BRITISH STANDARD

BS 6312 : Part 2 : Section 2.2 : 1997

Connectors for analogue telecommunication interfaces

Part 2. Sockets for use with plugs specified in BS 6312 : Part 1

Section 2.2. Particular requirements for fixed socket-outlets used in permanent wiring installations

ICS 31.220.10

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee TCT/2, Analogue telecommunication networks, upon which the following bodies were represented:

Communications Workers Union
Department of Trade and Industry (Communications Information Industries Directorate)
Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
Electricity Association
Federation of the Electronics Industry
Kingston Communications (Hull) plc
Mercury Communications Ltd.
National Transcommunications Ltd.
OFTEL (Office of Telecommunications)
Society of Cable Telecommunication Engineers
Telecommunications Industry Association
Telecommunications Users' Association (TUA)
Co-opted members

This British Standard, having been prepared under the direction of the Telecommunications Assembly, was published under the authority of the Standards Board and comes into effect on 15 April 1997

Amendments issued since publication

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The following BSI references relate to the work on this standard:
Committee reference TCT/2
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Contents

Foreword

This Section of BS 6312 : Part 2 has been prepared under the direction of the Telecommunications Standards Policy Committee. It forms one of a series of British Standards that are being produced following the commencement of liberalization in October 1981 of the supply of certain telecommunications apparatus within the United Kingdom.

The series of standards includes product and facility specifications giving particular requirements for individual items of apparatus and facilities, together with standards covering general requirements for the connection of apparatus to the various public telecommunication systems (i.e. any telecommunication system designated as a public telecommunication system by an order made under Section 9 of the Telecommunication Act 1984).

The requirements specified in the standards are intended to ensure that apparatus conforming to them, when connected to public telecommunication systems, will neither adversely affect any such system, nor interfere with the service available to other users of the systems.

The standards include certain safety requirements that are only for the protection of personnel operating the public telecommunication system and others that are for the protection of users from hazards that may arise from the connection of the apparatus to that system.

BS 6312 : 1985 has been revised and re-numbered as BS 6312 : Part 1 : 1994 and is published with a new Part 2 which comprises two separate Sections.

BS 6312 covers the generic subject of connectors for analogue telecommunication interface purposes.

BS 6312 : Part 1 specifies the requirements for plugs. BS 6312 : Part 2 specifies the requirements for sockets for use with plugs specified in BS 6312 : Part 1.

There are two Sections of Part 2.

Section 2.1 *Specification for sockets – General requirements*

Section 2.2 *Specification for particular requirements for fixed socket-outlets used in permanent wiring installations*

Compliance with a British Standard does not of itself confer immunity from legal obligation. In particular, attention is drawn to the Telecommunications Act 1984.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

1 Scope

This Section of BS 6312 : Part 2 specifies the requirements and tests necessary to ensure the safety and the dimensional interchangeability of fixed socket-outlets, as defined in **3.2**, intended for connection to telecommunications wiring.

Such socket-outlets may be classified both by function, i.e. as being either primary (surge protected or unprotected) or secondary, and according to their method of mounting, i.e. as surface, flush and panel mounted socket-outlets.

This Section does not apply to sockets incorporated in apparatus.

Socket-outlets conforming to this standard are intended to be suitable for use under the following conditions of service unless otherwise specified:

- an ambient temperature in the range −5 °C to +35 °C, the average value over a 24 h period not exceeding 25 °C;
- a situation not subject to direct radiation from the sun or other source of heat likely to raise temperatures above the limits specified above;
- an atmosphere not subject to excessive pollution by smoke, chemical fumes, rain, spray, prolonged or high humidity or other abnormal conditions.

NOTE. Socket-outlets conforming to this standard may be suitable for use in other conditions subject to agreement between manufacturer and user. Information given in a manufacturer's catalogue may take the place of such an agreement.

This standard applies in conjunction with BS 6312 : Section 2.1 and the requirements are in addition to those in that standard.

Requirements for electromagnetic compatibility are not given as socket-outlets do not in themselves produce extraneous emissions, nor is their functioning affected by external emissions. Therefore no emission or immunity tests are necessary.

2 References

2.1 Normative references

This British Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are made at the appropriate places in the text and the cited publications are listed on the inside back cover. For dated references, only the edition cited applies; any subsequent amendments to, or revisions of, the cited publication apply to this British Standard only when incorporated in the reference by amendment or revision. For undated references, the latest edition of the cited publication applies, together with any amendments.

2.2 Informative references

This British Standard refers to other publications that provide information or guidance. Editions of these publications current at the time of issue of this standard are listed on the inside back cover, but reference should be made to the latest editions.

3 Definitions

For the purposes of this British Standard, the definitions given in BS 6312 : Part 2.1 apply, together with the following.

3.1 socket-outlet

A device associated with telecommunications wiring intended to accept a plug conforming to BS 6312 : Part 1 : 1994 and incorporating a socket conforming to BS 6312 : Section 2.1 : 1994.

3.2 fixed socket-outlet

A socket-outlet intended to be mounted on a fixed surface and to be connected to fixed telecommunications wiring.

3.3 flush mounted socket-outlet

A fixed socket-outlet for mounting behind or integral with a mounting plate, the back of the plate being flush with the mounting surface.

3.4 surface mounted socket-outlet

A fixed socket-outlet provided with a seating surface so that when mounted, it projects wholly above the surface on which it is mounted.

3.5 panel mounted socket-outlet

A fixed socket-outlet intended for incorporation into equipment panels or trunking and which depends on such incorporation for its enclosure.

3.6 primary surge protected socket-outlet

A socket-outlet incorporating certain components for the protection and operation of a telecommunications system.

