DEAS 495-3: 2024

ICS 29.120.30

DRAFT EAST AFRICAN STANDARD

Plugs, socket-outlets, adaptors and connection units — Part 3: Specification for adaptors

EAST AFRICAN COMMUNITY

Second Edition

Copyright notice

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 054, *Electrical appliances, machines, and equipment.*

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

This second edition cancels and replaces the first edition (EAS 495-1), which has been technically revised.

DEAS 495 consists of the following parts, under the general title *Plugs, socket-outlets, adaptors and connection units*:

— *Part 1: Specification for rewirable and non-rewirable fused plugs*

— *Part 2: Specification for switched and unswitched socket outlets*

— *Part 3: Specification for adaptors*

— *Part 4: 13 A fused connection units: Switched and unswitched*

Plugs, socket-outlets, adaptors and connection units — Part 3: Adaptors

1 Scope

This part of Draft East African Standard specifies requirements for adaptors having insulating sleeves on the line and neutral plug pins and suitable for use with socket-outlets complying with EAS 495-2, with particular reference to safety in normal use. Adaptors specified in this part of EAS 495 are intended for household, commercial and light industrial purposes. The adaptors 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. at 50 Hz.

Adaptors incorporating electronic components detailed in Annex A are included within this part of EAS 495.

This standard also applies to shaver adaptors 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 a socket-outlet conforming to EAS 495-2.

Adaptors conforming to this standard are shuttered and therefore do not require the use of additional means to shield the current carrying contacts when no plug is present in the adaptor socket-outlets.

Assemblies comprising a plug and one or more portable socket-outlets connected together by a flexible cord or cable are not considered to be adaptors according to this part of EAS 495. Devices incorporating switches, transformers, timers, thermostats or other control means are outside the scope of this part of EAS 495.

NOTE 1 The titles of the publications referred to in this standard are listed on the inside back cover.

NOTE 2 In order to maintain safety and interchangeability with plugs and socket-outlets it is necessary that these products comply with the requirements of Clause 9, Clause 12 and Clause 13, however their body outline need not be limited at a distance of 6.35 mm from the plug engagement face.

An adaptor is mechanical by nature of construction. The product is therefore immune from electromagnetic interference. An adaptor that does not incorporate electronic devices does not emit intolerable electromagnetic interference, since significant electromagnetic disturbances are only generated during insertion and withdrawal which are not continuous. This East African Standard does not cover:

a) Direct plug-in devices

b) Automatic electric controls

c) Travel adaptors.

This standard applies to all adaptors in East African Region

2 Normative references

The following referenced documents are indispensable for the application of this East African Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EAS 496, General purpose fuse links for domestic and similar purposes (primarily for use in plugs) – Specification

IEC 60112, Method for the determination of the proof and the comparative tracking indices of solid insulating materials

ISO 9453, Soft solder alloys – Chemical compositions and forms

EAS 495-1, 13 A plugs, socket-outlets, adaptors and connection units — Part 1: Specification for rewirable and non-rewirable 13 A fused plugs

EAS 495-2, 13 A plugs, socket-outlets, adaptors and connection units — Part 2: Specification for 13 A switched and unswitched socket-outlets

EAS 495-4, 13 A plugs, socket-outlets, adaptors and connection units — Part 4: Specification for 13 A fused connection units: switched and unswitched

IEC 60893-1, Insulating materials – Industrial rigid laminated sheets based on thermosetting resins for electrical purposes – Part 1: Definitions, designations and general requirements

IEC 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 1654, Copper and copper alloys – Strip for springs and connectors

IEC 60999-1, Connecting devices – Electrical copper conductors – Safety requirements for screwtype and screwless-type clamping units – Part 1: General requirements and particular requirements for clamping units for conductors from 0.2 mm2 up to 35 mm2 (included)

EAS 203, Boxes for enclosure of electrical accessories — Specification

ISO 7724, Paints and varnishes – Colorimetry

ISO 8458-2, Steel wire for mechanical springs – Part 2: Patented cold-drawn non-alloy steel wire

IEC 60112:1980, Method of test for determining the comparative and the proof tracking indices of solid insulating rnaterials under moist conditions

IEC 60227-5, Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 5: Flexible cables (cords)

IEC 60245-4 Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables

IEC 60245-8:1998+AMD1:2003+AMD2:2011 Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 8: Cords for applications requiring high flexibility IEC 60417, Graphical symbols for use on equipment

IEC 60695-1-1, Fire hazard testing – Part 1-1: Guidance for assessing the fire hazard of electrotechnical products – General guidelines

IEC 60695-4, Fire hazard testing – Part 4: Terminology concerning fire tests for electrotechnical products

IEC 60695-2-10, Fire Hazard testing – Part 2-10: Glowing/hot-wire based test methods – Glow-wire apparatus and common test procedure

EAS 370, Test probes to verify protection by enclosure

BS 546, Specification — Two-pole and earthing-pin plugs, socket-outlets and socket-outlet adaptors

BS 646, Specification — Cartridge fuse-links (rated up to 5 amperes) for a.c. and d.c. service

ISO 2039-1, Plastics – Determination of hardness – Part 1: Ball indentation method

ISO 2039-2, Plastics – Determination of hardness – Part 2: Rockwell hardness

BS 4573, Specification for 2-pin reversible plugs and shaver socket-outlets

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

IEC 60445:2021, Basic and safety principles for man-machine interface, marking and identification - Identification of equipment terminals, conductor terminations and conductors.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

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

3.1 adaptor

V a portable accessory having plug pins, intended to engage with the contacts of a EAS 495 socket outlet, and having socket-outlet contacts to accommodate one or more plugs

3.2 adaptor socket-outlet

a set of contacts forming part of an adaptor and designed to engage with the pins of a corresponding plug

3.3 multiway adaptor

an adaptor having more than one set of socket contacts (the socket contacts may or may not be of the same - type or rating as the plug pin portion)

3.4 non-rewirable adaptor

an adaptor as in 3.7 or 3.8, so constructed that it forms a complete unit with the flexible cord such that the o flexible cord after connection and assembly by the manufacturer of the adaptor

NOTE See also 12.6.

3.5 rewirable adaptor

an adaptor as in 3.7 or 3.8, so constructed that a flexible cord can be fitted or replaced using general purpose tools

3.6 fused adaptor

an adaptor having a replaceable cartridge fuse link interposed between the line pin and one or more line socket contacts

3.7 adaptor plug

a fused adaptor having one or more socket-outlets and provision for the connection of a flexible cord to a portable appliance, in parallel with the socket-outlet

3.8 intermediate adaptor

a fused adaptor having one or more socket-outlets and provision for the connection of a flexible cord to a remote control device in series with the socket-outlet

3.9 conversion adaptor

a fused adaptor having one or more sets of socket contacts of a type or rating differing from the plug pin portion

3.10 shaver adaptor

a fused conversion adaptor specifically designed to have a single socket-outlet capable of accepting the plugs normally fitted to electrical shavers as referred to in Clause 18

3.11 shutter

a movable device arranged to shield the current carrying socket-outlet contacts automatically when a corresponding plug is removed

3.12 terminal

a means by which the user can make an electrical connection between the appropriate flexible cord and the conducting parts of the adaptor without the use of special tools

3.13 screw-type terminal

a terminal in which the connection is made directly by means of screws or nuts of any kind or indirectly through an intermediate metal part such as a washer, clamping plate or anti spread device on which the screw bears directly

NOTE The following are examples of screw-type terminals.

a) A pillar terminal is a terminal in which the conductor is inserted into a hole or cavity, where it is clamped under the shank of the screw or screws.

b) A screw terminal is a terminal in which the conductor is clamped under the head of the screw.

c) A stud terminal is a terminal in which the conductor is clamped under a nut.

3.14 termination

a means by which an electrical connection can be made between the appropriate flexible cord and the conducting part of the adaptor using special purpose tools, e.g. soldering, welding, crimping

3.15 fuse carrier

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

3.16 type test

a test or series of tests made on a type test sample, for the purpose of checking compliance of the design of a given product with the requirements of the relevant standard

3.17 type test sample

a sample consisting of one or more similar units or specimens submitted by the manufacturer or responsible vendor for the purpose of a type test

3.18 accessible external surface of an adaptor all surfaces which can be touched by test probe B of EAS 370 when the adaptor is in full engagement with the corresponding socket-outlet without any plugs being in engagement with the adaptor

3.19 engagement surface of an adaptor that surface which cannot be touched by test probe B of EAS 370 when the adaptor is in full engagement with a corresponding socket-outlet without any plugs being in engagement with the adaptor

3.20 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.

3.21 fine wire thermocouple

a thermocouple having wires not exceeding 0.3 mm in diameter

3.22 calibrated link

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

3.23 indicator lamp (pilot lamp)

a lamp which illuminates to indicate that the adaptor is energized

3.24 resilient material

a material having the inherent capability of regaining or substantially regaining its original form when deforming loads are removed

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

3.26 clearance
shortest distance in air between two conductive parts

3.27 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.

3.28 supplementary insulation

independent insulation applied in addition to basic insulation, in order to provide protection against electric shock in the event of failure of basic insulation

3.29 reinforced insulation

a single insulation system applied to live parts, which provides a degree of protection against electric shock equivalent to double insulation under the conditions specified in the relevant standard

3.30 functional insulation

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

3.31

actuating member

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

3.32

insulated shutter opening device (ISOD)

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

3.33

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

3.34

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

3.35

engagement surface of the socket-outlet portion of an adaptor

surface, ignoring any raised marking, which is in contact with or directly beneath the Figure 11 gauge when it is in full engagement with the socket-outlet

3.36

insignificant mass

insufficient combustible mass to constitute a fire hazard

4 General requirements and conditions of use

4.1 Adaptors shall be so designed and constructed that in nor mal use their performance is reliable and minimizes the risk of danger to the user or to the surroundings. Such adaptors shall be capable of meeting all the relevant requirements and tests specified in this part of EAS 495.

4.2 Adaptors shall be suitable for use under the following conditions:

a) an ambient temperature in the range -5 °C to +45 °C, the average value over 24 h not exceeding 30 °C;

NOTE Under normal conditions of use, the available cooling air is subject to natural atmospheric variations of temperature and hence the peak temperature occurs only occasionally during the hot, season, and on those days when it does occur it does not persist for lengthy periods.

b) a situation not subject to exposure to direct radiation from the sun or other source of heat likely to raise temperatures above the limits specified in a);

c) an atmosphere not subject to abnormal pollution by smoke, chemical fumes, rain, spray, prolonged periods of high humidity or other abnormal conditions. This is the equivalent to pollution degree 2, see Annex F, and overvoltage category III, see Annex E.

5 General conditions for type testing

5.1 All tests shall be type tests

Unless otherwise specified in this part of EAS 495, the adaptors shall be tested as delivered by the manufacturer or responsible vendor and under normal conditions of use, at an ambient temperature of 20 °C ± 5 °C after being conditioned at nor mal laboratory temperature and humidity levels for at least 4 days.

The adaptors used for the tests shall be representative of normal production items in respect of all details which may affect the test results.

Non-rewirable adaptors shall be supplied with an appropriate flexible cord which shall be at least 1 m long. Adaptors shall be deemed to comply with this part of EAS 495 if no specimen fails in the complete series of tests given in Table 1.

Table 1 — Schedule of test

Sequence	Samples	Tests	Clause number
1	3	Inspection, measurement, gauging and manipulation	5, 6, 7, 9.1, 9.2, 9.3, 9.5, 9.6, 10.1, 11.1, 12.1, 12.2, 12.3, 12.4, 12.5, 12.11 (12.11.1, 12.11.2, 12.11.3 and 12.11.6 only), 12.15, 12.16, 12.17, 12.18, 13.1, 13.2, 13.3, 13.4, 13.5, 13.8, 13.9, 13.10, 19.2, 19.3, 19.4, 19.6, 21, 8
2	3	General	5, 9.4, 19.1, 12.14, 12.19.2, 12.19.3, 12.19.2
3	3		5, 20.1.2, 20.1.3, 17, 20.1.4, 16
4	3		5, 14.2 12.10, 19.5, 12.19.4
5	3		5, 14.1, 20.1.5, 12.9, 10.2, 12.12, 12.6, 12.7, 12.8, 12.13, 21.3
6	3		5, 14.1, 15, 13.7, IS (13.7, 9.1, 16, 15, 13.5, 13.6, 10.2),
			13.11
7	3*		5, 12.11.4
8 a)	9	Additional tests for adaptors with non-solid pins/or an ISOD	5, 12.11.5
8 b)	3	Additional tests for adaptors fitted with an ISOD	5, 12. 12.4.3
9	3	Materials	5,22
10	3		5,23.2 , 8.2, (Annex C only)
11	3		5,24,21.3
12 A)	3	Positive break (switched adaptors)	5, 13.12.2
13	3	Overloads	5, 14.1, 26

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

NOTE 2 The order of tests given in sequence no. 1 is preferred but not obligatory except where required within the text of the appropriate clause.
NOTE 3 ** denotes that additional samples might be required for adaptors incorporating electronic components.

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

If one specimen fails in a complete series of tests given in Table 1, then adaptors of that type shall be deemed to have failed to comply with this part of EAS 495, unless the adaptor shall be shown to be not representative of normal production or design, in which case a further type test sample shall be submitted to the test or tests in that particular group. If there is no failure in this retest then adaptors of that type shall be deemed to comply with this part of EAS 495.

If more than one specimen fails in the complete series of tests given in Table 1 then adaptors of that type shall be deemed not to comply with this part of EAS 495.

NOTE 1 For type testing, all tests have been included in the test schedule and should be performed in the specified order. References to carrying out specific tests in various clauses are not intended to indicate a sequence of testing different to that in the schedule and should not be conducted as separate additional tests.

5.2 All inspections and tests, of any one classification (see Clause 6), shall be carried out as specified in the clauses listed in Table 1 on the number of specimens in the sample column and in the order given.

5.3 Gauges in accordance with Figure 5, Figure 11, Figure 12, Figure 14, and Figure 16a and Figure 16b shall be considered to comply with the dimensional requirements if the measured values are within the specified dimensions and the uncertainty of measurement at not less than 95 % confidence level does not exceed ±0.005 mm.

Figure 5- ***Gauge or plug pins***

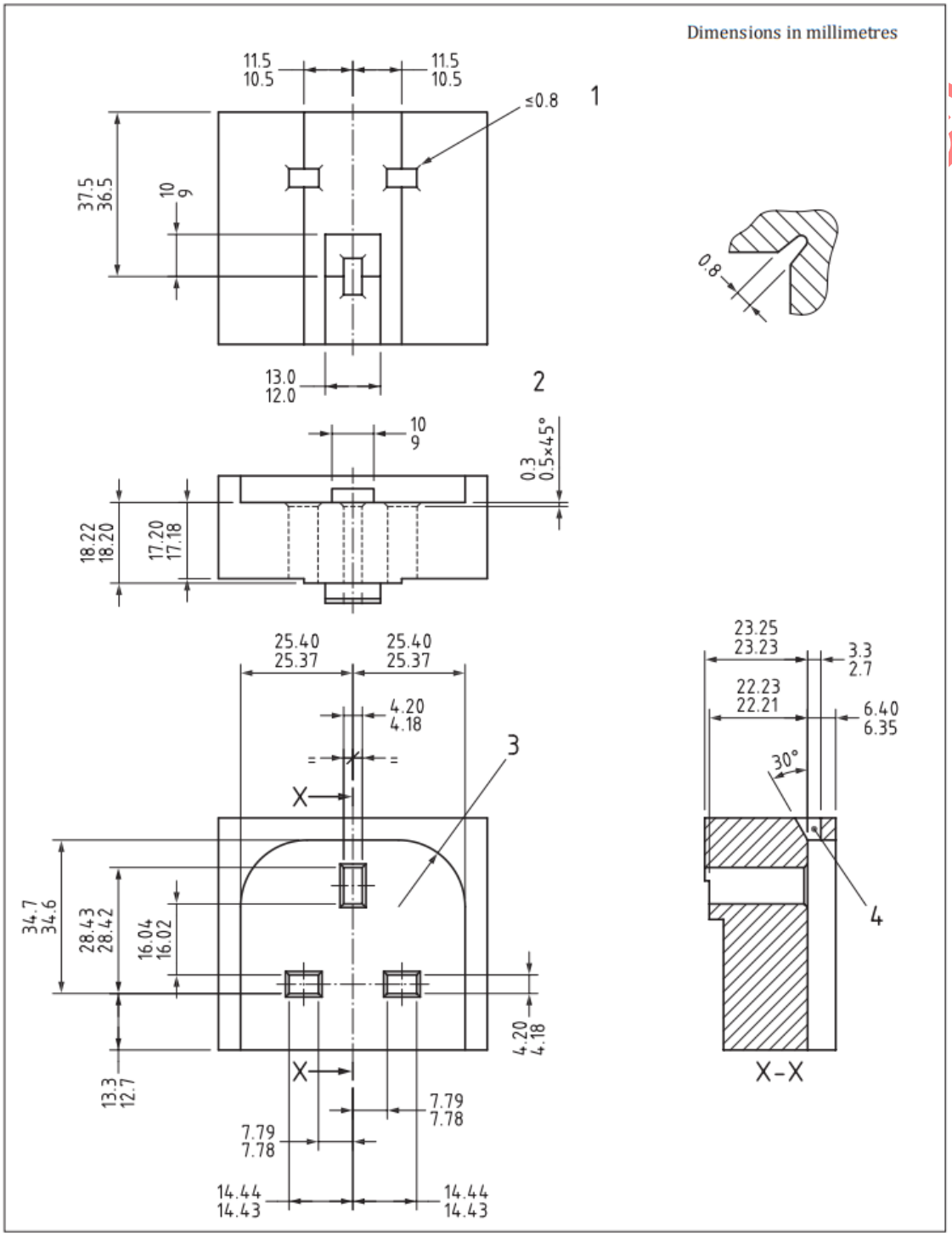


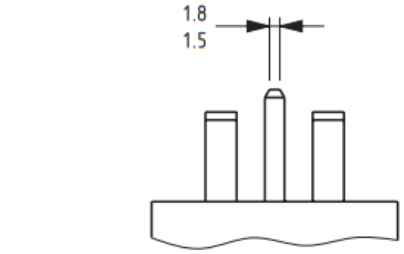
Figure 5 — *Gauge for plug pins (continued)*

Key			
1	Corners might be relieved up to 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

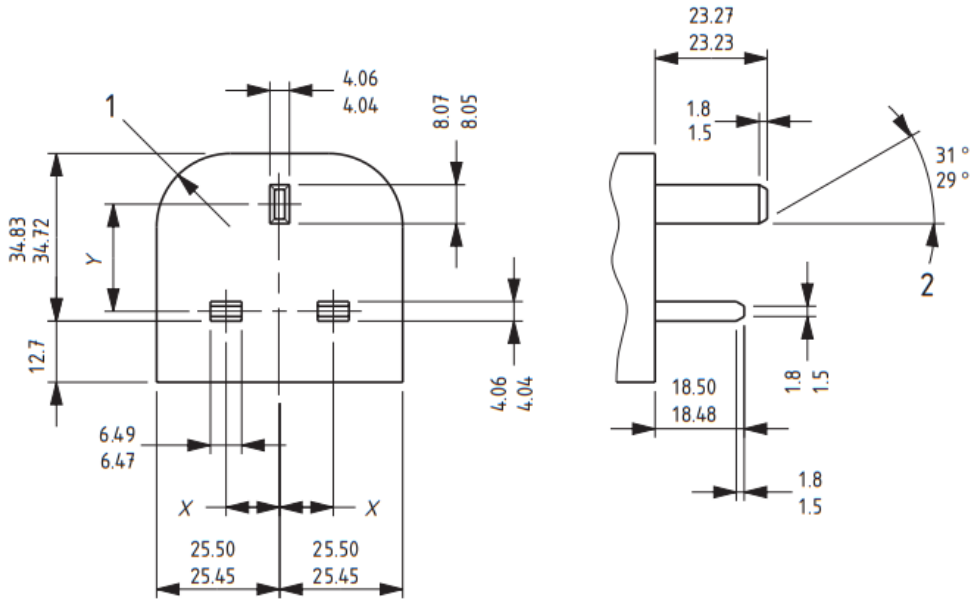
NOTE Gauge might be fabricated in several component parts, providing assembly is within dimensions shown.

Figure 11- GO gauge for socket-outlets

Dimensions in millimetres



		Dimension X	Dimension Y
Pins at max. centres	Min.	11.19	22.37
	Max.	11.21	22.39
Pins at min. centres	Min.	11.01	22.07
	Max.	11.03	22.09



Key

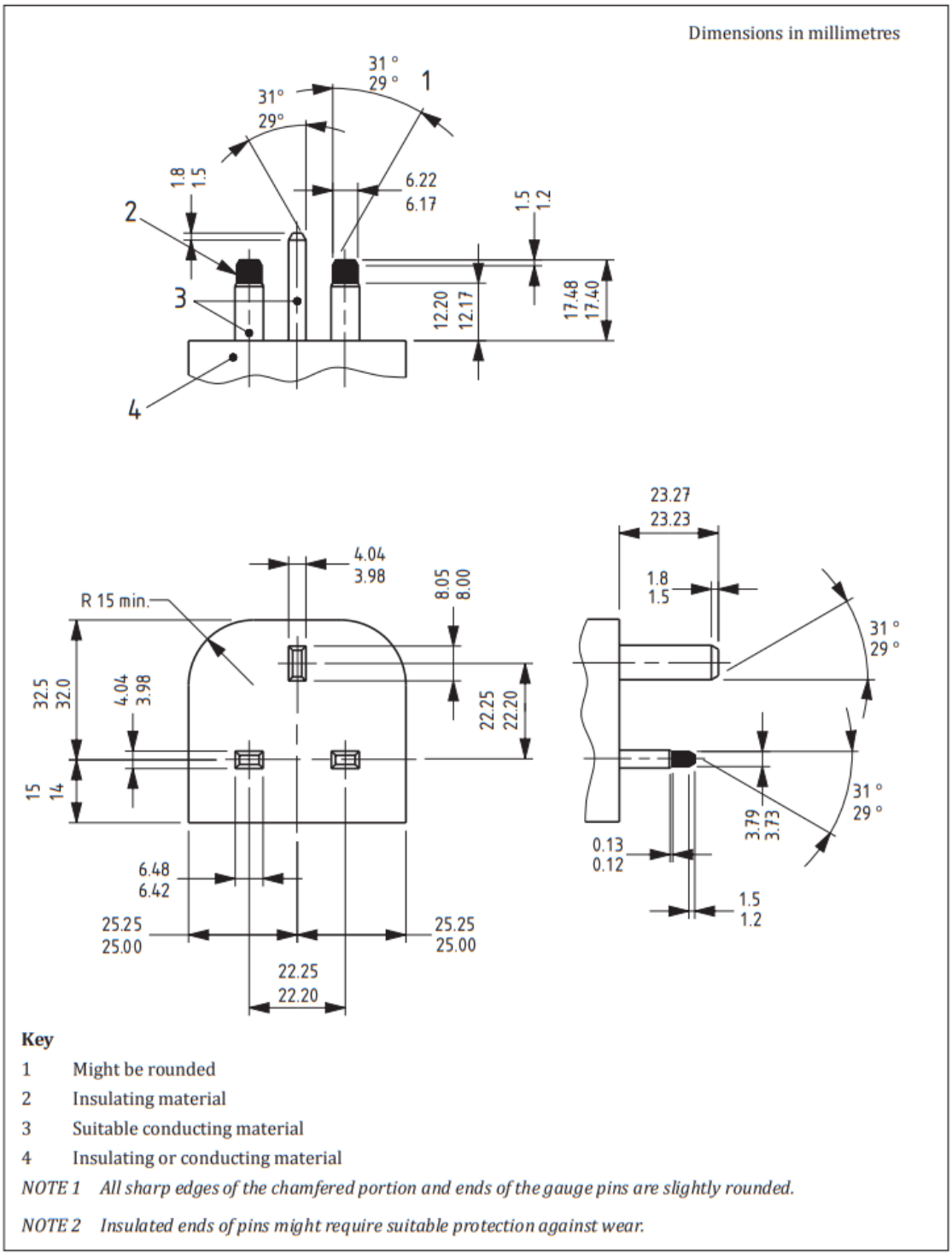
1 R 15.2 TP (true profile) with a tolerance zone 0.1 from the TP; the form of this contour is to blend smoothly with the sides

2 This might be a chamfer or part of the surface of a cone

NOTE 1 All sharp edges of the shaped portion of all the pins of the socket-outlet are slightly rounded.

NOTE 2 The surface of the gauge in which the pins are mounted are flat to within 0.025 mm.

Figure 12- Contact test gauge



Key

1 Might be rounded

2 Insulating material

3 Suitable conducting material

4 Insulating or conducting material

NOTE 1 All sharp edges of the chamfered portion and ends of the gauge pins are slightly rounded.

NOTE 2 Insulated ends of pins might require suitable protection against wear.

Figure 14- Non-contact test gauge

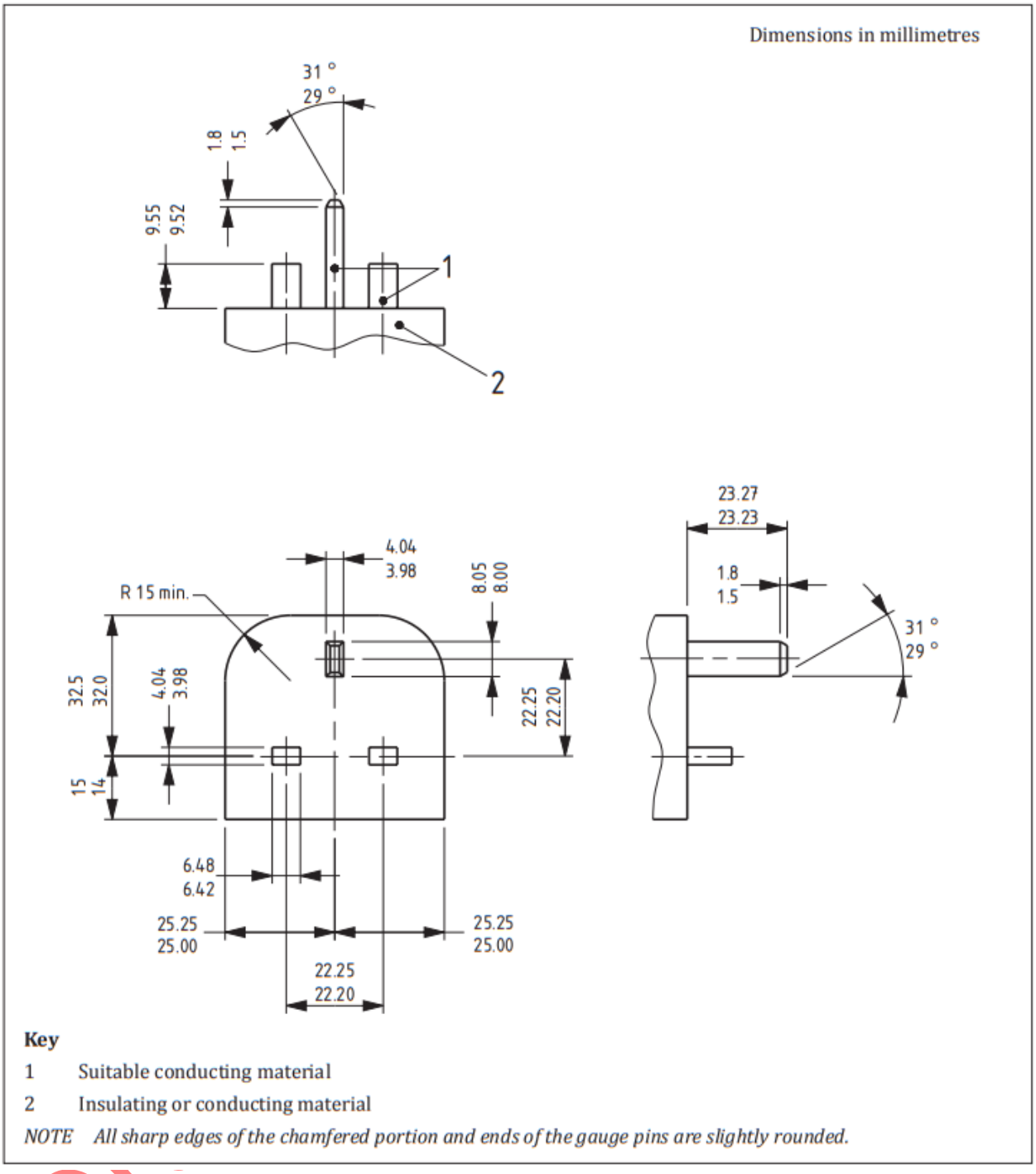
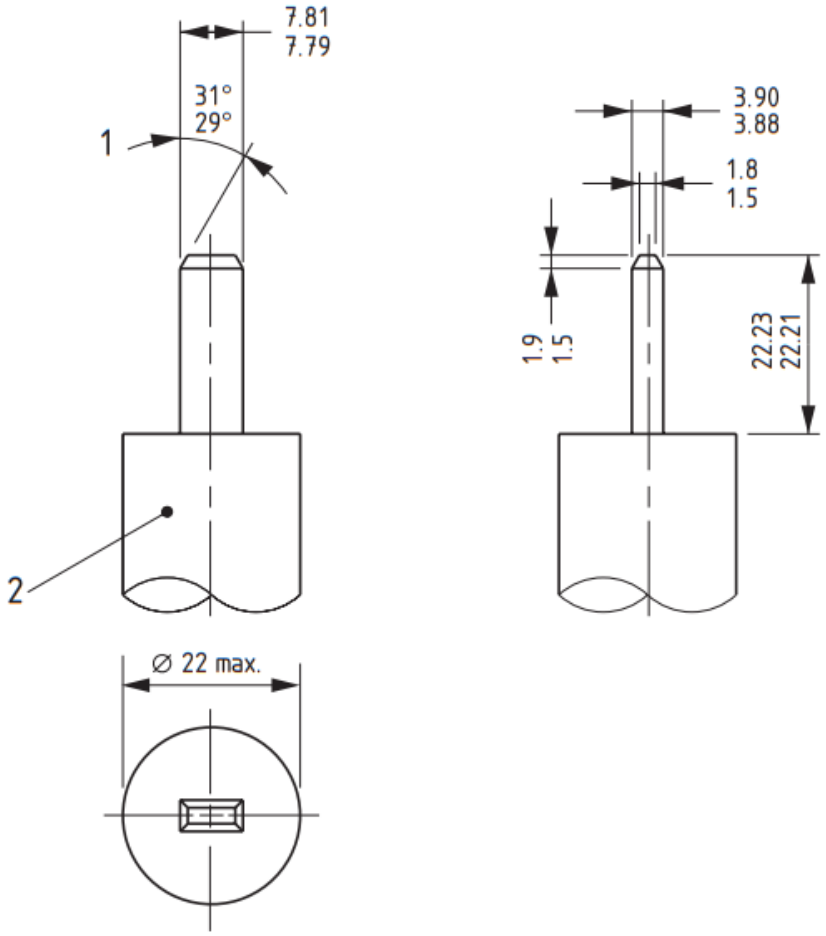


Figure 16a-— *Withdrawal pull gauges for effectiveness of contact: Gauge for earthing socket contact*

Dimensions in millimetres



Key

1 This might be a chamfer or part of the surface of a cone

2 Length to make total mass of gauge $227^{+1.5}_{0}$ g.

6 Classification and rating

6.1 Classification

Adaptors shall be classified as follows, as appropriate:

a) fused or unfused;
b) conversion (from EAS 495 system to another);
c) multiway (from EAS 495 system to multiple outlets);
d) intermediate;
e) adaptor plug;
f) rewirable or non-rewirable (in the case of an intermediate adaptor or adaptor plug);
g) shaver adaptor fitted with an unterminated brass earth pin; or
h) shaver adaptor fitted with an ISOD.

