

BS 8546:2016+A1:2018



BSI Standards Publication

Travel adaptors compatible with UK plug and socket system – Specification

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Foreword

Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 30 April 2016. It was prepared by Panel PEL/23/-/13, *Travel adaptors*, under the authority of Technical Committee PEL/23, *Electrical accessories*. A list of organizations represented on this committee can be obtained on request to its secretary.

Supersession

BS 8546:2016+A1:2018 supersedes BS 8546:2016.

BS 8546:2016 remains current and will be withdrawn on 31 October 2021.

Information about this document

Text introduced or altered by Amendment No. 1 is indicated in the text by the tags A1 A1. Minor editorial changes are not tagged.

Presentational conventions

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

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

Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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

1 Scope

This British Standard specifies requirements for the construction, rating, marking, dimensions and testing of travel adaptors intended for the temporary connection of electrical equipment. It applies to travel adaptors having at least one plug or socket-outlet portion compatible with BS 1363 plugs and socket-outlets, which are suitable for the connection of a non-BS 1363 plug, or to a non-BS 1363 socket-outlet.

Travel adaptors incorporating USB circuits for charging devices are also covered by this standard.

This British Standard applies to travel adaptors intended for use in household, commercial and light industrial premises where:

- the nominal supply voltage does not exceed 250 V a.c. single-phase, 50 Hz to 60 Hz; or
- the rated current of the travel adaptor does not exceed 13 A and is not less than 5 A.

Travel adaptors within the scope of this British Standard do not convert voltage.

This British Standard excludes adaptors conforming to BS 1363-3 and conversion plugs conforming to BS 1363-5.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[BS 1362](#), *Specification for general purpose fuse links for domestic and similar purposes (primarily for use in plugs)*

BS 1363-1:1995+A4:2012, *13 A plugs, socket-outlets, adaptors and connection units – Part 1: Specification for rewirable and non-rewirable 13 A fused plugs*¹

BS 1363-2:1995+A4:2012, *13 A plugs, socket-outlets, adaptors and connection units – Part 2: Specification for 13 A switched and unswitched socket-outlets*¹

[BS 1363-3](#), *13 A plugs, socket-outlets, adaptors and connection units — Part 3: Specification for adaptors*

[BS 1363-4](#), *13 A plugs, socket-outlets, adaptors and connection units — Part 4: Specification for 13 A fused connection units switched and unswitched*

[BS 1363-5](#), *13 A plugs, socket-outlets, adaptors and connection units — Part 5: Specification for fused conversion plugs*

[BS 1858](#), *Electric cables — Accessories — Bitumen-based filling compounds*

[BS 2572](#), *Specification for phenolic laminated sheet and epoxy cotton fabric laminated sheet*

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

[BS 4800](#), *Schedule of paint colours for building purposes*

[BS 5733](#), *General requirements for electrical accessories — Specification*²

[BS 6004:2012](#), *Electric cables — PVC insulated and PVC sheathed cables for voltages up to and including 300/500 V, for electric power and lighting*

¹ A new edition of BS 1363 (all parts) is due to be published in 2016.

² Informative reference is made to BS 5733:2010+A1:2014.

- BS EN 1652, *Copper and copper alloys — Plate, sheet, strip and circles for general purposes*
- BS EN 10270-1:2001, *Steel wire for mechanical springs — Part 1: Patented cold drawn unalloyed spring steel wire*
- BS EN 50525-1, *Electric cables — Low voltage energy cables of rated voltages up to and including 450/750 V (U₀/U) — Part 1: General requirements*
- BS EN 60060-1, *High-voltage test techniques — Part 1: General definitions and test requirements*
- BS EN 60112:2003+A1:2009, *Method for the determination of the proof and the comparative tracking indices of solid insulating materials*
- BS EN 60127 (all parts), *Miniature fuses*
- BS EN 60269 (all parts), *Low voltage fuses*
- BS EN 60664-3, *Insulation coordination for equipment within low-voltage systems — Part 3: Use of coating, potting or moulding for protection against pollution*
- BS EN 60664-5, *Insulation coordination for equipment within low-voltage systems — Part 5: Comprehensive method for determining clearances and creepage distances equal to or less than 2 mm*
- BS EN 60695-2-11:2014, *Fire hazard testing — Part 2-11: Glowing/hot-wire based test methods — Glow-wire flammability test method for end-products (GWEPT)*
- BS EN 60695-10-2:2014, *Fire hazard testing — Part 10-2: Abnormal heat — Ball pressure test method*
- BS EN 60950-1, *Information technology equipment — Safety — Part 1: General requirements*
- BS EN 61000-6-1, *Electromagnetic compatibility (EMC) — Part 6-1: Generic standards — Immunity for residential, commercial and light-industrial environments*
- BS EN 61000-6-3, *Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments*
- BS EN 61032:1998, *Protection of persons and equipment by enclosures — Probes for verification*
- BS EN 61558-2-6, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V — Part 2-6: Particular requirements and tests for safety isolating transformers and power supply units incorporating safety isolating transformers*
- BS EN 61558-2-16, *Safety of transformers, reactors, power supply units and similar products for supply voltages up to 1 100 V — Part 2-16: Particular requirements and tests for switch mode power supply units and transformers for switch mode power supply units*
- BS EN 62368-1, *Audio/video, information and communication technology equipment — Part 1: Safety requirements*
- BS EN 62680-1-1, *Universal serial bus interfaces for data and power — Part 1.1: Universal serial bus interfaces — Common components — USB battery charging specification, Revision 1.2 (TA 14)*