3.7 primary unprotected socket-outlet

A socket-outlet incorporating certain components for the operation of a telecommunications system.

3.8 secondary socket-outlet

A socket-outlet that is not a primary socket-outlet.

3.9 accessible metal part

A metal part or surface that can be touched by test probe B specified in BS 3042 : 1992, when the socket-outlet is installed as in normal use.

3.10 intermediate metal part

A metal part that is included in the structure or embedded in insulating material such that, as a feature of the design of the socket-outlet, it is not connected to a live part or to an accessible metal part.

3.11 live part

An unearthed conductive part that is, or is designed to be, connected to a telecommunications network.

4 Classification of fixed socket-outlets

Socket-outlets shall be classified according to their method of mounting, as follows:

surface;

flush;

panel;

and according to their function:

primary (surge protected) (see figure 2a);

primary (unprotected) (see figure 2b);

secondary (see figure 3).

5 General requirements

Socket-outlets within the scope of this standard shall be so designed and constructed that, in normal use, their performance is reliable and without danger to the user or the surroundings.

NOTE. Where tolerances are not specified in this standard the values shall be taken to be nominal.

Conformity shall be established by meeting all the requirements of this standard.

6 Testing

6.1 A manufacturer or responsible vendor who claims conformity to this standard for any product, shall submit a representative type test specimen of that product to the relevant tests of this standard in the order specified in **6.2**. The tests shall be made either by the manufacturer, or the responsible vendor, or by any competent testing laboratory or certification authority. The results of such tests shall be recorded and retained for reference and inspection. Where no test method is specified, conformity shall be checked by inspection and, where appropriate, by measurement.

6.2 A total of at least nine specimens of socket-outlet, of any one type, shall be submitted to inspection and tests against the requirements of the following clauses:

a) three specimens of socket-outlet: clauses **7**, **8**, **9**, **10** and **12** (visual inspection and manual examination);

b) three specimens of socket-outlet: clauses **10**, **11**, **13** and **14** (general tests);

c) three specimens of socket-outlet: clause **15** (material tests).

NOTE. If any particular test has to be repeated, as part of the normal sequence, this requirement is specified in the appropriate test clause.

6.3 Unless otherwise specified in this standard, the socket-outlets shall be tested (as delivered by the supplier) under the conditions specified in **4.2** of BS 6312 : Section 2.1 : 1994.

Socket-outlets used for the tests shall be identical to normal production items in respect of all details which may affect the test results.

Socket-outlets shall be deemed to conform if no socket-outlet fails in the complete series of tests given in **6.2**.

If one socket-outlet fails in any group in the complete series of tests specified in **6.2**, socket-outlets of that type shall be deemed to have failed to conform to this standard, unless that socket-outlet can be shown to be unrepresentative of normal production or design, in which case a further set of socket-outlets shall be submitted to the test or tests in that group. If there is no failure in this retest then socket-outlets of that type shall be deemed to conform to this standard.

If more than one socket-outlet fails in the complete series of tests given in **6.2** then socket-outlets of that type shall be deemed to have failed to conform to this standard.

7 Construction

7.1 The minimum size of flush socket-outlet plates constructed either of insulating material or of metal, or a combination of both, and which are intended for mounting on size UA1 boxes as specified in BS 4662, shall be 82.5 mm × 82.5 mm.

7.2 Flush-mounted socket-outlets intended for mounting on size UA1 boxes as specified in BS 4662 shall have provision for two M3.5 fixing screws at centres of (60.3 ± 0.2) mm.

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

7.3 Surface mounted socket-outlets shall be provided with a box or enclosure to ensure proper seating on a flat surface, the box having a minimum of two holes for mounting which will accept No. 6 wood screws conforming to BS 1210 : 1963.

7.4 For panel mounted socket-outlets, the manufacturer/supplier shall specify the panel thickness and method of mounting. The dimensions of the panel cut-out shall be not less than those shown in figure 1.

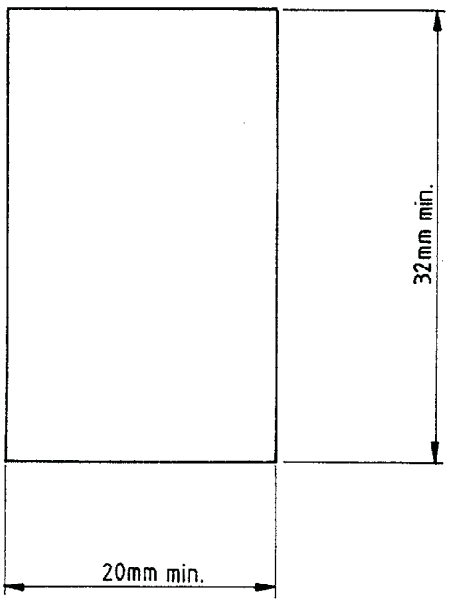


Figure 1. Panel cut-out dimensions

7.5 The construction of the socket-outlet shall be such that when a mating plug is withdrawn from it, the socket contacts are automatically screened by a shutter.

NOTE. The shutter may be operated by hand or on insertion and withdrawal of a mating plug.

7.6 For multiple socket-outlets incorporating two or more sockets, the pitch between adjacent sockets shall be not less than 24 mm.

7.7 The mounting of a socket within a socket-outlet shall be such that the maximum dimension from the front face of the socket beneath the shutter to the front face of the socket-outlet immediately adjacent to the shutter is 5.5 mm.

