

## DRAFT EAST AFRICAN STANDARD

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Plugs, socket-outlets, adaptors and connection units — Part 2:  
Specification for switched and unswitched socket outlets

EAST AFRICAN COMMUNITY

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Draft for public review

## Contents

Page

Foreword .....	v
1 Scope .....	1
2 Normative references .....	3
3 Terms and definitions .....	4
4 General requirements and conditions of use .....	12
5 General conditions for type testing .....	12
5.1 All tests shall be type tests .....	12
6 Classification and rating .....	19
6.1 Classification .....	19
6.2 Ratings .....	20
7 Marking and labelling .....	21
8 Clearances, creepage distances and solid insulation .....	24
8.1 Clearances .....	24
8.1.1 Clearances for basic insulation .....	24
8.1.2 Clearances for functional insulation .....	25
8.1.3 Clearances for supplementary insulation .....	25
8.1.4 Clearances for reinforced insulation .....	25
8.1.5 Contact gap .....	25
8.2 Creepage distances .....	25
8.2.1 Creepage distances for basic insulation .....	26
8.2.2 Creepage distances for functional insulation .....	27
8.2.3 Creepage distances for supplementary insulation .....	27
8.2.4 Creepage distances for reinforced insulation .....	27
8.3 Solid insulation .....	27
9 Accessibility of live parts .....	28
10 Provision for earthing .....	29
11 Terminals and terminations .....	31
12 Construction of socket-outlets .....	34
13 Resistance to ageing, resistance to humidity and protection provided by enclosures .....	45
13.2 Resistance to humidity .....	45
13.3 Protection provided by enclosures .....	46
13.3.1 General .....	46
14 Insulation resistance and electric strength .....	49
15 Temperature rise .....	50
16 Breaking capacity of socket-outlets .....	55
17 Normal operation of socket-outlets .....	56
18 Connection of flexible cords and cord anchorage .....	57
19 Mechanical strength .....	60
20 Screws, current-carrying parts and connections .....	68
21 Resistance to heat .....	69
22 Resistance to abnormal heat, fire and tracking .....	72

22.1	General.....	72
22.2	Glow-wire test .....	72
22.3	Resistance to tracking .....	74
23	Resistance to excessive residual stresses and to rusting.....	74
24	Overload test .....	75
25	Cyclic loading test .....	76
	Annex A (normative).....	77
	The construction and calibration of a calibrated link .....	77
A.1	Construction.....	77
A.2	Calibration .....	79
	Annex B (normative).....	81
	Test plug for temperature-rise test .....	81
B.1	General.....	81
B.2	Calibration .....	83
	Annex C (normative).....	83
	Measurement of clearances and creepage distances.....	83
	Annex D (normative).....	89
	Determination of the Comparative Tracking Index (CTI) and Proof Tracking .....	89
	Index (PTI).....	89
	Annex E (normative).....	90
	Relation between rated impulse withstand voltage, rated voltage and Overvoltage Category .....	90
	Annex F (normative) .....	91
	Pollution degree.....	91
	Annex G (normative).....	92
	Impulse voltage test .....	92
	Annex H (normative).....	93
	Requirements for incorporated electronic components .....	93
	Bibliography .....	99

## 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 495-2), 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 2: Specification for switched and unswitched socket outlets

### 1 Scope

This Draft East African Standard specifies requirements for 13 A switched and unswitched shuttered socket outlets for household, commercial and light industrial purposes, with particular reference to safety in normal use. The socket-outlets 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 using plugs in accordance with EAS 495-1. Additional requirements are included for socket-outlets suitable for electric vehicle charging.

Requirements are specified for 13 A shuttered socket-outlets in single or multiple arrangements with or without associated controlling switches, for flush mounting in suitable boxes, e.g. complying with EAS 203, or for surface or panel mounting or for portable use. Fixed socket-outlets are intended for use with cables complying with IEC 60227 having copper conductors.

Socket-outlets incorporating fuse links, Circuit Breakers for Equipment (CBE), switches and indicator lamps are included within the scope of this part of EAS 495. Socket-outlets incorporating electronic components as detailed in Annex H are included within the scope of this part of EAS 495.

This standard does not apply to socket-outlets incorporating screwless terminals for the connection of external conductors of the following types:

- a) insulation-piercing connecting devices; portable
- b) twist-on connecting devices.

Socket-outlets complying with 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 socket-outlet. Certain installations require the inclusion of intumescent and acoustic pads and this might have an effect on the conformance of the socket-outlet to the requirements of this standard. This might influence temperature rise and internal clearances. Verification of suitability of the socket-outlet needs to be obtained from the manufacturer.

NOTE 1 The titles of the publications referred to in this part of EAS 495 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 of this part of EAS 495, however their body outline need not be limited at a distance of 6.36 mm from the plug engagement face.

NOTE 3 Requirements for electromagnetic compatibility are not given for the following reasons.

NOTE 4 A socket-outlet that does not incorporate electronic devices is mechanical by nature of construction. The product is therefore immune from electromagnetic interference.

NOTE 5 Individually protected socket-outlets (IPS) are only intended to provide supplementary overcurrent protection downstream of the IPS. Individually protected socket-outlets are intended for use in circuits where fault protection is already assured upstream of the socket-outlet.



NOTE 6 Individually protected socket-outlets (IPS) are rated at 13 A. The maximum load current is restricted by the fitted fuse/CBE for its particular application.

NOTE 7 Recommendations for products incorporating EAS 495-2 socket-outlets are given in Annex I.

A switched or unswitched socket-outlet does not emit intolerable electromagnetic interference since significant electromagnetic disturbances are only generated during insertion and withdrawal which are not continuous.

A switched or unswitched socket-outlet is mechanical by nature of construction. The product is therefore immune from electromagnetic interference.

This standard applies to all socket outlets in East African Region

Draft for public review

## 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.

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 495-3, 13A plugs, socket-outlets, adaptors and connection units — Part 3: Specification for adaptors.

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

EAS 203, Boxes for enclosure of electrical accessories — Specification

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

IEC 60227-1, Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 1: General requirements

IEC 60227-2, Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 2: Test methods

IEC 60227-3, Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 3: Non-sheathed cables for fixed wiring

IEC 60227-4, Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V –

Part 4: Sheathed cables for fixed wiring

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

IEC 60227-6, Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 6: Lift cables and cables for flexible connections

IEC 60884-1:2022, Plugs and socket-outlets for household and similar purposes - Part 1: General requirements

IEC 60884-2-2:2006, Plugs and socket-outlets for household and similar purposes - Part 2-2: Particular requirements for socket-outlets for appliances-EAS 203:2001, Boxes for enclosure of electrical accessories - Specification

IEC 60227-7, Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V – Part 7: Flexible cables screened and unscreened with two or more conductors

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

### 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

##### **socket-outlet**

an accessory having a set of three socket-contacts designed to engage with the pins of a corresponding plug and having means for the electrical connection of appropriate cables or flexible cords

#### 3.2

##### **fixed socket-outlet**

a socket-outlet which with its associated enclosure is intended for use mounted in or on a fixed surface

#### 3.3

##### **surface-mounted socket-outlet**

a socket-outlet which is intended to be mounted on a wall or other flat surface without the need for recessing

#### 3.4

##### **flush-mounted socket-outlet**

a socket-outlet which is intended to be mounted in a box which is recessed into a wall or other flat surface. The socket-outlet plate and the socket-outlet base are regarded as forming a complete unit, and the socket-outlet plate is mounted with its back either flush with a wall or other flat-surface structure, or flush with the front of a socket-outlet box or enclosure

### 3.5

#### **panel-mounted socket-outlet**

a socket-outlet intended for incorporation into equipment panels or electrical trunking and which depends upon such incorporation for its enclosure

### 3.6

#### **portable socket-outlet**

a socket-outlet intended to be connected to, or integral with, a flexible cord, and which can easily be moved from one place to another while connected to the supply

### 3.7

#### **rewirable portable socket-outlet**

a portable socket-outlet so constructed that a flexible cord can be fitted or replaced using general purpose tools

### 3.8

#### **non-rewirable portable socket-outlet**

a portable socket-outlet so constructed that it forms a complete unit with the flexible cord after connection and assembly by the manufacturer of the portable socket-outlet. The base and cover of non-rewirable portable socket-outlets are permanently attached to each other, such that the flexible cord cannot be separated without making the portable socket-outlet permanently useless, and the portable socket-outlet cannot be opened by hand or by using a general purpose tool, for example a screwdriver used as such”

NOTE See also 13.18.

### 3.9

#### **moulded-on portable socket-outlet**

a non-rewirable portable socket-outlet, the manufacture of which is completed by insulating material moulded around pre-assembled component parts and the terminations of the flexible cord

### 3.10

#### **fused socket-outlet**

a socket-outlet having provision for a replaceable cartridge fuse link

### 3.11

#### **switched socket-outlet**

a socket-outlet with an associated switch to disconnect the supply to the line socket contact or to both line and neutral socket contacts

### 3.12

#### **multiple socket-outlet**

a combination of two or more socket-outlets

### 3.13

#### **socket-outlet base**

that part of the socket-outlet which carries the contacts

NOTE It may be integral with the socket-outlet plate.

### 3.14

#### **socket-outlet plate**

the external plate which covers the base and contact assembly of a socket-outlet and through which the pins of the plug are inserted

### 3.15

#### **socket-outlet box**

a box suitable for mounting one or more socket-outlets

### 3.16

#### **shutter**

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

### 3.17

#### **actuating member**

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

### 3.18

#### **indicator lamp (pilot lamp)**

a lamp which illuminates to indicate that the socket-outlet contacts are energized

### 3.19

#### **terminal**

a means by which the user can make an electrical connection between the appropriate cable or flexible cord and the conducting parts of the socket-outlet without the use of special tools

### 3.20

#### **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 or nut 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.

### 3.21

#### **Termination**

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

### 3.22

#### **fuse carrier**

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

### 3.23

#### **part 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

### 3.24

#### **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

### 3.25

#### **accessible external surface of a socket-outlet**

all surfaces which can be touched by test probe B of EAS 370 when the socket-outlet is installed as in use

### 3.26

#### **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.

### 3.27

#### **fine wire thermocouple**

a thermocouple having wires not exceeding 0.3 mm in diameter

### 3.28

#### **calibrated link**

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

### 3.29

#### **resilient material**

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

### 3.30

#### **creepage distance**

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

### 3.31

#### **clearance**

shortest distance in air between two conductive parts

### 3.32

#### **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.

### 3.33

#### **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

### 3.34

#### **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

### 3.35

#### **functional insulation**

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

### 3.36

#### **class II**

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

NOTE 1 Such an application may be one of the following.

a) An application having a double and substantially continuous enclosure of insulation material which envelops all metal parts with the exception of small parts such as name plates, screw and rivets which are isolated from live parts by insulation at least equivalent to reinforced insulation. Such an application is called insulation encased class II.

b) An appliance having a substantially continuous enclosure of metal. in which double insulation is used throughout, except for those parts which reinforced insulation is used because the application of double. insulation is manifestly impracticable. Such an application is called metal encased class II.

c) An appliance which is a combination of types a) and b) above.

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

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

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



### 3.37

#### **actuating member**

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

### 3.38

#### **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.

### 3.39

#### **insignificant mass**

insufficient combustible mass to constitute a fire hazard

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

### 3.40

#### **rated voltage**

voltage assigned by the manufacturer for a specified operating condition

### 3.41

#### **reinforced insulation**

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

### 3.42

#### **small parts**

parts where each surface lies completely within a circle of 15 mm diameter or where some of the surface lies outside the 15 mm diameter circle but in such a way that it is not possible to place a circle of 8 mm diameter on any of this remaining surface.

### 3.43

#### **Clamp type (screwless) terminal**

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

### 3.44

#### **engagement surface of a socket-outlet**

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

NOTE See 14.1

**3.45**

**individually protected socket-outlet (IPS)**

socket-outlet which incorporates a fuse or other overcurrent protection device intended to provide supplementary overcurrent protection.

**3.46**

**flat quick-connect termination**

electrical connection consisting of a male tab and female connector which can be readily inserted and withdrawn without the use of a tool

NOTE Other terms, such as: "snap-on connector", "flat push-on connector" are sometimes used.

**3.47**

**female connector**

portion of a flat quick-connect termination which is pushed on to the male tab

**3.48**

**male tab**

portion of a flat quick-connect termination which receives the female connector

**3.49**

**Accessible metal parts**

Metal parts of socket outlets that are not intended to carry current but are exposed and accessible to touch during normal use or under fault conditions.

## 4 General requirements and conditions of use

4.1 Socket-outlets shall be so designed and constructed that in normal use their performance is reliable and minimizes the risk of danger to the user or to the surroundings. Such socket-outlets shall be capable of meeting all the relevant requirements and tests specified in this part of EAS 495.

Unless otherwise stated, reference to a plug within this part of EAS 495 shall mean a plug in accordance with EAS 495-1.

4.2 Socket-outlets shall be suitable for use under the following conditions:

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

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 equivalent to pollution degree 2, see Annex F, and overvoltage category III, see Annex E.
- d) a situation not suspending a plug or an adaptor in an inverted orientation, unless otherwise specified in the manufacturer's instructions.

## 5 General conditions for type testing

### 5.1 All tests shall be type tests

Unless otherwise specified in this part of EAS 495 the socket-outlets shall be tested as delivered by the manufacturer or responsible vendor and under normal conditions of use, at an ambient temperature of  $20\text{ °C} \pm 5\text{ °C}$ , after being conditioned at normal laboratory temperature and humidity levels for at least 4 days.

Unless otherwise stated by the manufacturer, flush-mounted socket-outlets shall be tested when mounted on a corresponding insulated box complying with EAS 203, the fixing screws being tightened with a torque of  $0.6\text{ Nm} \pm 10\%$ .

Other types shall be mounted according to the manufacturer's instructions.

Socket-outlets having a declared IP rating shall be tested as a complete assembly (socket-outlet and enclosure) when mounted in accordance with manufacturer's instructions and conditions of use. Individually protected socket-outlets (IPS) shall be tested as delivered. Individually protected socket-outlets (IPS) shall be tested as fixed socket-outlets unless otherwise specified in the particular test. The box or enclosure shall be as specified by the manufacturer.

NOTE 1 Individually protected socket-outlets (IPS) are intended for incorporation into equipment or enclosures such as those for use in electrical systems within the scope of BS 6396. IPS may be either fixed or portable, subject to manufacturer's instructions, integral with the complete assembly, (e.g. furniture), in a surface accessory, or they may comprise a flush accessory mounted in a corresponding box.

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

Non-rewirable socket-outlets shall be supplied with an appropriate flexible cord which shall be at least 1 m long.

Socket-outlets shall be deemed to comply if no specimen fails in the complete series of tests given in Table 1. If one specimen fails in the complete series of tests given in Table 1, then socket-outlets of that type shall be deemed to have failed to comply with this part of EAS 495, unless the socket-outlets 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 re-test then socket-outlets of that type shall be deemed to comply with this part of EAS 495.

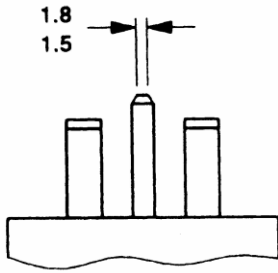
If more than one specimen fails in the complete series of tests given in Table 1 then socket-outlets of that type shall be deemed not to comply with this part of EAS 495.

For type testing, all tests have been included in the test schedule and shall be performed in the specified order.

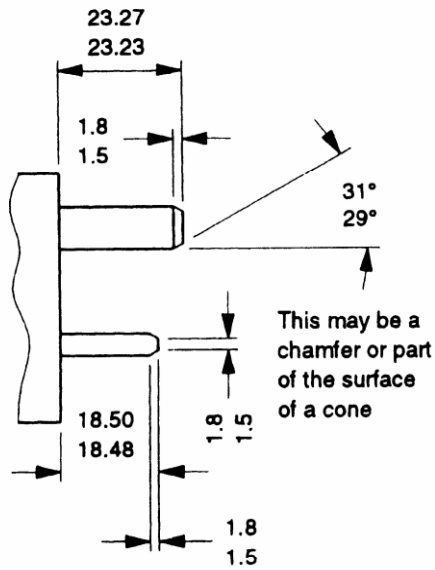
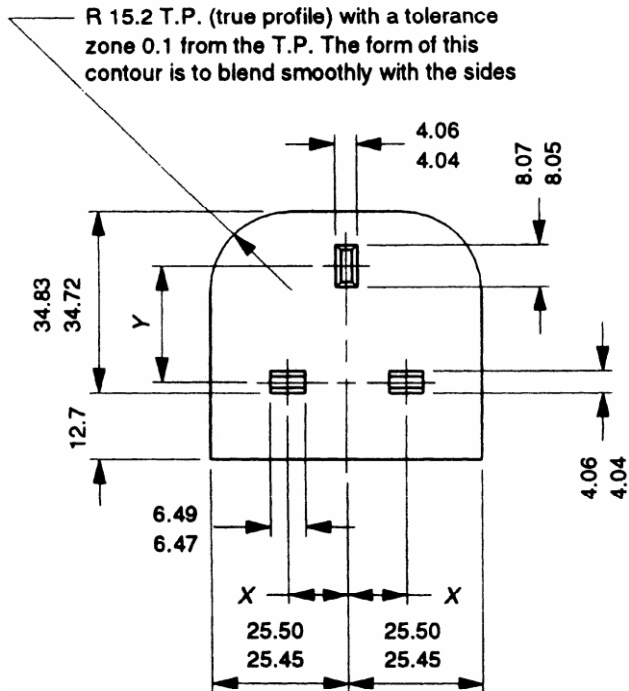
NOTE 1 References to carrying out specific tests in various clauses are not intended to indicate a sequence of testing different to that in the schedule and should not be conducted as separate

**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 11, Figure 12, Figure 14, and Figure 16 shall be considered to comply with the dimensional requirements if the results of the measured values are within the specified dimensions and the uncertainty of measurement at not less than 95 % confidence level does not exceed  $\pm 0.005$  mm.



