

13 A plugs, socket-outlets and adaptors —

Part 3: Specification for adaptors

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Committees responsible for this British Standard

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

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- Association for Consumer Research (ACRE)
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- Fire Offices Committee
- Royal Society for the Prevention of Accidents

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Contents

	Page
Committees responsible	Inside front cover
Foreword	iii
1 Scope	1
2 Definitions	1
3 Classification and rating	2
4 Conditions of use	2
5 General requirements	3
6 General conditions for type testing	3
7 Marking and labelling	3
8 Creepage distances, clearances and distances through insulation	5
9 Accessibility of live parts	5
10 Provision for earthing	6
11 Terminals and terminations of intermediate adaptors and adaptor plugs	6
12 Construction of adaptors (plug portion)	8
13 Construction of adaptors (adaptor socket-outlet portion)	12
14 Resistance to ageing and humidity	14
15 Insulation resistance and electric strength	15
16 Temperature rise	15
17 Breaking capacity of adaptors	17
18 Normal operation of adaptors	17
19 Connection of flexible cords and cord anchorage in intermediate adaptors and adaptor plugs	17
20 Mechanical strength	19
21 Screws, current-carrying parts and connections	20
22 Resistance to heat	21
23 Resistance to abnormal heat, fire and tracking	22
24 Resistance to excessive residual stresses and to rusting	23
Appendix A The construction and calibration of a calibrated link	24
Appendix B Standard test plug for temperature-rise test	25
Figure 1 — Test pin	25
Figure 2 — Test plug	25
Figure 3 — Gauge for adaptor pins	26
Figure 4 — GO gauges for standard adaptor socket-outlet	27
Figure 5 — “Contact” test gauge	28
Figure 6 — “Non-contact” test gauge	29
Figure 7 — Withdrawal pull gauges for effectiveness of contact	30
Figure 8 — Identification of contacts	31
Figure 9 — Dimensions and disposition of pins and maximum outline	31
Figure 10 — Apparatus for testing adaptor enclosure fixing screws	32
Figure 11 — Apparatus for tests on adaptor pins	33
Figure 12 — Apparatus for testing adaptor pin distortion by twisting	34
Figure 13 — Mounting plate	34
Figure 14 — Pin deflection test apparatus for adaptors	35
Figure 15 — Apparatus for abrasion test on insulating sleeves of adaptor pins	36
Figure 16 — Apparatus for pressure test at high temperature	37
Figure 17 — Test apparatus and circuit for use with “contact” and “non-contact” test gauges	38

	Page
Figure 18 — Simulated plug and cord devices for tests of 13.10 and 13.11	39
Figure 19 — Apparatus for calibration of turning moment of the simulated plug and cord devices shown in Figure 18	40
Figure 20 — Apparatus for checking turning moments of simulated plug and cord devices	41
Figure 21 — Dummy front plate for 13 A socket-outlet for temperature-rise test	42
Figure 22 — Test cabinet for temperature-rise test	43
Figure 23 — Apparatus for flexing test	44
Figure 24 — Solid link for test on fuse clips (for BS 1362 fuse-links)	45
Figure 25 — Solid link for test on fuse clips (for BS 646 fuse-links)	45
Figure 26 — Pendulum impact test apparatus	46
Figure 27 — Tumbling barrel	48
Figure 28 — Apparatus for pressure test on adaptors	49
Figure 29 — Ball pressure test apparatus	50
Figure 30 — Calibrated link	51
Figure 31 — Calibration jig for calibrated link	52
Figure 32 — Test plug for temperature-rise test	53
Table 1 — Test schedule for adaptors	3
Table 2 — Current, fuse rating and load for flexing and cord grip tests related to size of flexible cord	4
Table 3 — Torque values for screws and nuts	7
Table 4 — Permitted temperature rises	17
Table 5 — Connection of flexible cords	20
Table 6 — Application of glow-wire test	22
Publications referred to	Inside back cover

Foreword

This Part of BS 1363 has been prepared under the direction of the Power Electrical Engineering Standards Committee.

This Part of BS 1363 covers adaptors for use with socket-outlets complying with BS 1363:1984. The latter standard covers both 13 A plugs and socket-outlets, and it is intended to revise it and divide it into Part 1: Plugs, and Part 2: Socket-outlets.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 54, 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 Scope

This Part of BS 1363 specifies requirements for adaptors having insulating sleeves on the line and neutral plug pins and suitable for use with socket-outlets complying with BS 1363:1984, with particular reference to safety in normal use.