3 Terms and definitions

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

3.1 configurable travel adaptor

travel adaptor having user configurable plug and/or socket portions

3.2 flat plug pin

plug pin having a ratio of thickness to width less than that of a BS 1363 type plug pin

3.3 fused travel adaptor

travel adaptor having a replaceable fuse link

3.4 insulated shutter opening device (ISOD)

protrusion from the engagement surface of a travel adaptor in place of a BS 1363 type brass earth pin, made of insulating material having dimensions similar to those of an earth pin

3.5 multiway travel adaptor

travel adaptor which allows the connection simultaneously of more than one plug to all socket-outlet portions of the travel adaptor

3.6 normal use

use of an accessory for the purpose for which it was made, and in the manner intended by the manufacturer

[SOURCE: BS 5733:2010+A1:2014, 3.5]

3.7 rated current

current assigned to the travel adaptor by the manufacturer

3.8 rated voltage

voltage assigned to the travel adaptor by the manufacturer

3.9 standard sheet

dimensional requirements for plugs and socket-outlets defined in national and international standards

NOTE For further information regarding the standards refer to IEC/TR 60083.

3.10 travel adaptor

portable accessory intended for temporary and occasional use, having plug portions intended to engage with the contacts of a corresponding socket-outlet and having socket-outlet portions to accommodate one or more plugs

NOTE Travel adaptors are not intended to convert voltage.

4 Classification

Travel adaptors shall be classified as follows, as appropriate:

- a) single or multiway;
- b) fused or unfused;
- c) configurable or non-configurable;
- d) with or without provision for earthing;
- e) for use within the UK (i.e. with BS 1363 type plug pin portion);
- f) for use outside the UK (i.e. with BS 1363 type socket portion).

5 General requirements

- 5.1** Travel adaptors shall be so designed and constructed that, in normal use, their performance is reliable and minimizes risk of danger to the user or surroundings.

- 5.2 Travel adaptors incorporating plug pins and/or socket-outlets for use with a country's specific standard sheets shall conform to the dimensional requirements of those relevant standards sheets. Travel adaptors incorporating plug pins and/or socket-outlets for use with more than one country's standard sheets shall conform to those standard sheets as far as they reasonably apply.

6 Type testing

- 6.1 Unless otherwise specified, travel adaptors shall be tested as delivered in accordance with normal use at an ambient temperature of $(20 \pm 5) ^\circ\text{C}$, after being conditioned at normal laboratory temperature and humidity levels for at least four days.
- 6.2 Travel adaptors used for the tests shall be representative of production items in respect of all details which might affect the test results.
- 6.3 Travel adaptors shall be submitted to inspection and tests in accordance with [Table 1](#).
- 6.4 Travel adaptors shall be deemed to conform if no travel adaptor fails in the complete series of tests given in [Table 1](#). If one travel adaptor fails in any group in the complete series of tests specified in [Table 1](#), then travel adaptors of that type shall be deemed to have failed to conform to this British Standard, unless that travel adaptor is shown to be not representative of normal production or design, in which case a further set of travel adaptors shall be submitted to the test or tests in that group. If there is no failure in this retest then travel adaptors of that type shall be deemed to conform to this British Standard.
- 6.5 If more than one travel adaptor fails in the complete series of tests given in [Table 1](#) then travel adaptors of that type shall be deemed to have failed to conform to this British Standard.

