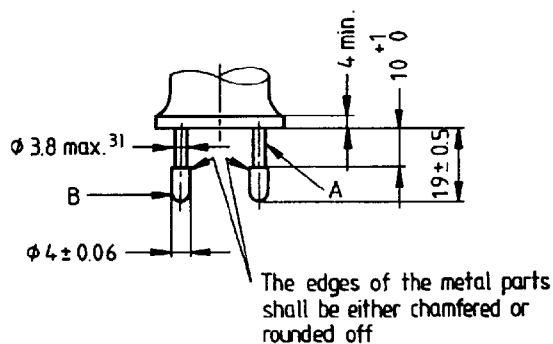
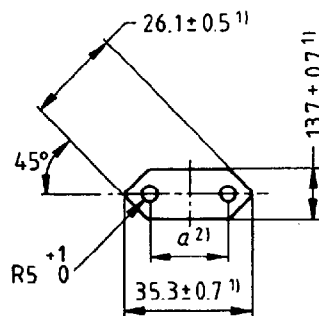
The plug is regarded as having passed the glow-wire test if:

- there is no visible flame and no sustained glowing, or if
- flames and glowing at the plug extinguish within 30 s after the removal of the glow-wire.

There shall be no ignition of the tissue paper or scorching of the board.

Standard Sheet 1

2,5 A 250 V two-pole plug for Class II appliances



Dimensions in millimetres

A = insulating collar

B = metal pin

<sup>1)</sup> These dimensions shall not be exceeded within a distance of 18 mm from the engagement face of the plug.

<sup>2)</sup> Dimension *a* is:

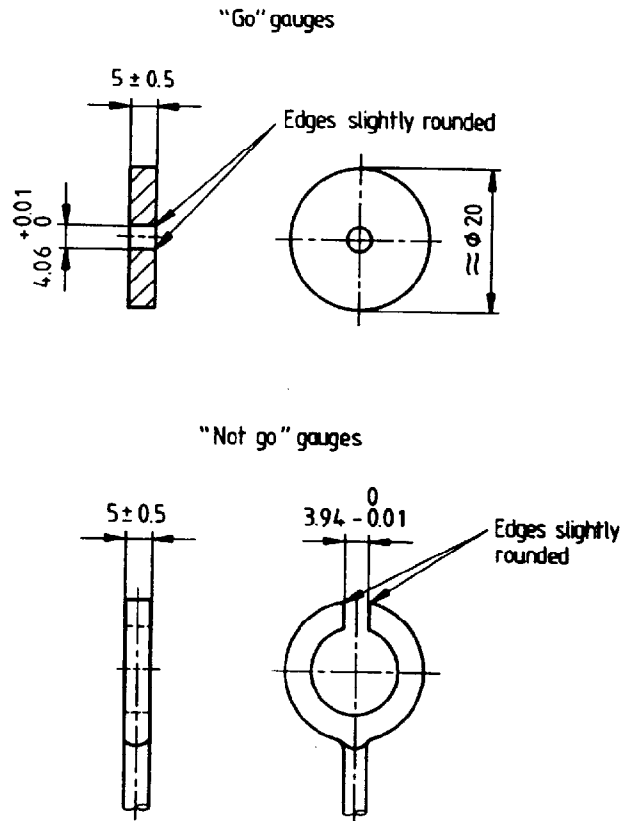
18 mm to 19,2 mm in the plane of the engagement face;

17 mm to 18 mm at the ends of the pins.

<sup>3)</sup> This dimension may be increased to 4 mm within a distance of 4 mm from the engagement face of the plug.

Pin ends shall be rounded, or conical as shown in detail sketch.