6.2 Rating

The rated voltage range of adaptors that incorporate or do not incorporate electronic components shall be 220 V up to and including 250 V.

The rated current of an adaptor shall be one of the following:

— equal to the sum of the rated currents of the adaptor socket-outlet portions, if this sum is lower than 13 A;
— 13 A if the sum of the rated current of the adaptor socket-outlet portions is higher than 13 A;
— 13 A for an adaptor plug;
— 13 A if the sum of the rated currents of the socket-outlet is equal to or greater than 13 A

7 Marking and labelling

7.1 Adaptors 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 may be duplicated on a removable fuse carrier;

b) the number of this East African Standard, i.e. EAS 495-3(1);

c) on rewirable adaptors, the terminals intended for the connection of the various conductors shall be identified by the symbols given in 7.5;

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1) 'Marking EAS 495 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 third party certification of conformity, which may also be desirable

d) for fused adaptors, the words "FUSE" or "FUSED" or the symbol (given in 7.5) on the external accessible surface of the adaptor;

e) non-rewirable adaptors shall be marked on the engagement surface 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 cord;

f) adaptors other than shaver adaptors shall be marked, on the engagement surface with their total maximum electrical load intended to be connected in amperes, as calculated in 6.2, e.g. "MAX 13 A";

g) shaver adaptors shall be marked on the accessible external surface with appropriate words, e.g. "SHAVERS ONLY".

Shaver adaptors shall be marked on the engagement surface with appropriate words to indicate that the adaptor should be fitted with a 1 A rated fuse complying with BS 646;

h) all adaptors shall be marked with:

1) rated voltage;
2) nature of supply.
3) Rated frequency

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 (±0.4A)	Fuse rating	Load for flexing test	**Cable grip tests**	
					Load +2%, −0%	**tests Torque** [B)]
mm²	**A**	**A**	**A**	**kg**	**kg**	**Nm**
0.5	3	3.5	3 (5)[C)]	1	3	0.15
0.75	6	7	7 (13)[C)]	1	3	0.20
1 (0.75)[D)]	10	11	10 (13)[C)]	2	3	0.25
1.25 (1)[D)]	13	14	13	2	6	0.30
1.5	13	14	13	2	6	0.35

A) Non-rewirable adaptors may have a rated current appropriate to a smaller cable size than that fitted, (e.g. a non-rewirable adaptor rated at 3 A may be fitted with an 0.75 mm 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 adaptor.

B) The recording of a measured value of torque in accordance with this table is considered to conform to this part of EAS 495 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 fuse rating when a non-rewirable adaptor is used with certain types of appliances where the use of the higher rated fuse link is necessary because of their characteristics. Portable socket-outlets are not considered to be appliances and therefore the higher rated fuse cannot be used.

D) The figure in brackets indicates the flexible cable size which may be used with a maximum flexible cable length of 2 m.

7.1.1 Compliance 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, 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 comply without test.

7.2 Rewirable intermediate adaptors and adaptor 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).

7.2.1 Compliance shall be checked by inspection.

7.3 Except where an intermediate adaptor or adaptor plug fitted with a flexible cord 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 cord of this intermediate adaptor (or adaptor plug) must be connected to a piece of equipment before being plugged into a socket-outlet";

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

c) the colour code of the cores of the flexible cord as follows: IMPORTANT. Wires in the mains lead are coloured in accordance with the following code:

Green/Yellow Earth (if any)

Blue Neutral

Brown Live

d) if the intermediate adaptor or adaptor plug is fitted with a 2-core flexible cord, the following statement: "This lead must not be used with equipment requiring the protection of an earth continuity conductor".

7.3.1 Compliance shall be checked by inspection.

7.4 Rewirable adaptors and adaptor plugs shall be provided with adequate instructions for the safe connection of the appropriate flexible cords including clear instructions for the removal of insulation from the conductors.

7.4.1 Compliance shall be checked by inspection.

7.5 Symbols shall be as follows:

amperes	A	
volts	V	

alternating current	~	
direct current (d.c.)	⎓	
line (adaptor plugs)	L	
neutral	N	
earth	⏚ (preferred) or ⏚	
NOTE 1 The letter "E" may be used in addition to either of these symbols.		
supply line terminal (intermediate adaptors)	L in or L1	supply line terminal (intermediate adaptors)
load line terminal (intermediate adaptors)	L out or L2	load line terminal (intermediate adaptors)
fuse	⏛	

NOTE For the marking of the rated current and rated voltage of the adaptor, figures may be used alone. The figures for the current rating being placed before or above that of the rated voltage and separated by a line.

Examples:

13 A 250V ∿ or 13/250 ∿ or $\frac{13}{250}$ ∿

or 13 A 250 V a.c. or 13/250 a.c or $\frac{13}{250}$ a.c

If a symbol for nature of supply is used, it shall be placed next to the marking for rated current and rated voltage.

8 Clearances, creepage distances and solid insulation

Adaptors 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 may occur. Clearances, creepage distances and solid insulation shall comply with the relevant subclauses 8.1 to 8.4

The distance between lead wires in the pinch of a neon lamp with external resistor shall be a minimum of 1 mm. Adaptors 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 adaptor shall be tested accordingly.

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

NOTE 2 Product insulation consists of basic insulation and protective earthing as required by IEC 61140: 2016

for Class I equipment. Mechanical strength equivalent to that which would be provided by reinforced insulation as listed in IEC 61140: 2016 is achieved in BS 1363 products through specific mechanical and material tests.

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

8.1 Clearances

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

The clearances shall be dimensioned to withstand the rated impulse voltage declared by the manufacturer considering the rated voltage and the Overvoltage Category as given in Annex E and the pollution degree declared by the manufacturer according to Annex F.

For the measurements:

— all parts which may be removed without the use of a tool are removed and moveable parts which can be assembled in different orientations are placed in the most unfavourable position.

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

Clearance distances are measured in accordance with Annex C.

8.1.1 Clearances for basic insulation

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

Smaller clearances (except those values marked in Table 3 with footnote b) may be used if the accessory meets the impulse withstand voltage test of Annex G at the impulse voltage specified in Annex E but 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.

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

8.1.2 Clearances for functional insulation

The clearances for functional insulation shall not be less than the values specified for basic insulation in 8.1.1.

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

8.1.3 Clearances for supplementary insulation

The clearances for supplementary insulation shall not be less than the values specified for basic insulation in 8.1.1.

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

Table 3 — Minimum clearances for basic insulation

Rated impulse withstand voltage kV[a]	Minimum clearances in air
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
6.0	5.5

[a] See Annex E. This voltage is:
– for functional insulation: the minimum impulse voltage expected to occur across the clearance;
– for basic insulation directly exposed to or significantly influenced by transient overvoltage from the low-voltage mains: the rated impulse withstand voltage of the accessory;
– for other basic insulation: the highest impulse voltage that can occur in the circuit.

[b] Minimum clearance values are based on IEC 60664-1.

8.1.4 Clearances for reinforced insulation

The clearance for reinforced insulation shall be not less than the values specified for basic insulation in 8.1.1 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 adaptor plug pins.

Compliance shall be checked by inspection and by measurement or the test detailed in Annex G.

8.1.5 Contact gap

The minimum contact gap shall be 1.2 mm when the switch is in the open position, except for electronic switches covered by A.5.

Compliance shall be checked by measurement.

8.2 Creepage distances

The creepage distance 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 may be removed without the use of a tool are removed and moveable parts which can be assembled in different orientations are placed in the most unfavourable position.

NOTE 1 Moveable 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 are measured in accordance with Annex C.

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 are determined in accordance with Annex D.

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

8.2.1 Creepage distances for basic insulation

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

Compliance shall be checked by measurement.

Table 4 — Minimum creepage distances fox basic insulation

Rated voltage[a] V (r. m. s.)	**Pollution Degree 2**			**Pollution Degree 3**		
up to and including	Material group[b]			Material group[b]		
	1	11	IIIa/IIIb	1	11	IIIa
250	1.3	1.8	2.5	3.2	3.6	4.0

a This voltage is the voltage rationalized through Table 3a and Table 3b of IEC 60664-1 based on the rated voltage.

b Details of pollution degrees are given in Annex F.

8.2.2 Creepage distances for functional, insulation

The creepage distance for functional insulation shall not be less than the values specified for basic insulation in 8.2.1.

Compliance shall be checked by measurement.

The creepage distances for supplementary insulation shall not be less than the values specified for basic insulation in 8.2.1.

Compliance shall be checked by measurement.

8.2.4 Creepage distances for reinforced insulation

The creepage distances for reinforced insulation shall not be less than those derived from twice the distance specified for basic insulation in Table 4. This requirement shall not be applied to the sleeves of the adaptor plug pins.

Compliance shall be checked by measurement.

8.3 Solid insulation

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

No minimum thickness is specified for solid insulation.

8.3.1 Basic and, supplementary solid insulation

Compliance shall be checked by tests in accordance with Clause 15.1.3 using the values given in table 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

8.3.2 Reinforced solid insulation

Reinforced insulation shall be dimensioned to withstand the required impulse voltage, but one step higher, than that for basic and supplementary insulation in 8.3.1.

Compliance shall be checked by tests in accordance with Clause 15.

8.4 Requirements for printed wiring boards and equivalent construction

Printed wiring boards and equivalent construction shall conform to IEC 60664-5.
Where coating, potting or moulding is used articles shall conform to IEC 60664-3.

9 Accessibility of live parts

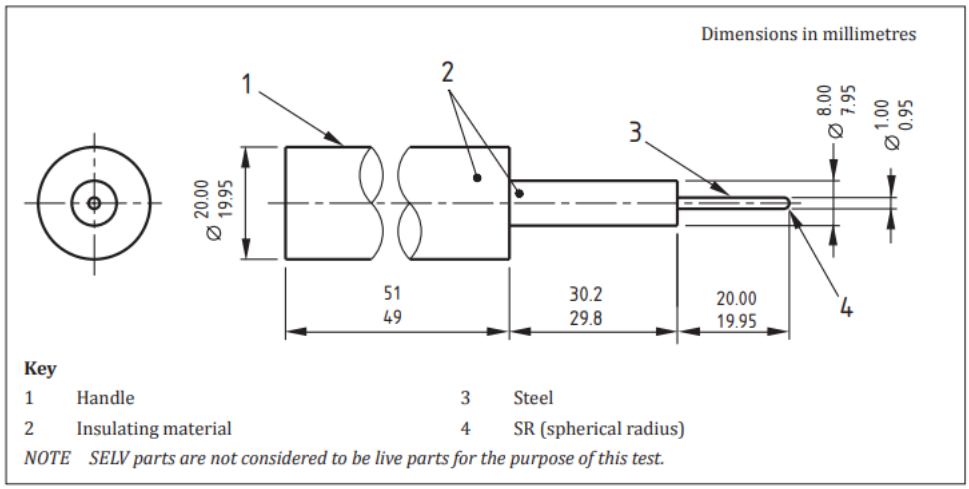
9.1 Live parts of adaptors shall not be accessible when wired as in use and in full engagement in a corresponding socket-outlet. Removal of detachable fuse carriers shall not result in live parts becoming accessible when the adaptor is in full engagement with the socket-outlet. Additionally, adaptor plugs shall comply with this requirement without a flexible cord fitted.

9.1.1 Compliance shall be checked by the application of test probe 12 of EAS 370 applied with a force of 5^{0}_{-1} N with non-rewirable adaptors fitted with their appropriate flexible cords, rewirable intermediate adaptors fitted with a 2-core flexible cord as given in IEC 60227-5 (clause 2). Detachable fuse carriers shall be removed before this test is undertaken.

9.2 Adaptors shall be so designed that when they are mounted and wired as in normal use live parts are not accessible.

9.2.1 Compliance shall be checked by the application of the test pin shown in Figure 1 perpendicular to the accessible external surface of the adaptor with a force of 5^{0}_{-1} N. It shall not be possible to touch live parts.

Figure 1- Test pin



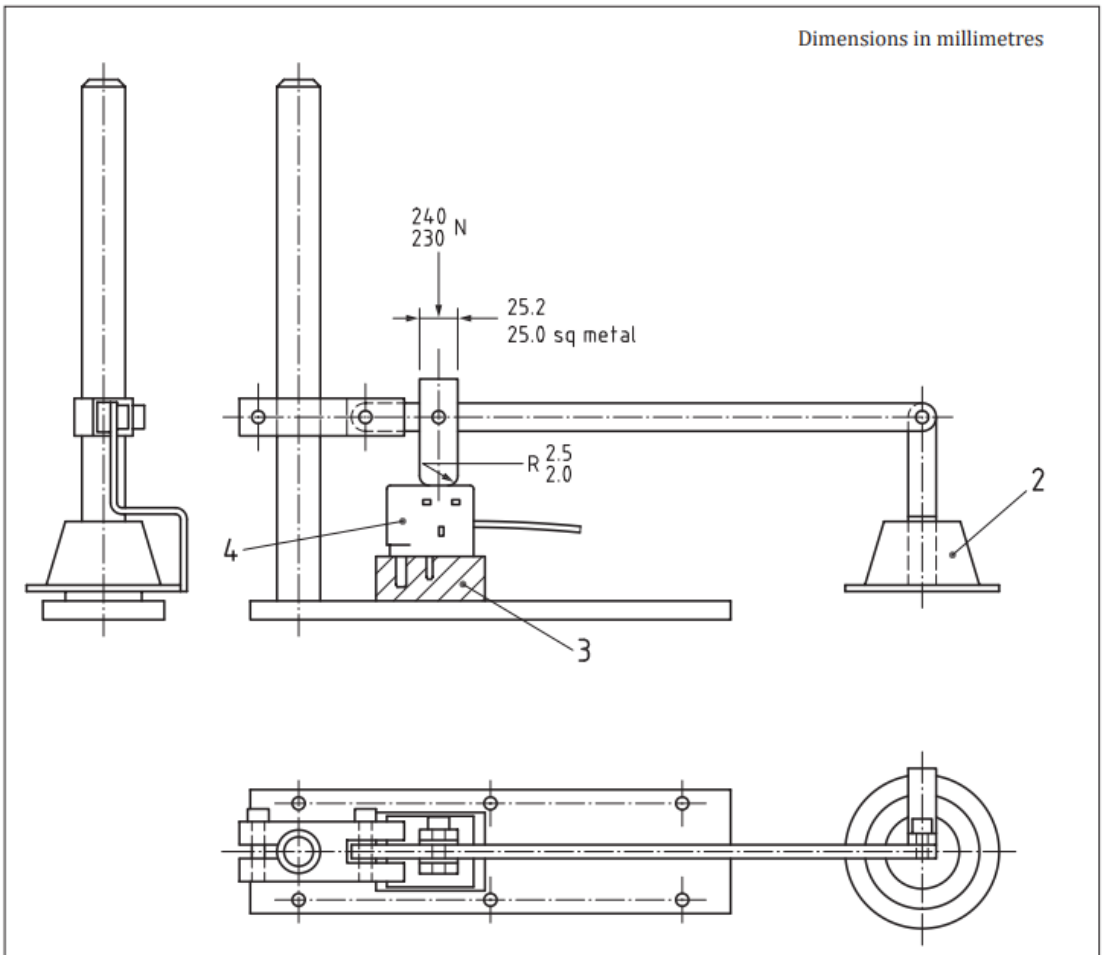
9.3 The plug portion of an adaptor shall be designed and constructed so as to protect the user against accidental contact with live parts during insertion or withdrawal from corresponding socket outlets. The socket-outlets of an adaptor shall be designed and constructed so as to protect the user against accidental contact with live parts during insertion or withdrawal of plugs.

9.3.1 Compliance shall be proved by satisfying the dimensional and gauging requirements of this part of EAS 495.

9.4 Resilient covers of adaptors 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 8.

9.4.1 Compliance shall be checked by the following test (an example of a suitable apparatus is shown in Figure 2a).

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



Key

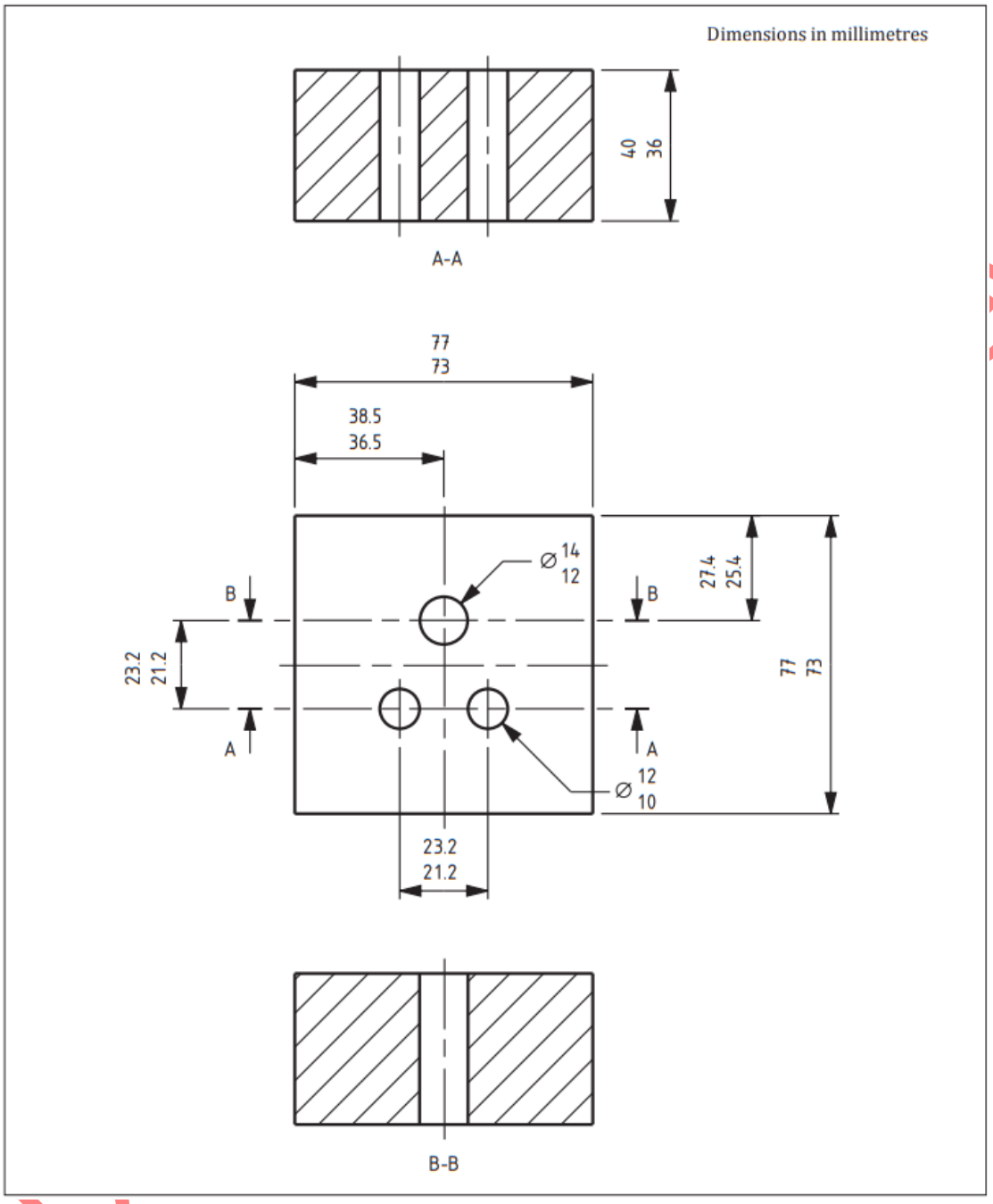
1 Sample under test

2 Weight

3 Hardwood block [see Figure 2b)]

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

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



The design of the apparatus shall be such that a steady force of 240^{0}_{-10}N can 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 2000 V ± 60 V, 50 Hz of substantially sinusoidal waveform is applied for $60^{+}_{0}{}^{5}$ s between all live parts bonded together and the earthed 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 probe 11 of EAS 370 applied with a force of 30^{0}_{-2} N.

9.5 Except for assemblies supplied to equipment manufacturers for incorporation into their equipment, an intermediate adaptor or adaptor plug supplied fitted with a flexible cable shall have the free end of such an assembly encapsulated in insulating material.

9.5.1 Compliance shall be checked by inspection.

9.6 It shall not be possible to introduce a conducting device through the earthing socket apertures) of an adaptor in such a manner that there is a risk of making contact with live parts, or a live conductor with or without insulation.

9.6.1 Compliance shall be checked by introducing a rigid metal pin, $1^{0}_{.0.05}$ mm diameter × 60 mm ± 1 mm long, through any earthing socket aperture or apertures of a socket outlet of an adaptor mounted as in normal use, applying a force of 5^{0}_{-1} N, and with the conductors, if any, in the most unfavourable position.

10 Provision for earthing

10.1 Adaptors shall be so constructed that, when inserting a plug with an earthing pin into a corresponding socket-outlet of an adaptor the earth connection is made before the current-carrying pins of the plug become live. When withdrawing a plug the current-carrying parts shall separate before the earth contact is broken.

10.1.1 Compliance shall be checked by inspection and electrical test.

10.2 All accessible metal parts of adaptors shall be in effective electrical contact with the earthing socket contact and earthing plug pin, except that metal parts on or screws in or through, nonconducting 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 socket contact and earthing plug pin. Metal parts having an accessible surface coating of lacquer or enamel shall be tested as accessible metal parts.

10.2.1 Compliance shall be checked by inspection, and the following:

a) for metal parts insulated from live parts, by the test described in 15.1.3;

b) for metal parts connected to an earthing terminal or earthing plug pin, by the following test.

A current of 25 A ± 0.7 5 A, derived from an a.c. source having a no-load voltage not exceeding 12 V, is passed for $60^{+}_{0}{}^{5}$ as follows:

1) for all adaptors, between the earthing pin of the adaptor, and the following:

   i) the terminal of an earthing pin of an appropriate plug inserted into each adaptor earthing socket control;

   ii) any accessible metal part intended to be earthed;

2) for intermediate adaptors and adaptor plugs, between the earthing terminal, and the following:

   i) the remote end of an earthing pin of an adaptor;

   ii) any accessible metal part intended to be earthed.

The resistance between the earthing plug pin or earthing terminal and any other nominated part shall not exceed 0.05 Ω .

11 Terminals and terminations of intermediate adaptors and adaptor plugs

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

11.1.1 Compliance shall be checked in accordance with 11.2 to 11.9.

11.2 Rewirable adaptors shall be provided with terminals as defined in 3.12 or 3.13.

11.2.1 Compliance shall be checked by inspection.

11.3 Non-rewirable adaptors 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 cords unless the soldered area is entirely outside the crimp.

11.3.1 Compliance shall be checked by inspection and measurement.

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

11.4.1 Compliance shall be checked by inspection and fitting the appropriate conductors.

11.5 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 side of the major diameter of the clamping screw and the conductor hole does not exceed 0.4 mm.

11.5.1 Compliance shall be checked by inspection and measurement.

11.6 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.

11.6.1 Compliance shall be checked by inspection and measurement.

11.7 Insulating barriers in intermediate adaptors or adaptor plugs shall be an integral part, so arranged that with the cord 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;

b) the line conductor in a fused adaptor coming into contact with the line pin assembly.

11.7.1 Compliance shall be checked by inspection and, except for non-rewirable adaptors, by the following test.

Rewirable adaptors are wirable as in normal use with an appropriate 0.5 mm^2 3-core flexible cord as given in IEC 60227-5 (clause 6) in accordance with the manufacturer's instructions. All terminal screws or nuts are tightened to the appropriate torque given in Table 6.

Table 6 —Torque values for screws and nuts

Declared diameter of screw thread	Torque		
	For metal screws (See Note 1) N-m	For other metal screws and nuts N-m	For screws of insulating material N-m
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 3.0 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 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 blade wider than the diameter of the screw.

NOTE 2 The recording of a measured value given in this table is considered to comply with this part of EAS 495 on condition that the uncertainty of measurement at not less than 95 % confidence level does not exceed ±10 %.

A continuity indicating circuit operating at not less than 40 V is connected between the conductors and the other parts nominated. All terminal screws are then loosened and the cord anchorage rendered inoperative and the cover of the adaptor refitted. The flexible cord is then withdrawn from the adaptor at a rate not exceeding 50 mm/min, the direction of the pull being varied, until the earth core is pulled free of the adaptor. The test is made six times in all. For each new test, a fresh section of the cord is fitted and the flexible cord 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.

11.8 Intermediate adaptors or adaptor plugs shall be designed so that they can be wired in a manner which prevents strain to the earth connection before the line and/or neutral connection when the cord anchorage is rendered inoperative.

11.8.1 Compliance shall be checked by inspection and manipulation using an intermediate adaptor or adaptor plug wired in accordance with the manufacturer's instructions.

11.9 Terminals of intermediate adaptors or adaptor plugs shall be so located or shielded that should a strand of a flexible conductor escape when the conductors are fitted, then a is negligible risk of accidental connection between live parts and accessible external surfaces, or of a stray strand bypassing the fuse link.

