BS 1363-1:2023

BSI Standards Publication

13 A plugs, socket-outlets, adaptors and connection units

Part 1: Rewirable and non-rewirable 13 A fused plugs – Specification

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Contents

Summary of pages
This document comprises a front cover, an inside front cover, pages I to VI, pages 1 to 78, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 1363 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 June 2023. It was prepared by Technical Committee PEL/23, *Electrical accessories*. A list of organizations represented on this committee can be obtained on request to the committee manager.

Supersession

This part of BS 1363 supersedes BS 1363-1:2016+A1:2018 which remains current and will be withdrawn on 30 June 2026.

Relationship with other publications

BS 1363 is published in the following parts:

- *Part 1: Rewirable and non-rewirable 13 A fused plugs – Specification*;
- *Part 2: 13 A switched and unswitched socket-outlets – Specification*;
- *Part 3: Adaptors – Specification*;
- *Part 4: 13 A fused connection units: switched and unswitched – Specification*;
- *Part 5: Fused conversion plugs – Specification*.

Information about this document

This is a full revision of the document, and introduces the following principal changes:

- the Scope now covers operating frequencies from 50 Hz to 60 Hz;
- current carrying parts made of brass are required to have a minimum content of 58% copper;
- the overload test has been revised for rewirable and non-rewirable plugs.

The numbering of figures within this standard remains as in the previous version; however, future revisions will implement consecutive numbering throughout.

Annex J gives details of the annex renumbering from the 2016 editions of BS 1363, Part 1 to Part 5 to the 2023 editions.

This publication can be withdrawn, revised, partially superseded or superseded. Information regarding the status of this publication can be found in the Standards Catalogue on the BSI website at bsigroup.com/standards, or by contacting the Customer Services team.

Where websites and webpages have been cited, they are provided for ease of reference and are correct at the time of publication. The location of a webpage or website, or its contents, cannot be guaranteed.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.

Requirements in this standard are drafted in accordance with the *Rules for the structure and drafting of UK standards:2022*, subclause **G.1.1**, which states, "Requirements should be expressed

using wording such as: 'When tested as described in Annex A, the product shall ...'". This means that only those products that are capable of passing the specified test will be deemed to conform to this standard.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. "organization" rather than "organisation").

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Compliance with a British Standard cannot confer immunity from legal obligations.

In particular, attention is drawn to the following specific regulations:

- The Plugs and Sockets etc. (Safety) Regulations 1994. SI No. 1768 [1] .

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1 Scope

This part of BS 1363 specifies requirements for 13 A fused plugs having insulating sleeves on line and neutral pins, for household, commercial and light industrial purposes, with particular reference to safety in normal use. The plugs are suitable for the connection of portable appliances, sound-vision equipment, luminaires, etc. in a.c. circuits only, operating at voltages not exceeding 250 V r.m.s. and frequencies from 50 Hz to 60 Hz. Additional requirements are included for plugs suitable for electric vehicle charging.

Requirements are specified for plugs incorporating a fuse link conforming to BS 1362:1973+A3:2021. The plugs might be rewirable or non-rewirable complete with flexible cable. Categories of plugs are specified covering normal and rough use. Rewirable plugs are intended for use with flexible cables conforming to the relevant parts of BS EN 50525 (see Clause **2**), having conductor cross-sectional areas from 0.5 mm^2 to 1.5 mm^2 inclusive. See **20.1**.

Non-rewirable plugs are intended for use with flexible cables having conductor cross-sectional areas not exceeding 1.5 mm^2. See **20.4**.

This standard also applies to non-rewirable 13 A plugs which have the earth pin replaced with a similarly dimensioned protrusion made of insulating material designated as an insulated shutter opening device (ISOD) designed to operate the shutter mechanism of socket-outlet conforming to BS 1363-2:2023.

A plug is mechanical by nature of construction. The product is therefore immune from electromagnetic interference.

Plugs incorporating switches and indicator lamps are included within the scope of this part of BS 1363.

Plugs incorporating electronic components detailed in Annex A are included within the scope of this part of BS 1363.

Recommendations for plug in equipment incorporating BS 1363-1 plug pins are given in Annex B.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes provisions, or limits the application, of this document[1)]. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 1362:1973+A3:2021, *General purpose fuse links for domestic and similar purposes (primarily for use in plugs) – Specification*

BS 1363-2:2023, *13 A plugs, socket-outlets, adaptors and connection units – Part 2: 13 A switched and unswitched socket-outlets – Specification*

BS 2572, *Specification for phenolic laminated sheet and epoxy cotton fabric laminated sheet*

BS 2870:1980, *Rolled copper and copper alloys – Sheet, strip and foil*

BS 4662:2006+A1:2009, *Boxes for flush mounting of electrical accessories – Requirements and test methods and dimensions*

BS 4800:2011-SET , *Schedule of paint colours for building purposes*

1) Documents that are referred to solely in an informative manner are listed in the Bibliography.

BS 6004:2012+A1:2020, *Electric cables – PVC insulated and PVC sheathed cables for voltages up to and including 300/500 V, for electric power and lighting*

BS EN 1652:1998, *Copper and copper alloys – Plate, sheet, strip and circles for general purposes*

BS EN 10270-1:2011+A1:2017, *Steel wire for mechanical springs – Part 1: Patented cold drawn unalloyed spring steel wire*

BS EN 50525-2-11:2011, *Electric cables – Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U) – Part 2-11: Cables for general applications – Flexible cables with thermoplastic PVC insulation*

BS EN 50525-2-12:2011, *Electric cables – Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U) – Part 2-12: Cables for general applications – Cables with thermoplastic PVC insulation for extensible leads*

BS EN 50525-2-21:2011, *Electric cables – Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U) – Part 2-21: Cables for general applications – Flexible cables with crosslinked elastomeric insulation*

BS EN 50525-2-71:2011, *Electric cables – Low voltage energy cables of rated voltages up to and including 450/750 V (U_0/U) – Part 2-71: Cables for general applications – Flat tinsel cables (cords) with thermoplastic PVC insulation*

BS EN 60893-3-4, *Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes – Part 3-4: Specifications for individual materials – Requirements for rigid laminated sheets based on phenolic resins*

BS EN 60695-10-2:2014, *Fire hazard testing – Part 10-2: Abnormal heat – Ball pressure test method*

BS EN 60664-3, *Insulation coordination for equipment within low-voltage systems – Part 3: Use of coating, potting or moulding for protection against pollution*

BS EN 60664-5, *Insulation coordination for equipment within low-voltage systems – Part 5: Comprehensive method for determining clearances and creepage distances equal to or less than 2 mm*

BS EN 61180:2016, *High-voltage test techniques for low-voltage equipment – Definitions, test and procedure requirements*

BS EN 61032:1998, *Protection of persons and equipment by enclosures – Probes for verification*

BS EN 61643-311, *Components for low voltage surge protective devices – Part 311: Performance requirements and test circuits for gas discharge tubes (GDT)*

BS EN 61643-321, *Low voltage surge protective devices – Part 321: Specifications for avalanche breakdown diode (ABD)*

BS EN 61643-331, *Low voltage surge protective devices – Part 331: Specification for metal oxide varistors (MOV)*

BS EN IEC 60112:2020 , *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*

BS EN IEC 60664-1:2020, *Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests*

BS EN IEC 60669-2-1, *Switches for household and similar fixed electrical installations – Particular requirements – Part 2-1: Electronic control devices*

BS EN IEC 60695-2-11:2021, *Fire hazard testing – Part 2-11: Glowing/hot wire based test methods – Glow-wire flammability test method for end-products (GWEPT)*

BS EN IEC 61000-6-1, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity for residential, commercial and light-industrial environments*

BS EN IEC 61000-6-3, *Electromagnetic compatibility (EMC) – Generic standards – Part 6-3: Emission standard for residential, commercial and light industrial environments*

BS EN IEC 61051-2:2021, *Harmonized system of quality assessment for electric components – Varistors for use in electronic equipment – Part 2: Sectional specification for surge suppression varistors*

BS EN ISO 9453:2020, *Soft solder alloys – Chemical compositions and forms*

IEC 60038, *IEC standard voltages*

3 Terms and definitions

For the purposes of this part of BS 1363, the following terms and definitions apply.

NOTE Where the terms voltage and current are used, they imply r.m.s. values, unless otherwise stated.

3.1 accessible external surfaces of a plug

surfaces that can be touched by test probe B specified in BS EN 61032:1998 when the plug is in full engagement with a corresponding socket-outlet

3.2 actuating member

that part which is moved, e.g. pulled, pushed or turned by the user, to operate the switch mechanism of a switched plug

3.3 basic insulation

insulation applied to live parts to provide basic protection against electric shock

NOTE Basic insulation does not necessarily include insulation used exclusively for functional purposes.

3.4 calibrated link

calibrated heat source for use in place of a fuse link during temperature rise tests

3.5 clamp type (screwless) terminal

terminal for the connection and subsequent disconnection of one or more conductor(s), the connection being made directly or indirectly by means of springs, wedges or the like

3.6 class I

method of protection against electric shock which does not rely on basic insulation only, but which includes means for the connection of exposed conductive parts to a protective conductor in the fixed wiring of the installation

3.7 class II

method of protection against electric shock which does not rely on basic insulation only, but in which additional safety precautions, such as double insulation or reinforced insulation are provided, there being no provision for protective earthing or reliance upon installation conditions

NOTE 1 Such a method may be one of the following.

a) Equipment having a double and substantially continuous enclosure of insulation material which envelopes all metal parts with the exception of small parts such as name plates, screws and rivets which are isolated from live parts by insulation at least equivalent to reinforced insulation. Such equipment is called "insulated encased class II equipment".

b) Equipment having a substantially continuous enclosure of metal, in which double insulation is used throughout, except for those parts where reinforced insulation is used. Such equipment is called "metal encased class II equipment".

c) Equipment that is a combination of types a) and b) above.

NOTE 2 The enclosure of an insulation encased class II appliance may form a part or whole of the supplementary insulation, or reinforced insulation.

NOTE 3 If an appliance with double insulation and/or reinforced insulation throughout has an earthing terminal or an earthing contact, it is of class I construction.

NOTE 4 Class II appliances may have parts in which protection against electric shock relies on operation at safety extra-low-voltage (SELV).

3.8 clearance

shortest distance in air between two conductive parts

3.9 creepage distance

shortest distance along the surface of the insulating material between two conductive parts

3.10 engagement surface of a plug

that surface which are not able to be touched by test probe B of BS EN 61032:1998 when the plug is in full engagement with a corresponding socket-outlet

3.11 fine wire thermocouple

thermocouple having wires not exceeding 0.3 mm in diameter

3.12 functional insulation

insulation between conductive parts which is necessary only for the proper functioning of the equipment

3.13 fuse carrier

movable or removable part designed to carry, retain, cover and/or remove the fuse link

3.14 fused plug

plug having provisions for a replaceable cartridge fuse link

3.15 indicator lamp (pilot lamp)

lamp or similar device which illuminates to indicate that the plug is energized

3.16 insignificant mass

insufficient combustible mass to constitute a fire hazard

NOTE Parts of insignificant mass are usually less than 2 g.

3.17 insulated shutter opening device (ISOD)

protrusion from the engagement surface of the plug, in place of a brass earth pin, made of insulating material having dimensions similar to those of a brass earth pin

3.18 live parts

current-carrying parts and those metal parts in contact with them during normal use

NOTE Metal parts of the earthing circuit are not considered to be current-carrying parts.

Table 1 — *Schedule of tests*

Sequence	Samples	Tests	Clause number
1	3	Inspection, measurement, gauging and manipulation	6, 7, 8, 12.1, 10.1, 10.2, 10.4, 13.1, 13.2, 13.3, 13.4, 13.5, 13.9, (13.9.1, 13.9.2, 13.9.3 and 13.9.6 only), 13.13, 13.14, 13.15, 13.16, 13.19**, 20.2, 20.3, 20.4, 20.6, 9 (except Annex I) 22
2	3	General	6, 10.3, 20.1, 13.12, 13.17.2, 13.17.3, 13.17.2
3	3		6, 15.2, 13.8, 20.5, 13.17.4
4	3		6, 15.1, 16.1, 17, 18, 13.18.1, 19, 21, 13.7, 11.1, 12.12, 13.10, 13.6, 13.11
5	3*		6, 13.9.4.1 or 13.9.4.2
6	3	Additional tests for rewirable plugs with clamp type (screwless) terminals	6, 15.1, 22.1
7	3		6, 12.10, 12.11
8a)	9	Additional tests for plugs with nickel plated brass pins, non-solid pins and/or ISODs	6, 13.9.5
8b)	3	Additional tests for plugs fitted with ISOD	6, 13.9.4.3
9	3	Materials	6, 23
10	3		6, 24.2, 9.2 (Annex I only)
11	3		6, 25
12 A)	3	Positive break (switched plugs)	6, 13.18.2
13	3	Overloads	6, 15.1, 27
14	3	Cyclic loading [plugs for Electric Vehicles (EV)]	6, 28

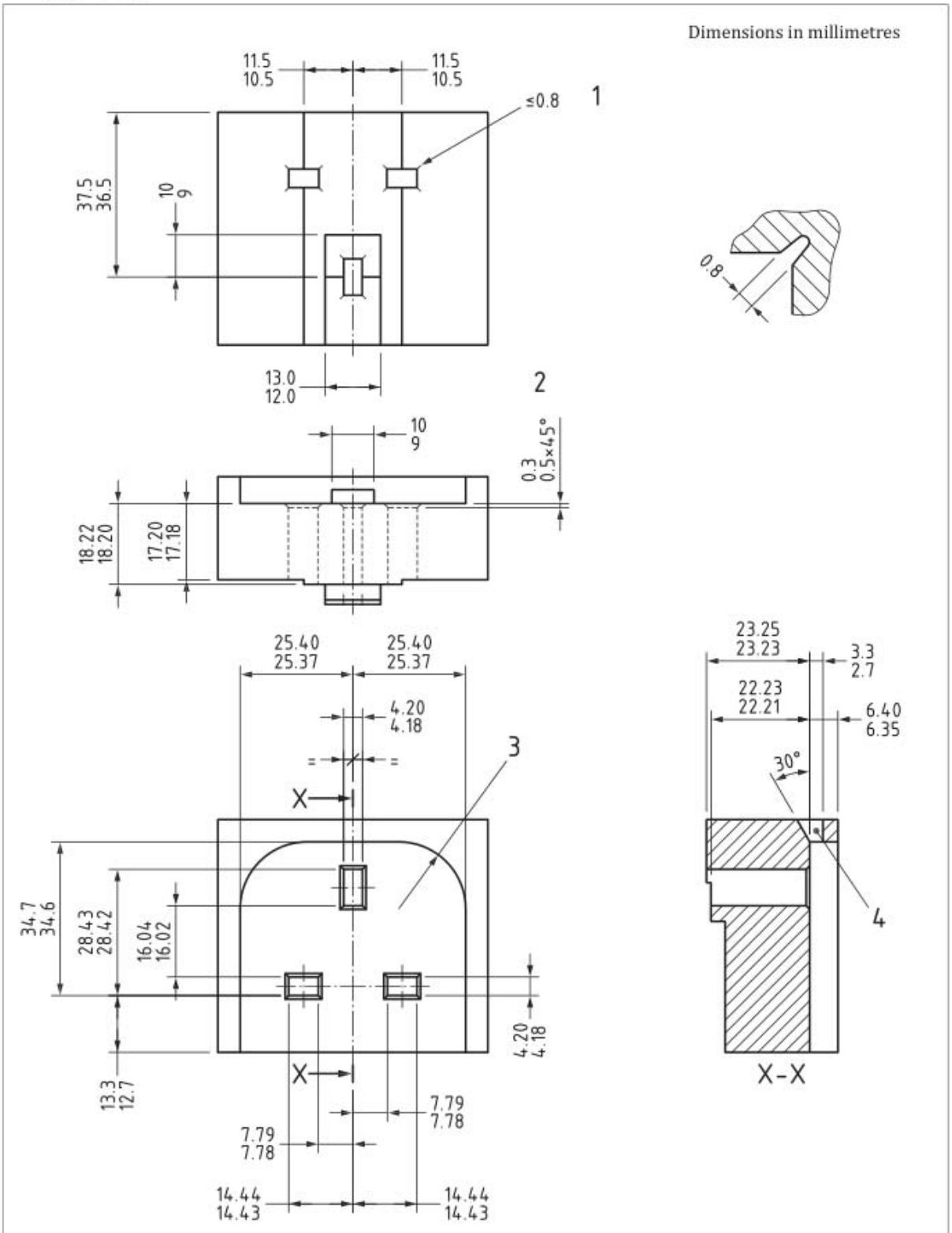
NOTE 1 The order of tests given in sequence one is preferred but not mandatory except where required within the text of the appropriate clause.

*NOTE 2 *denotes that an additional three samples will be required for plugs with non-solid pins.*

*NOTE 3 ** denotes that additional samples might be required for plugs incorporating electronic components.*

A) An additional new set of three samples prepared with the contacts closed might be required.

Figure 5 — *Gauge for plug pins*



Key

1	Corners may be relieved up to a width of 0.8 as shown	3	Radius = 15.088 TP (true profile) with a tolerance zone 0.100 wide, ±0.050 from the TP; the form of this contour is to blend smoothly with the sides
2	Chamfer all round	4	Slot optional

NOTE Gauge might be fabricated in several component parts, providing assembly is within dimensions shown.

7 Classification and rating

7.1 Classification

Plugs shall be classified as follows:

a) rewirable or non-rewirable;

b) switched or unswitched;

c) for normal use or rough use;

d) for electric vehicle (EV) charging;

e) fitted with screw or clamp type (screwless) terminals;

f) for non-rewirable plugs for class II applications only, fitted with an unterminated brass earth pin or ISOD.

7.2 Rating

The rated voltage of plugs which do not incorporate any electronic components other than indicator lights shall be 250 V.

The rated voltage of plugs which incorporate electronic components shall be 230 V, 240 V or 250 V.

The rated current of rewirable plugs shall be 13 A.

The rated current of non-rewirable plugs shall be according to Table 2.

Table 2 — *Rated current and maximum fuse rating in normal use, and load for flexing and cable grip tests related to size of flexible cable*

Flex cable nominal cross-sectional area	**Rated current[A)]**	**Test current ±0.4 A**	**Fuse rating**	**Load for flexing test**	**Cable grip tests**	
					Load	**Torque[B)]**
				+2%, -0%	+2%, -0%	
mm^2	A	A	A	kg	kg	Nm
0.5	3	3.5	3 (5)[D)]	1	3	0.15
0.75	6	7	7 (13)[D)]	1	3	0.20
1 (0.75)[C)]	10	11	10 (13)[D)]	2	3	0.25
1.25 (1)[C)]	13	14	13	2	6	0.30
1.5	13	14	13	2	6	0.35

[A)] Non-rewirable plugs may have a rated current appropriate to a smaller cable size than that fitted (e.g. a plug rated at 3 A may be fitted with a 0.75 mm^2 cable). In such cases, load and torque parameters for testing shall relate to the size of cable fitted and the test current shall relate to the rated current of the plug.

[B)] The recording of a measured value of torque in accordance with this table is considered to conform to this part of BS 1363 on condition that the uncertainty of measurement at not less than 95% confidence level does not exceed ±10%.

[C)] The figure in brackets indicates the flexible cable size which may be used for cable sets where non-rewirable plugs are used with a maximum flexible cable length of 2 m.

[D)] The figure in brackets indicates the maximum fuse rating when a plug is used with an appliance where the manufacturer specifies a higher rating of fuse is appropriate for the particular appliance.

8 Marking and labelling

8.1 Plugs shall be legibly and durably marked with the following information, which shall not be placed on screws, removable washers or other easily removable parts, or upon parts intended for separate sale:

a) either the name, trade mark or identification mark of the manufacturer or responsible vendor, which might be duplicated on a removable fuse carrier;

b) the number of this British Standard, i.e. BS 1363[2)];

c) the rated voltage;

d) for rough use plugs the number of this British Standard shall be followed by "/A";

e) on rewirable plugs the terminals intended for the connection of the various conductors shall be identified by the symbols given in **8.5**;

f) the words "FUSE" or "FUSED" or the symbol (as given in **8.5**) on the external accessible surface of a plug;

g) all rewirable plugs shall be marked on the engagement surface with the rated current. All non-rewirable plugs shall be marked with the rated current of the fuse link fitted, which shall not exceed the value given in Table 2 for the appropriate size of flexible cable;

h) plugs with clamp type (screwless) terminals shall be marked to show the length of conductor insulation to be removed before fitting the conductor in the terminal; and

i) for plugs for electric vehicle charging, the number of this British Standard shall be followed by "/EV".

8.1.1 Conformity shall be checked by inspection and by rubbing the marking for approximately 15 s with a cloth soaked in water, and again for approximately 15 s with a cloth soaked in an aliphatic solvent hexane with a content of aromatics of maximum 0.1% by volume, a Kauri-butanol value of 29, an initial boiling point of approximately 69 °C, and relative density of approximately 0.68. The marking shall remain legible. Markings produced by an engraving or moulding process shall be deemed to conform without test.

8.2 Rewirable plugs shall have a removable tag or label indicating the rating of the fuse link fitted, e.g. "Fitted with "X" ampere fuse" (where "X" denotes the rating of the fuse link).

8.2.1 Conformity shall be checked by inspection.

8.3 Except where a plug fitted with a flexible cable is supplied direct to a manufacturer for incorporation in other equipment, the free end of such an assembly shall have a label attached which shall include the following:

a) the statement: "The flexible cable of this plug must be connected to an item of equipment before being plugged into a socket-outlet";

b) the maximum rating, in amperes, of the equipment to which it might be fitted (as given in Table 2);

c) the colour code of the cores of the flexible cable as follows:

"IMPORTANT. Wires in the mains lead are coloured in accordance with the following code:

[2)] Marking BS 1363 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with second or third-party certification of conformity. Further testing and conformity certification remains at the discretion of the manufacturer and is not a requirement of this standard.

Green-and-yellow	Earth (if any)
Blue	Neutral
Brown	Line"; and

d) if the plug is fitted with a 2-core flexible cable, the following statement:

"This lead must not be used with equipment requiring the protection of an earth continuity conductor".

8.3.1 Conformity shall be checked by inspection.

8.4 Rewirable plugs shall be provided with adequate instructions for the safe connection of the appropriate flexible cables, including clear instructions for the removal of insulation from the conductors.

Plugs incorporating clamp type (screwless) terminals shall be supplied with information indicating that the plug is fitted with clamp type (screwless) terminals and containing clear instructions for the removal of insulation from the conductors and for the effective connection and disconnection of conductors.

8.4.1 Conformity shall be checked by inspection.

8.5 Symbols shall be as follows:

amperes	A
volts	V
line	L
neutral	N

earth  (preferred) or 

NOTE The letter "E" may be used in addition to either of these symbols.

fuse 

9 Clearances, creepage distances and solid insulation

Plugs shall be constructed so that the clearances, creepage distances and solid insulation are adequate to withstand the electrical stresses taking into account the environmental influences that might occur. Clearances, creepage distances and solid insulation shall conform to the relevant requirements of 9.1, 9.2, 9.3 and 9.4. The distance between lead wires in the pinch of a neon lamp with external resistor shall be a minimum of 1 mm.

Plugs conforming to the requirements for basic insulation shall be deemed to meet the requirements of this clause. If the manufacturer declares an insulation level exceeding basic insulation then the plug shall be tested accordingly.

NOTE 1 The requirements and tests are based on BS EN IEC 60664-1.

NOTE 2 Product insulation consists of basic insulation and protective earthing as required by BS EN 61140 for Class I equipment. Mechanical strength equivalent to that which would be provided by reinforced insulation as listed in BS EN 61140 is achieved in BS 1363 products through specific mechanical and material tests.

9.1 Clearances

Plugs energized directly from the low voltage supply fall into Overvoltage Category III.

The clearances shall withstand the rated impulse voltage declared by the manufacturer considering the rated voltage and the Overvoltage Category as given in Annex D and the pollution degree declared by the manufacturer in accordance with Annex C.

For the measurements, all parts which are removable without the use of a tool shall be removed and movable parts which can be assembled in different orientations shall be placed in the most unfavourable position.

NOTE Movable parts are, for example, hexagonal nuts, the position of which cannot be controlled throughout an assembly.

9.1.1 Clearances for basic insulation

The clearances for basic insulation shall be not less than the values given in Table 3.

Conformity shall be checked by inspection, and if necessary by measurement, or by the test of Annex E.

Smaller clearances, other than those values marked in Table 3 with footnote "B", shall be permitted if the plug meets the impulse withstand voltage test of Annex E at the impulse voltage specified in Table E.1. This exception shall apply only if the parts are rigid or located by mouldings or if the construction is such that it is unlikely that distances will be reduced by distortion or by movement of the parts during mounting, connection and normal use.

If clearance distances are to be measured, this shall be carried out in accordance with Annex F.

Table 3 — *Minimum clearances for basic insulation*

Rated impulse withstand voltage kV[A)]	**Minimum clearances in air up to 2 000 m above** mm
0.33	0.2[B)]
0.50	0.2[B)]
0.80	0.2[B)]
1.5	0.5
2.5	1.5
4.0	3.0
6.0	5.5

A) See Annex D. This voltage is:

- for functional insulation: the maximum impulse voltage expected to occur across the clearance;
- or basic insulation directly exposed to or significantly influenced by transient overvoltage from the low voltage mains: the rated impulse withstand voltage of the plug;
- for other basic insulation: the highest impulse voltage that can occur in the circuit.

B) Minimum clearance values are based on BS EN IEC 60664-1.

9.1.2 Clearances for functional insulation

The clearances for functional insulation shall be not less than the values specified for basic insulation in **9.1.1**.

Conformity shall be checked by inspection, and if necessary by measurement, or by the test of Annex E.

If clearance distances are to be measured, this shall be carried out in accordance with Annex F.

9.1.3 Clearances for supplementary insulation

The clearances for supplementary insulation shall not be less than the values specified for basic insulation in **9.1.1**.

Conformity shall be checked by inspection, and if necessary by measurement, or by the test of Annex E.

If clearance distances are to be measured, this shall be carried out in accordance with Annex F.

9.1.4 Clearances for reinforced insulation

The clearances for reinforced insulation shall be not less than the values specified for basic insulation in **9.1.1** but using the next higher step for rated impulse withstand voltage given in Table 3.

This requirement shall not be applied to the sleeves of the plug pins.

Conformity shall be checked by inspection and measurement, or by the test of Annex E.

9.1.5 Contact gap

The minimum contact gap shall be 1.2 mm in the open position, except for electronic switches covered by **A.4**.

Conformity shall be checked by measurement.

9.2 Creepage distances

The creepage distances shall be dimensioned for the voltage, which is expected to occur in normal use taking into account the pollution degree, and the material group as declared by the manufacturer.

For the measurements, all parts which are removable without the use of a tool shall be removed and movable parts which might be assembled in different orientations shall be placed in the most unfavourable position.

NOTE 1 Movable parts are, for example, hexagonal nuts, the position of which cannot be controlled throughout an assembly.

NOTE 2 A creepage distance cannot be less than the associated clearance.

Creepage distances shall be measured in accordance with Annex F.