Table 1 — Schedule of tests

Sequence	Samples	Requirements and tests	Clause number
1	3	Inspection, measurement, gauging and manipulation	5, 6, 7, 8, 9, 11.1 to 11.9, 12, 13.1 (inspection only), 13.3, 13.4, 13.7, 13.8, 14.3, 13.9, 13.10, 13.11, 13.14, 13.18, 13.19, A1 13.21 A1 , 14.1, 14.2, 10
2	3	General (resilient covers and pin sleeves)	5, 6, 11.10, 13.12
3	3	General [ageing, humidity, normal operation, insulation resistance (IR), electric strength (ES), temperature rise]	5, 6, 15, 16, 17, 13.6, 11.4, 18
4	3	Mechanical strength	5, 6, 15, 13.5, A1 Text deleted A1 , 19, 17, 18
5	3	Pin strength	5, 6, 13.15, 13.16
6	3	Effect of pins on socket contacts (plated pins and ISODs only)	5, 6, 13.17
7	3	Pin sleeves (if fitted)	5, 6, 15, 16, 17, 13.13
A1 8	3	Materials (normal heat)	5, 6, 13.2, 20 A1
9	3	Materials (glow wire)	5, 6, 21
10	3	Materials (metals)	5, 6, 22

A1 NOTE Additional samples may be required for Sequence 1 [Clause 13.21](#) depending on the incorporated components. **A1**

7 Rating

Travel adaptors shall have a rated voltage not exceeding 250 V a.c. and a rated current not lower than 5 A and not exceeding 13 A.

The rated voltage shall not be lower than that of the socket-outlet which can accept the adaptor.

The rated current of a travel adaptor shall be the lowest of the following:

- a) equal to the sum of the rated currents of the socket-outlet portions if this is lower than 13 A;
- b) the rated current of the lowest plug portion but not exceeding 13 A;
- c) the rating of the fuse-link fitted but not exceeding 13 A.

Conformity shall be checked by inspection of the marking (see [Clause 8](#)) and by the tests given in [Table 1](#).

8 Marking

8.1 Requirements for marking

8.1.1 Information to be marked on travel adaptors

Travel adaptors shall be marked with the information given in items a) to e) and if relevant, the information listed in f) to i):

- a) the name or trade mark of the manufacturer or responsible vendor;
- b) the number of this British Standard, i.e. BS 8546 **A1** Text deleted **A1**³;
- c) the rated current;
- d) the rated voltage;
- e) the nature of supply;
- f) for fused travel adaptors, the word “FUSE” or “FUSED”, or the appropriate symbol specified in [8.1.4](#) marked on the external accessible surface of the travel adaptor;
- g) for travel adaptors which are intended for use with unearthed supply systems marked, “Caution: For use with unearthed appliances only”;
- h) “THIS ADAPTOR DOES NOT CONVERT VOLTAGE”; and
- i) symbol for USB outlet.

8.1.2 Safety information

Where it is necessary for safe operation that the user is aware of any particular characteristics of the travel adaptor, the necessary information shall be given by markings on the travel adaptor itself or, where this is not practicable, on the packaging and/or in instructions which accompany it.

Safety information shall include the manufacturer’s declared compatible plug and socket systems.

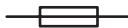
³ Marking BS 8546 **A1** Text deleted **A1** on or in relation to a product represents a manufacturer’s declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant’s responsibility. Such a declaration is not to be confused with third-party certification of conformity.

8.1.3 Visibility of marking

The marking specified in 8.1.1 c), d), g) and h) shall be visible when the travel adaptor is engaged in a socket-outlet.

8.1.4 Symbols for marking travel adaptors

If symbols are used they shall be as follows:

Amperes	A
Volts	V
Power	W (max)
Alternating current*	~
Line	L
Neutral	N
Earth*	
Fuse*	
USB outlet	

*NOTE BS EN 60417 gives guidance on symbols marked *. However, strictly proportional reductions might not be practical in certain media. Interpretative licence is permissible provided that a clear graphical representation of the symbol is produced which communicates the intention.*

8.1.5 Marking of rated current and/or power and voltage

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

EXAMPLE

13 A 250 V ~

13/250 ~

or

$\frac{13}{250} \sim$

or

13 A 250 V a.c.

13/250 a.c.

or

$\frac{13}{250} \sim$ a.c.

Rated power shall be completed by the word MAX, e.g.

1200 W MAX

8.1.6 Legibility and durability

Marking on the travel adaptor shall be legible and durable, as determined in accordance with 8.2.2 and 8.2.3, and shall not be placed on screws, washers or other easily removable parts.