Adaptors specified in this Part of BS 1363 are intended for household, commercial and light industrial purposes. The adaptors are suitable for the connection of portable appliances, sound-vision equipment, luminaires, etc., in a.c. circuits only, operating at voltages not exceeding 250 V at 50 Hz.

Assemblies comprising a plug and one or more portable socket-outlets connected together by a flexible cord or cable are not considered to be adaptors according to this Part of BS 1363. Devices incorporating switches, transformers, timers, thermostats or other control means are outside the scope of this Part of BS 1363.

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

2 Definitions

For the purposes of this Part of BS 1363 the following definitions apply.

2.1

adaptor

a portable accessory having plug pins, intended to engage with the contacts of a BS 1363 socket-outlet, and having socket-outlet contacts to accommodate one or more plugs

2.2

fused adaptor

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

2.3

conversion adaptor

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

2.4

multiway adaptor

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

2.5

shaver adaptor

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

2.6

intermediate adaptor

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

2.7

adaptor plug

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

2.8

rewireable adaptor

an adaptor as in 2.6 or 2.7, so constructed that a cable or flexible cord can be fitted or replaced using general purpose tools

2.9

non-rewireable adaptor

an adaptor as in 2.6 or 2.7, so constructed that it forms a constructional unit with the flexible cord such that the flexible cord cannot be separated from the adaptor without making it permanently useless, and the adaptor cannot be opened by hand or by using a general purpose tool, e.g. a screwdriver and/or pliers, without making the adaptor permanently useless

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

2.10

accessible external surface of an adaptor

all surfaces which can be touched by test finger I of BS 3042:1971 when the adaptor is in full engagement with a corresponding socket-outlet without any plugs being in engagement with the adaptor

2.11

engagement surface of an adaptor

that surface which cannot be touched by test finger I of BS 3042:1971 when the adaptor is in full engagement with a corresponding socket-outlet without any plugs being in engagement with the adaptor

2.12

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 adaptor without the use of special tools

2.13**screw-type terminal**

a terminal in which the connection is made directly 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.

2.14**termination**

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

2.15**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.

2.16**fuse carrier**

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

2.17**type test**

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

2.18**fine wire thermocouple**

a thermocouple having wires not exceeding 0.3 mm in diameter

2.19**calibrated link**

a calibrated heat source for use in place of a BS 1362 fuse-link during temperature-rise tests

2.20**indicator lamp (pilot lamp)**

a lamp which illuminates to indicate that the adaptor is energized

2.21**shutter**

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

2.22**adaptor socket-outlet**

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

3 Classification and rating

3.1 Adaptors shall be classified as follows, as appropriate:

- a) fused or unfused;
- b) conversion (from the BS 1363 system to another);
- c) multiway (from the BS 1363 system to multiple outlets);
- d) intermediate;
- e) adaptor plug;
- f) rewirable or non-rewirable (in the case of an intermediate adaptor or adaptor plug);
- g) shaver adaptor.

3.2 The rated current of an adaptor shall be:

- a) equal to the sum of the rated currents of the adaptor socket-outlet portions, if this sum is lower than 13 A; or
- b) 13 A if the sum of the rated currents of the adaptor socket-outlet portions is higher than 13 A; or
- c) 13 A for an adaptor plug; or
- d) 1 A for a shaver adaptor.

4 Conditions of use

Adaptors shall be suitable for use under the following conditions:

- a) an ambient temperature in the range -5°C to $+35^{\circ}\text{C}$, 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.

5 General requirements

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

Adaptors shall be capable of meeting all the relevant requirements and tests specified in this standard.

Gauges to Figure 3, Figure 4, Figure 5, Figure 6 and Figure 7 shall be deemed 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.

6 General conditions for type testing

6.1 All tests are type tests.

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

The adaptors 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 adaptors shall be supplied with an appropriate flexible cord which shall be at least 1 m long.

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

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

If one specimen fails in the complete series of tests given in Table 1 then adaptors of that type shall be deemed not to comply with this standard unless that specimen can be shown to be not representative of normal production or design, in which case a further set of adaptors shall be submitted to the test or tests in that particular group. If there is no failure in this re-test then adaptors of that type shall be deemed to comply with this standard.

