BRITISH STANDARD

BS 6312 :
Section 2.1 :
1994

Connectors for analogue telecommunication interfaces

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

Section 2.1 Specification for sockets — general requirements

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:

British Approvals Board for Telecomunications
British Broadcasting Corporation
British Facsimile Industry Consultative Committee
British Micro Computer Manufacturers' Group (BMMG)
British Telecommunications plc
Cable Communications Association
Department of Trade and Industry (Telecommunications and Posts Division)
Electrical Installation Equipment Manufacturers' Association (BEAMA Ltd.)
Electricity Association
Federation of the Electronics Industry
Institution of Electrical Engineers
Kingston Communications (Hull) plc
Mercury Communications Ltd.
National Communications Union
National Transcommunications Ltd.
OFTEL (Office of Telecommunications)
Society of Cable Television Engineers
Society of Telecom Executives
Telecommunications Industry Association
Telecommunications Users' Association (TUA)

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 March 1996

The following BSI references relate to the work on this standard:
Committee reference TCT/2
Draft for comment 93/630693 DC

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Contents

Foreword

This Section of BS 6312 : Part 2 has been prepared under the direction of Technical Committee TCT/2. 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 designed as a public telecommunication system by an order made under Section 9 of the Telecommunications Act 1984).

The requirements specified in the standards are intended to ensure that the apparatus conforming to them, when connected to public telecommunication systems, will neither adversely affect any such system, not interfere with the service available to other users of the systems.

The standards include 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

This standard may be presented for designation under Section 22 of the Telecommunications Act 1984.

It is stipulated in the Telecommunications Act 1984 that apparatus within the scope of a designated standard may only be approved for connection to a telecommunication system if it conforms to that standard. Exceptions may be determined by or under the designation, which may stipulate variations of, or additions to, the requirements of the standard. The designation may also set conditions regarding the apparatus, its connection, or its use.

A copy of any designation will be included when available with all copies of this standard. Any further information on, or details of, the designation may be obtained from the Office of Telecommunications (OFTEL), 50 Ludgate Hill, London EC4M 7JJ.

Figure 1 is reproduced, by way of illustration, with the permission of British Telecommunications plc.

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

Specification

1 Scope

This Section of BS 6312 specifies requirements for dimensions, mechanical and electrical performance and tests for sockets for use with plugs which conform to BS 6312 : Part 1 : 1994. The requirements are specified to ensure mechanical compatibility and reliable electrical contact between the plug and socket.

This standard applies to sockets with 2,3,4, 5 or 6 contacts and with the latch adjacent to the position for contact number 6 of the plug as shown in figure 2 of BS 6312 : Part 1 : 1994.

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

NOTE. The socket specified in this Part of BS 6312 is subject to intellectual property rights. See annex A for information on licensing of these rights.

2 References

2.1 Normative references

This Section of BS 6312 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 Section 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 Section of BS 6312 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 purpose of this British Standard, the definitions given in BS 9520 : 1983 apply, together with the following:

3.1 plug

A connector conforming to BS 6312 : Part 1 : 1994.

3.2 socket

A device with mating characteristics intended to be compatible with those of a plug which conforms to BS 6312 : Part 1 : 1994.

3.3 type tests

A test or series of tests directed towards approval of a design, conducted to determine whether an item is capable of meeting the requirements of a product standard.

3.4 ambient temperature

The temperature in the room in which a type test is conducted, measured in the same horizontal plane as the socket under test, and at a distance of approximately 1 m from the socket and in a position not adversely affected by other heat sources nor by cooling air currents.