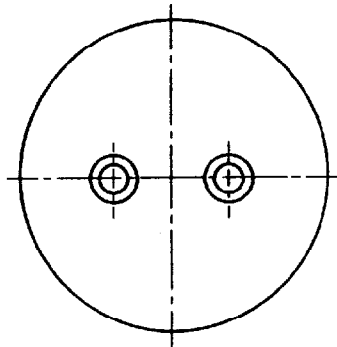
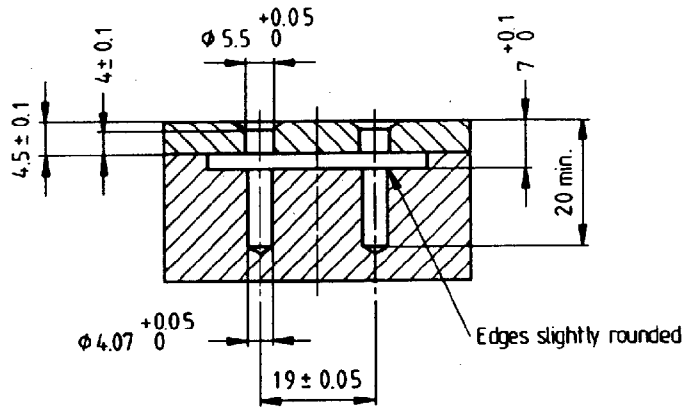
The sketches are not intended to govern design except as regards the dimensions shown.



*Dimensions in millimetres*

It shall be possible to pass the pin through the "go" gauge without undue force; it shall not be possible to pass the pin through the gap in the "not go" gauge without undue force.

