

Specification for

13 A fused plugs and switched and unswitched socket-outlets

UDC 621.316.541*13A

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- Association of Manufacturers of Domestic Electrical Appliances
- Association of Short Circuit Testing Authorities
- British Electrical Systems Association (BEAMA)
- British Electrotechnical Approvals Board
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- National Economic Development Office
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The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- Association of Supervisory and Executive Engineers
- Consumers Association
- Electric Cable Makers' Confederation
- Fire Offices Committee

This British Standard, having been prepared under the direction of the Power Electrical Engineering Standards Committee, was published under the authority of the Board of BSI and comes into effect on 31 August 1984

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First published June 1947
First published as BS 2814 January 1957
First revision of BS 1363 and BS 2814 combined as BS 1363 September 1967
Second revision August 1984

The following BSI references relate to the work on this standard:
Committee reference PEL/4
Draft for comment 79/27210 DC

ISBN 0 580 13556 X

Amendments issued since publication

Amd. No.	Date of issue	Comments
4852	April 1985	
5052	December 1985	
5729	July 1987	
5820	December 1987	
6221	June 1989	
6302	February 1990	Indicated by a sideline in the margin

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Foreword

This revision of this British Standard has been prepared under the direction of the Power Electrical Engineering Standards Committee and supersedes BS 1363:1967.

The principal changes in the revised standard are as follows:

- a) dimensions have been converted to metric;
- b) the conditions of normal use in which the accessories¹⁾ are intended to perform satisfactorily have been specified;
- c) requirements and tests are specified for non-rewireable plugs, and for portable socket-outlets;
- d) requirements and tests have been added to ensure that new techniques and materials now available will be satisfactory in use.

This standard has been aligned as much as possible with Part 1 of the draft “Standard for plugs and socket-outlets for household and similar purposes” which is being prepared by the IEC.

Requirements for boxes for the enclosure of socket-outlets have been omitted since they are now given in BS 4662.

This revised standard comes into force immediately, but to allow manufacturers time to design and introduce any necessary changes, BS 1363:1967 will not be withdrawn until three years from the date of publication of this standard.

Attention is drawn to Statutory Instrument 1987 No. 603. Consumer Protection. The Plugs and Sockets etc. (Safety) Regulations 1987.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 66, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

¹⁾ For convenience, where separate mention is not required, the plugs and socket-outlets covered by this standard are referred to as “accessories”.

1 Scope

This British Standard specifies requirements for 13 A fused plugs having insulating sleeves on line and neutral pins and 13 A shuttered socket-outlets for household, commercial and light industrial purposes, with particular reference to safety in normal use. The plugs and 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 at 50 Hz.

Requirements are specified for plugs incorporating a fuse-link complying with BS 1362. The plugs may be rewirable or non-rewirable complete with flexible cord. Two categories of accessories are specified covering normal and rough use.

Rewireable plugs are intended for use with flexible cords complying with BS 6500 having conductor cross-sectional areas from 0.5 mm² to 1.5 mm² inclusive as referred to in 19.1. Non-rewirable plugs are intended for use with flexible cords having conductor cross-sectional areas not exceeding 1.5 mm² as referred to in 19.4. Plugs containing switches and devices other than indicator lamps are outside the scope of this standard.

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 enclosures, e.g. complying with BS 4662, and for surface or panel mounting or for portable use. Fixed socket-outlets are intended for use with cables complying with BS 6004 or BS 6007 having copper conductors. Portable socket-outlets are intended for use with flexible cords, complying with BS 6500. Socket-outlets containing devices other than fuse-links, switches and indicator lamps are outside the scope of this standard.

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

2 Conditions of use

Plugs and socket-outlets shall be suitable for use under the following conditions:

- a) an ambient temperature in the range – 5 °C to + 35 °C, the average value over 24 h not exceeding 25 °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 altitude not exceeding 2 000 m above sea level;

- d) an atmosphere not subject to abnormal pollution by smoke, chemical fumes, rain, spray, prolonged periods of high humidity or other abnormal conditions.

3 Definitions

For the purposes of this British Standard the following definitions apply.

3.1 accessory

a device associated with the wiring of an installation

3.2 rough-use accessory

an accessory designed to withstand severe mechanical handling

NOTE Rough-use accessories are identified by additional marking in accordance with 7.1 c). They are not intended for gross mis-use. For instance, a plug should not be withdrawn from a socket-outlet by pulling on the attached flexible cord.

3.3 rewirable accessory

an accessory so constructed that a cable or flexible cord can be fitted or replaced using general purpose tools

3.4 non-rewirable accessory

an accessory so constructed that it forms a constructional unit with the flexible cord such that the flexible cord cannot be separated from the accessory without making it permanently useless, and the accessory cannot be opened by hand or by using a general purpose tool, e.g. a screwdriver and/or pliers, without making the accessory permanently useless

NOTE An accessory is considered to be permanently useless when, for re-assembly of the accessory, parts or materials other than the original need to be used. This does not apply to the replacement of a fuse-link.

3.5 moulded-on accessory

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

3.6 fused accessory

an accessory having provision, internally, for a replaceable cartridge fuse-link

3.7 plug

a portable fused accessory having projecting pins designed to engage with the contacts of a corresponding socket-outlet. A plug also incorporates means for the electrical connection and the mechanical retention of a suitable flexible cord

3.8 socket-outlet

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

3.9 fixed socket-outlet

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

3.10 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

3.11 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-surfaced structure, or flush with the front of a socket-outlet box or enclosure

3.12 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

3.13 portable socket-outlet

a socket-outlet designed for connection to a flexible cord so that the complete socket-outlet may be used without mounting to a fixed surface or structure

3.14 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

3.15 multiple socket-outlet

a combination of two or more socket-outlets

3.16 socket-outlet base

that part of the socket-outlet which carries the contacts. It may be integral with the socket-outlet plate

3.17 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

3.18 socket-outlet box or enclosure

a box or enclosure suitable for mounting one or more socket-outlets

3.19 shutter

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

3.20 actuating member

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

3.21 indicator lamp (pilot lamp)

a lamp which illuminates to indicate that the accessory is energized

3.22 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 accessory without the use of special tools

3.23 screw-type terminal

a terminal in which the connection is made directly or indirectly by means of screws or nuts of any kind

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.