8 Components

8.1 Primary surge protected socket-outlets shall include the following components, configured as shown in figure 2a):

a) C1: capacitor 1.8 μF 250 V conforming to BS CECC 30401 023 : 1979;

b) R1: resistor 470 kΩ conforming to BS CECC 40101 019 : 1977;

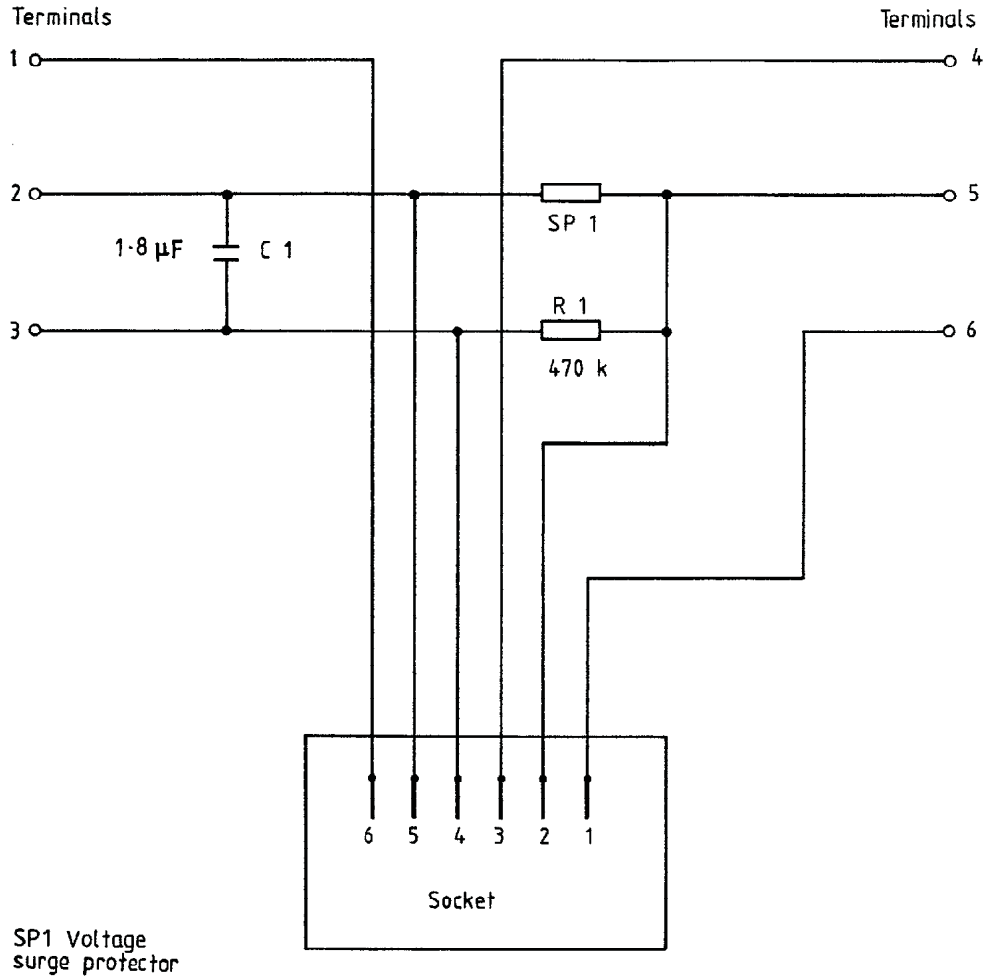
c) SP1: voltage surge protector (SP1) having the characteristics specified in **A.1**.

8.2 Unprotected primary socket-outlets shall include the same components as those specified in **8.1**, with the exception of the voltage surge protector. The circuitry shall be configured as shown in figure 2b).

8.3 Secondary socket-outlets shall not include auxiliary components and shall be configured as shown in figure 3.

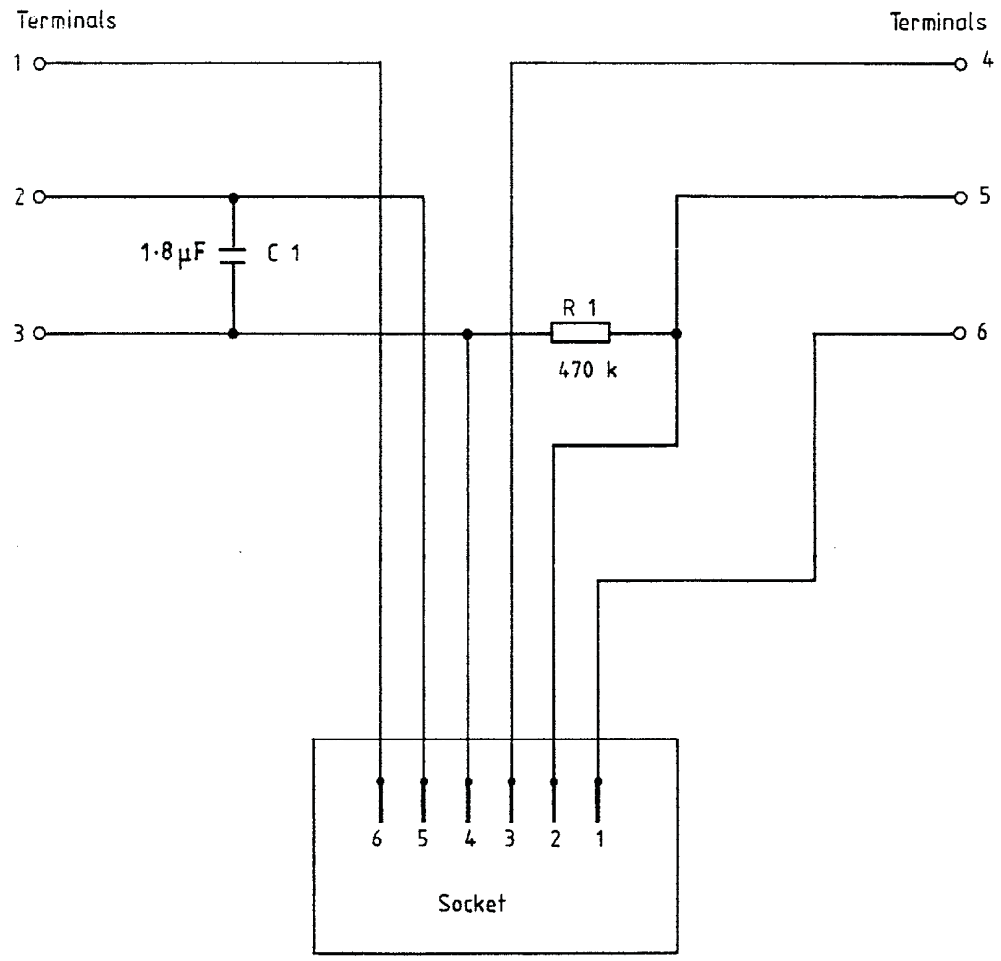
8.4 Any printed wiring board shall have a base material type 249-2-5-FVO-EP-GC-Cu with a nominal thickness of 1.6 mm and a minimum copper thickness of 35 μm or greater in accordance with BS 4584 : 102.5 : 1990.