The relationship between material group and between comparative tracking index (CTI) values and proof tracking index (PTI) values is as follows:

Material group I	600 ≤ CTI/PTI
Material group II	400 ≤ CTI/PTI < 600
Material group IIIa	175 ≤ CTI/PTI < 400
Material group IIIb	100 ≤ CTI/PTI < 175

The CTI or PTI values shall be determined in accordance with Annex I.

NOTE 3 For glass, ceramics and other inorganic materials which do not track, creepage distances need not be greater than their associated clearance.

9.2.1 Creepage distances for basic insulation

The creepage distances for basic insulation shall be not less than the values given in Table 4. Conformity shall be checked by measurement.

Table 4 — *Minimum creepage distances (mm) for basic insulation*

Rated voltage[A]	**Pollution degree 2**[B]			**Pollution degree 3**[B]		
V (r.m.s.)						
Up to and including	**Material group**			**Material group**		
—	I	II	IIIa/IIIb	I	II	IIIa
250	1.3	1.8	2.5	3.2	3.6	4.0

[A] This voltage is the voltage rationalized through BS EN IEC 60664-1:2020, Table F.3a and Table F.3b based on the nominal voltage of the supply system.

[B] Details of pollution degrees are given in Annex C.

9.2.2 Creepage distances for functional insulation

The creepage distances for functional insulation shall be not less than the values specified for basic insulation in **9.2.1**.

Conformity shall be checked by measurement.

9.2.3 Creepage distances for supplementary insulation

The creepage distances for supplementary insulation shall be not less than the values specified for basic insulation in **9.2.1**.

Conformity shall be checked by measurement.

9.2.4 Creepage distances for reinforced insulation

The creepage distances for reinforced insulation shall be not less than those derived from twice the distances specified for basic insulation in Table 4.

This requirement shall not be applied to the sleeves of the plug pins.

Conformity shall be checked by measurement.

9.3 Solid insulation

Solid insulation for basic, functional, supplementary and reinforced insulation shall be capable of withstanding electrical stresses which might occur in normal use.

No minimum thickness is specified for solid insulation.

9.3.1 Conformity shall be checked by tests in accordance with **16.1.3** using the values given in Table 5.

Table 5 — *Withstand voltages for insulation types*

Insulation	**Test voltage**
	V (r.m.s)
Functional insulation	1 500
Basic insulation	1 500
Supplementary insulation	1 500
Reinforced insulation	3 000

9.4 Requirements for printed wiring boards and equivalent construction

Printed wiring boards and equivalent construction shall conform to BS EN 60664-5:2007.

Where coating, potting or moulding is used articles shall conform to BS EN 60664-3:2003+A1:2010.

10 Accessibility of live parts

10.1 Live parts of plugs shall not be accessible when the plugs are wired as in normal use and in full engagement in a corresponding socket-outlet.

Removal of detachable fuse carriers shall not result in live parts becoming accessible when the plug is in full engagement with the socket-outlet or the socket-outlet portion of an adaptor.

10.1.1 Conformity shall be checked by the application of test probe 12 of BS EN 61032:1998 applied with a force of 5^{0}_{-1} N with rewirable plugs fitted with a 2-core flexible cable as given in BS EN 50525-2-71:2011 and non-rewirable plugs as supplied. Detachable fuse carriers shall be removed before this test is undertaken.

10.2 Plugs shall be designed and constructed so as to protect the user against accidental contact with live parts during insertion or withdrawal of plugs.

10.2.1 Conformity shall be verified by satisfying the dimensional and gauging requirements of this part of BS 1363.

10.3 Resilient covers of plugs shall be so designed and constructed that when assembled and wired as in normal use, there is no risk that, as a result of undue pressure, live parts could penetrate the cover or become so disposed as to reduce creepage distances and clearances below those given in Clause 9.

10.3.1 Conformity shall be checked by the following test (an example of a suitable apparatus is shown in Figure 2a) and Figure 2b).

The design of the apparatus shall be such that a steady force of 240^{0}_{-10} N shall be applied to those places where the possibility of a failure exists, the force being applied through a metal test pressure block as shown in Figure 2a).

Each sample shall be subjected to the force at each chosen place in turn. During each application of force, a test voltage of 2 000 V ±60 V 50 Hz of substantially sinusoidal waveform is applied for 60^{+5}_{0} s between all live parts bonded together and the metal test pressure block.

During the test no flashover or breakdown shall occur.

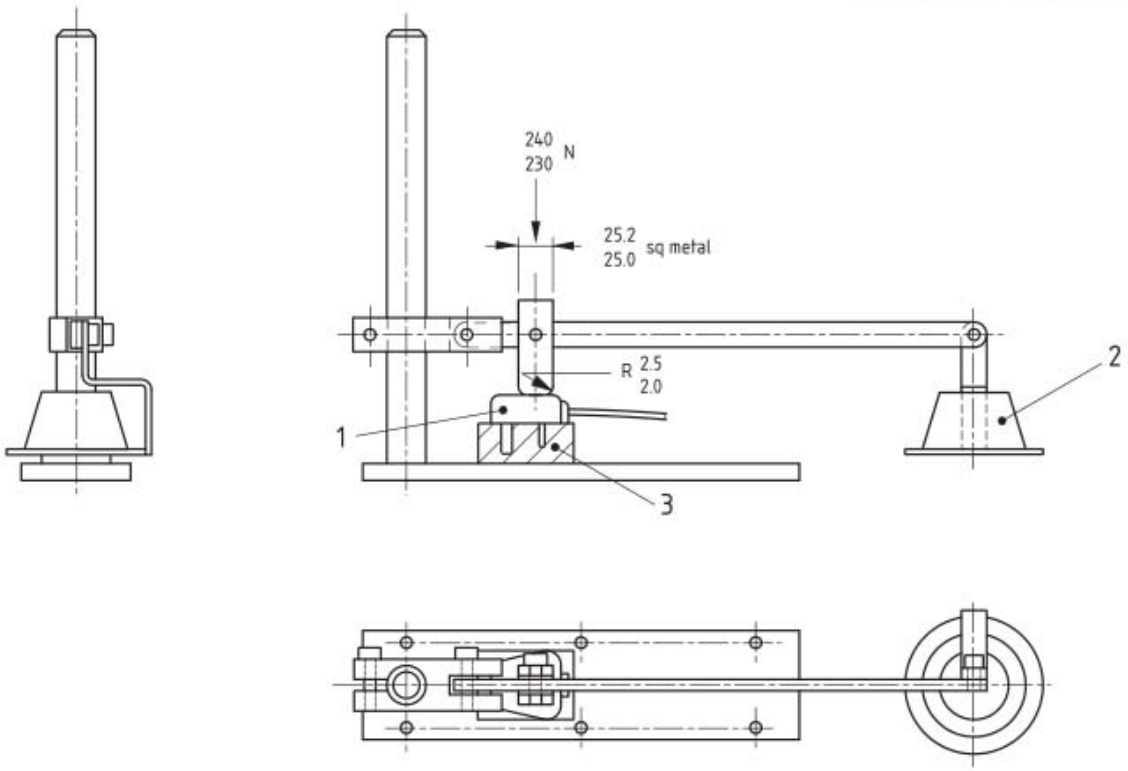
After the test it shall not be possible to touch live parts with test 11 of BS EN 61032:1998 applied with a force of 30^{0}_{-2} N.

10.4 Except for a plug fitted with a flexible cable supplied to equipment manufacturers for incorporation into their equipment, a plug supplied with a flexible cable shall have the free end encapsulated in insulating material.

10.4.1 Conformity shall be checked by inspection.

Figure 2a) — *Apparatus for mechanical strength test on resilient covers*

Dimensions in millimetres



Key

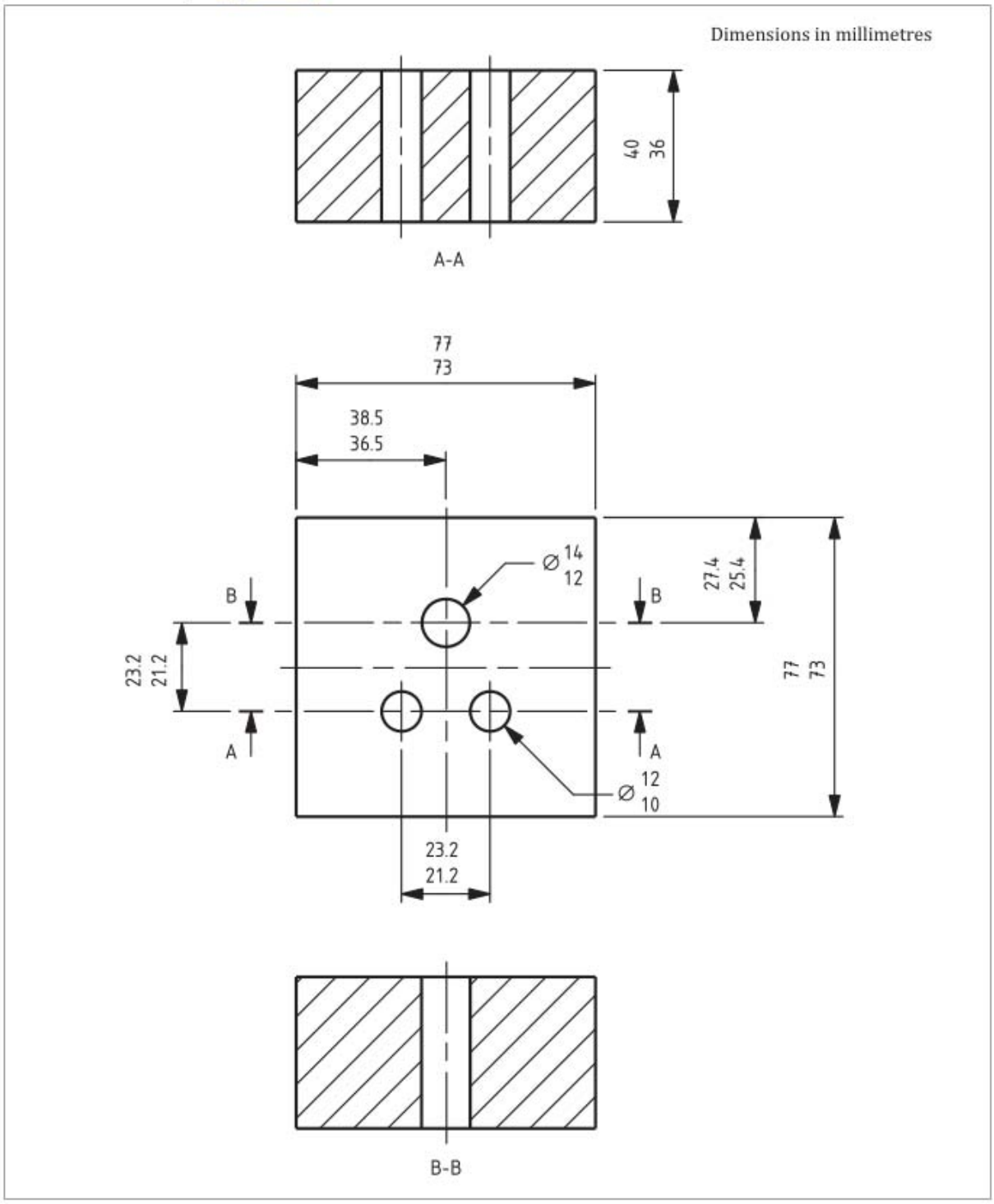
1 Sample under test

2 Weight

3 Hardwood block [see Figure 2b)]

NOTE This drawing is not intended to govern design except as regards the dimensions and specific values shown.

Figure 2b) — *Hardwood block for Figure 2a)*



11 Provision for earthing

11.1 All accessible metal parts of plugs shall be in effective electrical contact with the earthing plug pin, except that metal parts on, or screws in or through, non-conducting material, and separated by such material from current-carrying parts in such a way that in normal use they cannot become live, need not be in effective electrical contact with the earthing pin.

The earth pin shall be provided with a terminal or termination such as to provide a joint of low resistance with the earth conductor of a flexible cable.

8 Marking and labelling

8.1 Plugs shall be legibly and durably marked with the following information, which shall not be placed on screws, removable washers or other easily removable parts, or upon parts intended for separate sale:

a) either the name, trade mark or identification mark of the manufacturer or responsible vendor, which might be duplicated on a removable fuse carrier;

b) the number of this British Standard, i.e. BS 1363[2)];

c) the rated voltage;

d) for rough use plugs the number of this British Standard shall be followed by "/A";

e) on rewirable plugs the terminals intended for the connection of the various conductors shall be identified by the symbols given in **8.5**;

f) the words "FUSE" or "FUSED" or the symbol (as given in **8.5**) on the external accessible surface of a plug;

g) all rewirable plugs shall be marked on the engagement surface with the rated current. All non-rewirable plugs shall be marked with the rated current of the fuse link fitted, which shall not exceed the value given in Table 2 for the appropriate size of flexible cable;

h) plugs with clamp type (screwless) terminals shall be marked to show the length of conductor insulation to be removed before fitting the conductor in the terminal; and

i) for plugs for electric vehicle charging, the number of this British Standard shall be followed by "/EV".

8.1.1 Conformity shall be checked by inspection and by rubbing the marking for approximately 15 s with a cloth soaked in water, and again for approximately 15 s with a cloth soaked in an aliphatic solvent hexane with a content of aromatics of maximum 0.1% by volume, a Kauri-butanol value of 29, an initial boiling point of approximately 69 °C, and relative density of approximately 0.68. The marking shall remain legible. Markings produced by an engraving or moulding process shall be deemed to conform without test.

8.2 Rewirable plugs shall have a removable tag or label indicating the rating of the fuse link fitted, e.g. "Fitted with "X" ampere fuse" (where "X" denotes the rating of the fuse link).

8.2.1 Conformity shall be checked by inspection.

8.3 Except where a plug fitted with a flexible cable is supplied direct to a manufacturer for incorporation in other equipment, the free end of such an assembly shall have a label attached which shall include the following:

a) the statement: "The flexible cable of this plug must be connected to an item of equipment before being plugged into a socket-outlet";

b) the maximum rating, in amperes, of the equipment to which it might be fitted (as given in Table 2);

c) the colour code of the cores of the flexible cable as follows:

"IMPORTANT. Wires in the mains lead are coloured in accordance with the following code:

[2)] Marking BS 1363 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with second or third-party certification of conformity. Further testing and conformity certification remains at the discretion of the manufacturer and is not a requirement of this standard.

Green-and-yellow	Earth (if any)
Blue	Neutral
Brown	Line"; and

d) if the plug is fitted with a 2-core flexible cable, the following statement:

"This lead must not be used with equipment requiring the protection of an earth continuity conductor".

8.3.1 Conformity shall be checked by inspection.

8.4 Rewirable plugs shall be provided with adequate instructions for the safe connection of the appropriate flexible cables, including clear instructions for the removal of insulation from the conductors.

Plugs incorporating clamp type (screwless) terminals shall be supplied with information indicating that the plug is fitted with clamp type (screwless) terminals and containing clear instructions for the removal of insulation from the conductors and for the effective connection and disconnection of conductors.

8.4.1 Conformity shall be checked by inspection.

8.5 Symbols shall be as follows:

amperes	A
volts	V
line	L
neutral	N

earth  (preferred) or 

NOTE The letter "E" may be used in addition to either of these symbols.

fuse 

9 Clearances, creepage distances and solid insulation

Plugs shall be constructed so that the clearances, creepage distances and solid insulation are adequate to withstand the electrical stresses taking into account the environmental influences that might occur. Clearances, creepage distances and solid insulation shall conform to the relevant requirements of 9.1, 9.2, 9.3 and 9.4. The distance between lead wires in the pinch of a neon lamp with external resistor shall be a minimum of 1 mm.

Plugs conforming to the requirements for basic insulation shall be deemed to meet the requirements of this clause. If the manufacturer declares an insulation level exceeding basic insulation then the plug shall be tested accordingly.

NOTE 1 The requirements and tests are based on BS EN IEC 60664-1.

NOTE 2 Product insulation consists of basic insulation and protective earthing as required by BS EN 61140 for Class I equipment. Mechanical strength equivalent to that which would be provided by reinforced insulation as listed in BS EN 61140 is achieved in BS 1363 products through specific mechanical and material tests.

9.1 Clearances

Plugs energized directly from the low voltage supply fall into Overvoltage Category III.

The clearances shall withstand the rated impulse voltage declared by the manufacturer considering the rated voltage and the Overvoltage Category as given in Annex D and the pollution degree declared by the manufacturer in accordance with Annex C.

For the measurements, all parts which are removable without the use of a tool shall be removed and movable parts which can be assembled in different orientations shall be placed in the most unfavourable position.

NOTE Movable parts are, for example, hexagonal nuts, the position of which cannot be controlled throughout an assembly.

9.1.1 Clearances for basic insulation

The clearances for basic insulation shall be not less than the values given in Table 3.

Conformity shall be checked by inspection, and if necessary by measurement, or by the test of Annex E.

Smaller clearances, other than those values marked in Table 3 with footnote "B", shall be permitted if the plug meets the impulse withstand voltage test of Annex E at the impulse voltage specified in Table E.1. This exception shall apply only if the parts are rigid or located by mouldings or if the construction is such that it is unlikely that distances will be reduced by distortion or by movement of the parts during mounting, connection and normal use.

If clearance distances are to be measured, this shall be carried out in accordance with Annex F.

Table 3 — *Minimum clearances for basic insulation*

Rated impulse withstand voltage kV[A)]	**Minimum clearances in air up to 2 000 m above** mm
0.33	0.2[B)]
0.50	0.2[B)]
0.80	0.2[B)]
1.5	0.5
2.5	1.5
4.0	3.0
6.0	5.5

A) See Annex D. This voltage is:

- for functional insulation: the maximum impulse voltage expected to occur across the clearance;
- or basic insulation directly exposed to or significantly influenced by transient overvoltage from the low voltage mains: the rated impulse withstand voltage of the plug;
- for other basic insulation: the highest impulse voltage that can occur in the circuit.

B) Minimum clearance values are based on BS EN IEC 60664-1.

9.1.2 Clearances for functional insulation

The clearances for functional insulation shall be not less than the values specified for basic insulation in **9.1.1**.

Conformity shall be checked by inspection, and if necessary by measurement, or by the test of Annex E.

If clearance distances are to be measured, this shall be carried out in accordance with Annex F.

Metal parts having an accessible surface coating of lacquer or enamel shall be tested as accessible metal parts.

11.1.1 Conformity shall be checked by inspection and the following:

a) for metal parts insulated from live parts, by the test described in **16.1.3**;

b) for metal parts connected to an earthing terminal or earthing plug pin, by the following test. A current of 25 A ±0.75 A, derived from an a.c. source having a no-load voltage not exceeding 12 V, is passed for 60^{+5}_{0} s between the remote end of the protective conductor of a 3-core flexible cable (cut to a length of 150 mm ±5 mm measured from the nearest edge of the earthing pin) and the remote end of the earthing plug pin and any accessible metal part intended to be earthed, taking account of the following:

1) for non-rewirable plugs, the manufacturer's connection is tested as supplied, with the flexible cable cut to a length of 150 mm ±5 mm measured from the nearest edge of the earthing pin, precoiled flexible cables being extended before measurement.

2) for rewirable plugs, 1.25 mm² flexible cable conforming to BS EN 50525-2-11:2011 shall be used:

i) for screw-type terminals the clamping screw shall be tightened with a torque equal to two thirds of the appropriate value given in Table 6;

ii) for clamp type (screwless) terminals the connection shall be made in accordance with the manufacturer's instructions.

The resistance between the earthing terminals or termination and any other nominated metal part shall not exceed 0.05 Ω.

Table 6 — *Torque values for screws and nuts*

Declared diameter of screw thread	**Torque (see Note 1)**		
	For metal screws (see Note 2)	**For other metal screws and nuts**	**For screws of insulating material**
mm	Nm	Nm	Nm
Up to and including 2.8	0.2	0.4	0.4
Over 2.8, up to and including 3	0.25	0.5	0.5
Over 3, up to and including 3.2	0.3	0.6	0.6
Over 3.2, up to and including 3.6	0.4	0.8	0.6
Over 3.6, up to and including 4.1	0.7	1.2	0.6
Over 4.1, up to and including 4.7	0.8	1.8	0.9
Over 4.7, up to and including 5.3	0.8	2.0	1.0
Over 5.3, up to and including 6	—	2.5	1.25

NOTE 1 The recording of a measured value given in this table is considered to conform to this part of BS 1363 on condition that the uncertainty of measurement at not less than 95% confidence level does not exceed ±10%.

NOTE 2 This column applies to metal screws without heads if the screw when tightened does not protrude from the hole, and to other metal screws which cannot be tightened by means of a screwdriver with a blade wider than the diameter of the screw.

12 Terminals and terminations

12.1 Terminals and terminations shall provide for effective clamping and securing of conductors connected to them, so that efficient electrical connection is made.

12.1.1 Conformity shall be checked in accordance with **12.2** to **12.9**.

12.2 Rewirable plugs shall be provided with terminals as defined in 3.27 or 3.5.

12.2.1 Conformity shall be checked by inspection.

12.3 Non-rewirable plugs shall be provided with soldered, welded, crimped or similar terminations; for all these methods of termination, not more than one strand of a 0.5 mm^2 conductor or two strands of other sized conductors shall be fractured during connection.

Screwed and "snap-on" terminals shall not be used. Crimped connections shall not be made on to pre-soldered flexible cables unless the soldered area is entirely outside the crimp.

A terminal or termination shall not be provided on an ISOD.

12.3.1 Conformity shall be checked by inspection and measurement.

12.4 Terminals in rewirable plugs shall permit the connection, without special preparation, of flexible cables having nominal conductor cross-sectional areas of 0.5 mm^2 to 1.5 mm^2.

12.4.1 Conformity shall be checked by inspection and fitting the appropriate conductors.

12.5 Where pillar terminals are used they shall have clamping screws of sufficient length to extend to the far side of the conductor hole. The end of the screw shall be slightly rounded so as to minimize damage to the conductors. The sizes of the conductor hole and the clamping screw shall be such that the clearance between each size of the major diameter of the clamping screw and the conductor hole does not exceed 0.4 mm.

12.5.1 Conformity shall be checked by inspection and measurement.

12.6 Terminal screws shall have a declared outside diameter of not less than 3 mm or be not smaller than 6 B.A.

Thread cutting and/or thread forming screws shall not be used.

12.6.1 Conformity shall be checked by inspection and measurement.

12.7 Insulating barriers in rewirable plugs shall be an integral part, so arranged that with the cable anchorage rendered inoperative and the earth or line conductors becoming detached from their respective terminals, there is negligible risk of the following:

a) the earth conductor coming into contact with parts at line potential; and

b) the line conductor coming into contact with the line pin assembly.

12.7.1 Conformity shall be checked by inspection and by the following test.

The plug shall be wired as in normal use with a 0.5 mm^2 3-core flexible cable as given in BS EN 50525-2-11:2011 in accordance with the manufacturer's instructions. All terminals screws or nuts shall be tightened to the appropriate torque given in Table 6.

A continuity indicating circuit operating at not less than 40 V shall be connected between the conductor and the other parts nominated. All terminals screws shall then be loosened and the cable anchorage rendered inoperative and the cover of the plug refitted. For plugs fitted with clamp type (screwless) terminals the conductor clamp shall be rendered inoperative. The flexible cable shall then be withdrawn from the plug at a rate not exceeding 50 mm/min, the direction of the pull being varied, until the earth core is pulled free of the plug. The test is made six times in all. For each new test a fresh section of the flexible cable shall be fitted and the flexible cable rotated through approximately 60° in the plane perpendicular to its major axis in a clockwise direction before fitting unless the design is such that this is not practicable.

There shall be no contact between parts at line potential and the earth conductor or between the line conductor and line pin assembly, thus bypassing the fuse link.

12.8 Rewirable plugs shall be designed to be wired in a manner which prevents strain to the earth connection before the line and/or neutral connection when the cable anchorage is rendered inoperative.

12.8.1 Conformity shall be checked by inspection and manipulation using a plug wired in accordance with the manufacturer's instructions.

12.9 In rewirable plugs terminals shall be so located or shielded so that where a strand of a flexible conductor might escape when the conductors are fitted, there is negligible risk of accidental connection between live parts and accessible external surfaces, or of a stray strand bypassing the fuse link.

12.9.1 Conformity shall be checked by inspection, and by the following test.

A length of insulation in accordance with the manufacturer's instructions shall be removed from the end of a flexible conductor having a nominal cross-sectional area of 1.5 mm^2. One strand of the flexible conductor shall be left free and the other strands shall be fully inserted into and clamped in the terminal. The free strand shall be bent, without tearing the insulation back, in every possible direction, but without making sharp bends around barriers unless a bend is reproduced by the replacement of the cover.

The free strand of a conductor connected to a live terminal shall not:

a) touch any metal part so as to bypass the fuse link;

b) touch any metal part which is accessible or is connected to an accessible metal part; or

c) reduce creepage distance and clearance to accessible surfaces to less than 1.3 mm.

The free strand of a conductor connected to an earthing terminal shall not touch any live parts.

12.10 Clamp type (screwless) terminals shall be so designed that they make electrical contact to the specified conductors, between metal surfaces with sufficient pressure, and without additional means to maintain the clamping pressure. They shall not cause undue damage to the conductors.

NOTE Conductors are considered to be unduly damaged if they show deep or sharp indentations.

It shall be clear how the connection and disconnection of the conductors is intended to be effected.

The intended disconnection of a conductor shall require an operation to unlatch the clamp manually prior to removing the conductor.

12.10.1 Conformity shall be checked by the following.

a) Inspection of three sample plugs.

b) The following test shall be carried out on each terminal of the three set of L, N and E terminals supplied in the test sample. For the purposes of this test, terminals shall be removed from the test sample or alternatively supplied separately.

Tests shall be carried out on each line, neutral and earth terminals separately with individual flexible conductors, first with conductors having the largest cross-sectional area, and then with conductors having the smallest cross-sectional area, as specified in **12.4**.

Conductors shall be connected and disconnected five times, on each terminal, new conductors being used each time, except for the fifth time, when the conductors used for the fourth connection are reconnected at the same place.

For each insertion, the conductors shall be inserted so that adequate connection is obvious. After insertion, the conductor shall be subjected to a pull of 30^{0}_{-2} N. The pull shall be applied in one smooth and continuous motion for 60^{+5}_{0} s in a direction equivalent to that in which the conductor lies when the terminal is mounted in the plug.

During the application of the pull, the conductor shall not come out of the terminal. After these tests neither the terminals nor the clamping means shall have deteriorated in a manner impairing their further use and not more than one strand of a 0.5 mm^2 conductor or two strands of other sized conductors shall be fractured.