The clamping pressure may be applied directly by the shank of the screw or through an intermediate member to which pressure is applied by the shank of the screw.

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

The clamping pressure may be applied directly by the head of the screw or through an intermediate part, such as a washer, clamping plate or anti-spread device.

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

The clamping pressure may be applied directly by a suitably shaped nut or through an intermediate part, such as a washer, clamping plate or anti-spread device.

3.24**termination**

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

3.25**fuse carrier**

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

3.26**type test**

a test of one or more accessories to show that all accessories made to the same specification and having the same essential details, would pass an identical test

3.27**accessible external surface of a plug**

all surfaces which can be touched by test finger I of BS 3042:1971 when the plug is in full engagement with a corresponding socket-outlet

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

all surfaces of a socket-outlet which can be touched by test finger 1 of BS 3042:1971 when the socket is installed as in use

3.29**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.

3.30**fine wire thermocouple**

a thermocouple having wires not exceeding 0.3 mm in diameter

3.31**calibrated link**

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

3.32**clamp type (screwless) terminal**

a terminal in which the connection is made by clamping the conductor of a flexible cable or cord between two metallic surfaces without the use of a screw

4 General requirements

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

Accessories purporting to comply with this standard shall be capable of meeting all the relevant requirements and tests specified in this standard.

Gauges to Figure 5, Figure 11, Figure 12, Figure 14 and Figure 16 shall be considered to comply with the dimensional requirements if the results of measurements fall within the specified dimensions and the uncertainty of measurement does not exceed ± 0.005 mm.

NOTE Where tolerances are not specified in this standard the values are to be regarded as nominal.

5 General conditions for type testing**5.1 All tests are type tests.**

Unless otherwise specified in this standard the accessories shall be tested as delivered by the manufacturer or responsible vendor and under normal conditions of use, at an ambient temperature of 20 ± 5 °C.

Unless otherwise stated by the manufacturer flush-mounted accessories shall be tested when mounted on a corresponding insulated box complying with BS 4662, the fixing screws being tightened with a torque of 0.6 N m.

The accessories used for the tests shall be substantially identical to normal production items in respect of all details which may affect the test results.

Non-rewireable accessories shall be supplied with an appropriate flexible cord which shall be at least 1 m long.

Accessories shall be deemed to comply if no sample fails in the complete series of tests given in Table 1.

If one sample fails in the complete series of tests given in Table 1 and this sample can be shown to be not representative of normal production or design, then a separate set of three samples shall be submitted to the test or tests in that particular group. If there is no failure in this re-test then accessories of that type shall be deemed to comply with this standard.

If more than one sample fails in the complete series of tests given in Table 1 then accessories of that type shall be deemed to have failed to comply with this standard.

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 samples and in the order given.

Table 1 — Test schedule

Test	No. of samples	Order of tests (clause reference)
Plugs Inspection, measurement, gauging and manipulation	3	5.1, 4, 6.2, 7.1, 7.2, 7.3, 7.5, 7.6, 11.2, 11.4, 11.7, 11.8, 8.1, 9.2, 9.3, 9.5, 11.9.2.1, 11.9.3.1, 12.1, 12.2, 12.3, 12.4, 12.5, 12.9, 12.13, 12.14 ^a , 12.15, 12.16, 19.2, 19.3, 19.4, 19.6, 21.1, 21.2, 21.3, 11.3 ^a .
General Additional tests for rewirable plugs with clamp type (screwless) terminals	3	5.1, 9.4, 21.3, 10.2, 15.1.3, 11.10, 11.11, 19.1, 12.12, 12.17.2, 12.17.3, 12.17.2.
	3	5.1, 14.2, 15.1.2, 15.1.3, 12.8 ^a , 15.2, 19.5 ^a , 12.17.4.
	3	5.1, 14.1, 15.1.2, 15.1.3, 16.1.2, 20.1.2, 12.10, 20.1.3, 12.6, 12.6.2, 12.6.3, 12.11, 21.3, 16.1.2, 12.7, 8.2.
	27	C.4 ^c .
	3	5.1, 14.1, 21.1.1, 25, 16.
	3	5.1, 11.9.1
Material	3	5.1, 22.1.2, 9.2, 15.1.3, 22.2.
	3	5.1, 22.1.3, 15.1.2 b) 1), 15.1.3, 22.2.
	3	5.1, 23.1, 23.2.
	3	5.1, 23.3, 21.3, 24.1, 24.2.
	3	12.9.6, C.1 ^c , C.2 ^c , C.3 ^c , C.5 ^b .
Socket-outlets Inspection, measurement, gauging and manipulation	3	5.1, 4, 6.3, 7.1, 7.2, 7.4, 7.5, 7.6, 9.1, 11.2, 11.4, 11.5, 11.6, 11.7, 11.8, 8.1, 9.3, 9.6, 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, 21.1, 21.2, 11.3 ^a .
General For all socket-outlets For all socket-outlets For all socket-outlets For fixed socket-outlets only For portable socket-outlets only For all socket-outlets For fused socket-outlets only For fixed socket-outlets only For single and twin portable socket-outlets only For portable socket-outlets with more than two outlets only	3	5.1, 9.4, 21.3, 10.2, 10.3, 11.11, 19.1, 14.2, 15.1.2, 15.1.3, 13.13, 13.4.2, 13.4.3, 13.5, 13.6.
	3	5.1, 13.13, 20.1.2, 17.1.2, 17.1.3, 17.1.4, 13.4.2, 13.11, 16.1.3 or 16.1.4, 19.5 ^d .
	3	5.1, 14.1, 15.1.2, 15.1.3, 18.1.2, 9.1, 10.2, 13.6, 13.7, 13.8, 15.1.2, 15.1.3.
		+ 16.1.3, 8.2.
		+ 16.1.4, 13.19, 8.2.
	3	5.1, 14.2, 15.1.2, 15.1.3, 18.1.3, 13.4.2, 15.1.2, 15.1.3 ^e .
		+ 20.1.2 + 20.1.4, 8.1, 8.2, 9.1, 9.3, 9.4, 9.6, 15.1.2, 15.1.3 + 16.1.4, 20.1.5, 20.1.3, 13.4.3, 15.1.2, 15.1.3, 16.1.4. + 20.1.6, 14.3.3, 15.1.2, 15.1.3, 16.1.4.
Material For fixed socket-outlets only For portable socket-outlets only For all socket-outlets For all socket-outlets	3	5.1, 22.1.2, 9.2, 15.1.3, 22.2, 5.1, 22.1.3, 15.1.2 b) 1), 15.1.3, 22.2.
	3	5.1, 23.1, 23.2.
	3	5.1, 23.1, 23.3, 24.1, 24.2.