11.9.1 Compliance shall be checked by inspection, and by the following test.

A length of insulation in accordance with the manufacturer's instructions is 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 is left free and the other strands are fully inserted into and clamped in the terminal. The free strand is bent, without tearing the insulation back, in every possible direction, but without making sharp bends round 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;

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 Construction of adaptors (plug portion)

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

Figure 4a) — *Dimensions*

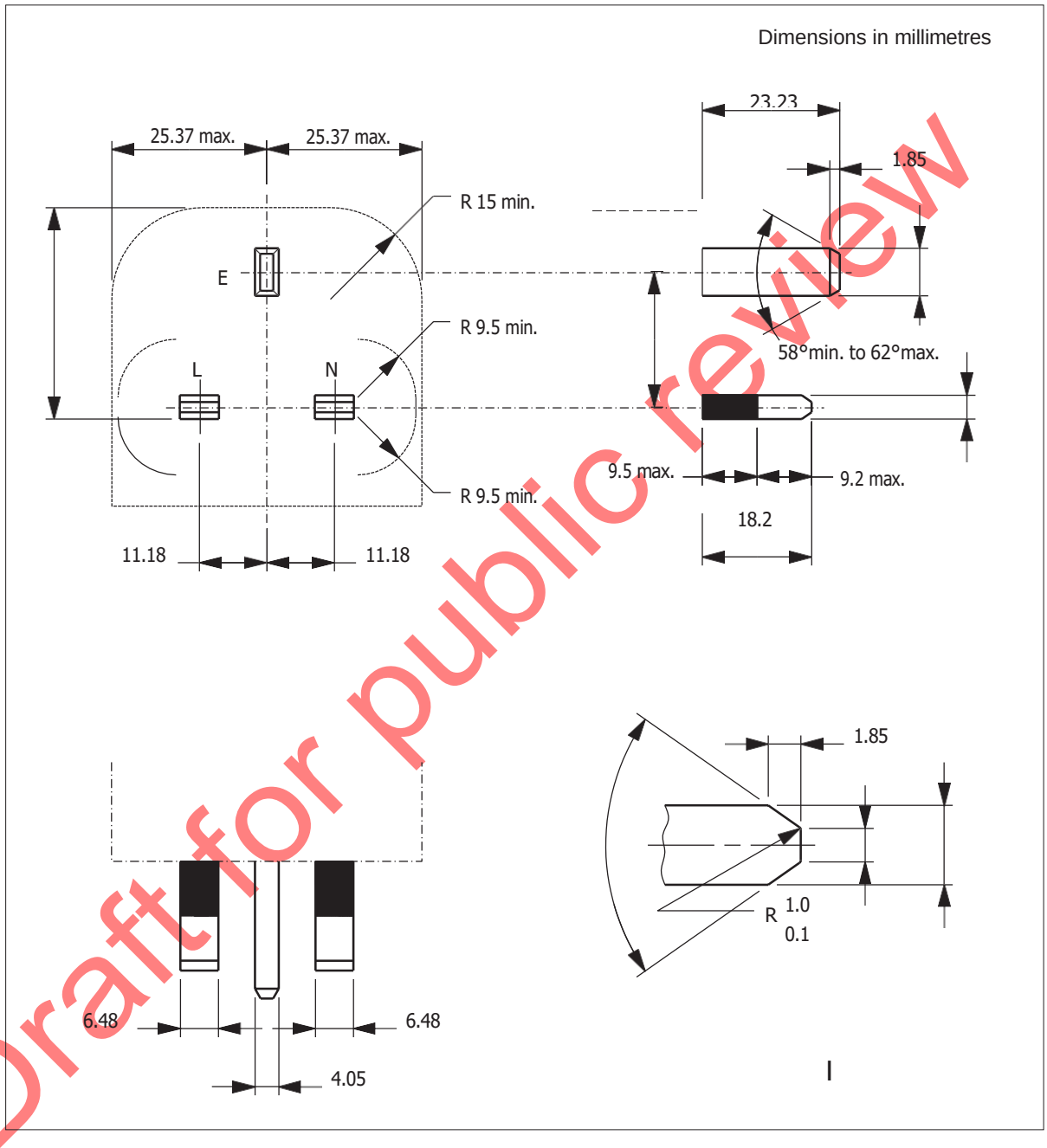
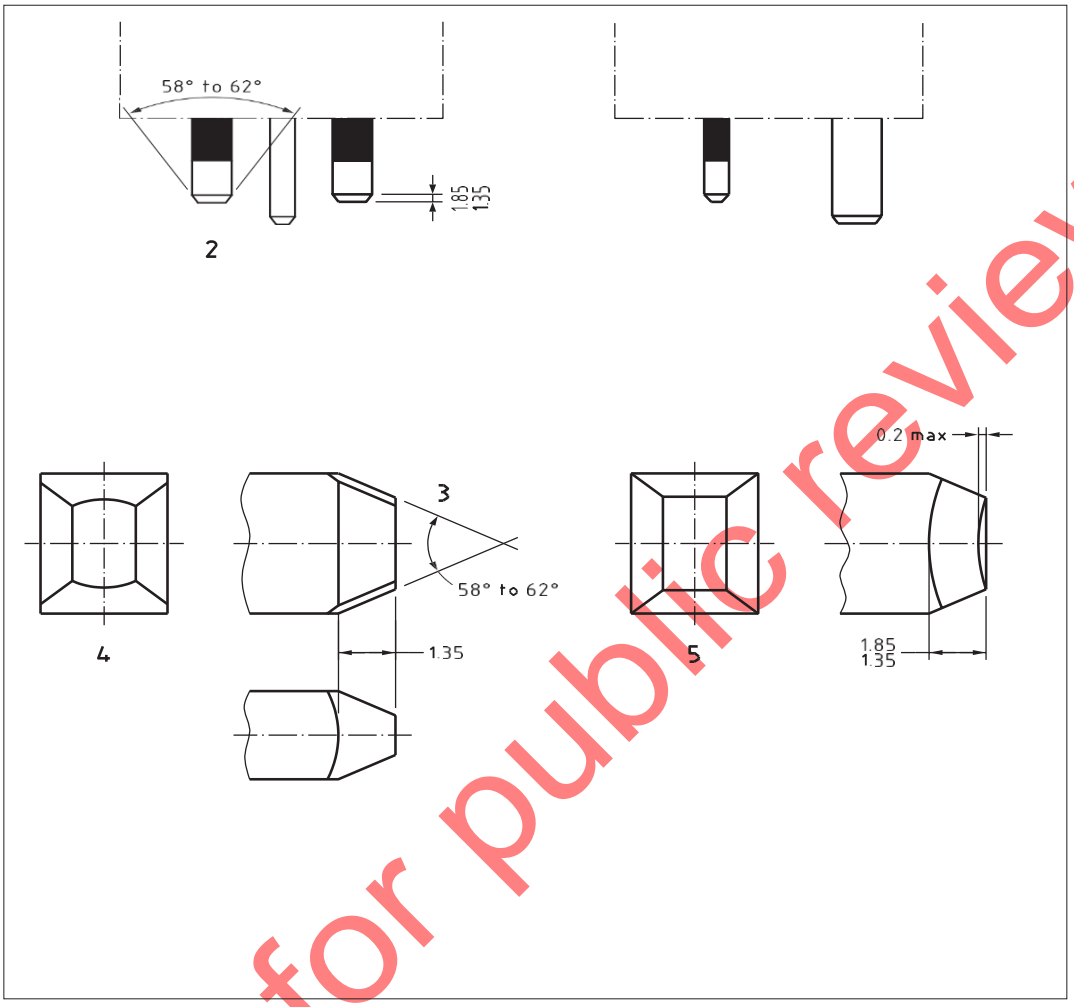


Figure 4a) — *Dimensions and disposition of pins (continued)*



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.

12.1.1 Compliance shall be checked by inspection.

12.2 The outline of the adaptor 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 adaptor, except that at a distance more than 6.35 mm from the engagement surface the outline of the adaptor may exceed the dimensions shown in Figure 4a in the plane of the earth pin and in the plane of the cord 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 comply with Figure 4a, except for non-solid pins and ISODs where the chamfers shall generally fall within the profiles of Figure 4 and their adequacy shall be checked by the test given in 12.11.5.1. 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.

Adaptors 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)

12.2.1 Compliance shall be checked by inspection, measurement and by the use of the gauge shown in Figure 5. In the case of adaptors with ISODs, where alignment cannot be maintained due to the flexibility of plastic materials, the test given in EAS 495-2, 13.8, shall be performed and the maximum withdrawal force from a socket-outlet conforming to EAS 495-2 shall not exceed 36 N

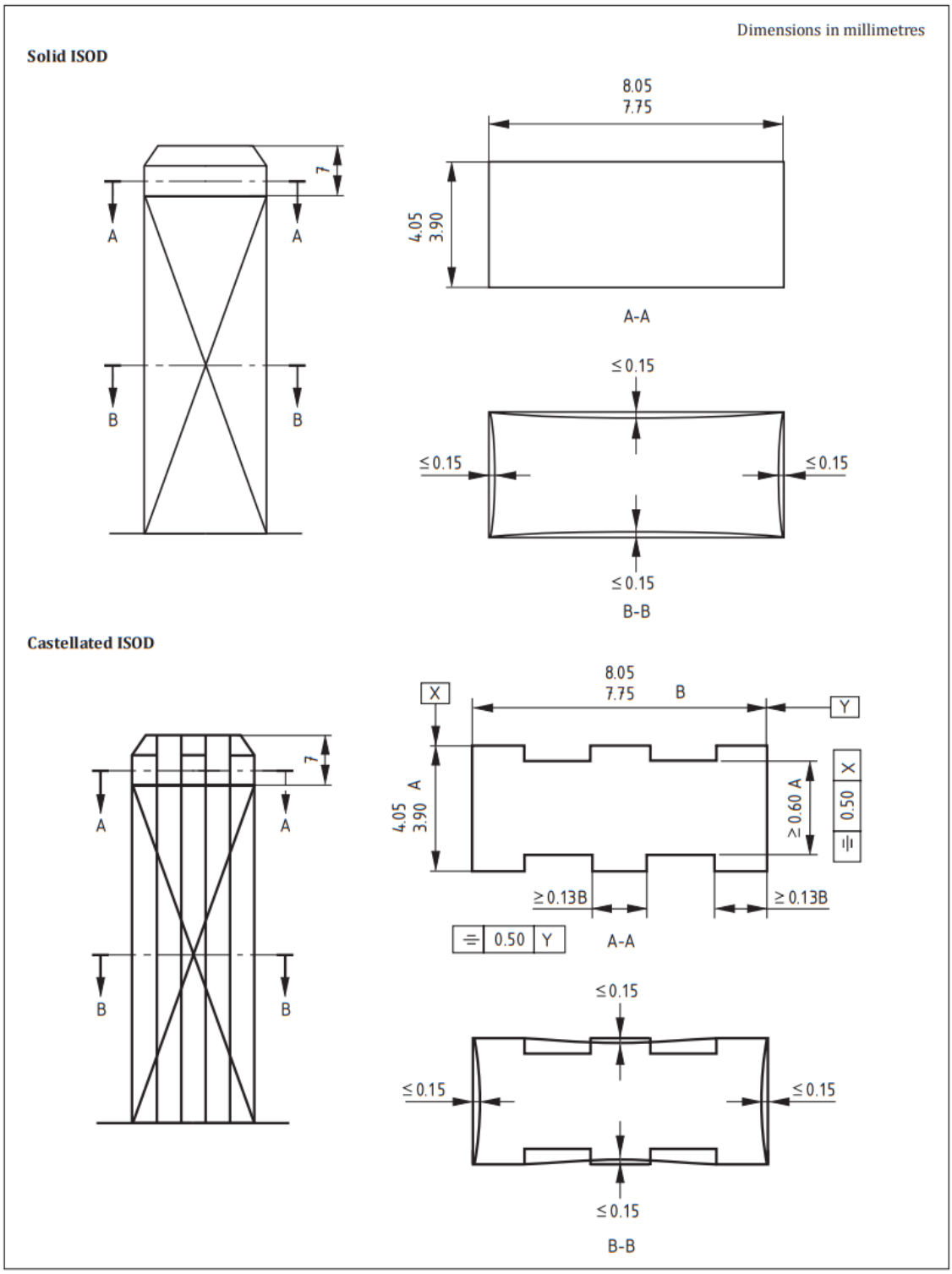
For the gauging test, intermediate adaptors and adaptor plugs shall be fitted with a 3-core 1.25 mm^2 flexible cord as given in IEC 60227-5 (clause 6). Non-rewirable intermediate adaptors and adaptor plugs shall be tested as delivered.

With the gauge in an approximately vertical position and the engagement surfaces of the adaptor 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 adaptor shall then enter the gauge fully when a force of 10 N or less is applied to the centre of the adaptor at right angles to the engagement surface and without any additional force being applied to the pins to bring them into alignment.

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

12.3.1 Compliance shall be checked by measurement.

Figure 4b)- Concave shrinkage allowance for ISODs



12.4 The provision of fuses in adaptors shall be in accordance with the following.

a) An adaptor having only one or two adaptor socket-outlets for 13 A plugs complying only with EAS 495 and having no other adaptor socket-outlets need not be fused.

b) A multiway adaptor having two adaptor socket-outlets for EAS 495 plugs and one or more adaptor socket-outlets for plugs complying with other standards, shall either be:

— provided with only one fuse link which shall have a rated current of 13 A and comply with EAS 496; or

— provided with a 13 A fuse link, complying with EAS 496, protecting the EAS 495 adaptor socketoutlets and an appropriate fuse link complying with EAS 496 or BS 646 protecting all other adaptor socket-outlets.

c) A multiway adaptor having more than two adaptor socket-outlets for EAS 495 plugs shall be provided with a 13 A fuse link complying with EAS 496.

d) A multiway adaptor having one adaptor socket-outlet for a EAS 495 plug and one or more adaptor socket-outlets for plugs complying with other standards, shall be provided with an appropriate fuse link, complying with EAS 496 or BS 646 to protect the outgoing circuit or circuits. The adaptor socket-outlet for the EAS 495 plug need not be fused.

e) An adaptor having only adaptor socket-outlets complying with standards, other than EAS 495 shall be provided with an appropriate fuse link, complying with EAS 496 or BS 646 to protect the outgoing circuit or circuits.

f) An adaptor plug or an intermediate adaptor shall be provided with an appropriate fuse link, complying with EAS 496 or BS 646 to protect the outgoing flexible cord.

g) A shaver adaptor shall be provided with a 1 A fuse link complying with BS 646.

When a fuse link is provided within the body of the adaptor it shall be mounted in appropriate contacts only between the line plug pin and the corresponding line socket contacts) in such a way that it cannot be displaced when the adaptor is in use. The design shall be such that the fuse link cannot be left in inadequate contact when the fuse cover or fuse carrier is replaced and firmly secured in position. It shall be impossible to replace the fuse link in an adaptor unless the adaptor is completely withdrawn from the socket-outlet.

12.4.1 Compliance shall be checked by inspection.

12.5 In non-rewirable intermediate adaptors and adaptor 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 adaptor by means of marking.

12.5.1 Compliance shall be checked by inspection.

12.6 The base and cover of non-rewirable intermediate adaptors and adaptor plugs shall be permanently attached to each other, such that the flexible cable cannot be separated without making the portable adaptor permanently useless.

An intermediate adaptor and adaptor plug shall be considered to be permanently useless when for reassembling the intermediate adaptor and adaptor plug parts or materials other than the original have to be used.

Such intermediate adaptors and adaptor plugs shall not be able to be opened and re-assembled by hand using the same original fixings or parts using a general-purpose tool, for example a screwdriver.

The use of re-useable fixings of any type, including tamperproof and security screws to secure the base and cover of non-rewirable intermediate adaptors and adaptor plugs shall not be used.

The base and cover of rewirable intermediate adaptors and adaptor plugs shall be firmly secured to each other, such that they cannot be detached from each other without the aid of a tool

12.6.1 Compliance shall be checked by inspection and for non-moulded on non-rewirable intermediate adaptors and adaptor plugs by the test given in 12.8.1.

12.7 The base and cover of rewirable intermediate adaptors and adaptor plugs having the cover fixed by screws shall be firmly secured to each other. It shall not be possible to remove the cover unless the adaptor is completely withdrawn from the socket-outlet. Fixing screws shall be captive.

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

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

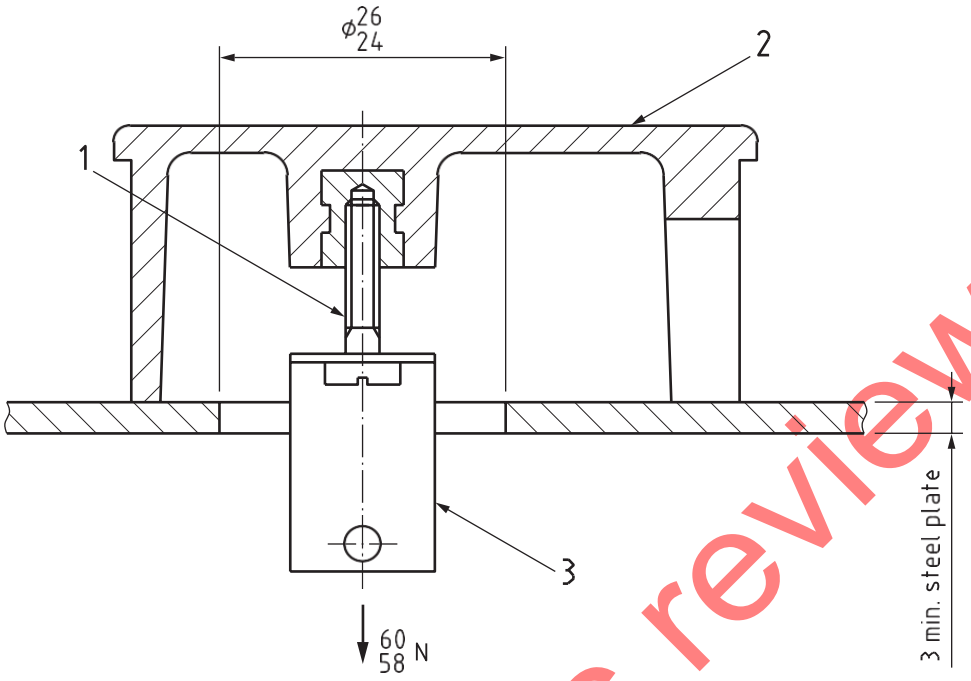
At the end of the test, any screw thread shall be serviceable and any insert shall not have moved to such an extent that correct assembly of the adaptor is prevented.

12.8 The base and cover of adaptors other than those described in 12.6 and 12.7 shall be firmly secured to each other. It shall not be possible to remove the cover unless the adaptor is completely withdrawn from the socket-outlet.

12.8.1 Compliance shall be checked by inspection and the following test.

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

Dimensions in millimetres



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

All the adaptor pins are 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 adaptor cover profile. The test is carried out in an oven at a temperature of 70 °C ± 5 °C and the pull applied for 60^{0}_{-2} 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.

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

12.9.1 Compliance shall be checked by inspection and by the following test.

Immediately after the test described in Clause 16, test probe 11 of EAS 370 is applied to the accessible surface of the adaptor with a force of 30^{0}_{-5} N. It shall not be possible to touch live parts.

12.9.2 Non-moulded on, non-rewirable plugs are tested with the flexible cord supplied. The plug pins are clamped in the vertical position using a suitable jig with the plug pins uppermost. The plug lead fitted shall be 1 m in length and a weight of 3 +0.06/-0 Kg fixed to the end. With the weight initially held 0.5 ± 0.05 m from the end of the cord anchorage, and at the same height. The weight is allowed to fall through an arc of 1 m and this test shall be carried out 5 times.

After this test the plug cover shall be in place and show no damage.

Compliance shall be checked by inspection.

12.10 For non-rewirable intermediate adaptors and adaptor plugs means shall be provided to prevent loose strands of a conductor or current-carrying parts from reducing the minimum insulation thickness requirements between such parts and all accessible external surfaces of the adaptor.

12.10.1 Compliance shall be checked by inspection and by the test described in 15.2.

12.11 Adaptor plug pins shall be constructed of brass. Materials other than brass (having a minimum content of 58% copper) shall not be used in the construction of line and neutral adaptor plug pins except for sleeves of pins as specified in 12.19. Adaptor plug pins and ISODs shall conform to 12.13.1. Non-solid pins shall conform to 12.12.2.

12.11.1 All exposed surfaces of the adaptor 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.

12.11.1.1 Compliance shall be checked by inspection.

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

12.11.2.1 Compliance shall be checked by inspection.

12.11.3 All seams and joints of non-solid adaptor plug pins shall be closed over their entire length

12.11.3.1 Compliance shall be checked by inspection and in case of doubt by the following test.

Push a steel test probe of 0.2 mm diameter complying with Table 1 of ISO 8458-2 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.

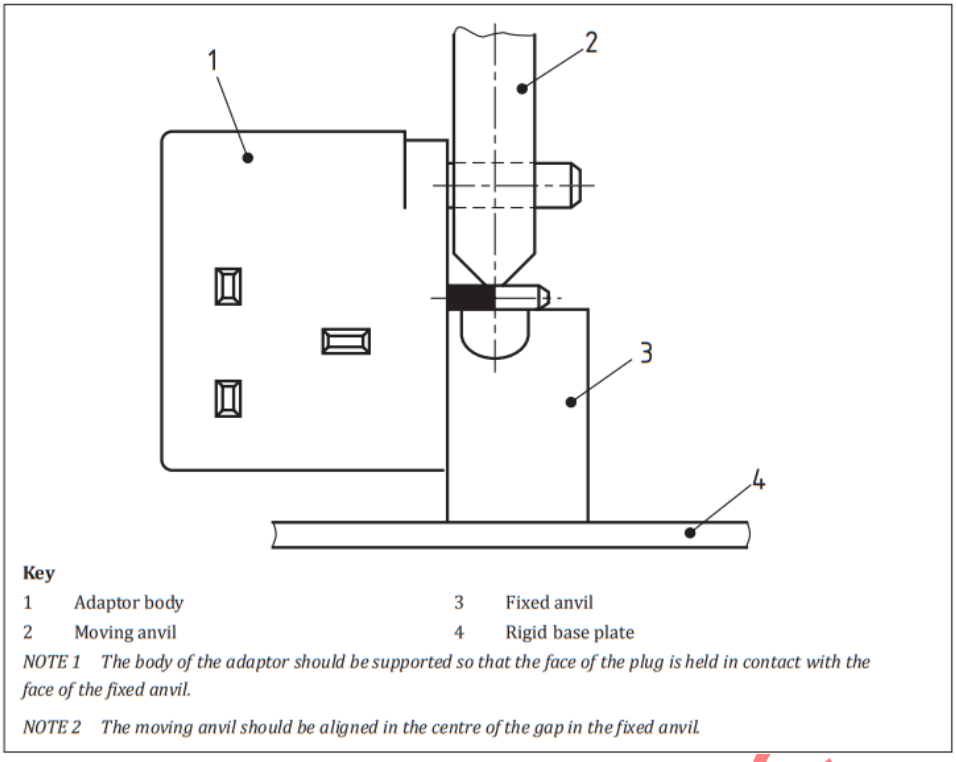
12.11.4 Adaptor plug pins and ISODs shall have adequate strength to withstand the stresses of normal use.

12.11.4.1 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. 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 adaptor shall fit the gauge shown in Figure 5 when used in the manner described in 12.2.1.

Figure 32a)- Apparatus for tests on adaptor pins



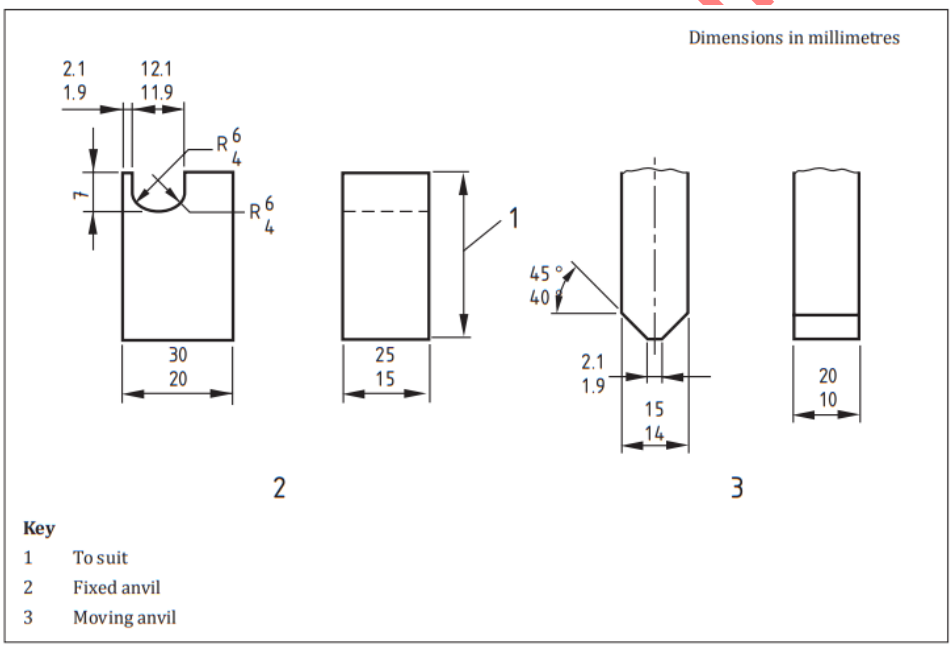
Key

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

NOTE 1 The body of the adaptor 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 32a)- Apparatus for tests on adaptor pins



Key

1	To suit
2	Fixed anvil
3	Moving anvil

12.11.4.2 For non-solid pins, compliance 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 comply with 12.11.2 and 12.11.3 and the adaptor shall fit the gauge shown in Figure 5 when used in the manner described in 12.2.1.

b) Separate specimens shall be used to check in accordance with 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 $1.5\ ^{0}_{-0.1}$ min. 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 1100 N.

12.11.4.3 for ISODs, Compliance 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 moveable 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 moveable anvil by any convenient method such that the ISOD is strained at a rate of 10 mm/min ±2 mm/min.

A force of 400 +_10 N shall be 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 adaptor plug pins shall fit the Figure 4 gauge when used in the manner described in

12.2.1 with a force not exceeding 20 N.

When testing an adaptor 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 EAS 495-2:2023, 12.9, shall be performed and the maximum withdrawal force from a socket-outlet conforming to EAS 495-2:2023 shall not exceed 36 N.

12.11.5 Adaptors with non-solid pins and/or ISODs shall not cause excessive wear to socket contacts or shutters of socket-outlets in accordance with EAS 495-2. For adaptors with non-solid pins, Compliance shall be checked by 12.11.5.1. For adaptors with ISODs, Compliance shall be checked by 12.11.5.2.

12.11.5.1 Compliance for adaptors with non-solid pins shall be checked by the following tests.

The test shall be carried out with adaptors with non-solid pins and three different types of new socket-outlets in accordance with EAS 495-2. 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 live and neutral pins only.

The combination of rewirable adaptors having 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 adaptors shall be tested with the rated current appropriate

to the flexible cord given in Table 2, at 250 V ± 10 V a.c. 15 000 times (30 000 movements) in a substantially non-inductive circuit.

Each adaptor is 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 adaptor being approximately 150 mm/s. The periods during which the adaptor is inserted and withdrawn shall be approximately equal. The adaptor pins are renewed or a new adaptor is used after each 5 000 insertions and withdrawals. For the purpose of this test, no lubrication is applied to the pins of the adaptor or the socket-outlet contacts.

After the test the shutters of the socket-outlets shall be operating satisfactorily, the socket contacts shall be safely shielded and the socket-outlets shall be in accordance with 9.1, 16, 15, 13.4.1a), 10.2, 13.6, 13.7, and 13.8 of EAS 495-2, with the permitted values of voltage drop specified in 13.4.1a) of EAS 495-2 for the adaptor pin to socket contact measurements increased by 50 %. The pins of the adaptor shall remain intact with no openings in the surface, joints or seams which will accept the probe specified in 12.11.3.

12.11.5.2 Compliance for adaptors with ISODs shall be checked by the following.

Using a selection of three different makes of rewirable plugs conforming to EAS 495-1:2023 and three different makes of unswitched socket-outlets conforming to EAS 495-2:2023, selected to represent different earth contact designs, the earth resistance between the earthing adaptor plug pin and the earthing socket contact of the socket-outlets shall be established in accordance with EAS 495-2, 10.2.1b).

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

The test shall be made using a separate sample of adaptor 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 adaptor plug being approximately equal. For the purpose of this test no lubrication shall be applied to the adaptor plug pins or socket-outlet contacts either prior to or during the test.

After 5000 insertions and withdrawals, the standard rewirable adaptor 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 adaptor plug pin and the earthing socket contact of the socket- outlets shall be in accordance with EAS 495-2, 10.2.1b).

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

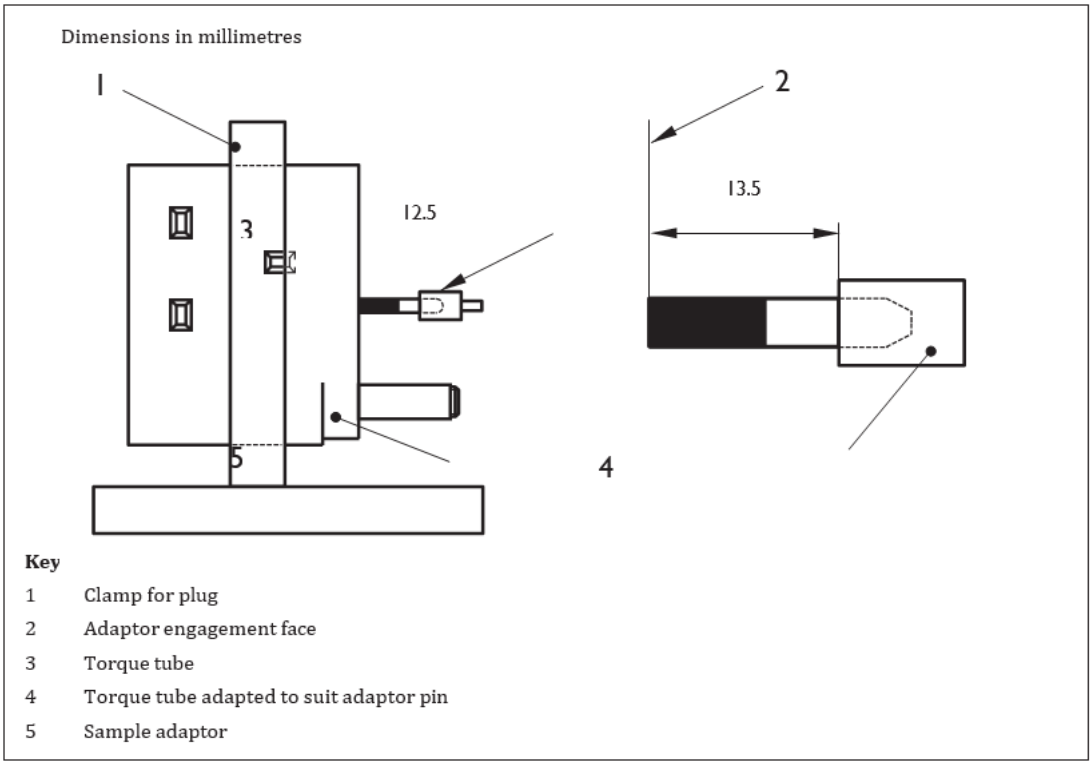
After the test, the shutters of the socket-outlet shall operate satisfactorily and the socket contacts shall be safely shielded.

12.11.6 Adaptor plug pins and ISODs (if any) shall have adequate mechanical strength to ensure that they cannot be distorted by twisting.

12.11.6.1 Compliance shall be checked by inspection and by the following test.

The adaptor is clamped in a block as shown in Figure 33. Each pin is twisted about its longitudinal axis by applying a torque of 1 Nm ± 10 % for 60 $_{0}^{+5}$ 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 adaptor shall fit the gauge shown in Figure 5. The test shall then be repeated with each adaptor plug pin being twisted in the opposite direction to that of the first test. After this second test the adaptor shall fit the gauge shown in Figure 5. In each case the gauge is used in the manner as described in 12.2.1.

Figure 33 — *Apparatus for torsion test on pins*



Key

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

12.12 The socket contacts and any terminals or terminations 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, if any, shall be connected to the line socket contact and any line terminal or termination shall be formed in one piece with the socket contact and the fixed part of any terminal or termination. Alternatively, it shall be permanently connected in such a way that efficient electrical connection is made that cannot work loose in normal use, and the other contact for the fuse link shall be similarly connected to the corresponding adaptor plug pin. These connections shall not be made by means of screws.