Conformity shall be checked by inspection and by examination of a manufacturer's declaration.



a) Surge protected

Figure 2. Primary socket-outlet circuit schematic



b) Unprotected

Figure 2. Primary socket-outlet circuit schematic (*concluded*)

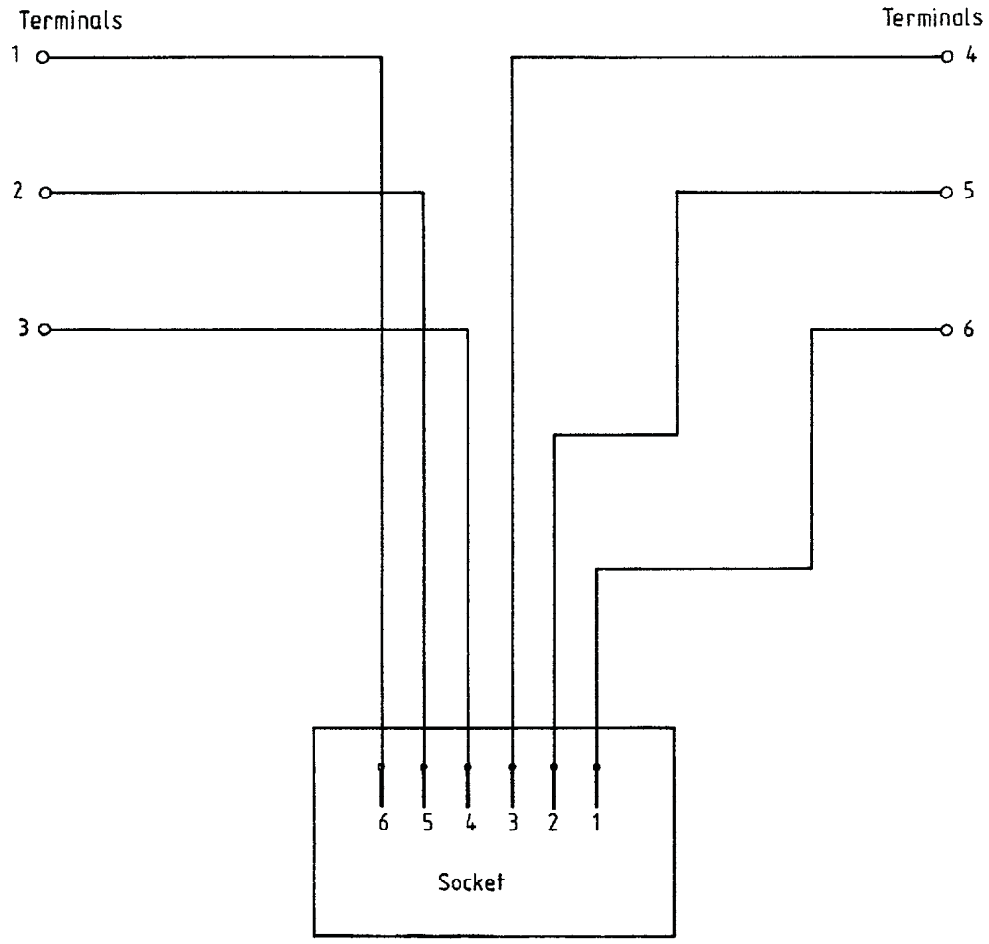


Figure 3. Secondary socket-outlet circuit schematic

9 Marking

9.1 Requirement

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

a) the name or trademark of the manufacturer or responsible vendor;

b) the number of this British Standard, i.e. BS 6312 : 2.2[1)];

c) terminals shall be identified by the numbers specified in **12.2**.

Any earthing terminal shall be marked in accordance with **12.1**.

Markings produced by an engraving or moulding process are deemed to conform to the durability requirement without test. All other markings shall remain legible when tested in accordance with **9.2**.

9.2 Test method

Lightly rub the marking on the socket-outlet, first for 15 s with a piece of cloth soaked with water, and then for 15 s with a piece of cloth soaked in an aliphatic solvent hexane (petroleum spirit), with a maximum aromatics content of 0.1 % (*V/V*), a kauri-butanol value of 29, initial boiling point of approximately 69 °C, and a specific gravity of approximately 0.68.