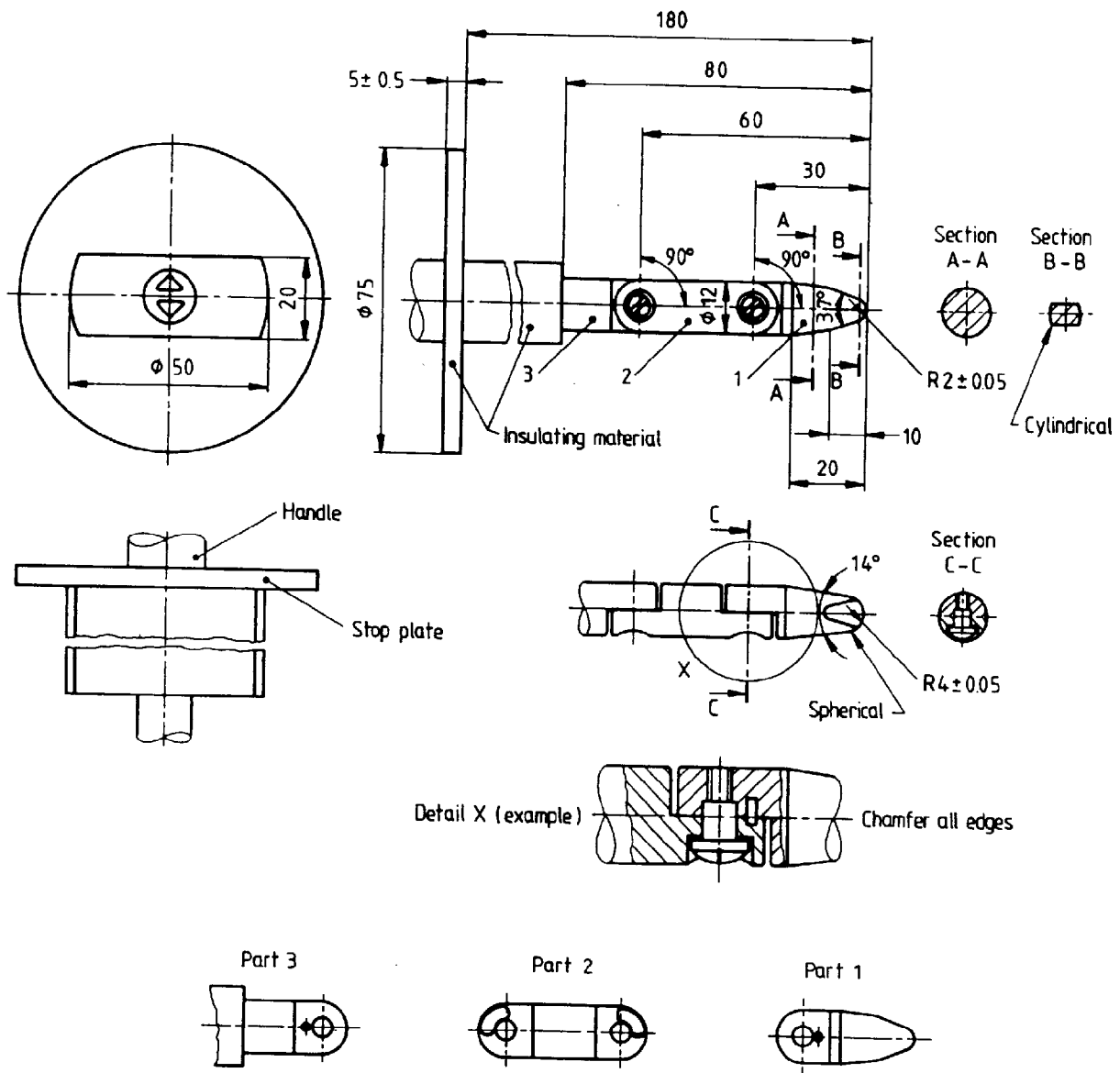
**Figure 1. Gauge for pin diameter**



*Dimensions in millimetres*

It shall be possible to insert the plugs into the gauge without undue force so that the engagement face comes into contact with the surface of the gauge.

**Figure 2. Gauge for interchangeability**



Dimensions in millimetres

Tolerances on dimensions without specific tolerance:

on angles:  $\begin{matrix} 0 \\ -10^\circ \end{matrix}$

on linear dimensions:

up to 25 mm:  $\begin{matrix} 0 \\ -0,06 \end{matrix}$

over 25 mm:  $\pm 0,2$

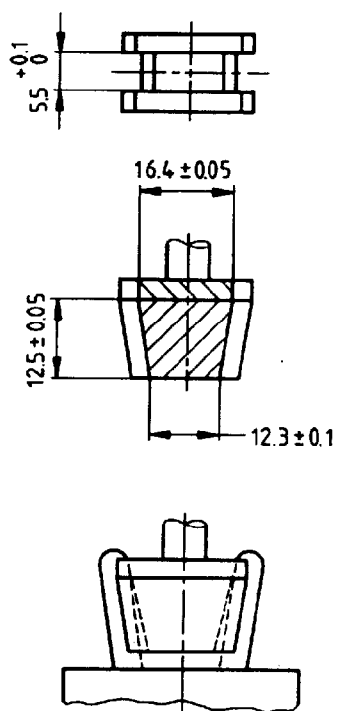
Material of finger: e.g. heat-treated steel

Both joints of this finger may be bent through an angle of  $90^\circ + 10^\circ$ , but in one and the same direction only.

Using the pin and groove solution is only one of the possible approaches in order to limit the bending angle to  $90^\circ$ . For this reason dimensions and tolerances of these details are not given in the drawing. The actual design must ensure a  $90^\circ$  bending angle with a 0 to  $+10^\circ$  tolerance.