^a Non-rewirable plugs only.^b Plugs with solid pins only.^c Plugs with non-solid pins only.^d Non-rewirable socket-outlets.^e Test voltage reduced by 25 %. See 18.1.3.

6 Classification

6.1 Accessories shall be classified in accordance with **6.2** and **6.3**.

6.2 Plugs. Plugs shall be:

- a) rewirable or non-rewirable;
- b) for normal use or rough use;
- c) fitted with screw or clamp type (screwless) terminals.

6.3 Socket-outlets. Socket-outlets shall be:

- a) single or multiple;
- b) switched or unswitched;
- c) for normal use or rough use²⁾;
- d) fused or unfused;
- e) fixed or portable²⁾;
- f) (if fixed) flush or surface or panel-mounting;
- g) (if portable) rewirable or non-rewirable.

7 Marking and labelling

7.1 Accessories 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) The name or trademark of the manufacturer or responsible vendor;
- b) The number of this British Standard, i.e. BS 1363³⁾;
- c) For rough-use plugs and portable socket-outlets the number of the standard shall be followed by “/A”;
- d) On rewirable accessories the terminals intended for the connection of the various conductors shall be identified by the symbols given in **7.6**.
- e) For fused accessories, the words “FUSE” or “FUSED” or the symbol (given in **7.6**) on the engagement surface of a socket-outlet or on the external accessible surface of a plug.
- f) All socket-outlets shall be marked with:
 - 1) rated current;
 - 2) rated volts;
 - 3) nature of supply.

In the case of a non-rewirable portable socket-outlet, the rated current shall be the maximum current appropriate to the attached cable. Portable socket-outlets shall be marked on the accessible external surface.

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

7.1.1 Compliance shall be checked by inspection and by rubbing the markings for 15 s with a cloth soaked in water, and again for 15 s with a cloth soaked in petroleum spirit. The marking shall remain legible. Markings produced by an engraving or moulding process are deemed to comply without test.

7.2 Rewirable fused accessories shall have a removable tag or label indicating the rating of the fuse-link fitted, e.g. “Fitted with X ampere fuse” (where X denotes the rating of the fuse-link).

7.2.1 Compliance shall be checked by inspection.

7.3 Except where a plug fitted with a flexible cord is supplied direct to a manufacturer for incorporation in other equipment, the free end of such an assembly shall have a label attached stating:

a) “the flexible cord of this accessory must be connected to a piece of equipment before being plugged into a socket-outlet.”

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

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

“Wires in the mains lead are coloured in accordance with the following code:

Green/Yellow	Earth (if any)
Blue	Neutral
Brown	Live”

d) if the plug is fitted with a 2-core flexible cord as follows:

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

²⁾ All portable socket-outlets shall be classified as for rough use.

³⁾ Marking BS 1363 on or in relation to a product is a claim by the manufacturer that the product has been manufactured in accordance with the requirements of the standard. The accuracy of such a claim is therefore solely the manufacturer's responsibility. Enquiries as to the availability of third party certification to support such claims should be addressed to the Director, Quality Assurance Division, BSI, Maylands Avenue, Hemel Hempstead, Herts HP2 4SQ for certification marks administered by BSI or to the appropriate authority for other certification marks.

7.3.1 Compliance shall be checked by inspection.

7.4 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 given in 7.3 c).

7.4.1 Compliance shall be checked by inspection.

7.5 Rewireable portable accessories shall be provided with adequate instructions for the safe connection of the appropriate flexible cords.

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

7.5.1 Compliance shall be checked by inspection.

7.6 if symbols are used they shall be as follows:

amperes	A
volts	V
^a alternating current	~
line	L
neutral	N
^a earth	⏏
^a fuse	⏏

NOTE BS 6217 gives details of symbols marked^a.

^a All portable socket-outlets shall be classified as for rough use.

For the marking of the rated current and rated voltage of the accessory 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 250 V ~
or 13/250 ~
or $\frac{13}{250}$ ~
13 A 250 V a.c.
or 13/250 a.c.
or $\frac{13}{250}$ a.c.