10 Accessibility of electrical connections

10.1 Requirement

Socket-outlets shall be so constructed and enclosed that, in normal use, electrified parts shall not be accessible without the use of a tool, and that when tested in accordance with **10.2** it shall not be possible to touch electrified parts.

Other than openings necessary for the safe use and working of the socket, enclosures shall have no openings giving inadvertent access to electrified parts.

The insulating properties of lacquer, enamel, paper, cotton, oxide film on metal parts, beads and sealing compound shall not be relied upon to give the required protection against accidental contact with electrified parts.

NOTE. Self-hardening resins are not regarded as sealing compounds.

10.2 Test method

With the socket-outlet mounted and connected as in normal use, apply a test probe 'B' as specified in BS 3042 : 1992 in every position that is possible, including with the shutter held open to its fullest extent.

11 Provision for earthing and insulation of accessible metal parts

11.1 General

An individual socket-outlet shall either:

a) have provision for earthing all accessible metal parts via an earthing terminal, in accordance with **11.2**; or

b) have all accessible metal parts insulated from live parts in accordance with **11.3** and **11.4**; or

c) employ any combination of a) and b).

11.2 Earthing

11.2.1 *Requirement*

When tested in accordance with **11.2.2**, the resistance between any accessible metal part and the earthing terminal shall not exceed 0.05 Ω.

11.2.2 *Test method*

Pass a current of (25 ± 0.5) A, derived from an a.c. source having a no-load voltage not exceeding 12 V, for 60 $^{+5}_{0}$ s between the earthing terminal and each accessible metal part that is required to be earthed.

11.3 Insulation

11.3.1 *Requirement*

Accessible metal parts shall be insulated from live parts by insulating material in such a manner that there is no risk of accidental electrical contact between live parts and accessible metal parts either directly or through intermediate metal parts.

When tested in accordance with **11.3.2** there shall be no breakdown or flashover between live parts and accessible metal parts either directly or through intermediate metal parts.

Conformity shall be verified by the test given in **11.3.2**.

11.3.2 *Test method*

Apply individually a test voltage of 1050 V a.c. for 60 $^{+5}_{-0}$ s between all live parts, electrically connected together, and each accessible metal part.

[1)] Marking BS 6312 : 2.2 on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. The accuracy of the claim is solely the claimant's responsibility. Such a declaration is not to be confused with third party certification of conformity, which may also be desirable.

11.4 Design and fixing of insulating material

11.4.1 *Requirement*

The insulating material referred to in **11.3.1** shall be designed and fixed in such a way that:

a) it cannot be removed without being permanently damaged such that it cannot be replaced, and failure to replace it would render the socket-outlet inoperable and manifestly incomplete; or

b) if it can be removed without being damaged, it cannot be replaced in an incorrect position such that there is risk of accidental contact between live parts and accessible metal parts, and failure to replace it would render the socket-outlet inoperable and manifestly incomplete.

11.4.2 *Test*

Conformity shall be checked by inspection.

12 Terminals

12.1 Any earthing terminal of a socket-outlet shall be capable of connecting at least two 1.5 mm^2, solid copper conductors and shall be marked with the symbol ⏚ or ⏚ (preferred) conforming to BS 6217 : 1981.

12.2 The method of connection of the telecommunications wiring to the socket-outlet shall be by screw-type terminals or insulation displacement terminals.

The individual clamping units of screw type or insulation displacement terminals shall be capable of accepting up to two solid copper conductors, plain or tinned 0.38 mm to 0.65 mm diameter, with the following insulation materials having an overall insulation diameter of 0.55 mm to 1.55 mm:

- PVC conforming to BS 6746 : 1990;
- polyethylene conforming to BS 6234 : 1987.

The terminals for the connection of the telecommunications wiring shall be numbered in accordance with figures 2 or 3, as appropriate.

Insulation displacement terminals shall have the characteristics specified in **A.2**.

13 Electrical strength and insulation resistance

The electrical strength and insulation resistance of socket-outlets shall be such that:

a) there shall be no breakdown or flash-over between metal parts when (1050 ± 50) V a.c. is applied for 60 $^{+5}_{0}$ s; and

b) the insulation resistance shall not be less than 100 MΩ when measured with a voltage of (500 ± 50) V d.c. for 60 $^{+5}_{0}$ s.

14 Mechanical strength

14.1 Requirement

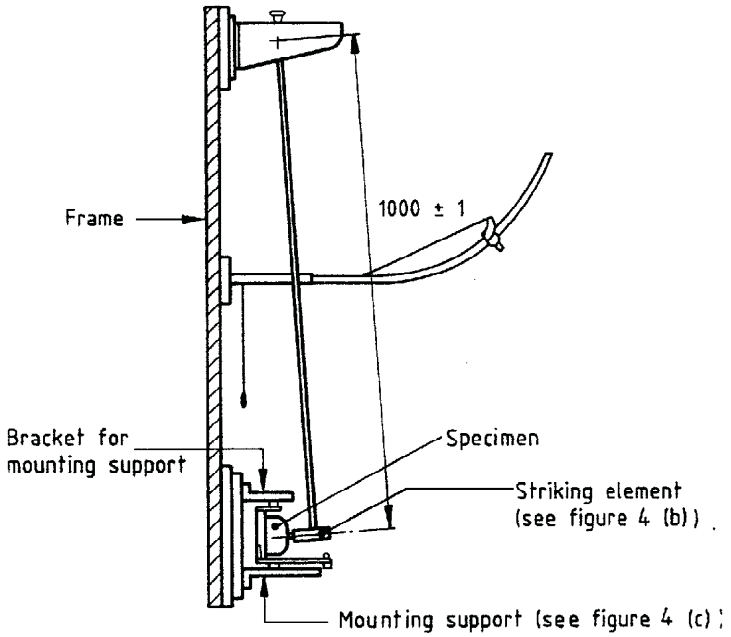
When tested in accordance with **14.2**, the socket-outlet shall withstand 10 blows evenly distributed over the socket-outlet, including one blow being on the shutter. After the test the socket-outlet shall still conform to clause **7** and clause **11**.