4 Testing

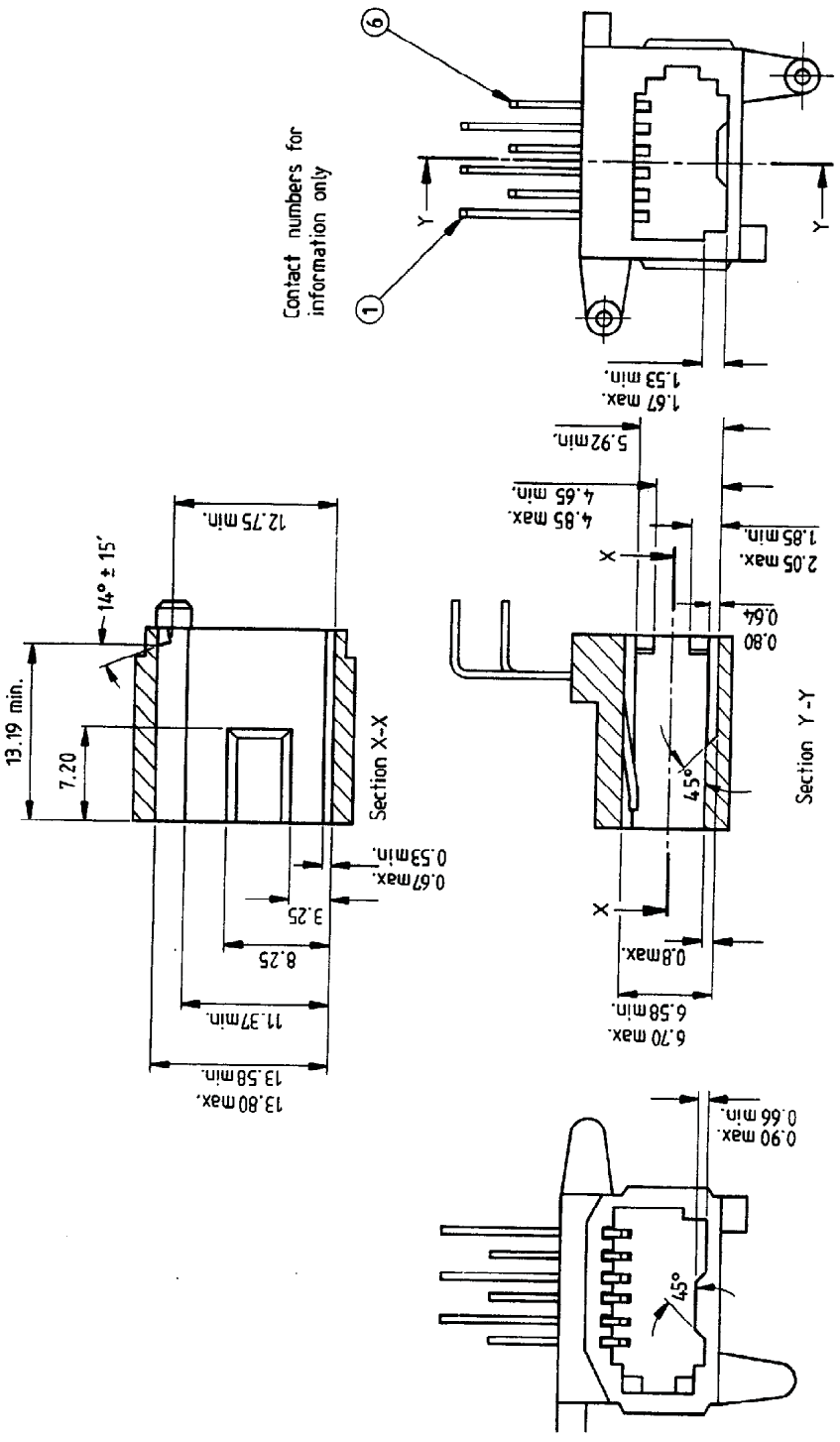
4.1 General

The tests described in this Section of BS 6312 shall be performed as type tests, as defined in **3.3**. Conformity to the standard shall only be claimed after satisfactory performance of these tests, in order to ensure that the respective requirements are met. Where no test method is specified, conformity shall be checked by inspection and, where appropriate, by measurement.

4.2 Conditions for tests

4.2.1 The plugs used for these tests shall conform to BS 6312 : Part 1, and have the same number of contacts, with the corresponding contact positions, as the socket under test.

The sockets used for the tests shall be identical with normal production items in respect of all details which may affect the test results. A particular implementation of the socket is illustrated in figure 1.



Tolerance, unless otherwise stated,
on linear dimensions: ± 0.1
on angles: ± 1°

Dimensions are in millimetres

NOTE. Features without dimensions are shown by way of illustration only and are not intended to govern design.