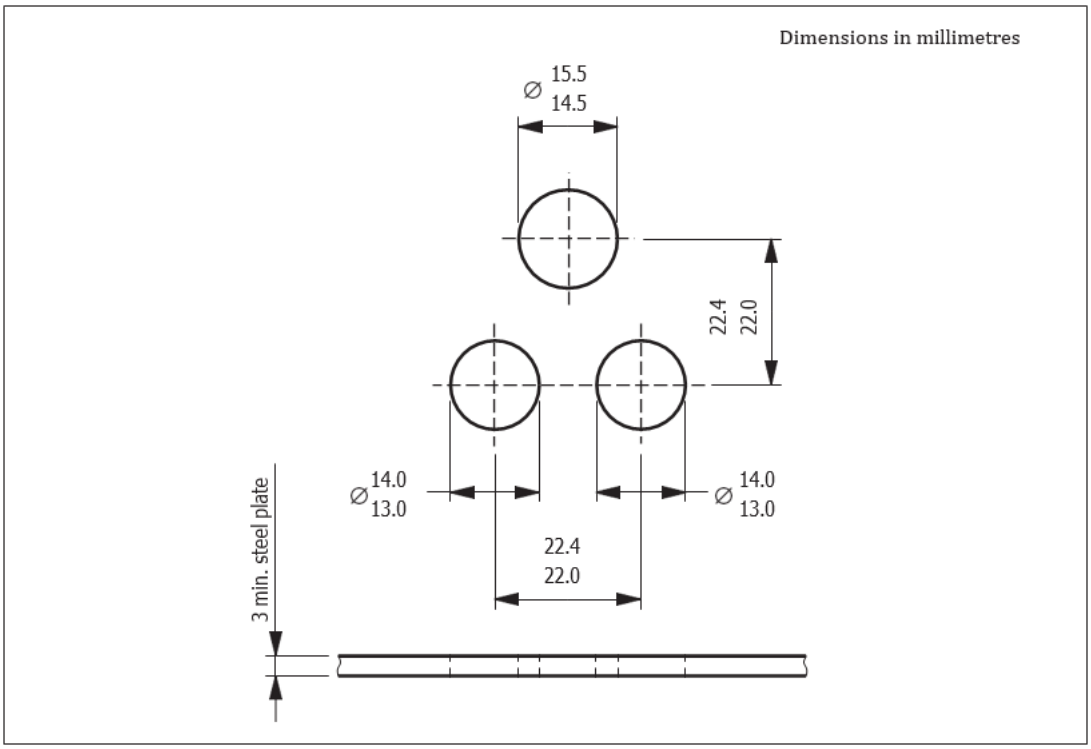
12.12.1 Compliance shall be checked by inspection and the tests described in 20.1.5 and Clause 16.

12.13 Adaptors 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 adaptor during normal use.

12.13.1 Compliance shall be checked by the following test.

After the tests described in Clause 20, each pin is subjected for 60 $^{+5}_{0}$ s to a pull of 100 $^{0}_{-2}$ N in one smooth and continuous movement in the direction of the major axis. The adaptor is mounted using the steel plate shown in Figure 7. The apparatus is placed within an oven and the pull is applied at least 1 h after the adaptor body has attained the test temperature of 70 °C ± 5 °C while maintained at this temperature.

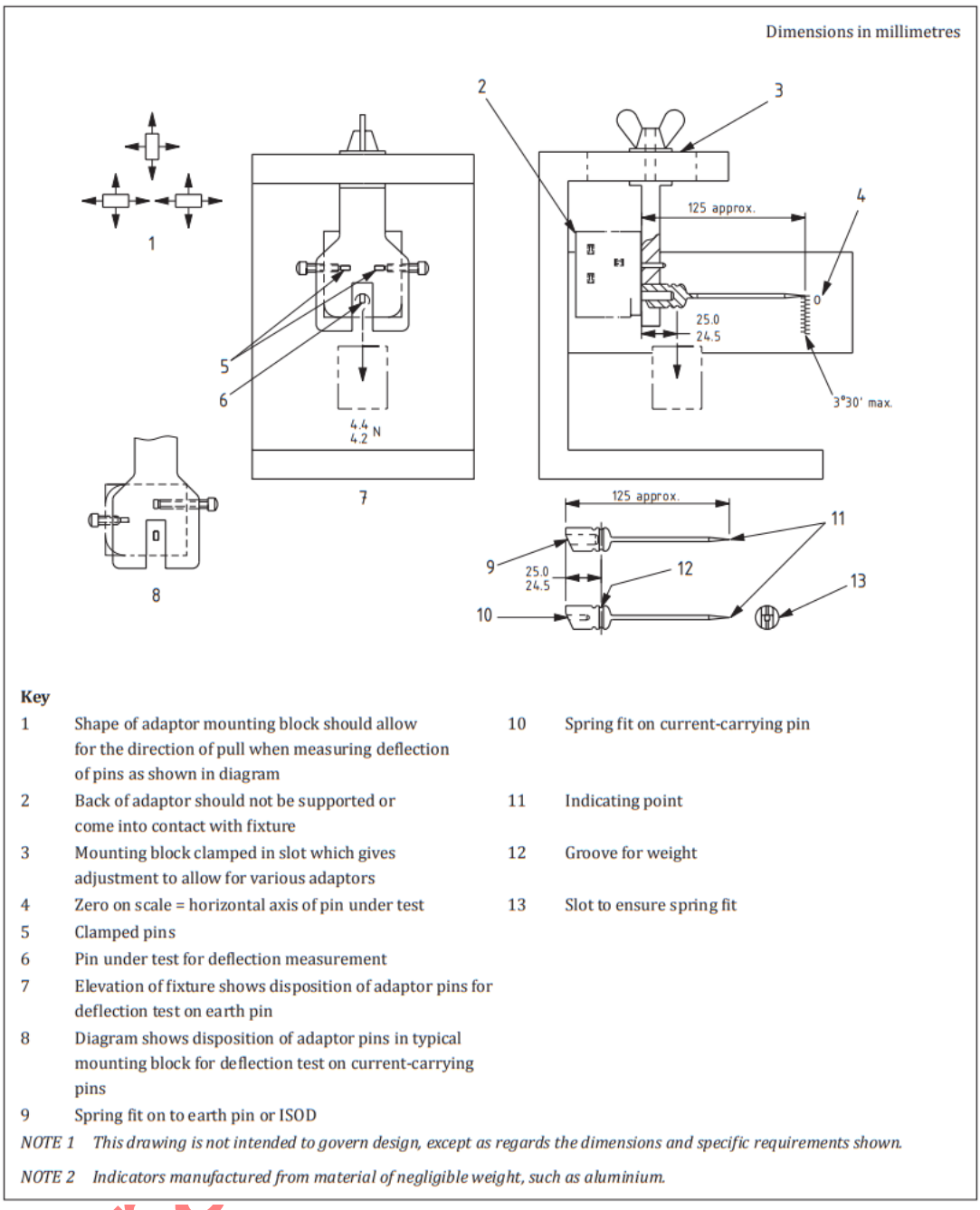
Figure 7 — *Mounting plate*



After the test the adaptor pin shall comply with the gauge shown in Figure 5 when used in the manner as described in 12.2.1.

12.14 The degree of flexibility of mounting of the adaptor 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 face when the pins are subjected to a force as shown in Figure 8.

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



Key

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

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.

12.14.1 Compliance shall be checked by inspection and in case of doubt by the following test

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

The unclamped pain 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 face of the adaptor 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 adaptor.

During each test the declination from the horizontal measured on the scale shall not exceed 3° 30'. After all tests have been completed the adaptor shall fit the gauge shown in Figure 5 when used in the manner as described in 12.2.1.

12.15 Suitable means shall be provided for withdrawing the intermediate adaptor or adaptor plug without subjecting the flexible cord to stress.

12.15.1 Compliance shall be checked by inspection.

12.16 Non-rewirable intermediate adaptors and adaptor plugs shall be fitted with flexible cords in accordance with 19.4.

12.16.1 Compliance shall be checked by inspection.

12.17 Conductive component parts of adaptors 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 adaptor.

12.17.1 Compliance shall be checked by inspection and manual manipulations.

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

12.18.1 Compliance shall be checked by inspection and by measurement for pin and sleeve and use of the gauge shown in Figure 5 as described in 12.2.1 for socket-outlet compatibility.

12.19 Adaptor plug pin sleeves shall have adequate electric strength, resistance to abrasion and resistance to deformation due to overheating of pins.

12.19.1 Compliance shall be checked by the tests given in 12.19.2, 12.19.3 and 12.19.4.

12.19.2 A 50 Hz voltage of substantially sinusoidal waveform is applied between each L and N pin and a thin metal strip of between 5.5 mm and 6 mm width wrapped around the base of the adaptor plug pin sleeve adjacent to the base of the adaptor. Initially not more than 500 V is applied, the voltage then being raised to 1250 V ± 30 V which is maintained for 60^{+5}_{0} s.

During the test no breakdown or flashover shall occur.

12.19.3 The test apparatus for resistance to abrasion (see Figure 9) comprises 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, is 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.

The adaptor is 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 adaptor plug pin at right angles to it and the adaptor plug pin slopes downward at an angle between 5° and 10° to the horizontal. The beam is loaded so that the wire exerts a force of $4\ ^{0}_{-0.1}$ N on the pin.

The adaptor is 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 pin thus abraded is approximately 9 mm of which approximately r mm is over the insulating sleeve.

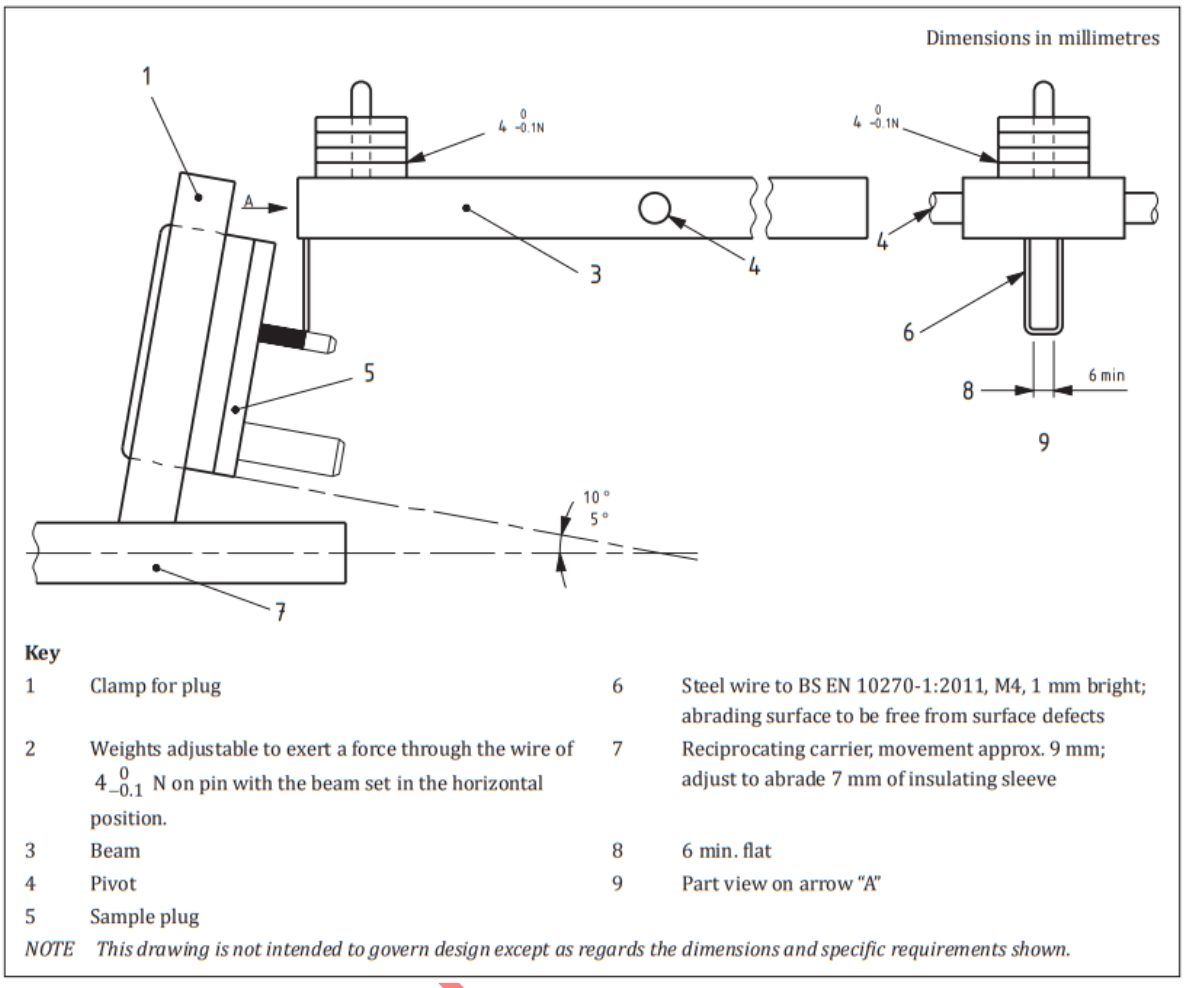
The adaptor is moved 10 000 times in each direction (20 000 movements) at a rate of 25 movements to 30 movements per minute.

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

After the test the sleeve shall show no damage which might impair the further use of the adaptor.

The sleeve shall not have been penetrated or creased and shall satisfy the tests described in 12.19.2, any abraded brass contamination on the sleeve having been removed.

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



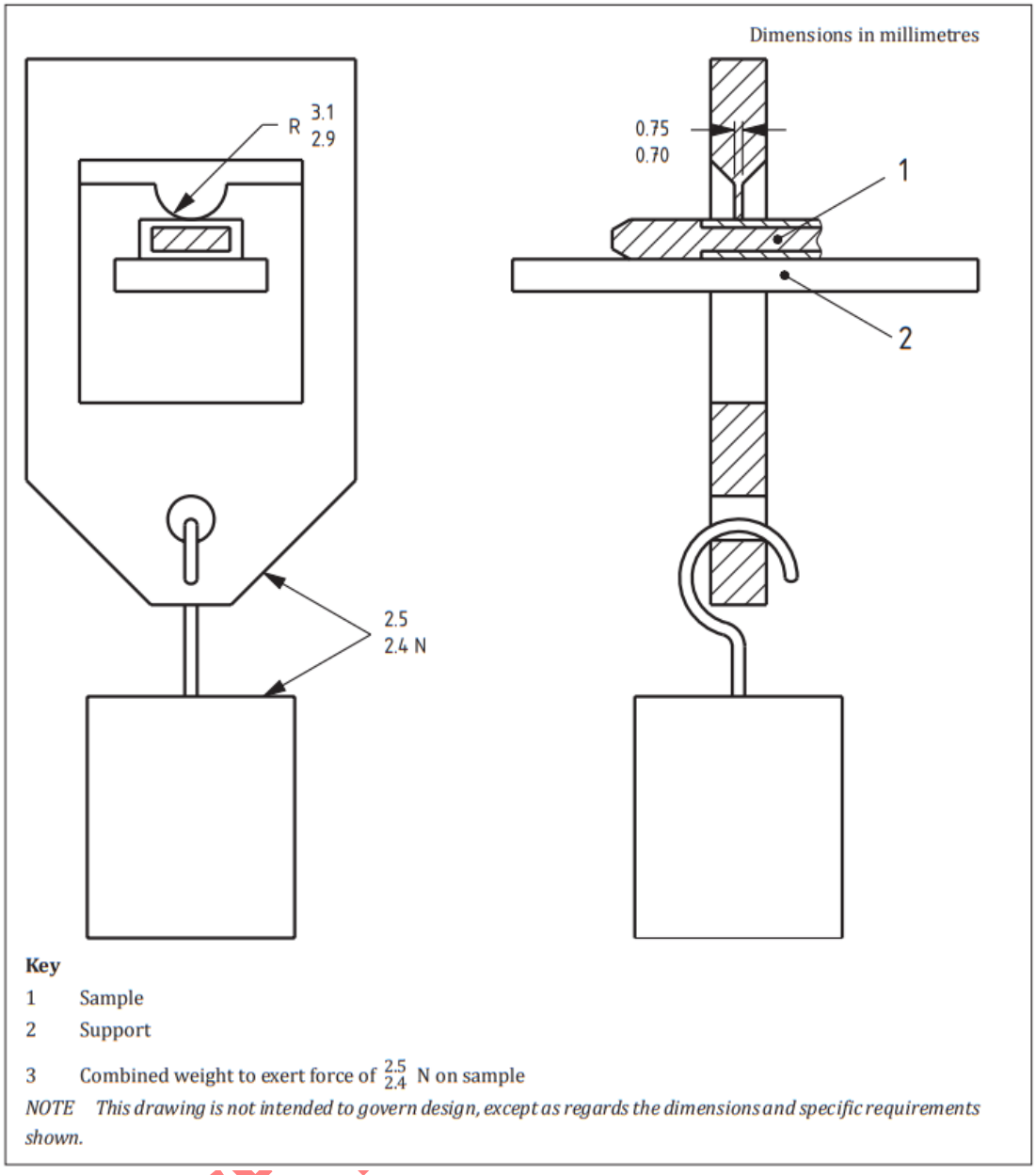
Key

1	Clamp for plug	6	Steel wire to BS EN 10270-1:2011, 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.

12.19.4 A set of three specimen pins is tested by means of the apparatus shown in Figure 10 which has a blade $0.70\ ^{0}_{+0.05}$ mm wide and a radius of 3 mm ± 0.1 mm. The test is made on one pin of each adaptor not used for the test described in 12.19.3.

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

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

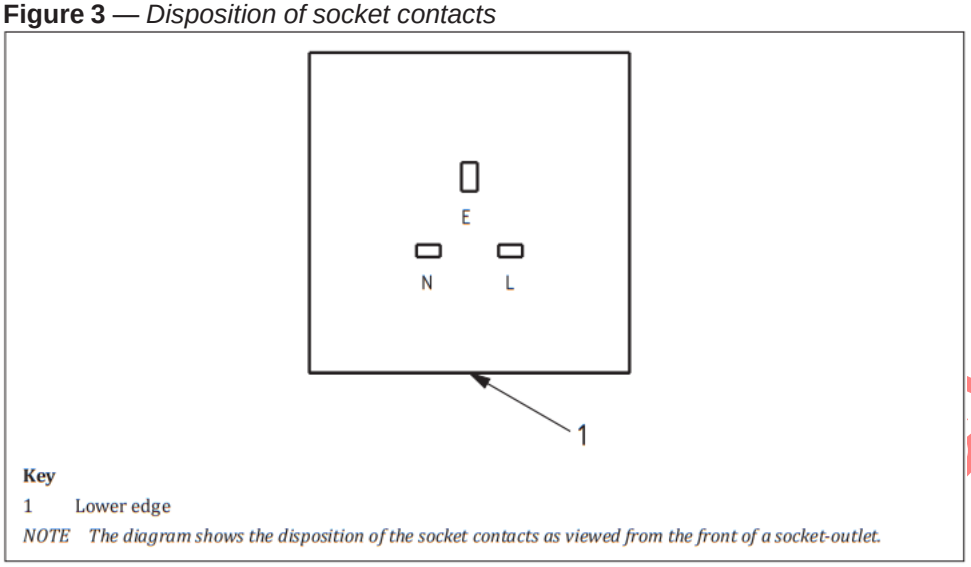
12.20 For fused adaptors with the fuse carrier or cover removed and the fuse link correctly fitted in the fuse clips, the creepage and clearance distances between live parts of the fuse and clips and the engagement face of the adaptor shall meet the requirements of 8.1 and 8.2.

12.20.1 Compliance shall be checked by measurement

13 Construction of adaptors (adaptor socket-outlet portion)

13.1 For adaptors with adaptor socket-outlets for EAS 495 plugs, the disposition of the socket contacts shall be as shown in Figure 3.

Figure 3 — *Disposition of socket contacts*



There shall be no projection on the engagement surface of the adaptor such as would prevent the full insertion of an appropriate plug. The spacing of the socket contacts shall correspond with that of the plug pins as specified in EAS 495-1.

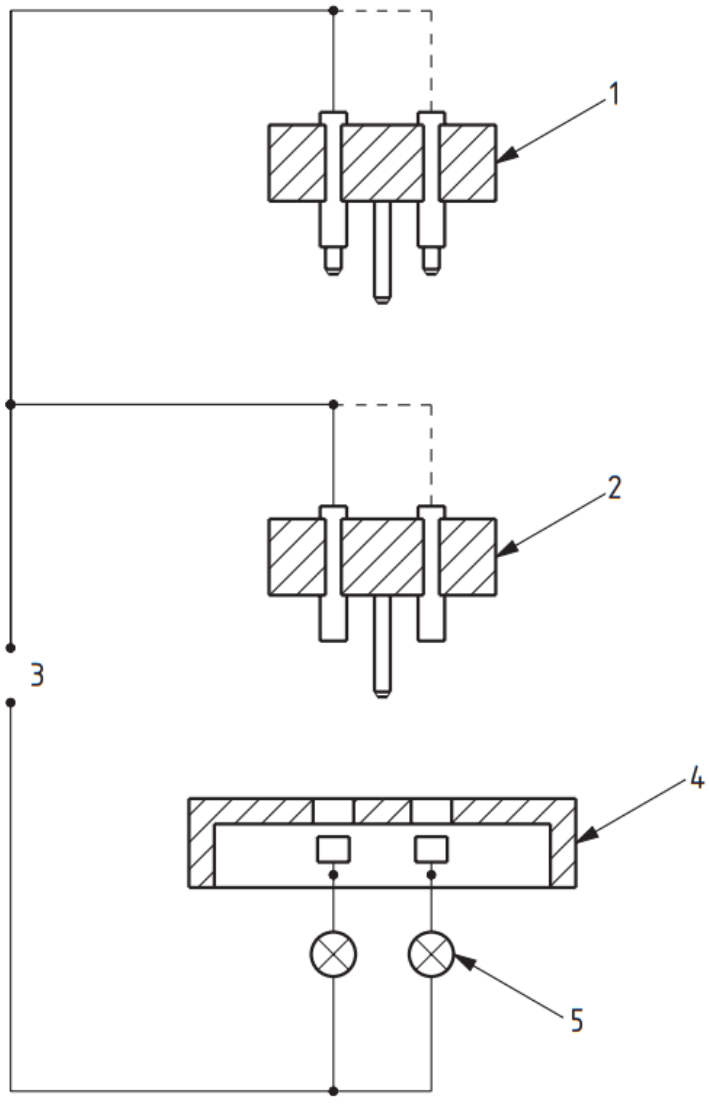
13.1.1 Compliance shall be checked by inspection and the use of the gauges shown in Figure 11.

If raised marking is used, it shall not project more than 0.5 mm from the engagement face and shall allow compliance with 13.2.

13.2 For adaptors with adaptor socket-outlets for EAS 495 plugs the line and neutral socket contacts in adaptors shall be positioned so as to make satisfactory contact with the corresponding pins of a plug in all positions that the contact may occupy when the plug is correctly and fully inserted.

13.2.1 Compliance shall be checked by inspection and the use of the gauge shown in Figure 12 and the circuit shown in Figure 13. Both indicator lamps shall light.

Figure 13 — *Test apparatus and circuit for use with contact and non contact gauges*



Key

1 "Contact" test gauge
2 "Non-contact" test gauge
3 40 V supply
4 Sample socket-outlet under test
5 Indicating lamps

NOTE 1 For details of contact test gauge, see Figure 3.

NOTE 2 For details of non-contact test gauge, see Figure 4.

NOTE 3 Dotted lines show additional connections when gauge body is made from insulating material.

NOTE 4 The figure shows a typical test apparatus and is not intended to be specific.

13.3 For adaptors with adaptor socket-outlets for EAS 495 plugs, on insertion of a plug into an adaptor, the travel of the end of either current-carrying pin from the front face of the adaptor to the first point of contact with the appropriate socket contact, in any position the socket contacts may occupy, shall be not less than 9.6 mm.

13.3.1 Compliance shall be checked by inspection and the use of the gauge shown in Figure 14 and the circuit shown in Figure 13. Neither indicator shall light.

13.4 For adaptor socket-outlets intended to accept plugs complying with other standards, the disposition and dimensions shall enable reliable and safe interconnection and there shall be no projection on the engagement

surface of the adaptor such as would prevent the full insertion of a plug. The spacing of the socket contacts shall correspond with that of the plug pins.

Raised marking is permitted provided it does not project more than 0.5 mm from the engagement face.
NOTE Apertures may be shaped at their front edges to facilitate insertion of plugs.

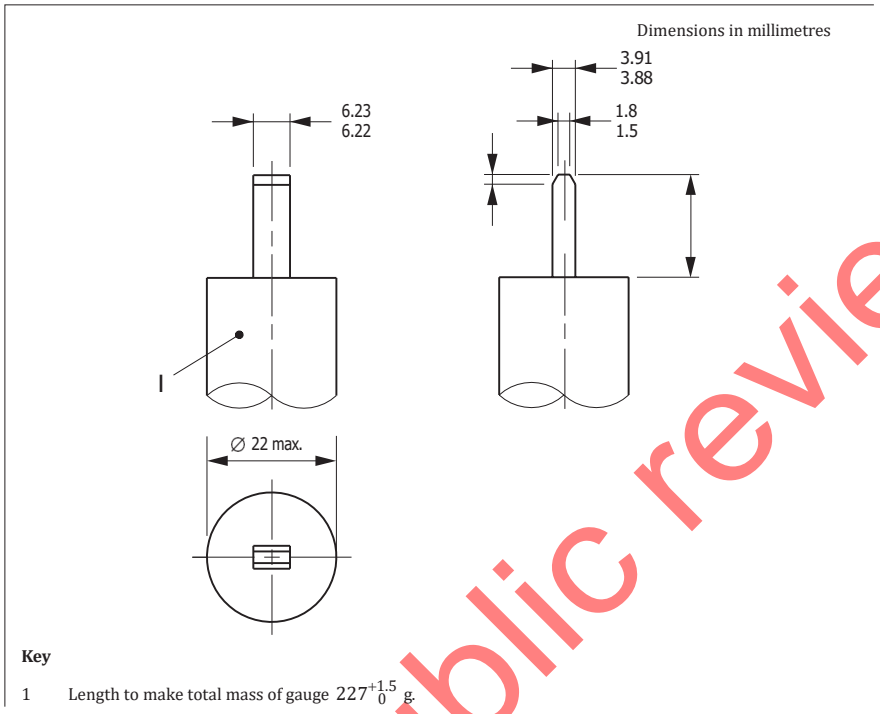
13.4.1 Compliance shall be checked by inspection and measurement and the requirements in the appropriate standards.

13.5 Socket contacts of adaptors shall be self adjusting as to contact making and each socket contact shall be such as to make and maintain, in normal use, effective electrical and mechanical contact with a corresponding plug pin. The means for producing the contact pressure shall be associated with each socket contact independently and shall not be dependent on insulating material in contact with the socket contact.
13.5.1 Compliance shall be checked by inspection and, except for shaver adaptors, by the tests given in 13.5.2 and 13.5.3, as appropriate.

13.5.2 The voltage drop between any individual line or neutral socket-contact and the corresponding plug o pin is measured between the terminal connecting strap at a point immediately adjacent to the socket-contact and the corresponding plug pin. Other than when tested in accordance with 18.1.2 and 18.1.3, the voltage drop shall not exceed 25 mV at rated current.

13.5.3 For adaptor socket-outlets for EAS 495 plugs, the withdrawal pull of a gauge as shown in Figure 16a) for individual earth socket contact and in Figure 16b) for individual line or neutral socket contact is checked whilst ensuring that neither the shutter mechanism, nor the material of the enclosure has any effect on the results of the test. The socket contact shall retain the gauge for not less than 30 s when the socket-outlet is held horizontally with the gauge hanging vertically downwards.

Figure 16b) — *Withdrawal pull gauges for effectiveness of contact: Gauge for line and neutral current carrying socket contacts*



Key

1 Length to make total mass of gauge $227^{+1.5}_{0}$ g.

Adaptor socket-outlets for plugs complying with BS 546 are checked using the gauge shown in Figure 2 of BS 546 as shown in Table 17 of BS 546. The individual line or neutral socket contact is checked whilst ensuring that neither the shutter mechanism, nor the material of the enclosure has any effect on the results of the test. The socket contact shall retain the gauge for not less than 30 s when the socket-outlet is held horizontally with the gauge hanging vertically downwards.

Adaptor socket-outlets for plugs complying with standards other than EAS 495 and BS 546 shall be tested in accordance with the relevant clauses of their appropriate standards.

13.6 The construction of adaptors shall be such as to allow for easy withdrawal of a plug from the socket-outlets.

A plug is inserted into and withdrawn from the socket-outlet 10 times with the adaptor mounted as in normal use.

13.6.1 Compliance shall be checked by the following test.

An appropriate plug having pins of maximum dimensions on nominal centres is inserted into and withdrawn from the socket-outlet 10 times with the adaptor mounted rigidly.

For shaver adaptors three types of plug shall be used, as specified in Clause 18.

Any grease from the plug pins and socket contacts prior to the tests. Each socket outlet of the adaptor shall be tested in turn.

The plug is then inserted into the adaptor socket outlet and a force is gradually exerted in a direction parallel to the axis of the pins. For shaver-outlets and for adaptor socket-outlets for EAS 495 plugs it shall not be possible to reach a pull of 36 N without the plug coming out of the adaptor socket-outlet.

For adaptor socket-outlets for plugs complying with other standards, the maximum force shall be that U specified in the appropriate standard.