Figure 3. Standard test finger



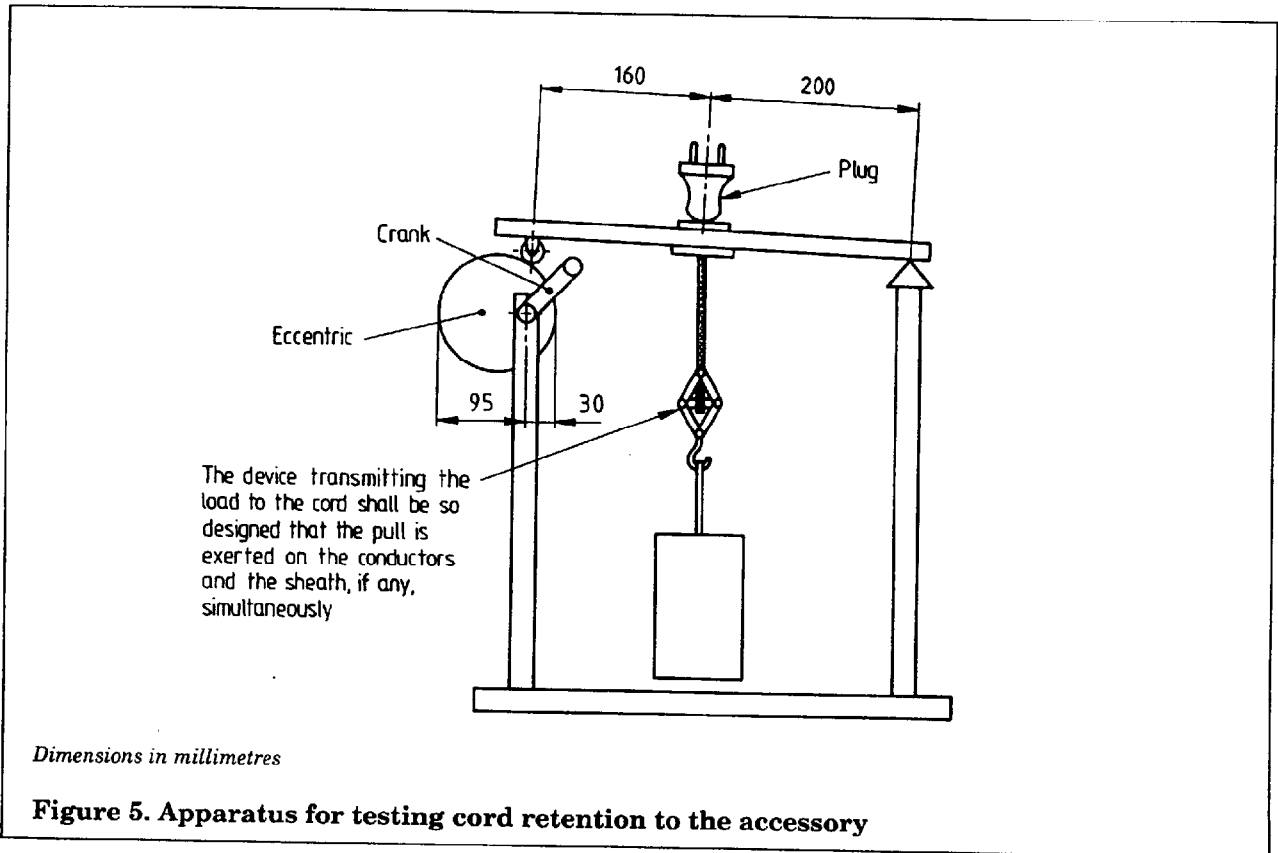


*Dimensions in millimetres*

The mass of the gauge is 1000 g.

The gauge is allowed to rest between the pins as shown above, for 1 min. Under its own weight, the gauge shall not come into contact with the engagement face of the plug.