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

6.2 All inspections and tests, of any one classification (see clause 3), shall be carried out as specified in the clauses listed in Table 1 on the number of specimens and in the order given.

Table 1 — Test schedule for adaptors

Set	No. of specimens	Order or tests for all adaptors
1	3	6.1, 7, 8.1, 9, 10.1, 11, 12.1, 12.2, 12.4, 12.5, 12.6, 12.12, 12.13, 13.1, 13.2, 13.3, 13.4, 13.5, 13.6, 13.8, 13.9, 13.10, 19
2	3	6.1, 17, 12.8, 20.2.4, 12.10, 8.0, 9, 12.14, 15
3	3	6.1, 14.1, 14.2, 15, 21, 10.2, 16, 8.2, 22.1 a) [including 15.1 a) 2) i) and 15.1 b)], 22.1 b) [including 9.2 and 15.1 b)], 23.2, 24
4	3	6.1, 12.11, 12.3, 13.7, 18, 13.7, 13.11, 9.1, 10.2, 12.7, 20.2.2, 20.2.3, 20.2.5, 16, 16, 23.3
5	3	6.1, 12.9 (conduct tests applicable to solid pins only) 22.2
Additional tests for adaptors with non-solid pins		
6	3	6.1, 12.9.3, 12.9.4, 12.9.6
7	3	6.1, 12.9.5 a), 12.9.3, 12.9.4
8	3	6.1, 12.9.5 b)

7 Marking and labelling

7.1 Marking

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

- The number of this Part of this British Standard, i.e. BS 1363-3¹⁾.
- The name or trade mark of the manufacturer or responsible vendor.
- On rewireable adaptors, the terminals intended for the connection of the various conductors shall be identified by the symbols given in 7.4.

¹⁾ Marking BS 1363-3 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 therefore solely the responsibility of the person making the claim. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

- d) For fused adaptors, the words “FUSE” or “FUSED” or the symbol (given in 7.4) on the external accessible surface of the adaptor.
- e) Non-rewireable adaptors shall be marked on the engagement surface with the rated current of the fuse-link fitted, which shall not exceed the value given in Table 2 for the appropriate size of flexible cord.
- f) Adaptors other than shaver adaptors shall be marked, on the engagement surface, with their total maximum electrical load intended to be connected in amperes, as calculated in 3.2, e.g. “MAX 13 A”.
- g) Shaver adaptors shall be marked on the accessible external surface with appropriate words, e.g. “SHAVERS ONLY”.

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

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

Flexible cord size	Rated current	Test current	Fuse rating	Load for flexing test	Load for cord 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 adaptor/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.

Compliance for legibility shall be checked by inspection, using normal or corrected vision without additional magnification. Compliance for durability shall be checked by rubbing the marking, by hand, for 15 s using a piece of cloth soaked in water, and again for 15 s with a piece of cloth soaked in petroleum spirit. After this test the marking shall remain easily legible. Petroleum spirit used for this test shall consist of a solvent hexane having a maximum aromatics content of 0.1 % by volume, a kauri-butanol value of 29, an initial boiling point of approximately 65 °C, a dry point of approximately 69 °C, and a relative density at 15/15 °C of approximately 0.68.

NOTE Relative density may be determined by the method described in BS 4714.

Marking made by engraving, moulding, or a similarly permanent process, is deemed to comply with the requirement for durability without testing.

7.2 Labelling

7.2.1 Rewireable intermediate adaptors and adaptor plugs shall have a removable tag or label indicating the rating of the fuse-link fitted, e.g. “Fitted with X ampere fuse” (where X denotes the rating of the fuse-link).

Compliance shall be checked by inspection.

7.2.2 Intermediate adaptors and adaptor plugs fitted with a flexible cord (unless supplied direct to a manufacturer for incorporation in other equipment) shall have a label attached to the cord giving the following information.

- a) The substance of the following warning:
“The flexible cord of this adaptor plug must be connected to a piece of equipment before being plugged into a socket-outlet”.
- b) The maximum rating, in A, of the equipment to which it may be fitted (as given in Table 2).
- c) The colour code of the cores of the flexible cord as follows:
“IMPORTANT. Wires in the mains lead are coloured in accordance with the following code:

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

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

Compliance shall be checked by inspection.