		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



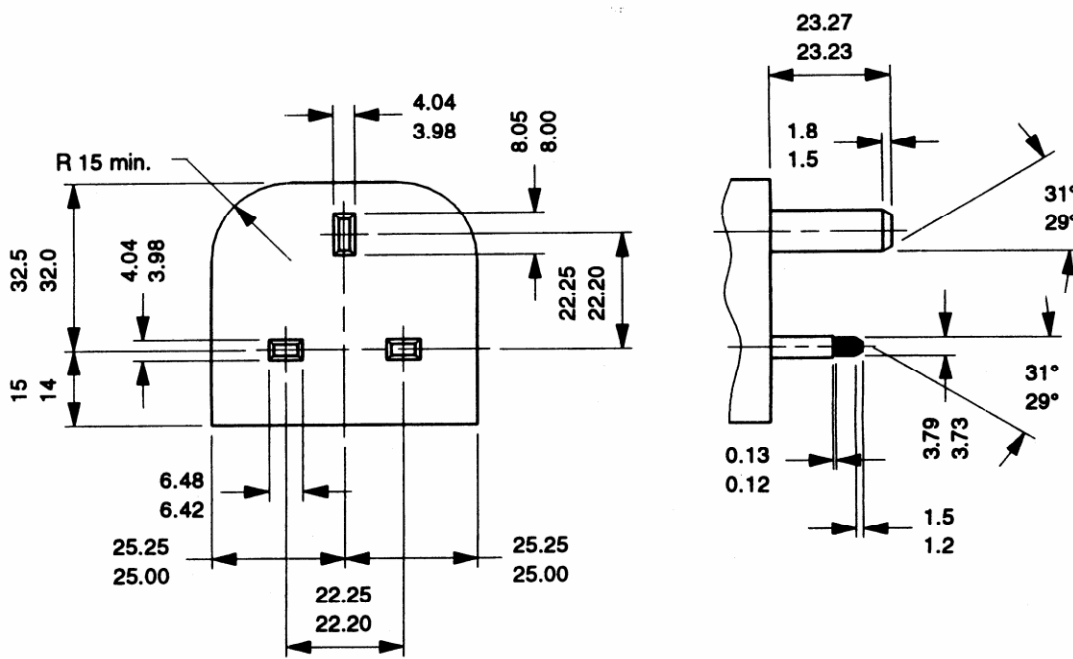
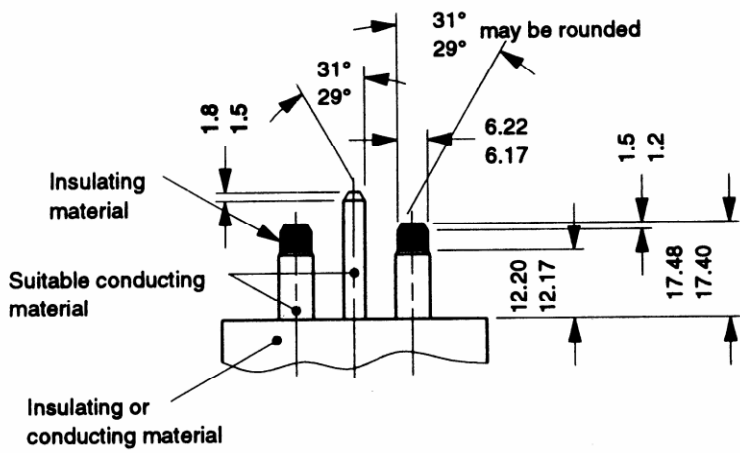
**General view**

All linear dimensions are in millimetres

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

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

**Figure 11 — GO gauge for socket-outlet**

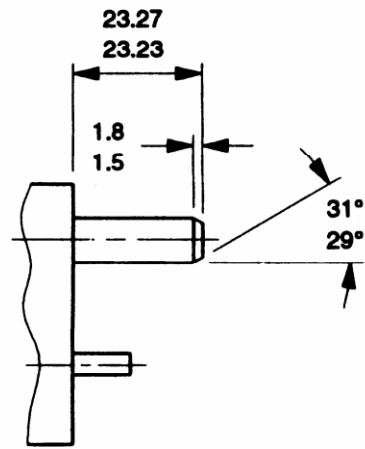
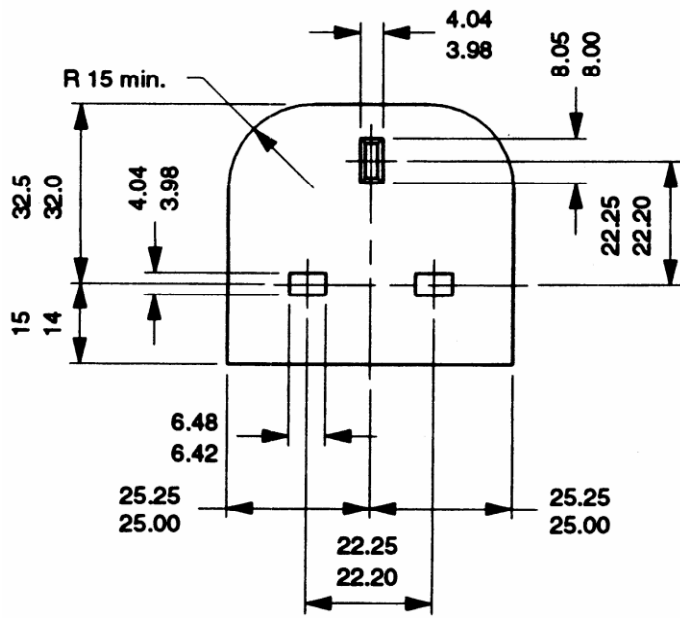
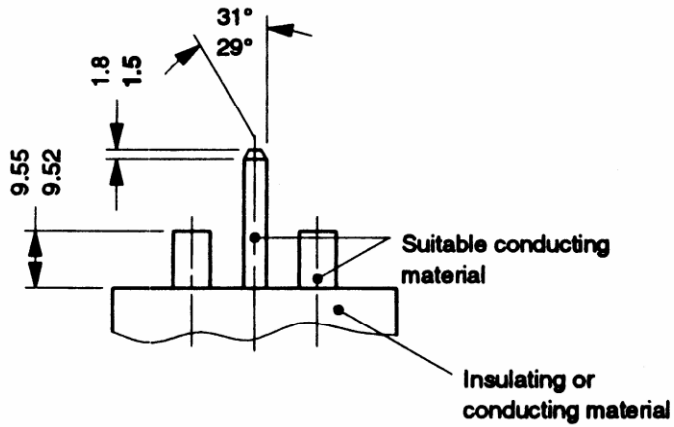


All linear dimensions are in millimetres

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

NOTE 2 All insulated ends of pins may require suitable protection against water.

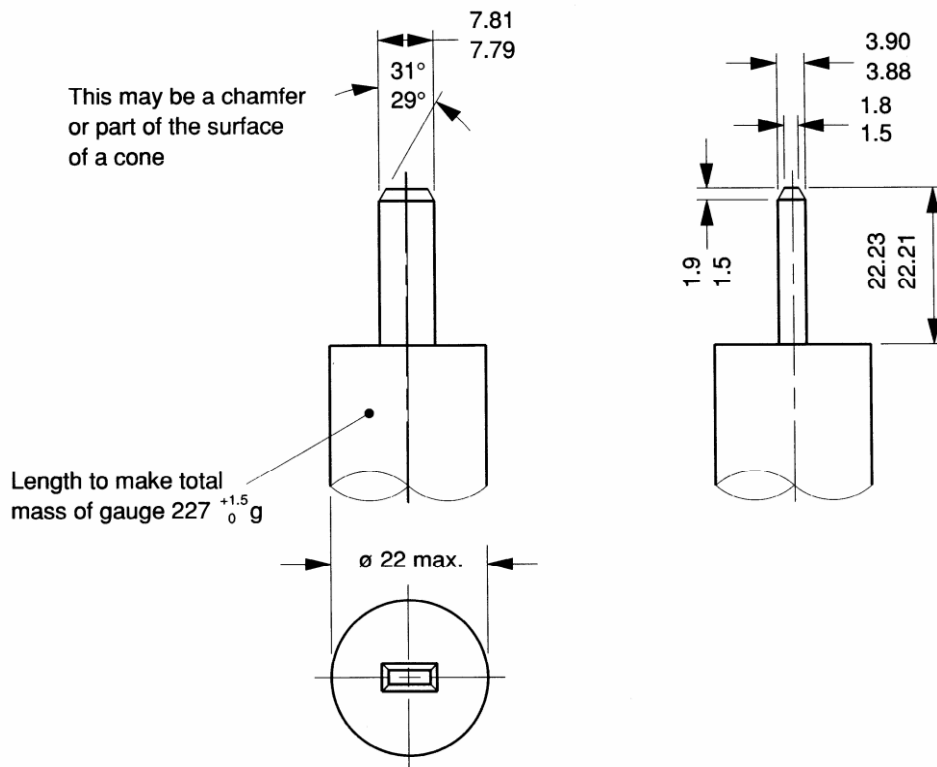
Figure 12 — Contact test gauge



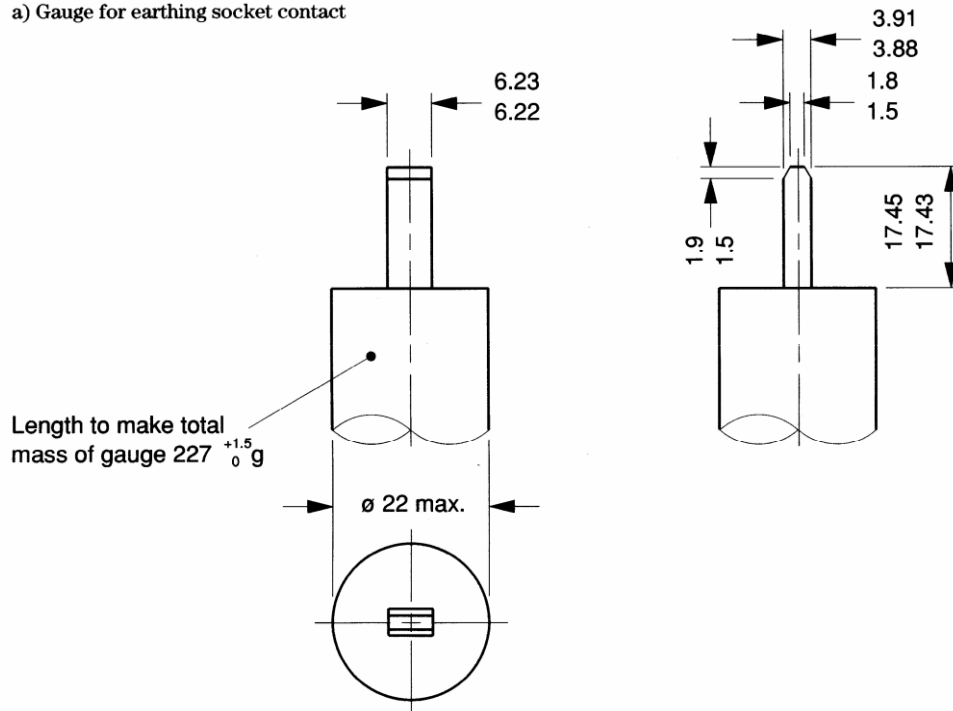
All linear dimensions are in millimetres

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

Figure 14 — Non-contact test gauge



a) Gauge for earthing socket contact



All linear dimensions are in millimetres

Figure 16 — Withdrawal pull gauges for effectiveness of contact



**Table 1 — Schedule of test**

Sequence	Samples	Test	Clause no.
1	3	Inspection, measurement, gauging and manipulation	5, 6, 7, 9.1, 11.1, 9.2, 9.4, 10.1, 13.1, 13.2, 13.3, 13.9, 13.10, 13.12, 13.14, 13.15, 13.16, 13.17, 13.18, 13.20, 19.2, 19.3, 19.4, 19.6,21,8
2	3	General	5, 13.13 (20.1.2 only), 17, 13.11, 16, 19.5, 21.3
3	3		5, 13.13 (20.1.2 only), 17, 13.11, (13.11.1 only), 16, 19.5, 21.3
4	3		5, 14.1, 15, 18.1.2 (9.1, 16, 13.1% 15, 13.4.1a) 10.2, 13.6, 13.7, 13.8)
5	3		5, 14.2, 18.1.3, 20
6	3		Materials
7	3		5,23.2
8	3		5,24,21.3
9 <sup>A)</sup>	3	Positive break	5, 13.11.2
10	3	Ingress protection	5, 13.22, 13.23, 13.24
11	3	Electric Vehicle charging	5, 14.1, 17.2, 18.2
12	3		5, 26
13	3	Additional tests for rewirable fixed socket outlets with screwless terminals	5, 14.1, 11.10
14	3	Additional tests for individually Protected Socket outlets (IPS)	5, 25
<p><sup>a</sup> An additional new set of three samples prepared with the contacts closed is supplied by the manufacturer for this test.            NOTE 1 The order of tests given in sequence 1 above is preferred but not mandatory except where required within the text of the appropriate clause.            NOTE 2 ** denotes that additional samples might be required for socket-outlets incorporating electronic components.            NOTE 3 Individually protected socket-outlets can be fixed, portable or both. Therefore not all of the tests in the sequences above might be applicable. Refer to manufacturer's instructions for guidance.</p> <p><sup>A)</sup>An additional new set of three samples prepared with the contacts closed might be required"            NOTE 4: the number of sampled items should have the same specifications</p>			

## 6 Classification and rating

### 6.1 Classification

Socket-outlets shall be classified as follows:

#### 6.1.1 according to the number of gangs:

- a) single; or
- b) multiple.

#### 6.1.2 according to switching capability:

- a) switched; or
- b) unswitched.

#### 6.1.3 according to fusing capability:

- a) fused; or
- b) unfused.

#### 6.1.4 according to method of mounting:

- a) fixed flush;
- b) fixed surface;
- c) panel mounting;
- d) portable rewirable; or
- e) portable non-rewirable.

#### 6.1.5 according to indicator type:

- a) with indicator lamp; or
- b) without indicator lamp.

#### 6.1.6 according to the IP rating if declared:

- a) for socket-outlets having an IP rating with the plug inserted; or
- b) for socket-outlets having an IP rating only when no plug is inserted.

#### 6.1.7 according to the type of terminal:

- a) socket-outlets with screw type terminals;
- b) socket-outlets with screwless terminals for rigid conductors only;
- c) socket-outlets with screwless terminals for flexible conductors only; or
- d) socket-outlets with screwless terminals for rigid and flexible conductors.

6.1.8 according to suitability for electric vehicle charging:

- a) intended for electric vehicle charging, applicable to fixed single-gang socket-outlets only; or
- b) not intended for electric vehicle charging.

6.1.9 according to incorporation of electronic components:

- a) with electronic components; or
- b) without electronic components.

## 6.2 Ratings

The rated current of all socket-outlets shall be 13 A as given in Table 2.

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

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

For fixed socket-outlets and portable socket-outlets other than IPS types, protected by a CBE, the rating of the CBE shall be not less than 13 A.

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

Flex cord nom cross-sectional area mm <sup>2</sup>	Rated current A	Test current ± 0.4 A A	Fuse rating A	Load for flexing test +2 % —0 % kg	Cord grip tests	
					Load +2%, 0% kg	Torque <sup>a</sup> N.m
0.5	3	3.5	3		3	0.15
0.75	6	7	7 (13) <sup>b</sup>		3	0.20
1	10	11	10 (13) <sup>b</sup>	2	3	0.25
1.25	13	14	13	2	6	0.30
1.5	13	14	13	2	6	0.35

<sup>a</sup> The recording of a measured value of torque in accordance with 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 %.

<sup>b</sup> The figure in brackets indicates the maximum lose rating when a non-rewirable plug/cord assembly is used with certain equipment which because of its operating characteristic needs a higher rating of fuse link.

## 7 Marking and labelling

7.1 Socket-outlets 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 (EAS 495-2) <sup>1)</sup>;
- c) for portable socket-outlets the number of this East African Standard shall be followed by "/A";
- d) on rewirable socket-outlets the terminals intended for the connection of the various conductors shall be identified by the symbols given in 7.5;
- e) for fused socket-outlets, the words "FUSE" or "FUSED" or the symbol (given in 7.5) on the engagement surface of a socket-outlet;
- f) fixed fused multiple socket-outlets shall be marked on the engagement surface with the maximum rated current of 13 A (e.g. MAX. 13A);
- g) all socket-outlets shall be marked with the Following:
  - 1) rated current in amperes;
  - 2) rated Voltage in volts;
  - 3) nature of supply.
- h) for socket outlets for electric vehicle charging, the number of this EAS standard shall be followed by "/EV"
- i) The socket outlets incorporating USB circuits shall be marked with its rated output voltage and current for each output circuit.

Portable socket-outlets shall be marked on the accessible external surface. In the case of a nonrewirable portable socket-outlet, the rated current shall be the maximum current appropriate to the attached flexible cord as given in Table 2.

---

<sup>1)</sup> 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.

**7.1.1** Compliance shall be checked by inspection and by rubbing the markings 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. Workings produced by an engraving or moulding process shall be deemed to comply without test.

**7.2** Portable fused socket-outlets shall be supplied with a removable tag, label or instructions 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** Portable socket-outlets fitted with a flexible cord shall be supplied with a label or instruction indicating the colour coding of the cores of the flexible cord as follows.

Wires in the mains lead shall be coloured in accordance with the following code:

Green/yellow Earth

Blue Neutral




Brown Live

**7.3.1** Compliance shall be checked by inspection.

**7.4** Rewireable portable socket-outlets shall be provided with adequate instructions for the safe connection of the appropriate 3-core flexible cord, including clear instructions for the removal of insulation from the conductors.




**7.4.1** Compliance shall be checked by inspection.

7.5 If symbols are used they shall be as follows:

Parameters	Symbols
volts	V
alternating current	~
line	L
neutral	N
Direct current (d.c)	— — — —
earth	 (preferred) or 
<i>NOTE The letter "E" may be used in addition to either of these symbols.</i>	
fuse	
For screwless terminals suitable for rigid conductors only	r
For screwless terminals suitable for flexible conductors only	f
Degree of protection, where relevant	IPXX

NOTE For the marking of the rated current and rated voltage of the socket-outlet, 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.

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

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

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

7.6 Instructions for installation and use of socket-outlets having an IP classification greater than IP20 shall be provided.

## 8 Clearances, creepage distances and solid insulation

Socket outlets 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, 8.2 and 8.3.

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

Socket-outlets 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 socket-outlet 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 for Class I equipment. Mechanical strength equivalent to that which would be provided by reinforced insulation as listed in IEC 61140 is achieved in EAS 495 products through specific mechanical and material tests.

### 8.1 Clearances

Accessories 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 in accordance with 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 Note 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	Minimum clearances in mm
kV <sup>a</sup>	
0.33	0.2 <sup>b</sup>
0.50	0.2 <sup>b</sup>
0.80	0.2 <sup>b</sup>
1.5	0.5
2.5	1.5
4.0	3
6.0	5.5

<sup>a</sup> See Annex E. This voltage is:  
— for functional insulation: the maximum 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.

<sup>b</sup> 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. Compliance shall be checked by inspection and by measurement or by the test of Annex G".

### 8.1.5 Contact gap

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

## 8.2 Creepage distances

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



— all parts which 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 for basic insulation**

Rated voltage V (r.m.s.)	Pollution Degree 2			Pollution Degree 3		
	Material group <sup>b</sup>			Material group <sup>b</sup>		
up to and including	I	II	IIIa/IIIb	I	II	IIIa
250	1.3	1.8	2.5	3.2	3.6	4.0
<p>a This voltage is the voltage rationalized through Table 3a and Table 3b of IEC 60664-1 based on the rated voltage.</p> <p>b Details of pollution degrees are given in Annex F</p>						

### 8.2.2 Creepage distances for functional insulation

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

Compliance shall be checked by measurement.

### 8.2.3 Creepage distances for supplementary insulation

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.

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 might occur in normal use.

No minimum thickness is specified for solid insulation.

**8.3.1** the conformity shall be checked by tests in accordance with 15.1.3 using the values given in table 5

**Table 5** — *Withstand voltages for insulation types*

<b>Insulation</b>	<b>Test voltage</b> V (r.m.s)
Functional insulation	1 500
Basic insulation	1 500
Supplementary insulation	1 500
Reinforced insulation	3 000

8.4 Requirements for printed wiring boards and equivalent construction Printed wiring boards and equivalent construction shall conform to IEC 60664-5.

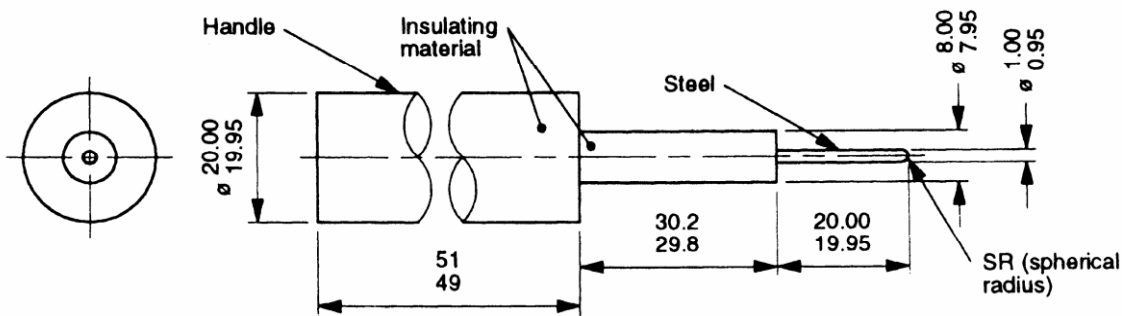
Where coating, potting or moulding is used, articles shall conform to IEC 60664-3.

## 9 Accessibility of live parts

9.1 Socket-outlets shall be so designed that when they are mounted and wired as in normal use, live parts are not accessible.

9.1.1 Compliance shall be checked by the application of the test pin shown in Figure 1 perpendicular to the accessible external surface of the socket-outlet with a force of  $50_{-1}^0$  N. It shall not be possible to touch live parts.

NOTE: Safe Extra Low Voltages (SELV) parts are not considered to be live parts for the purpose of this test.



All dimensions are in millimetres

Figure 1 — Test pin

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

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

9.3 Resilient accessible external surfaces of socket-outlets 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 accessible external surfaces or become so disposed as to reduce creepage and clearances below those given in Clause 8.

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

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 2.