12.11 Clamp type (screwless) terminals shall be so constructed that incorrect fitting of the conductor is prevented.

12.11.1 Conformity shall be checked by inspection.

12.12 Clamp type (screwless) terminals shall be adequately located in the plug when assembled for normal use.

12.12.1 Conformity shall be checked by inspection, and by the mechanical strength test given in **21.1.3**.

13 Construction of plugs

13.1 The disposition of the plug pins (including ISODs where applicable) shall be as shown in Figure 4a).

Figure 4a) — *Dimensions and disposition of pins*

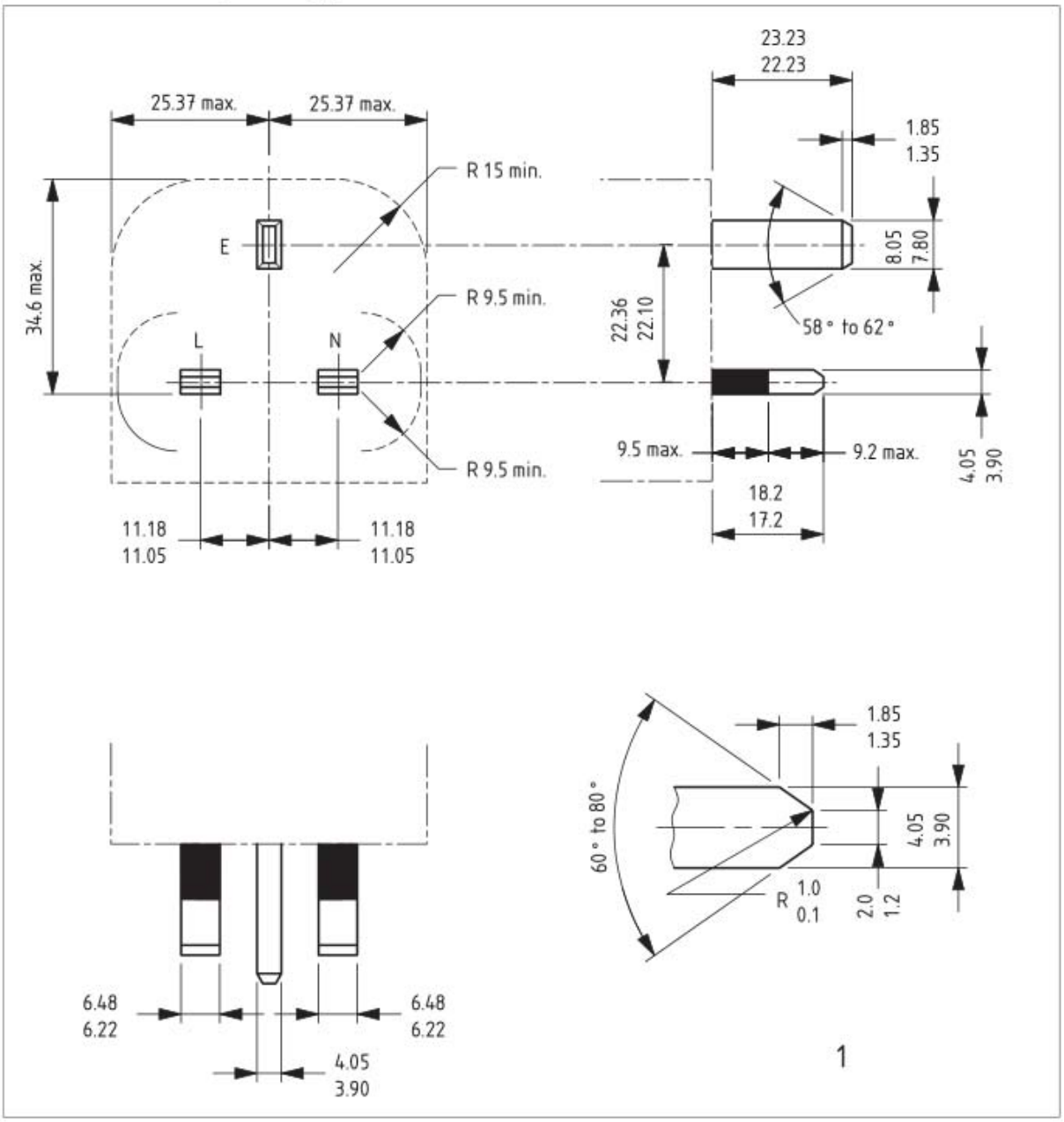
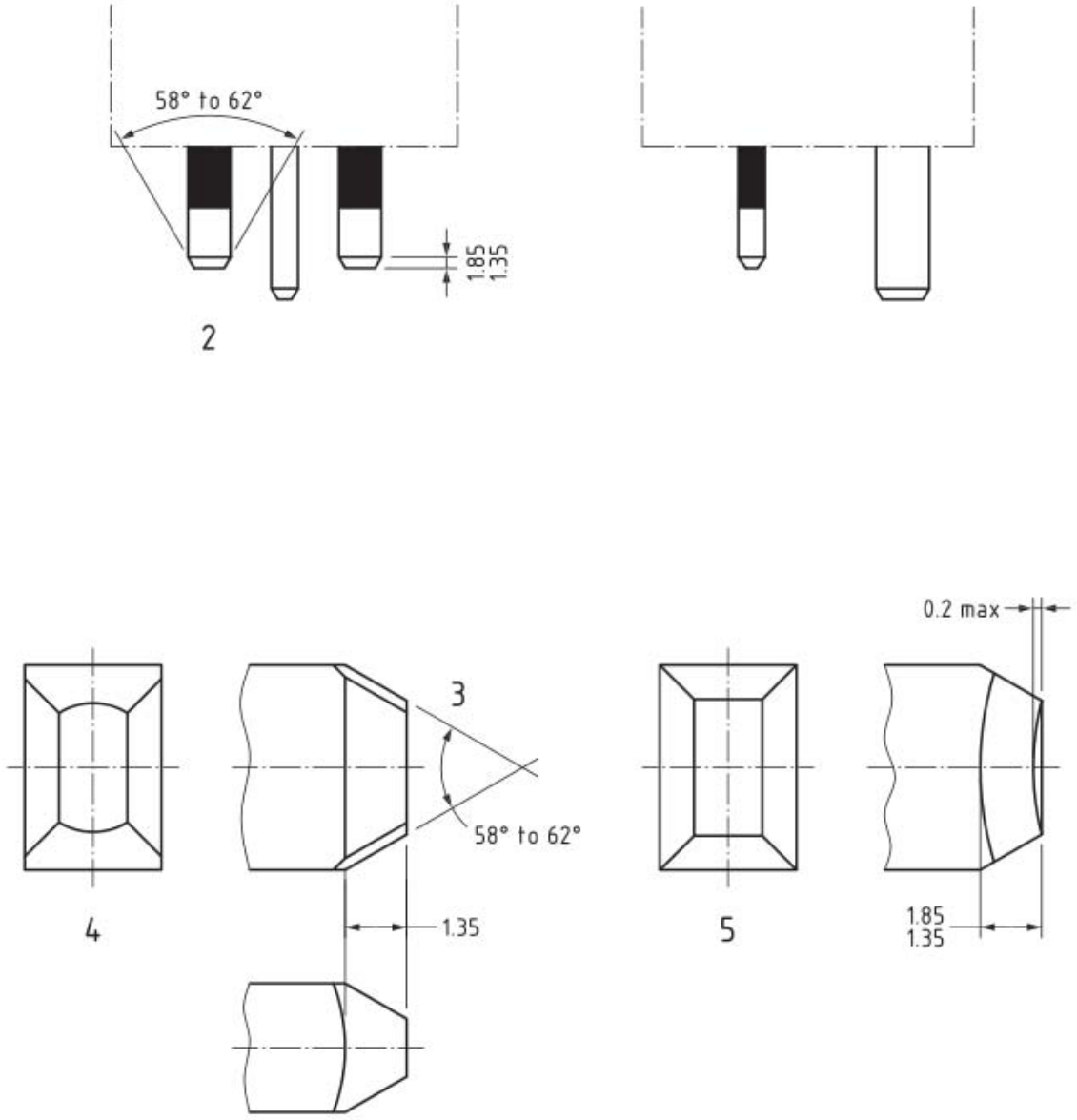


Figure 4a) — *Dimensions and disposition of pins (continued)*



Key

1 Pin end chamfer detail

2 Permitted additional chamfers on L and N pins (if additional chamfer is used it has to be on both pins)

3 58° to 62° cone

4 Alternative method of forming 58° to 62° included chamfer on pin ends

5 Alternative method of forming main chamfer on pin ends

NOTE 1 External edges of pins should be free from burrs or sharp edges and have a radius not exceeding 1 mm.

NOTE 2 The surfaces of pins are to be flat within the specified tolerances.

13.1.1 Conformity shall be checked by inspection.

13.2 The outline of the plug shall not exceed the dimensions shown in Figure 4a) for a distance of not less than 6.35 mm from the engagement surface and within these dimensions there shall be no axial projection from the engagement surface of the plug, except that at a distance more than 6.35 mm from the engagement surface the outline of the plug is permitted to exceed the dimensions shown

in Figure 4a) in the plane of the earth pin and in the plane of the flexible cable entry to facilitate the removal of the plug from the socket.

Pin disposition, length and body outline shall be checked by use of the gauge shown in Figure 5 in accordance with the following test. Pin and sleeve dimensions shall be checked by measurement and shall conform to Figure 4a), except for non-solid pins and ISOD where the chamfers shall generally fall within the profiles of Figure 4a), and their adequacy shall be checked by the tests of **13.9.5**. ISODs shall be of generally rectangular cross-section. "I" sections are not permitted although castellated cross-sections are permitted provided their dimensions conform to Figure 4b) and all the other requirements of the standard are met.

The maintenance of these dimensions shall not rely on the terminal screws.

Plugs fitted with an ISOD shall conform to all the dimensions specified in Figure 4a) with the exception of the ISOD width and height dimensions which shall conform to Figure 4b).

Figure 4b) — *ISOD dimensions*

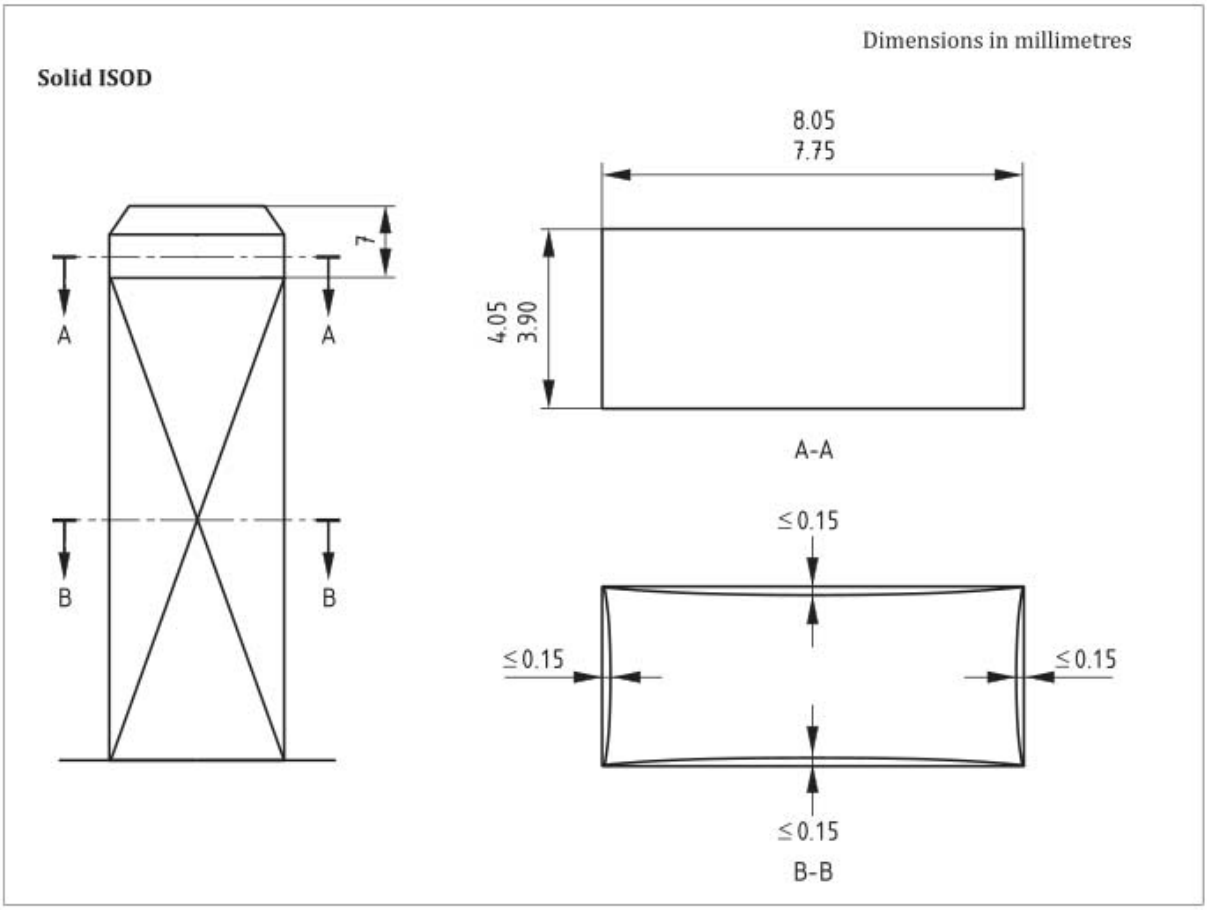
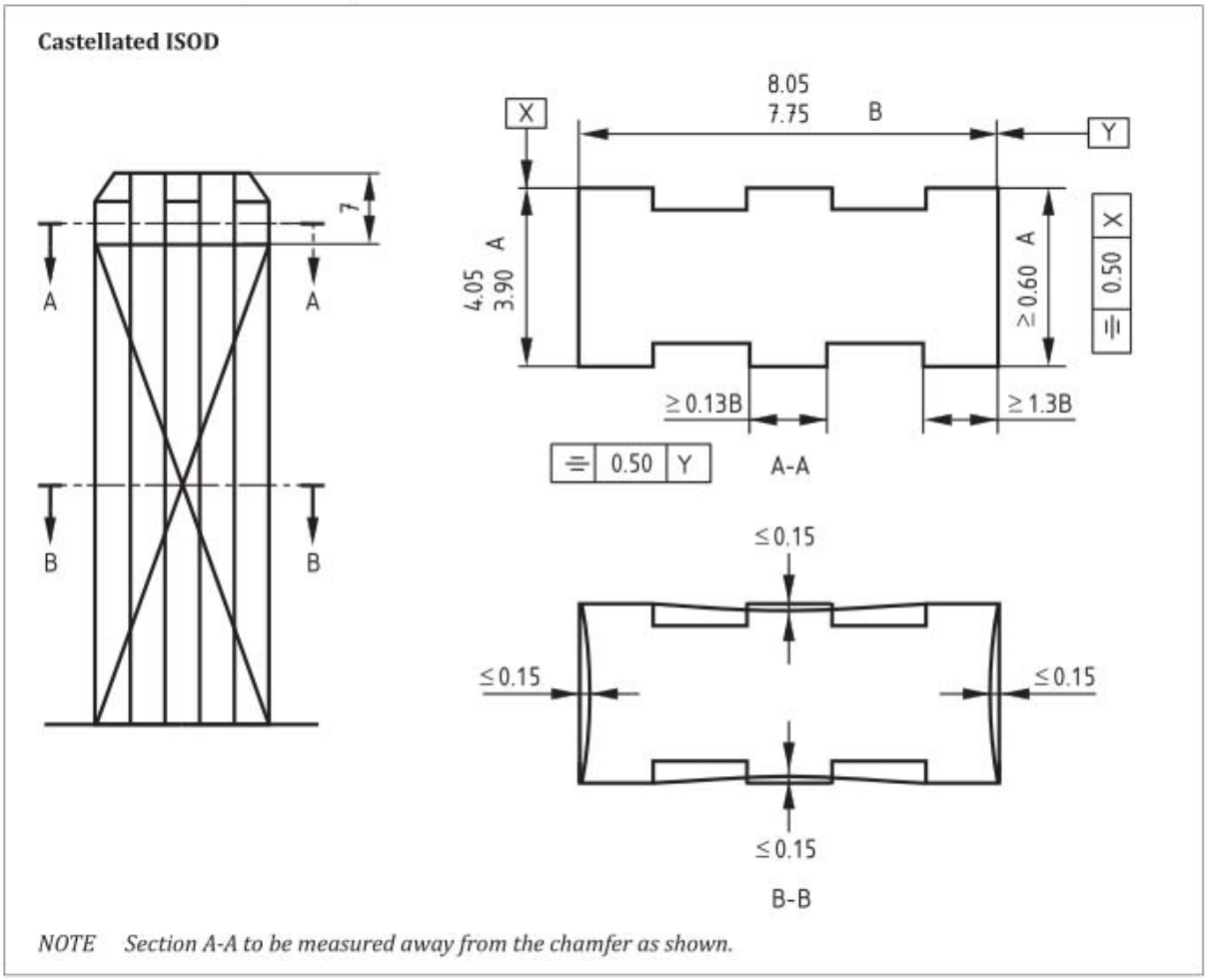


Figure 4b) — *ISOD dimensions (continued)*



NOTE Preferred plug profile dimensions to assist with compatibility with enclosed socket-outlets are given in Annex G.

13.2.1 Conformity shall be checked by inspection, measurement and by the use of the gauge shown in Figure 5.

For the gauging test rewirable plugs shall be fitted with a 3-core 1.25 mm^2 flexible cable as given in BS EN 50525-2-11:2011. Non-rewirable plugs shall be tested as delivered.

With the gauge in an approximately vertical position and the engagement surfaces of the plug and the gauge parallel to each other, the line and neutral pins shall be entered into the gauge for a distance not exceeding 2 mm. The plug shall then enter the gauge fully when a force of 10 N or less is applied to the centre of the plug at right angles to the engagement surface and without any additional force being applied to the pins to bring them into alignment.

In the case of plugs with ISODs, due to the flexibility of plastic materials some additional alignment of the ISOD is allowed when inserting into the Figure 5 gauge. Where alignment cannot be maintained the test given in BS 1363-2:2023, **14.8**, shall be performed and the maximum withdrawal force from a socket-outlet conforming to BS 1363-2:2023 shall not exceed 36 N.

13.3 No part of a line or neutral pin shall be less than 9.5 mm from the periphery of the plug measured along the engagement surface.

13.3.1 Conformity shall be checked by measurement.

13.4 A fuse link conforming to BS 1362:1973+A3 shall be provided within the body of the plug and the fuse link shall be mounted in appropriate contacts only between the line terminals or termination and the corresponding plug pin in such a way that it cannot be displaced when the plug is in use. The design shall be such that the fuse link cannot be left in inadequate contact when the plug cover, fuse cover or the fuse carrier is replaced and firmly secured in position.

NOTE A manufacturer of plugs may supply plugs in part assembled form, with or without an appropriate fuse, direct to a manufacturer for incorporation in other equipment, provided that when assembled the complete plug conforms to this part of BS 1363.

It shall be impossible to replace the fuse link in a plug unless the plug is completely withdrawn from the socket-outlet.

For non-rewirable plugs the current rating of the fuse link shall not exceed the value given in Table 2 for the appropriate size of the flexible cable.

13.4.1 Conformity shall be checked by inspection.

13.5 In non-rewirable plugs, where the fuse link is retained by means of a fuse carrier, this device shall be either:

a) non-detachable during normal replacement of the fuse link; or

b) readily identifiable in relation to its plug by means of marking.

13.5.1 Conformity shall be checked by inspection.

13.5.2 For non-rewirable plugs with the fuse carrier or cover removed and the fuse link correctly fitted in the fuse clips, the creepage and clearance distances between live parts of the fuse and clips and the engagement face of the plug shall meet the requirements of **9.1** and **9.2**.

13.5.3 Conformity shall be checked by measurement.

13.6 The base and cover of non-rewirable plugs shall be permanently attached to each other, such that the flexible cable cannot be separated without making the plug permanently useless, and the plug cannot be opened by hand or by using a general purpose tool, for example, a screwdriver. A plug shall be considered to be permanently useless when, for reassembling, the plug parts or materials other than the original have to be used.

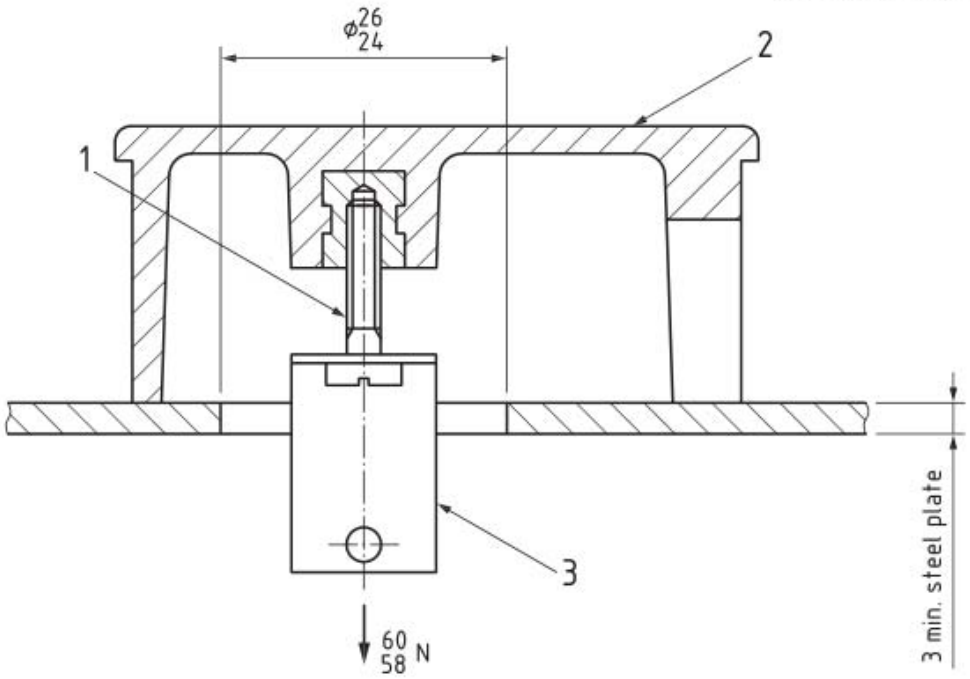
The base and cover of rewirable plugs shall be firmly secured to each other. It shall not be possible to remove the cover unless the plug is completely withdrawn from the socket-outlet. Any fixing screws shall be captive.

13.6.1 Conformity shall be checked by inspection and by the following tests as applicable.

a) Each plug cover fixing screw shall have a pull of $60^{\ 0}_{-2}$ N exerted upon it for $60^{+5}_{\ 0}$ s whilst the surface temperature of the product is 70 °C ±5 °C. The test shall be carried out using apparatus similar to that shown in Figure 6 and for the test the plug cover and apparatus are placed in an oven until they reach the required temperature.

At the end of the test any screw thread shall be serviceable and any insert shall not have moved to such an extent that correct assembly of the plug is prevented.

Figure 6 — *Apparatus for testing plug cover fixing screws*



Key

1 Cover retaining screw positioned as in service

2 Sample plug/adaptor cover supported with cover fixing screw axis vertical

3 Light metal stirrup

NOTE This drawing is not intended to govern design, except as regards the dimensions and specific requirements shown.

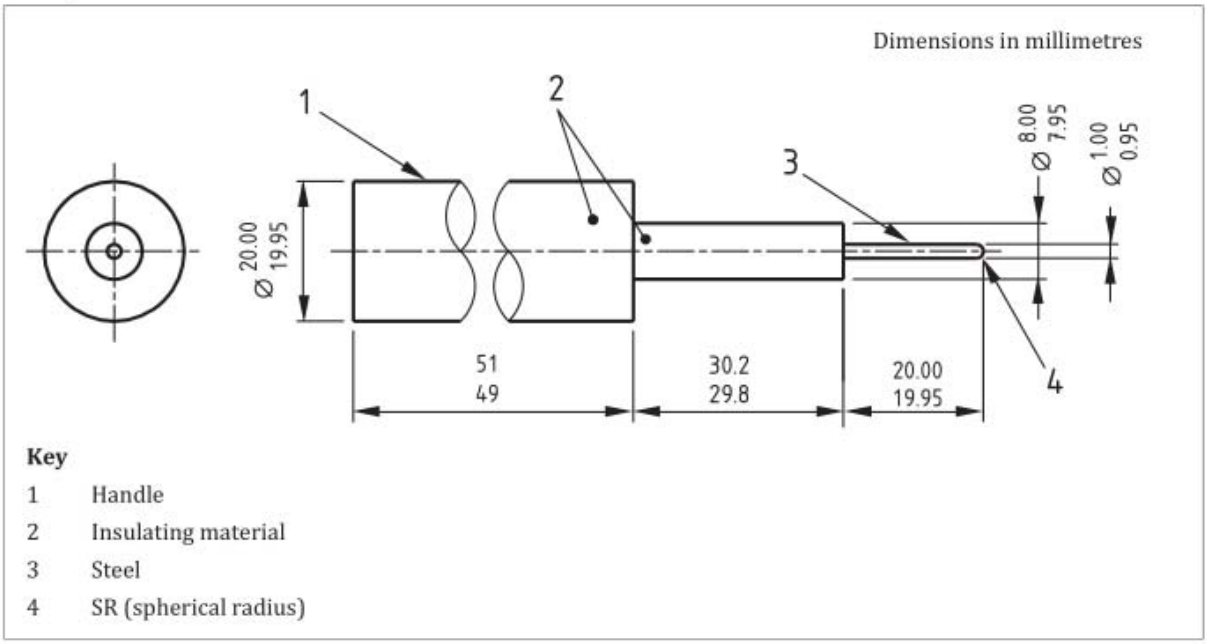
b) For rewirable plugs having covers fixed by means other than screws and for non-moulded-on, non-rewirable plugs, all the plug pins shall be clamped together in a suitable jig and subjected to a pull of 60^{0}_{-2} N whilst suspending the cover by means of a "nest" to suit the plug cover profile. The test shall be carried out in an oven at a temperature of 70 °C ±5 °C and the pull applied for 60^{+5}_{0} s after the temperature has been attained.

After the test it shall not be possible to touch live parts with the test pin shown in Figure 1 applied with a force of 5^{0}_{-1} N.

c) Non-moulded-on, non-rewirable plugs shall be tested with the flexible cable supplied. The plug pins shall be clamped in the vertical position using a suitable jig with the plug pins uppermost. The plug lead fitted shall be extended with a similar flexible cable resulting in a total length of 1 m in such a way that any joint has negligible effect and a weight of $3^{+0.06}_{0}$ kg fixed to the end. With the weight initially held 0.5 m ±0.05 m from the end of cable anchorage, and at the same height, the weight shall be allowed to fall freely. This test shall be carried out five times.

After this test the plug cover shall be in place and show no damage. If the flexible cable becomes detached during this test but the plug cover remains in place and shows no damage the plug shall be deemed to have passed this test.

Figure 1 — *Test pin*



13.7 Plugs shall be so designed and constructed that they cannot readily be deformed to allow access to live parts.

13.7.1 Conformity shall be checked by inspection and by the following test.

Immediately after the test described in Clause 17, test probe 11 of BS EN 61032:1998 shall be applied to the accessible surface of the plug with a force of $30^{\ 0}_{-5}$ N. It shall not be possible to touch live parts.

13.8 For non-rewirable plugs, means shall be provided to prevent loose strands of a conductor or current-carrying parts from reducing the minimum insulation requirements between such parts and all external surfaces of the plug.

13.8.1 Conformity shall be checked by inspection and the test described in **16.2**.

13.9 Materials other than brass (having a minimum content of 58% copper) or nickel plated brass shall not be used in the construction of line and neutral plug pins except for sleeves of pins as specified in **13.16**. Plug pins and ISODs shall conform to **13.9.1**. Non-solid pins shall conform to **13.9.2**.

13.9.1 All exposed surfaces of plug pins shall be smooth and free from burrs or sharp edges and other irregularities which could cause damage or excessive wear to corresponding socket contacts or shutters.