Table 2 — Current, fuse rating and load for flexing and cord grip tests related to size of flexible cord

Flexible cord size current	Rated current	Test current	Fuse rating	Load for flexing test	Load for card grip test
mm ²	A	A	A	N	N
0.50	3	3,5	3 (5) ^a	10	30
0.75	6	7	13	10	30
1.00	10	11	13	20	30
1.25	13	14	13	20	60
1.50	13	14	13	20	60

^a The figure in brackets indicates the fuse rating when a non-rewireable plug/cord assembly is used with certain types of equipment where the use of a 5 A fuse-link is necessary because of the high instantaneous input current.

8 Creepage distances, clearances and distances through insulation

8.1 When the accessory is correctly assembled and wired with the appropriate cable or flexible cord the minimum clearance through air and the minimum creepage distance shall be 2.5 mm:

- a) between live parts of opposite polarity (the value of 2.5 mm is reduced to 1 mm for the distance between the lead wires in the pinch of a neon indicator lamp with external resistor);
- b) between live parts and any other metal parts;
- c) between live parts and the accessible external surface of the accessory;
- d) between component parts in the fused line circuit which are separated by the removal of the fuse-link.

Any metal parts of plugs, other than the pins, which are exposed on the engagement face of a plug and are in contact with live parts shall be recessed at least 3.0 mm below the engagement face.

When detachable fuse carriers are used on plugs there shall be a minimum gap of 3 mm between live metal and the engagement face of the plug, measured with the fuse in position and the carrier omitted.

The minimum clearance between switch contacts in the open position for socket-outlets shall be 1.2 mm.

8.1.1 Compliance shall be checked by inspection and measurement. Movable parts are placed in the most unfavourable position. Nuts and screws with non-circular heads are assumed to have been tightened in the most unfavourable position. In rewireable accessories the clearances are measured when fitted with the maximum size of conductors.

NOTE The contribution to the creepage distance of any groove less than 1 mm wide is limited to its width; any air gap less than 1 mm is ignored in computing the total clearance.

8.2 Accessories shall have either a minimum distance of 2 mm through insulation between live parts and the accessible external surface or the minimum distance shall be made up of 2 mm through air and 1 mm insulation, provided the parts are located such that there is no likelihood of the distance through air being reduced by distortion or movement of the parts.

The insulating sleeving of plug pins and any flexible cord connected to an accessory are excluded from these requirements.

8.2.1 Compliance shall be checked by inspection and measurement and by the following test.

Immediately after the temperature-rise test of clause 16, and while the accessory is still hot, test finger III of BS 3042:1971 is applied to the surface with a force of 30 N. This shall not cause the air gap to reduce below 2 mm.

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 5 N. It shall not be possible to touch live parts.

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

9.2.1 Compliance shall be checked by the application of test pin II of BS 3042:1971 applied with a force of 5 N with the plug fitted with a 2-core 0.5 mm² flexible cord as given in Table 14 of BS 6500:1984.

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

9.3.1 Compliance is proved by satisfying the dimensional and gauging requirements of this standard.

9.4 Resilient covers of accessories shall be so designed and constructed that when assembled and wired as in normal use, there is no risk that, as a result of undue pressure, live parts could penetrate the cover or become so disposed as to reduce creepage and clearances below those given in clause 8.

9.4.1 Compliance shall be checked by the following test, using the apparatus shown in Figure 2.

The design of the apparatus shall be such that an even force of 240 N can be applied to those places where the possibility of a hazard exists.

Each sample is subjected to the force of 240 N at each hazard point in turn, and during each application of force a 2 kV 50 Hz test voltage of substantially sinusoidal waveform is applied for 1 min 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 finger III of BS 3042:1971 applied with a force of 30 N.

9.5 Where a plug is supplied fitted with a flexible cord, the free end of such an assembly shall be encapsulated in insulating material.

NOTE This does not apply to assemblies supplied to equipment manufacturers for incorporation into their equipment.

9.5.1 Compliance shall be checked by inspection.

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

9.6.1 Compliance shall be checked by introducing a rigid metal pin, 1 mm diameter × 60 mm long, through the earthing socket aperture of a socket-outlet mounted and wired with an appropriate enclosure, as in normal use, 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.

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

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:

- a) for metal parts insulated from live parts, by the test described in **15.1.3**;
- b) for metal parts connected to an earthing terminal or earthing plug pin, by the following test. A current of 25 A, derived from an a.c. source having a no-load voltage not exceeding 12 V, is passed for 1 min as follows:

- 1) for plugs, between the remote end of the protective conductor of a 3-core flexible cord cut to a length of 150 ± 5 mm measured from the nearest edge of the earthing pin, and the remote end of the earthing plug pin and any accessible metal part intended to be earthed, taking account of the following:

- i) for non-rewireable plugs, the manufacturer's connection is tested as supplied, with the flexible cord cut to the length as specified in 1), precoiled flexible cords being extended before measurement;
- ii) for rewireable plugs, 1.25 mm^2 flexible cord complying with BS 6500:1984 shall be used;

for screw type terminals the clamping screw shall be tightened with a torque equal to two-thirds of the appropriate value specified in Table 3;

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

- 2) for socket-outlets, between the earthing terminal and any accessible metal part intended to be earthed and between the earthing terminal and a plug pin inserted in the earthing socket-contact.

The resistance between the remote end of the protective conductor of a plug or the earthing terminal of a socket and any other nominated part shall not exceed 0.05Ω .

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 **10.2.1** 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 3.

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 **11.10**.

11.2 Rewireable accessories shall be provided with terminals as defined in **3.23** or, for rewireable plugs only, **3.32**.

11.2.1 Compliance shall be checked by inspection.

11.3 Non-rewireable accessories shall be provided with soldered, welded, crimped or similar terminations; 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.

For all these methods of termination, no more than one strand, or 5 % of the total number of strands of the conductor, whichever is the larger, shall be fractured during connection.