Damage to the finish, and small chips that do not adversely affect the protection against contact with electrified parts shall be ignored, as shall cracks not visible with normal or corrected vision without additional magnification, and surface cracks in fibre-reinforced mouldings and the like.

14.2 Test method

14.2.1 *Principle*

Socket-outlets are tested with the impact test apparatus shown in figure 4.

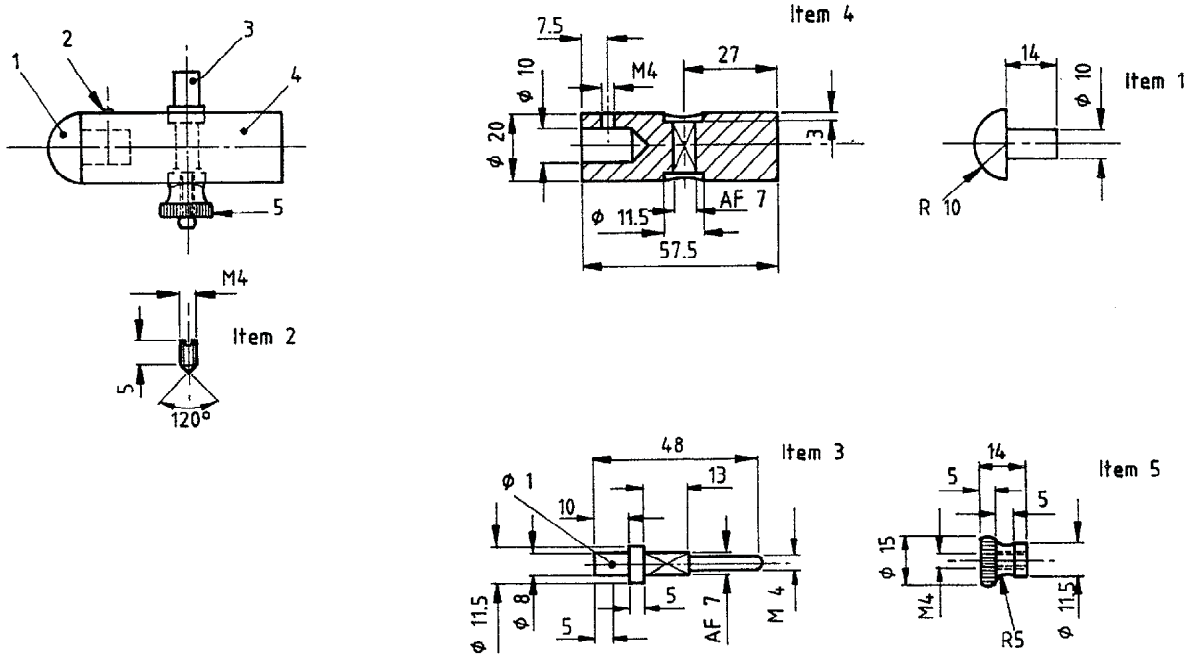


All dimensions are in millimetres.