**Figure 4. Gauge for checking impossibility of single-pole insertion of plugs into socket-outlets**



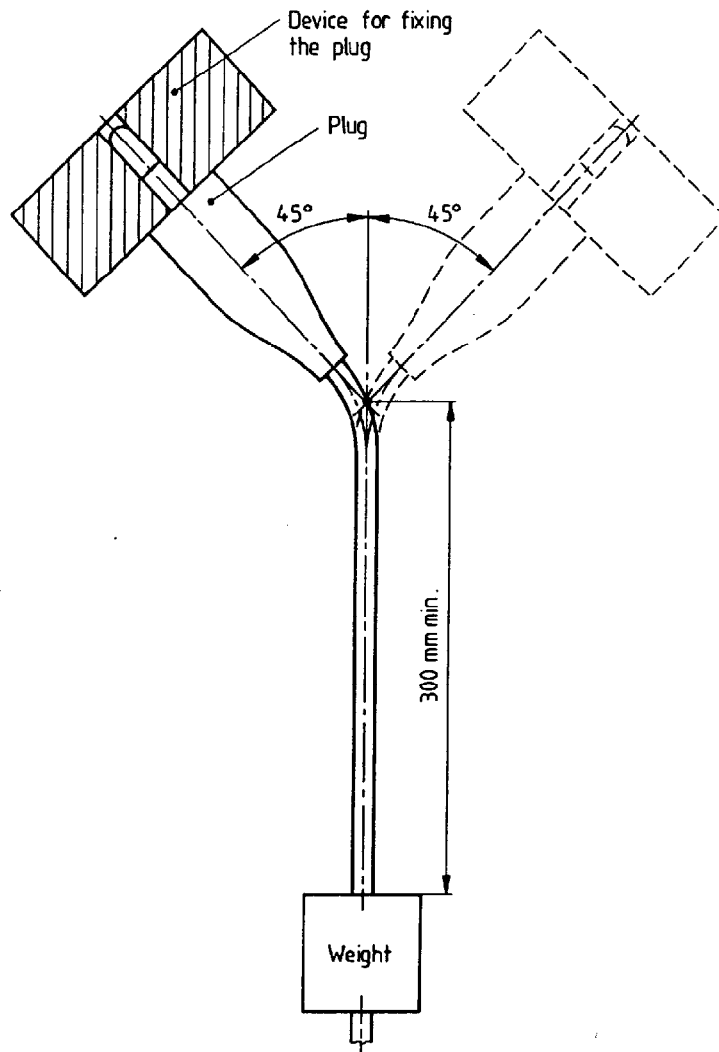
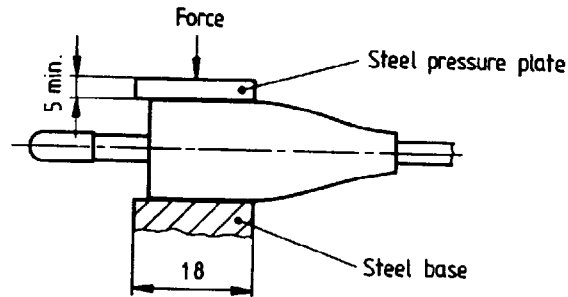
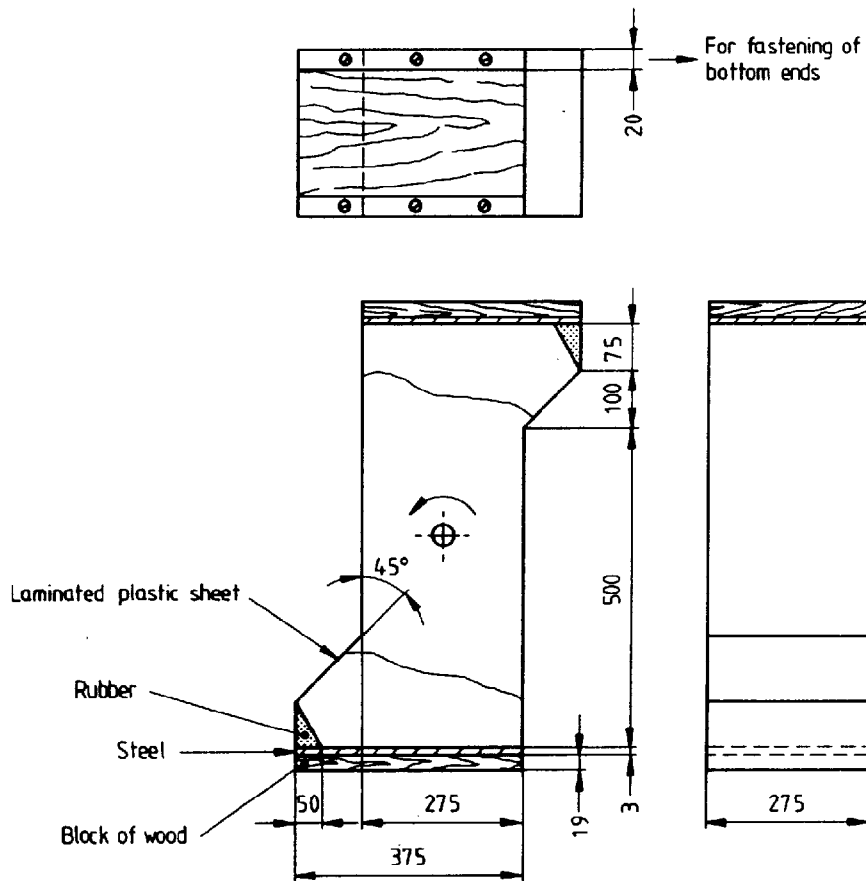