8.2 Test methods

8.2.1 Visual inspection

Conformity to the requirements of 8.1.1 to 8.1.6 shall be checked by visual inspection.

8.2.2 Test for legibility

Conformity shall be checked by inspection, using normal or corrected vision without additional magnification.

8.2.3 Test for durability

Marking made by engraving, moulding or a similar permanent process shall meet the requirement for durability, without the need for testing.

Unless the marking is made by engraving, moulding or a similar permanent process, the marking shall be rubbed by hand for approximately 15 s using a cloth soaked in water and again for approximately 15 s with a cloth soaked in aliphatic solvent hexane with a content of aromatics of maximum 0.1% by volume, a kauri-butanol value of 29, initial boiling point of approximately 65 °C, a dry point of approximately 69 °C, and a relative density of approximately 0.68.

When tested by this method, the marking shall remain legible.

9 Dimensions and dispositions

Dimensional requirements, which are important for safety and interchangeability with plugs and socket-outlets conforming to other standards, shall be in accordance with the tolerances specified in the relevant standards sheets except as permitted below.

It shall not be possible, within the declared compatible plug and socket systems, to engage:

- a) the plug portion of a travel adaptor with a socket-outlet having a higher voltage rating;
- b) a live pin of a plug with an earthing contact of the socket-outlet portion of the travel adaptor;
- c) an earthing pin of a plug with a current-carrying contact of the socket-outlet portion of the travel adaptor;
- d) a plug with the socket-outlet portion of the travel adaptor in such a way that the earthing circuit is interrupted.

Travel adaptors shall conform to the dimensions and dispositions specified in the relevant standard sheets except for deviations which permit compatibility with multiple plug and socket systems and do not affect the safety of travel adaptors.

Travel adaptors with such deviations shall conform to all other requirements of this British Standard.

A1 Interfaces between detachable parts of configurable travel adaptors shall not be compatible with plugs, sockets or connectors having standardized dimensions. **A1**

Conformity shall be checked by inspection, measurement or gauges as specified in the relevant standard sheets.

10 Clearances, creepage distances and solid insulation

10.1 General

Travel adaptors energized directly from the low-voltage supply shall be classified as Overvoltage Category III in accordance with [Annex A](#).

Travel adaptors shall be constructed so that the clearances, creepage distances and solid insulation are adequate to withstand the electrical stresses taking into account the environmental influences that might occur (see [Annex B](#)).

Clearances, creepage distances and solid insulation shall conform to the relevant requirements of [10.2](#), [10.3](#) and [10.4](#).

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

Travel adaptors shall conform to the requirements for basic insulation in [10.2.3](#) and [10.3.3](#) and for functional insulation in [10.2.4](#) and [10.3.4](#). If the manufacturer declares an insulation level exceeding basic insulation then the accessory shall be tested accordingly.

10.2 Clearances

10.2.1 Requirements

When tested in accordance with [10.2.2](#), clearances shall be dimensioned to withstand the rated impulse voltage declared by the manufacturer, taking into account the rated voltage and the overvoltage category in accordance with [Annex A](#) and the pollution degree declared by the manufacturer in accordance with [Annex B](#).

10.2.2 Test method

All parts that can be removed without the use of a tool shall be removed.

All moveable parts that can be assembled in different orientations shall be placed in the most unfavourable position.

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

10.2.3 Clearances for basic insulation

The clearances for basic insulation shall be not less than the values given in [Table 2](#) except as follows.

Smaller unspecified clearances shall only be used (except those values marked in [Table 2](#) with a reference to Footnote B) if the accessory passes the impulse withstand voltage test of [Annex C](#) at the impulse voltage specified in [Annex A](#), but only if the parts are rigid or located by mouldings or if the construction is such that it is unlikely that distances can be reduced by distortion or by movement of the parts during mounting, connection and normal use.

Conformity shall be checked by inspection, and if necessary by measurement, or by the test in [Annex C](#).

If clearance distances are to be measured, this shall be carried out in accordance with [Annex D](#).

Table 2 — Minimum clearances for basic insulation

Rated impulse withstand voltage kV ^A	Minimum clearances in air up to 2 000 m above sea level mm
0.33	0.2 ^{B)}
0.50	0.2 ^{B)}
0.80	0.2 ^{B)}
1.5	0.5
2.5	1.5
4.0	3.0
6.0	5.5

^{A)} See [Annex A](#). This voltage is:

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

^{B)} Minimum clearance values are based on BS EN 60664-1.