13.7 The construction of the adaptor shall be such that when a plug is withdrawn from it, the current-carrying socket contacts are automatically screened by shutters. The shutters shall be operated either by the insertion of the earthing pin or by the simultaneous insertion of any two or more pins of the plug, provided that any one corresponding single pin inserted into any current-carrying socket aperture shall not open the shutter. One socket aperture shutter shall not be capable of closing independently of the other aperture shutter.

13.7.1 Compliance shall be checked by inspection, before and after the test described in Clause 18, and by the application of the corresponding single pin applied to the shutter using a force of $5\ ^{0}_{-0.1}$ N.

The test pin shown in Figure 1 is then applied to the shutter using a force of $5\ ^{0}_{-0.1}$ N applied perpendicular to the engagement face of the socket-outlet.

It shall not be possible to touch current-carrying parts.

13.7.2 Earth pin operated shutters and 3-pin operated shutters shall be deemed to conform to this requirement without testing. For other shutter designs, Compliance shall be checked by the following test.

A 2-pin plug conforming to IEC 60884-1 shall be applied to the socket line and neutral apertures with a force of 30-2N. The plug pins, when applied in any direction, shall not make contact with live parts.

13.8 For adaptors with adaptor socket-outlets for EAS 495 plugs, apertures for the reception of the line and the neutral plug pins shall not exceed 7.2 mm × 4.8 mm and for the earthing plug pin 8.8 mm × 4.8 mm.

NOTE Apertures may be shaped at their front edges to facilitate insertion of appropriate plug pins.

Earth socket contacts may be flush with the front face of enclosure, but shall not depend for their effectiveness on insulating material of the enclosure. In such a case the aperture shall be measured between the contact faces at the maximum separation.

13.8.1 Compliance shall be checked by inspection and measurement.

13.9 For adaptors with adaptor socket-outlets for EAS 495 plugs, no part of the aperture intended for the reception of the line or neutral pin shall be less than 9.5 mm from the periphery of the engagement face of a socket-outlet except that when a shutter is operated by the simultaneous insertion of the current-carrying pins this dimension shall be increased to 18 mm from the lower edge of the socket-outlet portion. The 9.5 mm and 18 mm dimensions may include a peripheral edge radius of not more than 1 mm.

13.9.1 Compliance shall be checked by inspection and measurement.

13.10 Adaptors with associated plugs and cords shall not impose undue strains on fixed socket outlets.

13.10.1 Except for shaver adaptors, conformity shall be checked by the following tests.

a) Adaptors with three adaptor socket-outlets for EAS 495 plugs shall be fitted with the following:

— one device and counterweight, simulating a plug and 1 m of 1.5 mm^2 3-core flexible cord in the outlet giving the most onerous condition. See Figure 35 (load 2);

— two devices and counterweights, simulating plugs and 1 m of 0.75 mm^2 3-core flexible cord on the remaining outlets. See Figure 35 (load 1).

Adaptors with two adaptor socket-outlets for EAS 495 plugs shall be fitted with the following:

— one device and counterweight, simulating a plug and 1 m of 1.5 mm^2 3-core flexible cord in the outlet giving the most onerous condition. See Figure 35 (load 2);

— one device and counterweight, simulating a plug and 1 m of 0.75 mm^2 3-core flexible cord in the remaining outlet. See Figure 35 (load 1).

Other adaptors shall be fitted with a complete complement of appropriate devices and counterweights shown in Figure 35 (loads 3 or 4) (for BS 546 outlets), or if no appropriate device is described, then a plug fitted with 1 m of flexible cord suitable for the current rating of the plug shall be fitted. Intermediate and adaptor plugs shall be fitted with 1 m of appropriate flexible cord.

The total mass shall not exceed 800 g.

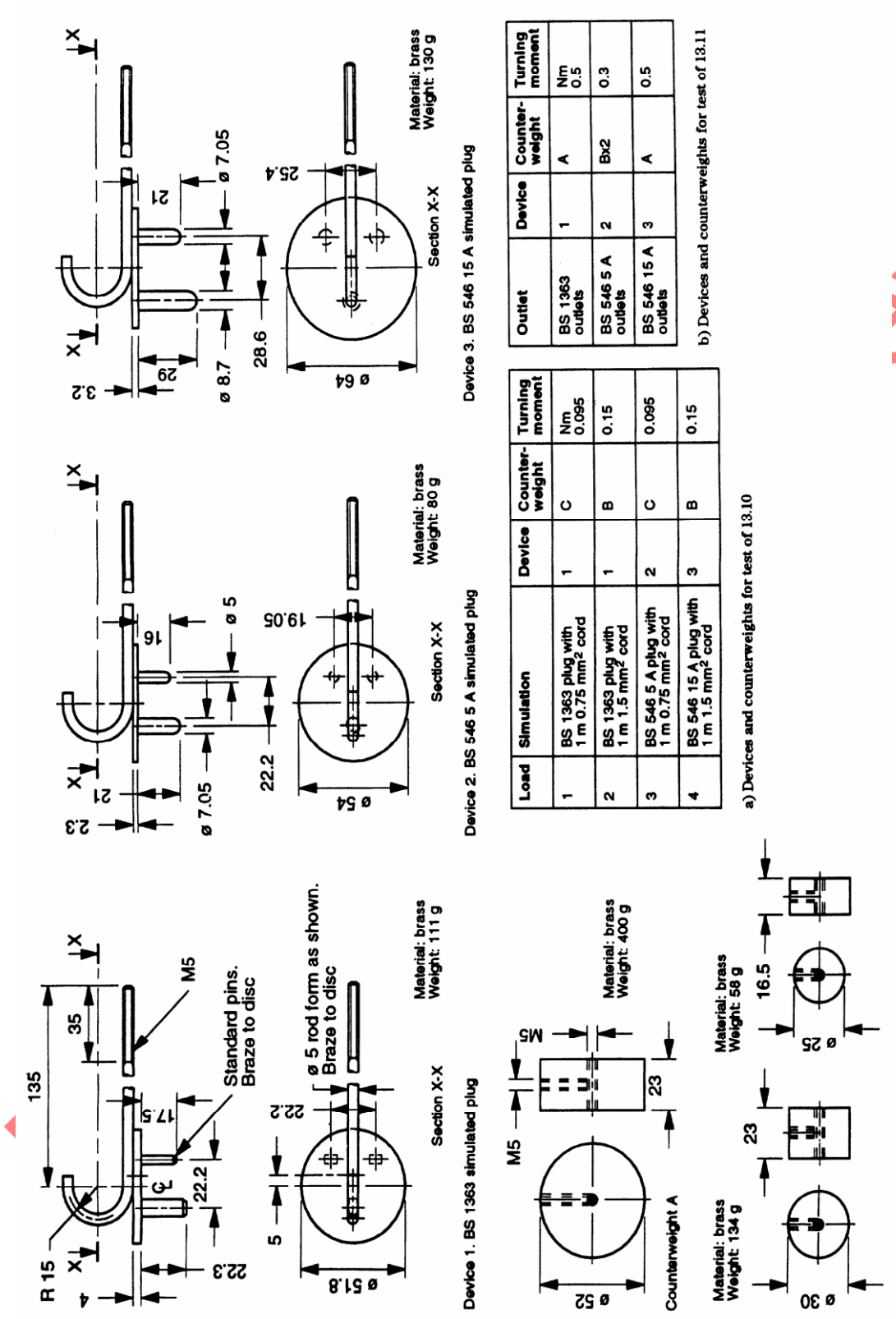
NOTE 1 Devices as shown in Figure 35 may be modified to suit particular adaptors, provided the mass/turning moment characteristics remain unchanged.

NOTE 2 A suitable device for calibrating simulated plugs is shown in Figure 36.

b) The adaptor with devices and counterweights or plugs and flexible cords as described in item a) shall be inserted into a socket-outlet complying with EAS 495-2. The socket-outlet shall be pivoted about its horizontal axis, 8 mm behind the engagement face and parallel with it, with its centre equidistant from pin centres. The additional torque which has to be applied to the socket outlet to maintain the engagement face in the vertical plane shall not be greater than 0.7 Nm. Care shall be taken that flexible cords, if any, hang freely during the test.

NOTE 3 A device for checking this requirement is shown in Figure 37.

Figure 35 — Simulated plug and cord devices (see Clause 13)



Load	Simulation	Device	Counter-weight	Turning moment
1	BS 1363 plug with 1 m 0.75 mm² cord	1	C	Nm 0.095
2	BS 1363 plug with 1 m 1.5 mm² cord	1	B	0.15
3	BS 546 5 A plug with 1 m 0.75 mm² cord	2	C	0.095
4	BS 546 15 A plug with 1 m 1.5 mm² cord	3	B	0.15

a) Devices and counterweights for test of 13.10

Outlet	Device	Counter-weight	Turning moment
BS 1363 outlets	1	A	Nm 0.5
BS 546 5 A outlets	2	Bx2	0.3
BS 546 15 A outlets	3	A	0.5

b) Devices and counterweights for test of 13.11

Figure 36 — Apparatus for calibration of turning moment of simulated plug (see Clause 13)

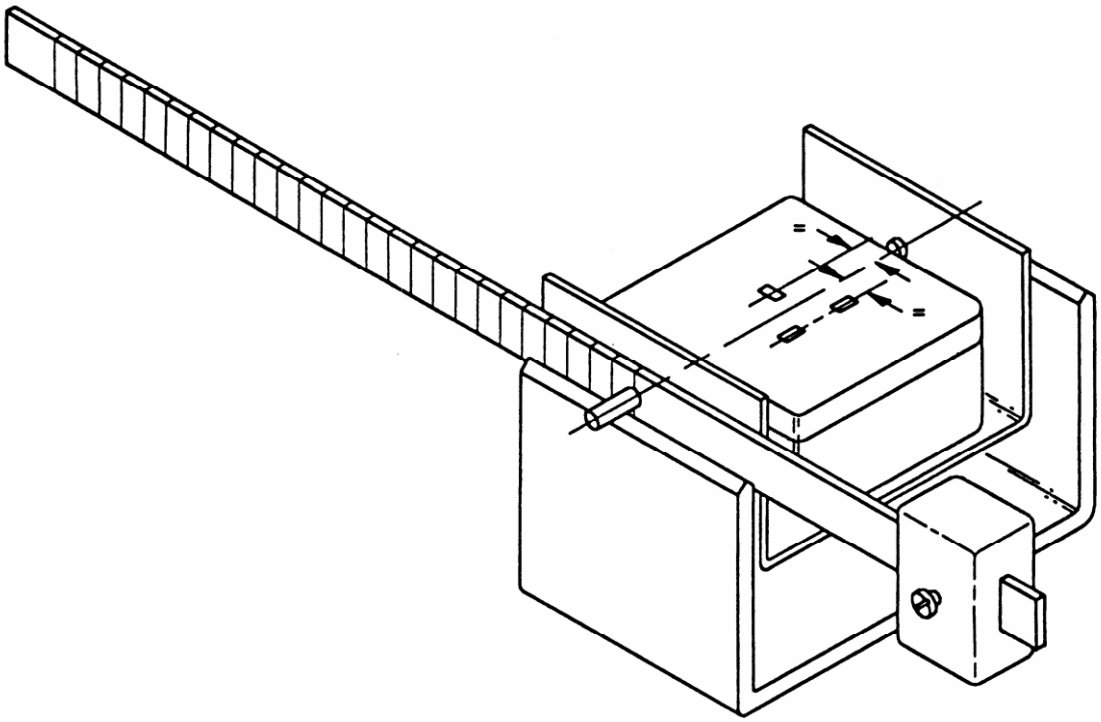
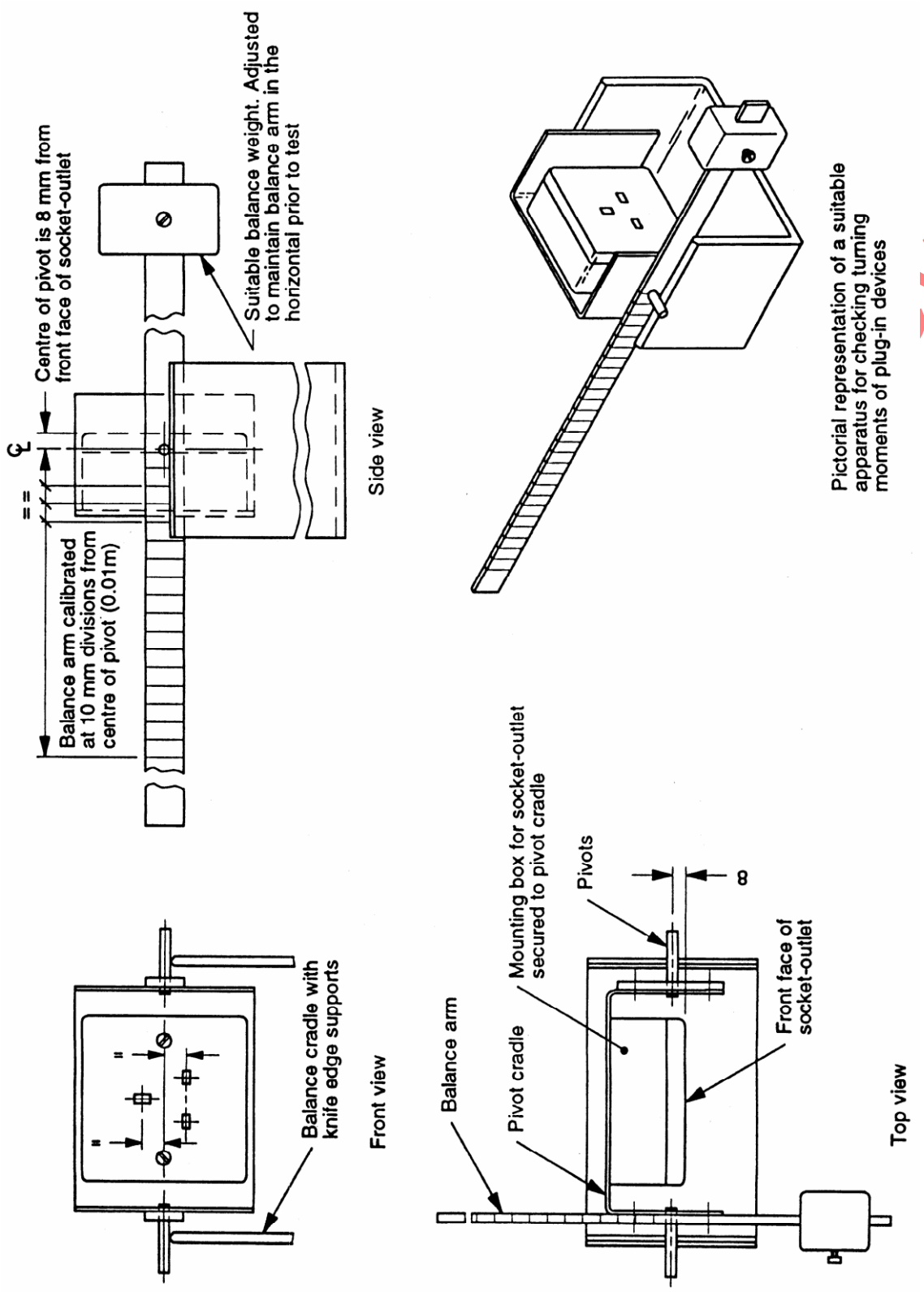


Figure 37 — Turning moment apparatus (see Clause 13)



13.10.2 Adaptors with socket-outlets on the same plane shall have a maximum of two outlets. The outlets shall be on the horizonal plane only, and shall be on the same centreline as the plug-pins of the adaptor. The vertical centre of the outlets shall be equally spaced from the vertical centre of the plug- pins and each outlet shall be no more than 30 mm from the vertical centre of the plug-pins.

13.11 Adaptor socket-outlet contacts shall withstand the strain imposed on them by associated plugs and cords.

13.11.1 Compliance shall be checked for adaptor socket-outlets for plugs complying with BS 546 and EAS 495 by the following test.

NOTE Shaver adaptors and adaptor socket-outlets for plugs complying with BS 546 of 2 A rating are not subject to this test.

The adaptors shall be rigidly mounted with the axis of plug pins horizontal and the earth pin uppermost. The appropriate device and counterweight shown in Figure 35 shall be fully inserted into the adaptor outlet being tested and removed after 1 min. The adaptor is turned through 90° on the mounting surface with the plug pin axis still horizontal and the device and counterweight fully inserted. The test is made four times, the adaptor being moved 90° after each insertion and removal.

During the test the device and counterweight shall not come out.

After the test, the adaptor shall show no damage within the meaning of this standard and the contacts shall retain for not less than 30 s the relevant weight gauges shown in Figure 16a) and Figure 16b) for adaptor socket-outlets for EAS 495 plugs when the face tested is held horizontally and the weight gauges are hanging vertically downwards. For adaptor socket-outlets for plugs complying with BS 546 the gauges of Figure 2 and Table 19 of BS 546 shall be used. The test shall be repeated for each adaptor v socket-outlet.

13.12 Switches shall be so constructed that undue arcing cannot occur when the switch is operated slowly. The switch shall disconnect at least the line circuit. Double pole switches shall make and break each pole with one movement of the actuator.

The adaptor switch shall not be used to switch incorporated electronic components other than an indicator lamp

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

Following the test described in 17.1.3, the circuit is 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.

13.12.2 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 might take up a single rest position. The actuating mechanism shall be so constructed that when operated the switch might remain only in a position giving adequate contact or adequate separation of contacts.

13.12.2.1 Conformity shall be checked by inspection and by the test of 13.12.3.

13.12.3 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. The method for fixing the contacts shall not unduly affect the test result. The test sample might be dismantled where necessary in preparation for this test and 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** ***N***	**Maximum test force** ***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.*			

13.13 Electronic components incorporated in adaptors shall conform to Annex A.

13.13.1 Compliance shall be checked by inspection of component Compliance evidence and the tests of Annex H.

14 Resistance to ageing and to humidity

14.1 Resistance to ageing

Adaptors shall be resistant to ageing.

14.1.1 Compliance shall be checked by the following test.

The adaptors are 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 is kept at 70 °C ± 5 °C. The specimens are kept in the cabinet for 168 h (0, +2) 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 are removed from the cabinet and kept at room temperature and relative o humidity for 1 h; and following which they are examined and shall show no damage which:

— would lead to non-compliance with this standard;

— would impair safety;

— would prevent further use.

14.2 Resistance to humidity

Adaptors shall be proof against humid conditions which may occur in normal use

14.2.1 Compliance 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 15.

Rewirable intermediate adaptor and adaptor plugs are fitted with 1000 mm ± 50 mm of 3-core 1.25 mm^2 PVC cord as given in IEC 60227-5 (clause 6). Non-rewirable adaptors are tested with 1000 mm ± 50 mm of the flexible cord with which they are supplied measured from the centre of the earth pin.

Vitrified ceramic material, which after 24 h immersion in water has not increased in mass by more than 0.5 % after all the moisture has been removed from its surface, shall not be subjected to further tests, providing the resistance to water of the material does not depend on glaze or varnish.

To suit the ambient conditions at the time of test, a convenient temperature, *T* °C, between 20 °C and

30 °C, is chosen as a reference temperature. The sample is brought to a temperature of between T °C and *T* + 4 °C and then 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 is kept in the cabinet for 48 + $_{0}^{+1}$ h.

NOTE 1 In most eases 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 within the cabinet, it is necessary to ensure constant circulation of the air within the cabinet and, in general, to use a cabinet which is thermally insulated.

The tests described in Clause 15 shall be made in the humidity cabinet or immediately after removal of the Y specimen 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 EAS 495.

15 Insulation resistance and electric strength

15.1 The insulation resistance and electric strength of adaptors shall be adequate.

15.1.1 Compliance shall be checked by the tests given in 15.1.2 and 15.1.3.

15.1.2 The insulation resistance is measured using a dc voltage of 500$_{0}^{+250}$, the measurement being made for 60 $_{0}^{+5}$ s after application of the voltage. The insulation resistance is 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 terminal/ termination;

3) any metal part of a cord anchorage.

c) each switched pole of a switched adaptor and corresponding plug pin, with the switch contact 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 insulated therefrom, including earthed metal.

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 intermediate adaptors and adaptor plugs, these tests shall be made using accessible parts, e.g. pins known to be connected to the terminations.

15.1.3 A 50 Hz voltage of substantially sinusoidal waveform is applied as described in 15.1.2. Initially, not more than 1000 V is applied, the voltage is then raised to 2000 V ± 60 V. The high voltage source used shall be such that when the output is adjusted to 2000 V ± 60 V for 60 $_{0}^{+5}$ 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.

One pole of neon indicators and the like shall be disconnected before making this test.

15.2 Non-rewirable intermediate adaptors or adaptor 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 6000 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.

16 Temperature rise

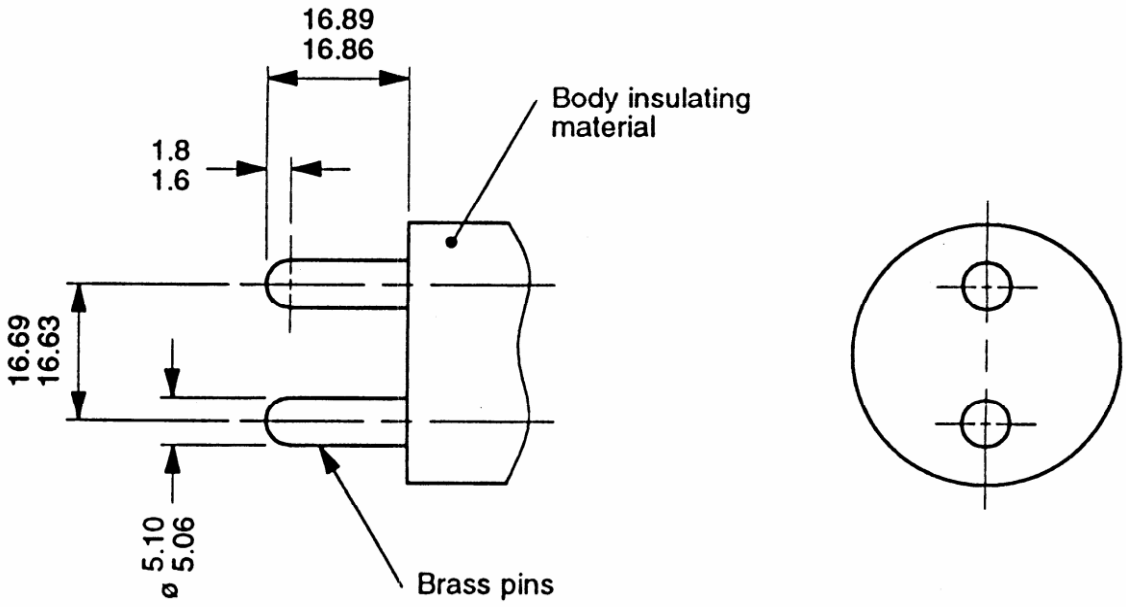
16.1 Adaptors and their surroundings shall not attain excessive temperatures in normal use.

16.1.1 Compliance shall be checked by the following tests.

For adaptors with adaptor socket-outlets for EAS 495 plugs, the standard test plug described in Annex B shall be used.

For adaptors with adaptor socket-outlets for other plugs, e.g. those complying with BS 546, appropriate plugs fitted with 1000 mm ± 50 mm of appropriate PVC insulated flexible cord as specified in IEC 60227-5 (clause 6), to suit the maximum current rating of the plugs, shall be used. For shaver adaptors the test plug as detailed in Figure 34 fitted with 1 000 mm ± 50 mm of twin circular 0.5 mm2 flexible cord(IEC 60227-5 (clause 5)) shall be used.

Figure 34 — Test plug (see Clause 16)



All linear dimensions are in millimetres

Non-rewirable intermediate adaptors shall have the cord supplied cut to 1000 mm ± 50 mm length. Rewirable intermediate adaptors shall be fitted with 1000 mm ± 50 mm of 1.25 mm^2 PVC insulated flexible cord (IEC 60227-5 (clause 6)) having the appropriate number of cores. The L in and L out cores shall be linked at their extremity to provide a normally closed path.

Adaptor plugs are tested with 1000 mm ± 50 mm of 1.25 mm^2 3-core PVC insulated flexible cord (see Table 27 of EAS 117-1) if they are rewirable, or with 1000 mm ± 50 mm of the flexible cord supplied if non-rewirable.

Adaptors with fuses complying with EAS 496 shall have the fuse replaced with a calibrated link constructed and calibrated in accordance with Annex A.

Adaptors with fuses complying with BS 646 shall be fitted with a BS 646 fuse link of 5 A rating. Shaver adaptors shall be fitted with a BS 646 fuse link of 1 A rating.

During the tests, measure temperature rises at the terminals or terminations (if any) and where overheating might result in hazard.

16.1.2 Tests shall be carried out as follows.

a) For adaptors where all the adaptor socket-outlets are for EAS 495 plugs, a series of tests shall be conducted by inserting the standard test plug into each socket-outlet in turn and, in each test, a current of 14 A ± 0.4 A shall be passed through the assembly.

b) For other adaptors:

1) where there is one adaptor socket-outlet for EAS 495 plugs plus other ratings to other standards; or

2) where all adaptor socket-outlets are for plugs of types and ratings to other standards; or

3) in adaptor plugs where there is one adaptor socket-outlet for EAS 495 plugs plus an outlet for a flexible cord.

A series of tests shall be conducted by inserting an appropriate test plug into each socket-outlet in turn, or by applying a load via the flexible cord of an adaptor plug. In each test a current as specified below shall be passed through the assembly.

i) For socket-outlets rated at 13 A or higher, the test current shall be 14 A ± 0.4 A.

ii) For other socket outlets and for flexible cords, the test current shall be equal to 110 % of the respective rating but in no case shall an individual test exceed 14 A.

iii) For multiway adaptors, an additional test shall be conducted by inserting an appropriate test plug into each socket-outlet and, for an adaptor plug, by connecting a load via the flexible cord. An electrical load equal to 110 % of the total connectable load but not exceeding a maximum value of 14 A shall then be passed through the complete assembly dividing this current between all the socket-outlets, including the flexible cord, if any, in proportion to their respective current ratings.

iv) For conversion adaptors, the test current shall be equal to 110 % of the respective current rating of the socket-outlet but shall not exceed 14 A.

Where fitted with USB battery charging outlets these shall be loaded with their rated currents (+10 $_{0}$ %) for the duration of the tests.

In the case of adaptors having more than one USB outlet, the test load for the USB outlets shall be applied to a single USB outlet in turn for each test.
For adaptors with multiple USB outlets it might be necessary to repeat the test multiple times with the loading on different outlets to cover the different possible loading options and combinations. For the purpose of this test a suitable load shall be used to provide the desired load current.

The tests shall be carried out at a rated voltage -20^{+10} %.

Adaptors rated 50 Hz and 60 Hz are tested at either frequency unless they contain electronic components which can influence the temperature rise, 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

v) For shaver adaptors, the test current shall be 1 A ± 0.1 A.

The tests shall be carried out at a rated voltage $^{+10}$ %.

$^{+20}$

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.

During the tests temperature rises are measured and the values shall not exceed those given in Table 8.

Table 8 — Permitted temperature rises

Measurement point	Temperature rise K
Line pin spacer (see Figure 17)	37
Neutral pin spacer (see Figure 17)	37
Terminals or termination of intermediate adaptors or adaptor plugs	52
Accessible external surface 1	52
NOTE he recording of a measured value up to and including the specified maximum permissible limit for temperature rise is considered to comply with the requirement of the standard on condition that the uncertainty of measurement at not less than 95 % confidence level does not exceed ±2 °C.	

The temperature rises of the line and neutral pins of the adaptor are measured by means of thermocouples using the apparatus shown in Figure 17. Temperature rises are 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 are 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, it is essential that care is taken to ensure that the heat from the soldering process does not affect the performance of the adaptor and that no electrical connections are bridged by solder.

NOTE .

If, in order to fix thermocouples, a non-rewirable adaptor 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.

The adaptor is mounted in a flat insulating plate as shown in Figure 17. The supply conductors are attached to the line and neutral pins of the adaptor by means of clamps which also serve to retain the adaptor in position. The clamp screws are tightened to a torque of between 0.8 N.m and 1.2 N.m.