Figure 6. Apparatus for flexing test



*Dimensions in millimetres*

**Figure 7. Arrangement for compression test**



*Dimensions in millimetres*

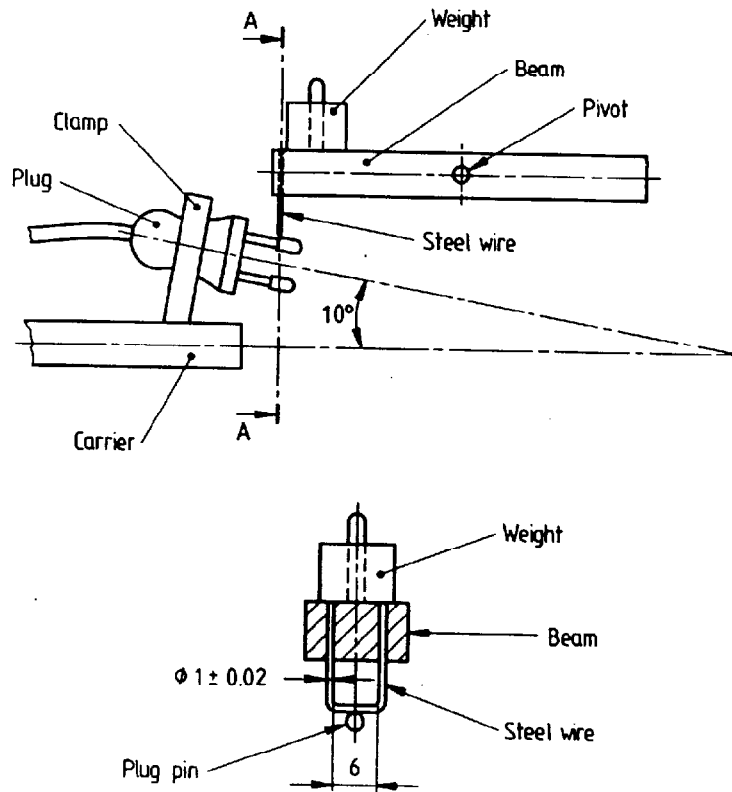
The body of the tumbling barrel shall be made of steel sheet of 1.5 mm thickness.

The compartments where the sample rests between individual falls, shall be backed by a rubber part made of chip-resistant rubber with a hardness of 30 IRHD and the sliding surfaces of these same compartments shall be made of laminated plastic sheet, such as "formica".

The tumbling barrel shall be provided with an aperture with lid made of transparent acrylic.

The shaft of the tumbling barrel shall not protrude into the barrel itself.