10.2.4 Clearances for functional insulation

The clearances for functional insulation shall be not less than the values specified for basic insulation in [10.2.3](#).

Conformity shall be checked by inspection, and if necessary by measurement, or by the test in [Annex C](#).

If clearance distances are to be measured, this shall be carried out in accordance with [Annex D](#).

10.2.5 Clearances for supplementary insulation

The clearances for supplementary insulation shall be not less than the values specified for basic insulation in [10.2.3](#).

Conformity shall be checked by inspection, and if necessary by measurement, or by the test in [Annex C](#).

If clearance distances are to be measured, this shall be carried out in accordance with [Annex D](#).

10.2.6 Clearances for reinforced insulation

The clearances for reinforced insulation shall be not less than the values specified for basic insulation in [10.2.3](#), but using the next higher step for rated impulse withstand voltage given in [Table 2](#).

Conformity shall be checked by inspection and by measurement, or by the test in [Annex C](#).

10.3 Creepage distances

10.3.1 Requirements

The creepage distances shall be dimensioned for the voltage which is expected to occur in normal use, and shall be in accordance with the pollution degrees in [Annex B](#) and the material group, as declared by the manufacturer.

10.3.2 Test method

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

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

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

Creepage distances shall be measured in accordance with [Annex D](#). The relationship between material group and the comparative tracking index (CTI) values and proof tracking index (PTI) values shall be as follows:

- Material group I $600 \leq \text{CTI/PTI}$;
- Material group II $400 \leq \text{CTI/PTI} < 600$;
- Material group IIIa $175 \leq \text{CTI/PTI} < 400$;
- Material group IIIb $100 \leq \text{CTI/PTI} < 175$.

The CTI or PTI values shall be determined in accordance with [Annex E](#).

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

10.3.3 Creepage distances for basic insulation

The creepage distances for basic insulation shall be not less than the values given in [Table 3](#).

Conformity shall be checked by measurement.

Table 3 — Minimum creepage distances for basic insulation

Rated voltage ^{A)} V (r.m.s.)	Minimum creepage distance					
	mm					
	Pollution degree 2 ^{B)}			Pollution degree 2 ^{B)}		
	Material group I	Material group II	Material group IIIa/IIIb	Material group I	Material group II	Material group IIIa
≥250	1	1	2.5	3	3	4

^{A)} This voltage is the voltage rationalized in accordance with BS EN 60664-1:2007, Table F3a and Table F3b.

^{B)} Details of pollution degrees are given in [Annex B](#).

10.3.4 Creepage distances for functional insulation

When measured in accordance with [Annex D](#), the creepage distances for functional insulation shall be not less than the values specified for basic insulation in [10.2.3](#).

10.3.5 Creepage distances for supplementary insulation

When measured in accordance with [Annex D](#), the creepage distances for supplementary insulation shall be not less than the values specified for basic insulation in [10.2.3](#).

10.3.6 Creepage distances for reinforced insulation

When measured in accordance with [Annex D](#), the creepage distances for reinforced insulation shall be not less than twice the distances specified for basic insulation in [Table 3](#).

10.4 Solid insulation

10.4.1 General

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

NOTE No minimum thickness is specified for solid insulation.

10.4.2 Basic, supplementary and functional solid insulation

When tested in accordance with [Annex C](#), followed by the tests in [Clause 17](#) using the values given in [Table 4](#), basic, supplementary and functional solid insulation shall each withstand the required impulse voltage declared by the manufacturer of the accessory, as specified in [10.2.1](#) for overvoltage category III.

Table 4 — Withstand test voltages for solid insulation types

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

10.4.3 Reinforced solid insulation

When tested in accordance with [Annex C](#), followed by the tests in [Clause 17](#) using the values given in [Table 4](#), reinforced solid insulation shall be dimensioned to withstand the required impulse voltage, but one step higher than that specified for basic insulation in [10.2.3](#).

10.5 Requirements for printed wiring boards and equivalent construction

Wiring boards and equivalent shall conform to the constructional requirements of BS EN 60664-5.

Where coating, potting or moulding is used, these shall conform to BS EN 60664-3.

11 Accessibility of live parts

11.1 Requirement

When tested in accordance with [11.2](#), live parts of travel adaptors shall not be accessible. For configurable travel adaptors, live parts shall not be accessible even when partially configured or with any moveable/removable parts in all possible positions.