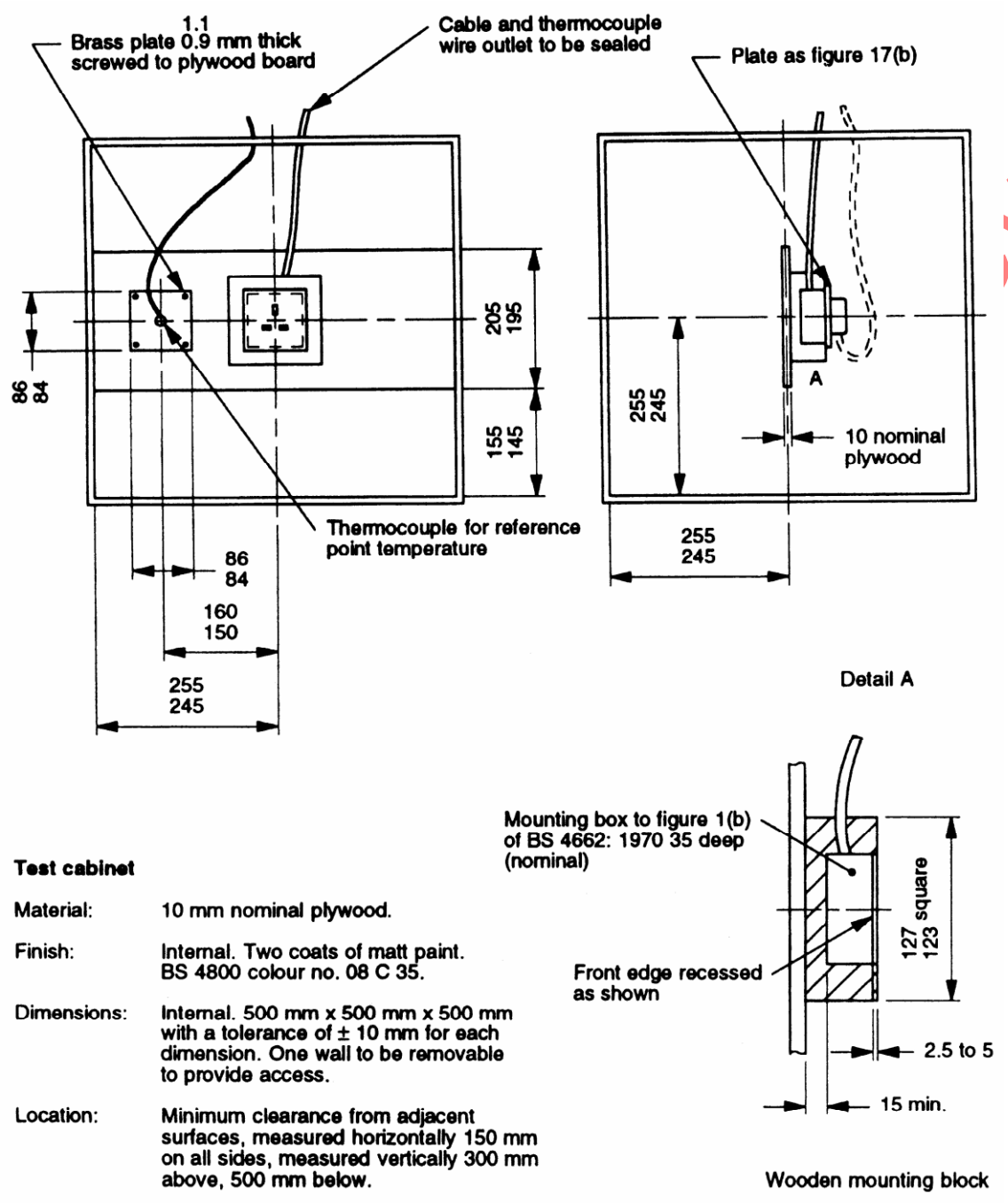
The assembly is mounted by means of screws in a standard steel flush-mounted socket-outlet box as shown in Figure 1b of EAS 203, having a nominal internal depth of 35 mm which is mounted in a test cabinet as shown in Figure 17a). The incoming cable and outgoing flexible cords) shall enter the test cabinet through holes in the top surface which shall then be sealed to prevent circulation of air. The length of cable and flexible cord within the

Figure 17a) enclosure shall be a maximum length of 600 mm and 850 mm, respectively. Care shall be taken to position the cable and flexible cord away from the reference temperature measuring point so as not to influence the derivation of plug temperature rise values.

The incoming cable shall be 2.5 mm^2 PVC insulated and sheathed cable, as given in Table 8 of IEC 60227 and shall enter the socket-outlet mounting box through the standard knock-out 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 shall be passed through the adaptor and through a loads) connected to the flexible cord of the test plugs) 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.

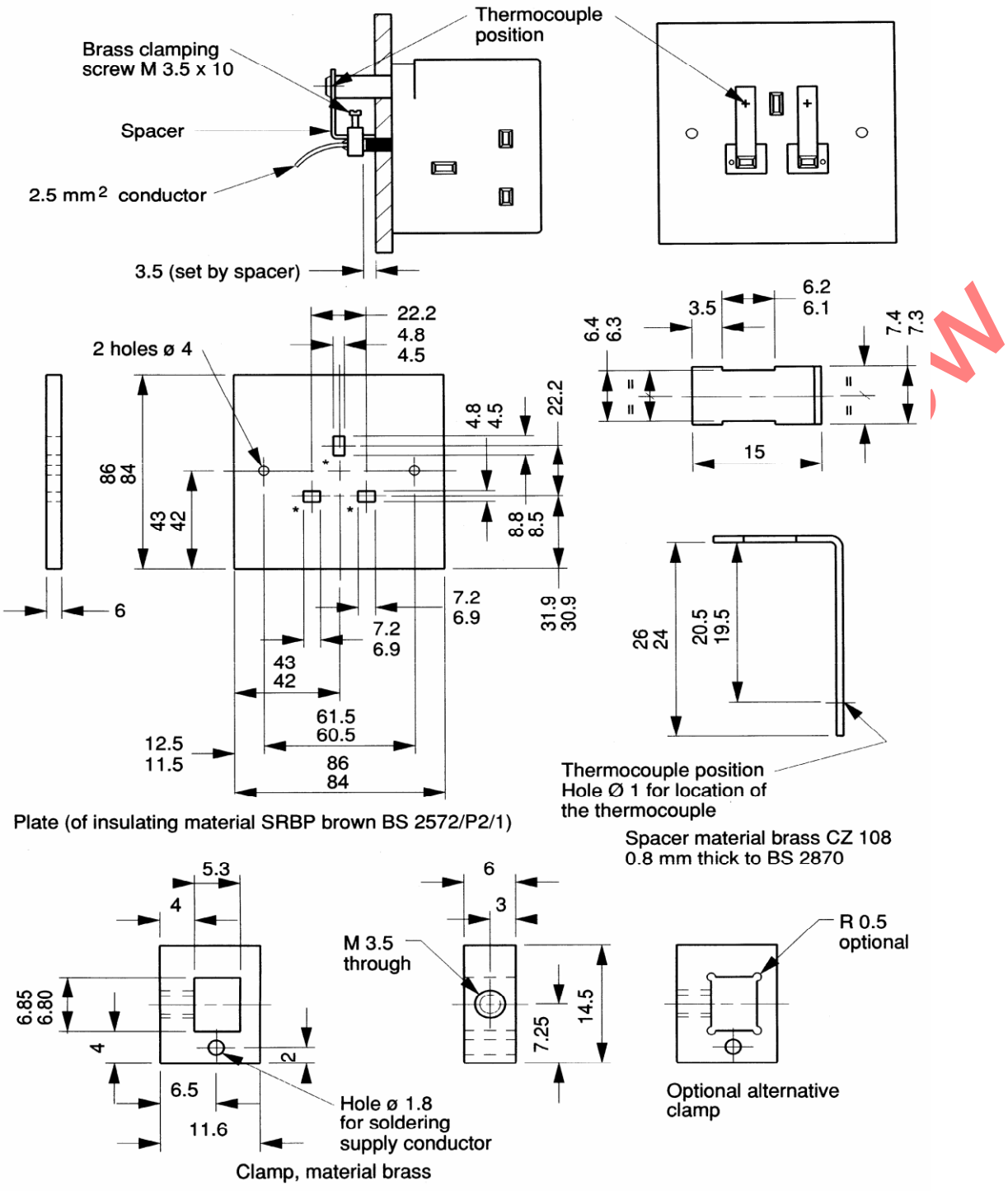
The temperature rise is calculated by deducting the reference point temperature from the measurement point temperature recorded [see Figure 17a) and Figure 17b) respectively].

Figure 17a) — Test apparatus for temperature rise test (see Clause 16 and Annex B)



All linear dimensions are in millimetres

Figure 17b) — Dummy front plate for temperature rise test (see Clause 16 and Annex B)



All linear dimensions are in millimetres

* The positional tolerance of the three pin apertures shall be proved by the use of gauges in accordance with Figure 11.

NOTE Tolerance ± 0.2 mm except where shown.

17 Breaking capacity of adaptors

17.1 The breaking capacity of socket contacts incorporated in adaptors shall be adequate.

17.1.1 Except for shaver adaptors, conformity shall be checked by the tests described in 17.1.2 as applicable, which shall be completed with the adaptors connected and mounted as in normal use.

NOTE Shaver adaptors are deemed to conform without testing.

17.1.2 The socket contacts shall make and break a current of 1.25 times rated current ± 0.4 A, i.e. (1.25 x 13) A ± 0.4 A in a substantially non-inductive a.c. circuit at 250 V ± 5 V, 10 times in succession at intervals of approximately 30 s, a plug being withdrawn from the socket-outlet at a speed of approximately 150 mm/s immediately after insertion. For the purpose of the test the fuse link may be replaced by a link of negligible impedance.

After the test, the socket-outlet shall be capable of satisfying the subsequent tests detailed in Table 1 for the appropriate test sample.

17.1.3 The switch shall make and break a current of 1.25 times rated current ±0.4 A in a substantially non-inductive a.c. circuit of 275 V ±5 V, 10 times in succession at intervals of approximately 30 s. After the test, the adaptor shall be capable of passing the subsequent tests specified in Table 1 for the appropriate test sample.

18 Normal operation of adaptors

18.1 Adaptors shall withstand without excessive wear or other harmful effects, the electrical and mechanical stresses occurring in use.

18.1.1 For adaptors other than shaver adaptors, compliance shall be checked by the tests described in 18.1.2 and for shaver adaptors by the tests described in 18.1.3.

18.1.2 Using an appropriate plug with solid pins, each socket-outlet of the adaptor shall make and break a current equal to the rated current t0.4 A of the adaptor, or if the rated current ± 0.4 A of the plug is lower, the rated current of the appropriate plug at 250 V ± 10 V a.c. 15000 times (30000 movements) in a substantially non-inductive circuit.

Each plug is inserted into and withdrawn from the socket-outlet under test at a rate of approximately six insertions and 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 are approximately equal. Each socketoutlet on the adaptor shall be tested in turn, the plug pins are renewed after each 5000 insertions and withdrawals. For the purposes of this test, no lubrication is applied to the plug or socket-outlet under test.

After the test the shutter shall be operating satisfactorily, the socket contacts safely shielded and the adaptor shall be in accordance with 13.7, 9.1, 16, 15, 13.5, 13.6 and 10.2. The permitted value of voltage drop specified in 13.5.2 is increased to not greater than 40 mV.

18.1.3 Shaver adaptors shall be tested without making and breaking a current, i.e. purely mechanical test. For the test, three shaver adaptors shall be used, each being tested with one type of plug only.

The three plugs shall be:

a) UK, complying with BS 4573;

b) USA, as referred to in IEC/TR 60083, sheet A1-15 (non-polarity);

c) European, as referred to in IEC/TR 60083, sheet C5.

After the test the shutter shall be operating satisfactorily, the socket contacts shall be safely shielded and the adaptor shall be in accordance with 13.7, 9.1, 16, 15, 13.5, 13.6 and 10.2. The permitted value of voltage drop specified in 13.5.2 is increased to not greater than 40 mV.

18.1.4 Switched adaptors the voltage drop across each switched pole, measure and points in immediately adjacent to the switch, shall not exceed 60 mV at rated current.
The switch shall then make and break its rated current ±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 used 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 its rated current ±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 voltages given in 15.1.3 being reduced by 25%.

19 Connection of flexible cords and cord anchorage in intermediate adaptors and adaptor plugs

19.1 Provision shall be made for the entry and effective clamping without bending of 2-core and 3core flexible cords for rewirable adaptors as given in IEC 60245-8 (clause 5), IEC 60245-8 (clause 2), IEC 60245-8 (clause 3), IEC 60245-4 (clause 4), IEC 60227-5 (clause 2), IEC 60227-5 (clause 5) and IEC 60227-5 (clause 6), having nominal conductor cross-sectional areas not exceeding 1.5 mm^2. For non-rewirable adaptors provision shall be made for the entry and adequate retention of the flexible cord with which the plug is supplied, once assembled it shall not be possible to affect the integrity of the cord anchorage.

The entry for the flexible cord shall be between the current-carrying pins at the side of the adaptor opposite the earth pin.

The cord anchorage shall be such that the conductors are relieved from strain, including twisting, where they are connected to the terminals or terminations.

The cord anchorage shall contain the sheath. Cord 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 cord into a knot or tying the ends with string, etc. shall not be used.

19.1.1 Compliance shall be checked by inspection and by the following tests.

a) Rewirable adaptors are fitted with a 2-core flexible cord having a nominal conductor cross-sectional area as given in IEC 60227-5 (clause 2). The conductors are introduced into the terminals and the terminal screws tightened just sufficiently to pr event the conductors easily changing their positions. The cord anchorage is 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 is then left untouched for a minimum of 24 h.

After this preparation, it shall not be possible to push the flexible cord into the adaptor to such an extent as to impair safety or so that the cord anchorage is loosened. The flexible cord is then subjected 25 times to the pull given in Table 2. The pulls are applied without jerks in the most unfavourable position momentarily. Immediately afterwards, the flexible cord is subjected for $60\ ^{+5}_{0}$ s to the appropriate torque shown in Table 2, at a minimum distance of 150 mm from the cord entry.

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

The tests are then repeated but with the rewirable adaptor fitted with a 3-core flexible cord having a nominal conductor cross-sectional area of 1.5 mm^2 as given in IEC 60227-5 (clause 6).

b) For non-rewirable adaptors, the test is carried out with the cord with which the adaptor is supplied and using the load and torque given in Table 2. The conductors of the flexible cord are severed at the point of termination prior to the test.

During this test the insulation of the flexible cord shall not be damaged.

A voltage of 3750 V ± 75 V is applied for $60\ ^{+5}_{0}$ s between the conductors. Breakdown or flashover is considered to indicate damage to the flexible cord.

c) After the tests given in a) and b) the flexible cord shall not have been displaced by more than 2 mm. For the measurement of longitudinal displacement, a mark is made on the cord whilst it is subjected to the load given in Table 2, at a point adjacent to the anchorage in the case of rewirable adaptors, or as close as practicable to the cord anchorage in the case of non-rewirable adaptors, before starting the tests. After the test, the displacement of the mark on the flexible cord in relation to the cord anchorage is measured whilst the cord is again subjected to the load given in Table 2.

19.2 Cord anchorages in rewirable adaptors shall anchor the cord securely to the adaptor. The design shall ensure the following:

a) the cord anchor age cannot be released from the outside without the use of a tool;

b) it shall not be possible to touch cord anchorage screws, if any, with test probe B of EAS 370 when the accessory is energized;

c) the cord is not clamped by a metal part bearing directly on the flexible cord;

d) at least one part of the anchorage is securely fixed to the adaptor;

e) clamping the cord does not require the use of a special purpose tool;

f) tightening the cord anchorage screws if any to the torque specified in Table 6does not distort the engagement surface of the adaptor to such an extent that conformity with 12.2 is affected;

g) the adaptor may be correctly assembled without damage when it is wired with the largest specified flexible cord and all screws are tightened to the torque specified in Table 6.

19.2.1 Compliance shall be checked by inspection and test.

19.3 Screws which are used when clamping the flexible cord shall not serve to fix any other components unless the adaptor 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.

19.3.1 Compliance shall be checked by inspection.

19.4 Non-rewirable adaptors shall be fitted with flexible cords complying with IEC 60227-5 or IEC 60245-4, IEC 60245-8 or with flexible cords complying with the requirements of the specification appropriate to the equipment to which they may be fitted. Connections shall be as given in Table 9.

19.4.1 Compliance shall be checked by inspection and a continuity test.

19.5 Non-rewirable adaptors shall be so designed that the flexible cord is not subjected to excessive bending where it enters the adaptor.

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

Adaptors with flat flexible cords are mounted so that the major axis of the section is parallel to the axis of oscillation. The flexible cord is loaded with a weight such that the force is as given in Table 2.

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

neutral conductor. The oscillating member is moved backwards and forwards 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, adaptors with cords of circular section are turned through 90° ± 5° about the cord entry centreline.

NOTE A flexing is one movement through 90°, either backwards or forwards.

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

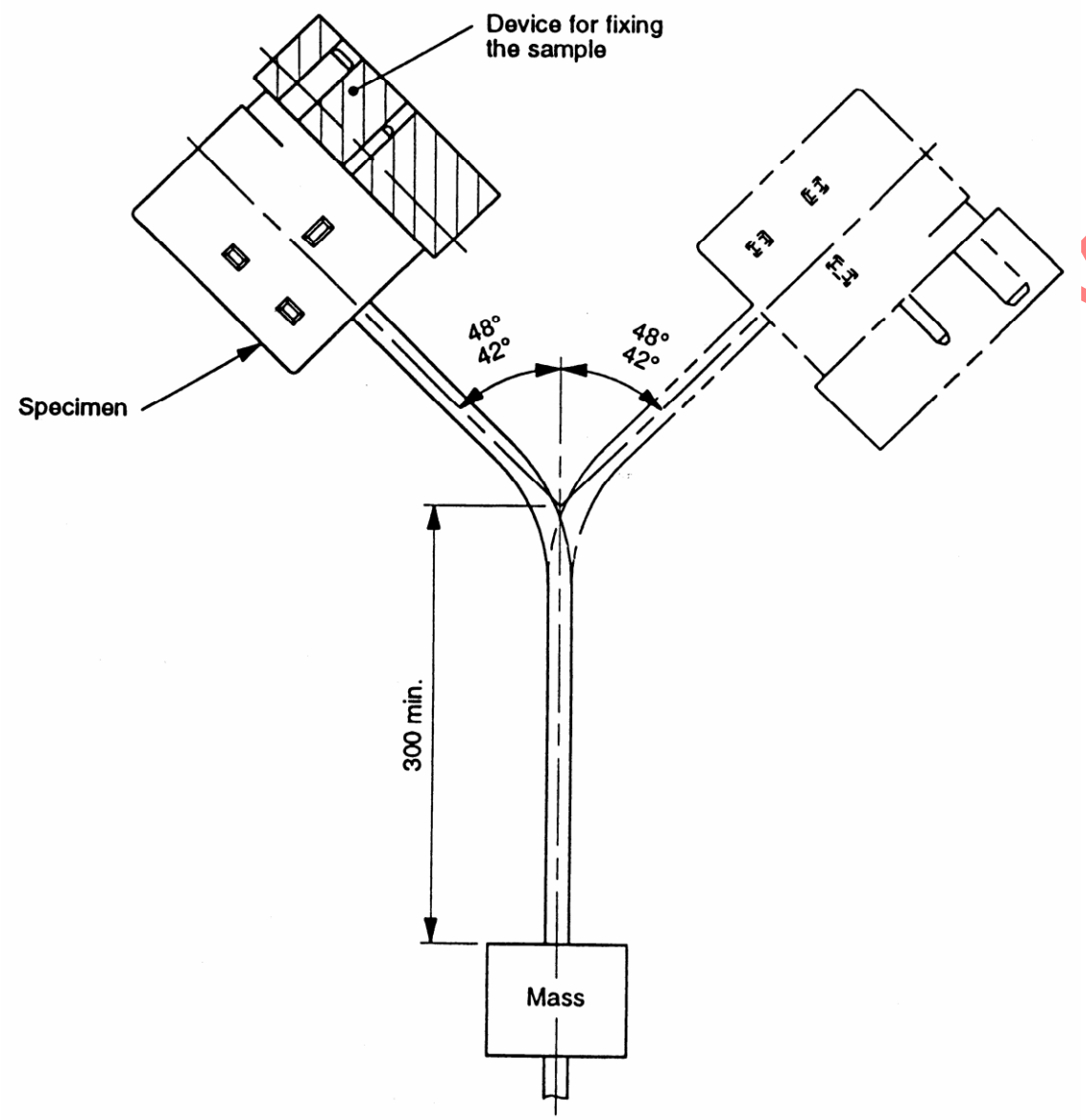
19.6 The cord entry to rewirable adaptors shall be so shaped as to prevent damage to the cord.

19.6.1 Compliance shall be checked by inspection.

Table 9 — Connection of flexible cords

Termination	**Conductor insulation colour**				
	IEC 60227/ IEC 60245 **colour code**		**Other 2-core cords (**IEC 60227-5 (clause 2)**)**	**4-core cords for intermediate adaptors**	
	3-core	**2-core**		**Termination**	**Colour**
Earthing	Green/Yellow	No connection	No connection	Earth	Green/Yellow
live	Brown	Brown	As supplied	L in/L1	Brown
Neutral	Blue	Blue	As supplied	L out/L2	Black
				Neutral	Blue

Figure 18 — Apparatus for flexing test (see Clause 19)



All linear dimensions are in millimetres

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

20 Mechanical strength

20.1 Adaptors shall have adequate mechanical strength and be so constructed as to withstand such handling as may be expected in normal use.

20.1.1 Compliance shall be checked for the following:

a) adaptors fitted with EAS 496 fuse links by the tests of 20.1.2;

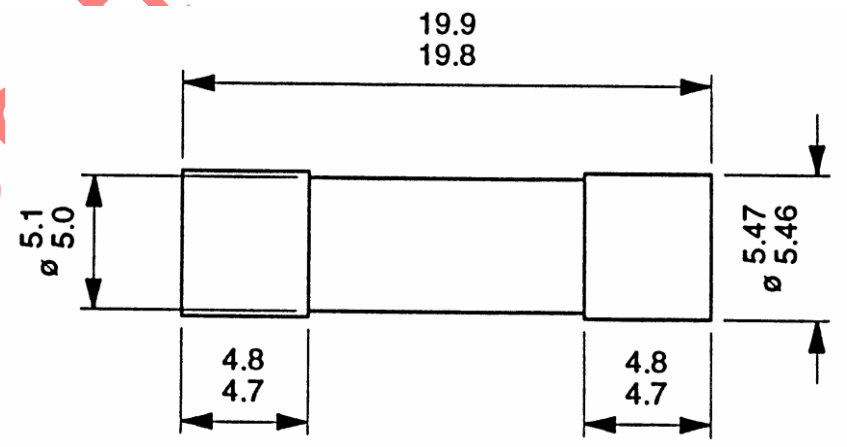
b) adaptors fitted with BS 646 fuse links by the tests of 20.1.3;

c) following which, all adaptors are subjected to the tests given in 20.1.4 and 20.1.5 using separate specimens for each of these tests.

20.1.2 For fused adaptors using fuse links complying with EAS 496, a solid link of stainless steel as shown in Figure 19 is inserted and withdrawn from the fuse clips of a fused adaptor 20 times in succession in a normal manner, not in misuse conditions, at a rate not exceeding 10 per minute. A standard fuse link complying with EAS 496 is then fitted and the appropriate mechanical strength test completed.

20.1.3 For fused adaptors using fuse-links complying with BS 646, a solid link of stainless steel as shown in Figure 38 is inserted and withdrawn from the fuse clips of the fused adaptor 20 times in succession in a normal manner, not in misuse conditions, at a rate not exceeding 10 per minute. A standard fuse link complying with BS 646 is then fitted and the appropriate mechanical strength test completed.

Figure 38 — Solid links for test on fuse clips (see Clause 20)



20.1.4 Adaptors are tested with the impact test apparatus shown in Figure 21a) when mounted in a socket-outlet. The pendulum consists of a steel tube with an external diameter of 9 mm and a wall thickness of 0.5 mm, suspended in such a way that it swings only in a vertical plane. A hammer is rigidly fixed to the lower end.

The striking element has a hemispherical face made of polyamide having a Rockwell hardness of HR 100 ± 5, or hornbeam, and a radius of 10 mm ± 0.5 mm [see Figure 21b)]. The design of the apparatus is such that a force of between 1.9 N and 2 N has to be applied to the face of the hammer to maintain the pendulum in a horizontal position.

A flush socket-outlet complying with EAS 495 is mounted with its associated box, which is placed in a block of hardwood which is itself fixed to a sheet of plywood. The wood used shall have the direction of the wood fibres perpendicular to the direction of impact.

To simulate the condition of normal use, the rear of the plate is flush with the surface of the block. The front edge of the box is between 2.5 mm and 5 mm behind the face of the block.

The mounting support [see Figure 21c)], having a mass of 10 kg ± 1 kg is mounted on a rigid bracket by means of pivots. The bracket is mounted on a frame which is fixed to a solid wall.

The design of the mounting assembly shall be such that:

a) the specimen can be so placed that the point of impact lies in the vertical plane through the axis of the pivot of the pendulum;

b) the specimen can be moved horizontally and turned about an axis perpendicular to the surface of the plywood;

c) the plywood can be turned about a vertical axis.

The adaptor is inserted into the socket-outlet so that the point of impact lies in the vertical plane through the axis of the pivot of the pendulum. For all tests the hammer falls from a height of $150\ ^{0}_{-5}$ mm measured vertically between the point of impact on the specimen and the face of the hammer at the point of release. Ten blows are applied to points evenly distributed over the adaptor, and any lens receives one blow of the hammer at a point approximately in its centre.

After the test the adaptor shall still be in accordance with Clause 8, Clause 9 and Clause 15. After the test on a lens, the lens may be cracked and/or dislodged, but it shall not be possible to touch live parts using the test pin shown in Figure 1 applied with a maximum force of 5 N applied in accordance with 9.1.1. Damage to the finish, small dents which do not reduce creepage distances and clearances below the values specified in Clause 8 and small chips that do not adversely affect the protection against electric shock or moisture shall be ignored.

Cracks not visible with normal or corrected vision without additional magnification, and surface cracks in fibre reinforced mouldings and the like shall be ignored.

Figure 21 — Pendulum impact test (see Clause 20)

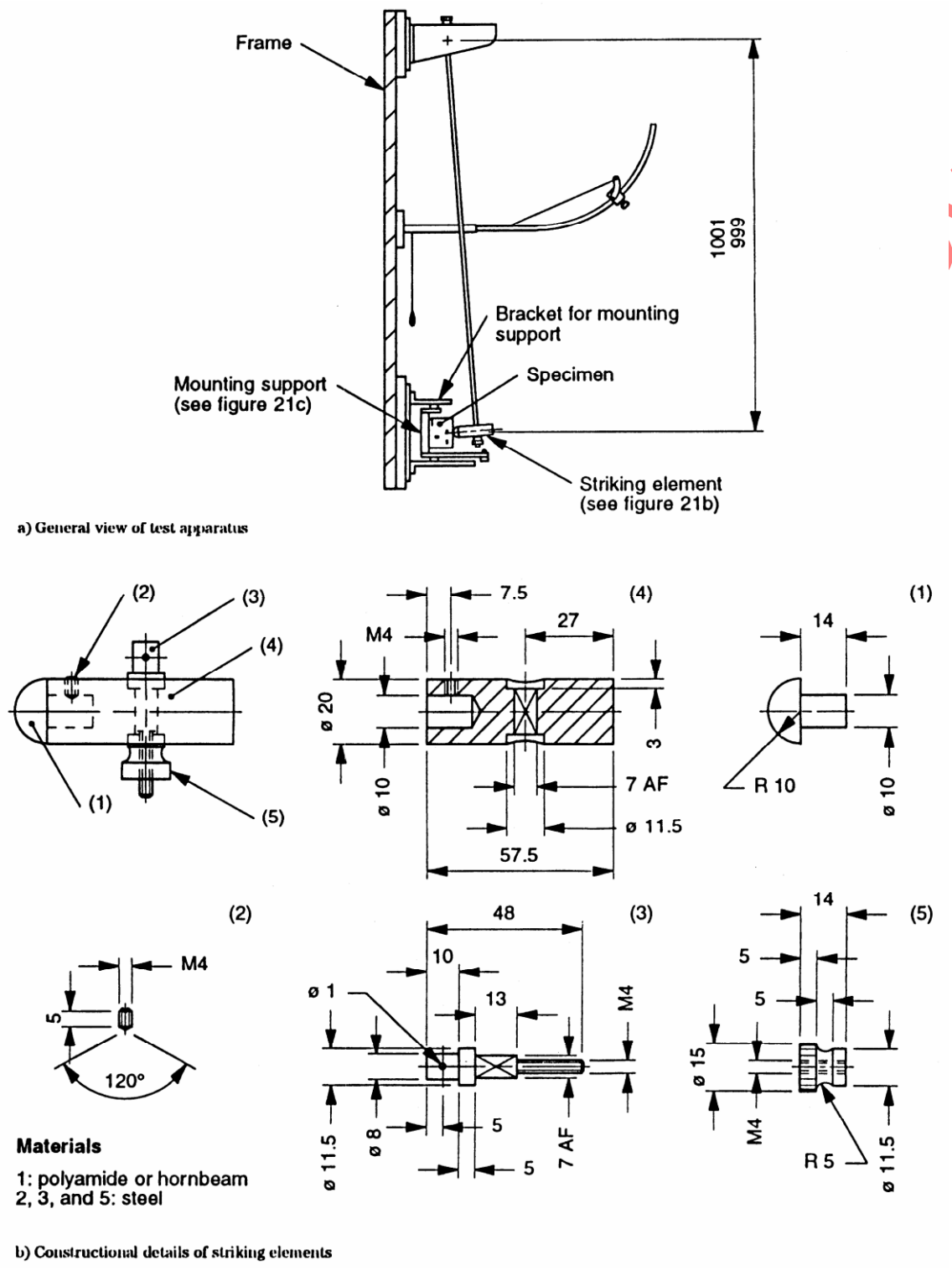
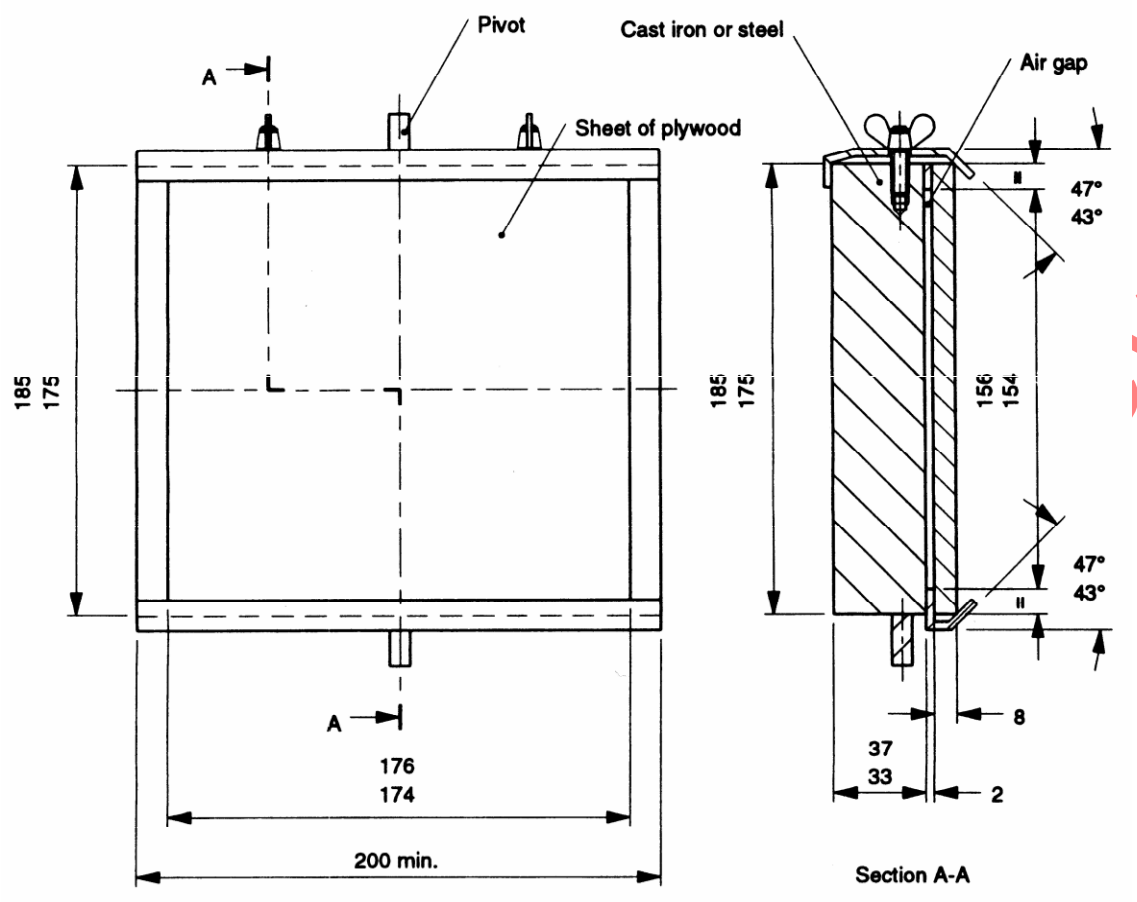