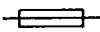
7.3 Instructions

Rewireable and non-rewireable adaptors and adaptor plugs shall be provided with adequate instructions for the safe connection of the appropriate flexible cords.

Compliance shall be checked by inspection.

7.4 Symbols

When symbols are used, they shall be as follows.

A	amperes
V	volts
~	alternating current ^a
L	line (adaptor plugs)
L in or L1	supply line terminal (intermediate adaptors)
L out or L2	load line terminal (intermediate adaptors)
N	neutral
 (preferred) or	earth ^a
	
	fuse ^a

^a See BS 6217.

8 Creepage distances, clearances and distances through insulation

8.1 Creepage distances and clearances

When the adaptor is correctly assembled and in the case of intermediate adaptors or adaptor plugs, wired with the appropriate flexible cord, the minimum clearance through air and the minimum creepage distance shall be 2.5 mm:

- 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);
- between live parts and any other metal parts;
- between live parts and the accessible external surface of the adaptor;
- between component parts in the fused line circuit which are separated by the removal of the fuse-link.

Any metal parts of adaptors other than the pins, which are exposed on the engagement surface of an adaptor and are in contact with live parts shall be recessed at least 3.0 mm below the engagement surface.

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

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 and left in the most unfavourable position. In rewirable intermediate adaptors or adaptor plugs the clearances are measured when the adaptors are 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 Distances through insulation

Adaptors 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 requirements of this subclause do not apply to any flexible cord connected to the adaptor or to sleeves on plug pins of adaptors.

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 adaptor 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 Adaptors shall be so designed that live parts are not accessible when mounted as in normal use.

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

9.2 Live parts of intermediate adaptors shall not be accessible when wired as in use and in full engagement in a corresponding socket-outlet. Additionally adaptor plugs shall comply with this requirement without a flexible cord fitted.

Compliance shall be checked by the application of test pin II of BS 3042:1971 applied with a force of 5 N with non-rewirable adaptors fitted with their appropriate flexible cords, rewirable adaptor plugs, without a flexible cord fitted, and rewirable intermediate adaptors fitted with a 2-core 0.5 mm² flexible cord in accordance with T of BS 6500:1985.

9.3 Adaptors shall be designed and constructed so as to protect the user against accidental contact with live parts during insertion or withdrawal from corresponding socket-outlets.

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

9.4 Where an intermediate adaptor or adaptor 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.

Compliance shall be checked by inspection.

9.5 It shall not be possible to introduce a conducting device through the earthing socket aperture of an adaptor in such a manner that there is a risk of making contact with live parts.

Compliance shall be checked by introducing a rigid metal pin, of 1 mm diameter and 60 mm long, through any earthing socket aperture of an adaptor mounted as in normal use. The pin shall not touch live parts.

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

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

Immediately after the tests described in **16.2** test finger III of BS 3042:1971 is applied to the accessible surface of the adaptor with a force of 30 N. It shall not be possible to touch live parts.

10 Provision for earthing

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

Compliance shall be checked by inspection.

10.2 All accessible metal parts of adaptors shall be in effective electrical contact with the earthing socket contact and earthing plug pin, except that metal parts on, or screws in or through, 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 and 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.

Compliance shall be checked by inspection and:

- a) for metal parts insulated from live parts, by the test described in **15.1** b);

b) for metal parts connected to an earthing terminal and 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 all adaptors, between the earthing plug pin and

- i) the terminal of an earthing plug pin inserted into each earthing socket contact, and

- ii) any accessible metal part intended to be earthed;

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

- i) the remote end of an earthing plug pin, and

- ii) any accessible metal part intended to be earthed.

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

11 Terminals and terminations of intermediate adaptors and adaptor plugs

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

Compliance shall be checked in accordance with **11.2** to **11.8**.

11.2 Rewireable adaptors shall be provided with terminals as defined in **2.13**.

Compliance shall be checked by inspection.

11.3 Non-rewireable adaptors 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 of 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.

Compliance shall be checked by inspection and measurement.

11.4 Terminals in rewireable adaptors shall permit the connection, without special preparation, of flexible cords having nominal conductor cross-sectional areas of 0.5 mm² to 1.5 mm².