11.3.1 Compliance shall be checked by inspection and measurement.

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

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

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

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

11.6 Earthing terminals in fixed sockets-outlets shall permit the connection, without special preparation, of one, two or three 1.5 mm^2 or 2.5 mm^2 solid or stranded or of one or two 4 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 mm when intended for the connection of flexible cords and 0.6 mm when intended solely for the connection of fixed wiring.

Table 3 — Torque values for screws and nuts

Nominal outside diameter of thread	Torque		
	For metal screws as described below ^a	For other metal screws and nuts	For screws of insulating material
mm	N m	N m	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

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

11.7.1 Compliance shall be checked by inspection and measurement.

11.8 Terminal screws shall have a nominal diameter of not less than 3 mm.

NOTE For B.A. threads this value is reduced to 2.8 mm.

11.8.1 Compliance shall be checked by inspection and measurement.

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

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

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

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

11.9.1 Compliance shall be checked by:

- inspection of three sample plugs;
- the following test which is carried out on each terminal of the three sets of L, N and E terminals supplied in the test sample. For the purpose of this test, terminals are removed from the test sample or alternatively supplied separately.

Tests are carried out on each line, neutral and earth terminal separately with individual flexible conductors, first with conductors having the largest cross-sectional area, and then with conductors having the smallest cross-sectional area, as specified in 11.4.

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

For each insertion, the conductors are inserted so that adequate connection is obvious. After insertion, the conductor is subjected to a pull of 30 N. The pull is applied without jerks for 1 min in a direction equivalent to that in which the conductor lies when the terminal is mounted in the plug.

During the application of the pull the conductor shall not come out of the terminal. After these tests neither the terminals nor the clamping means shall have deteriorated in a manner impairing their further use and no more than one strand, or 5 % of the total strands in the conductor, whichever is the larger, shall be fractured.

11.9.2 Clamp type (screwless) terminals shall be so constructed that incorrect fitting of the conductor is prevented. Marking, indicating the length of insulation to be removed before fitting of the conductor into the clamp type (screwless) terminal, shall be marked on the plug.

11.9.2.1 Compliance shall be checked by inspection.

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

11.9.3.1 Compliance shall be checked by inspection, by the test of 11.9.1, and the mechanical strength test of 20.1.3.

11.10 Insulating barriers in plugs shall be an integral part, so arranged that in the event of a failure of the cord anchorage or of the earth or line conductors becoming detached from their respective terminals, there is negligible risk of:

- a) the earth conductor coming into contact with parts at line potential;
- b) the line conductor coming into contact with the line pin assembly.

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

NOTE Non-rewireable plugs are excluded from this test.

The plug is wired as in normal use with a 0.5 mm^2 3-core flexible cord as given in Table 6 of BS 6500:1984 in accordance with the manufacturer's instructions. In the absence of such instructions the cord is fitted, having a 10 mm length of the conductor insulation removed from the ends of each core for pillar-type terminals and a 20 mm length for stud-type terminals, all terminal screws being tightened to the appropriate torque given in Table 3.

A continuity indicating circuit operating at not less than 40 V is connected between the conductors and the other parts nominated. All terminal screws are then loosened and the cord anchorage rendered inoperative and the cover of the plug refitted. For plugs fitted with clamp type (screwless) terminals the conductor clamp shall be rendered inoperative. The flexible cord is then withdrawn from the plug at a rate not exceeding 50 mm/min, the direction of the pull being varied, until the earth core is pulled free of the plug. The test is made six times in all. For each new test a fresh section of the cord is fitted and the flexible cord rotated through approximately 60° in the plane perpendicular to its major axis in a clockwise direction before fitting unless the design is such that this is not practicable. There shall be no contact between parts at line potential and the earth conductor or between the line conductor and line pin assembly, thus bypassing the fuse-link.

11.11 Terminals of portable accessories shall be so located or shielded that should a wire of a stranded conductor escape when the conductors are fitted, there is no risk of accidental connection between live parts and accessible external surfaces, or of a stray wire bypassing the fuse-link.

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

A 4 mm length of insulation is removed from the end of a flexible conductor having a nominal cross-sectional area of 1.5 mm^2 . One wire of the stranded conductor is left free and the other wires are fully inserted into and clamped in the terminal. The free wire 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 wire of a conductor connected to a live terminal shall not touch any metal part so as to bypass the fuse-link, or any metal part which is accessible or is connected to an accessible metal part or reduce creepage distances and clearances to accessible surfaces to less than 1.3 mm. The free wire of a conductor connected to an earthing terminal shall not touch any live parts.

12 Construction of plugs

12.1 The disposition of the pins shall correspond with that shown for socket contacts in Figure 3.

12.1.1 Compliance shall be checked by inspection.

12.2 The outline of the plug shall not exceed the dimensions shown in Figure 4 and within these dimensions there shall be no axial projection from the engagement surface of the plug.

Pin centres and dimensions shall be as shown in Figure 4.

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

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

For the gauging test the plug is fitted with a 3-core 1.25 mm flexible cord as given in Table 16 of BS 6500:1984.

With the engagement faces of the plug and the gauge parallel to each other, the plug shall enter the gauge when a force of 5 N or less is applied to the centre of the plug at right angles to the engagement face and without any additional force being applied to the pins to bring them into alignment.

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

12.3.1 Compliance shall be checked by measurement.

12.4 A fuse-link complying with BS 1362 shall be provided within the body of the plug and the fuse-link shall be mounted in appropriate contacts only between the line terminal or termination and the corresponding plug pin in such a way that it cannot be displaced when the plug is in use. The design shall be such that the fuse-link cannot be left in inadequate contact when the plug or fuse cover or the fuse-carrier is replaced and firmly secured in position.