This drawing is reproduced, by way of an illustration, with the permission of British Telecommunications plc.

Figure 1. Dimensions of the socket

4.2.2 Three new plug/socket specimens shall be used for each test sequence except for the test specified in **6.7.2**, in which two new plug/socket specimens shall be used.

Once selected, the nominated plug/socket combination shall be retained throughout the test sequence.

4.2.3 Unless otherwise specified, tests are made under normal operating conditions, as follows:

a) ambient temperature: 20 ± 5 °C

b) relative humidity: 45 % to 75 %

c) air pressure: 86 kPa to 106 kPa

4.2.4 Test sequences shall be performed in the order set out in each test method.

5 Dimensions

The dimensions of the socket shall conform to the values shown in figure 1.

NOTE. Figure 1 of BS 6312 : Part 1 : 1994 depicts a typical implementation of a socket conforming to this Section of BS 6312.

6 Performance

6.1 Insertion force (latch inoperative)

6.1.1 *Requirement*

When tested in accordance with **6.1.2**, a plug, with the latch inoperative, shall fully engage with the socket when subjected to an axial force not exceeding (2.5n + 5) N, where n equals the number of contacts in the socket.

6.1.2 *Test*

The socket under test is mounted on suitable apparatus. A plug, with the latch inoperative, is partially inserted into the socket aperture, care being taken to ensure that the respective contacts are not engaged.

Apply an axial force to the plug, and measure and record the axial force required to ensure full engagement of the plug and socket.

6.2 Withdrawal force (latch inoperative)

6.2.1 *Requirement*

When tested in accordance with **6.2.2**, the axial force necessary to withdraw a plug, with the latch inoperative, from the socket shall not exceed (2.5n + 5) N, where n equals the number of contacts in the socket.

6.2.2 *Test*

The socket under test is mounted on suitable apparatus. A plug, with the latch inoperative, is fully engaged with the socket.

Subject the plug to an axial force applied in a direction away from the socket. Measure and record the axial force required to ensure complete withdrawal of the plug from the socket.

6.3 Plug retention and damage caused by forced withdrawal

6.3.1 *Requirement*

The latch shall prevent withdrawal of a plug from the socket when the plug is subjected to an axial withdrawal force less than or equal to 30 N.

When tested in accordance with **6.3.2**, the plug and socket combination, when subjected to an axial withdrawal force sufficient to enable the plug, with the latch operative, to be withdrawn from the socket, shall suffer no damage such that the requirements of **6.1.1** and **6.2.1** cannot be met.

6.3.2 *Test*

Insert the plug, with the latch operative, into the socket.

Subject the plug to an axial withdrawal force of 30 N for 1 min and then check that the plug remains latched.

Increase the withdrawal force until the plug pulls out from the socket. Inspect the plug and socket combination for damage occurring as a result of this action.

Perform the insertion force test as specified in **6.1.2** to ensure that the the requirements of **6.1.1** are still met. With the latch operative, subject the plug to an axial withdrawal force of 30 N for 1 min. Check that the plug remains latched. Perform the test specified in **6.2.2** to ensure that requirements of **6.2.1** are still met.

6.4 Termination resistance

6.4.1 *Requirement*

When tested in accordance with **6.4.2**, the initial termination resistance of each contact of the plug and socket combination shall be not greater than 25 mΩ.

NOTE 1. The initial value of the resistance is the value before the plug and socket combination is subjected to normal use or to an industrial atmosphere environment (see **6.6.2**), and in particular, for the purpose of establishing conformity, before the tests specified in **6.5.2** and **6.6.2** are undertaken.

NOTE 2. The contacts of BT jacks in the 600 series are currently plated with 98 % minimum acid hard gold, with a hardness in the range 120 to 200 on the Vickers hardness scale, (see BS 4292 : Part 1 : 1989). If incompatible plating is used on the plug this could cause failure of the mating surfaces.

6.4.2 ***Test***

With the latch inoperative, measure the resistance R_1 of each contact of the mated plug and socket combination, as shown in figure 2a. Subtract the resistance R_2 of the corresponding contact of the plug when unmated, as shown in figure 2b. The current and voltage levels shall be in accordance with **1.2.4.2a** of BS 9520 : 1983.