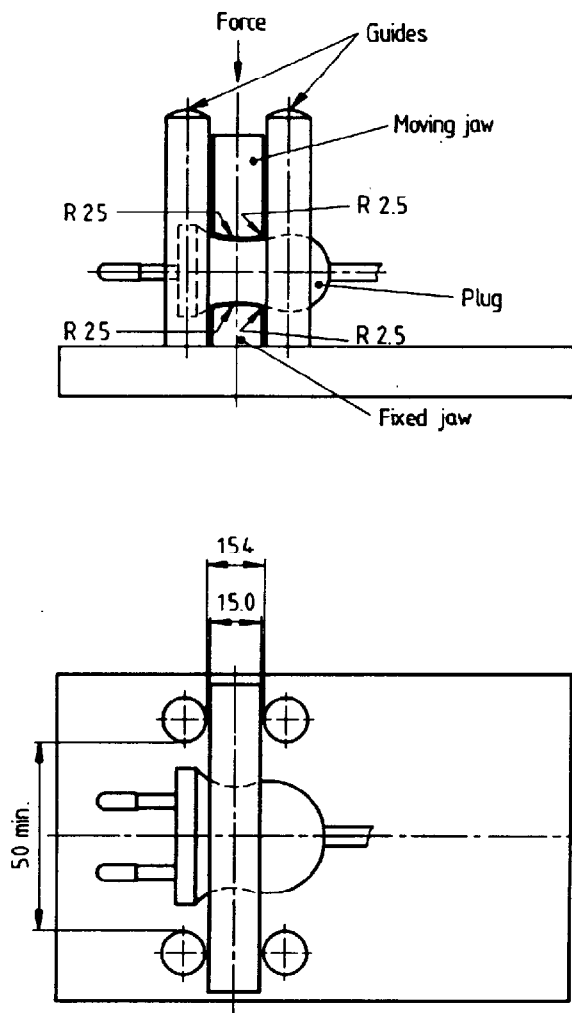
**Figure 8. Tumbling barrel**



Enlarged part of section A-A showing steel wire

Dimensions in millimetres

**Figure 9. Apparatus for abrasion test on insulating sleeves of plug pins**



*Dimensions in millimetres*

**Figure 10. Apparatus for compression test for the verification of resistance to heat**

**Annex A (Informative)****National A - Deviations**

This European Standard does not fall under any Directive of the E.C. In the relevant CEN/CENELEC countries these A - Deviations are valid instead of provisions of the European Standard until they have been removed.

Country	Clause	Legal Ref.
GB	4.5 - No failures are allowed when type testing	SI 603 : 1987
GB	6.1 - A Europlug can only be supplied when connected to any electrical equipment where the equipment conforms to any standard that provides the use of a Europlug and must under these circumstances be marked with or accompanied by a warning that it is not suitable for use in a GB mains socket	SI 603 : 1987



## National appendix NA

The United Kingdom participation in the preparation of this European Standard was entrusted by the Power Electrical Engineering Standards Policy Committee (PEL/-) to Technical Committee PEL/4, upon which the following bodies were represented:

ASTA Certification Services  
 Association of Consulting Engineers  
 Association of Control Manufacturers (TACMA (BEAMA Ltd))  
 Association of Manufacturers of Domestic Electrical Appliances  
 British Electrical Systems Association (BEAMA Ltd)  
 British Electrotechnical Approvals Board  
 British Plastics Federation  
 Consumer Policy Committee of BSI  
 Decorative Lighting Association  
 Department of Health  
 Department of Trade and Industry (Consumer Safety Unit, CA Division)  
 ERA Technology Ltd  
 Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd)  
 Electricity Supply Industry in United Kingdom  
 Institution of Electrical Engineers  
 Lighting Industry Federation Ltd  
 National Inspection Council for Electrical Installation Contracting

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

Association for Consumer Research (ACRE)  
 British Cable Makers' Confederation  
 Royal Society for the Prevention of Accidents

## National appendix NB

The British Standards corresponding to the International standards referred to in EN 50075 are as follows:

International standard	British Standard
EN 60320	BS 4491 Appliance couplers for household and similar general purposes (Identical)
HD 444.2.1	BS 6458 Fire hazard testing for electrotechnical products Section 2.1 : 1984 Glow-wire test (Identical)

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