a) General view

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

Figure 4. Test specimen

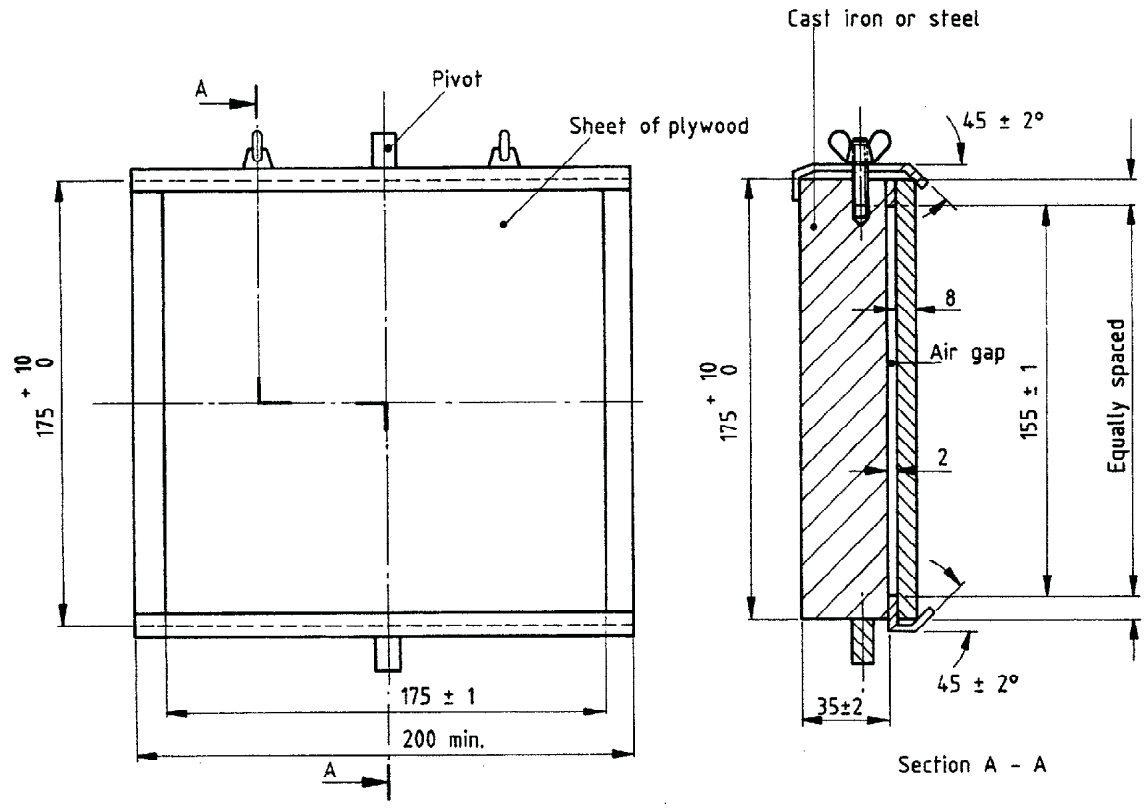


All dimensions are in millimetres.

b) Constructional details of striking element

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

Figure 4. Test apparatus (*continued*)



All dimensions are in millimetres.

c) Constructional details of mounting support for test samples

Figure 4. Test apparatus (*concluded*)

14.2.2 ***Apparatus***

The apparatus consists of a steel tube pendulum suspended in such a way that it swings only in a vertical plane. A striking element of 0.15 kg is rigidly fixed to the lower end of the pendulum with its axis 1 m from the axis of suspension. The striking element has a 10 mm radius hemispherical face made of polyamide having a Rockwell hardness of R100[2], or of hornbeam.

The design of the apparatus is such that a force of between 1.9 N and 2.0 N has to be applied to the face of the striking element to maintain the pendulum in a horizontal position.

The socket-outlet is mounted on a sheet of plywood 8 mm thick and 175 mm square, secured at its top and bottom edges to a mounting support. The mounting support, having a mass of 10 ± 1 kg, is mounted on a frame that is fixed to a solid wall.

The design of the mounting assembly is such that:

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

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

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

The socket-outlet is mounted on the plywood as in normal use.

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

The hardwood used has the direction of the wood fibres substantially perpendicular to the direction of impact.

To simulate the condition of normal use, the rear of the front plate is flush with the surface of the hardwood block. The front edge of the box is between 2.5 mm and 5 mm behind the face of the hardwood block. The socket is placed so that the point of impact lies in the vertical plane through the axis of the pendulum pivot.

14.2.3 ***Procedure***

Allow the hammer to fall from a height of $150\ ^{+5}_{0}$ mm, measured vertically between the point of impact on the socket and the face of the hammer at the point of release.

Apply 10 such blows to different points, evenly distributed over the surface of the socket. One of the points of impact shall be the shutter.

14.3 Effectiveness of shutter

14.3.1 ***Initial opening force***

When tested in accordance with **14.3.2**, shutters of socket-outlets shall not move when a force of 0.5 N is applied but shall open fully when a force of 2.5 N is applied.

14.3.2 ***Test***

Apply the tip of a tension gauge to the lip of the shutter as shown in figure 5, and test that the shutter does not move when a force of 0.5 N is applied but opens fully when a force of 2.5 N is applied.

14.3.3 ***Opening force after operation***

After the shutter has been opened to its fullest extent and allowed to close 1000 times, it shall still conform to **14.3.1**.

14.3.4 ***Test***

Open the shutter to its fullest extent and allow it to close 1000 times and then perform the test given in **14.3.2**.

15 Resistance to heat

Except for printed circuit boards, and parts mounted thereon, a socket outlet subjected to a temperature of (70 ± 2) °C for a period of 1 h (in a suitable heating cabinet), shall not undergo any change impairing its further use, and any sealing compound shall not flow to such an extent that live parts are accessible.

Discoloration, blisters or slight displacement of any sealing compound shall be disregarded provided that conformity to the requirements of clause **10** is not impaired.