There shall be no contact between the test probe and any live part.

11.2 Test method

Test probe 11 of BS EN 61032:1998, using a force of 5_{-1}^0 N, shall be applied in every possible position when:

- the travel adaptor or any component part is in partial or complete engagement with a socket-outlet;
- plugs are in partial or complete engagement with the travel adaptor.

An electrical indicator with a voltage of (45 ± 5) V shall be used to show contact with live parts.

11.3 Travel adaptors with detachable plug-pin portions

11.3.1 Requirement

When tested in accordance with [11.3.2](#), travel adaptors having detachable plug-pin portions shall not have live parts accessible to test probe 13 of BS EN 61032:1998 when the plug-pin portion is engaged in a socket-outlet.

11.3.2 Test method

Test probe 13 of BS EN 61032:1998 shall be applied without appreciable force in every possible position.

An electrical indicator with a voltage of (45 ± 5) V shall be used to show contact with live parts.

11.4 Socket apertures with protection by shutters

11.4.1 Requirements

Travel adaptors which incorporate shutters to provide increased protection against electric shock shall be constructed such that, when tested in accordance with [11.4.2](#), live parts protected by the shutters are not accessible and the shutters do not operate.

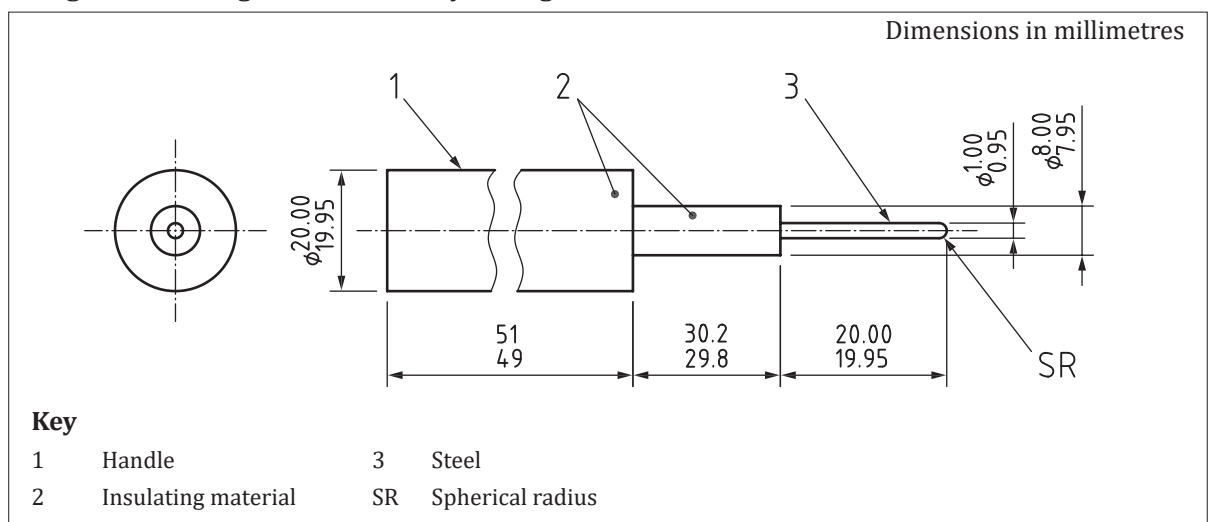
The travel adaptors shall be constructed such that, when tested in accordance with [11.4.2](#), live parts are automatically screened by a shutter, or shutters, which are not operated solely by the insertion of one current-carrying plug pin.

11.4.2 Test method

The test pin of [Figure 1](#) shall be applied with a force of 5 N perpendicularly to the engagement surface of the socket-outlet portion of the travel adaptor.

Plug pins of the appropriate types shall be applied individually with a force of 20 N to the socket-outlet contacts of the travel adaptor.

Figure 1 — Gauge for checking non-accessibility through shutters



11.5 Socket apertures without shutters

11.5.1 Requirements

When tested in accordance with [11.5.2](#), the live parts of travel adaptors having socket apertures without shutters shall not be accessible.

11.5.2 Test method

Test probe 13 of BS EN 61032:1998 shall be applied without appreciable force in every possible position.

An electrical indicator with a voltage of (45 ± 5) V shall be used to show contact with live parts.