Each sample is subjected to the force at each chosen place in turn. During each application of force, a test voltage of  $2000\text{ V} \pm 60\text{ V}$  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.

**9.4** It shall not be possible to introduce a conducting device through the earthing socket apertures) of a socket-outlet in such a manner that there is a risk of making contact with any live conductor, with or without insulation.

**9.4.1** Compliance shall be checked by introducing a rigid metal pin,  $1^{0-0.05}$ , mm diameter  $\times$   $60\text{ mm} \pm 1\text{ mm}$  long, through the earthing socket aperture or apertures of a socket-outlet mounted and wired within an appropriate enclosure, applying a force of  $5^{0-1}$  N, with the conductors in the most unfavourable positions.

## 10 Provision for earthing

**10.1** Socket-outlets shall be so constructed that, when inserting the plug, the earth connection is made before the current-carrying pins of the plug become live. When withdrawing the 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 socket-outlets shall be in effective electrical contact with the earthing socket contact, except that metal parts on, or screws in or through, non-conducting material, and separated by such material from current-carrying parts in such a way that in normal use they cannot become live, need not be in effective electrical contact with the earthing socket contact.

NOTE Metal parts having an accessible surface coating of lacquer or enamel are accessible metal parts within the meaning of this requirement.

**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 by the following test. A current of  $25\text{ A} \pm 0.75\text{ A}$ , derived from an a.c. source having a no-load voltage not exceeding  $12\text{ V}$ , is passed for  $60^{0+5}$  s between the earthing terminal and any accessible metal part intended to be earthed and between the earthing terminal and an earthing plug pin inserted in the earthing socket contact;

- c) the resistance between the earthing terminal and any other nominated part shall not exceed 0.05  $\Omega$ .

**10.3** If means are provided for electrically bonding the mounting box to the earthing circuit of the socket-outlet by means of the fixing screws the connection between the screw and earthing terminal shall be of low resistance.

**10.3.1** Compliance shall be checked by the test described in 10.2.1b) applied between the socket outlet earthing terminals and any fixing screw in electrical contact with the earthing circuit. For the purpose of this test the socket-outlet shall be attached to its appropriate mounting box, the fixing screws being tightened to a value of two-thirds those given in Table 3a.

**Table 6 — Torque values for screws and nuts**

Declared diameter of screw thread  mm	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, 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 metal screws which cannot be tightened by means of a screwdriver with a 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  $\pm 10$

**10.4** Where fixed socket-outlets have more than one earth terminal for connecting to the earth socket contacts, these terminals shall be reliably connected together.

**10.4.1** Compliance shall be checked by inspection and by the test described in 10.2.1b) applied between each terminal

## **11 Terminals and terminations**

**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 portable socket-outlets shall be provided with terminals as defined in 3.7.

**11.2.1** Compliance shall be checked by inspection.

**11.3** Non-rewirable portable socket-outlets shall be provided with soldered, welded, crimped or similar terminations; for all these methods of termination, not more than one strand of a  $0.5 \text{ mm}^2$  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 portable socket-outlets shall permit the connection, without special preparation, of flexible cords having nominal conductor cross-sectional areas of  $0.5 \text{ mm}^2$  to  $1.5 \text{ mm}^2$ .

**11.5** Line and neutral terminals in fixed socket-outlets shall permit the connection, without special preparation, of one, two or three  $2.5 \text{ mm}^2$  solid or stranded or of one or two  $4 \text{ mm}^2$  stranded conductors.

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

**11.16** Earthing terminals in fixed socket-outlets shall permit the connection, without special preparation, of one, two or three  $1.5 \text{ mm}^2$  or  $2.5 \text{ mm}^2$  solid or stranded or of one or two  $4 \text{ mm}^2$  stranded conductors.

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

**11.7** 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 the sides of the major diameter of the clamping screw and the conductor hole does not exceed  $0.4 \text{ mm}$  when intended for the connection of flexible cords and  $0.6 \text{ mm}$  when intended solely for the connection of fixed wiring.

**11.7.1** Compliance shall be checked by inspection and measurement.

**11.8** Terminal screws shall have a declared outside diameter of not less than  $3 \text{ mm}$  or be not smaller than 6 B.A.

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

**11.8.1** Compliance shall be checked by inspection and measurement.

**11.9** In rewirable portable socket-outlets terminals shall be so located or shielded that should a stray strand of a flexible conductor escape when the conductors are fitted, there is negligible risk of accidental connection between live parts and accessible external surfaces, or of a stray strand bypassing the fuse link if any.

**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<sup>2</sup>. One free strand of the flexible conductor is left free and the other strands are fully inserted into and clamped in the terminal. The stray 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 flexible conductor connected to a live terminal shall not:

- a) touch any metal part, so as to bypass any fuse link;
- b) touch any metal part which is accessible or is connected to an accessible metal part;
- c) reduce creepage distances and clearances to accessible surfaces to less than 1.3 mm.

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

**11.10** Screwless terminals for fixed and panel-mounted socket-outlets

**11.10.1** Screwless terminals for fixed socket-outlets shall be provided with clamping units which allow the proper connection of conductors as specified in 11.4, 11.5, 11.6 or 11.11 as appropriate. The terminals shall be of the type suitable for the following:

- a) rigid (solid or stranded) copper conductors only; or
- b) flexible copper conductors only; or
- c) both rigid (solid or stranded) and flexible copper conductors.

Conformity shall be checked by inspection and by fitting the appropriate conductors. For screwless terminals intended to be suitable for the connection of both rigid and flexible copper conductors the tests given in 11.10 shall be carried out with rigid conductors first and then repeated with flexible conductors. Screwless terminals shall be such that the conductor is able to be connected without special preparation.

NOTE Special preparation includes soldering of the wires of the conductor and use of terminal ends, but not reshaping of the conductor before its introduction into the terminal or the twisting of a stranded conductor to consolidate the end.

Conformity shall be checked by inspection.

**11.10.2** Screwless terminals shall be so designed that they clamp the specified conductors with sufficient contact pressure and without undue damage to the conductor. The conductor shall be clamped between metal surfaces. Conformity shall be checked by inspection and by the test of 11.10.7.

**11.10.3** It shall be clear how the conductors are to be inserted and disconnected. The intended disconnection of a conductor shall require an operation, other than a pull on the conductor, which can be effected manually with or without the help of a tool in normal use. Openings for the use of a tool intended to assist the insertion or disconnection shall be clearly distinguishable from the opening intended for the conductor. Conformity shall be checked by inspection and by the test of 11.10.7.

**11.10.4** Screwless terminals which are intended to be used for the interconnection of two or more conductors shall be so designed that:

a) during the connection or disconnection the conductors are able to be connected or disconnected either at the same time or separately;

b) each conductor is introduced in a separate clamping unit (not necessarily in separate holes). Conformity shall be checked by inspection and by tests with the appropriate number and size of conductors as specified in 11.10.1.

**11.10.5** Screwless terminals shall be so designed that undue insertion of the conductor is prevented and adequate insertion is obvious. Marking indicating the length of insulation to be removed before the insertion of the conductor into the screwless terminal shall be given on the socket-outlet. Conformity shall be checked by inspection and by the test of 11.10.7.

**11.10.6** Screwless terminals shall be properly fixed to the socket-outlet. When tested in accordance with 11.10.7, screwless terminals shall not work loose when the conductors are inserted or disconnected during installation. Conformity shall be checked by inspection and the test of 12.10.7.

**11.10.6** Screwless terminals shall withstand the mechanical stresses occurring in normal use. When tested in accordance with the following method, the conductors shall not have moved noticeably in the clamping unit, neither the terminals nor the clamping part shall have worked loose and the conductors shall show no deterioration, such that further use is impaired.

The test shall be carried out with uninsulated conductors on one screwless terminal of each sample. The appropriate copper conductors shall be used, first conductors having the largest cross-sectional area, and then conductors having the smallest cross-sectional area specified in 11.4, 11.5 or 11.6 as appropriate. Conductors shall be inserted and disconnected five times, new conductors being used each time, except for the fifth time, when the conductors used for the fourth insertion shall be clamped at the same place.

For each insertion, the conductors shall be either:

a) pushed as far as possible into the terminal; or

b) inserted so that adequate connection is obvious. After each insertion, the conductor shall be subjected to a pull of  $30 \pm 10$  N. The pull shall be applied in one smooth and continuous motion for  $60 \pm 5$  s, in the direction of the longitudinal axis of the conductor space. During the application of the pull, the conductor shall not come out of the screwless terminal and the terminal shall not have become detached from the socket-outlet.

**11.10.8** Screwless terminals shall withstand the electrical and thermal stresses occurring in normal use. When tested in accordance with the following methods, the screwless terminals shall show no changes likely to impair further use, e.g. cracks, deformation. The following tests shall be carried out on five screwless terminals which have not been used for any other test. Both tests shall be carried out with new copper conductors.

a) The screwless terminals shall be connected with 1 m long conductors having a cross-sectional area of 1.5 mm<sup>2</sup> and loaded for  $60 \pm 1$  min with an alternating current of 19 A. The test shall be carried out on each clamping unit. During the test the current shall not be passed through the socket-outlet, but only through the terminals. Immediately after this period, the voltage drop across each screwless terminal shall be measured



with 13 0 2 0 –. A flowing. In no case shall the voltage drop exceed 15 mV. The measurements shall be made across each screwless terminal, as near as possible to the point of contact of each conductor. NOTE The samples may be prepared by the manufacturer. During the preparation of the samples, care shall be taken to ensure that the behaviour of the terminal is not affected. When performing the test and taking the measurements, care shall be taken to ensure that the conductors and the measurement equipment are not moved.

b) The screwless terminals, after being subjected to the determination of the voltage drop in accordance with item a) shall be tested as follows. During the test, a current of 19 A shall be passed through the terminal. The whole test arrangement, including the conductors, shall not be moved until the measurements of the voltage drop have been completed. The terminals shall be subjected to 192 temperature cycles, each cycle having a duration of approximately 1 h and being carried out as follows:

- 1) with the current flowing for approximately 30 min; and
- 2) with no current flowing for approximately a further 30 min.

The voltage drop in each screwless terminal shall be determined in accordance with the test in item

a) after every 24 temperature cycles and after 192 temperature cycles have been completed.

In no case shall the voltage drop exceed 22.5 mV. On completion of the test, each screwless terminal shall be inspected using normal or corrected vision without additional magnification. The mechanical stress test in accordance with 11.10.7 shall be repeated. All samples shall withstand the mechanical stress test.

### 11.11 Terminals for panel-mounted socket-outlets

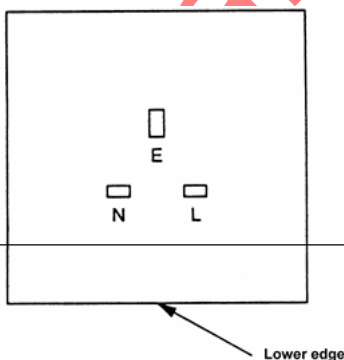
Panel-mounted socket-outlets shall be provided with screw type or screwless terminals, alternatively soldered or flat, quick-connect terminations in accordance with IEC 61210. The capacity and compatibilities of the terminals or terminations shall be specified by the manufacturer.

11.12 Conformity of screw type terminals shall be checked by inspection and fitting the appropriate conductors.

Conformity of screwless terminals shall be checked by the tests of 11.10. Conformity of flat, quick-connect terminations shall be checked by inspection and measurement.

## 12 Construction of socket-outlets

12.1 The disposition of the socket contacts shall be as shown in Figure 3.



NOTE The diagram shows the disposition of the socket contacts as viewed from the front of a socket-outlet.

Figure 3 — Disposition of socket contacts

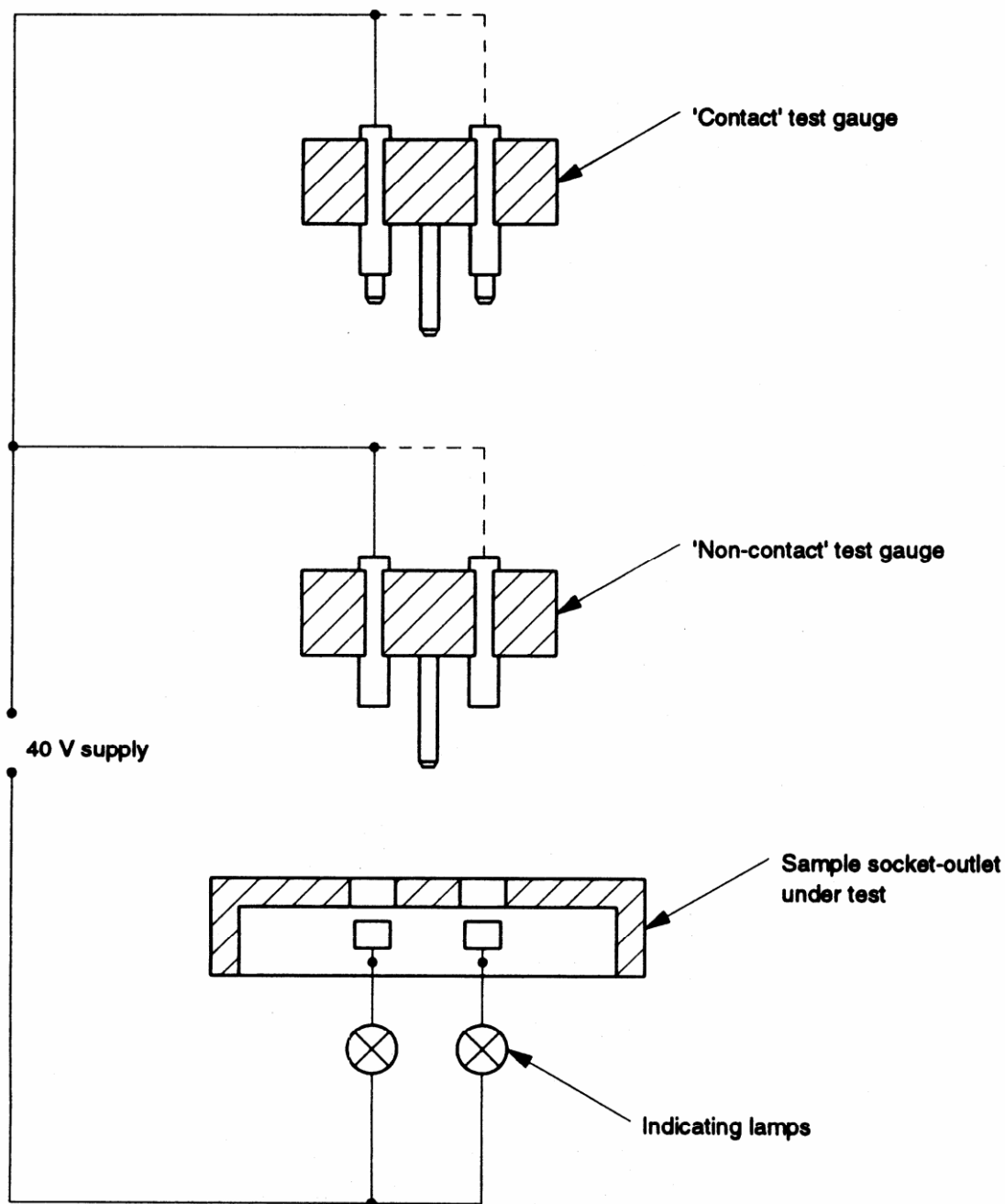
The engagement surface shall be substantially flat. Any steps or profile contours on the engagement surface shall not result in the surface deviating from the plane of engagement by more than 3mm. Holes not exceeding 8mm diameter for the purpose of assembly fixing shall be deemed acceptable. There shall be no projection on the engagement surface of the socket-outlet such as would prevent the full insertion of a plug. The spacing of the socket contacts shall correspond with that of plug pins as specified in EAS 495-1.

**12.1.1** Compliance shall be checked by inspection, measurement 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 12.2.

**12.2** The line and neutral socket contacts in socket-outlets shall be positioned so as to make satisfactory contact with the corresponding pins of a plug in all positions that the contacts may occupy when the plug is correctly and fully inserted.

**12.2.1** 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.



NOTE 1 For details of contact test gauge see Figure 12.

NOTE 2 For details of non-contact test gauge see Figure 14.

NOTE 3 The figure shows a typical test apparatus and is not intended to be specific.

NOTE 4 Dotted lines show additional connectors when the gauge body is made from insulating material.

**Figure 13 — Test apparatus and circuit for use with contact and non-contact test gauges (see Clause 13)**

**12.3** On insertion of a plug into a socket-outlet, the travel of the end of either current-carrying pin from the front face of the socket-outlet 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.

**12.3.1** 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.

**12.4** Socket contacts 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. Each socket contact shall be reliably connected to the fixed parts of its terminal or termination.

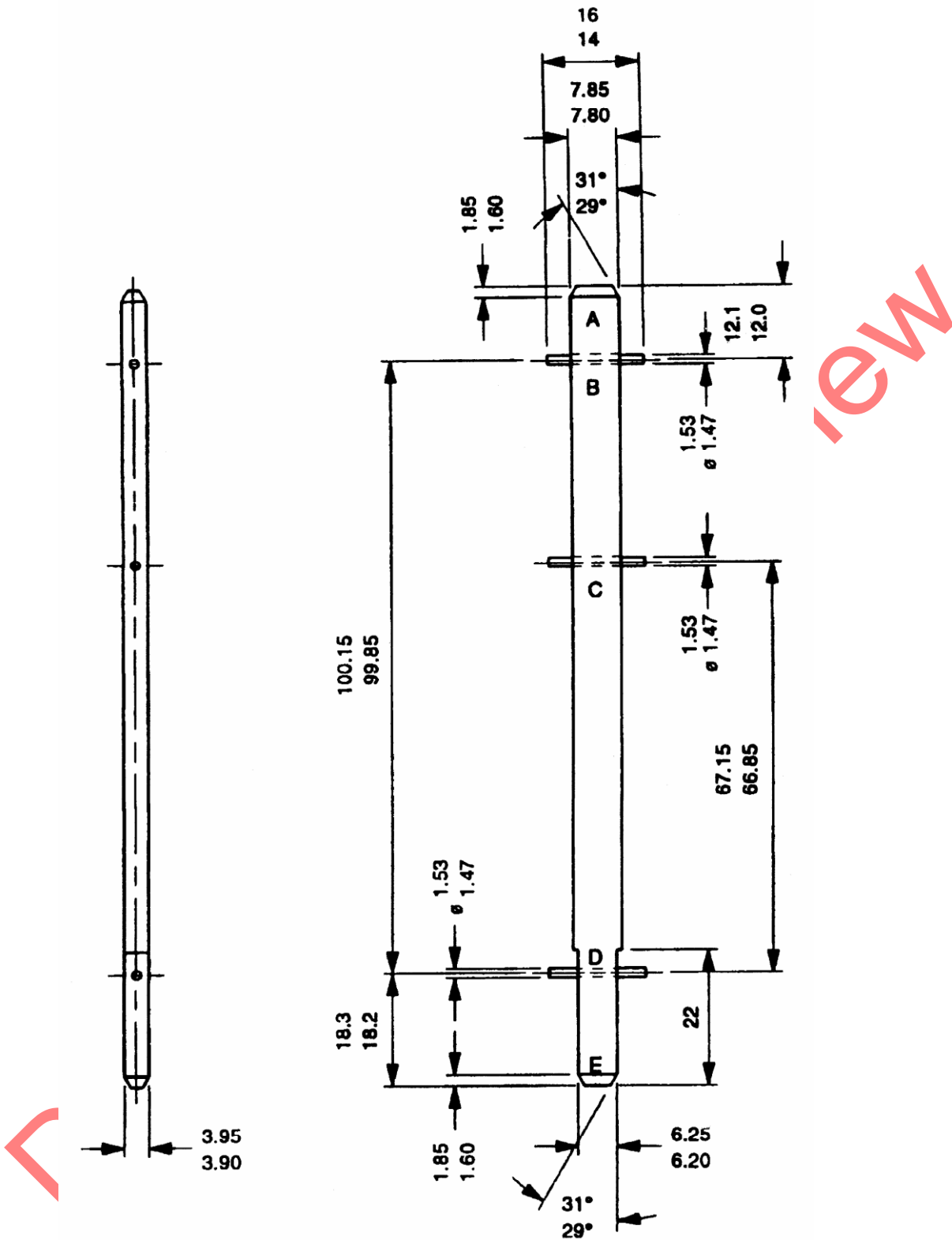
**12.4.1** Compliance shall be checked by the following tests and Clause 16.