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

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

Compliance shall be checked by inspection and measurement.

11.6 Terminal screws shall have a nominal outside diameter of thread of not less than 3 mm or be not smaller than 6 BA.

Compliance shall be checked by inspection and measurement.

11.7 Insulating barriers in adaptors 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 in a fused adaptor coming into contact with the line pin assembly.

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

Non-rewireable adaptors are excluded from this test.

The adaptor is wired as in normal use with a 0.5 mm² appropriate 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.

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 3.0 up to and including 3.2	0.3	0.6	0.6
Over 3.2 up to and including 3.6	0.4	0.8	0.6
Over 3.6 up to and including 4.1	0.7	1.2	0.6
Over 4.1 up to and including 4.7	0.8	1.8	0.9
Over 4.7 up to and including 5.3	0.8	2.0	1.0
Over 5.3 up to and including 6	—	2.5	1.25

^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.

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

The test is made six times in all.

For each new test a fresh section of the cord is fitted and the flexible cord rotated through approximately 60° in the plane perpendicular to its major axis in a clockwise direction before fitting, unless the design is such that this is not practicable.

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

11.8 Terminals of adaptors shall be so located or shielded that should a wire of a flexible 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.

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 mm². One wire of the 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 adaptors (plug portion)

12.1 General

The disposition, dimensions and centres of the pins, and the width of the body for a minimum height of 6.35 mm from the engagement surface shall correspond with those shown in Figure 8 and Figure 9.

Compliance shall be checked by inspection, measurement and the use of the gauge shown in Figure 3.

12.2 Internal connections: design

The design of internal connections shall ensure that plug pins and socket contacts and terminations for flexible cords maintain correct polarity between the input and output sides of the device.

Compliance shall be checked by inspection and by an electrical continuity test.

12.3 Internal connections: reliability

Internal electrical connections including earthing connections shall be reliable and be of low resistance. Screwed or rivetted joints shall not loosen in normal service. Internal electrical connections to fuse-clips shall not be made by means of screws.

Compliance shall be checked by inspection and by the tests of clauses 18 and 20 followed by the test of clause 16.

12.4 Distance of line and neutral pins from periphery

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

Compliance shall be checked by measurement.

12.5 Fuses

The following requirements to provide fuses in adaptors shall be met.

- a) An adaptor having one or two adaptor socket-outlets for 13 A plugs complying with BS 1363 need not be fused.
- b) A multiway adaptor having more than two adaptor socket-outlets for BS 1363 plugs shall be provided with a 13 A fuse-link complying with BS 1362.
- c) A multiway adaptor having one adaptor socket-outlet for a BS 1363 plug and one or more adaptor socket-outlets for plugs complying with other standards, shall be provided with an appropriate fuse-link, complying with BS 646 or BS 1362, to protect the outgoing circuit or circuits. The adaptor socket-outlet for the BS 1363 plug need not be fused.
- d) An adaptor having adaptor socket-outlets for plugs complying with standards other than BS 1363 shall be provided with an appropriate fuse-link, complying with BS 646 or BS 1362, to protect the outgoing circuit or circuits.
- e) An adaptor plug or an intermediate adaptor shall be provided with an appropriate fuse-link, complying with BS 646 or BS 1362, to protect the outgoing flexible cord.

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

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

Compliance shall be checked by inspection.

12.6 Fuse carriers

In non-rewireable intermediate adaptors and adaptor plugs where the fuse-link is retained by means of a fuse-carrier, this device shall be either:

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

Compliance shall be checked by inspection.

12.7 Security of parts

All external parts of adaptors and any internal parts of insulating material necessary to separate live parts or to locate them in position, shall be adequately secured.

Compliance shall be checked by inspection and by the tests of 20.2.4 and 20.2.5.

12.8 Dismantling

It shall not be possible to dismantle the adaptor unless the adaptor is completely withdrawn from the socket-outlet. Any fixing screws which secure external parts together shall provide reliable attachment. It shall not be possible to dismantle the adaptor without the aid of a tool.

The base and cover of non-rewireable intermediate adaptors and adaptor plugs shall be permanently attached to each other.

Compliance shall be checked by inspection and by the following tests as appropriate.