13.9.1.1 Conformity shall be checked by inspection.

13.9.2 Those surfaces of the non-solid plug pins which are visible when the plug is correctly assembled shall be free of apertures.

13.9.2.1 Conformity shall be checked by inspection.

13.9.3 All seams and joints of non-solid pins shall be closed over their entire length.

13.9.3.1 Conformity shall be checked by inspection and in case of doubt by the following test.

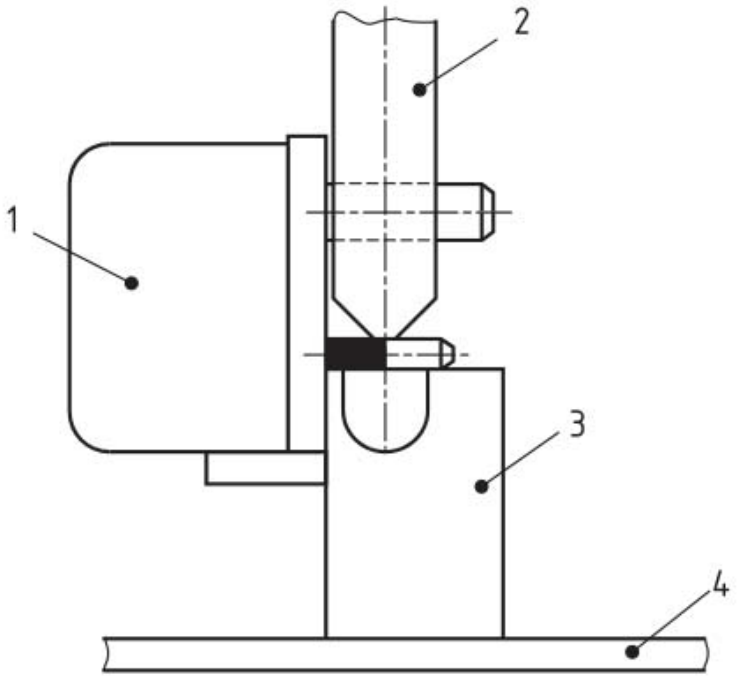
Push a steel test probe of 0.2 mm diameter into all seams and joints. Check that the test probe does not enter into any seam or joint to a depth greater than the thickness of the material from which the plug pin is formed.

13.9.4 Plug pins and ISODs shall have adequate strength to withstand the stresses of normal use.

13.9.4.1 For solid pins, conformity shall be checked by the following test.

Position a pin on the fixed anvil of the apparatus, as shown in Figure 32, with its contact surfaces in the horizontal plane. Apply a force of $1\,100^{\ 0}_{-10}$ N to the movable anvil by any convenient method such that the pin is strained at a rate not exceeding 10 mm/min.

Figure 32a) — *Apparatus for tests on plug pins: A plug pin under test*



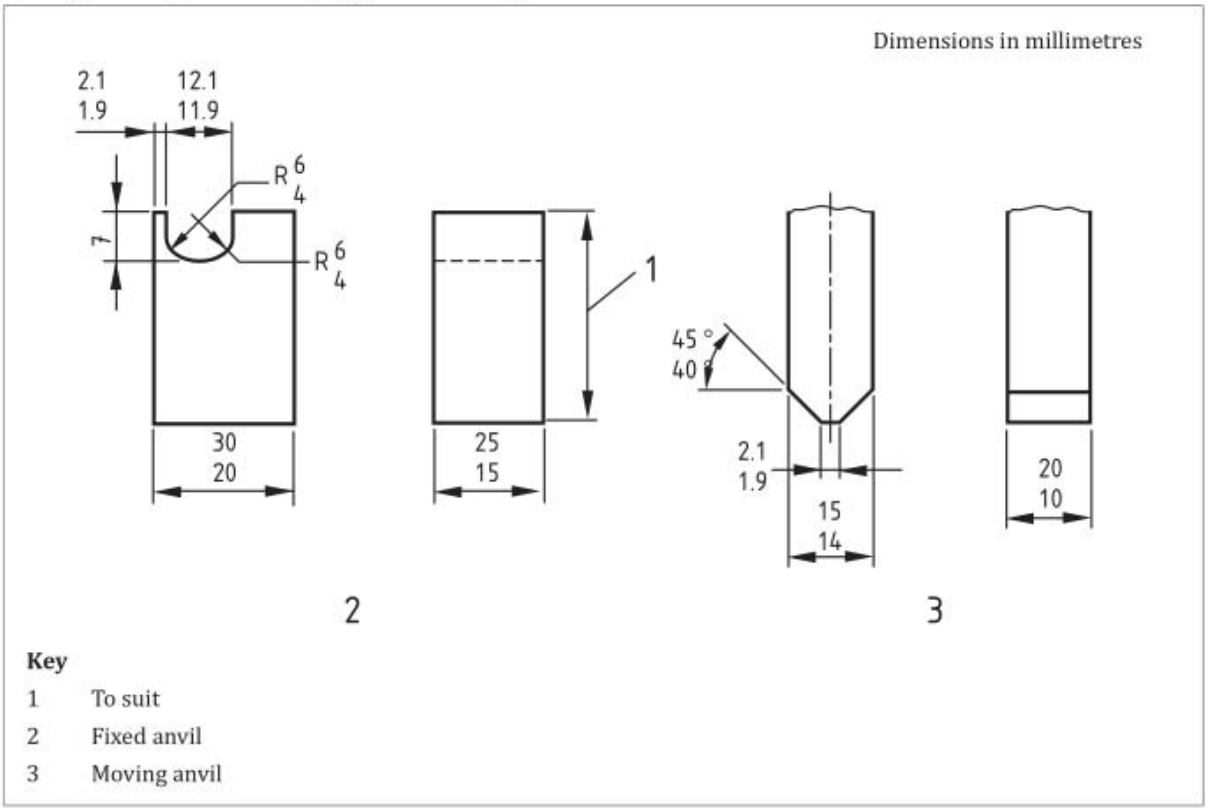
Key

1 Plug body
2 Moving anvil
3 Fixed anvil
4 Rigid base plate

NOTE 1 The body of the plug should be supported so that the face of the plug is held in contact with the face of the fixed anvil.

NOTE 2 The moving anvil should be aligned in the centre of the gap in the fixed anvil.

Figure 32b) — *Apparatus for tests on plug pins: Details of anvils*



Key

1 To suit
2 Fixed anvil
3 Moving anvil

The test shall be made separately on the line, neutral and earth pins applying the load perpendicular to the major axis surfaces of the pins.

After this test the plug shall fit the gauge shown in Figure 5 when used in the manner described in **13.2.1**.

13.9.4.2 For non-solid pins, conformity shall be checked by the following tests.

a) Position a pin on the fixed anvil of the apparatus, as shown in Figure 32, with its contact surfaces in the horizontal plane. Bring the movable anvil to rest against the upper surface of the pin. Apply a force of 800^{0}_{-10} N to the movable anvil 50 times without impact.

The test shall be made separately on the line, neutral and earth pins applying the load perpendicular to the major axis surfaces of the pins. If there is a joint or seam in one of the major axis surfaces of a pin then the test shall be made twice. The seam or joint shall face the moving anvil for the first test and shall face the fixed anvil for the second test.

After the test the pins shall conform to **13.9.2** and **13.9.3** and the plug shall fit the gauge shown in Figure 5 when used in the manner described in **13.2.1**.

b) Separate samples shall be used for the following test.

Position a pin on the fixed anvil of the apparatus, as shown in Figure 32, with the widest surface in the horizontal plane. Bring the movable anvil to rest against the upper surface of the pin. This quiescent position shall be taken as the datum point. Apply a force to the movable anvil by any convenient method such that the pin is strained at a rate not exceeding 10 mm/min. Measure the applied force when the movement of the anvil from the datum point reaches $1.5^{0}_{-0.1}$ mm. The test shall be made separately on the line, neutral and earth pins applying the load perpendicular to the major axis surfaces of the pins. If there is a joint or seam in one of the major axis surfaces of a pin then the test shall be made twice. The seam or joint shall face the moving anvil for the first test and shall face the fixed anvil for the second test. The force shall be not less than 1 100 N.

13.9.4.3 For ISODs, conformity shall be checked by the following test.

Position the ISOD on the fixed anvil of the apparatus as shown in Figure 32 with the widest surface in the horizontal plane. Bring the movable anvil to rest against the upper surface of the ISOD. The quiescent position shall be taken as the datum point. Apply a force to the movable anvil by any convenient method such that the ISOD is strained at a rate of (10 ±2) mm/min.

A force of 400^{+10}_{0} N is applied and the measured deflection shall not exceed 1.5 mm. The ISOD shall not be broken or show cracks that are visible with normal or corrected vision without additional magnification.

After the test the plug shall fit the Figure 5 gauge when used in the manner described in **13.2.1** with a force not exceeding 20 N.

When testing a plug fitted with an ISOD due to the flexibility of plastic materials some additional alignment of the ISOD is allowed when inserting into the Figure 5 gauge. Where alignment cannot be maintained the test of BS 1363-2:2023, **14.8** shall be performed and the maximum withdrawal force from a socket-outlet conforming to BS 1363-2:2023 shall not exceed 36 N.

13.9.5 Plugs with nickel plated brass pins, non-solid pins and/or ISODs shall not cause excessive wear to socket contacts or shutters of socket-outlets in accordance with BS 1363-2:2023. For plugs with nickel plated brass pins and/or non-solid pins, conformity shall be checked by **13.9.5.1**. For plugs with ISODs, conformity shall be checked by **13.9.5.2**.

13.9.5.1 Conformity shall be checked by the following tests.

The test shall be carried out with plugs with nickel plated brass pins and/or non-solid pins and three different types of new socket-outlets in accordance with BS 1363-2:2023. Two types of the socket-outlet shall have the shutters operated by the earth pin, one of which is preferably operated by all three pins and one of which is preferably operated by line and neutral pins only.

The combination of plugs having nickel plated brass pins and/or non-solid pins and each type of socket-outlet as described shall make and break a current of 13 A ±0.4 A, non-rewirable plugs shall be tested with the rated current appropriate to the flexible cable given in Table 2, at 250 V ±10 V a.c. 15 000 times (30 000 movements) in a substantially non-inductive circuit.

Each plug shall be inserted into and withdrawn from the socket-outlet at a rate of six insertions and six withdrawals per minute, the speed of travel of the plug being approximately 150 mm/s. The periods during which the plug is inserted and withdrawn shall be approximately equal. The plug pins shall be renewed or a new plug is used after each 5 000 insertions and withdrawals. For the purpose of this test no lubrication shall be applied to the pins of the plug or the socket-outlet contacts.

After the test, the shutters of the socket-outlets shall be operating satisfactorily, the socket contacts safely shielded and the socket-outlets shall be in accordance with BS 1363-2:2023, **9.1**, **17**, **16**, **14.4.1**a), **11.2**, **14.6**, **14.7**, and **14.8** and the permitted values of voltage drop specified in BS 1363-2:2023, **14.4.1**a) for the plug pin to socket contact measurements increased by 50%. The pins of the plug shall remain intact with no openings in the surface, joints or seams which will accept the probe specified in **13.9.3**. There shall be no visible evidence of peeling or flaking of plating.

13.9.5.2 Conformity shall be checked by the following.

Using a selection of three different makes of rewirable plugs conforming to this standard and three different makes of unswitched socket-outlets conforming to BS 1363-2:2023, selected to represent different earth contact designs, the earth resistance between the earthing plug pin and the earthing socket contact of the socket-outlets shall be established in accordance with BS 1363-2:2023, **11.2.1**b).

All socket-outlets shall be of the type where the earth pin or ISOD of a plug inserted into the socket-outlet operates the shutter mechanism.

The test shall be made using a separate sample of plug with ISOD for each type of socket-outlet, with each sample being inserted into and withdrawn from the socket-outlet at a rate of six insertions and six withdrawals per minute, the speed of travel of the plug being approximately 150 mm/s. The period during which the plug is inserted and withdrawn shall be approximately equal. For the purpose of this test no lubrication is applied to the plugs or sockets either prior to or during the test.

After 5 000 insertions and withdrawals the standard rewirable plug used prior to the test, for each type of socket-outlet shall be reinserted and the earth resistance test repeated. After the test the earth resistance between the earthing plug pin and the earthing socket contact of the socket-outlets shall be in accordance with BS 1363-2:2023, **11.2.1**b).

The socket-outlet shall be examined and shall show no sign of damage that would impair further use. The plugs under test shall show no damage and shall conform to the dimensional requirements of this standard.

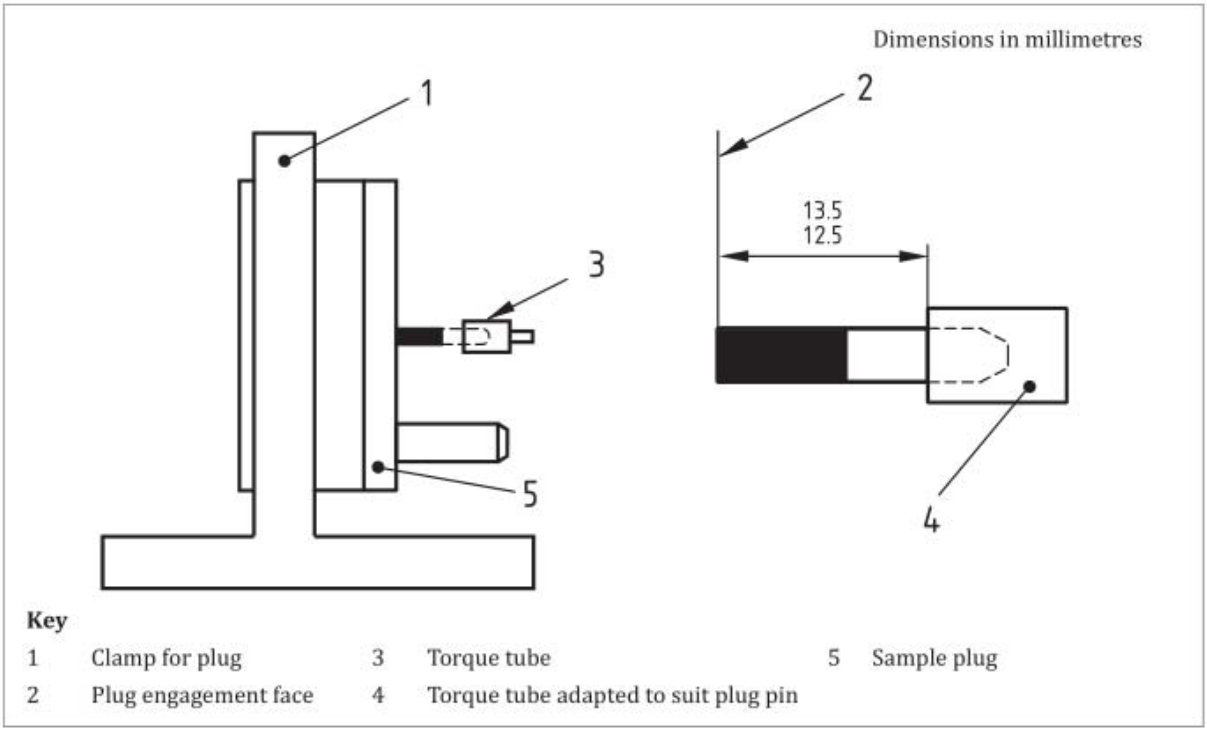
After the test, the shutters of the socket-outlet shall be operating satisfactorily and the socket contacts shall be safely shielded.

13.9.6 Plug pins and ISODs shall have adequate mechanical strength to ensure that they cannot be distorted by twisting.

13.9.6.1 Conformity shall be checked by inspection and by the following test.

The plug shall be clamped in a block as shown in Figure 33. Each pin shall be twisted about its longitudinal axis by applying a torque of 1 Nm ±10%, for 60^{+5}_{0} s. The torque tube and its position on the plug pin shall be as shown in Figure 33. After each pin has been separately twisted, the plug shall fit the gauge shown in Figure 5. The test shall then be repeated with each plug pin being twisted in the opposite direction to that of the first test. After this second test, the plug shall fit the gauge shown in Figure 5. In each case, the gauge is used in the manner as described in **13.2.1**.

Figure 33 — *Apparatus for torsion test on pins*



Key

1	Clamp for plug	3	Torque tube	5	Sample plug
2	Plug engagement face	4	Torque tube adapted to suit plug pin		

13.10 The terminals of earthing and neutral plug pins shall be formed as one piece with, or shall be permanently connected to, the pin in such a way that efficient electrical connection is made that cannot work loose in use. This connection shall not be made by means of a screw.

The contact for the fuse link connected to the line terminal or termination shall be formed in one piece with the fixed part of the terminal or termination, or be permanently connected to it in such a way that it cannot work loose in normal use, and the other contact for the fuse link shall be similarly connected to the corresponding plug pin. The connections shall not be made by means of screws.

The line terminals or termination shall provide for effectively clamping and securing conductors connected to it so that efficient electrical connection is made with the fuse link.

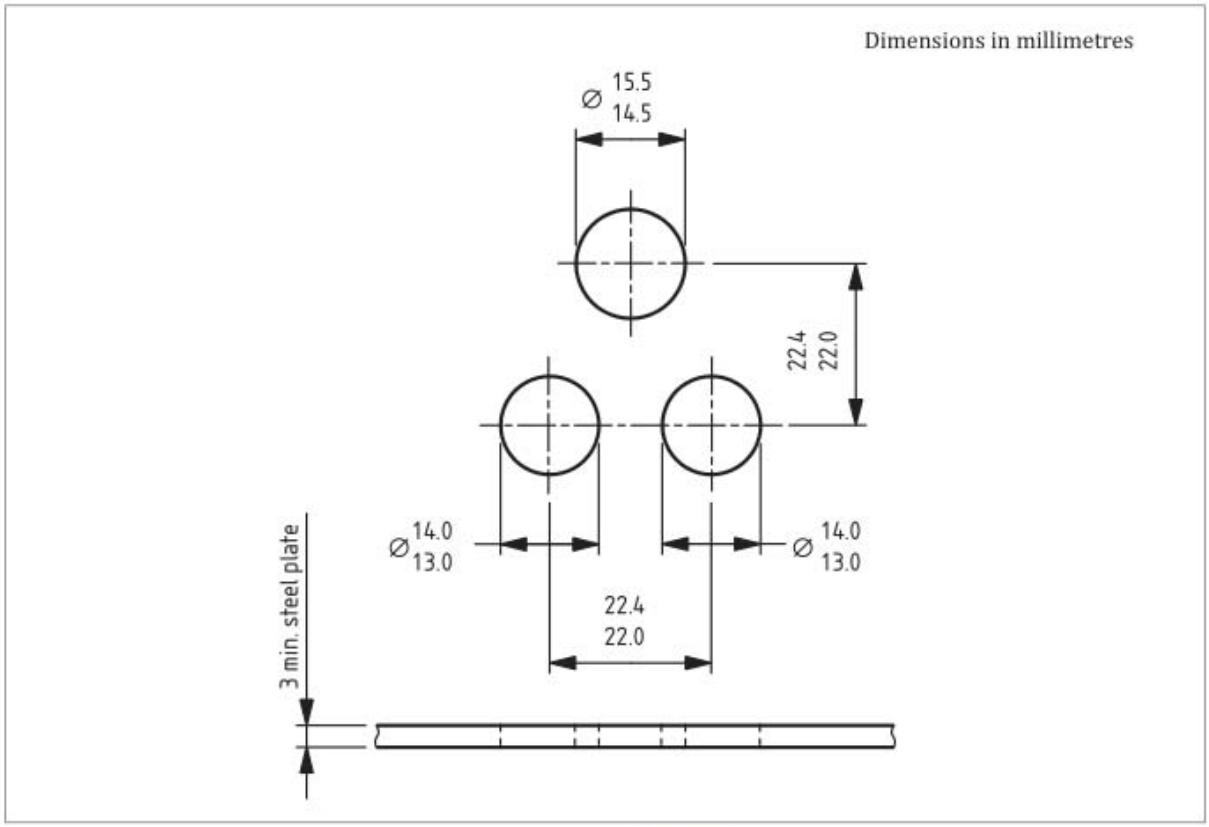
13.10.1 Conformity shall be checked by inspection and the tests described in **21.1.3** and Clause **17**.

13.11 Plugs shall be so designed that when fully assembled the pins are adequately retained in position such that there is no likelihood of them becoming detached from the plug during normal use.

13.11.1 Conformity shall be checked by the following test.

After the tests described in Clause **21** each pin shall be subjected for 60^{+5}_{0} s to a pull of $100^{\ 0}_{-2}$ N in one smooth and continuous motion in the direction of the major axis, the plug is mounted using the steel plate shown in Figure 7. The apparatus shall be placed within an oven and the pull shall be applied at least 1 h after the plug body has attained the test temperature of 70 °C ±5 °C while maintained at this temperature.

Figure 7 — *Mounting plate*

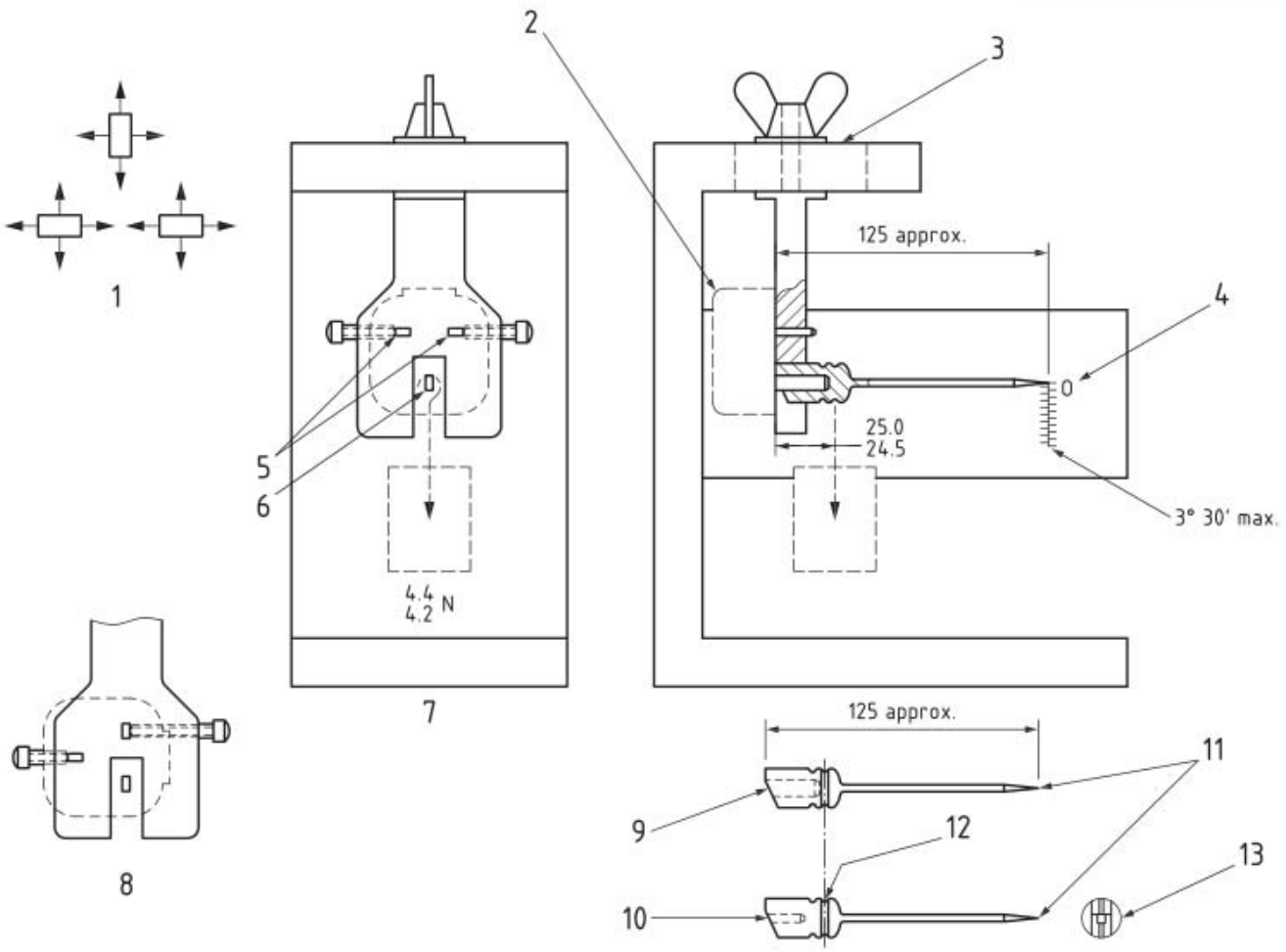


After the test the plug pin shall fit the gauge shown in Figure 5 when used in the manner as described in **13.2.1**.

13.12 The degree of flexibility of mounting of the plug pins or the angular movement of the pins in the base shall be not greater than 3° 30' in the directions shown in Figure 8 from an axis which is

perpendicular to the plug engagement surface when the pins are subjected to a force as shown in Figure 8.

Figure 8 — *Plug pin deflection test apparatus for resilient plugs*



Key

1	Shape of plug mounting block should allow for the direction of pull when measuring deflection of pins as shown in diagram	8	Diagram shows disposition of plug pins in typical mounting block for deflection test on current-carrying pins
2	Back of plug should not be supported or come into contact with fixture	9	Spring fit on to earth pin or ISOD
3	Mounting block clamped in slot which gives adjustment to allow for various plugs	10	Spring fit on current-carrying pin
4	Zero on scale = horizontal axis of pin under test	11	Indicating point
5	Clamped pins	12	Groove for weight
6	Pin under test for deflection measurement	13	Slot to ensure spring fit
7	Elevation of fixture shows disposition of plug pins for deflection test on earth pin		

NOTE 1 This drawing is not intended to govern design, except as regards the dimensions and specific requirements shown.

NOTE 2 Indicators manufactured from material of negligible weight, such as aluminium.

13.12.1 Conformity shall be checked by inspection and in case of doubt by the following test.

NOTE Plugs may be checked using an apparatus similar to that shown in Figure 8. Other methods of measuring the 3° 30′ deflection may be used.

The plug shall be clamped in the mounting block by means of any two of the plug pins in such a manner as to ensure that the engagement surface of the plug, from which the plug pins project, is supported and in contact with the corresponding flat surface of the mounting block. The back of the plug shall not be supported and shall not come into contact with the fixture. The axis of the clamped pins shall be horizontal.

The unclamped pin shall be tested for declination from the horizontal by applying a force of $4.4^{\ 0}_{-0.2}$ N, $25^{\ 0}_{-0.5}$ mm from the engagement surface of the plug and parallel with it in the four directions shown in Figure 8. The test shall be repeated in turn on the other two pins of the plug.

During each test the delineation from the horizontal measured on the scale shall not exceed 3° 30'. After all tests have been completed the plugs shall fit the gauge shown in Figure 5 when used in the manner as described in **13.2.1**.

13.13 Suitable means shall be provided for withdrawing the plug without subjecting the flexible cable to stress.

13.13.1 Conformity shall be checked by inspection.

13.14 Non-rewirable plugs shall be fitted with flexible cables in accordance with 20.4.

13.14.1 Conformity shall be checked by inspection.

13.15 Conductive component parts of plugs shall be so located and separated that, in normal use, they cannot be displaced so as to affect adversely the safety or proper operation of the plug.