Where plugs are supplied in part assembled form, with or without an appropriate fuse, direct to a manufacturer for incorporation in other equipment, the complete plug when assembled shall comply with this standard.

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

NOTE For rewirable accessories the preferred ratings of fuse-links are 3 A and 13 A.

For non-rewirable accessories the current rating of the fuse-link shall be appropriate to the attached flexible cord (see Table 2).

12.4.1 Compliance shall be checked by inspection.

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

- a) non-detachable in normal use; or
- b) readily identifiable in relation to its plug by means of marking or colour.

12.5.1 Compliance shall be checked by inspection.

12.6 The base and cover of non-rewirable plugs shall be permanently attached to each other.

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

12.6.1 Compliance shall be checked by inspection and by the tests described in **12.6.2** and **12.6.3** as applicable, carried out after the mechanical strength tests described in clause **20**.

12.6.2 Each plug cover fixing screw has a pull of 60 N exerted upon it for 1 min whilst at a temperature of 70 ± 2 °C. The test is carried out using apparatus similar to that shown in Figure 6 and for the test the plug cover and apparatus are placed in an oven until they reach the required temperature.

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

12.6.3 For rewirable plugs having covers fixed by means other than screws and for non-moulded-on, non-rewirable plugs, all the plug pins are clamped together in a suitable jig and subjected to a pull of 60 N whilst suspending the cover by means of a “nest” to suit the plug cover profile. The test is carried out in an oven at a temperature of 70 ± 2 °C and the pull applied for 1 min after the temperature has been attained.

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

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

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

Immediately after the test described in **16.1.2**, test finger III of BS 3042:1971 is applied to the accessible surface of the plug with a force not exceeding 30 N. It shall not be possible to touch live parts.

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

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

12.9 Plug pins shall be of brass. Materials other than brass shall not be used in the construction of plug pins except for sleeves of pins as specified in **12.16**. Plugs fitted with solid pins shall comply with **12.9.1**. Plugs fitted with non-solid pins shall comply with **12.9.2**.

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

12.9.1.1 Compliance shall be checked by inspection.

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

12.9.2.1 Compliance shall be checked by inspection.

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

12.9.3.1 Compliance shall be checked by inspection and in case of doubt by the test described in **C.1**.

12.9.4 Plug pins shall have adequate strength to withstand the stresses of normal use.

12.9.4.1 For solid pins, compliance shall be checked by the test described in **C.5**. After this test the plug shall fit the gauge shown in Figure 5.

For non-solid plug pins, compliance shall be checked by the test described in **C.3**. After the test the pins shall comply with **12.9.2** and **12.9.3** and the plugs shall fit the gauge shown in Figure 5. Separate samples shall be used to check pins in accordance with the test described in **C.2**.

12.9.5 Non-solid pins shall not cause excessive wear to socket contacts or shutters.

12.9.5.1 Compliance shall be checked by the tests described in **C.4**. After the tests the socket-outlets used shall still meet the requirement specified after the test described in **18.1.2** and the plug pins shall remain intact with no openings in the surfaces, joints or seams which will accept the probe described in **C.1**.

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

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

The plug is clamped in a block as shown in Figure 33. Each pin is twisted about its longitudinal axis by applying a torque of 0.95 N m for 1 min. The torque tube and its position on the plug pin shall be as shown in Figure 33. After each pin has been separately twisted the plug shall fit the gauge shown in Figure 5. The test shall then be repeated with each plug pin being twisted in the opposite direction to that of the first test. After this second test the plug shall fit the gauge shown in Figure 5.

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

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

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

12.10.1 Compliance shall be checked by inspection and the tests described in **20.1.3** and **16.1.2**.

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

12.11.1 Compliance shall be checked by the following test.

After the tests described in clause **20** each pin is subjected for 1 min to a pull of 100 N without jerks in the direction of the major axis. The plug is mounted using the steel plate shown in Figure 7. The apparatus is placed within an oven and the pull is applied 1 h after the plug body has attained the test temperature of $70 \pm 2^\circ\text{C}$.

After the test the plug pin shall comply with the gauges shown in Figure 5.

12.12 The degree of flexibility of mounting of the plug pins and the angular movement of the pins in the base shall not be excessive.

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

Plugs shall be checked using the apparatus shown in Figure 8.

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

The unclamped pin shall be tested by applying a deflection force of 4.4 N at the position and in the four directions shown in Figure 8. The test shall be repeated in turn on the other two pins of the plug.

During each test the deflection measured on the scale shall not exceed 3° . After all tests have been completed the plugs shall fit the gauge shown in Figure 5.

12.13 Suitable means shall be provided for withdrawing the plug without subjecting the flexible cord to stress.

12.13.1 Compliance shall be checked by inspection.

12.14 Non-rewireable plugs shall be fitted with flexible cords in accordance with **19.4**.

12.14.1 Compliance shall be checked by inspection.

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

12.15.1 Compliance shall be checked by inspection and manual manipulation.

12.16 Line and neutral plug pins shall be fitted with insulating sleeves. The dimensions of the pin and sleeve shall fall within those required by Figure 4.

Sleeves shall not be fitted to any earthing plug pin.

12.16.1 Compliance shall be checked by inspection and by measurement for the pin and sleeve, and by the use of the gauge shown in Figure 5 for compatibility with the socket-outlet.

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

12.17.1 Compliance shall be checked by the tests described in **12.17.2**, **12.17.3** and **12.17.4**.

12.17.2 A 50 Hz voltage of substantially sinusoidal waveform is applied between each L and N pin and a thin metal strip of 6 mm width wrapped around the base of the plug pin sleeve adjacent to the base of the plug. Initially not more than 500 V is applied, the voltage then being raised to $1\,250 \pm 30$ V which is maintained for 60 ± 1 s.