- a) Each adaptor cover fixing screw shall have 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 10 and for the test the adaptor cover and apparatus are placed in an oven until they reach the required temperature.

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

- b) For adaptors having covers fixed by means other than screws, 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 adaptor 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.

12.9 Pins

12.9.1 Adaptor 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 12.13. Adaptors shall comply with the subclauses relevant to solid or non-solid pins as specified in Table 1.

12.9.2 All exposed surfaces of solid 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.

Compliance shall be checked by inspection.

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

Compliance shall be checked by inspection.

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

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

Push a probe of 0.2 mm diameter of steel complying with Table 1 of BS 5216:1975 into all seams and joints. Check that the test probe does not enter into any seam or joint to a depth greater than the thickness of the material from which the plug pin is formed.

12.9.5 Pins shall have adequate strength to withstand the stresses of normal use.

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

Position a pin on the fixed anvil of the apparatus, as shown in Figure 11, with its contact surfaces in the horizontal plane. Bring the movable anvil to rest against the upper surface of the pin. The quiescent position shall be taken as the datum point. Apply a force of 1 100 N to the movable anvil by any convenient method such that the pin is strained at a rate not greater than 10 mm/min. The test shall be made separately on the line, neutral and earth pins applying the load perpendicular to the major axis surfaces of the pins.

After this test the adaptor shall fit the gauge shown in Figure 3 with a force of 5 N applied.

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

- a) Position a pin on the fixed anvil of the apparatus, as shown in Figure 11, with its contact surfaces in the horizontal plane. Bring the movable anvil to rest against the upper surface of the pin. Apply a force of 800 N to the movable anvil 50 times without impact.

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

After the test the pins shall comply with **12.9.3** and **12.9.4** and the adaptor shall fit the gauge shown in Figure 3 with a force of 5 N applied.

- b) Separate samples shall be used to check in accordance with the following test:

Position a pin on the fixed anvil of the apparatus, as shown in Figure 11, with its contact surfaces in the horizontal plane. Bring the movable anvil to rest against the upper surface of the pin. This quiescent position shall be taken as the datum point. Apply a mechanical load to the movable anvil by any convenient method such that the pin is strained at a rate of 10 mm/min. Measure the applied load when the movement of the anvil from the datum point reaches 1.5 mm. The test shall be made separately on the line, neutral and earth pins applying the load perpendicular to the major axis surfaces of the pins. If there is a joint or seam in one of the major axis surfaces of a pin then the test shall be made twice. The seam or joint shall face the moving anvil for the first test and shall face the fixed anvil for the second test. The load shall be not less than 1 100 N.

12.9.6 Adaptors with non-solid pins shall not cause excessive wear to socket contact or shutters of socket-outlets complying with BS 1363:1984.

Compliance shall be checked by the following tests.

The test is carried out using a combination of adaptors with non-solid pins and three different types of new and unused single unswitched socket-outlets complying with BS 1363:1984. One type of socket-outlet shall have the shutters operated by the line and neutral pins, the other two types of socket-outlet shall have the shutters operated by the earth pin: of these two types of socket-outlet one shall have a shutter operating ramp of metal and the other of plastic.

The combination of adaptors having non-solid pins and each type of socket-outlet as described shall make and break a current of 13 A at 250 V a.c. 15 000 times (30 000 movements) in a substantially non-inductive circuit.

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

After the test the shutters of the socket-outlets shall be operating satisfactorily, the socket contacts safely shielded and the socket-outlets shall be in accordance with **9.1**, **10.2**, **13.6**, **13.7**, **13.8** and clauses **15** and **16** of BS 1363:1984 and the permitted values of voltage drop described in **13.4.2** of that standard for the plug pin to socket contact measurements but increased by 50 %. The pins of the adaptors shall remain intact with no openings in the surface, joints or seams which will accept the probe described in **12.9.4** of this Part of BS 1363.

12.9.7 Pins shall have adequate mechanical strength to ensure that they cannot be distorted by twisting.

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

The adaptor is clamped in a block as shown in Figure 12. 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 12. After each pin has been separately twisted the adaptor shall fit the gauge shown in Figure 3. 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 adaptor shall fit the gauge shown in Figure 3.

12.10 Fixing of pins

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

Compliance shall be checked by the following test.