- a) The voltage drop between any individual line or neutral socket contact and the corresponding plug pin is measured between the terminal connecting strap at a point immediately adjacent to the socket contact and the corresponding plug pin. The voltage drop shall not exceed 25 mV at  $13 \text{ A} \pm 0.4 \text{ A}$ .
- b) The withdrawal pull of a gauge as shown in Figure 16b) from any individual line or neutral socket contact is checked ensuring that neither the shutter mechanism, nor any insulating material have 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.

**12.5** Line and neutral socket contacts shall withstand the stresses imposed upon them by the use of socket outlet adaptors and the like.

**12.5.1** Compliance shall be checked by the following test.

The socket-outlet is mounted with the engagement face in the vertical plane and with the major axis of the line and neutral pins horizontal. The end E of the gauge shown in Figure 15 is inserted into the line socket aperture as far as the pin D and a mass of  $750 \text{ g} \pm 5 \text{ g}$  is suspended from pin C for  $30_{-0}^{+5} \text{ s}$ .



All linear dimensions are in millimeters  
 NOTE The material is of steel.

Figure 15 — Turning moment gauge

The socket-outlet is rotated through 180° approximately about an axis perpendicular to the engagement face and the load applied to pin C for a further 30<sup>+5</sup> s. The test is repeated with the gauge inserted in the neutral socket aperture. After the test the socket contact shall retain the weight gauge shown in

Figure 16b) for not less than 30 s when the socket-outlet engagement face is held horizontally, with the gauge hanging vertically downwards. After the gauge is inserted, if any insulating material touches the moving parts of the contact, the test shall be repeated with this insulation removed.

**12.6** Earth socket contacts shall withstand the stresses imposed upon them by the attempted incorrect insertion of plugs. Earth socket contacts shall only make contact with the broad surface (8.05/7.80mm) of a corresponding earth pin.

**12.6.1** Compliance shall be checked by the following test.

The socket-outlet is mounted with the engagement face in the vertical plane and with the major axis of the earth pin aperture horizontal. The end A of the gauge shown in Figure 15 is inserted into the earth socket aperture as far as the pin B, and a mass of 750 g ± 5 g is suspended from pin D for 30<sup>+5</sup> s. The socket-outlet is rotated through 180° approximately about an axis perpendicular to the engagement face and the load is applied to pin D for a further 30<sup>+5</sup> s.

After the test the earth socket contact shall retain the weight gauge shown in Figure 16a) for not less than 30s when the socket-outlet engagement Face is held horizontally with the gauge hanging vertically downwards. After the gauge is inserted, if any insulating material touches the moving parts of the contact, the test shall be repeated with this insulation removed.

**12.7** The construction of the socket-outlet shall be such that when a plug is withdrawn from it, the current-carrying socket contacts are automatically screened by shutters. One socket aperture shutter shall not be capable of closing independently of the other aperture shutter. 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 the gauge [see Figure 16b)] inserted into any current-carrying socket aperture shall not open the shutter.

**12.7.1** Compliance shall be checked by inspection, by the test described in 18.1.2, and by the application of the gauge shown in Figure 16b). The gauge and the test pin, shown in Figure 1, are applied to the shutter using a force of 5<sup>+0</sup> N applied perpendicular to the engagement face of the socket-outlet.

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

**12.8** The construction of socket-outlets shall be such as to allow for easy withdrawal of the plug.

**12.8.1** Compliance shall be checked by the following test.

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

The plug is then inserted into the socket-outlet and a force is gradually exerted in a direction parallel to the axis of the pins.

It shall not be possible to reach a pull of 36 N without the plug coming out of the socket-outlet.

NOTE Care should be taken to remove any grease from the plug pins and socket contacts prior to the tests.

**12.9** 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.

The holes for the line and the neutral plug pins in metal plates shall have sufficient insulating material around them to ensure compliance with Clause 8.

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

**12.9.1** Compliance shall be checked by inspection and measurement.

**12.10** 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 not less than 18 mm from the lower edge of the socket-outlet.

NOTE The 9.5 mm and 18 mm dimensions may include a peripheral edge radius of not more than 1 mm.

**12.10.1** Compliance shall be checked by inspection and measurement.

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

The switch in any switched socket-outlet shall disconnect at least the supply to the line socket contact. Double pole switches shall make or break each pole with one movement of the actuator.

The socket-outlet switch shall not be used to switch incorporated electronic components other than an indicator lamp.

**12.11.1** Compliance shall be checked by inspection and by the following test.

Following the test described in Clause 17, 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.

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

**12.11.3** Compliance shall be checked by inspection and by the test of 12.11.4.

**12.11.4** The necessary force  $F$  to switch off shall first be measured and the force should 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. Dismantling of the test sample is permitted where necessary in preparation for this test. The test sample and components shall not be damaged during this preparation.

The actuating member of the switch being in the closed position, fixed and moving contacts of the pole for which the test is estimated to be the most severe, shall be maintained closed by mechanical means.

The actuating member shall be subjected to a test force as defined in Table 3b. 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	3F	150	150
F is the normal operating force in new condition. The test force shall be 3F with the stated minimum and maximum values applied.			
NOTE1 The use of grease and the likes are not considered to be a mechanical means.			
NOTE 2 The specimen may be dismantled where necessary in preparation for this test but adequate care must be taken that the test specimen or components are not damaged during this preparation.			



**12.12** Multiple socket-outlets shall be capable of simultaneous use of all socket-outlets

**12.12.1** Compliance shall be checked by inspection and by fitting gauges as shown in Figure 11 in adjacent socket-outlets of the multiple socket-outlet.

**12.13.** If a fuse link is fitted to a socket-outlet it shall conform with EAS 496 or in the case of individually protected socket-outlets (IPS), EAS 496 or IEC 60127-2 Fuses shall be mounted in suitable contacts between the line terminal or terminations and the corresponding socket contact or contacts or the switch.

The design shall be such that the fuse link cannot be displaced accidentally during use or be left in incorrect contact when the fuse cover or fuse carrier is replaced and secured in position. Except for individually protected socket-outlets (IPS), it shall be possible to remove and replace the fuse link whilst passing current without dismantling the socket-outlet and no live parts shall become accessible during its removal or replacement.

The contact for a fuse link connected to the line terminal, or to a switch, shall be formed in one piece with a fixed part of that terminal or the switch, or connected to them in such a way that efficient electrical connection is made that cannot work loose in normal use. The other contact for the fuse link shall be similarly connected to the corresponding socket contact or contacts.

Overcurrent protective devices other than fuses in individually protected socket-outlets (IPS) shall conform to IEC 60934 and shall be of the non-self-resetting type.

Circuit breakers for equipment shall also be:

- a) trip free (positively trip free); or
- b) the operating means shall not be accessible without the use of a tool; or
- c) The operating means shall not be accessible unless the load is disconnected

**12.13.1** Compliance shall be checked by inspection and by the application of the standard test probe B of EAS 370 and the test pin shown in Figure 1 applied in accordance with 9.1.1. Fuse link clips in socket outlets shall be checked for mechanical strength by the insertion and withdrawal test described in 20.1.2.

Current making and breaking of fuse links shall be checked by the test described in 17.1.4 after which the temperature-rise test described in Clause 16 shall be carried out.

**12.14** Conductive component parts of socket-outlets 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 socket-outlet.

**12.14.1** Compliance shall be checked by inspection and manipulation.

**12.15** For fixed flush mounted socket-outlets, the size of the base or bases shall be such that the clearance for the purpose of wiring between the base or bases and the inside walls of the box or enclosure does not prevent its safe installation in a box or enclosure specified in EAS 203.

There shall be no live metal protruding from or flush with the socket-outlet base. Any exposed live metal part shall be recessed to give the necessary clearance distance from any earthed metal or with the lugs of a

mounting box as described in EAS 203 which could come into contact with the base when the socket-outlet is installed in accordance with the manufacturer's instructions.

**NOTE** If the terminals are arranged for front wiring after fixing the base then the 14 mm clearance need not apply.

For socket-outlets for use in other enclosures, the clearance between the socket-outlet and the appropriate box or enclosure shall provide adequate wiring space according to the method of entry of all the necessary cables.

Where it is intended that the fixed wiring conductors pass through holes in the base of the socket outlet to the terminals, each hole shall be large enough to accept satisfactorily three 2.5 mm<sup>2</sup> cable cores with their insulation, the sheath, if any, having been removed.

**12.15.1** Compliance shall be checked by inspection and measurement.

**12.16** Fixed surface-mounted socket-outlets shall be provided with means to ensure proper seating on a flat surface and with fixing holes which will accept No. 6 wood screws.

Flush or semi-flush mounted socket-outlet plates shall have provision for two M3.5 fixing screws at centres of 60.3 mm ± 0.2 mm on the horizontal or vertical centrelines for boxes intended to accommodate 1-gang socket-outlets, 120.6 mm ± 0.3 mm on the horizontal or vertical centrelines for boxes intended to accommodate 2-gang socket-outlets of 180.9 mm ± 0.4 mm on the horizontal or vertical centrelines for boxes intended to accommodate 3-gang socket-outlets in accordance with EAS 203.

The size and disposition of fixing holes shall be such as to allow satisfactory attachment to boxes having centres manufactured to a ±0.8 mm tolerance.

**12.16.1** Compliance shall be checked by inspection and measurement.

**12.17** Flush socket-outlet plates either of insulating material or metal, or a combination of both, shall be 82.5 mm × 82.5 mm minimum for single socket-outlets and 82.5 mm × 142.5 mm minimum for multiple socket-outlets.

**12.17.1** Compliance shall be checked by inspection and measurement.

**12.18** The base and cover of non-rewirable portable socket-outlets shall be permanently attached to each other, such that the flexible cord cannot be separated without making the portable socket-outlet permanently useless, and the portable socket-outlet cannot be opened by hand or by using a general purpose tool, for example a screwdriver used as such. A portable socket-outlet is considered to be permanently useless when for reassembling the portable socket-outlet parts or materials other than the original have to be used.

The base and cover of rewirable portable socket-outlets shall be firmly secured to each other, such that they cannot be detached from each other without the aid of a tool.

**12.18.1** Compliance shall be checked by inspection

**12.19** Portable socket-outlets shall be so designed and constructed that they cannot be deformed to allow access to live parts or to allow separated metal parts to be brought into contact with each other.

**12.19.1** Compliance shall be checked by inspection and by use of test probe 11 of EAS 370 applied with a force of  $30^{0-2}$  N immediately after the appropriate temperature-rise test described in Clause 16.

**12.20** For non-rewirable portable socket-outlets means shall be provided to prevent loose strands of a conductor connected to current-carrying parts from reducing the minimum insulation requirements between such parts and all accessible external surfaces of the socket-outlet.

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

**12.21** For non-rewirable portable socket-outlets internal connections shall not be made by means of screws.

**12.21.1** Conformity shall be checked by inspection.

**12.22** Socket-outlets having an IP classification higher than IP20 shall be so constructed so that when they are fixed and wired as in normal use there are no free openings in their enclosures according to their classification. NOTE BS 1363-1:2023, Annex G provides dimensions for plug profiles to improve compatibility with BS 1363-2 socket-outlets incorporated in floor boxes and IP rated enclosures.

**12.22.1** Conformity shall be checked by inspection and the tests in accordance with 14.3. Drain holes, small gaps between cables and conduits, or between enclosure and operating means shall be neglected provided they do not compromise the declared IP rating.

**12.23** Surface mounted socket-outlets having an IP classification higher than IP20 shall maintain their IP classification when fitted with conduits or with sheathed cables as in normal use. Fixed surface mounted socket-outlets having degrees of protection IPX4, IPX5 or IPX6 shall have provisions for opening a drain hole. If a socket-outlet is provided with a drain hole, it shall be not less than 5 mm in diameter, or 20 mm<sup>2</sup> in area with a width and a length not less than 3 mm. If the design of the socket-outlet is such that only one mounting position is possible, the drain hole shall be effective in that position. Alternatively, the drain hole shall be effective in at least two positions of the socket-outlet when it is mounted on a vertical wall, one of these with the conductors entering at the top and the other with the conductors entering at the bottom. Lid springs, if any, shall be corrosion resistant.

**12.23.1** Conformity shall be checked by inspection, measurement and by the relevant tests of 13.3. Conformity of lid springs shall be checked by inspection and if necessary by the test of 25.2.1. NOTE 1 The IP classification may be achieved by means of a lid when the plug is not in position. NOTE 2 This requirement does not imply that the lid, if any, or the entry openings for the pins need to be closed when the plug is not in position, provided that socket-outlets pass the relevant test for the verification of the ingress of water. A drain hole in the back of the enclosure shall have a minimum clearance of 5 mm from the mounting surface or provides a drainage channel of at least the size specified in 13.23.

**13.24** Portable socket-outlets having an IP classification higher than IP20 shall be adequately enclosed when fitted with a flexible cable as for normal use and without a plug in engagement. Lid springs, if any, shall be corrosion resistant.

**12.24.1** Conformity shall be checked by inspection, measurement and by the relevant tests of 13.3.

Conformity of lid springs shall be checked by inspection and if necessary by the test of 25.2.1. NOTE 1 The IP classification may be achieved by means of a lid when the plug is not in position. NOTE 2 This requirement does not imply that the lid, if any, or the entry openings for the pins need to be closed when the plug is not in position, provided that the socket-outlet passes the relevant test for the verification of the ingress of water.

**12.25** Electronic components incorporated in socket-outlets shall conform to Annex H.

**12.25.1** Conformity shall be checked by inspection of component conformity evidence and the tests of Annex H.

**12.26** Overcurrent protective devices other than fuses in socket-outlets for use in furniture and educational furniture shall conform to IEC 60934.

**12.26.1** Conformity shall be checked by inspection of component conformity evidence.

### **13 Resistance to ageing, resistance to humidity and protection provided by enclosures**

**13.1** Resistance to ageing Socket-outlets shall be resistant to ageing

**13.1.1** Compliance is checked by the following test.

Socket-outlets are subjected to a test in a heating cabinet with an atmosphere having the composition and U pressure of the ambient air and ventilated by natural circulation.

The temperature in the cabinet is maintained at  $70\text{ °C} \pm 5\text{ °C}$ . 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.

### **13.2 Resistance to humidity**

Socket-outlets shall be proof against humid conditions which may occur in normal use.

**13.2.1** Compliance shall be checked by the following humidity treatment followed within 20 min by the measurement of the insulation resistance and by the electric strength test specified in Clause 14.

Rewireable portable socket-outlets are fitted with 1000 mm  $\pm$  50 mm of 3-core 1.25 mm<sup>2</sup> PVC cord as specified in IEC 60227-5. Non-rewirable portable socket-outlets are tested with 1000 mm  $\pm$  50 mm of the flexible cord with which they are supplied. Fixed socket-outlets are tested as delivered.

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,  $T$  (in °C), between 20 °C and 30 °C, is chosen as a reference temperature. The sample is brought to a temperature of between  $T$  and  $T + 4$  °C and is 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 maintained within  $\pm 2$  °C of the chosen value  $T$ .

The sample is kept in the cabinet for 48 h.

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

NOTE 2 A relative humidity of between 85 % and 96 % can be obtained by placing in the humidity cabinet a saturated solution of potassium nitrate (KNO<sub>3</sub>) or sodium sulfate (Na<sub>2</sub>SO<sub>4</sub>) 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 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.

### **13.3 Protection provided by enclosures**

#### **13.3.1 General**

The enclosure of the socket-outlet shall provide protection against access to hazardous parts, against harmful effect due to ingress of solid foreign objects and against effects due to ingress of water in accordance with the IP classification of the socket.

Conformity shall be checked by the tests of 13.3.2 and 13.3.3.

#### **13.3.2 Protection against access to hazardous parts and against harmful effects due to ingress of solid foreign objects**

##### **13.3.2.1 General**

For socket-outlets having a classification of IP5X, Category 2 of IEC 60529:1992+A2:2013 applies. Conformity shall be checked by the appropriate tests of IEC 60529:1992+A2:2013 under the conditions specified below.

Socket-outlets shall be mounted as in normal use in accordance with the manufacturer's instructions and for rewirable socket-outlets with conductors of the smallest cross-sectional area specified in Clause 12.

Socket-outlets having an IP classification with a plug inserted in the socket-outlet shall be tested according to the following arrangements.

a) One sample shall be tested with a rewirable plug fitted with 2-core 0.5 mm<sup>2</sup> flexible cable as given in IEC 50525-2-11:2011.

b) One sample shall be tested with a rewirable plug fitted with 3-core 1.5 mm<sup>2</sup> flexible cable as given in IEC 50525-2-21:2011.

c) One sample shall be tested without a plug fitted.

Socket-outlets having an IP classification with no plug inserted shall be tested for this arrangement.

Mounting screws for boxes or enclosures and screws for fixing socket-outlets to boxes or enclosures shall be tightened with a torque according to the manufacturer's instructions.

In the absence of such instructions, the screws shall be tightened with a torque equal to two thirds of the values given in Table 6.

Socket-outlets with screwed glands or membranes shall be fitted with circular cables having a code H07RN F and a cross-sectional area of 1.5 mm<sup>2</sup> as given in IEC 50525-221:2011. Glands shall be tightened with a torque according to the manufacturer's instructions. In the absence of such instructions, glands shall be tightened with a torque equal to two thirds of the values given in Table 8.

Glands shall not be filled with sealing compound or the like.

Parts which are removeable without the aid of a tool shall be removed.

**Table 8 — Tightening torque values for cable glands**

Gland size mm	Metal glands Nm	Glands of insulating material Nm
16	7.5	5.0
20	7.5	5.0
25	10.0	7.5

*NOTE The recording of a measured value given in 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  $\pm 10\%$*

### 13.3.2.2 Protection against access to hazardous parts

The appropriate test according to IEC 60529:1992+A2:2013 shall be performed.

### 13.3.2.3 Protection against harmful effects due to ingress of solid foreign bodies

The appropriate test according to IEC 60529:1992+A2:2013 shall be performed.

For socket-outlets classified as IP5X, the enclosure shall be deemed to be category 2.

Test probes shall not be applied to drain holes.

### 13.3.3 Protection against harmful effects Due to ingress of water

Conformity shall be checked by the appropriate tests of IEC 60529:1992+A2:2013 under the conditions specified below.

Socket-outlets shall be mounted as in normal use in accordance with the manufacturer's instructions.

Flush mounted socket-outlets shall be fixed in a test wall representing the intended use of the socket-outlet using an appropriate box in accordance with the manufacturer's instructions.

Where the manufacturer's instructions specify particular types of walls, these walls as well as any special installation requirements for the socket-outlet shall be described in sufficient detail.

Surface mounted socket-outlets shall be mounted as in normal use on a vertical surface and fitted with circular cables having a code H07RN F and a cross-sectional area of 1.5 mm<sup>2</sup> as given in IEC 50525-2-21:2011.

Socket-outlets having an IP classification with a plug inserted in the socket-outlet shall be tested according to the following arrangements.

- a) One sample shall be tested with a rewirable plug fitted with 2-core 0.5 mm<sup>2</sup> flexible cable as given in IEC 50525-2-11:2011.
- b) One sample shall be tested with a rewirable plug fitted with 3-core 1.5 mm<sup>2</sup> flexible cable as given in IEC 50525-2-21:2011.
- c) One sample shall be tested without a plug fitted.

Socket-outlets having an IP classification with no plug inserted shall be tested for this arrangement.

Mounting screws for boxes or enclosures and screws for fixing socket-outlets to boxes or enclosures shall be tightened with a torque according to the manufacturer's instructions. In the absence of such instructions, the screws shall be tightened with a torque equal to two thirds of the values given in Table 6.

Socket-outlets with screwed glands or membranes are fitted with circular cables having a code H07RN F and a cross-sectional area of 1.5 mm<sup>2</sup> as given in BS EN 50525-2-21:2011. Glands shall be tightened with a torque according to the manufacturer's instructions. In the absence of such instructions glands shall be tightened with a torque equal to two thirds of the values given in Table 8.