During the test no breakdown or flashover shall occur.

12.17.3 The test apparatus for resistance to abrasion (see Figure 9) comprises a horizontally disposed beam pivoted about its centre point. A short length of steel wire, 1 mm in diameter and bent into a U-shape, the base of the U being straight, the surface smooth with no defects, is rigidly attached at both ends to one end of the beam so that the straight part of the wire projects below the beam and is parallel to the axis of the beam pivot. The plug is held in a suitable clamp as shown in Figure 9 in such a position that the straight part of the steel wire rests upon the plug pin at right angles to it and the plug pin slopes downward at an angle of 10° to the horizontal. The beam is loaded so that the wire exerts a force of 4 N on the pin.

The plug is moved backwards and forwards in a horizontal direction in the plane of the axis of the beam so that the wire rubs along the pin. The length of pin thus abraded is approximately 9 mm of which approximately 7 mm is over the insulating sleeve.

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

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

After the test the sleeve shall show no damage which might impair the further use of the plug. The sleeve shall not have been penetrated or creased and shall satisfy the tests described in **12.17.2**.

However, abraded brass material which may contaminate the surface of the sleeve shall be removed for the purpose of this test.

12.17.4 A set of three specimen pins is tested by means of the apparatus shown in Figure 10 which has a blade 0.7 mm wide and a radius of 3 mm. The test is made on one pin of each plug not used for the test described in **12.17.3**.

A specimen is positioned as shown in Figure 10 and the apparatus is loaded so that the blade exerts a force of 2.5 N on the specimen. The apparatus, complete with specimen is then placed in a heating cabinet at $200^{+0}_{-5}^\circ\text{C}$ for a period of 2 h, after which the specimen is removed and immediately cooled by immersion in water at approximately room temperature.

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

13 Construction of socket-outlets

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

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 the plug pins.

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

NOTE Raised marking is permitted provided it does not project more than 0.5 mm from the engagement face and provided the requirements of **13.2** are met.

13.2 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.

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

13.3 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 not be less than 9.6 mm.

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

13.4 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 the corresponding plug pin having the minimum dimensions shown in Figure 4. The means for producing the contact pressure shall be associated with each socket contact independently and shall not be dependent on insulating material other than ceramic or mica. Each socket contact shall be reliably connected to the fixed parts of its terminal or termination.

13.4.1 Compliance shall be checked by the tests described in **13.4.2** and **13.4.3**.

13.4.2 The voltage drop between any individual line or neutral socket contact and the corresponding pin is measured between the terminal connecting strap at a point immediately adjacent to the socket contact and the corresponding plug pin. It shall not exceed 25 mV at 13 A, except that in switched socket-outlets the voltage drop in a switched pole of a clean new switched socket-outlet, measured from the terminal of a single switched socket-outlet, or from the terminal connecting strap of a multiple socket-outlet, to the corresponding plug pin, shall not exceed 60 mV at 13 A.

13.4.3 The withdrawal pull of a gauge as shown in Figure 16 from any individual line or neutral socket contact is checked ensuring that neither the shutter mechanism, nor the material of the cover or base moulding, have any effect on the results of the test. The socket contact shall retain the gauge for 30 s when the socket-outlet is held horizontally with the gauge hanging vertically downwards.

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

13.5.1 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 contact as far as the pin D and a mass of 0.75 kg is suspended from pin C for 30 s. The socket-outlet is rotated through 180° about an axis perpendicular to the engagement face and the load applied to pin C for a further 30 s. The test is repeated with the gauge inserted in the neutral socket contact.

After the test the socket contacts shall retain the weight gauge shown in Figure 16(b) for 30 s when the socket-outlet is held horizontally with the gauge hanging vertically downwards.

13.6 Earth socket contacts shall withstand the stresses imposed upon them by the attempted incorrect insertion of plugs.

13.6.1 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 contact as far as the pin B, and a mass of 0.75 kg is suspended from pin D for 30 s. The socket-outlet is rotated through 180° about an axis perpendicular to the engagement face and the load applied to pin D for a further 30 s.

After the test the earth socket contacts shall retain the weight gauge shown in Figure 16(a) for 30 s when the socket-outlet is held horizontally with the gauge hanging vertically downwards.

13.7 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 16(b)] inserted into any current-carrying socket aperture shall not open the shutter.

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

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

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

13.8.1 Compliance shall be checked by the following test.

A plug complying with this standard having pins of maximum dimensions 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 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.

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

13.9 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 when a corresponding plug is in position.

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.

13.9.1 Compliance shall be checked by inspection and measurement.

13.10 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 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.

13.10.1 Compliance shall be checked by inspection and measurement.

13.11 The actuating member of a switch shall not remain at rest in the off position whilst the switch contacts remain closed.

The actuating mechanism shall be so constructed that when operated the switch can remain only in a position giving adequate contact or adequate separation of the contacts.

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.

13.11.1 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 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 2 s and any arcing shall cease.

13.12 Multiple socket-outlets shall be capable of simultaneous use of all socket-outlets.

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

13.13 If a fuse-link is fitted to a socket-outlet it shall comply with BS 1362 and shall be mounted in suitable contacts between the line terminal or terminations and the corresponding socket contact or contacts.

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.

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 shall be formed in one piece with a fixed part of the terminal or connected to it in such a way that it cannot work loose in normal use, and the other contact for the fuse-link shall be similarly connected to the corresponding socket contact.

13.13.1 Compliance shall be checked by inspection and by the application of the standard test finger I of BS 3042:1971 and the test pin shown in Figure 1.

Fuse-link clips in socket-outlets shall be checked for mechanical strength by the insertion and withdrawal test described in 20.1.2.