After the tests described in 20.2.4, each pin is subjected for 1 min to a pull of 100 N without jerks in the direction of the major axis. The adaptor is mounted using the steel plate shown in Figure 13. The apparatus is placed within an oven and the pull is applied 1 h after the adaptor body has attained the test temperature of $70 \pm 2^\circ\text{C}$.

After the test the adaptor pin shall comply with the gauge shown in Figure 3.

12.11 Mounting of pins

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

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

Adaptors shall be checked using the apparatus shown in Figure 14. The adaptor is clamped in the mounting block by means of any two of the pins in such a manner as to ensure that the face of the adaptor, from which the pins project, is supported and in contact with the corresponding flat surface of the mounting block. The back of the adaptor is not supported and does not come into contact with the fixture. The axis of the clamped pins is horizontal.

The unclamped pin shall be tested by applying a deflection force of 4.4 N at the position and in the four directions shown in Figure 14. The test shall be repeated in turn on the other two pins of the adaptor.

During each test the difference measured in the scale shall not exceed 3° . After all tests have been completed the adaptors shall fit the gauge shown in Figure 3.

12.12 Conductive parts

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

Compliance shall be checked by inspection and manual manipulation.

12.13 Sleeves: dimensions

Line and neutral adaptor pins shall be fitted with insulating sleeves. The dimensions of the pin and sleeve shall fall within those required by Figure 9. Sleeves shall not be fitted to any earthing adaptor pin.

Compliance shall be checked by inspection and by measurement for pin and sleeve and by the use of the gauge shown in Figure 3 for socket-outlet compatibility.

12.14 Sleeves: electric and mechanical strength

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

Compliance shall be checked by the following tests.

- a) 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 adaptor pin sleeve adjacent to the base of the adaptor. 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.

- b) The test apparatus for resistance to abrasion (see Figure 15) 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 adaptor is held in a suitable clamp as shown in Figure 15 in such a position that the straight part of the steel wire rests upon the adaptor pin at right angles to it and the adaptor 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 adaptor is moved backwards and forwards in a horizontal direction in the plane of the axis of the beam so that the wire rubs along the pin. The length of pin thus abraded is approximately 9 mm of which approximately 7 mm is over the insulating sleeve.

The adaptor 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 adaptor.

The sleeve shall not have been penetrated or creased and shall satisfy the test described in 12.14 a). However, abraded brass material which may contaminate the surface of the sleeve is removed for the purpose of this test.

c) A set of three specimen pins is tested by means of the apparatus shown in Figure 16 which has a blade 0.7 mm wide and a radius of 3 mm. The test is made on one pin of each adaptor not used for the test described in 12.14 b).

A specimen is positioned as shown in Figure 16 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 $200 \pm 0, - 5$ °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 adaptors (adaptor socket-outlet portion)

13.1 For adaptors with adaptor socket-outlets for BS 1363 plugs the disposition of the socket contacts shall be as shown in Figure 8.

There shall be no projection on the engagement surface of the adaptor such as would prevent the full insertion of a plug. The spacing of the socket contacts shall correspond with that of the plug pins.

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

Compliance shall be checked by inspection and the use of the gauge shown in Figure 4.

13.2 For adaptors with adaptor socket-outlets for BS 1363 plugs the line and neutral socket contacts in adaptors shall be positioned so as to make satisfactory contact with the corresponding pins of a plug in all positions that the contacts may occupy when the plug is correctly and fully inserted.

Compliance shall be checked by inspection and the use of the gauge shown in Figure 5 and the circuit shown in Figure 17. Both indicator lamps shall light.

13.3 For adaptors with adaptor socket-outlets for BS 1363 plugs, on insertion of a plug into an adaptor, the travel of the end of either current-carrying pin from the front face of the adaptor to the first point of contact with the appropriate socket contact, in any position the socket contacts may occupy, shall not be less than 9.6 mm.

Compliance shall be checked by inspection and the use of the gauge shown in Figure 6 and the circuit shown in Figure 17. Neither indicator shall light.

13.4 For adaptor socket-outlets intended to accept plugs complying with other standards, the disposition and dimensions shall enable reliable and safe interconnection and there shall be no projection on the engagement surface of the adaptor such as would prevent the full insertion of a plug. The spacing of the socket contacts shall correspond with that of the plug pins.