Glands shall not be filled with sealing compound or the like.

Parts which are removeable without the aid of a tool shall be removed.

If the enclosure of a socket-outlet that has an IP classification less than IPX5 is designed with drain holes, one drain hole is opened as in normal use and in the lowest position. If an enclosure of a socket-outlet that has an IP classification equal to or greater than IPX5 is designed with drain holes, they shall not be opened.

Care shall be taken not to disturb, e.g. knock or shake, the assembly to such an extent as to affect test results.

Within 5 min of completion of the test, the samples shall withstand an electric strength test as specified in 14.1.3.

Inspection shall show that if any water has entered, it shall not:

- 1) be sufficient to interfere with the correct operation of the equipment or impair safety;
- 2) deposit on parts of insulating material where it could lead to tracking along the creepage distances;
- 3) reach live parts not designed to operate when wet; or

4) accumulate near the cable end or enter the cable if any.

If the socket-outlet enclosure has drain holes which have been opened, it shall be proved by inspection that any water which enters does not accumulate and that it drains away without doing any harm to the complete assembly.

## 14 Insulation resistance and electric strength

14.1 The insulation resistance and electric strength of socket-outlets shall be adequate.

14.1.1 Compliance shall be checked by the tests described in 14.1.2 and 14.1.3.

14.1.2 The insulation resistance is measured using a d.c. voltage of  $500 \pm 250$  V the measurement being made for  $60 \pm 5$  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 surf
  - 2) the earthing terminal/terminations;
  - 3) any metal part of a cord anchorage;
- c) each switched pole terminal of a switched socket and corresponding socket-outlet contact, with the switch contacts open.

The insulation resistance shall be not less than the following:

- i)  $5 \text{ M}\Omega$  between parts of opposite polarity;
- ii)  $5 \text{ M}\Omega$  between parts of opposite polarity connected together, and other parts insulated therefrom, including earthed metal;
- iii)  $2 \text{ M}\Omega$  across switch contacts with the switch open (where applicable).

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

Where terminals/terminations are not directly accessible, e.g. in non-rewirable portable socket-outlets, these tests shall be made using accessible parts, e.g. socket-outlets contacts, known to be connected to the terminations.



**14.1.3** A 50 Hz voltage of substantially sinusoidal waveform is applied as described in 14.1.2. Initially, not more than 1000 V is applied, the voltage then being raised to  $2000\text{ V} \pm 60\text{ V}$ . The high voltage source used shall be such that when the output is adjusted to  $2000\text{ V} \pm 60\text{ V}$  for  $60_{\pm 5}\text{ s}$  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.

**14.2** Non-rewirable portable socket-outlet 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. This test shall be carried out at  $6000\text{ V} \pm 100\text{ V}$  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.

## **15 Temperature rise**

**15.1** Socket-outlets and their surroundings shall not attain excessive temperatures in normal use.

**15.1.1** Compliance shall be checked by the tests described in 15.1.2, and 15.1.3 for fixed socket-outlets and portable socket-outlets respectively. For the purpose of this test individually protected socket-outlets (IPS) are tested as portable socket-outlets.

The tests shall be carried out at 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 3a.

During the tests temperature rises are measured at the terminals or terminations and where overheating might result in a hazard and the values measured shall not exceed the values given in Table 9. 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.

**NOTE** 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 socket-outlet and that no electrical connections are bridged by solder.

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

**Table 9 — Permitted temperature rises**

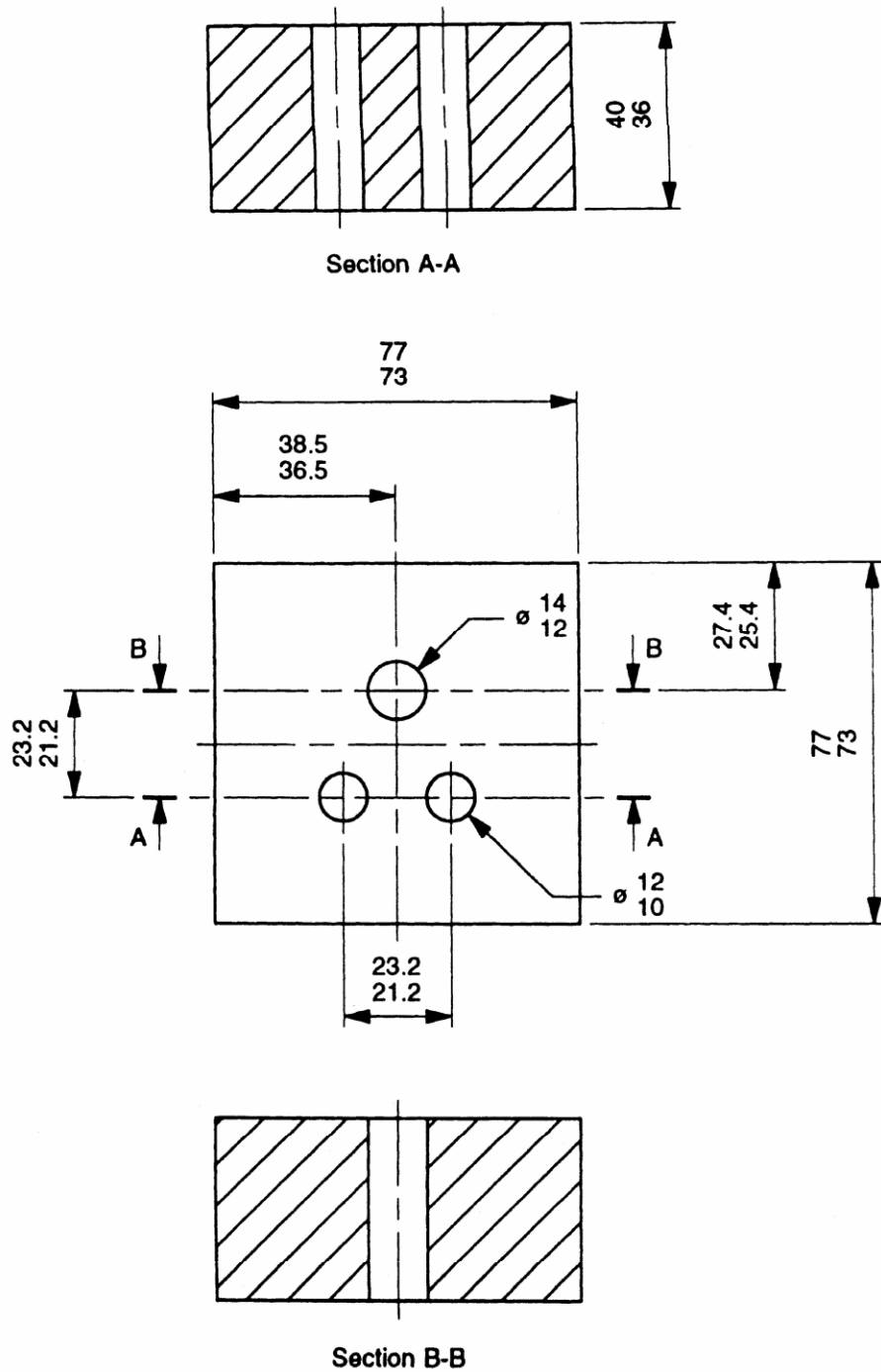
<b>Measurement point</b>	<b>Temperature rise K</b>
Terminals or terminations	52
Accessible external surface	52
NOTE 1 The recording of a measured value up to and including the specified maximum permissible limit for temperature rise is considered to comply with the requirements of the standard on condition that the uncertainty of measurement at not less than 95 % confidence level does not exceed $\pm 2$ °C. NOTE 2 The temperature rise values and test arrangements are for socket-outlets connected to conductors intended to operate at a temperature not exceeding 70 °C	

**15.1.2** Surface-mounted fixed socket-outlets are mounted as in use with their accompanying mounting block or backplate fixed to a vertical plywood board having a nominal thickness of 24 mm and having a surface extending at least 150 mm in each direction beyond the extremity of the socketoutlet.

Flush-mounted socket-outlets having one or two sets of socket contacts and designed for use with flush-mounted socket-outlet boxes as shown in either Figure 1b) or Figure 2b) of EAS 203 are mounted on a test fixture designed to simulate normal conditions of use, comprising such a metal box having a nominal internal depth of 35 mm, which is fixed into a block of wood, so that the front edges of the metal box are between 2.5 mm to 6 mm below the front surface of the block.

The size of the block shall be such that there is a minimum of 25 mm of wood surrounding the box on all four sides and the back. The socket outlet is then mounted by means of its fixing screws so that the rear of the plate is flush with the surface of the block.

Draft for public review



All dimensions are in millimeters

NOTE Holes are not used for testing sockets

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

Other types of fixed socket-outlets are mounted according to the manufacturer's instructions or, in the absence of such instructions, in the position of normal use considered to give the most onerous conditions. The line, neutral and earth terminals of a single socket-outlet are connected to an incoming and outgoing 2.5 mm<sup>2</sup> 2-core and earth PVC insulated and sheathed cable as given in IEC 60227. For socket-outlets that have

an IP classification higher than IPX0, the test shall be carried out with any lids closed if the design permits this when in use.

A twin unfused socket-outlet is connected as described above.

A multiple unfused socket-outlet having more than two sets of socket contacts is connected to an incoming 4 mm<sup>2</sup> 2-core and earth PVC insulated and sheathed cable as given in IEC 60227. There shall be no outgoing cable.

A fused socket-outlet having more than one set of socket contacts is connected to an incoming and outgoing 2.5 mm<sup>2</sup> 2-core and earth PVC insulated and sheathed cable as given in IEC 60227.

Panel-mounted socket-outlets shall be fitted with cable cords as specified by the manufacturer.

The incoming cable shall enter on the horizontal axis on one side of the enclosure and, where specified, the outgoing cable shall leave on the horizontal axis on the opposite side of the enclosure. Where possible, the cables shall enter and leave the enclosure through the standard knockouts provided and these, if required, shall be fitted with suitable grommets. The points of entry and exit shall be sealed to prevent circulation of air.

For surface-mounted socket-outlets the length of each of the cables within the enclosure shall be 75 mm ± 5 mm and for flush socket-outlets the length of each cable within the box shall be 150 mm ± 5 mm. In each case the outer sheath shall be removed from the cores to within 20 mm of the point of entry of the cable to the box or enclosure.

The fuse link, if any, incorporated in a multiple fused socket-outlet is replaced by a calibrated link, constructed and calibrated in accordance with Annex A.

Socket-outlets under test shall be subjected to electrical loading as given in Table 5. Where a plug is specified it shall be a special test plug, constructed and calibrated whilst carrying a load in accordance with Annex B. During the test the resistor of the test plug shall be connected to a d.c. source of supply equivalent to the "calibration voltage".

USB battery charging outlets shall be loaded with their rated currents (+10 %) for the duration of this test. In the case of socket-outlets 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 socket-outlets 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.

For socket-outlets which incorporate circuit breaker overcurrent protection having a conventional non-tripping rating less than the test current given in Table 9, the test shall be conducted as follows:

A test current equal to the conventional non-tripping current (±0.2 A) of the circuit breaker shall be applied for a period equal to the conventional tripping time of the circuit breaker. The circuit breaker shall not trip during this part of the test. The test current shall then be increased to the conventional tripping current of the circuit breaker or the current specified in Table 10, whichever is the lower.

If the test current is the conventional tripping current of the circuit breaker, it shall be maintained until the circuit breaker operates, which shall be within the conventional tripping time of the circuit breaker.

If the current is as specified in Table 9, it shall be maintained until stability is reached (i.e. less than 1 K rise per hour) or the circuit breaker operates.

**Table 10— Loading of socket-outlets for temperature-rise test**

<b>Number of outlets</b>	<b>Plugs with connected loads ±0.4 A</b>	<b>Balance of load ±0.4</b>	<b>Total load on supply cable (nominal)</b>
		<b>A</b>	<b>A</b>
1	1 x 14A	6	20
2	1 x 14A + 1 x 6A	—	20
>1 (fused)	1 x 14A	6	20
>2 (unfused)	2 x 14 A	—	28

NOTE The tolerance values for current take account of an uncertainty of measurement of not greater than ±1.5 % at a confidence level of not less than 95 %.

In the case of socket-outlets having more than one outlet, the disposition of the plugs shall be so arranged as to give the most onerous test conditions with regard to the position of terminals and fuses.

In the case of fused socket-outlets in which the number of outlets is greater than two, the test is then repeated, the total test current being divided equally between each of the test plugs, one inserted into each set of socket contacts in the socket-outlet.

The socket-outlet is subjected to the loading given in Table 5 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.

**15.1.3** Rewireable portable socket-outlets are tested with 1 000 mm ± 50 mm of 1.25 mm<sup>2</sup> 3-core PVC flexible cord as given in IEC 60227-5 (clause 6), non-rewireable portable socket-outlets are tested with 1000 mm ± 50 mm of the flexible cord supplied with them.

The fuse link, if any, incorporated in the portable socket-outlet is replaced by a calibrated link, constructed and calibrated in accordance with Annex A.

The IEC 60127-2 fuse link, if any, incorporated in the individually protected socket-outlet (IPS) shall be replaced by link of negligible impedance, the dimensions of which shall be as specified in IEC 60127-2.

The portable socket-outlet is placed in its intended position of normal use on a horizontal plywood board having a nominal thickness of 29 mm and having a surface extending at least 150 mm in each direction beyond the extremities of the socket-outlet.

A test current appropriate to the flexible cord fitted as given in Table 2 is passed through the portable socket-outlet by means of a special test plug constructed and calibrated in accordance with Annex B. In the case of a multiple portable socket-outlet the plug shall be placed in the set of socket contacts considered to give the most onerous conditions.

The socket-outlet is operated as described 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.

In the case of a multiple portable socket-outlet, the test is then repeated, the total test current being divided equally between each of the test plugs, one inserted into each set of socket contacts in the portable socket-outlet.

## 16 Breaking capacity of socket-outlets

**16.1** The breaking capacity of socket contacts, switches, and fuse contacts incorporated in socket outlets, shall be adequate.

**16.1.1** Compliance shall be checked by the tests described in 16.1.2, 16.1.3 and 16.1.4 as applicable, which shall be completed with the socket-outlets connected and mounted as in normal use.

**16.1.2** The socket contacts shall make and break a current of 1.25 times rated current  $\pm 0.4$  A [i.e.  $(1.25 \times 13) \pm 0.4$  A] in a substantially non-inductive a.c. circuit at  $250 \text{ V} \pm 5 \text{ V}$ , 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.

The fuse link of individually protected socket-outlets shall also be replaced by a link of negligible impedance. In the case of CBE, the overcurrent protection device shall be short circuited.

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

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

**16.1.3** The switch shall make and break a current of 1.25 times rated current  $\pm 0.4$  A [i.e.  $(1.25 \times 13) \pm 0.4$  A] in a substantially non-inductive a.c. circuit at  $275 \text{ V} \pm 5 \text{ V}$ , 10 times in succession at intervals of approximately 30 s.

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

The fuse link of individually protected socket-outlets shall also be replaced by a link of negligible impedance. In the case of CBE, the overcurrent protection device shall be short circuited.

**16.1.4** The fuse contacts shall make and break a current by insertion and removal of a fuse in a substantially non-inductive a.c. circuit at  $275 \text{ V} \pm 5 \text{ V}$ , 10 times in succession at intervals of approximately 30 s, the values of the current being 1.25 times rated current  $\pm 0.4$  A [i.e.  $(1.25 \times 13) \pm 0.4$  A] for fuses in single socket-outlets and 1.6 times rated current  $\pm 0.4$  A for fuses in multiple socket-outlets. Standard 13 A fuse links in accordance with EAS 496 are used for this test, and may be replaced if necessary during the test. For the test, all metal parts not in contact with line contacts shall be connected to the earth pole of the test circuit.

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

**16.2** For socket-outlets intended for electric vehicle charging the tests of 16.1.2 and 16.1.3 are performed at a power factor of  $0.6^{0-0.05}$  lagging.

**16.2.1** Conformity shall be checked by the tests described in 16.1.2 and 16.1.3 as applicable, with the socket-outlets connected and mounted as in normal use but at a power factor of 0.6 lagging.

## 17 Normal operation of socket-outlets

**17.1** Socket-outlets shall withstand without excessive wear or other harmful effects, the electrical and mechanical stresses occurring in use.

**17.1.1** Compliance shall be checked by the tests described in 17.1.2 and 17.1.3.

**17.1.2** The combination of plugs having solid pins and the socket-outlet under test shall make and break their rated current  $\pm 0.4$  A at  $250\text{ V} \pm 10\text{ V}$  ac 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 six withdrawals per minute, the speed of travel of the plug being approximately 150 mm/s. The periods during which the plug is inserted and withdrawn are approximately equal. The plug pins are renewed after each 5000 insertions and withdrawals. For the purpose of this test no lubrication is applied to the plug or socket under test with the engagement face substantially vertical.

After the test the shutter shall be operating satisfactorily, the socket contacts safely shielded and the socket-outlet shall be in accordance with Clause 9.1, Clause 15, Clause 14, Clause 12.4.1a), Clause 10.2, Clause 12.6, Clause 12.7 and Clause 12.8 The permitted value of voltage drop described in 12.4.1a) is increased to not greater than 12.4.1a) 40 mV.

**17.1.3** In switched socket-outlets the voltage drop across each switched pole, measured at points immediately adjacent to the switch, shall not exceed 60 mV at rated current.

The switch shall then make and break a current of  $13\text{ A} \pm 0.4\text{ A}$  at  $250\text{ V} \pm 10\text{ V}$  15000 times (30000 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 the rated current of  $13\text{ A} \pm 0.4\text{ A}$  at  $250\text{ V} \pm 10\text{ V}$  and the voltage drop across each switched pole, measured as above, shall not exceed 75 mV.

The switch shall also be in accordance with Clause 14, the test voltages of 14.1.3 being reduced by 25%.

Switches conforming to IEC 61058-1 or IEC 60669-1 incorporated in socket-outlets do not need to be tested for normal operation provided that they have a rated voltage of at least 250 V a.c. and a rated current of at least 13 A. Switches conforming to IEC 61058-1:2018 shall have at least the following classifications IEC 61058-1:2018, Clause 7):

- a) 7.2.1: for a substantially resistive load with a power factor of not less than 0.9;

- b) 7.4: min 25 000 operating cycles;
- c) 7.11: 850 °C glow wire;
- d) 7.12.6: 4 000 V impulse withstand voltage;
- e) 7.13.3: Overvoltage Category III;
- f) 7.14.3: full disconnection;
- g) 7.18.1: continuous duty.

**17.2** For socket-outlets intended for electric vehicle charging the test of 17.1.2 and 17.1.3 shall be performed at a power factor of  $0.6^{0-0.05}$  lagging and the number of cycles is 5000.

**17.2.1** Conformity shall be checked by the tests described in 17.1.2 and 17.1.3 as applicable with the power factor and number of cycles as stated in 17.2. After the test of 17.1.2 and 17.1.3 the socket-outlet shall be tested in accordance with Clause 15 only.

## 18 Connection of flexible cords and cord anchorage

**18.1** Provision shall be made for the entry and effective clamping without bending of 3-core flexible cords for rewirable portable socket-outlets, as given in Table 10, Table 11, Table 12, Table 13, Table 26 and IEC 60227-5 (clause 6), having nominal conductor cross-sectional areas not exceeding  $1.5 \text{ mm}^2$ . For non-rewirable portable socket-outlets provision shall be made for the entry and adequate retention of the 3-core flexible cord with which the socket-outlet is supplied.

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 or the like shall not be used.

**18.1.1** Compliance shall be checked by inspection and by the following tests.

- a) Rewireable portable socket-outlets are fitted with a 3-core flexible cord having a nominal cross-sectional area of  $0.5 \text{ mm}^2$  as given in IEC 60227-5 (clause 6). The conductors are introduced into terminals and the terminal screws tightened to one third of the torque value listed in table 3a to prevent 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 3a. 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 portable socket outlet 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  $60 \text{ s}^{0+5}$  to the appropriate torque shown in Table 2, as near as practicable to the cord entry. These tests



are then repeated but with the portable socket-outlet fitted with a 3 core flexible cord having a nominal conductor cross-sectional area of 1.5 mm<sup>2</sup> as given in IEC 60227-5 (clause 6).