13.15.1 Conformity shall be checked by inspection and manual manipulations.

13.16 Line and neutral plug pins shall be fitted with insulating sleeves. The dimensions of the pin and sleeve shall fall within those given in Figure 4a). Sleeves shall not be fitted to any earthing plug pin.

13.16.1 Conformity shall be checked by inspection and by measurement for pin and sleeve and use of the gauge shown in Figure 5 as described in **13.2.1** for socket-outlet compatibility.

13.17 Plug pin sleeves shall have adequate electric strength, resistance to abrasion and resistance to deformation due to overheating of pins.

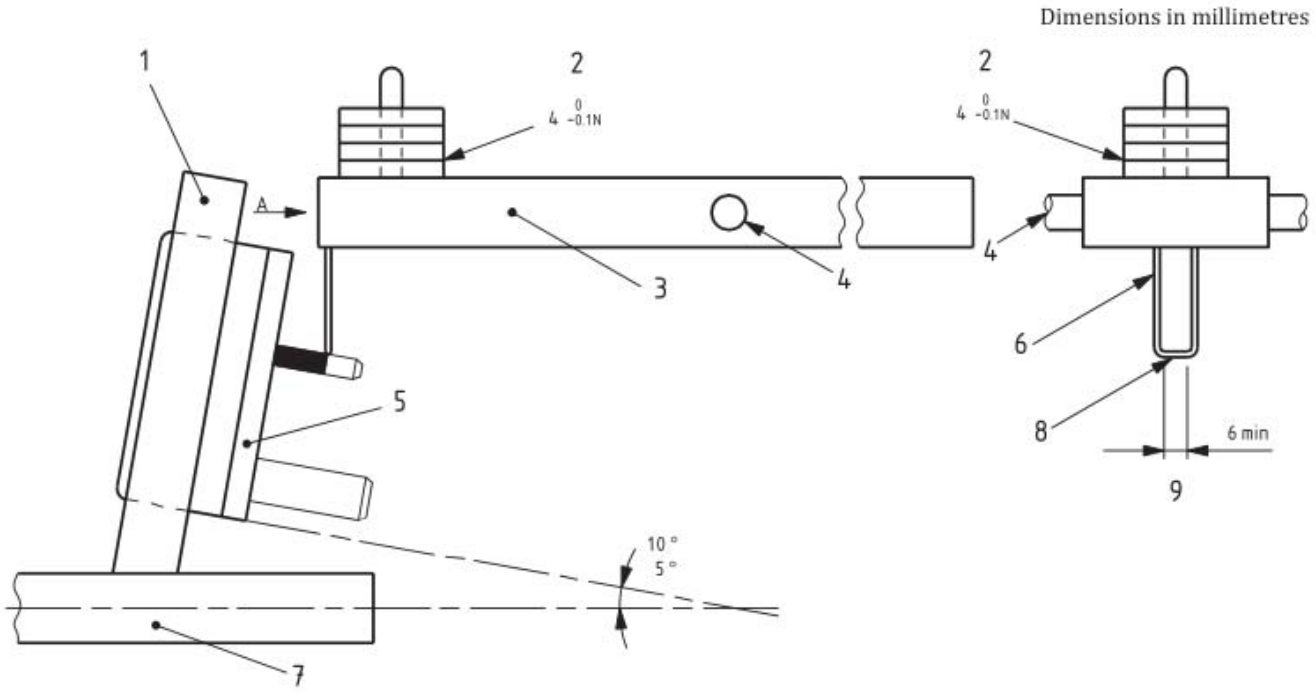
13.17.1 Conformity shall be checked by the tests given in **13.17.2** to **13.17.4**.

13.17.2 A 50 Hz voltage of substantially sinusoidal waveform shall be applied between each L-pin and N-pin and a thin metal strip of between 5.5 mm and 6 mm width wrapped around the base of the plug pin sleeve adjacent to the base of the plug. Initially not more than 500 V shall be applied, the voltage then being raised to 1 250 V ±30 V which is maintained for $60^{\ +5}_{\ 0}$ s.

During the test no breakdown or flashover shall occur.

13.17.3 The test apparatus for resistance to abrasion (see Figure 9) shall comprise a horizontally disposed beam pivoted about its centre point. A short length of steel wire, 1 mm ±0.02 mm in diameter and bent into a "U" shape, the base of the "U" being straight, with no surface defects, shall be rigidly attached at both ends to one end of the beam so that the straight part of the wire projects below the beam and is parallel to the axis of the beam pivot.

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



Key

1	Clamp for plug	6	Steel wire to BS EN 10270-1:2011+A1:2017, M4, 1 mm bright; abrading surface to be free from surface defects
2	Weights adjustable to exert a force through the wire of $4^{0}_{-0.1}$ N on pin with the beam set in the horizontal position	7	Reciprocating carrier, movement approx. 9 mm; adjust to abrade 7 mm of insulating sleeve
3	Beam	8	6 min. flat
4	Pivot	9	Part view on arrow "A"
5	Sample plug		

NOTE *This drawing is not intended to govern design except as regards the dimensions and specific requirements shown.*

The plug shall be held in a suitable clamp as shown in Figure 9 in such a position that the straight part of the steel wire rests upon the plug pin at right angles to it and the plug pin slopes downward at an angle between 5° and 10° to the horizontal. The beam shall be loaded so that the wire exerts a force of $4^{0}_{-0.1}$ N on the pin.

The plug shall be moved 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 the pin abrasion shall be approximately 9 mm, of which approximately 7 mm is over the insulating sleeve.

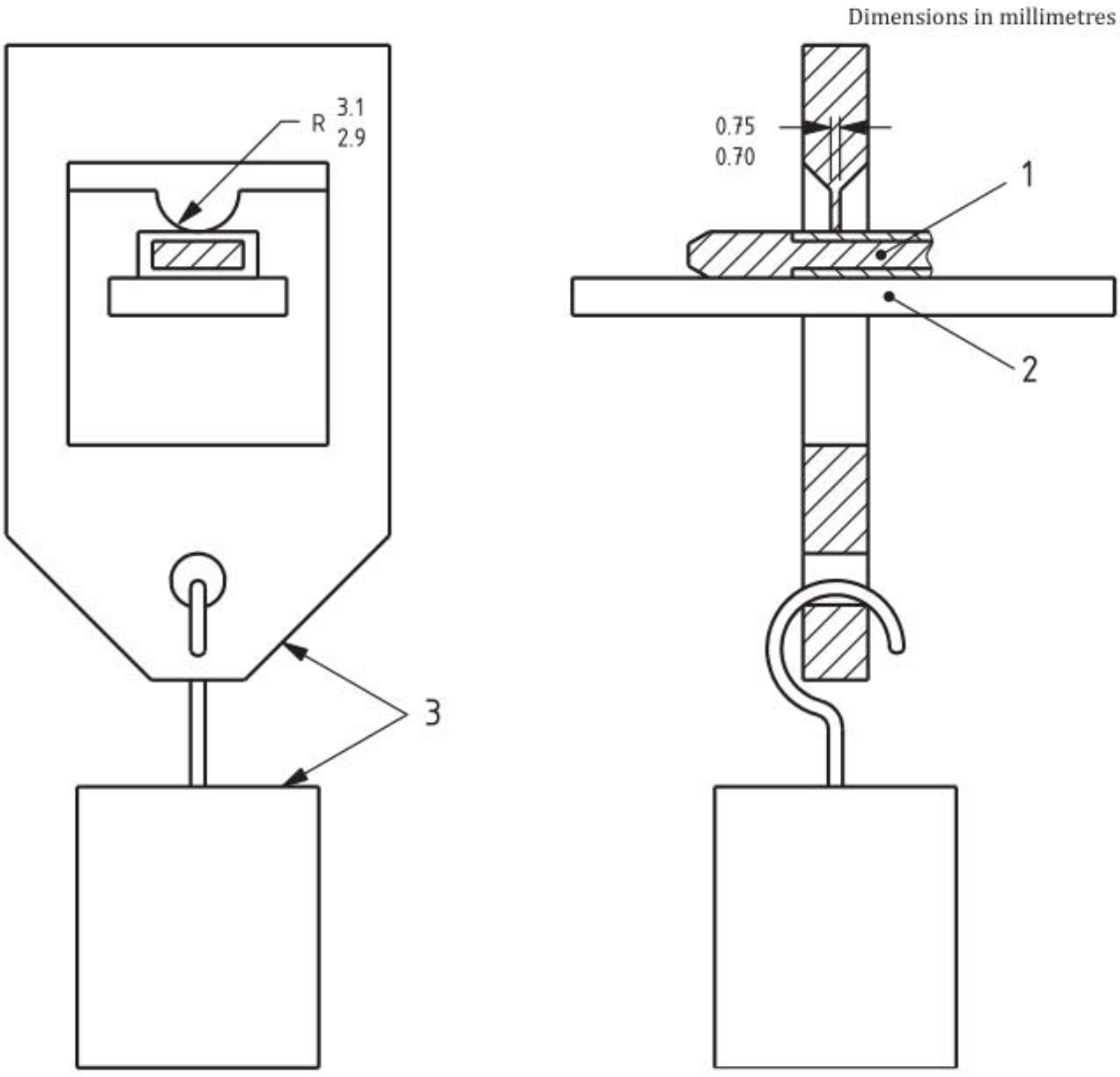
The plug shall be moved 10 000 times in each direction (20 000 movements) at a rate of 25 to 30 movements per minute.

The test shall be made on one pin of each plug.

After the test, the sleeve shall show no damage which might impair the further use of the plug. The sleeve shall not have been penetrated or creased and shall satisfy the tests described in **13.17.2**, any abraded brass contamination on the sleeve having been removed.

13.17.4 A set of three sample pins shall be tested by means of the apparatus shown in Figure 10 which has a blade $0.70^{+0.05}_{0}$ mm wide and a radius of 3 mm ±0.1 mm. The test shall be made on one pin of each plug not used for the test described in **13.17.3**.

Figure 10 — *Apparatus for pressure test at high temperature*



Key

1 Sample

2 Support

3 Combined weight to exert force of $^{2.5}_{2.4}$ N on sample

NOTE This drawing is not intended to govern design, except as regards the dimensions and specific requirements shown.

A sample shall be positioned as shown in Figure 10 and the apparatus shall be loaded so that the blade exerts a force of $2.5^{\ 0}_{-0.1}$ N on the sample. The apparatus, complete with sample, shall then be placed in a heating cabinet at $200^{\ 0}_{-8}$ °C for a period of $120^{\ 0}_{-5}$ min, after which the sample is removed and immediately cooled by immersion in water at approximately room temperature.

The thickness of the insulation remaining at the point of impression shall be measured and shall not have been reduced by more than 50%.

13.18 Switches shall be so constructed that undue arcing cannot occur when the switch is operated slowly.

The switch in any switched fused plug shall disconnect at least the supply to the line terminals.

Double pole switches shall make or break each pole with one movement of the actuator.

13.18.1 Conformity shall be checked by inspection and by the following test.

Following the test described in Clause **18**, the circuit shall be broken a further 10 times, each time moving the actuating member by hand over a period of approximately 2 s in a manner such as to attempt to stop the moving contact in an intermediate position causing arcing. The actuating member shall be released after approximately 2 s and any arcing shall cease.

13.18.2 The actuating member of a switch at rest shall take up a position corresponding to that of the moving contacts except those having a single push-button where the actuating member takes up a single rest position. The actuating mechanism shall be so constructed that when operated the switch remains only in a position giving adequate contact or adequate separation of contacts.

13.18.2.1 Conformity shall be checked by inspection and the test of **13.18.3**.

13.18.3 The necessary force (*F*) to switch off shall first be measured and the force shall be applied to the extremity of the actuating member.

With the actuating member of the switch in the closed position, for single pole switches, the fixed and moving contacts shall be mechanically fixed together. For double pole switches, the three samples shall be prepared as follows:

a) The fixed and moving contacts of one pole shall be mechanically fixed together and the actuating member of the switch tested.

b) The fixed and moving contacts of the other pole shall be mechanically fixed together and the actuating member of the switch tested.

c) The fixed and moving contacts of both poles shall be mechanically fixed together and the actuating member of the switch tested.

When fixing the contacts, care shall be taken to ensure that the test result is not unduly affected.

The method for fixing the contacts shall not unduly affect the test result. Dismantling of the test sample is permitted where necessary in preparation for this test. The test sample and components shall not be damaged during this preparation. The actuating member shall be subjected to a test force as defined in Table 7. This force shall be applied in one smooth and continuous motion to the extreme point of the actuating member in the most favourable direction to open the contacts for a period of 10 s.

If locking means are designed to lock the actuating members in opened position, it shall not be possible to lock the actuating members in this position while the force is applied.

After the test and when the test force is no longer applied, the actuating member shall not remain at rest in the "off" position.

Table 7 — *Actuator test force*

Type of actuator	Test force	Minimum test force	Maximum test force
		N	N
Switch actuator	3*F*	50	150

F is the normal operating force in new condition. The test force shall be 3F with the stated minimum and maximum values applied.

NOTE The use of grease and the like is not considered to be a mechanical fixing means.

13.19 Electronic components incorporated in plugs shall conform to Annex A.

13.19.1 Conformity shall be checked by inspection of component conformity evidence and the tests of Annex A.

14 *(Not used)*

15 Resistance to ageing and to humidity

15.1 Resistance to ageing

Plugs shall be resistant to ageing.

15.1.1 Conformity is checked by the following test.

Plugs shall be subjected to a test in a heating cabinet with an atmosphere having the composition and pressure of the ambient air and ventilated by natural circulation.

The temperature of the cabinet shall be kept at 70 °C ±5 °C.

The samples shall be kept in the cabinet for 168^{+2}_{0} h.

NOTE 1 The use of an electrically heated cabinet is recommended.

NOTE 2 Natural circulation may be provided by holes in the walls of the cabinet.

After the treatment, the samples shall be removed from the cabinet and kept at room temperature and relative humidity for 1 h; following which they shall be examined and shall show no damage which:

a) would lead to non-conformity with this standard;

b) would impair safety; or

c) would prevent further use.

15.2 Resistance to humidity

Plugs shall be resistant to humid conditions which might occur in normal use.

15.2.1 Conformity shall be checked by the humidity treatment described below followed within 20 min by the measurement of the insulation resistance and by the electric strength test specified in Clause **16**.

Rewirable plugs shall be fitted with 1 000 mm ±50 mm of 3-core 1.25 mm² PVC flexible cable as given in BS EN 50525-2-11:2011. Non-rewirable plugs shall be tested with 1 000 mm ±50 mm of the flexible cable with which they are supplied measured from the centre of the earth pin.

To suit the ambient conditions at the time of test, a convenient temperature, T (in °C), between 20 °C and 30 °C, shall be chosen as a reference temperature. The sample shall be brought to a temperature of between T and T +4 °C and shall then be placed in a humidity cabinet containing air with a relative humidity maintained between 85% and 95%. The temperature of the air where the samples are placed shall be kept within ±2 °C of the chosen value T.

The sample shall be kept in the cabinet for 48^{+1}_{0} h.

NOTE 1 In most cases samples may be brought to the chosen reference temperature by keeping them at this temperature for at least 4 h before the humidity treatment.

NOTE 2 A relative humidity of between 85% and 95% can be obtained by placing in the humidity cabinet a saturated solution of potassium nitrate (KNO_3) or sodium sulfate (Na_2SO_4) in water having a sufficiently large contact surface with the air.

In order to achieve the specified conditions, there shall be constant circulation of the air within the cabinet, and in general, a thermally insulated cabinet shall be used.

The tests described in Clause **16** shall be made in the humidity cabinet or immediately after removal of the sample from the cabinet in a room where the specified temperature is maintained.

Inspection shall not reveal any damage to the sample which would impair its use or safety within the requirements of this part of BS 1363.

16 Insulation resistance and electric strength

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

16.1.1 Conformity shall be checked by the tests described in 16.1.2 and 16.1.3.

16.1.2 The insulation resistance shall be measured using a d.c. voltage of 500^{+250}_{0} V, the measurement being made for 60^{+5}_{0} s after application of the voltage. The insulation resistance shall be measured consecutively between:

a) line and neutral terminals/terminations;

b) line and neutral terminals/terminations connected together and:

1) a metal foil in contact with the entire accessible external surface;

2) the earthing terminals/termination;

3) any metal part of a cable anchorage;

c) each switched pole terminal of a switched plug and corresponding plug pin, with the switch contacts open.

The insulation resistance shall be not less than the following:

i) 5 MΩ between parts of opposite polarity;

ii) 5 MΩ between parts of opposite polarity connected together, and other parts, including earthed metal, intended to be insulated from them;

iii) 2 MΩ across switch contacts with the switch open, where applicable.

Indicators and incorporated electronic components shall be disconnected before making this test. Where terminals/terminations are not directly accessible, e.g. in non-rewirable plugs, these tests shall be made using accessible parts, e.g. pins known to be connected to the terminations.

16.1.3 A 50 Hz voltage of substantially sinusoidal waveform shall be applied as described in 16.1.2. Initially, not more than 1 000 V shall be applied, the voltage then being raised to 2 000 V ±60 V. The high voltage source used shall be such that when the output is adjusted to 2 000 V ±60 V for 60^{+5}_{0} s and is then short-circuited, the output current is not less than 200 mA. Any overcurrent protection shall not operate at a current less than 100 mA.

During the test no flashover or breakdown shall occur.

Glow discharges without drop in voltage shall be ignored.

Indicators and incorporated electronic components shall be disconnected before making this test.

16.2 Non-rewirable plugs shall withstand a high voltage test, for which the test voltage shall be alternating (50 Hz to 60 Hz), applied between all current-carrying parts connected together and a conducting electrode in contact with the entire outer accessible surface, omitting the engagement face. This test shall be carried out at 6 000 V ±100 V for a period between 3 s and 5 s.

During the test no breakdown or flashover shall occur.

Glow discharges without drop in voltage shall be ignored.

17 Temperature rise

17.1 Plugs and their surroundings shall not attain excessive temperatures in normal use.

17.1.1 Conformity shall be checked by the following tests.

The tests shall be carried out at rated voltage +10%, −20%.

Plugs shall be tested at rated frequency.

Plugs rated 50 Hz and 60 Hz shall be tested at either frequency unless they contain electronic components which can influence the temperature rises, in which case the most unfavourable rated frequency shall be used.

For these tests, where conductors are connected to terminals, the terminal screws shall be tightened with a torque equal to two thirds of the values given in Table 6.

For rewirable plugs with clamp type (screwless) terminals the connection of the conductors shall be made in accordance with the manufacturer's instructions.

During the tests, temperature rises shall be measured where overheating might result in a hazard and the values measured shall not exceed the values given in Table 8. Additionally the temperature rises of the line and neutral plug pins shall be measured by means of thermocouples using the apparatus shown in Figure 17a) and Figure 17b). Temperature rises shall be determined by means of fine wire thermocouples so chosen and positioned that they have minimum effect on the temperature of the part under test. The thermocouples shall be attached by means of a mixture of equal parts of resin adhesive and zinc oxide, by soldering or by other equally effective means.

If soldering is used, the heat from the soldering process shall not affect the performance of the adaptor and no electrical connections shall be bridged by solder.

If, in order to fix thermocouples, a non-rewirable plug is dissected to give access to the appropriate positions, the removed parts shall be replaced and if necessary shall be cemented in place so that no additional air spaces are created.

Figure 17a) — *Test apparatus for temperature rise test*

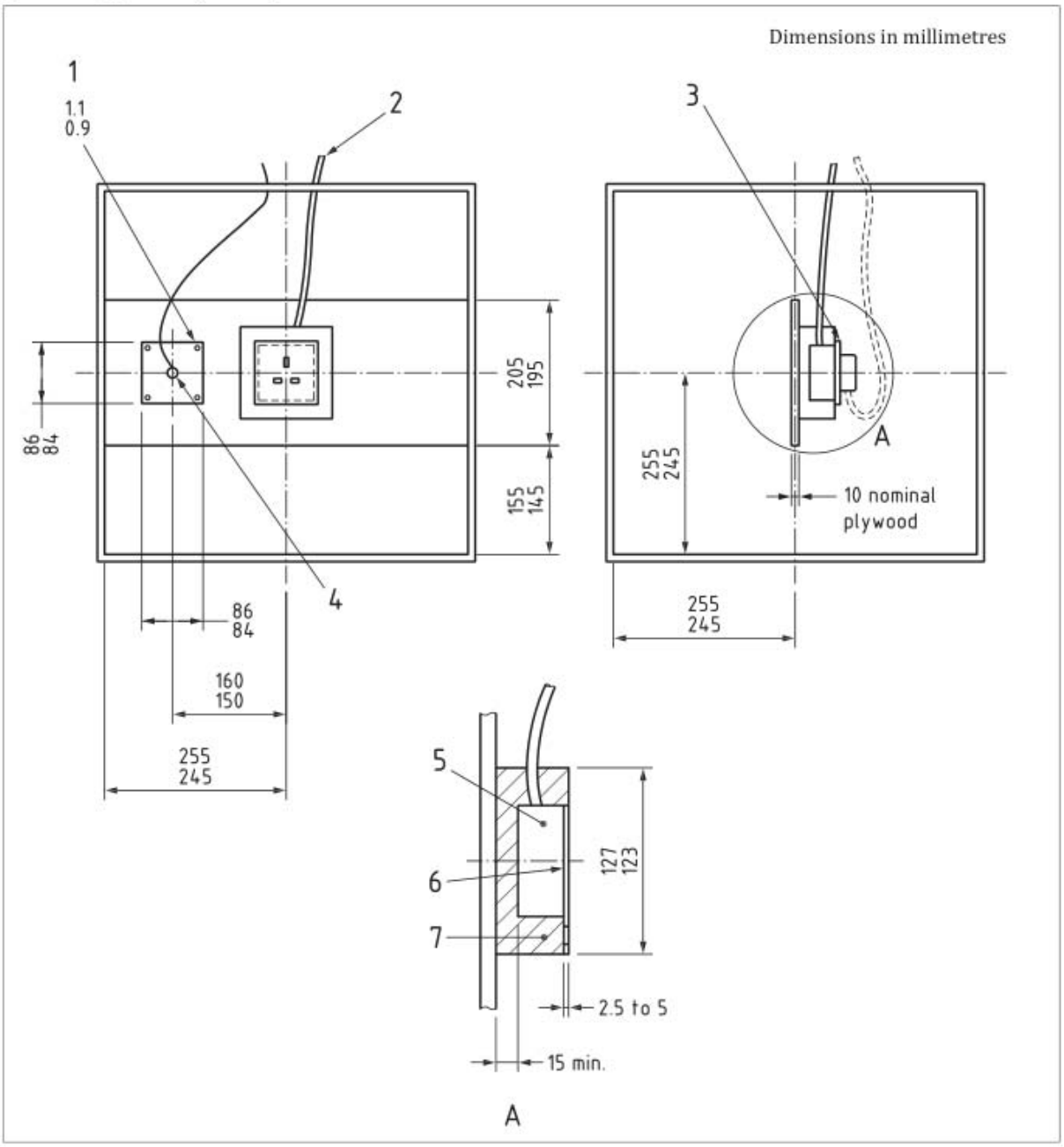


Figure 17a) — *Test apparatus for temperature rise test (continued)*

Test cabinet

Material: 10 mm nominal plywood.

Finish: Internal. Two coats of matt paint. BS 4800:2011, colour no. 08 C 35.

Dimensions: Internal. (500 × 500 × 500) mm with a tolerance of ±10 mm for each dimension. One wall to be removable to provide access.

Location: Minimum clearance from adjacent surfaces, measured horizontally 150 mm on all sides, measured vertically 300 mm above, 500 mm below.

Key

1	Brass plate $^{1.1}_{0.9}$ mm thick screwed to plywood board	6	Front edge recessed as shown
2	Cable and thermocouple wire outlet to be sealed	7	Wooden mounting block
3	Plate as Figure 17b)		
4	Thermocouple for reference point temperature		
5	Mounting box to BS 4662:2006+A1:2009, Figure 1, 35 mm deep (nominal)		

Figure 17b) — *Dummy front plate for temperature rise*

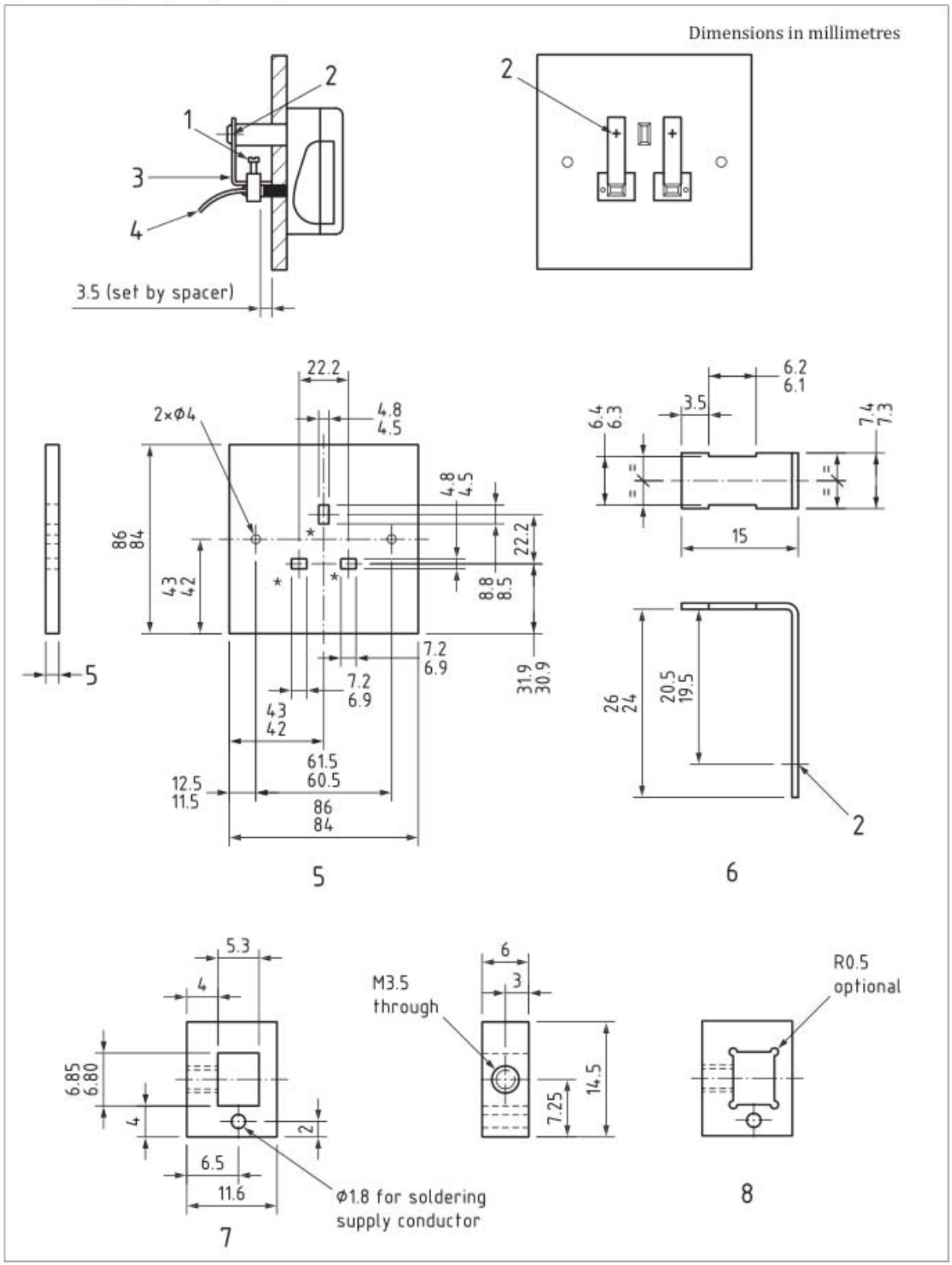


Figure 17b) — *Dummy front plate for temperature rise (continued)*

Key

1	Brass clamping screw M3.5 × 10	6	Spacer material brass CZ 108 0.8 mm thick to BS 2870:1980, or CW508L to BS EN 1652:1998
2	Thermocouple position	7	Clamp, material brass
3	Spacer	8	Optional alternative clamp
4	2.5 mm² conductor		
5	Plate (of insulating material Synthetic Resin Bonded Paper brown BS 2572 or BS EN 60893-3-4:2004+A1:2012)		

NOTE Tolerance ±0.2 mm except where otherwise shown.