Raised marking is permitted provided it does not project more than 0.5 mm from the engagement face.

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

13.5 Socket contacts of adaptors shall be self-adjusting as to contact making and each socket contact shall be such as to make and maintain, in normal use, effective electrical and mechanical contact with a corresponding plug pin. The means for producing the contact pressure shall be associated with each socket contact independently and shall not be dependent on insulating material other than ceramic or mica.

Compliance shall be checked by inspection and by the following tests, as appropriate. Shaver adaptors are not subjected to these tests.

a) For adaptor socket-outlets for BS 1363 plugs the withdrawal pull of a gauge as shown in Figure 7 from any individual line or neutral socket contact is checked whilst ensuring that neither the shutter mechanism, nor the material of the enclosure 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.

b) Adaptor socket-outlets for plugs complying with BS 546 are checked by the gauge of Figure 2 of BS 546 as shown in Table 17 of BS 546. The individual line or neutral socket contact is checked whilst ensuring neither the shutter mechanism, nor the material of the enclosure has any effect on the results of the test. The socket contact shall retain the gauge for 30 s when the socket-outlet is held horizontally with the gauge hanging vertically downwards.

c) Adaptor socket-outlets for plugs complying with standards other than above are tested to the relevant clauses of their appropriate standards.

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

Compliance shall be checked by the following test.

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

For shaver adaptors three types of plug shall be used, as referred to in clause 18.

Care should be taken to remove any grease from the plug pins and socket contacts prior to the tests. Each socket-outlet of the adaptor shall be tested in turn.

The plug is then inserted into the socket and a force is gradually exerted in a direction parallel to the axis of the pins. For shaver-outlets and for adaptor socket-outlets for BS 1363 plugs it shall not be possible to reach a pull of 36 N without the plug coming out of the adaptor socket-outlet.

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

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

Compliance shall be checked by inspection, before and after the test described in clause 18, and by the application of the corresponding single pin applied to the shutter using a force of 5 N.

The test pin shown in Figure 1 is then 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 For adaptors with adaptor socket-outlets for BS 1363 plugs, apertures for the reception of the line and the neutral plug pins shall not exceed 7.2 mm × 4.8 mm and for the earthing plug pin 8.8 mm × 4.8 mm.

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

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

Compliance shall be checked by inspection and measurement.

13.9 For adaptors with adaptor socket-outlets for BS 1363 plugs no part of the aperture intended for the reception of the line or neutral pin shall be less than 9.5 mm from the periphery of the engagement face of a socket-outlet except that when a shutter is operated by the simultaneous insertion of the current-carrying pins this dimension shall be increased to 18 mm from the lower edge of the socket-outlet portion (as shown in Figure 8).

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

Compliance shall be checked by inspection and measurement.

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

Compliance shall be checked by the following tests.

Shaver adaptors are not subject to these tests.

a) Adaptors with three adaptor socket-outlets for BS 1363 plugs shall be fitted with the following.

One device and counterweight, simulating a plug and 1 m of 1.5 mm² 3-core flexible cord in the outlet giving the most onerous condition.

See Figure 18 (load 2).

Two devices and counterweights, simulating plugs and 1 m of 0.75 mm² 3-core flexible cord on the remaining outlets. See Figure 18 (load 1).

Adaptors with two adaptor socket-outlets for BS 1363 plugs shall be fitted with the following.

One device and counterweight, simulating a plug and 1 m of 1.5 mm² 3-core flexible cord in the outlet giving the most onerous condition.

See Figure 18 (load 2).

One device and counterweight, simulating a plug and 1 m of 0.75 mm² 3-core flexible cord in the remaining outlet. See Figure 18 (load 1).

Other adaptors are fitted with a complete complement of appropriate devices and counterweights shown in Figure 18 (loads 3 or 4) (for BS 546 outlets), or if no appropriate device is described, then a plug fitted with 1 m of flexible cord suitable for the current rating of the plug shall be fitted. Intermediate and adaptor plugs shall be fitted with 1 m of appropriate flexible cord.

The total mass shall not exceed 800 g.

NOTE 1 Devices as shown in Figure 18 may be modified to suit particular adaptors provided the mass/turning moment characteristics remain unchanged.

NOTE 2 A suitable device for calibrating simulated plugs is shown in Figure 19.