- b) For non-rewirable portable socket-outlets the test is carried out with the cord with which it is supplied, using the appropriate load and torque as 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 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 pull at a distance of approximately 20 mm from the anchorage 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 subject to the pull.

**18.2** Cord anchorages in rewirable portable socket-outlets shall anchor the cord securely to the socket-outlet. The design shall ensure the following:

- a) the cord anchorage 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 socket outlet 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 socket-outlet;
- e) clamping the cord does not require the use of a special purpose tool;
- f) the cover shall be correctly fitted without damage when the portable socket-outlet is wired with the largest specified flexible cord and all screws are tightened to the torque specified in Table 3a.

**18.2.1** Compliance shall be checked by inspection and test.

**18.3** Screws which are used when clamping the flexible cord shall not serve to fix any other components unless the portable socket-outlet 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.

**18.3.1** Compliance shall be checked by inspection.

**18.4** Non-rewirable portable socket-outlets shall be fitted with 3-core flexible cords complying with IEC 60227-5. Connections shall be as given in Table 11.

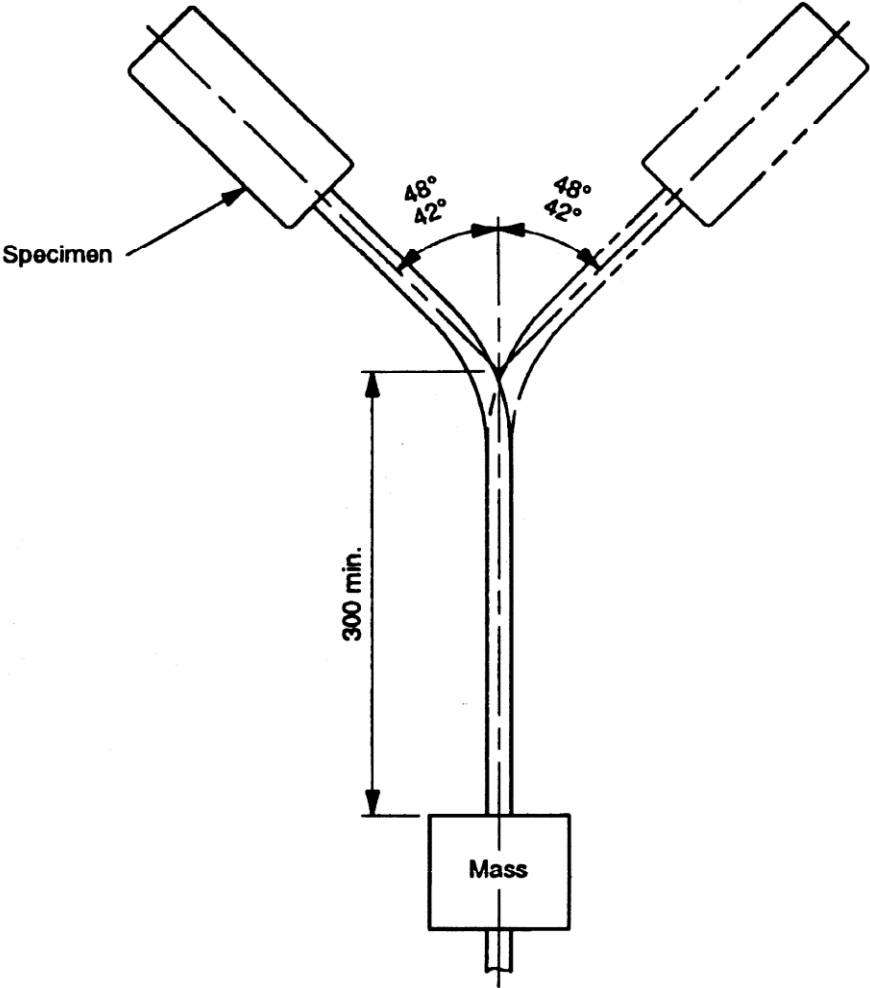
18.4.1 Compliance shall be checked by inspection and continuity test.

Table 11 — Connection of flexible cords

Termination	Conductor insulation colour: 3-core
Earthing	Green/yellow
Live	Brown
Neutral	Blue

18.5 Non-rewirable portable socket-outlets shall be so designed that the flexible cord is not subjected to excessive bending where it enters the portable socket-outlet.

18.5.1 Compliance shall be checked by the following test using an apparatus similar to that shown in Figure 18. The portable socket-outlet 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.



All linear dimensions are in millimetres

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

### Figure 18 — Apparatus for flexing test

The flexible cord is loaded with a weight as given in Table 2.

The distance between the point of entry to the portable socket-outlet 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  $250\text{ V} \pm 10\text{ V}$  a.c. The earthing conductor shall be connected at one end to the neutral conductor.

The oscillating member is moved backwards and forwards through an angle of  $45^\circ \pm 3^\circ$  on either side of the vertical, the number of flexings being 10000 at a rate of  $60^{0-10}$  per minute. After 5 000 flexings, socket-outlets are turned through  $90^\circ \pm 5^\circ$  about the cord entry centreline.

NOTE A flexing is one movement through  $90^\circ$ , either backwards or forwards.

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

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

**18.6** the flexible cord entry to rewirable portable socket-outlets shall be so shaped as to prevent damage to the cord 18.6.1 Compliance shall be checked by inspection.

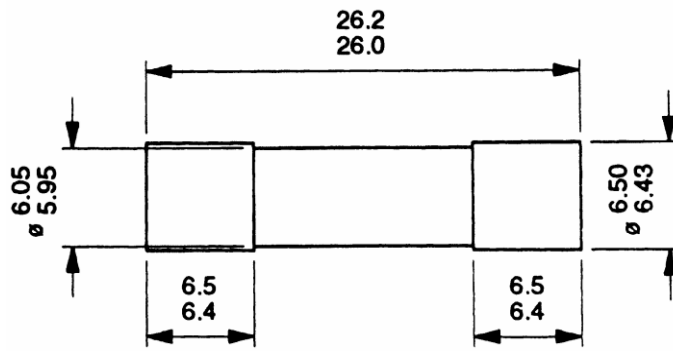
## 19 Mechanical strength

**19.1** Socket-outlets shall have adequate mechanical strength and be so constructed as to withstand such handling as may be expected in normal use.

**19.1.1** Compliance shall be checked by the tests described in 19.1.2, 19.1.3, 19.1.4 and 19.1.5 as appropriate.

Any decorative cover, cover plates or parts thereof, not providing protection against electric shock, shall be removed prior to testing.

**19.1.2** A solid link of stainless steel as shown in Figure 19 is inserted and withdrawn from the fuse clips of a fused socket-outlet 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.

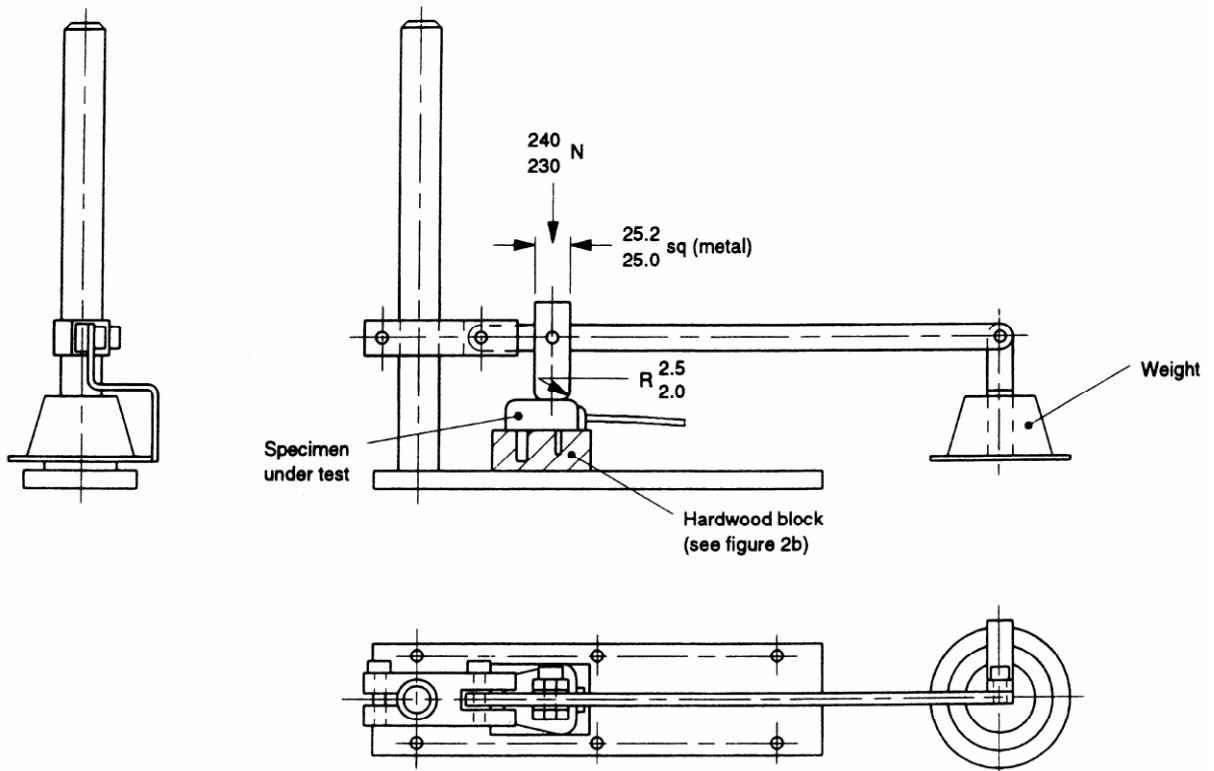


All dimensions are in millimetres

NOTE Finish: polished and sharp corners removed.

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

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



All dimensions are in millimetres

end.

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

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



## Figure 21 — Pendulum impact test

The socket-outlet is mounted on a sheet of plywood approximately 8 mm thick and 175 mm square, secured at its top and bottom edges to a mounting support.

The mounting support [see Figure 21c)], having a mass of  $10 \text{ kg} \pm 1 \text{ kg}$ , 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 pendulum pivot;
- 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 socket-outlet is mounted on the plywood as in normal use.

Flush socket-outlets and their boxes (if any) are placed in a block of hardwood which is itself fixed to the sheet of plywood.

The wood used shall have the direction of the wood fibres perpendicular to the direction of impact.

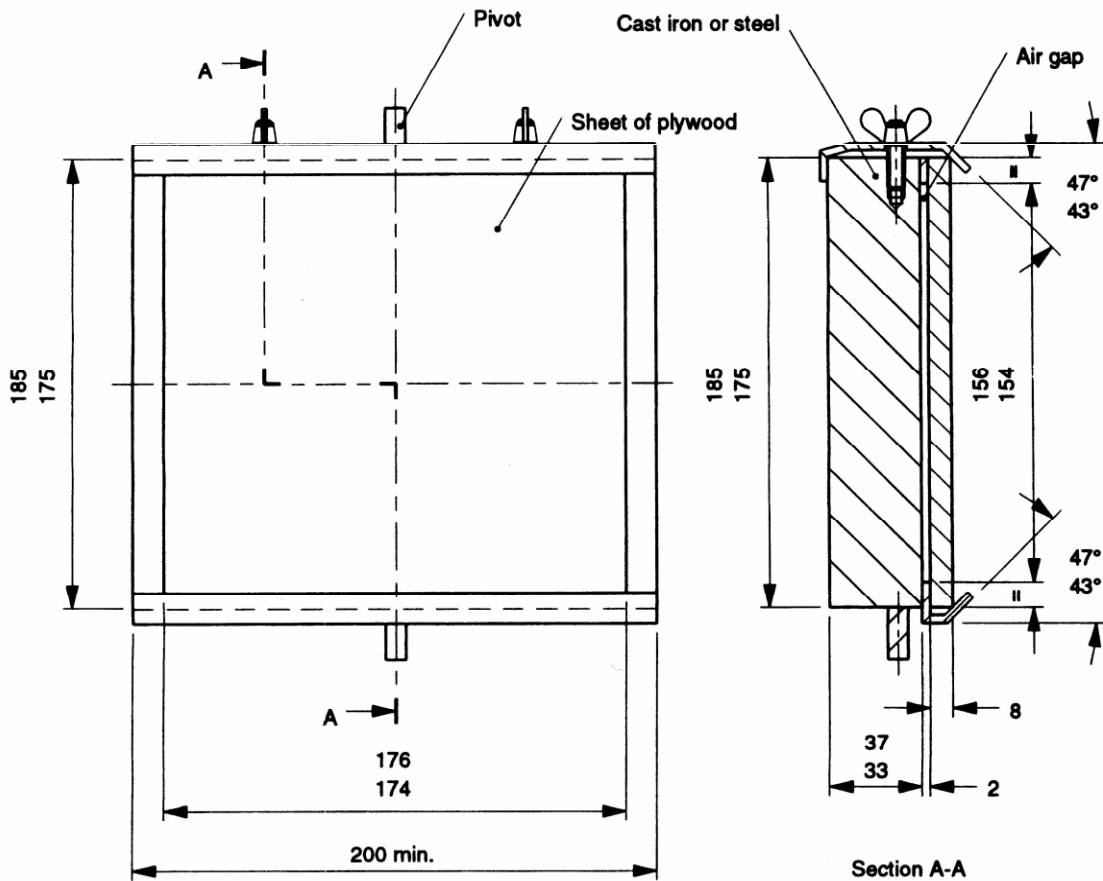
To simulate the condition of normal use the rear of the plate is flush with the surface of the block. The front edge of the box is between 2.5 mm and 5 mm behind the face of the block.

The socket-outlet is placed 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 socket-outlet. Any lens incorporated in a socket-outlet receives one blow of the hammer at a point approximately at its centre. One of the 10 blows of the hammer is applied to the actuating member, if any.

After the test the socket-outlet shall still be in accordance with Clause 8, Clause 9 and Clause 14. 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.



c) Constructional details of mounting support for test specimens

All linear dimensions are in millimetres

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

**Figure 21 — Pendulum impact test** (continued)

19.1.4 Rewireable single and twin portable socket-outlets arc fitted with 3-core PVC 1.25 mm<sup>2</sup> flexible cord as given in IEC 60227-5 (clause 6), the terminals and cover screws being tightened with the torque in Table 3a. Non-rewirable single and twin portable socket-outlets are tested as delivered.

The flexible cords attached to socket-outlets arc cut to a length of 150 mm ± 5 mm measured from the nearest edge of the socket-outlet, precoilcd flexible cords being extended before measurement.

They 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 socket-outlet is tested at a time. The number of drops is 5000.

After the test the portable socket-outlet shall show no external damage which might affect the safety and no components shall have become detached.

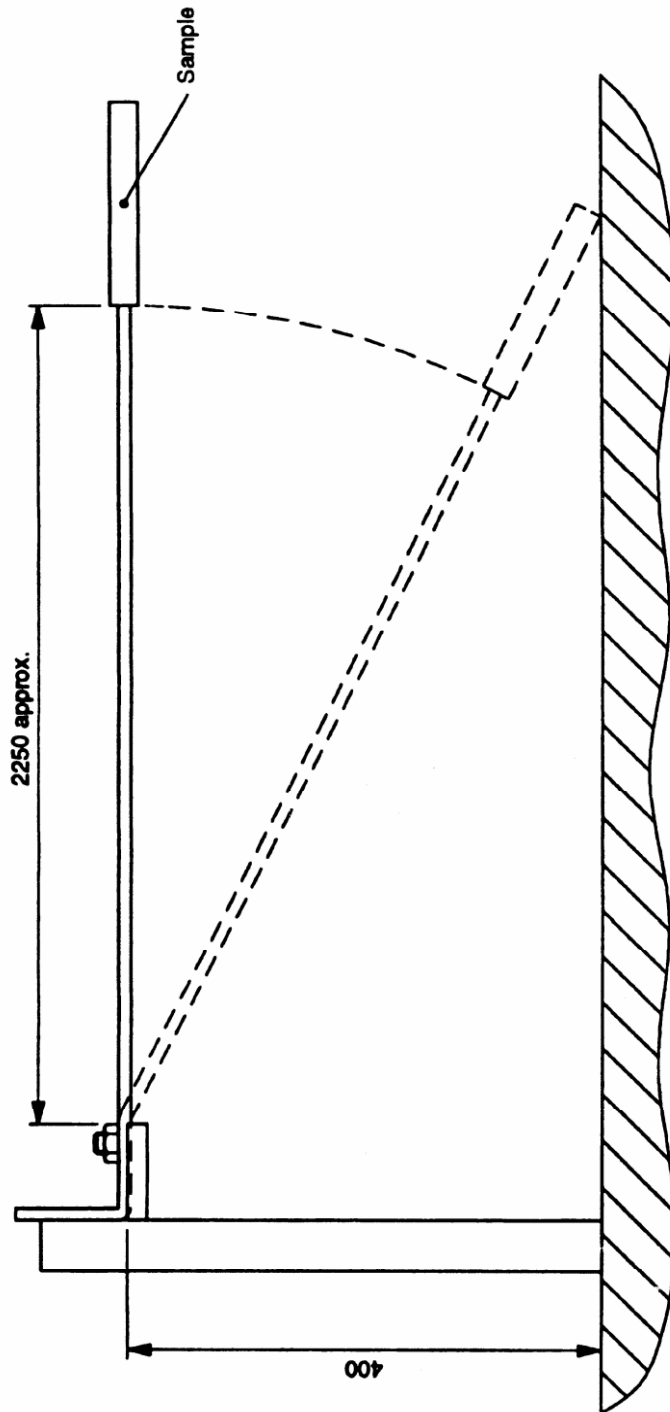
Compliance shall be checked by inspection and the test described in 12.4b) and Clause 14 and Clause 15.

Small chips and dents which do not adversely affect the protection against electric shock shall be ignored. For the repeat test in accordance with Clause 15, the attached flexible cord is retained without disturbing the terminal connections, but the conductor insulation and sheath are removed only as far as is necessary for the attachment of a 1000 mm  $\pm$  50 mm length of flexible cord of the same type as that already attached to the socket-outlet, the connection being made by means of a connector having a current rating appropriate to that of the flexible cord.

**19.1.5** Rewireable portable socket-outlets with more than two outlets are fitted with 3-core 1.25 mm<sup>2</sup> flexible cord as given in IEC 60227-5 (clause 6).

Non-rewirable accessories are tested as delivered.

The free end of the flexible cord which is approximately 2250 mm long is fixed to a wall at a height of 400<sup>0</sup> <sub>-10</sub> mm above the floor, as shown in Figure 22. The specimen is held so that the cable is approximately horizontal and then it is allowed to fall on to a concrete floor eight times, the flexible cord being rotated through approximately 45° at its fixing each time.



Review

Draw

All dimensions are in millimetres

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

**Figure 22 — Arrangements for mechanical strength test for portable socket-outlets**

After the test, the socket-outlet shall show no external damage which might affect the safety, no components shall have become detached and the portable socket-outlet shall satisfy the tests described in 12.4b) and Clause 14 and Clause 15. For the repeat test in accordance with Clause 15 the attached flexible cord is reduced to 1000 mm ± 50 mm without disturbing the terminal connections.

Small chips and dents which do not adversely affect the protection against electric shock are ignored.

## 20 Screws, current-carrying parts and connections

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

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

Contact pressure in electrical connections within the socket-outlet and between the socket-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.

**20.1.1** 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 a 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<sup>2</sup> flexible conductor is placed in the terminal in the case of portable socket-outlets, and a 2.5 mm<sup>2</sup> solid conductor is placed in the terminal in the case of fixed socket-outlets. 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 3a.

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.

**20.2** 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 socket-outlet 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.

**20.2.1** 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.

**20.3** 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 of terminals, nor to parts of socket-outlets used for earth continuity purposes other than the earthing contacts.

**20.3.1** Compliance shall be checked by inspection and by the relevant tests described in 10.2, Clause 15 and Clause 23.

## **21 Resistance to heat**

**21.1** Socket-outlets shall be resistant to heat.

**21.1.1** Compliance shall be checked by the test described in 21.1.2 or 21.1.3.

Parts made from rubber or ceramics in fixed socket-outlets shall not be subjected to these tests.