Voltage drop shall be checked by the section of 13.4.2 relating to switched socket-outlets, replacing the fuse-link with a link of negligible impedance.

Current making and breaking of fuse-links shall be checked by the test described in clause 17 after which the temperature-rise test described in clause 16 shall be carried out.

13.14 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.

13.14.1 Compliance shall be checked by inspection and manipulation.

13.15 For flush socket-outlets intended to be used in enclosures complying with BS 4662 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 is not less than 6 mm and such that the clearance between the overall depth of the base or bases and the bottom of the 35.0 mm deep box or enclosure is not less than 14 mm, when the box or enclosure and the socket-outlet are in the relative positions they will occupy in use, except that encroachments on these clearances shall be permissible provided that there is no interference with at least one conduit or cable entry on each face of the box or enclosure.

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 which may come into contact with the base.

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 mm² cable cores with their insulation, the sheath, if any, having been removed.

13.15.1 Compliance shall be checked by inspection and measurement.

13.16 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 complying with BS 1210.

Flush-mounted socket plates intended for mounting on boxes to BS 4662 shall have provision for two M3.5 fixing screws at centres of 60.3 ± 0.2 mm on the horizontal or vertical centrelines for 1-gang socket-outlets or 120.6 ± 0.3 mm on the longitudinal centreline for 2-gang socket-outlets.

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.

13.16.1 Compliance shall be checked by inspection and measurement.

13.17 Flush socket-outlet plates either of insulating material or metal, or a combination of both, shall be 82.5 mm $\times$ 82.5 mm minimum for single socket-outlets and 82.5 mm $\times$ 142.5 mm minimum for multiple socket-outlets.

13.17.1 Compliance shall be checked by inspection and measurement.

13.18 The base and cover of a portable socket-outlet shall be fastened together so that they cannot be detached from each other without the aid of a tool.

13.18.1 Compliance shall be checked by inspection.

13.19 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.

13.19.1 Compliance shall be checked by inspection and by use of test finger III of BS 3042:1971 applied with a force of 30 N immediately after the appropriate temperature-rise test described in clause 16.

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

13.20.1 Compliance shall be checked by inspection.

14 Resistance to ageing and humidity

14.1 Accessories shall be resistant to ageing.

14.1.1 Compliance shall be checked by the following test.

The items are suspended freely in a recirculating oven with approximately cubic proportions which is then maintained at a temperature of 70 ± 2 °C for 168 h. The chamber shall have ventilating holes in the top and bottom and the ratio of the cross-sectional area of the ventilating holes to the cross-sectional area of the chamber shall be between 1 : 200 and 1 : 250. It is recommended that the cabinet be electrically heated.

After the treatment the items are removed from the cabinet and left at room temperature for at least 4 h and then subjected to the tests given in Table 1.

14.2 Accessories shall be proof against humid conditions which may occur in normal use.

14.2.1 Compliance shall be checked by the humidity treatment described below and immediately followed by the tests described in clause 15.

Rewireable plugs and portable socket-outlets are fitted with 1 m of 3-core 1.25 mm² PVC cord as given in Table 16 of BS 6500:1984. Non-rewireable plugs and socket-outlets are tested with 1 m 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 °C, between 20 °C and 30 °C, is chosen as a reference temperature. The sample is brought to a temperature of between T °C and $T + 4$ °C and is then placed in a humidity cabinet containing air with a relative humidity maintained between 91 % and 95 %. The temperature of the air at all positions within the cabinet where samples can be placed shall be kept within 1 °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 91 % and 95 % can be obtained by placing in the humidity cabinet a saturated solution of potassium nitrate (KNO_3) or sodium sulphate (Na_2SO_4) in water having a sufficiently large contact surface with the air.

In order to achieve the specified conditions within the cabinet it is necessary to ensure constant circulation of the air within the cabinet and, in general, to use a cabinet which is thermally insulated.

The tests described in clause 15 shall be made in the humidity cabinet or 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 standard.

15 Insulation resistance and electric strength

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

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

15.1.2 The insulation resistance is measured using a d.c. voltage of not less than 500 V applied for a sufficient time for the reading of the measuring instrument to become steady. The insulation resistance is measured consecutively between:

- a) line and neutral terminals;
- b) line and neutral terminals connected together and:
 - 1) a metal foil in contact with the entire accessible external surface;
 - 2) the earthing terminal;
 - 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:

- i) 5 M Ω between parts of opposite polarity;
- ii) 5 M Ω between parts of opposite polarity connected together, and other parts insulated therefrom, including earthed metal;
- iii) 2 M Ω 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 are not directly accessible, e.g. in non-rewireable plugs and socket-outlets, these tests shall be made using accessible parts, e.g. pins or socket-outlets contacts, known to be connected to the terminals.

15.1.3 A 50 Hz voltage of substantially sinusoidal waveform is applied as described in 15.1.2. Initially, not more than 1 000 V is applied, the voltage then being raised to $2\,000 \pm 60$ V. The high voltage source used shall be such that when the output is adjusted to $2\,000 \pm 60$ V for 1 min 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 are ignored.

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

15.2 Each non-rewireable plug shall withstand a high voltage test, for which the test voltage shall be alternating, applied between all current-carrying parts connected together and a conducting electrode in contact with the entire outer accessible surface, omitting the engagement face. This test shall be carried out at 6 kV for a period between 3 s and 5 s.

During the test no breakdown or flashover shall occur.

Glow discharges without drop in voltage are ignored.

16 Temperature rise

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

16.1.1 Compliance shall be checked by the tests described in 16.1.2, 16.1.3 and 16.1.4 for plugs, fixed socket-outlets and portable socket-outlets respectively.

The tests shall be carried out at rated voltage.