[2] BS 2782 : Part 3 : Method 365C : 1992 gives details

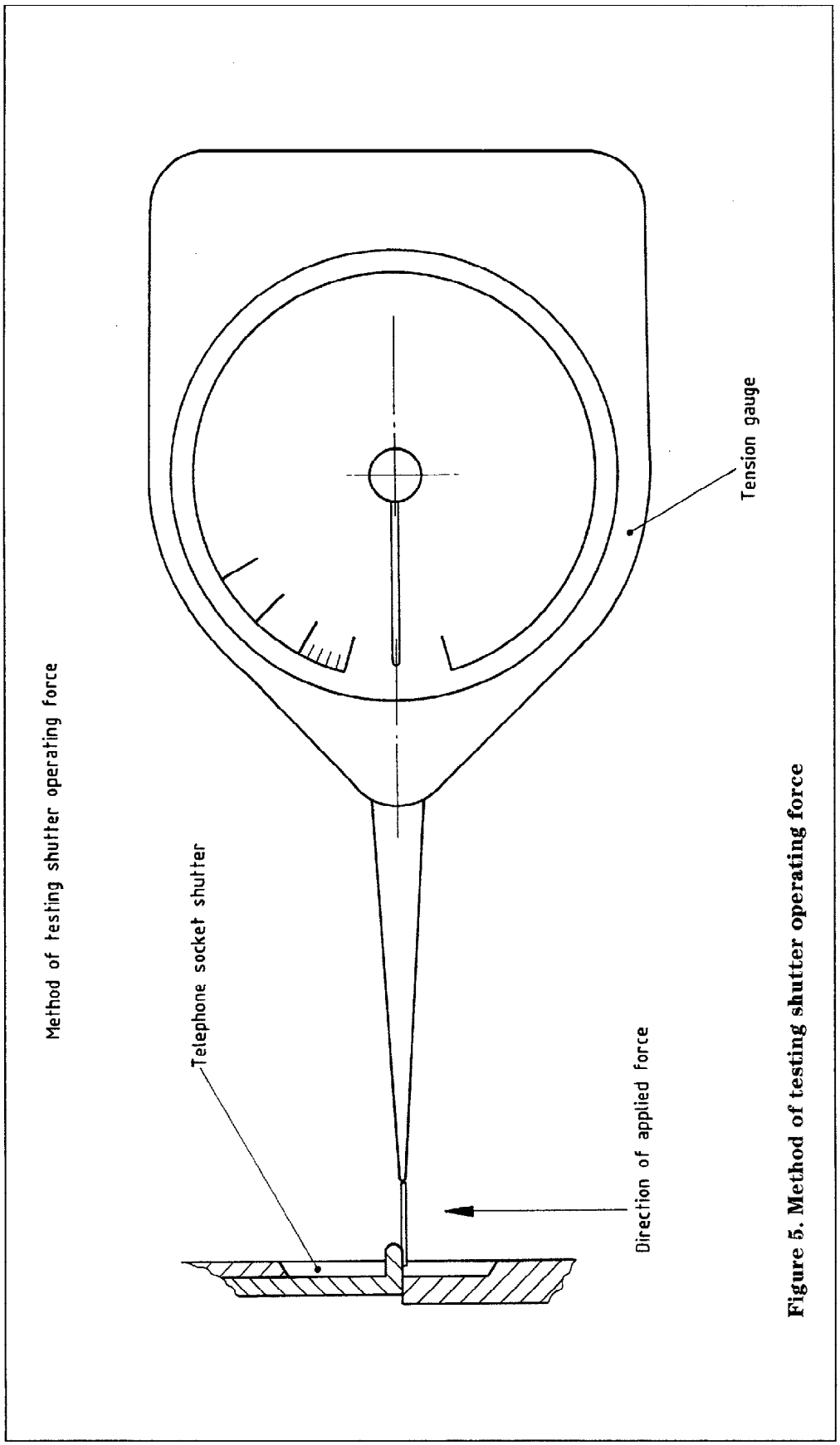


Figure 5. Method of testing shutter operating force

Annexes

Annex A (normative)
Characteristics of components

A.1 Voltage surge protector

The essential parameters of a voltage surge protector are as follows:

insulation resistance	≥ 100 MΩ at 170 V d.c.
capacitance	≤ 5 μF at 1 MHz
d.c. sparkover voltage	195 V to 265 V
impulse sparkover voltage	≤ 1000 V
impulse discharge current	5 kA
alternating discharge current (50 Hz)	≤ 5 A at 600 V
residual glow voltage	≤ 350 V at 10 mA
glow to arc transition current	≤ 1 A
arc voltage	≤ 35 V
holdover voltage	≤ 100 V

NOTE. The parameter values given are derived from BT specification D 2559

A.2 Insulation displacement terminals

The essential parameters of insulation displacement terminals are as follows:

current rating	1.5 A a.c or d.c. at 25 °C
voltage proof	1050 V a.c or d.c.
dielectric strength	2.0 kV
insulation resistance	≥ 100 MΩ
termination resistance	≤ 5 mΩ
capacitance between contacts	≤ 1 pF
crosstalk 300 Hz to 10 KHz	≥ 100 dB
insertion loss	≤ 0.1 dB
wire insertion force	40 N to 75 N
wire pull out force	10.5 N
wire retention force	75 % of wire breaking force

NOTE. The parameter values given are derived from BT specification D 2920

List of references (see clause 2)

Normative references

BSI publications

BRITISH STANDARDS INSTITUTION, London

BS 1210 : 1963	*Specification for wood screws*
BS 3042 : 1992	*Test probes to verify protection by enclosures*
BS 4662 : 1970	*Specification for boxes for the enclosure of electrical accessories*
BS 6217 : 1981	*Guide to graphical symbols for use on electrical equipment*
BS 6234 : 1987	*Specification for polyethylene insulation and sheath of electric cables.*
BS 6312 :	*Connectors for analogue telecommunications interfaces*
BS 6312 : Part 1 : 1994	*Specification for plugs*
BS 6312 : Part 2 :	*Sockets for use with plugs specified in BS 6312 : Part 1*
BS 6312 : Section 2.1 : 1994	*Specification for sockets —general requirements*
BS 6746 : 1990	*Specification for PVC insulation and sheath of electric cables*
BS EN 60249	*Base materials for printed circuits*
BS EN 60249-2	*Specifications*
BS EN 60249-2-5 : 1994	*Specification No.5 Epoxide woven glass fabric copper-clad laminated sheet of defined flammability (vertical burning test)*
BS CECC 30401 023 : 1979	*Harmonized detail specification for fixed metallized polyethylene terephthalate film dielectric d.c. capacitors. Rectangular insulated non-metallic case, rigid radial terminations. Full assessment level*
BS CECC 40101 019 : 1977	*Detail specification for fixed low power non-wirewound insulated resistors. Metal oxide film, helically cut. Full assessment level*

Informative references

BSI publications

BRITISH STANDARDS INSTITUTION, London

BS 2782:	*Methods of testing plastics*
BS 2782 : Part 3 :	*Mechanical properties*
BS 2782 : Part 3 : Method 365C : 1992	*Determination of Rockwell hardness*

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