**21.1.2** For complete socket-outlets and for separate ancillary components specimens are kept for 60<sup>±5</sup> min in a heating cabinet maintained at the following temperature:

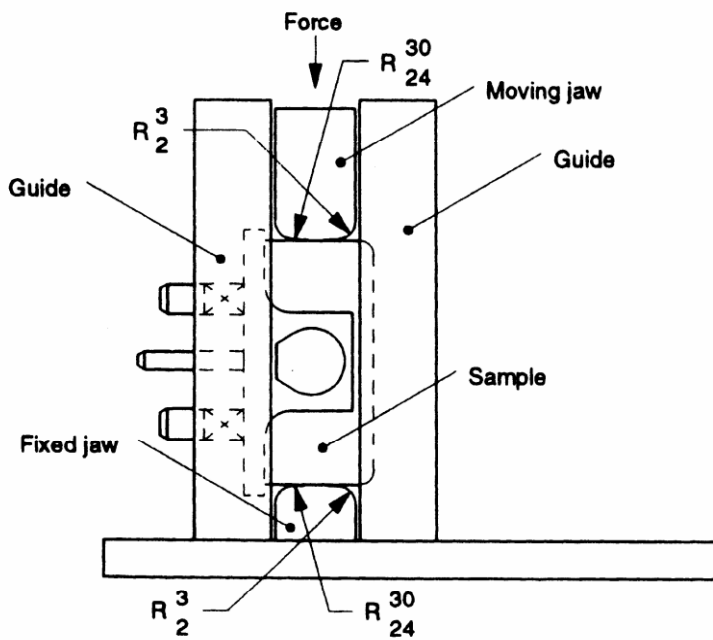
- a) 70 °C ± 5 °C for portable socket-outlets, mounting boxes, separate covers and separate cover plates;
- b) 100 °C ± 5 °C for all other socket-outlets.

During the test they shall not undergo any change impairing their further use and the sealing compound shall not flow to such an extent that live parts are exposed.

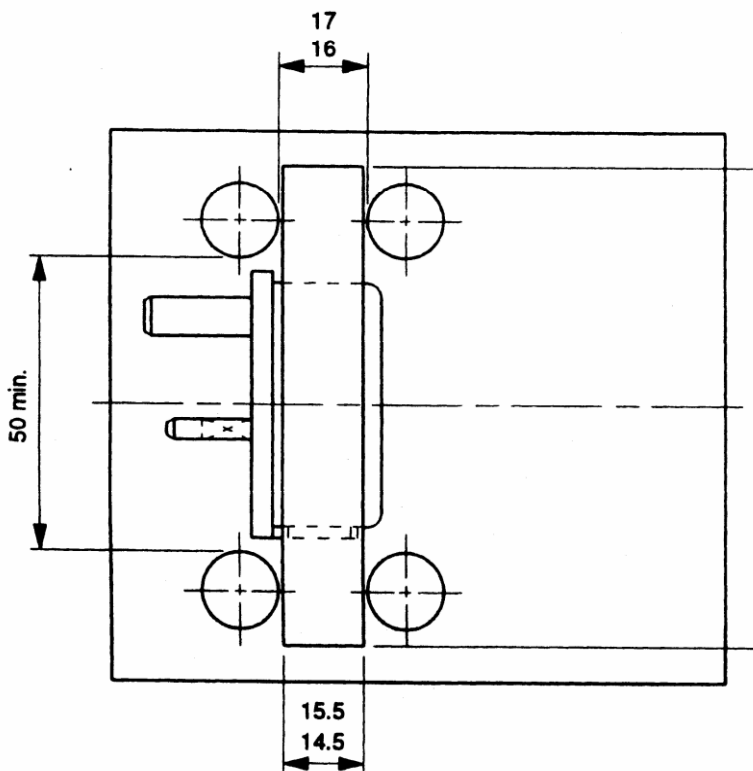
NOTE A slight displacement of the sealing compound should be disregarded.

After the test the socket-outlet shall still comply with 9.2.1 and 14.1.3, and it shall not be possible to touch live parts with test probe 11 of EAS 370 applied with a force of 300<sup>0</sup> ± 2 N.

**21.1.3** Portable socket-outlets 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.



Review



All dimensions are in millimetres

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

Figure 23 — Apparatus for pressure test

The socket-outlet 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 centreline of the jaws coinciding as nearly as possible with the centre of this area.

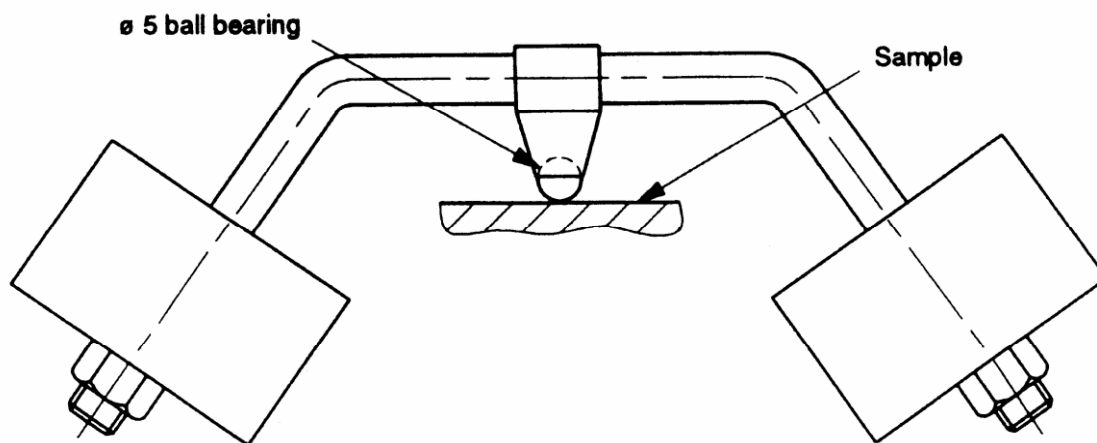
The force applied through and including the effect of the jaws is  $20^{0-1}$  N.

After  $60^{0+5}$  min the jaws are removed and the socket-outlets shall satisfy the tests described in 14.1.2b) 1) and 14.1.3 and shall accept the gauges of Figure 11.

**21.2** Parts of insulating material shall be sufficiently resistant to heat having particular regard to their location and function in the complete socket-outlet.

**21.2.1** Compliance shall be checked as follows:

- a) parts of ceramic material are deemed to comply without testing;
- b) external parts of socket-outlets tested according to 21.1.3, are deemed to comply 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.



All dimensions are in millimetres

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

**Figure 24 — Apparatus for ball pressure test**

The test shall be made in a heating cabinet as given below for the particular part.

For parts of insulating material necessary to retain current-carrying parts in position and the material forming the front surface of socket-outlets, within a zone of 2 mm around line and neutral pin entry holes, the test temperature shall be:

- 1) for fixed socket-outlets:  $125\text{ °C} \pm 6\text{ °C}$ ;
- 2) for portable socket-outlets:  $75\text{ °C} \pm 5\text{ °C}$ .

For parts of insulating material not necessary to retain current-carrying parts in position, even though they may be in contact with them, the test temperature shall be  $75\text{ °C} \pm 5\text{ °C}$  for fixed and portable socket-outlets.

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  $20^{0-1}\text{ N}$  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 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  $60^{0+1}$  min, the ball is removed from the specimen which is then cooled down, by immersion for at least 10s in water at approximately room temperature. The diameter of the impression caused by the ball is measured and shall not exceed 2 mm.

## **22 Resistance to abnormal heat, fire and tracking**

### **22.1 General**

Socket-outlets shall be proof against abnormal heat, fire and tracking.

**22.1.1** Compliance shall be checked by the test described in 22.2. The tests shall not be made on parts of ceramic material or metal.

### **22.2 Glow-wire test**

The test is performed in accordance with IEC 60695-2-10 and at the test temperature given in Table 12.

**Table 12 — Application of glow-wire test**

Part	Temperature of glow wire	
	Portable socket-outlets °C	Fixed socket-outlets °C
Parts necessary to retain live parts in position	750+10	850 ± 15
Parts not necessary to retain live parts in position(although they may be in contact with live parts)	650 ± 10	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. Small parts (see 3.42), parts of insignificant mass (see 3.39), parts unlikely to be subjected to abnormal heat and parts whose failure to pass these tests would not materially affect the safety of the socket-outlet shall be excluded from this glow wire test..

NOTE 2 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 socket-outlet or, if the test cannot be made on a complete socket-outlet, 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 any of the following apply:

- a) there is no visible flame and no sustained glowing;
- b) flames and glowing at the specimen extinguish within 30 s after the removal of the glow wire;
- c) there is no ignition of the tissue paper nor scorching of the board.



## 22.3 Resistance to tracking

For accessories having an IP code higher than IPX0, parts of insulating material retaining live parts in position shall be of material resistant to tracking in accordance to 60884-1.

NOTE for accessories having an IP code higher than and including IPX0, parts of insulating material retaining live parts in position must be of material resistant to tracking:

Compliance is checked according to IEC 60112.

Ceramic parts are not tested.

A flat surface of the part to be tested, if possible at least (15 × 15) mm, is placed in a horizontal position.

The material under test shall pass a proof-tracking index of 175 using test solution A with an interval between drops of (30 ± 5) s. No flashover or breakdown between electrodes shall occur before a total of 50 drops has fallen.

## 23 Resistance to excessive residual stresses and to rusting

**23.1** 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.

**23.1.1** Compliance shall be checked by the following test.

The sample 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<sub>2</sub>(NO<sub>2</sub>) and 10 ml of HNO<sub>3</sub> (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 sample is washed in running water, any excess mercury wiped off, and the sample is immediately visually examined.

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

**23.2** Ferrous parts, the rusting of which might cause the socket-outlet to become unsafe, shall be adequately protected against rusting.

**23.2.1** 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 only subjected to the test if there is doubt about the effectiveness of the grease film and the test should then be made without previous removal of the grease.

## 24 Overload test

**24.1** Individually protected socket-outlets shall withstand the associated electrical and mechanical stresses.

**24.1.1** Compliance shall be checked by the test described in 24.1.2.

**24.1.2** The socket-outlet shall be wired in accordance with 16.1.3 . The test shall be carried out at rated voltage.

For individually protected socket-outlets fitted with overcurrent protective devices to

IEC 60934 the test current shall be 0.95 times the current with which the protective device operates after 1 h. The individually protected socket-outlet shall be operated as described 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.

**24.2** If an overcurrent device releases before 4 h the current shall be reduced in 5% steps in order to achieve the stable conditions above.

**24.3** IPS fitted with IEC 60127 fuses shall withstand overload currents, which could occur due to overload, without creating a risk of contact with live parts.

**24.3.1** Compliance shall be checked by the tests given in 24.3.2 to 24.3.4 . 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.

The fuse link shall be replaced with a link of negligible impedance. The fuse fitted in the plug shall be in accordance with BS 1362:1973+A3:2021, rated at 13A.

NOTE A fuse link having negligible impedance is taken as being a solid copper link having the overall dimensions as specified in the relevant fuse standard.

**24.3.2** The IPS shall be subjected to a test current of 20.8 A for 60 min or until the fuse in the plug operates (if less than 60 min). Immediately afterwards, the checks specified in shall be made.

**24.3.3** The IPS shall be subjected to a test current of 24.7 A for 30 min or until the fuse in the plug operates. (if less than 30 min). Immediately afterwards, the checks specified in shall be made.

**24.3.4** Each IPS shall be checked for Compliance with , a), b) and , except that the tests shall be performed at ambient temperature. Deterioration which does not compromise access to live parts (e.g. discolouring, distortion) shall be deemed to be acceptable.

Inspection shall not reveal any damage to the IPS which would impair its safety within the requirements of EAS 495-1.

## 25 Cyclic loading test

**25.1** Single-gang socket-outlets classified as being suitable for electric vehicle charging shall withstand the associated electrical and mechanical stresses.

**25.1.1** Compliance shall be checked by the test described in 25.1.2.

**25.1.2** The socket-outlet shall be wired in accordance to using 2.5 mm<sup>2</sup> 2-core and earth PVC insulated and sheathed cable cord as given in BS 6004:2012+A1:2020, except that there shall be no outgoing cable cord. The test shall be carried out at rated voltage.

The plug shall be connected to a load of 13+0.4 A using the special test plug constructed and calibrated in accordance with Annex H.

The test shall be conducted for 28 continuous cycles each cycle consisting of 8 h “on”, 1 h “off”, 8 h “on” and 7 h “off”. The plug shall remain engaged throughout the duration of the test.

At the end of the 28 continuous cycles, the socket-outlet shall then be checked by inspection, and shall be in accordance with Clause 15, and the socket-outlet shall accept the gauges of Figure 11.

## 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)].

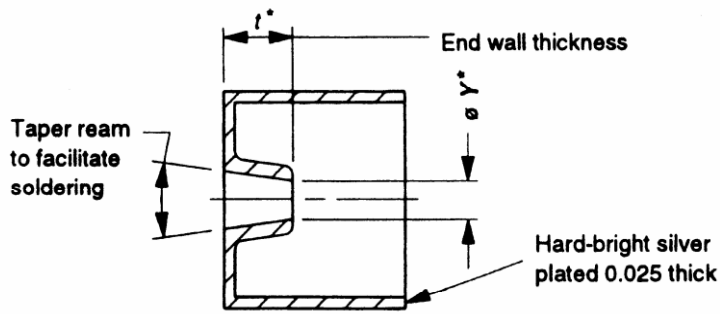
The resistive element shall be of copper nickel wire having a resistivity value between 44 NΩcm and 49 NΩ cm. The overall length shall be  $25.4^{+0.84}_{-0.84}$  mm and the diameter such as to allow a small reduction in the cross-sectional area to adjust the watts loss to the required value. The ends are turned down so that the distance between the shoulders so formed shall be  $25.4^{+0.84}_{-0.84}$  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.

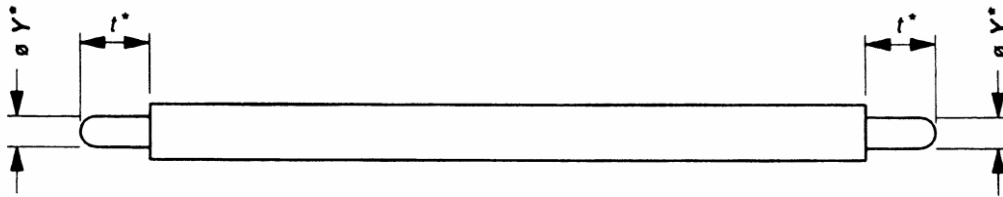
One end cap shall then be unsoldered, a standard ceramic body fitted, the cavity filled and the end cap resoldered in position making sure the shoulder of the element is butted to the inside face of the end cap (the ceramic body shall not interfere with this condition). [See Figure 28d)]

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

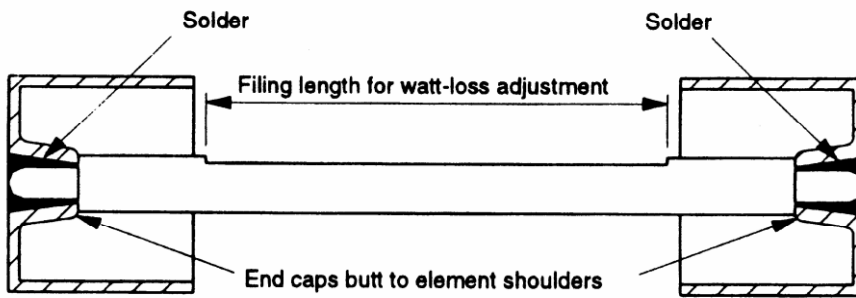
The resulting calibrated link shall be marked "NOT A FUSE" on the ceramic body and shall dimensionally be in accordance with EAS 496.



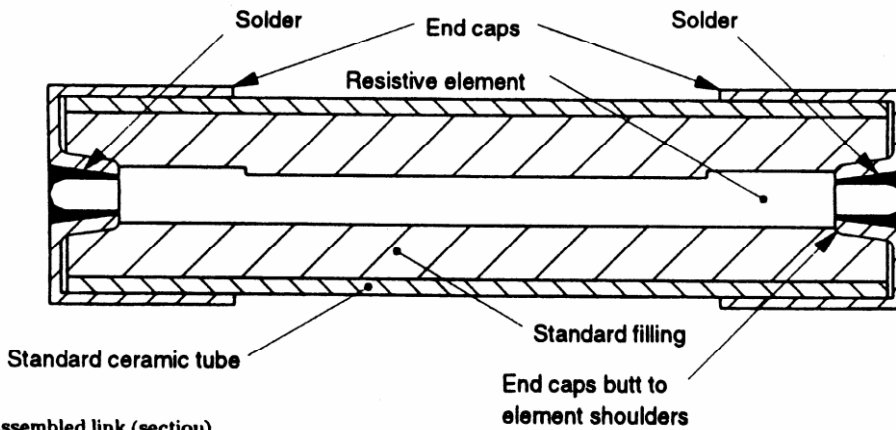
a) Modified standard end cap (section)



b) Resistive element Cu Ni



c) Assembly for calibration (section)



d) Assembled link (section)

\* See Annex A.

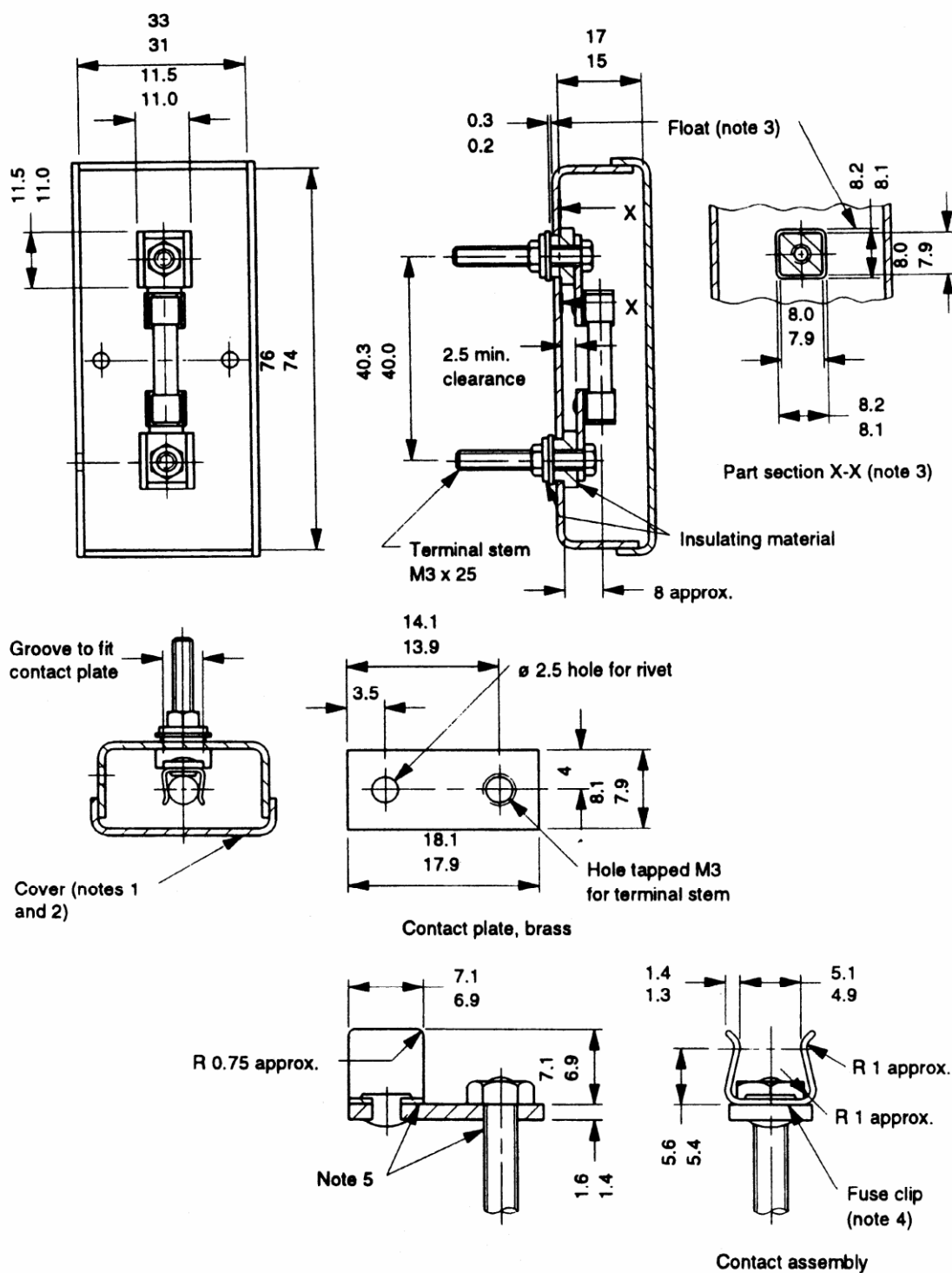
**Figure 28 — Calibrated link**

## **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,  $0.3 \text{ m} \pm 0.05 \text{ m}$  in length and  $2.5 \text{ mm}^2$  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 calibrated link, shall be in the range of  $15 \text{ }^\circ\text{C}$  to  $25 \text{ }^\circ\text{C}$ . The calibrated link shall be inserted into the clips provided in the calibration jig and the cover replaced. A current of  $13 \text{ A} \pm 0.1 \text{ A}$  is then passed continuously through the calibrated link for  $60 \text{ min} \pm 5 \text{ min}$ . 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 whilst it is still carrying the test current.