11.6 Single pin insertion

11.6.1 Requirements

When tested in accordance with [11.6.2](#), travel adaptors shall be so constructed such that:

- a) any earthing plug-pin of the travel adaptor or of a plug intended to be engaged with the travel adaptor does not make contact with a current-carrying socket-contact; and/or
- b) any current-carrying plug-pin of the travel adaptor or of a plug intended to be engaged with the travel adaptor does not make contact with a current-carrying socket-contact while any other plug-pin is accessible.

11.6.2 Test method

Conformity shall be checked by visual inspection.

An electrical indicator with a voltage of (45 ± 5) V shall be used to show contact with live parts.

11.7 Earthing contact

11.7.1 Requirement

Earthing plug-pins or contacts shall make and break contact with the earthing socket-contact respectively before and after the current-carrying plug-pins make and break contact with the current-carrying socket-contacts.

For earthed configurations, it shall not be possible to engage the current-carrying pins in a socket-outlet without the corresponding earth becoming engaged.

11.7.2 Test method

An electrical test shall be performed with the travel adaptor pins in all possible positions.

Conformity shall be checked by inspection.

11.8 Fused travel adaptors

In fused travel adaptors it shall not be possible to gain access to the fuse-link whilst the travel adaptor is in engagement with a socket-outlet.

Conformity shall be checked by inspection.

11.9 Dismantling

Apart from user configurable parts, it shall not be possible to dismantle travel adaptors by hand or by using a general purpose tool, e.g. a screwdriver.

Conformity shall be checked by inspection.

11.10 Resilient covers

11.10.1 Requirement

Resilient covers of travel adaptors shall be so designed and constructed that there is no risk that, as a result of undue pressure, live parts could penetrate the cover or become so disposed as to reduce creepage distances and clearances below those specified in [Clause 10](#).

After the test in [11.10.2](#) it shall not be possible to touch live parts with test probe 11 of BS EN 61032:1998, applied with a force of 30_{-2}^0 N.