* The positional tolerance of the three pin apertures shall be proved by the use of gauges in accordance with BS 1363-2:2023, Figure 11.

17.1.2 Rewirable plugs shall be tested with 1 000 mm ±50 mm of 1.25 mm² 3-core PVC insulated flexible cable as given in BS EN 50525-2-11:2011, non-rewirable plugs shall be tested with 1 000 mm ±50 mm (measured from the centre of the earth pin) of the flexible cable supplied at an appropriate test current as given in Table 2.

The plug shall be fitted with a calibrated link, constructed and calibrated in accordance with Annex H, and shall be mounted in a flat insulating plate as shown in Figure 17b). The supply conductors shall be attached to the line and neutral pins of the plug by means of clamps which also serve to retain the plug in position. The clamp screws shall be tightened to a torque of between 0.8 Nm and 1.2 Nm. The assembly shall be mounted by means of screws in a standard steel flush-mounted socket-outlet box as shown in Figure 1 of BS 4662:2006+A1:2009, having a nominal internal depth of 35 mm which is mounted in a test cabinet as shown in Figure 17a).

The incoming cable and outgoing flexible cable shall enter the test cabinet through holes in the top surface which shall then be sealed to prevent circulation of air. The length of cable and flexible cable within the Figure 17a) enclosure shall be of a maximum length of 600 mm and 850 mm respectively. The cable and flexible cable shall be positioned away from the reference temperature measuring point so not to influence the derivation of plug temperature rise values.

The incoming cable shall be a 2.5 mm² PVC insulated and sheathed cable, as given in BS 6004:2012, Table 4, and shall enter the socket-outlet mounting box through the standard knockout provided. This shall be fitted with a suitable rubber grommet, the point of entry being sealed to prevent the circulation of air. The length of cable within the socket-outlet box shall be 150 mm ±5 mm and the outer sheath and the circuit protective conductor shall be removed to within 20 mm of the point of entry. The test cabinet [see Figure 17a)] is placed in an environment having an ambient temperature of 20 °C ±5 °C. The test current specified in Table 2 shall be passed through the plug and through a load connected to the flexible cable for a minimum continuous period of 4 h or longer until stability is reached with a maximum duration of 8 h, stability being taken as less than 1 K rise within 1 h.

The temperature rise shall be calculated by deducting the reference point temperature from the measurement point temperature record [see Figure 17a) and Figure 17b) respectively].

Table 8 — *Permitted temperature rises*

Measurement point	Temperature rise
	K
Line pin spacer [see Figure 17b)]	37
Neutral pin spacer [see Figure 17b)]	37
Terminals or terminations	52
Accessible external surface	52
NOTE The recording of a measured value up to and including the specified maximum permissible limit for temperature rise is considered to conform to the requirements of the standard on condition that the uncertainty of measurement at not less than 95% confidence level does not exceed ±2 °C.	

18 Breaking capacity of switches incorporated in fused plugs

18.1 The breaking capacity of switches incorporated in plugs shall be adequate.

18.1.1 Conformity shall be checked by the following test. The switch shall make and break a current of 1.25 × rated current ±0.4 A (i.e. 1.25 × 13 A ±0.4 A) in a substantially non-inductive a.c. circuit at 275 V ±5 V, ten times in succession at intervals of approximately 30 s.

After the test the plug shall be capable of passing the subsequent tests detailed in Table 1 for the appropriate test sample.

19 Normal operation of switches

19.1 Switches incorporated in plugs shall withstand, without excessive wear or other harmful effects, the electrical and mechanical stresses occurring in normal use.

19.1.1 Conformity shall be checked by the following tests. The voltage drop across each switched pole, measured at points immediately adjacent to the switch, shall not exceed 60 mV at rated current. The switch shall then make and break a current of 13 A ±0.4 A at 250 V ±10 V 15 000 times (30 000 movements) in a substantially non-inductive a.c. circuit at a rate of approximately six complete cycles per minute at regular intervals. The periods during which the switch is "on" and "off" shall be approximately equal. The means for operating the switch shall be such as to move the actuating member at a speed of approximately 300 mm/s both in making and breaking the circuit and shall be so positioned that the normal action of the mechanism is not interfered with in any way.

At the end of the test, the switch shall be capable of making and breaking the rated current of 13 A ±0.4 A at 250 V ±10 V and the voltage drop across each switched pole, measured as above, shall not exceed 75 mV.

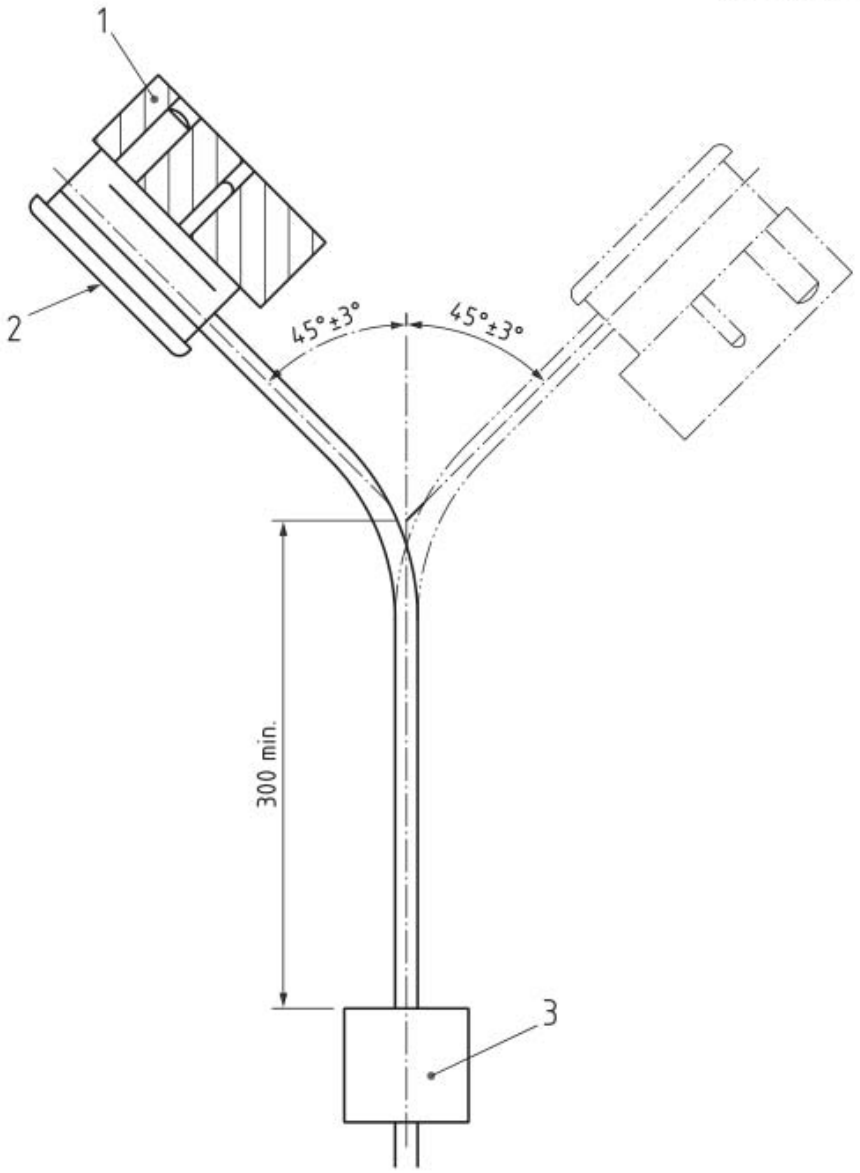
The switch shall also pass the tests given in Clause **15**, the test voltage being reduced by 25%.

20 Connection of flexible cables and cable anchorage

20.1 The entry of the flexible cable shall be between the current-carrying pins at the side of the plug opposite the earth pin (see Figure 18).

Figure 18 — *Apparatus for flexing test*

Dimensions in millimetres



Key

1 Device for fixing sample

2 Sample

3 Mass

NOTE This drawing is not intended to govern design except as regards the dimensions and specific requirements shown.

Provision shall be made for the entry and effective clamping without bending of 2-core and 3-core flexible cables for rewirable plugs as given in BS EN 50525-2-21:2011 and BS EN 50525-2-11:2011, having nominal conductor cross-sectional areas not exceeding 1.5 mm^2.

For non-rewirable plugs provision shall be made for the entry and adequate retention of the flexible cable with which the plug is supplied, once assembled it shall not be possible in normal use to affect the integrity of the cable anchorage.

NOTE Flexible cables with a mean overall dimension less than those given in BS EN 50525-2-11:2011 (such as decorative light cords) are permitted, provided a suitable retention aid is fitted to the flexible cable or cable anchorage so that it conforms to this standard.

The cable anchorage shall contain the sheath. Cable anchorages shall either be of insulating material or if of metal shall be provided with an insulating lining fixed to the metal parts.

Methods such as tying the flexible cable into a knot or tying the ends with string or the like shall not be used.

20.1.1 Conformity shall be checked by inspection and by the following tests.

a) Rewirable plugs shall be fitted with a 2-core 0.5 mm² flexible cable as given in BS EN 50525-2-11:2011. The conductors shall be introduced into the terminals and the terminal screws tightened to one third of the appropriate torque values listed in Table 6. The cable anchorage shall be used in the normal way, the clamping screws, if any, being tightened to a torque of two thirds of that given in Table 6. The assembly shall then be left untouched for a minimum of 24 h.

   After this preparation, it shall not be possible to push the flexible cable into the plug to such an extent as to impair safety or so that the cable anchorage is loosened.

   The flexible cable shall then be subjected 25 times to the pull given in Table 2. The pulls shall be applied in one smooth and continuous motion in the most unfavourable position momentarily. Immediately afterwards, the flexible cable shall be subjected for 60^{+5}_{0} s to the appropriate torque shown in Table 2, at a minimum starting distance of 150 mm from the flexible cable entry measured along the length of the cable.

   NOTE It is not intended that the dimension of 150 mm is maintained during the application of the test torque.

   These tests shall then be repeated but with the plug fitted with a 3-core flexible cable having a nominal conductor cross-sectional area of 1.5 mm² as given in BS EN 50525-2-11:2011.

b) For non-rewirable plugs the test shall be carried out with the flexible cable with which it is supplied, using the appropriate load and torque as given in Table 2. The conductors of the flexible cable shall be severed at the point of termination prior to the test. In the case of two single core cables the load and torque shall be shared equally between the two cables.

   A voltage of 3 750 V ±75 V shall be applied for 60^{+5}_{0} s between the conductors. During this test the insulation of the flexible cable shall not be damaged, i.e. no breakdown or flashover shall occur.

c) After the tests given in a) and b), the flexible cable shall not have been displaced by more than 2 mm.

For the measurement of longitudinal displacement a mark shall be made on the flexible cable whilst it is subjected to the load given in Table 2, at a point adjacent to the anchorage in the case of rewirable plugs, or as close as practicable to the cable anchorage in the case of non-rewirable plugs, before starting the tests. After the test, the displacement of the mark on the flexible cable in relation to the cable anchorage shall be measured whilst the flexible cable is again subjected to the load given in Table 2.

20.2 Cable anchorages in rewirable plugs shall anchor the flexible cable securely to the plug. The design shall ensure each of the following.

a) The cable anchorage cannot be released from the outside without the use of a tool.

b) It shall not be possible to touch cable anchorage screws, if any, with test probe B of BS EN 61032:1998 when the plug is energized.

c) The flexible cable is not clamped by a metal part bearing directly on the flexible cable.

d) At least one part of the anchorage is securely fixed to the plug.

e) Clamping the flexible cable does not require the use of a special purpose tool.

f) Tightening the cable anchorage screws if any to the torque prescribed in Table 6 does not distort the engagement face of the plug to such an extent that conformity with **13.2** is affected.

g) The cover is able to be correctly fitted, without damage when the plug is wired with the largest specified flexible cable and all screws are tightened to the torque specified in Table 6.

20.2.1 Conformity shall be checked by inspection and test.

20.3 Screws which are used when clamping the flexible cable shall not serve to fix any other components unless either the plug is rendered manifestly incomplete if the component is omitted or is replaced in an incorrect position, or the component intended to be fixed cannot be removed without further use of a tool.

20.3.1 Conformity shall be checked by inspection.

20.4 Non-rewirable plugs shall be fitted with flexible cables conforming to BS EN 50525-2-11:2011, BS EN 50525-2-12:2011, BS EN 50525-2-21:2011, BS EN 50525-2-71:2011 or with flexible cables conforming to the requirements of the specification appropriate to the equipment to which they might be fitted. Connections shall be as given in Table 9.

20.4.1 Conformity shall be checked by inspection and a continuity test.

20.5 Non-rewirable plugs shall be so designed that the flexible cable is not subjected to excessive bending where it enters the plug.

20.5.1 Conformity shall be checked by the following test using an apparatus similar to that shown in Figure 18. The plug shall be fixed to the oscillating member of the apparatus so that when this is vertical the axis of the flexible cable at the point of entry is vertical and passes through the axis of oscillation.

Samples with flat flexible cables shall be mounted so that the major axis of the section is parallel to the axis of oscillation.

The flexible cable shall be loaded with a weight as given in Table 2. In the case of two single core cables the load shall be shared equally between the two cables.

The distance between the point of entry to the plug and the axis of oscillation shall be adjusted so that the weight makes the minimum lateral movement as the oscillating member moves. A current appropriate to the flexible cable fitted, as given in Table 2, shall be passed through the line and neutral conductors, the voltage between them being 250 V ±10 V a.c. If an earthing conductor is incorporated in the flexible cable it shall be connected at one end to the neutral conductor.

The oscillating member shall be moved through an angle of 45° ±3° on either side of the vertical, the number of flexings being 10 000 at a rate of $60^{\ 0}_{-10}$ flexings per minute.

After 5 000 flexings, plugs with flexible cables of circular section shall be turned through 90° ±5° about the flexible cable entry centreline.

One flexing shall be one movement through 90°.

During the test there shall be no interruptions of the current passing through the conductors and no short-circuit between them.

After the test the sample shall show no damage except that breakage of not more than 10% of the total number of conductor strands in any core is ignored provided they have not pierced the insulation.

20.6 The flexible cable entry to rewirable plugs shall be so shaped as to prevent damage to the flexible cable.

20.6.1 Conformity shall be checked by inspection.

Table 9 — *Connection of flexible cables*

Termination	Conductor insulation colour		
	3-core	2-core colour coded	Flexible cables as given in BS EN 50525-2-71:2011
Earth	Green-and-yellow	No connection	No connection
Line	Brown	Brown	As supplied
Neutral	Blue	Blue	As supplied

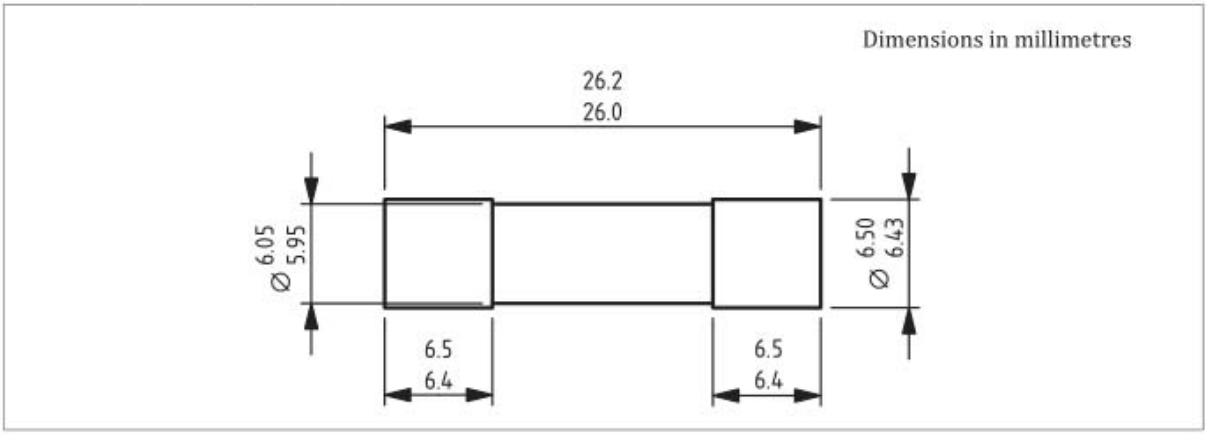
21 Mechanical strength

21.1 Plugs shall have adequate mechanical strength and be so constructed as to withstand such handling as expected in normal use.

21.1.1 Conformity shall be checked by the tests given in **21.1.2** and **21.1.3**.

21.1.2 A solid link of stainless steel as shown in Figure 19 shall be inserted and withdrawn from the fuse clips of the plug 20 times in succession in a normal manner, at a rate not exceeding ten per minute. A standard fuse link conforming to BS 1362:1973+A3 shall then be fitted and the appropriate mechanical strength test completed.

Figure 19 — *Solid link for test on fuse clips*



21.1.3 Rewirable plugs shall be fitted with 3-core PVC 1.25 mm² flexible cable as given in BS EN 50525-2-11:2011, the terminals and cover screws being tightened with the torque given in Table 6. Non-rewirable plugs shall be tested as delivered.

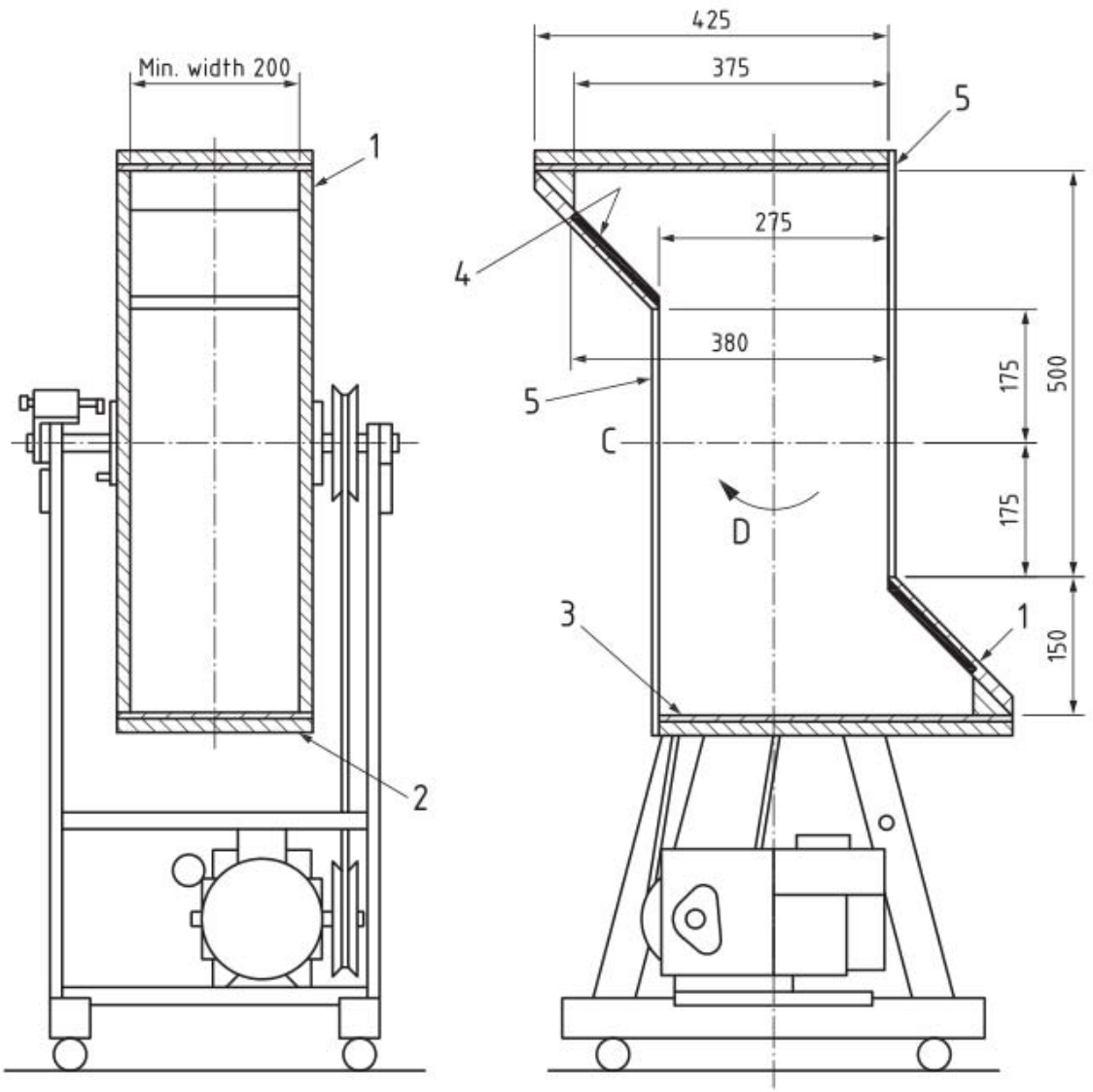
Rewirable plugs with clamp type (screwless) terminals shall be fitted with 3-core PVC 1.25 mm² flexible cable as given in BS EN 50525-2-11:2011. The connection of the conductors shall be made in accordance with the manufacturer's instructions.

The flexible cables attached to plugs shall be cut to a length of 150 mm ±5 mm measured from the nearest edge of the earthing pin, precoiled flexible cables being extended before measurement.

Plugs shall be tested in the tumbling barrel shown in Figure 20. The barrel shall be turned at a rate of approximately 5 r/min (approximately 10 drops per minute).

Figure 20 — *Tumbling barrel*

Dimensions in millimetres



Key

C	Centre of axis	3	Impact base 9 mm nominal thick plywood to be replaceable (both ends)[A]
D	Direction of rotation	4	Shelf faced with non-grip material
1	19 mm nominal thick blockboard or suitable alternative	5	Transparent sheet for observation purposes; might be removable for loading
2	19 mm nominal thick blockboard might be removable for the replacement of the impact plates		

NOTE 1 This drawing is not intended to govern design, except as regards the dimensions and specific requirements shown.

NOTE 2 All dimensions subject to tolerance ±3.0 except for material thickness.

[A] 9 mm nominal plywood having an impact face of birch, 1.4 mm nominal thickness and of 5-ply construction.

Only one plug shall be tested at a time. The number of drops shall be as follows:

a) rewirable plugs marked BS 1363: 1 000;

b) non-rewirable plugs marked BS 1363: 2 500;

c) plugs marked BS 1363/A: 5 000;

d) plugs marked BS 1363/EV: 5 000.

After the test, the plug shall show no external damage which might affect safety and no components shall have become detached. The earthing pin terminal screw if any shall remain tight to a torque not less than 70% of the original tightening torque and current-carrying joints shall not have become loose and shall make satisfactory contact. The sample shall then be checked by inspection, and shall conform to the appropriate test described in Clause **17**, and the gauge in accordance with Figure 5 when used in a manner as described in **13.2.1** but with a force not exceeding 20 N.

For the repeat test given in Clause **17**, the attached flexible cable shall be retained without disturbing the terminal connections, but the conductor insulation and sheath shall be removed only as far as is necessary for the attachment of a 1 000 mm ±50 mm length of flexible cable of the same type as that already attached to the plug, the connection being made by means of a connector having a current rating appropriate to that flexible cable.

22 Screws, current-carrying parts and connections

22.1 Screwed connections, electrical and otherwise, shall withstand the mechanical stresses occurring in normal use. Screws directly transmitting electrical contact pressure shall screw into metal. Screws shall not be of metal which is soft and liable to creep.

Screws shall not be of insulating material if their replacement by a metal screw would affect the safety or performance requirements of the plug.

Contact pressure in electrical connections within the plug and between the plug and the cable or flexible cable connected to it shall not be transmitted through insulating material other than ceramic, pure mica or other material with characteristics not less suitable, unless there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage or yielding of the insulating material.

22.1.1 Conformity shall be checked by inspection and, for screws and nuts which are intended to be tightened during installation or use or during replacement of the fuse link, by the following test.

The screw shall be tightened and loosened as follows:

a) 10 times for screws in engagement with a thread of insulating material, the screw being completely removed and replaced each time; or

b) five times for nuts and other screws.

When testing terminal screws and nuts a 1.5 mm^2 flexible conductor shall be placed in the terminal of plugs. The conductor shall be moved each time the screw is loosened. The test shall be made by means of a suitable test screwdriver, applying a torque as given in Table 6 in one smooth and continuous motion. The shape of the blade of the test screwdriver shall suit the head of the screw being tested.

During the test, no damage impairing the further use of the screwed connection shall occur.

For clamp type (screwless) terminals conformity shall be checked by inspection and the test given in Clause **26**.

22.2 Thread cutting and/or thread forming screws shall not be used for the making of current-carrying or earth continuity connections.

Screws which make a mechanical connection between different parts of the plug shall be locked against loosening, if the connection carries current.

Rivets used for current-carrying or earth continuity connections shall be locked against loosening, if these connections are subject to torsion in normal use which is likely to loosen the connection.

22.2.1 Conformity shall be checked by inspection and by manual test.

NOTE 1 Spring washers and the like may provide satisfactory locking.

NOTE 2 For rivets, a non-circular shank or an appropriate notch may be sufficient.

22.3 Current-carrying parts (except for line and neutral plug pins) and earthing plug pins shall be of brass (having a minimum content of 58% copper), copper, phosphor-bronze or other metal at least equivalent with regard to its conductivity, resistance to abrasion and resistance to corrosion. This requirement does not apply to screws, nuts, washers, clamping plates and similar parts of terminals, nor to parts of plugs used for earth continuity purposes.

22.3.1 Conformity shall be checked by inspection and by the relevant tests described in **11.1**, Clause **17** and Clause **25**.

23 Resistance to heat

23.1 Plugs shall be resistant to heat.

23.1.1 Conformity shall be checked by the test described in **23.1.2** or **23.1.3**.

23.1.2 Plug samples are kept for 60^{+5}_{0} min in a heating cabinet maintained at 70 °C ±5 °C. During the test they shall not undergo any change impairing their further use and the sealing compound shall not flow to such an extent that live parts are exposed.

A slight displacement of the sealing compound shall be disregarded.

After the test the plug shall still satisfy the tests described in **10.2.1** and **16.1.3**.

23.1.3 Plugs with external parts of resilient material, e.g. thermoplastics and rubber, shall be subjected to a pressure test by means of an apparatus similar to that shown in Figure 23, the test being made in a heating cabinet at a temperature of 70 °C ±5 °C.