Draft for public review



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.

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

A.C. shall be used for the calibration.

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

- a) the product of the measured millivolt drop multiplied by the test current gives a result of  $1^{0.00-0.05} W$
- b) the temperature difference between the fuse contact clips does not exceed 2 °C.

## **Annex B (normative)**

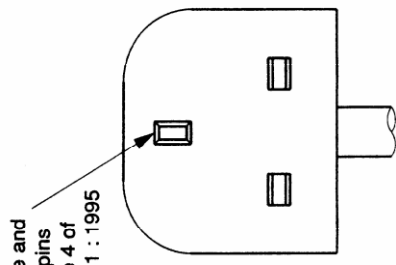
### **Test plug for temperature-rise test**

#### **B.1 General**

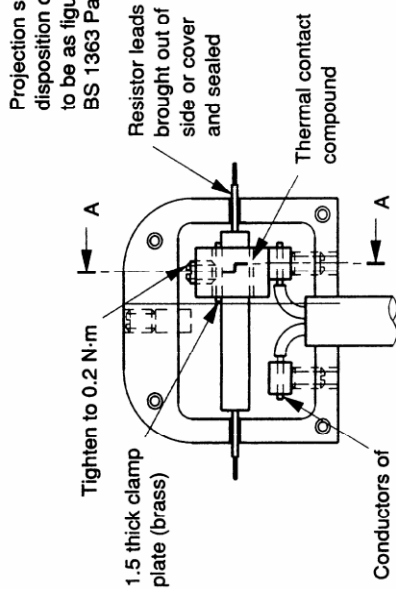
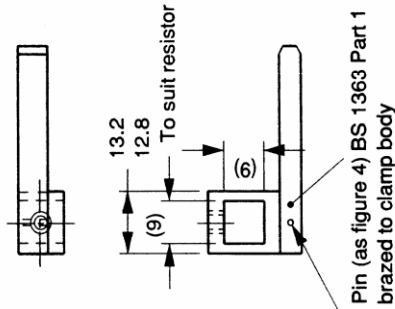
The test plug consists of a body made from insulating material and pins of brass. The pin dimensions and centres are as shown in Figure 14 of EAS 495-1.

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  $0.2 \text{ Nm} \pm 0.02 \text{ Nm}$ . 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 IEC 60227-5 (clause 6) with nominal cross-section  $1.25 \text{ mm}^2$  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.

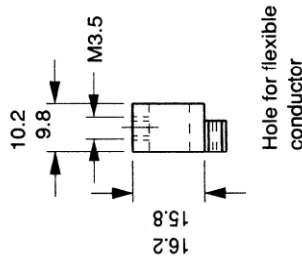




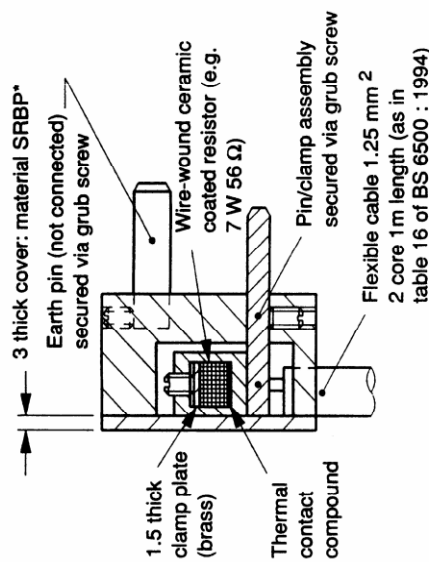
View on engagement face



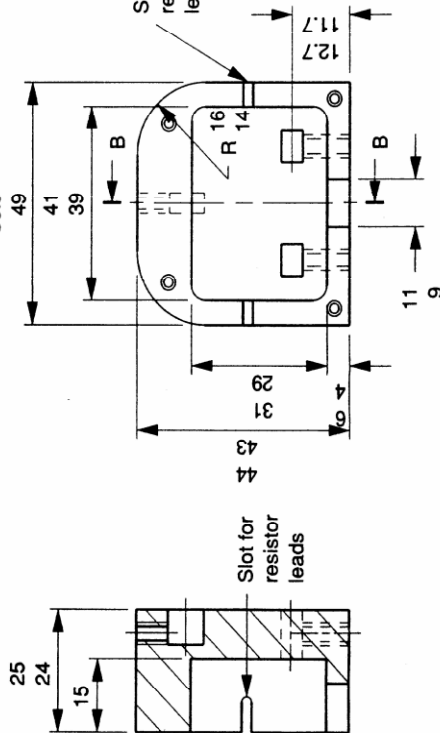
Plug assembly (cover removed)



L - Pin/clamp sub-assembly: material brass  
N - Pin only



Section on A-A



Body: material SRBP\*

All dimensions are in millimetres

\*Material SRBP to comply with BS 2572 types, brown or natural colour.

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

## B.2 Calibration

The test plug is mounted in the dummy front plate (see Figure 17 in EAS 495-1) and the test carried out in accordance with 16.2.1 with  $14\text{ A} \pm 0.2\text{ A}$  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  $35\text{ K} \pm 1\text{ K}$ . 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:

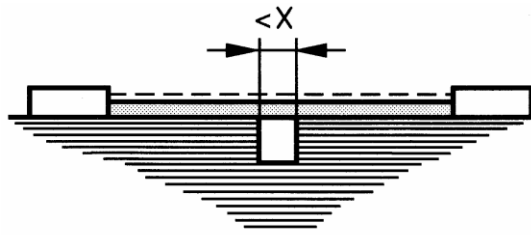
- any recess is assumed to be bridged with an insulating link having a length equal to the specified width X and being placed in the most unfavourable position (see Example 3);
- where the distance across a groove is equal to or larger than the specified width X, the creepage distance is measured along 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.

Explanation for Examples 1 to 11

----- clearance

===== creepage distance

All dimensions are in millimetres

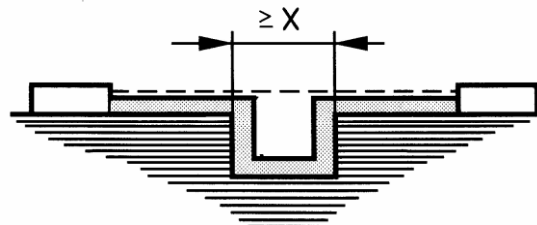


Example 1

Example 1

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

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

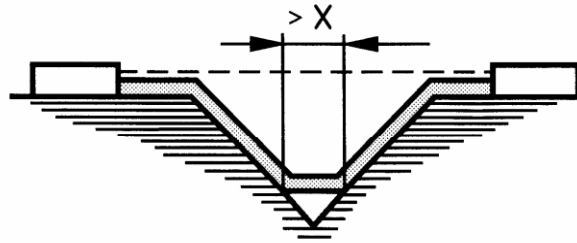


Example 2

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.

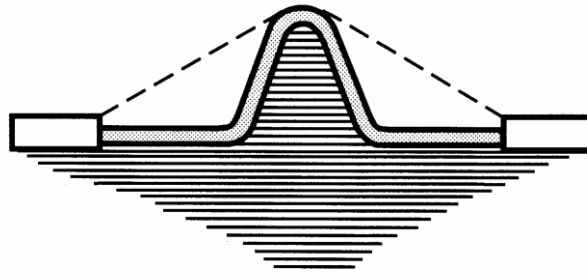


**Example 3**

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.

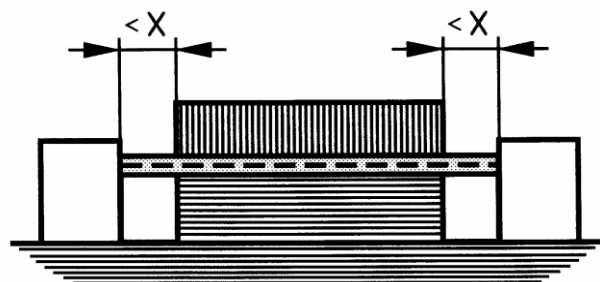


**Example 4**

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.

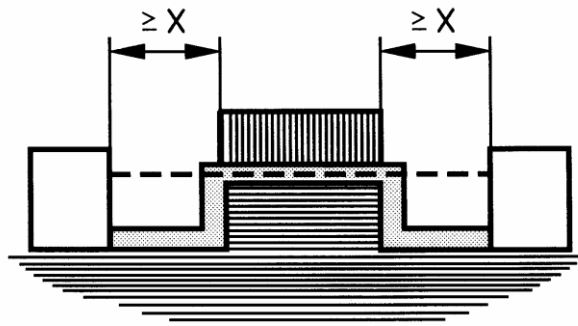


**Example 5**

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.

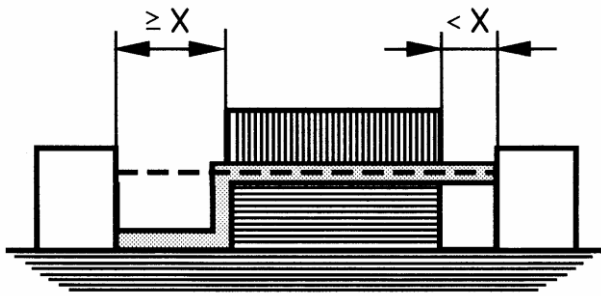


**Example 6**

**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.

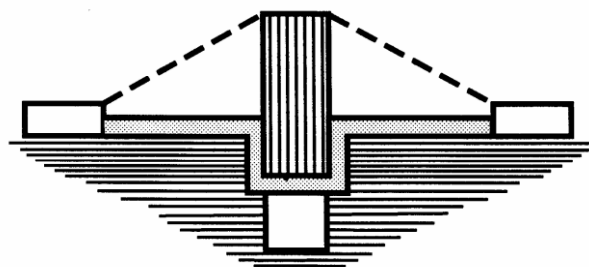


**Example 7**

**Example 7**

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

**Rule:** Clearance and creepage paths are as shown.

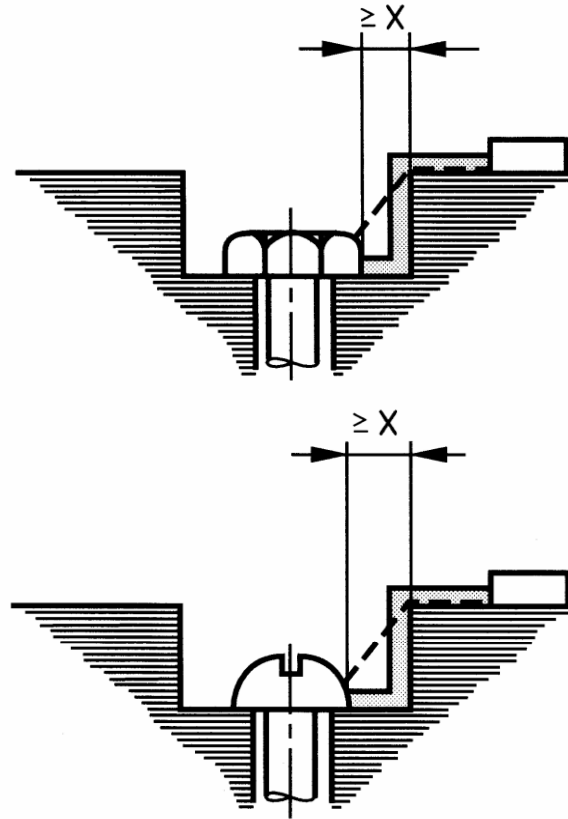


**Example 8**

**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.

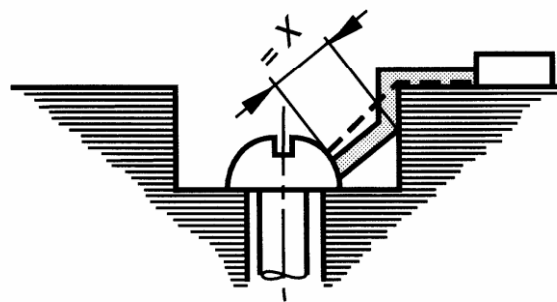
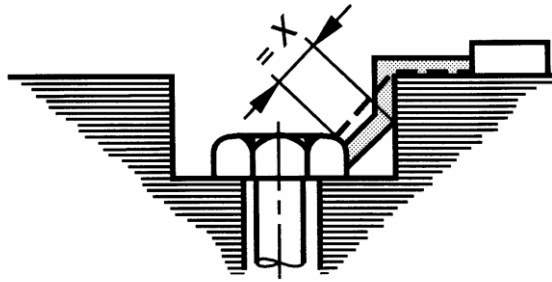


Example 9

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.

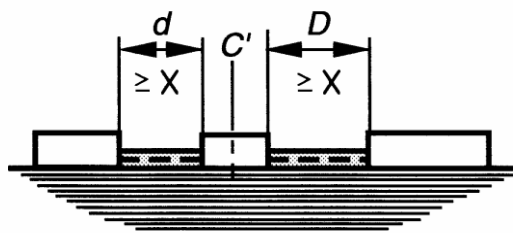


Example 10

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 IEC 60112 shall be used.
- c) In Clause 6, Procedure, either CTI or PTI is determined.
  - CTI is determined in accordance with IEC 60112.
  - The proof tracking test 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 <sup>a</sup>	Voltage line to neutral derived from nominal voltages a.c. or d.c. up to and including	Rated impulse withstand voltage		
V	V	V		
		Overvoltage Category		
		I	II	III
230/400	300	1500	2500	4000
<p>NOTE 1 For more information concerning supply systems see IEC 60664-1.</p> <p>NOTE2 For more information concerning Overvoltage Category see IEC 60664-1,</p> <p>NOTE3 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.</p> <p><sup>a</sup> 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.</p>				

## 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 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  $\mu$ S 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  $\Omega$ .

The impulse shall have the following characteristics:

- the waveform 1.2/50  $\mu$ S for the no load voltage with amplitudes equal to the values given in Table G.1;
- the waveform 8/20  $\mu$ S for an appropriate surge current.

NOTE 2 If the sample is provided with surge suppression the impulsive 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**

<b>Rated impulse withstand voltage <math>\hat{U}</math> kV</b>	<b>Impulse test voltage at sea level <math>\hat{U}</math> kV</b>
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.

NOTE2 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 of clearances are given in IEC 60664-1.

## Annex H (normative)

### Requirements for incorporated electronic components

#### H.1 General

NOTE 1 Attention is drawn to the SI 2017/1206 Radio Equipment Regulations 2017 (as amended) [2] with regards to socket-outlets which intentionally emit and/or receives radio waves for communication or radio determination at a frequency below 3000 GHz. Radio waves include Bluetooth, WiFi, and RF.

NOTE 2 Attention is drawn to the SI 2010/2617 Ecodesign for Energy-Related Products 2010 (as amended) [3] with regards to USB circuits incorporated in socket-outlets.

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

NOTE 3 Compliance with a standard for the relevant component does not necessarily ensure Compliance with this standard.

##### H.1.1 Electromagnetic compatibility (EMC) requirements

Socket-outlets 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 shall be verified by tests, in particular as per

IEC 61000-6-1 and IEC 61000-6-3.

##### H.1.2 Compliance

Compliance to A.1 shall be demonstrated by visual inspection of the appropriate certification.

## **H.2 USB circuits intended for charging portable devices**

### **H.2.1 General**

USB circuits incorporated in a socket-outlet shall conform to the requirements of:

- a) IEC 62368-1; or
- b) IEC 61558-2-16 and IEC 61558-2-6.

The USB circuit 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 socket-outlet 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 socket-outlet.

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

#### **H.2.1.1 Power rating and identification markings**

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

Marking of the USB circuit output:

The following marking shall be visible after the socket-outlet 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.2.2 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 socket-outlet. 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.2.2.1 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 socket-outlet.

### **H.2.2.2 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 socket-outlet, double or reinforced insulation shall be provided between the primary circuit and accessible parts of the socket-outlet.

### **H.2.2.3 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 socket-outlets they are tested as Overvoltage Category III.

### **H.2.3 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 for servicing purposes and is achieved by disconnection of the socket-outlet from the low voltage supply for fixed socket-outlets and by disconnection by the plug for portable socket-outlets.

### **H.2.4 Mechanical strength**

The requirements of BS 1363-2:2023, Clause 21 shall be applied to the USB circuit when incorporated in the socket-outlet. The mechanical strength requirements of IEC 62368-1 are not applicable.

#### **H.2.4.1 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 BS 1363-2:2023, Clauses 23 and 24 shall also apply.

### **H.2.5 Abnormal conditions**

Socket-outlets 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 socket-outlet and there shall be no risk of electric shock or exposure to live parts.

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

Socket-outlets shall be mounted, and mains loads applied as defined in Clause 17.

- a) Short circuit of USB outputs

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

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

b) Overload 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 socket-outlets 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 socket-outlet and the individual USB outlets.

A USB outlet shall be loaded with the maximum current it is able to deliver from the socket 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 should 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.

For multiple socket-outlets 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 suitable load shall be used to provide the desired load current.

c) Component failure conditions

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

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

- No emission of flames or burning particles shall occur.
- The operating temperature of electronic components marked with a rated operating

temperature shall not exceed that temperature during the test.

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

## H.2.6 Compliance

Compliance to A.3.1 to A.3.5 shall be checked by inspection of Compliance evidence or by test.

## H.3 Surge protective devices

### H.3.1 General

Surge protective devices (SPDs) incorporated in BS 1363-2:2023 socket-outlets shall conform to the requirements in A.3.2.

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).

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

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

### H.3.2 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  $-10\text{ }^{\circ}\text{C}$
  - ii) Upper category temperature  $+85\text{ }^{\circ}\text{C}$
  - iii) Duration of damp heat, steady state test: 21 days
- 2) Maximum continuous voltage

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

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

Combination pulses of 6 kV/3 kA of alternating polarity are used, having a pulse shape of 1.2/50  $\mu\text{s}$  for voltage and 8/20  $\mu\text{s}$  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.3.3 Compliance

Compliance to A.3.2 shall be checked by inspection of component Compliance evidence.

### H.3.4 Incorporation of VDRs in socket-outlets

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

- a) temporary overvoltages above the maximum continuous voltage;
- b) thermal overload due to leakage current within the VDR;
- c) burning and bursting of the VDR in the event of a short circuit fault. The following methods of VDR incorporation are permitted:



1) Between L and N

- A VDR is permitted between L and N provided that it is protected by a BS 1362:1973+A3:2021 fuse in the socket-outlet, or
- where not protected by a BS 1362:1973+A3:2021 fuse, a circuit interrupting device having adequate breaking capacity shall be incorporated within the product in series with the VDR.

2) Between L and E

- A VDR is permitted between L and protective E provided that it is protected by a
- BS 1362:1973+A3:2021 fuse in the socket-outlet and is connected in series with a spark gap/gas discharge tube meeting the requirements for basic insulation, or
- where not protected by a BS 1362:1973+A3:2021 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.3.5 Compliance

Compliance to A.3.4 shall be checked by inspection.

## H.4 Electronic switches

### H.4.1 General

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

### H.4.2 Compliance

Compliance to A.4.1 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

Draft for public review



Draft for public review