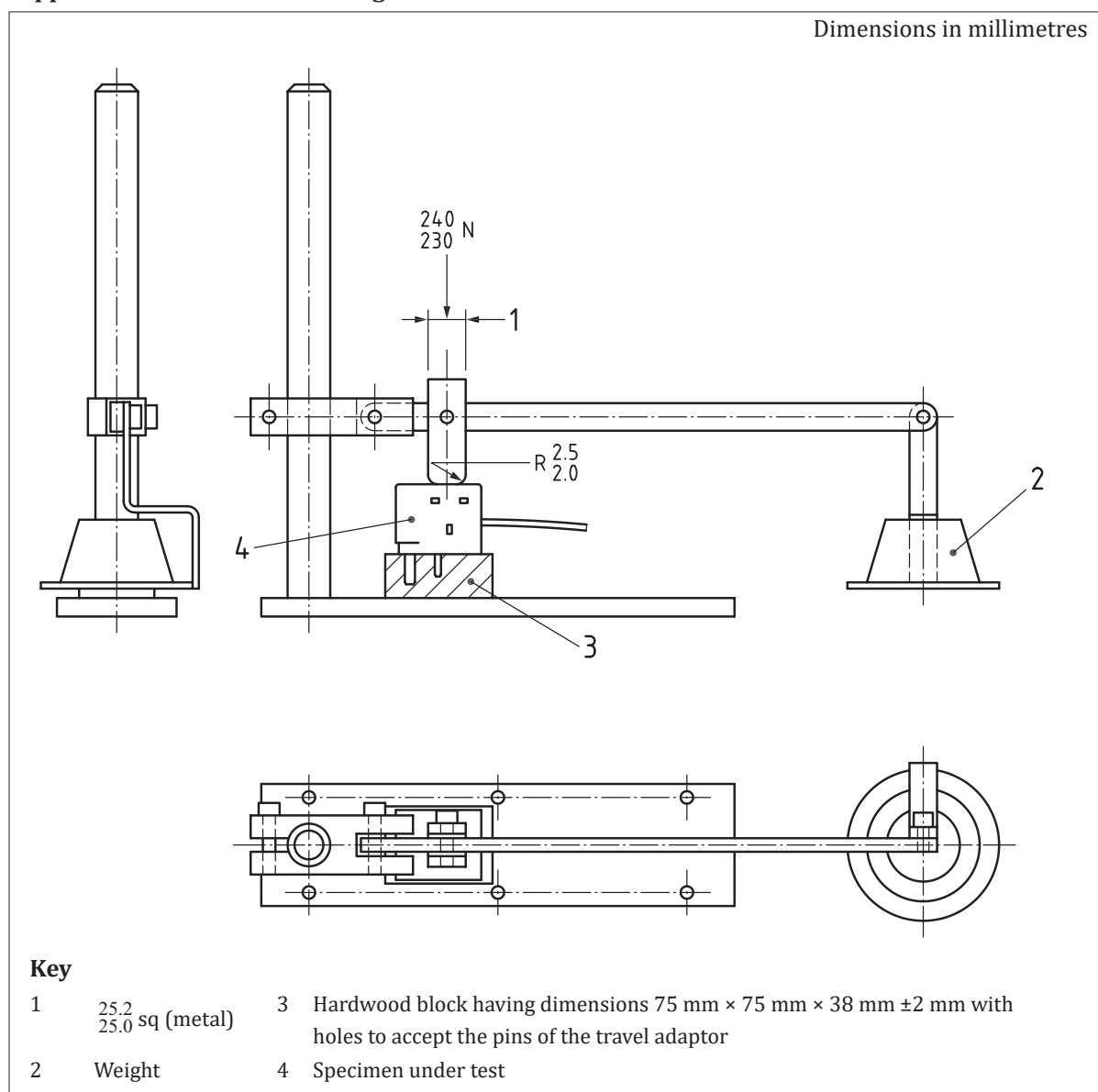
11.10.2 Test method

A steady force of $< 240_{-10}^0$ N shall be applied to those places where the possibility of a failure exists, the force being applied through a metal test pressure block as shown in [Figure 2](#).

Each sample shall be subjected to the force at each chosen place in turn.

During each application of force, a test voltage of $(2\,000 \pm 60)$ V, 50 Hz of substantially sinusoidal waveform shall be applied for (60 ± 5) s between all live parts bonded together and the earthed test pressure block.

During the test no flashover or breakdown shall occur.

Figure 2 — Apparatus for mechanical strength test on resilient covers

12 Provision for earthing

12.1 Requirements

With the exception of travel adaptors in [12.3.1](#), there shall be effective earthing of all metal parts that might become live in the event of failure of the insulation of the travel adaptor, and which are capable of being touched during normal operation.

NOTE This requirement does not apply to metal parts on, or screws in or through, non-conducting material and separated by such material from live parts in such a way that, in normal use, they cannot become live.

The connection between the earthing pin or contact and parts required to be connected thereto shall be of low resistance.

When tested in accordance with [12.2](#), the resistance between the earthing pin or contact and any other nominated part shall not exceed 0.05 Ω.

12.2 Test method

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

A current of (25 ± 0.75) A derived from an a.c. source having a no-load voltage not exceeding 12 V shall be passed for (60 ± 5) s as follows:

- a) between the earthing pin or contact and any accessible metal parts intended to be earthed; and/or
- b) between any corresponding earthing plug-pin inserted fully into an earthing socket-contact and the remote end of the earthing plug-pin of the travel adaptor.

12.3 Insulated metal parts

12.3.1 Requirements

The requirements of [12.1](#) shall not apply to travel adaptors having accessible metal parts, such as removable covers or cover plates, where such parts are not intended to be earthed, provided that:

- a) such accessible metal parts are separated from live parts by doubled or reinforced insulation; and
- b) such parts cannot be removed and replaced in an incorrect position; and
- c) there is no risk of accidental contact between live parts and metal covers or cover plates, for example through fixing screws; and
- d) precautions are taken to prevent creepage distances or clearances becoming less than the values specified in [Clause 10](#).

12.3.2 Test method

Conformity shall be checked by visual inspection and in accordance with the tests in [Clause 17](#) at a test voltage of $(4\,000 \pm 120)$ V.

13 Construction

13.1 Current-carrying parts

13.1.1 Requirements

Current-carrying parts and parts of the earthing contacts shall be made of brass, copper or phosphor-bronze.

Materials other than brass containing at least 50% copper shall not be used in the construction of travel adaptor plug pins except for sleeves of pins and ISODs.

NOTE Plug pins can be nickel plated.

This requirement shall not be applied to screws, nuts or washers.

13.1.2 Test method

Conformity shall be checked by visual inspection and in accordance with the tests for normal operation ([13.6.2](#)), temperature rise ([Clause 18](#)) and resistance to rust ([Clause 22](#)).

13.2 Sealing compounds

Sealing compounds of travel adaptors shall be resistant to heat and shall be of insulating material capable of maintaining a satisfactory seal under service conditions.

Conformity shall be checked by the test in [20.1.2](#).

Bituminous filling compounds shall conform to BS 1858.