Figure 21 — Pendulum impact test (see Clause 20) *(continued)*

All dimensions are in millimetres

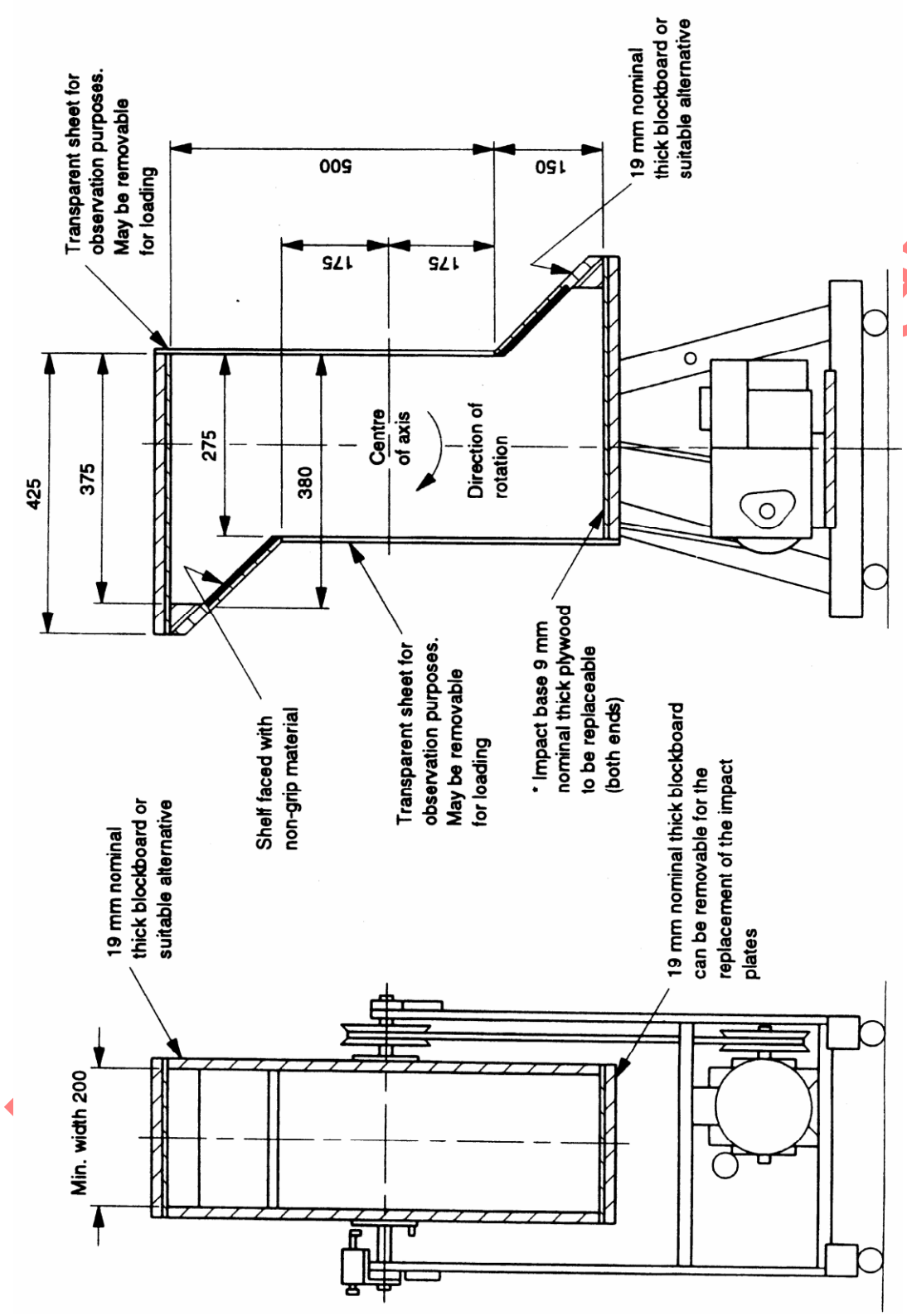
NOTE This drawing is not intended to govern design except as regards the dimensions and specific values shown.



c) Constructional details of mounting support for test specimens

20.1.5 Adaptors are tested in the tumbling barrel shown in Figure 20. The barrel is turned at a rate of approximately 5 r/min (approximately 10 falls per minute). Only one adaptor is tested at a time. The number of falls shall be 25. Rewirable intermediate adaptors and adaptor plugs are fitted with 3-core circular PVC 1.25 mm^2 flexible cord as given in Table 3. The connection of conductors shall be in accordance with the manufacturer's instructions.

Figure 20 — Tumbling barrel (see Clause 20)



All dimensions are in millimetres

*9 mm nominal plywood having an impact face birch, 1.4 mm nominal thickness and of 5 ply construction.

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

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

Non-rewirable intermediate adaptors and adaptor plugs are tested as delivered.

The attached flexible cords are cut to a length of 150 mm ± 5 mm measured from the nearest edge of the earthing pin, pre-coiled flexible cords being extended before measurement.

After the test the adaptor shall show no damage which might affect safety, no component parts shall have become detached, and the pins of the adaptor shall not have been unduly distorted as checked using the gauge shown in Figure 5 when used in a manner as described in 12.2.1 but with a force not exceeding 20 N.

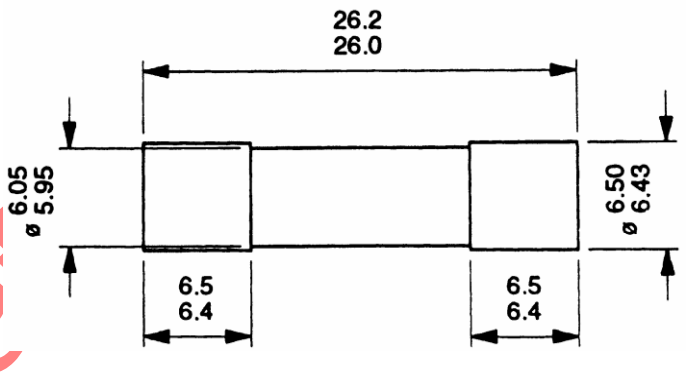
Screws shall remain tight to a torque not less than 70 % of the original tightening torque and currentcarrying joints shall not have become loose and shall make satisfactory contact.

Damage to the finish, small dents which do not reduce creepage distances and clearances, below the values specified in Clause 8 and small chips that do not adversely affect the protection against electric shock or moisture shall be ignored.

20.1.5.1 Compliance shall be checked by inspection and the temperature-rise test of Clause 16.

For the repeat test given in Clause 16, the attached flexible cord (if any) is retained without disturbing the o terminal connections, but the conductor insulation and sheath are removed only as far as is necessary for the attachment of a 1000 mm ± 50 mm length of flexible cord of the same type as that already attached to the adaptor, the connection being made by means of a connector having a current rating appropriate to that c of the flexible cord.

Figure 19 —Solid link for test on fuse clips (see Clause 20)



All dimensions are in millimetres

NOTE Finish: polished and sharp corners removed.

21 Screws, current-carrying parts and connections

21.1 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 of performance requirements of the adaptor.

Contact pressure in electrical connections within the adaptor-outlet and between the adaptor-outlet and the cable or flexible cord connected to it shall not be transmitted through insulating material other than ceramic, pure mica or other material with characteristics no less suitable, unless there is sufficient resiliency in the metallic parts to compensate for any possible shrinkage or yielding of the insulating material.

NOTE The suitability of the material is considered in respect of the stability of the dimensions under all conditions of normal use especially in view of shrinking, ageing or cold flow of the insulating part.

21.1.1 Compliance 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 is 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;

b) five times for nuts and other screws.

When testing terminal screws and nuts, a 1.5 mm^2 flexible conductor is placed in the terminal.

The conductor is moved each time the screw is loosened. The test is made by means of a suitable test screwdriver, applying a torque as given in Table 6.

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

NOTE It is essential that the shape of the blade of the test screwdriver suits the head of the screw being tested and that the screw is not tightened in jerks.

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

NOTE Thread-forming screws may be used to provide earthing continuity, provided that it is not necessary to disturb the connection in normal use and at least two screws are used for each connection.

Screws which make a mechanical connection between different parts of the adaptor 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.

21.2.1 Compliance 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.

21.3 Current-carrying parts and earthing contacts shall be of brass, copper, phosphor-bronze or other metal at least equivalent with regard to its conductivity, resistance to abrasion and resistance to corrosion.

NOTE This requirement does not apply to screws nuts washers, clamping plates and similar parts or terminals, nor to parts of adaptors used for earth continuity purposes other than the earthing contacts.

21.3.1 Compliance shall be checked by inspection and by the relevant tests described in 10.2 and Clause 16 and Clause 24.

22 Resistance to heat

22.1 Adaptors shall be resistant to heat.

22.1.1 Compliance shall be checked by the test given in 22.1.2 or 22.1.3.

22.1.2 Adaptor specimens are kept for 60±o 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 sealing compound shall not flow to such an extent that live parts are exposed.

NOTE A slight displacement of the sealing compound should be disregarded.

After the test the adaptor shall still satisfy the test described in 9.2.1 and 15.1.3.

22.1.3 Adaptors with external parts of resilient material, e.g. thermoplastics, rubber, are 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.

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

The force applied through, and including the effect of, the jaws is 20^{0}_{-1} N.

After 60 $^{+}_{0}{}^{5}$ min, the jaws are removed and the adaptor shall still satisfy the tests described in

15.1.2b)1) and 15.1.3 and shall comply with the gauge shown in Figure 5 when used in a manner as described in 12.2.1.

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

22.2.1 Compliance shall be checked as follows:

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

b) external parts of adaptors tested in accordance with 22.1.3 are deemed to conform without further testing;

c) all other parts of insulating material shall be subjected to the ball pressure test using the apparatus shown in Figure 24.

The test is made in a heating cabinet maintained at a temperature of 75 °C ± 5 °C.

The surface of the part to be tested is placed in the horizontal position and the apparatus shown in Figure 24 is placed on this surface such that a force of 20^{0}_{-1} N is applied.

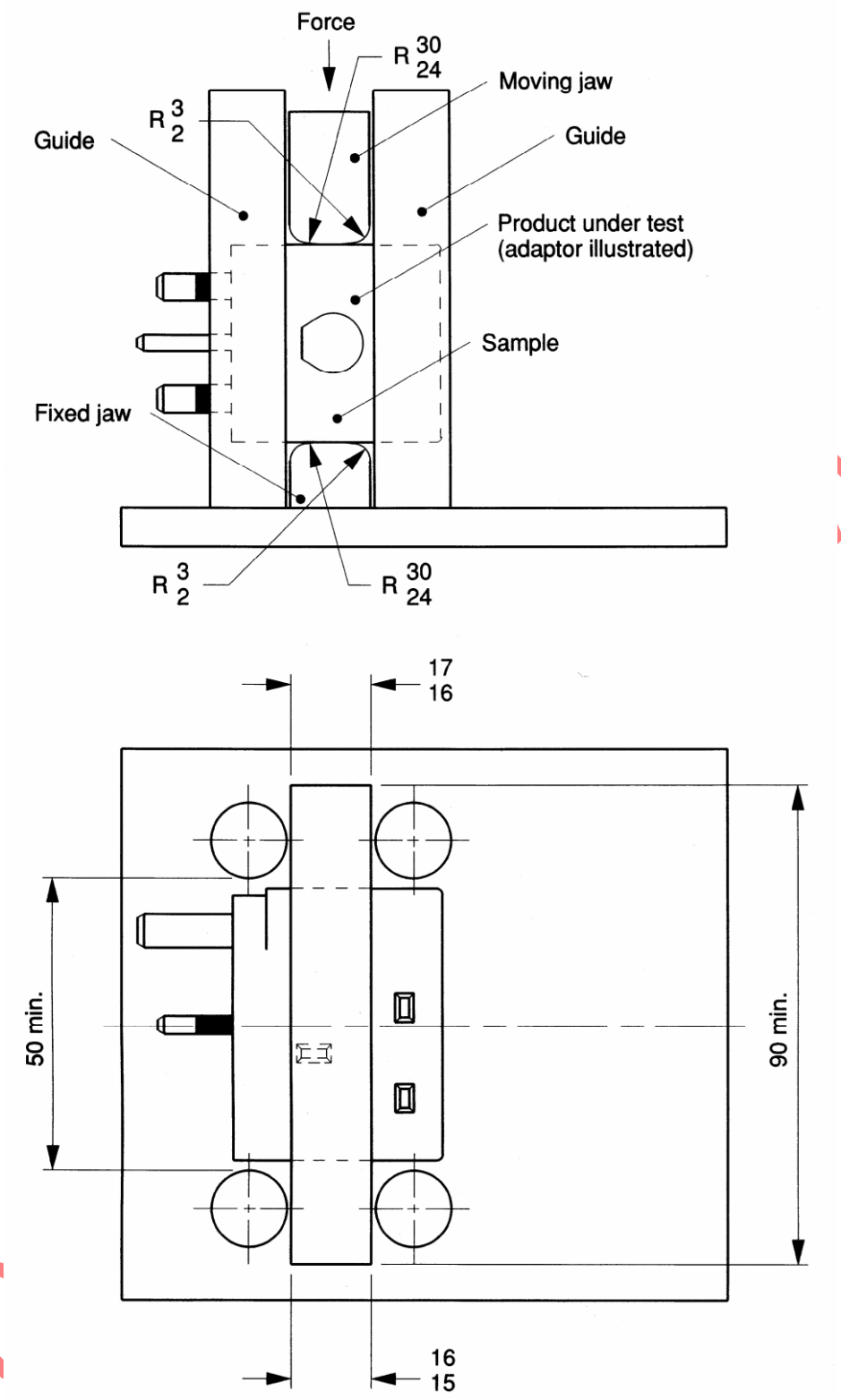
The underside of the part being tested is supported to withstand the test force and to minimize the risk of distortion.

The test load and the supporting means are placed within the heating cabinet for a sufficient time to ensure that they have attained the stabilized testing temperature before the test commences.

The part to be tested is placed in the heating cabinet, for a period of at least 10 min before the test load is applied.

After 60 $^{+1}_{0}$ min, the ball is removed from the sample which is then cooled down, by immersion for at least 10 s in water at approximately room temperature. The diameter of the impression caused by the ball is measured and shall not exceed 2 mm.

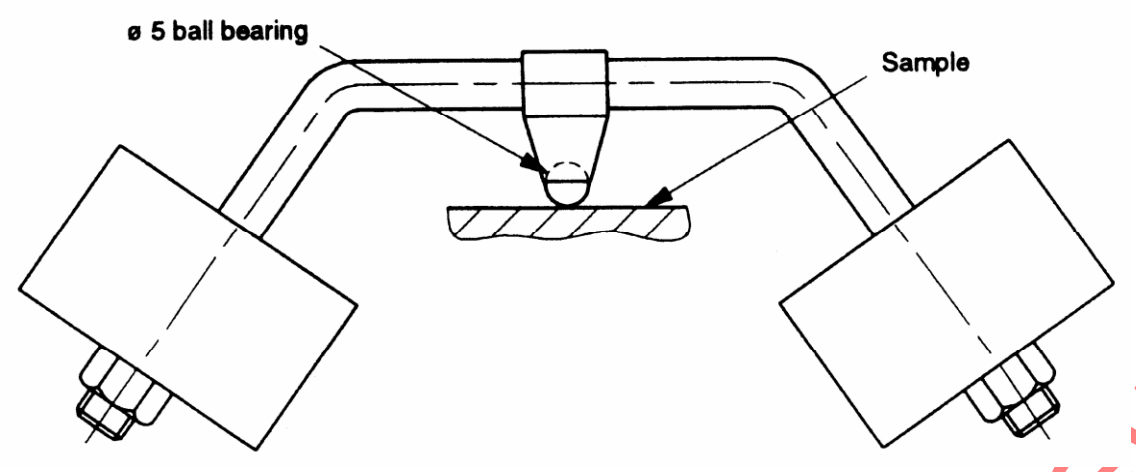
Figure 23 — Apparatus for pressure test (see Clause 22)



All dimensions are in millimetres

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

Figure 24 — Apparatus for ball pressure test (see Clause 22)



All dimensions are in millimetres

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

23 Resistance to abnormal heat and fire

23.1 General

Adaptors shall be proof against abnormal heat and fire .

23.1.1 Compliance shall be checked by the test described in 23.2. The tests shall not be made on parts of ceramic material or metal.

23.2 Glow-wire test

The test is performed in accordance with Clause 4 to Clause 10 of IEC 60695-2-10 and at the test temperature given in Table 10.

Table 10 – Application of glow-wire test

Part	Temperature of glow wire
Parts necessary to retain live parts in position	750 ± 10
Parts not necessary to retain live parts in position(although they may be in contact with live parts)	650 ± 10

NOTE 1 If the test specified is required to be made at more than one place on the same specimen, 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.

NOTE 2 Small parts unlikely to be subjected to abnormal heat and whose failure to pass these tests would not materially affect the safety of the adaptor are not subjected to the glow-wire test.

The glow-wire test is applied 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 specimen shall be either a complete adaptor or, if the test cannot be made on a complete adaptor, a suitable part may be cut from one for the purpose of the test.

The test shall be made on one specimen.

In case of doubt, the test shall be repeated on two further specimens. The test is made applying the glow wire once.

The specimen 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 specimen taking into account the conditions of the intended use under which a heated or glowing element may come into contact with the specimen. The specimen shall be regarded as having passed the glow-wire test if:

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

b) the flames and glowing at the specimen 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.

24 Resistance to excessive residual stresses and to rusting

24.1 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.

24.1.1 Compliance shall be checked by the following test.

The specimen is 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.

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

After the treatment, the specimen is washed in running water, any excess mercury wiped off, and the specimen is immediately visually examined.

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

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

24.2.1 Compliance shall be checked by the following test.

The sample is degreased in a suitable alkaline degreasing solution or organic solvent, the parts are then 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 are 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.

NOTE 1 Traces of rust on sharp edges and any yellowish film removable by rubbing should be ignored.

NOTE 2 For small helical springs and the like, and for parts exposed to abrasion, a layer of grease may provide sufficient protection against rusting. Such parts are subjected to the test only if there is doubt about the effectiveness of the grease film and the test should then be made without previous removal of the grease.

25 Overload tests

25.1 Adaptors rated at 13 A shall withstand current which could occur due to overload without creating a risk of contact with live parts.

25.1.1 Conformity is checked by the tests given in 25.1.2 to 25.1.4. The test arrangement shall be as described in 16.1 except no thermocouples or pin spacers shall be used and the test conducted at any voltage between 12 V and 250 V.

For adaptors with adaptor socket-outlets for EAS 495-1 plugs, a standard plug to

EAS 495-1 shall be used instead of the standard test plug for the temperature rise test described in Annex B.

For adaptors with a single socket-outlet section, the total test current shall be passed through that single socket-outlet. For multiway adaptors, the test current shall be divided between the adaptor socket-outlets such that at least one adaptor socket-outlet is loaded with the maximum rated current for the adaptor. The plug which is to be loaded with the rated current shall be fitted with a 13 A fuse to BS 1362. Other EAS 495-1 plugs which are connected to the adaptor shall be fitted with appropriately rated BS 1362 fuse(s). For adaptors with a flexible cable, or with provision for a flexible cable, the total test current shall pass through the connected flexible cable.

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

25.1.2 Fused adaptors shall be fitted with a 13 A fuse to BS 1362 and subjected to a test current of 1.6 times the rating of the fitted fuse for 60 min or until the fuse operates (if less than 60 min). Immediately afterwards the checks specified in 25.1.4 shall be made. Fused adaptors shall then be subjected to a test current of 1.9 times the rating of the fitted fuse for 30 min or until the fuse operates (if less than 30 min). Immediately afterwards the checks specified in 25.1.4 shall be made.

25.1.3 Unfused adaptors shall be subjected to a test current of 1.6 times the rating of the adaptor for 60 min. Immediately afterwards the checks specified in 25.1.4 shall be made. Unfused adaptors shall then be subjected to a test current of 1.9 times the rating of the adaptor for 30 min. Immediately afterwards the checks specified in 25.1.4 shall be made.

25.1.4 Each adaptor shall be checked for conformity with 9.1, 12.7.1, 12.8.1and 12.13.1 except that the tests shall be performed at ambient temperature. Deterioration which does not compromise access to live parts (e.g. discolouration, distortion) shall be deemed to be acceptable. Inspection shall not reveal any damage to the adaptor which would impair its safety within the requirements of this part of EAS 495”25.1.1 Conformity is checked by the tests given in 25.1.2 to 25.1.4. The test arrangement shall be as described in 16.1 except no thermocouples or pin spacers shall be used and the test conducted at any voltage between 12 V and 250 V.

For adaptors with adaptor socket-outlets for EAS 495-1 plugs, a standard plug to

EAS 495-1 shall be used instead of the standard test plug for the temperature rise test described in Annex B.

For adaptors with a single socket-outlet section, the total test current shall be passed through that single socket-outlet. For multiway adaptors, the test current shall be divided between the adaptor socket-outlets such that at least one adaptor socket-outlet is loaded with the maximum rated current for the adaptor. The plug which is to be loaded with the rated current shall be fitted with a 13 A

fuse to BS 1362. Other EAS 495-1 plugs which are connected to the adaptor shall be fitted with appropriately rated BS 1362 fuse(s). For adaptors with a flexible cable, or with provision for a flexible cable, the total test current shall pass through the connected flexible cable.

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

25.1.2 Fused adaptors shall be fitted with a 13 A fuse to BS 1362 and subjected to a test current of 1.6 times the rating of the fitted fuse for 60 min or until the fuse operates (if less than60 min). Immediately afterwards the checks specified in 25.1.4 shall be made. Fused adaptors shall then be subjected to a test current of 1.9 times the rating of the fitted fuse for 30 min or until the fuse operates (if less than 30 min). Immediately afterwards the checks specified in 25.1.4 shall be made.

25.1.3 Unfused adaptors shall be subjected to a test current of 1.6 times the rating of the adaptor for 60 min. Immediately afterwards the checks specified in 25.1.4 shall be made. Unfused adaptors shall then be subjected to a test current of 1.9 times the rating of the adaptor for 30 min. Immediately afterwards the checks specified in 26.1.4 shall be made.

25.1.4 Each adaptor shall be checked for conformity with 9.1, 12.7.1, 12.8.1and 12.13.1 except that the tests shall be performed at ambient temperature. Deterioration which does not compromise access to live parts (e.g. discolouration, distortion) shall be deemed to be acceptable. Inspection shall not reveal any damage to the adaptor which would impair its safety within the requirements of this part of EAS 495.

Annex A

(normative)

The construction and calibration of a calibrated link

A.1 Construction

The calibrated link (see Figure 28) shall employ the following components used to produce fuses complying with EAS 496:

a) ceramic body (as standard);

b) filling (as standard);

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

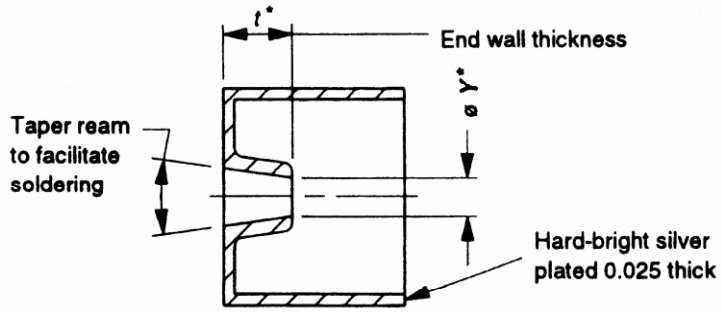
The resistive element shall be of copper nickel wire having a resistivity value between 44 μΩcm and 49 μΩcm. The overall length shall be $25.4^{+}{}_{-}{}^{0}{}_{0}{}^{.8}{}_{4}$ mm and the diameter such as to allow a small reduction in the cross-sectional area to adjust the watts loss to the required value. The ends are turned down so that the distance between the shoulders so formed shall be 25.4 ±0:4 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, grade 96S as specified in ISO 9453. The assembly thus formed [see Figure 28c)] shall be checked for watts loss in accordance with A.2. Metal shall then be carefully filed from the resistive element over as long a length as is possible and the assembly rechecked until the desired watts loss is achieved.

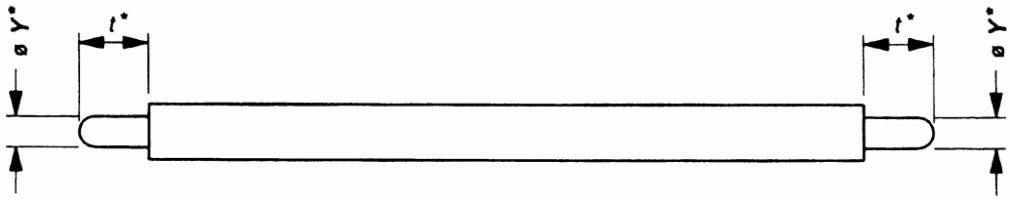
One end cap shall then be unsoldered, a standard ceramic body fitted, the cavity filled and the end cap resoldered in position making sure the shoulder of the element is butted to the inside face of the end cap; the ceramic body shall not interfere with this condition. [See Figure 28d).] The watts loss shall be rechecked in accordance with A.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 EAS 496.

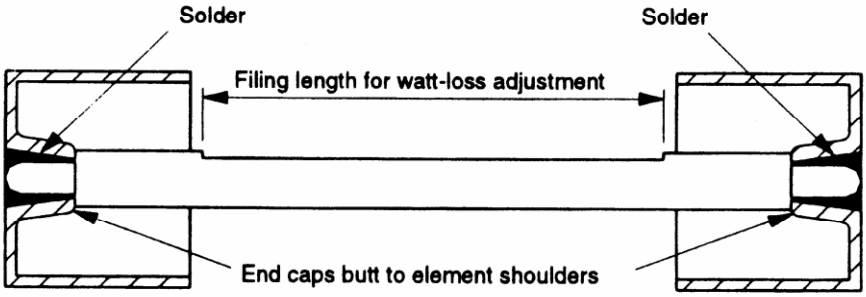
Figure 28 — Calibrated link (see A.1)



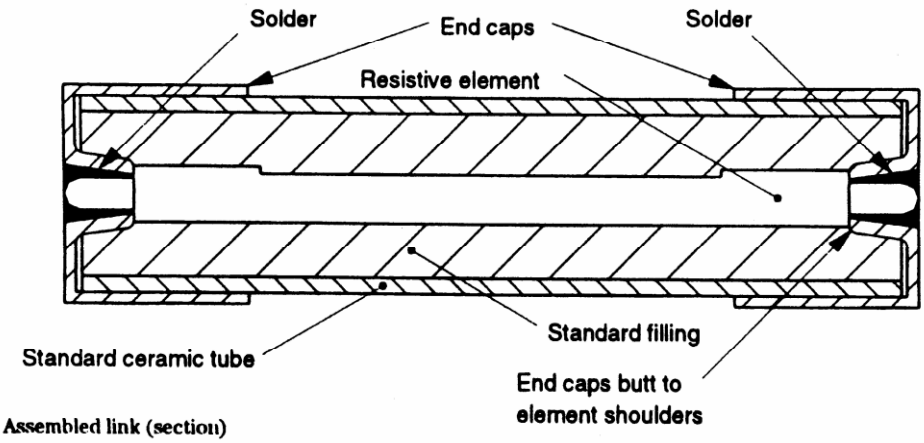
a) Modified standard end cap (section)



b) Resistive element Cu Ni



c) Assembly for calibration (section)



d) Assembled link (section)

* See Annex A.

All dimensions are in millimetres

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

A.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 replace the cover replaced. A current of 13 A ± 0.1 A is passed continuously through the calibrated link for 60 min ± 5 min. At the end of this time, the temperatures 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 while it is still carrying the test current.