Figure 23 — *Apparatus for pressure test*

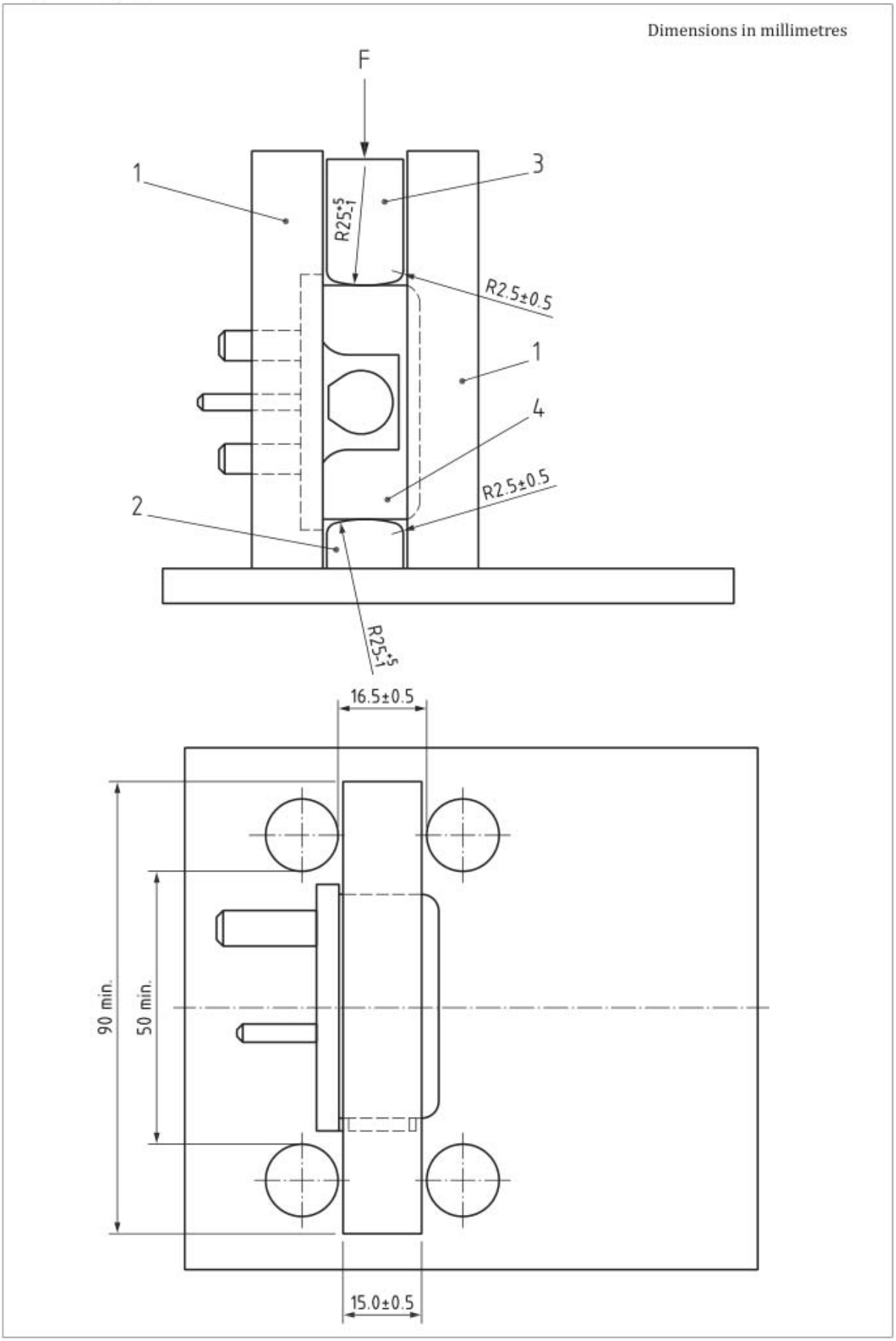


Figure 23 — *Apparatus for pressure test (continued)*

Key

F Force

1 Guide

2 Fixed jaw

3 Moving jaw

4 Sample

NOTE This drawing is not intended to govern design, except as regards the dimensions and specific requirements shown.

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

The force applied, including the effect of the jaws, shall be 20^{0}_{-1} N.

After 60^{+5}_{0} min the jaws are removed and the plugs shall satisfy the tests described in **16.1.2**b)1) and **16.1.3** and shall fit the gauge given in Figure 5 when used in a manner as described in **13.2.1**.

23.2 Parts of insulating material shall be sufficiently resistant to heat having particular regard for their location and function in the complete plug.

23.2.1 Conformity shall be checked as follows:

a) parts of ceramic material are deemed to conform without testing;

b) external parts of plugs tested according to **23.1.3**, are deemed to conform without further testing;

c) all other parts of insulating material including ISOD if fitted shall be subjected to the ball pressure test in accordance with BS EN 60695-10-2:2014. The test is made in a heating cabinet maintained at a temperature of 75 °C ±5 °C.

24 Resistance to abnormal heat and fire

24.1 General

Plugs shall be resistant to abnormal heat and fire. Conformity shall be checked by the test described in **24.2**.

The tests shall not be made on parts of ceramic material or metal.

24.2 Glow-wire test

The test shall be performed according to BS EN IEC 60695-2-11 and at the test temperature given in Table 10.

Table 10 — *Application of glow-wire test*

Part	Temperature of glow-wire °C
Parts necessary to retain live parts in position including ISOD	750 ±10
Parts not necessary to retain live parts in position (although they might be in contact with live parts)	650 ±10
NOTE If the test specified is required to be made at more than one place on the same sample, it is essential that care is taken to ensure that any deterioration caused by previous tests does not affect the result of the test to be made.	

Small parts (see 3.28), parts of insignificant mass (see 3.16), parts unlikely to be subjected to abnormal heat and parts whose failure to pass these tests would not materially affect the safety of the plug shall be excluded from this glow-wire test.

NOTE The glow-wire test is performed to ensure that an electrically heated test wire under defined test conditions does not cause ignition of insulating parts or to ensure that a part of insulating material, which might be ignited by the heated test wire under defined conditions, has a limited time to burn without spreading fire by flame or burning parts or droplets falling down from the tested part onto a pinewood board covered with tissue paper.

The test sample shall be either a complete plug or, if the test cannot be made on a complete plug, a suitable part cut from the sample for the purpose of the test.

The test shall be made on one sample.

In case of doubt, the test shall be repeated on two further samples.

The test shall be made applying the glow-wire once.

The sample shall be positioned during the test in the most unfavourable position of its intended use (with the surface tested in a vertical position).

The tip of the glow-wire shall be applied to the specified surface of the sample taking into account the conditions of intended use under which a heated or glowing element might come into contact with the sample.

The sample shall be regarded as having passed the glow-wire test if:

a) there is no visible flame and no sustained glowing; or

b) flames and glowing of the sample 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.

25 Resistance to excessive residual stresses and to rusting

25.1 Press-formed or similar current-carrying parts of copper alloy containing less than 80% of copper shall be resistant to failure in use due to stress corrosion.

25.1.1 Conformity shall be checked by the following test.

The sample shall be degreased in a suitable alkaline degreasing solution or organic solvent, then immersed in an aqueous solution of mercurous nitrate containing 10 g of $Hg_2(NO_3)_2$ and 10 ml of HNO_3 (relative density 1.42) per litre of solution for 30 min ±1 min at a temperature of 20 °C ±5 °C.

WARNING. Attention is drawn to the fact that due precautions should be taken when using and disposing of these liquids as they are toxic.

After the treatment the sample shall be washed in running water, any excess mercury wiped off, and the sample shall be immediately visually examined.

There shall be no cracks visible with normal or corrected vision without additional magnification.

25.2 Ferrous parts, the rusting of which might cause the plug to become unsafe, shall be adequately protected against rusting.

25.2.1 Conformity shall be checked by the following test.

The sample shall be degreased in a suitable alkaline degreasing solution or organic solvent, the parts shall then be immersed for 10 min ±0.5 min in a 10% solution of ammonium chloride in water at a temperature of 20 °C ±5 °C.

Without drying but after shaking off any drops, the parts shall be placed for 10 min ±0.5 min in a box containing air saturated with moisture at a temperature of 20 °C ±5 °C. After the parts have been dried for at least 10 min in a heating cabinet at a temperature of 100 °C ±5 °C their surfaces shall show no signs of rust. Traces of rust on sharp edges and any yellowish film removable by rubbing shall be ignored.

For small helical springs and the like, and for parts exposed to abrasion, a layer of grease can provide sufficient protection against rusting. Such parts shall only be subjected to the test if there is doubt about the effectiveness of the grease film and the test shall then be made without previous removal of the grease.

26 Electrical and thermal stress of clamp type (screwless) terminals

26.1 Clamp type (screwless) terminals shall pass the electrical and thermal stresses occurring in use.

26.1.1 Conformity shall be checked by the following tests.

The rewirable plug shall be wired and mounted for test in accordance with Clause **17**. The ambient temperature condition specified in **6.1** shall apply. The plug shall be fitted with a calibrated link for the tests.

A test current of 14 A ±0.4 A shall be passed through the plug and flexible cable combination for a period of 60 min ±2 min, after which the plug and flexible cable combination shall be allowed to cool naturally for a period of 60 min ±2 min. The test cycle of 60 min "on" and 60 min "off" shall be repeated a further 199 times. During the test, the calibrated link shall be replaced during the "off" period of every 48th consecutive cycle from the commencement of the test by a new link having characteristics known to be within calibration limits. The link shall then be replaced without disturbing the terminals or conductor terminations in so far as this is possible.

At the conclusion of the final cycle and without disturbance, the plug shall be subjected to a temperature rise test in accordance with Clause **17**. The measured temperature rise values shall not exceed those values given in Table 8.

After the test, inspection by normal or corrected vision, without additional magnification, shall show no changes impairing further use, such as cracks, deformation or the like.

27 Overload tests

27.1 Plugs shall withstand overload currents, which could occur due to overload, without creating a risk of contact with live parts.

27.1.1 Conformity shall be checked by the tests given in **27.1.2** to **27.1.4**. The test arrangement shall be as described in **17.1** except no thermocouples or pin spacers shall be used and the test conducted at any voltage between 12 V and 250 V.

Plugs shall be fitted with fuse links conforming to BS 1362:1973+A3. Rewirable plugs shall be fitted with 13 A rated fuse links. Non-rewirable plugs shall be fitted with the highest rating of fuse link specified in Table 2 for the cable fitted, alternatively the maximum rating of fuse link to be fitted as specified by the manufacturer, which shall be no lower than the rating of the plug. Also, plugs shall have the smallest cable cross-section which could be used with this rating of fuse link.

NOTE Owing to the high temperatures which can be expected during these tests, laboratories are advised to use separate test cabinets for these tests.

27.1.2 The plug shall be subjected to a test current of 1.6 times the rating of the fuse for 60 min or until the fuse operates (if less than 60 min). Immediately afterwards, the checks specified in **27.1.4** shall be made.

27.1.3 The plug shall be subjected to a test current of 1.9 times the rating of the fuse for 30 min or until the fuse operates (if less than 30 min). Immediately afterwards, the checks specified in **27.1.4** shall be made.

27.1.4 Each plug shall be checked for conformity with **10.1**, **13.6.1**a), **13.6.1**b) and **13.11.1**, except that the tests shall be performed at ambient temperature. Deterioration which does not compromise access to live parts (e.g. discolouring, distortion) shall be deemed to be acceptable. Inspection shall not reveal any damage to the plug which would impair its safety within the requirements of this part of BS 1363.

28 Cyclic loading test

28.1 Requirement

Plugs classified as being suitable for electric vehicle charging shall withstand the associated electrical and mechanical stresses.

28.2 Testing

Conformity shall be checked by the following test.

The test arrangement shall be as described in **17.1**.

Rewirable plugs shall be fitted with 1 000 mm ±50 mm length 3-core PVC 1.25 mm^2 flexible cable as given in BS EN 50525-2-11:2011 and the terminals shall be tightened with two thirds of the torque given in Table 6. Non-rewirable plugs shall be tested as delivered.

Rewirable plugs with clamp type (screwless) terminals shall be fitted with 1 000 mm ±50 mm length 3-core PVC 1.25 mm^2 flexible cable conforming to BS EN 50525-2-11:2011. The connection of the conductors shall be made in accordance with the manufacturer's instructions.

The test shall be carried out at rated voltage.

The plug shall be connected to a load of $13^{+0.4}_{0}$ A.

The test shall be conducted for 28 continuous cycles, each cycle consisting of 8 h "on", 1 hour "off", 8 h "on" and 7 h "off".

The plug shall then be checked by inspection and shall be in accordance with the appropriate requirements described in Clause **17**, and the inspection requirements of **13.2.1** using the Figure 5 gauge with a force not exceeding 20 N.

For the repeat test given in Clause **17**, the attached flexible cable shall be retained without disturbing the terminal connections.

Annex A (normative)
Requirements for incorporated electronic components

A.1 General

Incorporated electronic components shall conform to their relevant standard(s).

NOTE Conformity with a standard for the relevant component does not necessarily ensure conformity with this standard.

A.2 Electromagnetic compatibility (EMC) requirements

Plugs incorporating electronic circuits, apart from inherently benign components, shall conform to the immunity and emission requirements of the relevant product or generic BS EN 61000 standard series. In particular:

a) BS EN 61000-6-1; and

b) BS EN 61000-6-3.

NOTE Inherently benign components do not normally generate electromagnetic disturbances. Examples of inherently benign components are LED indicators, diodes, resistors, varistors, capacitors, surge suppressors and inductors. This list is not exhaustive.

No additional EMC immunity or emission tests are required if the following conditions are fulfilled:

1) the incorporated devices and components conform to the requirements for EMC as required by the relevant product or generic EMC standard; and

2) the internal installation and wiring is carried out in accordance with the devices and component manufacturer's instructions (arrangement with regard to mutual influences, cable, screening, earthing etc.).

In all other cases the EMC requirements are to be verified by tests, in particular as per BS EN 61000-6-1 and BS EN 61000-6-3.

A.3 Surge protective devices (SPDs)

A.3.1 General

Surge protective devices incorporated in BS 1363-1:2023 plugs shall conform to the requirements in **A.3.2**.

NOTE 1 The use of SPDs, variously known as voltage dependent resistors (VDRs), gas discharge tubes, avalanche breakdown diodes and similar devices, might have particular applications and restrictions in their use in many safety standards. Restrictions are applied where the disconnection of earth is possible as a single fault condition (applicable, for example, to domestic pluggable equipment).

The slow deterioration of surge protection devices with time might result in an increase in leakage current. This can cause a permanent and continuously increasing temperature stress, which can cause the component to burn or burst, and thus SPDs/VDRs are regarded as potential safety hazards.

NOTE 2 This annex does not cover comprehensive type testing which is specified in the BS EN 61643 series.

A.3.2 Requirements

The following types of SPD of the appropriate category shall be considered acceptable:

a) metal oxide varistors comforming to BS EN 61643-331;

b) gas discharge tubes conforming to BS EN 61643-311;

c) avalanche breakdown diodes conforming to BS EN 61643-321.

VDRs conforming to BS EN IEC 61051-2 and having the following characteristics shall be considered acceptable:

1) Preferred climatic categories:

   Lower category temperature −10 °C

   Upper category temperature +85 °C

   Duration of damp heat, steady state test: 21 days.

2) Maximum continuous voltage:

   The maximum continuous a.c. voltage shall be at least 315 V.

3) Pulse current (BS EN IEC 61051-2:2021, Table 4, Group 1)

   Combination pulses of 6 kV/3 kA of alternating polarity are used, having a pulse shape of 1.2/50 µs for voltage and 8/20 µs for current.

In addition to the performance requirements of BS EN IEC 61051-2:2021, Table 4, Group 1, the clamping voltage after the test shall not have changed by more than 10%, when measured with the manufacturer's specified current.

A.3.3 Conformity

Conformity to **A.3.2** shall be checked by inspection of component conformity evidence.

A.3.4 Incorporation of VDRs in plugs

A circuit interrupting device having adequate breaking capacity shall be connected in series with the VDR to provide protection against:

a) temporary overvoltages above the maximum continuous voltage;

b) thermal overload due to leakage current within the VDR;

c) burning and bursting of the VDR in the event of a short-circuit fault.

The following methods of VDR incorporation are permitted:

1) Between L and N

   A VDR is permitted between line and neutral provided that it is protected by the BS 1362:1973+A3 fuse in the plug.

2) Between L and E

   A VDR is permitted between line and protective earth provided it is protected by the BS 1362:1973+A3 fuse in the plug and is connected in series with a spark gap/gas discharge tube meeting the requirements for basic insulation.

A.3.5 Conformity

Conformity to **A.3.4** shall be checked by inspection.

A.4 Electronic switches

A.4.1 General

Electronic switches incorporated in plugs shall conform to BS EN IEC 60669-2-1.

A.4.2 Conformity

Conformity to **A.4.1** shall be checked by inspection of conformity evidence or by test.

Annex B (informative) Recommendations for products that incorporate BS 1363-1 plug pins

It is recommended that products that incorporate BS 1363-1 plug pins meet the requirements of the following clauses:

Table B.1 — *List of clauses*

Test carried out to:	BS 1363-3:2023
Turning moment test	**14.10**
Test carried out to:	BS 1363-1:2023
Clause **13**: Construction of plugs	**13.1**, **13.2**, **13.3**, **13.9**, **13.11**, **13.12**, **13.13**, **13.16** & **13.17** ONLY
Clause **13.9.5** (for ISODs and nickel plated pins) Construction of plugs (wear to socket-outlets)	**13.9.5**, **13.9.5.1** and **13.9.5.2**
Clause **23** (For ISODs) Resistance to heat	**23.2** ONLY
Clause **24** (For ISODs) Resistance to abnormal heat and fire	**24.2** ONLY

Annex C (normative)
Pollution degree

COMMENTARY ON ANNEX C

The micro-environment determines the effect of pollution on the insulation. The macro-environment, however, has to be taken into account when considering the micro-environment.

Means may be provided to reduce pollution at the insulation under consideration by effective use of enclosures, encapsulation or hermetic sealing. Such means to reduce pollution might not be effective when the PT system is subject to condensation or if, in normal operation, it generates pollutants itself.

Small clearances can be bridged completely by solid particles, dust and water and therefore minimum clearances are specified where pollution might be present in the micro-environment.

Pollution will become conductive in the presence of humidity. Pollution caused by contaminated water, soot, metal or carbon dust is inherently conductive.

Degrees of pollution in the micro-environment

For the purpose of evaluating creepage distances and clearances, the following three degrees of pollution in the micro-environment as defined in BS EN IEC 60664-1 shall be used.

Pollution degree 1

No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.

Pollution degree 2

Only non-conductive pollution occurs except that occasionally a temporary conductivity caused by condensation is to be expected.

Pollution degree 3

Conductive pollution occurs or dry non-conductive pollution occurs which becomes conductive due to condensation which is to be expected.

Annex D (normative)
Relation between rated impulse withstand voltage, rated voltage and Overvoltage Category

Table D.1 gives the rated impulse withstand voltage that shall be used for plugs energized directly from the low voltage mains.

Table D.1 — *Rated impulse withstand voltage for plugs energized directly from the low voltage mains*

Nominal voltage of the supply system based on IEC 60038 [A)]	**Voltage line-to-neutral derived from nominal voltages a.c. or d.c. up to and including**	**Rated impulse withstand voltage**		
V	V	V		
		Overvoltage Category		
		I	**II**	**III**
230/400	300	1 500	2 500	4 000

NOTE 1 For more information concerning supply systems see BS EN IEC 60664-1.

NOTE 2 For more information concerning Overvoltage Category see BS EN IEC 60664-1.

NOTE 3 Plugs fall into Overvoltage Category III. Parts of plugs where appropriate overvoltage reduction is provided fall into Overvoltage Category I.

[A)] The / mark indicates a four-wire three-phase distribution system. The lower value is the voltage line-to-neutral, while the higher value is the voltage line to line.

Annex E (normative)
Impulse voltage test

The purpose of this test is to verify that clearances will withstand specified transient overvoltage. The impulse withstand voltage test shall be carried out with a voltage having a 1.2/50 µs waveform as specified in BS EN 61180:2016, Clause **7** and is intended to simulate overvoltage of atmospheric origin. It also covers overvoltages due to switching of low voltage equipment.

The test shall be conducted for a minimum of three impulses of each polarity with an interval of at least 1 s between pulses. There shall be no discharges during the test. Glow discharges without a drop in voltage shall be ignored.

For solid insulation and for clearances not checked by measurement, the impulse withstand voltage shall be applied between:

a) line and neutral terminals/terminations;

b) line and neutral terminals/terminations connected together and:

   1) a sheet of metal foil in contact with the entire accessible external surface;

   2) the earthing terminal/termination;

   3) any metal part of a cable anchorage;

c) each switched pole terminal of a switched plug and corresponding plug pin, with the switch contacts open.

NOTE 1 The output impedance of the impulse generator should be not higher than 500 Ω.

NOTE 2 The expression "discharge" is used to cover the phenomena associated with the failure of insulation under electric stress, which include current flow and a drop in voltage.

The impulse shall have the following characteristics: the waveform 1.2/50 µs for the no-load voltage with amplitudes equal to the values given in Table E.1.

NOTE 3 If the sample is provided with surge suppression, the impulse voltage wave may be chopped but the sample should be in a condition to operate normally again after the test. If the sample is not provided with surge suppression and it withstands the impulse voltage, the waveform will not be noticeably distorted.

Table E.1 — *Test voltages for verifying clearances at sea level*

Rated impulse withstand voltage $\hat{U}$	**Impulse test voltage at sea level $\hat{U}$**
kV	kV
0.33	0.35
0.5	0.55
0.8	0.91
1.5	1.75
2.5	2.95
4.0	4.8
6.0	7.3

NOTE 1 When testing clearances, associated solid insulation will be subjected to the test voltage. As the impulse test voltage of Table E.1 is increased with respect to the rated impulse withstand voltage, solid insulation will have to be designed accordingly. This results in an increased impulse withstand capability of the solid insulation.

NOTE 2 The test may be made with the pressure adjusted to the value corresponding to the altitude of 2 000 m (80 kPa) and 20 °C with the test voltage corresponding to the rated impulse withstand voltage. In this case, solid insulation will not be subjected to the same withstand requirements as when testing at sea level.

NOTE 3 Explanations concerning the influencing factors (air pressure, altitude, temperature humidity) with respect to electric strength of clearances are given in BS EN IEC 60664-1.

Annex F (normative) Measurement of clearance and creepage distances

The width *X* specified in Figure F.1 to Figure F.11 shall apply to all examples as a function of the pollution degree as given in Table F.1.

Table F.1 — *Minimum values of width X*

Pollution degree	**Minimum values of width *X***
	mm
1	0.25
2	1.0
3	1.5

NOTE If the associated clearance is less than 3 mm, the minimum groove width may be reduced to one third of this clearance.

The methods of measuring creepage distances and clearances are indicated in the following Figure F.1 to Figure F.11. These cases do not differentiate between gaps and grooves or between types of insulation.

The following assumptions are made:

a) any recess is assumed to be bridged with an insulating link having a length equal to the specified width *X* and being placed in the most unfavourable position (see Figure F.3);

b) where the distance across a groove is equal to or larger than the specified width *X*, the creepage distance is measured along the contours of the groove (see Figure F.2); and

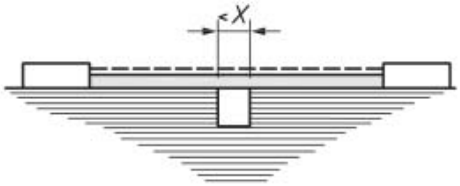
c) creepage distances and clearances measured between parts which might assume different positions in relation to each other, are measured when these parts are in their most unfavourable position.

Key for Figure F.1 to Figure F.11

– – – – – – – – – – – – –	clearance
▭	creepage distance

NOTE All dimensions are in millimetres.

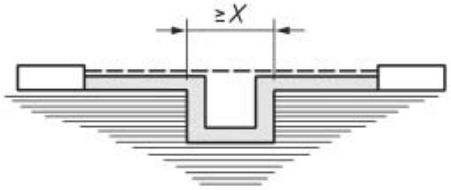
Figure F.1 — *Example 1*



Condition: Path under consideration includes a parallel or converging sided groove of any depth and with a width less than "*X*" mm.

Rule: Creepage distance and clearance are measured directly across the groove as shown.

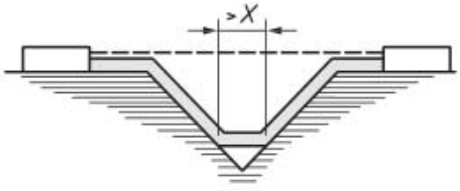
Figure F.2 — *Example 2*



Condition: Path under consideration includes a parallel-sided groove of any depth and with a width equal to or greater than "*X*" mm.

Rule: Clearance is the "line of sight" distance. Creepage path follows the contour of the groove.

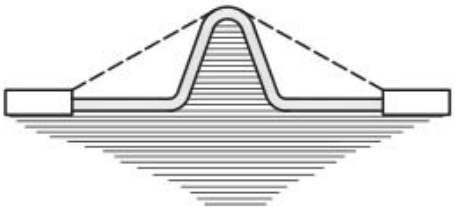
Figure F.3 — *Example 3*



Condition: Path under consideration includes a V-shaped groove with a width greather than "*X*" mm.

Rule: Clearance is the "line of sight" distance. Creepage path follows the contour of the groove but "short-circuits" the bottom of the groove by an "*X*" mm link.

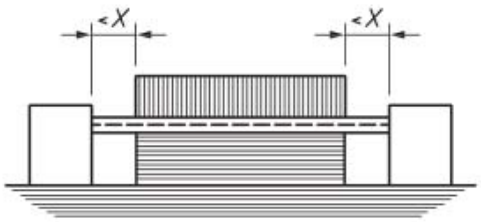
Figure F.4 — *Example 4*



Condition: Path under consideration includes a rib.

Rule: Clearance is the shortest direct air path over the top of the rib. Creepage path follows the contour of the rib.

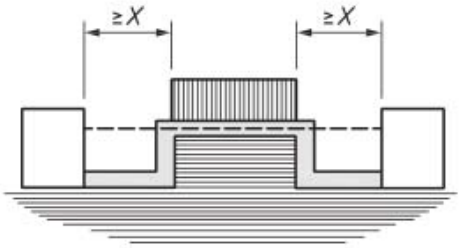
Figure F.5 — *Example 5*



Condition: Path under consideration includes an uncemented joint with grooves less than "*X*" mm wide on each side.

Rule: Creepage and clearance path is the "line of sight" distance shown.

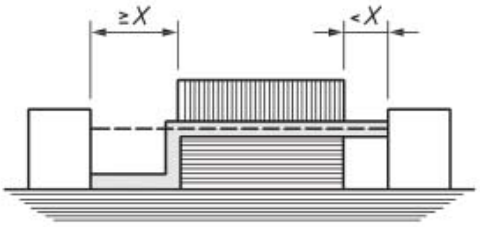
Figure F.6 — *Example 6*



Condition: Path under consideration includes an uncemented joint with grooves equal to or more than "*X*" mm wide on each side.

Rule: Clearance path is the "line of sight" distance. Creepage follows the contour of the grooves.

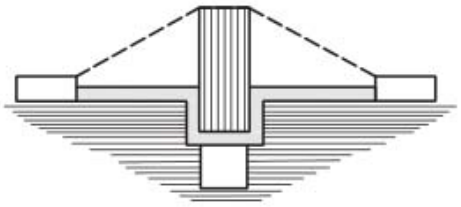
Figure F.7 — *Example 7*



Condition: Path under consideration includes an uncemented joint with groove on one side less than "*X*" mm wide and the groove on the other side equal to or more than "*X*" mm wide.

Rule: Clearance and creepage paths are as shown.

Figure F.8 — *Example 8*



Condition: Path under consideration includes a barrier with an uncemented joint. The creepage distance through the uncemented joint is less than the creepage distance over the barrier.

Rule: Clearance is the shortest direct air path over the top of the barrier. The creepage path follows the contour of the joint.

Figure F.9 — *Example 9*

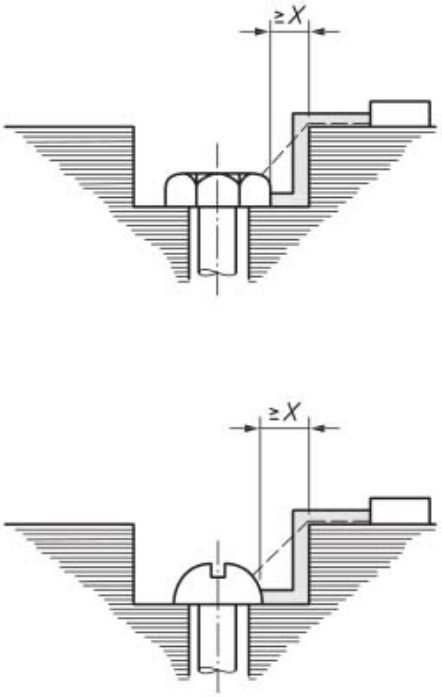
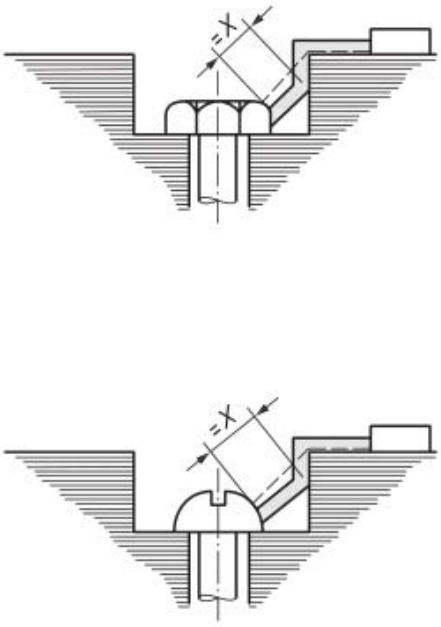


Figure F.9 — *Example 9 (continued)*

Condition: Gap between head of screw and wall of recess wide enough to be taken into account (greater than or equal to "*X*" mm).

Rule: Clearance and creepage paths are as shown.

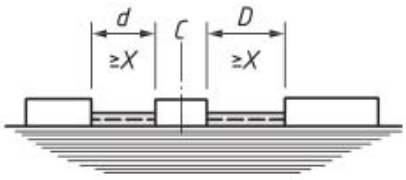
Figure F.10 — *Example 10*



Condition: Gap between head of screw and wall of recess too narrow to be taken into account (less than "*X*" mm).

Rule: Measurement of clearance and creepage distance is from the screw head to the point on the wall which is at a distance equal to "*X*" mm (as shown).

Figure F.11 — *Example 11*



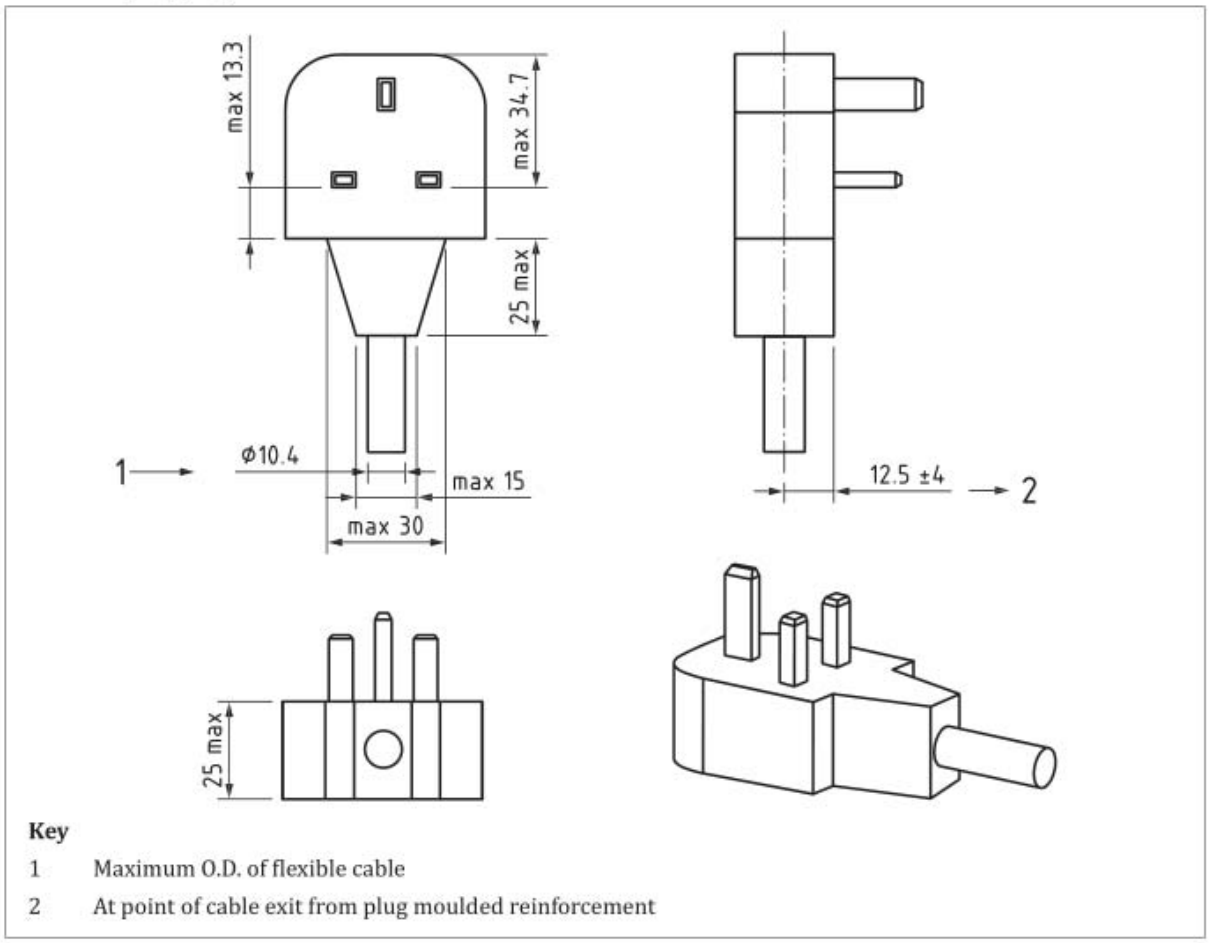
Condition: Path under consideration includes a floating part, *C*, with different sized grooves either side, each greater than or equal to "*X*" mm.

Rule: Clearance and creepage distance are both distance *d* + *D*.

Annex G (informative) Dimensions for plug profiles

Figure G.1 shows a normal plug profile. Figure G.2 shows a compact plug profile.

Figure G.1 — *Normal plug profile*



Key

1 Maximum O.D. of flexible cable

2 At point of cable exit from plug moulded reinforcement

Figure G.2 — *Compact plug profile*

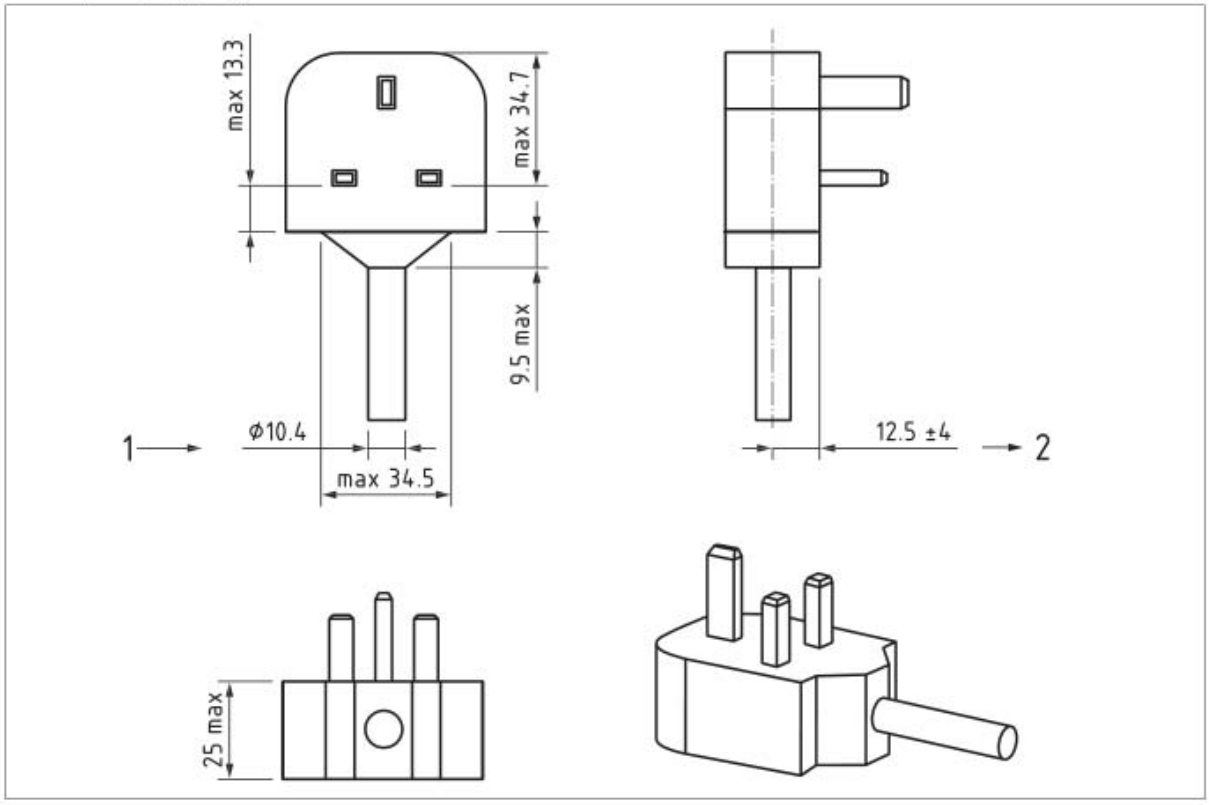


Figure G.2 — *Compact plug profile (continued)*

Key	
1	Maximum O.D. of flexible cable
2	At point of cable exit from plug moulded reinforcement

Annex H (normative)
The construction and calibration of a calibrated link

H.1 Construction

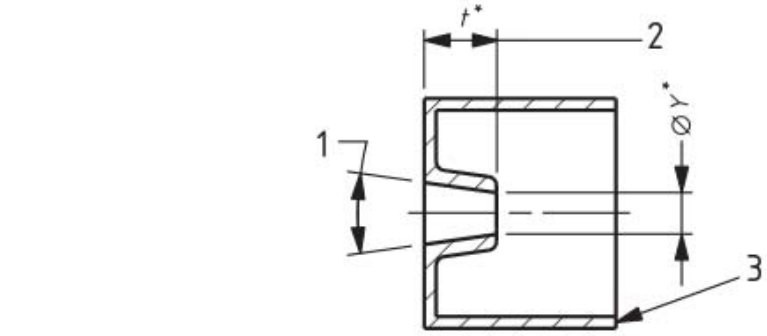
The calibrated link [see Figure 28a), Figure 28b), Figure 28c) and Figure 28d)] shall employ the following components used to produce fuses conforming to BS 1362:

a) ceramic body (as standard);

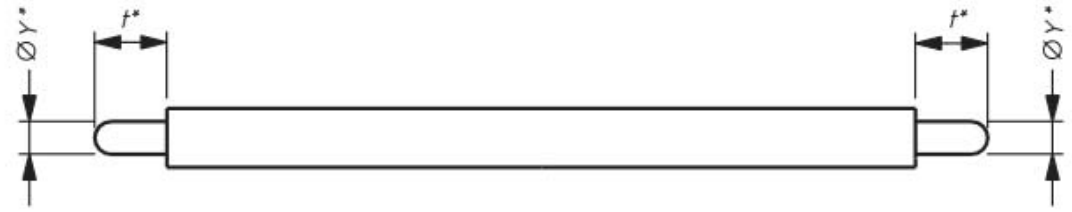
b) filing (as standard); and

c) end caps [modified standard cap as shown in Figure 28a)].

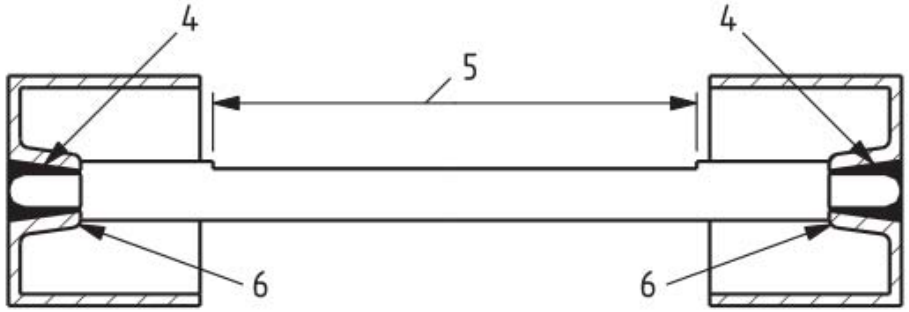
Figure 28 — *Calibrated link*



a) Modified standard end cap (section)

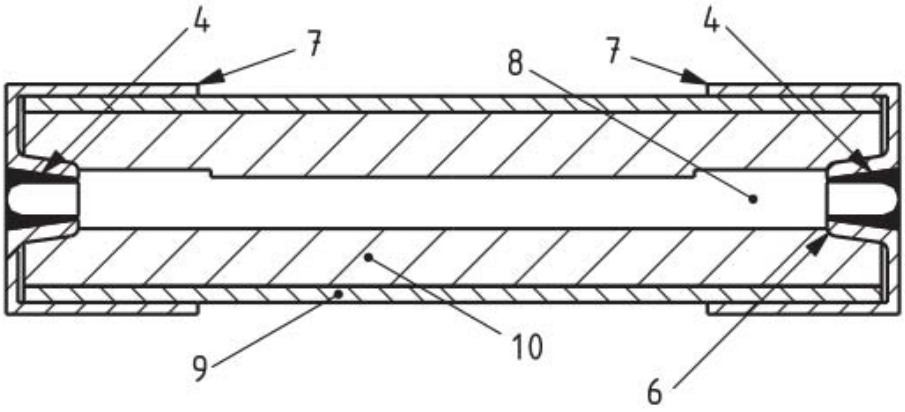


b) Calibrated link: Resistive element Cu Ni



c) Calibrated link: Assembly for calibration (section)

Figure 28 — Calibrated link *(continued)*



d) Calibrated link: Assembled link (section)

Key

1	Taper ream to facilitate soldering	6	End caps butt to element shoulders
2	End wall thickness	7	End caps
3	Hard-bright silver plated 0.025 thick	8	Resistive element
4	Solder	9	Standard ceramic tube
5	Filing length for watt-loss adjustment	10	Standard filling

NOTE This drawing is not intended to govern design except as regards the dimensions and specific requirements shown.

* See **H.1**.

The resistive element shall be of copper nickel wire having a resistivity value between 44 μΩ·cm and 49 μΩ·cm. The overall length shall be $25.4^{+0.8}_{-0.4}$ mm and the diameter such as to allow a small reduction in the cross-sectional area to adjust the watts loss to the required value. The ends are turned down so that the distance between the shoulders so formed shall be $25.4^{+0.8}_{-0.4}$ mm less twice the end cap end wall thickness "*t*" [see Figure 28b)].

The resistive element shoulders shall be firmly butted to the inside faces of the end caps and soldered using a tin-silver solder, alloy No. 701 as specified in BS EN ISO 9453:2020 or other tin-silver solder with a silver content not less than 3.5%, e.g. grade 96S as specified in BS 219:1977. The assembly thus formed [see Figure 28c)] shall be checked for watts loss in accordance with **H.2**. Metal shall then be filed carefully from the resistive element over as long a length as is possible and the assembly rechecked until the desired watts loss is achieved.

One end cap shall then be unsoldered, a standard ceramic body fitted, the cavity filled and the end cap resoldered in position making sure the shoulder of the element is butted to the inside of the end cap; the ceramic body shall not interfere with this condition [see Figure 28d)].

The watts loss shall be rechecked in accordance with **H.2** and adjusted if necessary.

The resulting calibrated link shall be marked "NOT A FUSE" on the ceramic body and shall dimensionally be in accordance with BS 1362.

H.2 Calibration

The calibration jig shown in Figure 29 is mounted horizontally approximately 25 mm above a wooden board by means of two ceramic pillars. A fine wire thermocouple is attached to the centre of each fuse contact clip, on the outside of the top edge, in such a way that it does not interfere with the contact area. The thermocouples are taken out of the box in slots cut in one end of the jig base, the width of the slots just being sufficient to accept the diameter of the thermocouples. The connection to the

jig base shall be by means of PVC insulated single core copper cables, 0.3 m ±0.05 m in length and 2.5 mm^2 cross-section.

The surroundings shall be free from draughts and the ambient air temperature, measured by a suitable thermometer or thermocouple at a horizontal distance of 1 m to 2 m from the standard link shall be in the range of 15 °C to 25 °C. The standard link shall be inserted into the clips provided in the calibration jig and the cover replaced. A current of 13 A ±0.1 A is then passed continuously through the calibrated link for 60 min ±5 min. At the end of this time the temperature measured by the thermocouples are noted, the cover of the jig is then removed and the millivolt drop between the end surfaces of the end caps of the calibrated link is measured whilst it is still carrying the test current.

Alternating current (a.c.) shall be used for the calibration.

The calibration is considered to be correct when the following apply:

a) the product of the measured millivolt drop multiplied by the test current gives a result of $1^{0}_{-0.05}$ W; and

b) the temperature difference between the fuse contact clips does not exceed 2 °C.

Figure 29 — *Calibration jig for calibrated link*

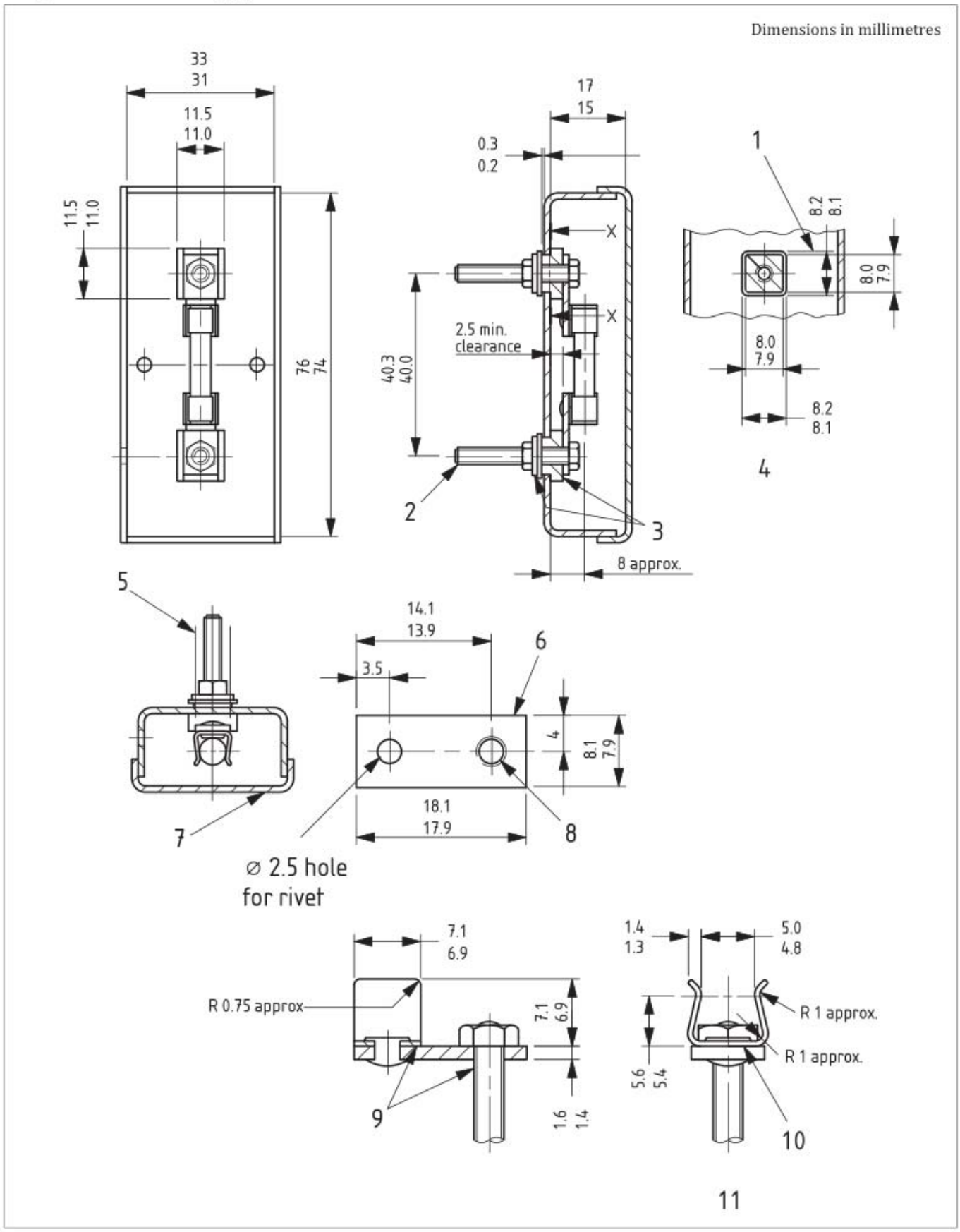


Figure 29 — *Calibration jig for calibrated link (continued)*

Key

1	Float [A]	7	Cover [B], [C]
2	Terminal stem M3 × 25	8	Hole tapped M3 for terminal stem
3	Insulating material	9	Joints between clip, contact plate and terminal stem to be soldered
4	Part section X-X [A]	10	Fuse clip [D]
5	Groove to fit contact plate	11	Contact assembly
6	Contact place, brass		

[A] The end float and clearance between the insulation and the box is to allow the contacts to be self aligning.

[B] Box and cover made from 1.25 mm brass sheet, clean natural finish.

[C] Cover shall be a push fit on box and shall not be rigidly attached.

[D] Fuse clip made from beryllium copper 0.45 mm thick and heat treated (170 HV minimum). Base of clip to be flat; finish, silver plated.

Annex I (normative) Determination of the Comparative Tracking Index and Proof Tracking Index

The Comparative Tracking Index (CTI) or Proof Tracking Index (PTI) shall be determined in accordance with BS EN IEC 60112:2020.

For the purpose of this standard the following applies.

a) In BS EN IEC 60112:2020, Clause **5**, Test specimen:

   1) Note 3 and the last paragraph also apply to PTI;

   2) If the surface 15 mm × 15 mm cannot be obtained because of the small dimensions of the PT system then special samples made with the same manufacturing process might be used.

b) The test solution "A" described in BS EN IEC 60112:2020, **7.3** shall be used.

c) In BS EN IEC 60112:2020, Clause **8**, Procedure, either CTI or PTI is determined.

   1) CTI is determined in accordance with BS EN IEC 60112:2020, Clause **11**.

   2) The PTI test of BS EN IEC 60112:2020, Clause **10**, is performed on five samples at the voltage referred to in BS EN IEC 60112:2020, **10.1**, based on the appropriate creepage distance, material group, pollution degree conditions and on the rated voltage of this standard declared by the manufacturer.

Annex J (informative) Annex identification migration from 2016 edition to 2023 edition

Table J.1 gives details of the annex renumbering from the 2016 editions of BS 1363, Part 1 to Part 5 to the 2023 editions.

Table J.1 — BS 1363 annex identification migration from 2016 to 2023

Annex title	Annex reference									
	BS 1363 Part 1		BS 1363 Part 2		BS 1363 Part 3		BS 1363 Part 4		BS 1363 Part 5	
	BS 1363-1:2016+A1:2018	BS 1363-1:2023	BS 1363-2:2016+A1:2018	BS 1363-2:2023	BS 1363-3:2016+A1:2018	BS 1363-3:2023	BS 1363-4:2016+A1:2018	BS 1363-4:2023	BS 1363-5:2016	BS 1363-5:2023
The construction and calibration of a calibrated link	A	H	A	G	A	H	A	F	A	F
Measurement of clearances and creepage distances	B	F	B	E	B	F	B	E	B	E
Determination of the Comparative Tracking Index and Proof Tracking Index	C	I	C	F	C	D	C	C	C	C
Relation between rated impulse withstand voltage, rated voltage and Overvoltage Category	D	D	D	C	D	C	D	B	D	B
Pollution degree	E	C	E	B	E	B	E	A	E	A
Impulse voltage test	F	E	F	D	F	E	F	D	F	D
Requirements for incorporated electronic components	G	A	I	A	H	A	–	–	–	–
Specific structure of BS EN 50525 and its derivation from British Standards and from HD 21 and HD 22	H	–	H	–	I	–	G	–	–	–
Recommendations for products that incorporate BS 1363-1 plug pins	I	B	–	–	–	–	–	–	–	–

Table J.1 — BS 1363 annex identification migration from 2016 to 2023 *(continued)*

Annex title	Annex reference									
	BS 1363 Part 1		BS 1363 Part 2		BS 1363 Part 3		BS 1363 Part 4		BS 1363 Part 5	
	BS 1363-1:2016+A1:2018	BS 1363-1:2023	BS 1363-2:2016+A1:2018	BS 1363-2:2023	BS 1363-3:2016+A1:2018	BS 1363-3:2023	BS 1363-4:2016+A1:2018	BS 1363-4:2023	BS 1363-5:2016	BS 1363-5:2023
Dimensions for plug profiles	J	G	–	–	–	–	–	–	–	–
Test plug for temperature rise test	–	–	G	H	G	G	–	–	–	–
Recommendations for products that incorporate BS 1363-2 socket-outlets	–	–	–	I	–	–	–	–	–	–
Annex identification migration from 2016 edition to 2023 edition	–	J	–	J	–	I	–	G	–	G

Bibliography

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For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 219:1977, *Specification for soft solders*

BS 1363-3:2023, *13 A plugs, socket-outlets, adaptors and connection units – Part 3: Adaptors – Specification*

BS 1363-4:2023, *13 A plugs, socket-outlets, adaptors and connection units – Part 4: 13 A fused connection units: switched and unswitched – Specification*

BS 1363-5:2023, *13 A plugs, socket-outlets, adaptors and connection units – Part 5: Fused conversion plugs – Specification*

BS EN 61140, *Protection against electric shock – Common aspects for installation and equipment*

Other publications

[1] GREAT BRITAIN. The Plugs and Sockets etc. (Safety) Regulations 1994. SI No. 1768. London: The Stationery Office

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