A.C. voltage shall be used for the calibration.

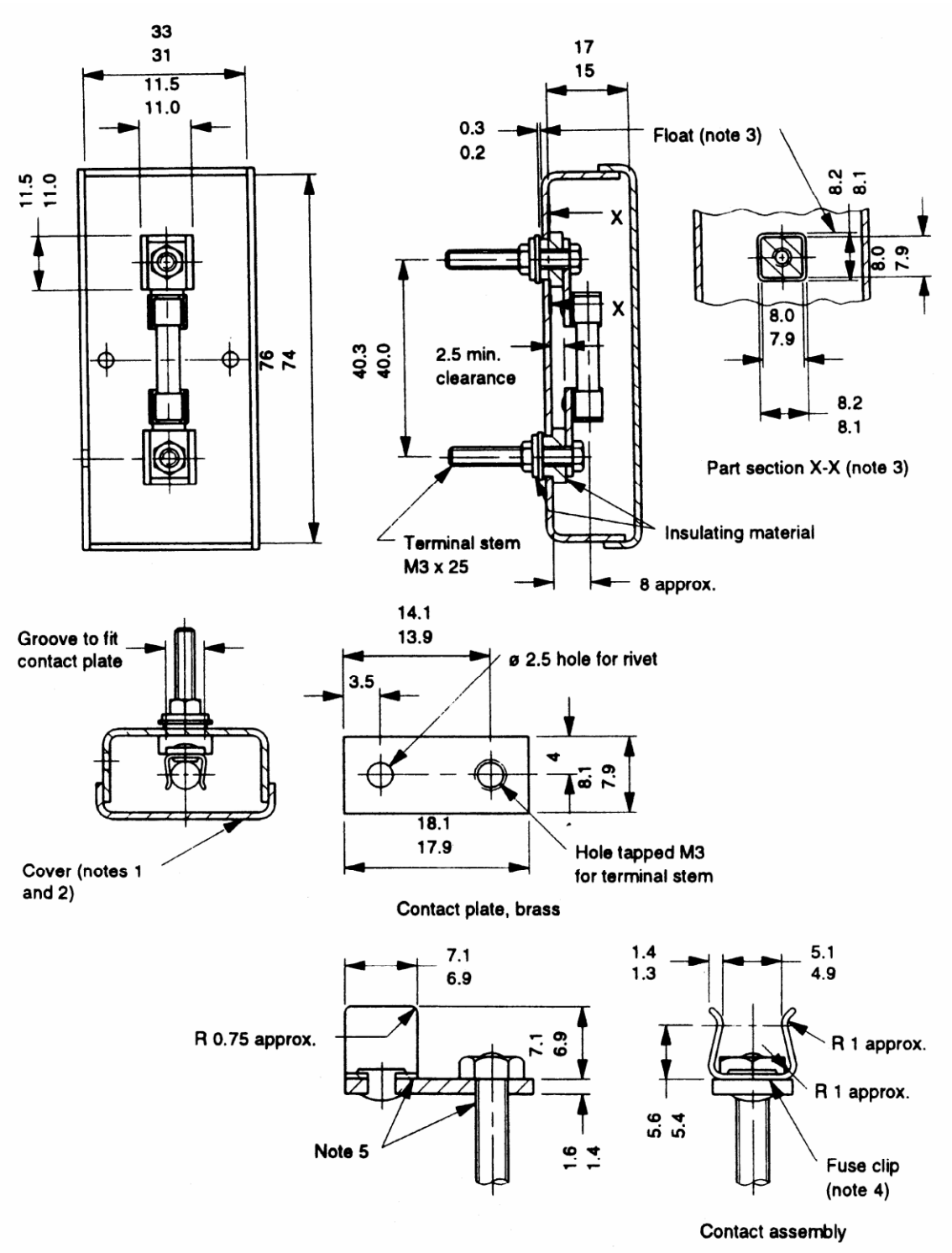
The calibration is considered to be correct when the following apply:

a) the product of the measured millivolt drop multiplied by the test current gives a result of:

$1\ ^{-0.050}$ W

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

Figure 29 — Calibration jig for calibrated link (see A.2)



All dimensions are in millimetres NOTE 1 Box and cover made from 1.25 mm brass sheet, clean natural finish.

NOTE 2 Cover should be a push fit on box and should not be rigidly attached.

NOTE 3 The end float and clearance between the insulation and the box is to allow the contacts to be self-aligning.

NOTE 4 Fuse clip. Made from beryllium copper 0.45 mm thick and heat treated (170 HV minimum). Base clip to be flat; finish, silver plated.

NOTE 5 Joints between clip, contact plate and terminal stem to be soldered.

Annex B (normative)

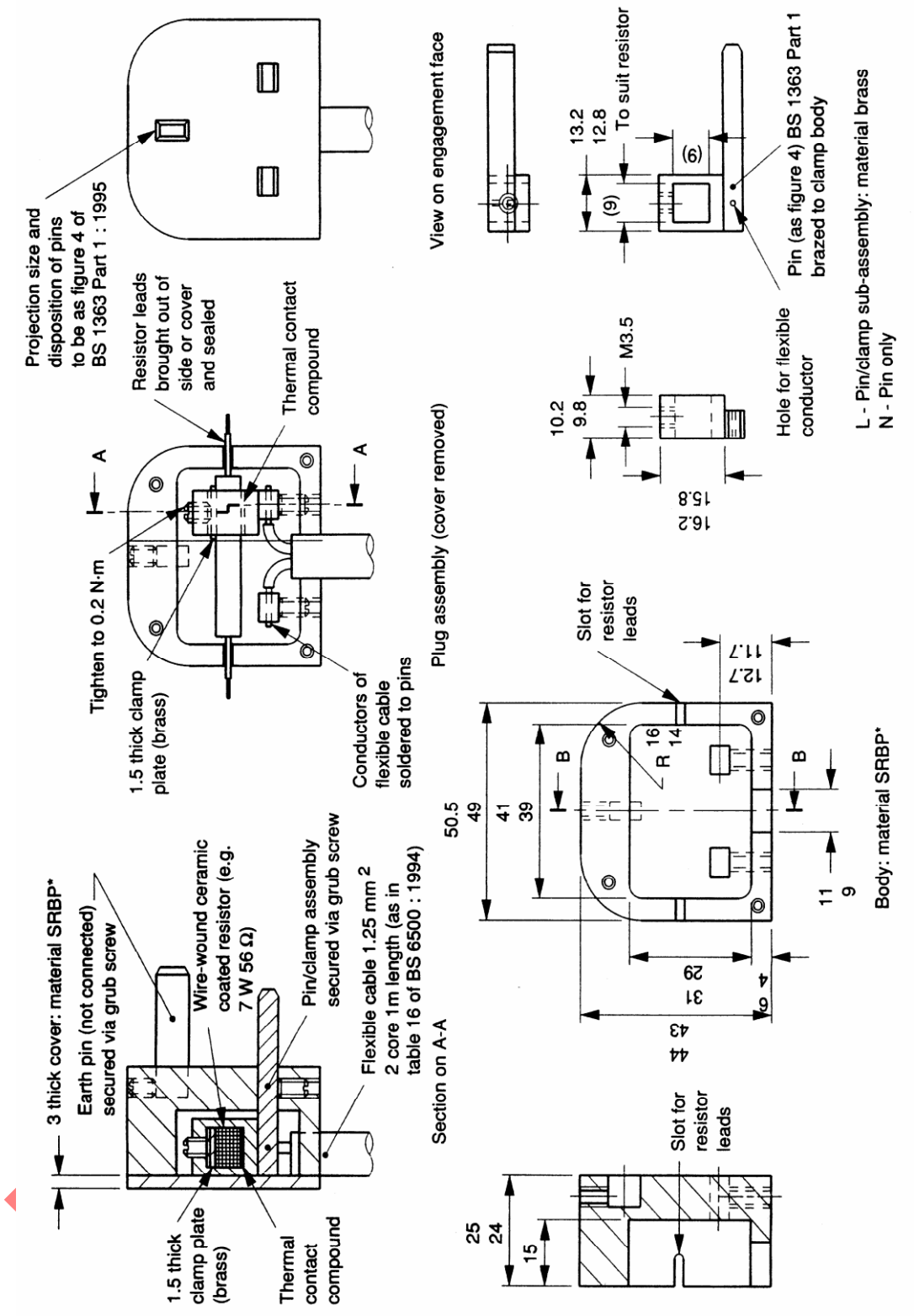
Test plug for temperature rise test

B.1 General

The test plug consists of a body made from insulating material and pins of brass. The pin dimensions and centres are as shown in Figure 4.

Inside the test plug a ceramic-covered wire-wound resistor is clamped to the line pin making no electrical contact between, the pin and the resistor element, though good thermal contact is essential. Thermal contact compound shall be used on the interface between the ceramic resistor body and the metal clamp. The M3.5 clamp screw shall be tightened to a torque of 0.2 Nm ± 0.02 Nm. The resistor leads pass through the sides or cover of the test plug. Approximately 1 000 mm of 3-core flexible cord as given in Table 27 of EAS 117-1 with nominal cross section 1.25 mm^2 is connected to the plug by soldering the line and neutral cores to their respective plug-pins. The earth core of the cord is not fitted to the earth pin. Details are shown in Figure 30.

Figure 30 — Test plug for temperature rise (See Annex B)



All dimensions are in millimetres

*Material SRBP to comply with IEC 60893 types, brown or natural colour.

B.2 Calibration

The test plug is mounted in the dummy front plate [see Figure 17 a)] and the test carried out in accordance with 16.1.2 with 14 A ± 0.2 A flowing through the flexible cord attached to the plug. At the same time, a separate low voltage d.c. supply is connected to the resistor and the voltage adjusted until the temperature rise on the plug-pin spacer stabilizes at 35 K ± 1 K. The value of the voltage applied to the resistor is noted. The calibration voltage is applied to the resistor when checking the temperature rise of a socket-outlet.

Annex C (normative)

Measurement of clearances and creepage distances

The width X specified in Examples 1 to 11 apply to all examples as a function of the pollution degree as given in Table C.1.

Table C.1 — Minimum values of width X

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

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 Examples 1 to 11. These cases do not differentiate between gaps and grooves or between types of insulation.

The following assumptions are made:

— 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 Example 3);

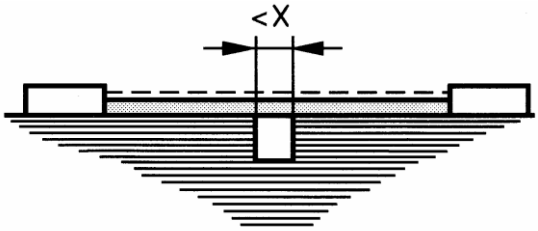
— where the distance across a groove is equal to or larger than the specified width X, the creepage distance is measured along the contours of the groove (see Example 2);

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

---------- clearance

═══════ creepage distance

All dimensions are in millimetres

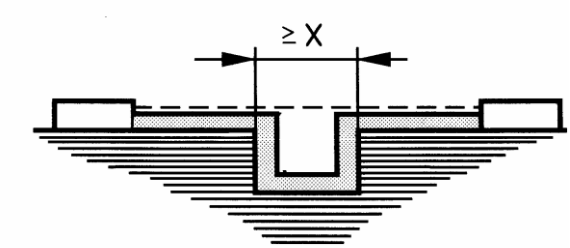


Example 1

Example 1

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

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

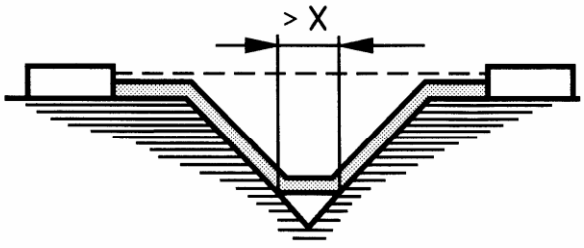


Example 2

Example 2

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

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

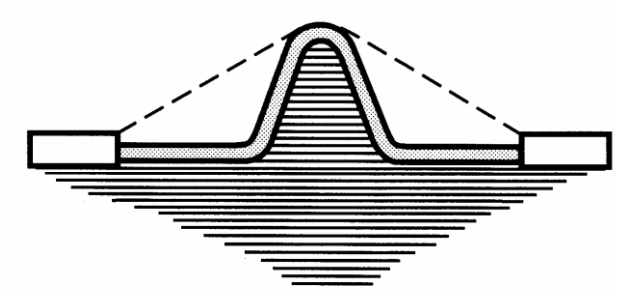


Example 3

Example 3

Condition: Path under consideration includes a V-shaped groove with a width greater 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.

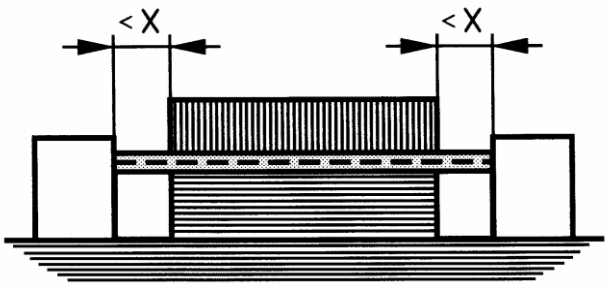


Example 4

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.

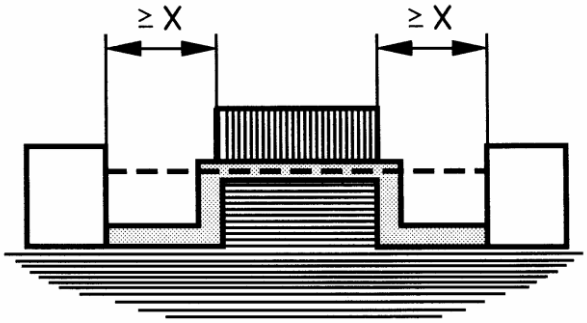


Example 5

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.

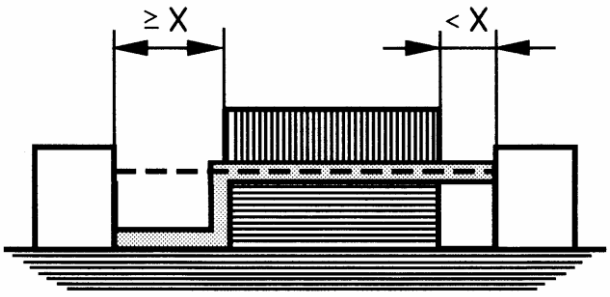


Example 6

Example 6

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

Rule Creepage and clearance path is the "line of sight" distance. Creepage follows the contour of the grooves.

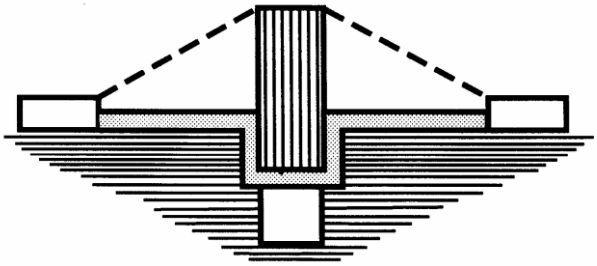


Example 7

Example 7

Condition: Path under consider anon 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.

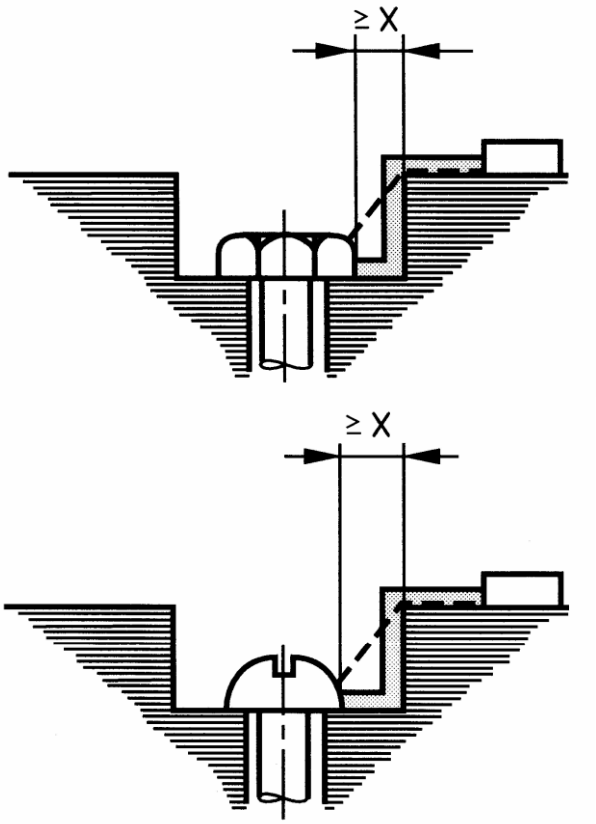


Example 8

Example 8

Condition: Creepage distance through uncemented joint is less than creepage distance over barrier.

Rule Clearance is the shortest direct air path over the top of the barrier.

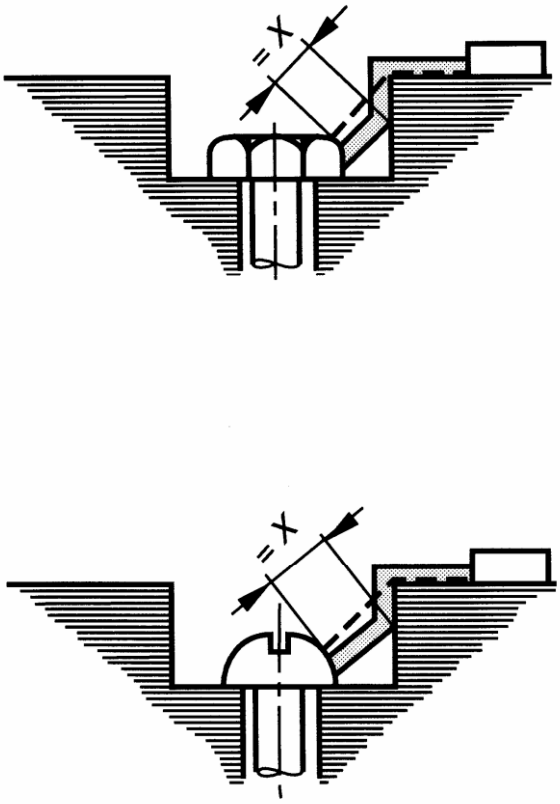


Example 9

Example 9

Condition: Gap between head of screw and wall of recess wide enough to be taken into account.

Rule: Clearance and creepage distance paths are shown.

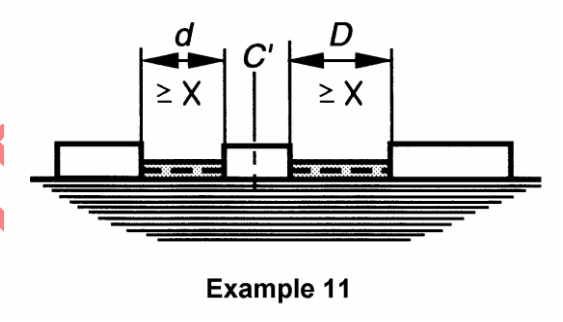


Example 10

Example 10

Gap between head of screw and wall of recess too narrow to be taken into account.

Measurement of creepage distance is from screw to wall when the distance is equal to "X" mm.



Example 11

Example 11

C = floating part

Clearance is distance $d_1 + d_2$

Creepage distance is also $d_1 + d_2$

Annex D (normative)

Determination of the Comparative Tracking Index (CTI) and Proof Tracking Index (PTI)

The CTI or PTI is determined in accordance with IEC 60112. For the purpose of this standard, the following applies.

a) In Clause 3 of IEC 60112, Test specimen:

— the last sentence of the first paragraph does not apply;

– Notes 2 and 3 also apply to the PTI;

— if the surface 15 mm X 15 mm cannot be obtained because of the small dimensions of the PT system then special samples made with the same manufacturing process may be used.

b) The test solution "A" described in 5.4 of IEC 60112 shall be used.

c) In Clause 6, Procedure, either CTI or PTI is determined:

— CTI is determined in accordance with 6.2 of IEC 60112;

— the proof tracking test of 6.3 of IEC 60112 is performed on 5 samples at the voltage referred to in 6.1 of IEC 60112 based on the appropriate creepage distance, material group, pollution degree conditions and on the rated voltage of this standard declared by the manufacturer

Annex E (normative)

Relation between rated impulse withstand voltage, rated voltage and Overvoltage Category

Table E.1 — Rated impulse withstand voltage for accessories energized directly from the low voltage mains

Nominal voltage of the supply system based on IEC 60038[a] V	Voltage line to neutral derived from nominal voltages a.c. or d.c. up to and including V	Rated impulse withstand voltage V		
		Overvoltage Category		
		I	II	III
230/400	300	1500	2500	4000
NOTE 1 For more information concerning supply systems see IEC 60664-1. NOTE 2 For more information concerning Overvoltage Category see IEC 60664-1. NOTE 3 Accessories fall into Overvoltage Category III. Parts of accessories where appropriate overvoltage reduction is provided fall into Overvoltage Category I. Energy consuming equipment falls into Overvoltage Category II.				
[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 F (normative)

Pollution degree

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 may 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 may be present in the micro-environment.

NOTE 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 a? in the micro-environment are established.

— 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 G (normative)

Impulse voltage test

The purpose of this test is to verify that clearances will withstand specified transient overvoltage.

The impulse withstand voltage test is carried out with a voltage having a 1.2/50 µS waveform as specified in IEC 60060-1 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.

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

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 G.1;

— the waveform 8/20 µS for an appropriate surge current.

NOTE 2 If the sample is provided with surge suppression the impulsed 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 G.1 — Test voltages for verifying clearances at sea level

Rated impulse withstand voltage $\hat{U}$ kV	**Impulse test voltage at sea level $\hat{U}$** 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 G.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 maybe made with the pressure adjusted to the value corresponding to the altitude of 2000 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 ofclearances are given in IIEC 60664-1.

Annex H (normative)

Requirements for incorporated electronic components

H.1 General

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

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

H.2 Electromagnetic compatibility (EMC) requirements

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

a) IEC 61000-6-1; and

b) IEC 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, 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 IEC 61000-6-1 and BS IEC 61000-6-3.

H.3 USB circuits intended for charging portable devices

H.3.1 General

USB circuits incorporated in an adaptor shall conform to the requirements of:

a) IEC 62368-1; or

b) IEC 61558-2-16 and IEC 61558-2-6.

The USB circuits shall be tested as a component or sub assembly to IEC 62368- 1 or

IEC 61558-2-16 and IEC 61558-2-6 and when incorporated into the adaptor the USB circuit shall meet the requirements of IEC 62368-1 or IEC 61558-2-16 (used in conjunction with IEC 61558-2-6) as applicable. Where a particular requirement is not considered to be applicable, or alternative means of meeting a requirement is used, then this shall not result in a lesser degree of safety with particular regard to reduction of the risks of fire, electric shock or injury for the operator or layman who might come into contact with the adaptor.

The following requirements relating to the appropriate use of the component or subassembly in the adaptor shall be met.

H.3.1.1 Power rating and identification markings

The input voltage rating of the USB circuit shall not be marked on the adaptor and shall not be less than the rated voltage of the adaptor.

Marking of the USB circuit output:

The following marking shall be visible after the adaptor has been installed as in normal use:

a) symbol for nature of supply, for d.c. only;

b) rated output power of USB port in watts, unless the output rating is expressed in volts and amperes.

H.3.2 Overcurrent and earth fault protection in primary circuits

Overcurrent protection shall be provided on the primary side of the USB circuit.

Where overcurrent protection is not provided within the USB circuit itself, provision shall be made for appropriate overcurrent protection in the supply to the USB circuit within the adaptor. The USB circuit shall not rely on the building or installation protection device for overcurrent protection.

NOTE Provision for overcurrent protection provided within the USB circuit can be verified by reference to the original test report.

H.3.2.1 Number and location of protective devices

A single overcurrent protection device shall be provided and it shall be located in the line circuit, either within the USB circuit or in the supply to the USB circuit within the adaptor.

A.3.2.2 Electrical insulation

Double or reinforced insulation shall be provided between the primary and secondary circuits of the USB circuit. The output of the USB circuit shall be SELV or equivalent.

When installed in the adaptor, double or reinforced insulation shall be provided between the primary circuit and accessible parts of the adaptor.

H.3.2.3 Clearances, creepage distances and distances through insulation

The USB circuit shall be designed and constructed to conform to the requirements of Overvoltage Category III.

NOTE USB circuits are generally tested as Overvoltage Category II whereas when they are incorporated in adaptors they are tested as Overvoltage Category III.

H.3.3 Disconnection from the mains supply

The requirement in IEC 62368-1 for the provision of a disconnect device shall not apply.

NOTE The disconnect device specified in IEC 62368-1 is provided by the adaptor plug pins.

A.3.4 Mechanical strength

The requirements of EAS 495-3:2023, Clause 21 shall be applied to the USB circuit when incorporated in the adaptor. The mechanical strength requirements of IEC 62368-1 are not applicable.

A.3.4.1 Reducing the risk of ignition and spread of flame

Method 1: A fire enclosure shall be provided which meets the requirements of IEC 62368-1; or

Method 2: Assessment and testing of all possible single fault tests shall be applied. In this case a fire enclosure is not required for equipment or that portion of equipment for which testing of all relevant components in both primary circuits and secondary circuits has been carried out.

Whichever method is selected, the material requirements of Clause 23 and Clause 24 shall also apply.

H.3.5 Abnormal conditions

Adaptors containing USB circuits shall not create a hazard under abnormal loading conditions.

No part shall reach such a temperature that there is danger of fire to the surroundings of the adaptor and there shall be no risk of electric shock or exposure to live parts.

Compliance is checked by subjecting the adaptor to a heating test under abnormal conditions as described below.

Adaptors shall be mounted, and mains loads applied as defined in Clause 16.

a) Short circuit of USB outputs

A short circuit shall be applied across the power pins of each USB outlet in turn.

For adaptors having multiple USB outlets, each USB outlet shall be tested in turn and together if powered from separate internal charging circuits.

b) Over-load of USB outputs

USB outlets shall be loaded with the maximum current they are capable of continuously supplying without the output entering any shutdown or current limiting mode for the duration of this test.

In the case of adaptors having more than one USB outlet, the disposition of the load shall be so arranged as to give the most onerous test conditions with regard to the loading on the adaptor and the individual USB outlets.

A USB outlet shall be loaded with the maximum current it is able to deliver from the adaptor until such time as the current to that USB outlet is limited and controlled by the socket. At such time any additional possible load current shall then be loaded to additional USB outlets with the same conditions applying until such time as the maximum current achievable from the product is reached.

NOTE 1 For multiway adaptors it might be necessary to repeat the test multiple times with the loading on different outlets to cover all maximum loading on different USB outlet combinations.

For the purpose of this test a passive resistive load shall be used to provide the desired load current.

c) Component failure conditions

Component failure conditions defined in IEC 62368-1; or BS 61558-2-16 shall be applied.

During the test of a), b) and c) above:

1) no emission of flames or burning particles shall occur;

2) the operating temperature of electronic components marked with a rated operating temperature shall not exceed that temperature during the test; and

3) no part shall reach such a temperature that there is danger of fire to the surroundings of the electronic switches during the test and temperatures shall remain within the limits defined in Clause 17.

Protection against electric shock is required during and after the test even though an electronic socket is being used or has been used under abnormal conditions. Compliance is checked by carrying out the tests of Clause 10 immediately following the test for each abnormal condition.

NOTE 2 It is not required for the socket-outlet to be functional during or after the test.

H.3.6 Compliance

Compliance to H.3.1 to H.3.5 shall be verified by inspection of compliance evidence or by test.

H.4 Surge protective devices

H.4.1 General

Surge protective devices incorporated in EAS 495-3 adaptors shall conform to the requirements in A.4.2.

NOTE 1 The use of SPDs, variously known as voltage dependant 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).

NOTE 2 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 3 This annex does not cover comprehensive type testing which is specified in the IEC 61643 series.

H.4.2 Requirements

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

a) metal oxide varistors conforming to IEC 61643-331;

b) gas discharge tubes conforming to IEC 61643-311;

c) avalanche breakdown diodes conforming to IEC 61643-321.

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

1) Preferred climatic categories:

i) Lower category temperature −10 °C

ii) Upper category temperature +85 °C

iii) Duration of damp heat, steady state test: 21 days

2) Maximum continuous voltage:

i) The maximum continuous a.c. voltage shall be not less than 315 V.

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

i) 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 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.

H.4.3 Compliance

Compliance to H.4.2 shall be checked by inspection of component Compliance evidence.

H.4.4 Incorporation of VDRs in adaptors

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; and

c) burning and bursting of the VDR in the event of a short-circuit fault. The following methods of VDR incorporation are permitted:

- Between L and N:

A VDR is permitted between line and neutral provided that it is protected by the EAS 496 fuse in the adaptor.

Where not protected by a EAS 496 fuse, a circuit interrupting device having adequate breaking capacity shall be incorporated within the product in series with the VDR.

- Between L and E:

A VDR is permitted between line and protective earth provided it is protected by the

EAS 496 fuse in the adaptor and is connected in series with a spark gap/gas tube meeting the requirements for basic insulation; or where not protected by a EAS 496 fuse a VDR is permitted between line and protective earth provided it is located in series with a circuit interrupting device having adequate breaking capacity, and is connected in series with a spark gap/gas tube meeting the requirements for basic insulation.

H.4.5 Compliance

Compliance to H.4.4 shall be checked by inspection.

H.5 Electronic switches

H.5.1 General

Electronic switches incorporated in adaptors shall conform to IEC 60669-2-1.

H.5.2 Compliance

Compliance to H.5.1 shall be checked by inspection of Compliance evidence or by test.

Bibliography

[1] ISO #####-#, *General title — Part #: Title of part*

[2] ISO #####-##:20##, *General title — Part ##: Title of part*