6.5 Insulation resistance

6.5.1 ***Requirement***

When tested in accordance with **6.5.2**, the insulation resistance shall be not less than 100 MΩ.

6.5.2 ***Test***

Measure the insulation resistance of a socket, using Method B specified in **1.2.4.4** of BS 9520 : 1983 with a nominal test voltage of 500 V d.c., and record the result. In the case of sockets that have an insulated shell, the insulation resistance shall be measured between the contacts only.

6.6 Mechanical endurance

6.6.1 ***Requirement***

When tested in accordance with **6.6.2**, the increase in termination resistance of each contact of the plug and socket combination shall be not more than 20 mΩ, the insulation resistance for the socket shall meet the requirements of **6.5.1**, and the requirements of **6.1.1** and **6.2.1** shall be met.

6.6.2 ***Test***

Measure and note the initial termination resistance of a plug and socket combination which conforms to **6.4.1**, and for which the socket conforms to **6.5.1**. Subject the combination to 250 complete manual insertion and withdrawal cycles at a rate of approximately 15 cycles/min. Using the procedures given in **6.1.2** and **6.2.2**, measure and record respectively the insertion and withdrawal forces, with the latch inoperative, after 1, 100 and 250 cycles.

During cycles other than those in which insertion and withdrawal measurements are made, ensure that the latch is made to function during each insertion but is made inoperative during each withdrawal.

After 250 cycles, measure the termination resistance of each contact of the plug and socket combination as specified in **6.4.2**. Finally measure the insulation resistance of the socket as specified in **6.5.2** to ensure conformity with **6.5.1**.

6.7 Effect of current switching and industrial atmosphere

6.7.1 ***Requirement***

When tested in accordance with **6.7.2**, the increase in termination resistance of each contact of the plug and socket combination shall be not more than 20 mΩ, and the insulation resistance for the socket shall meet the requirements of **6.5.1**. Following this test, the socket shall conform to the requirements of **6.1.1** and **6.2.1**.

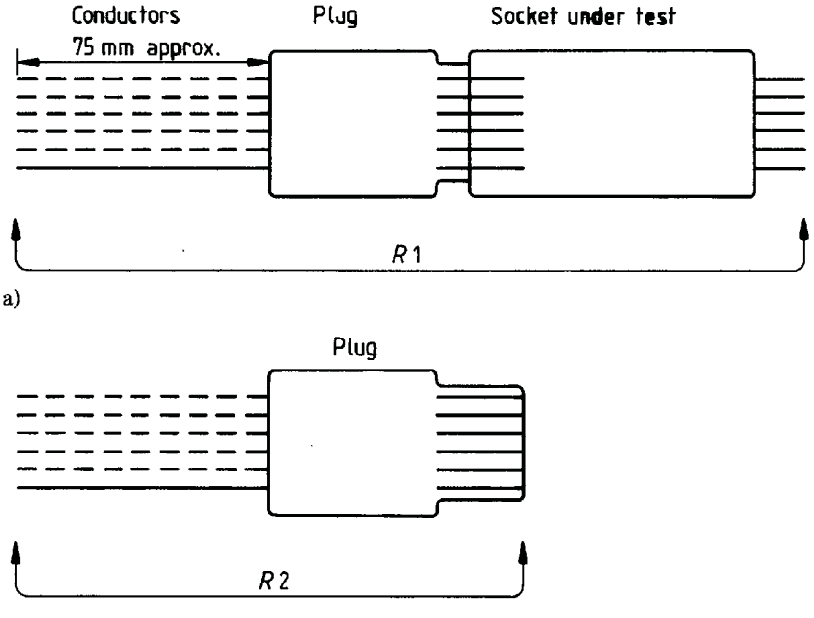


Figure 2. Method of measuring termination resistance

6.7.2 ***Test***

Measure and note the initial termination resistance for two plug and socket combinations which conform to **6.4.1**, and for which each socket conforms to **6.1.1, 6.2.1** and **6.5.1**.

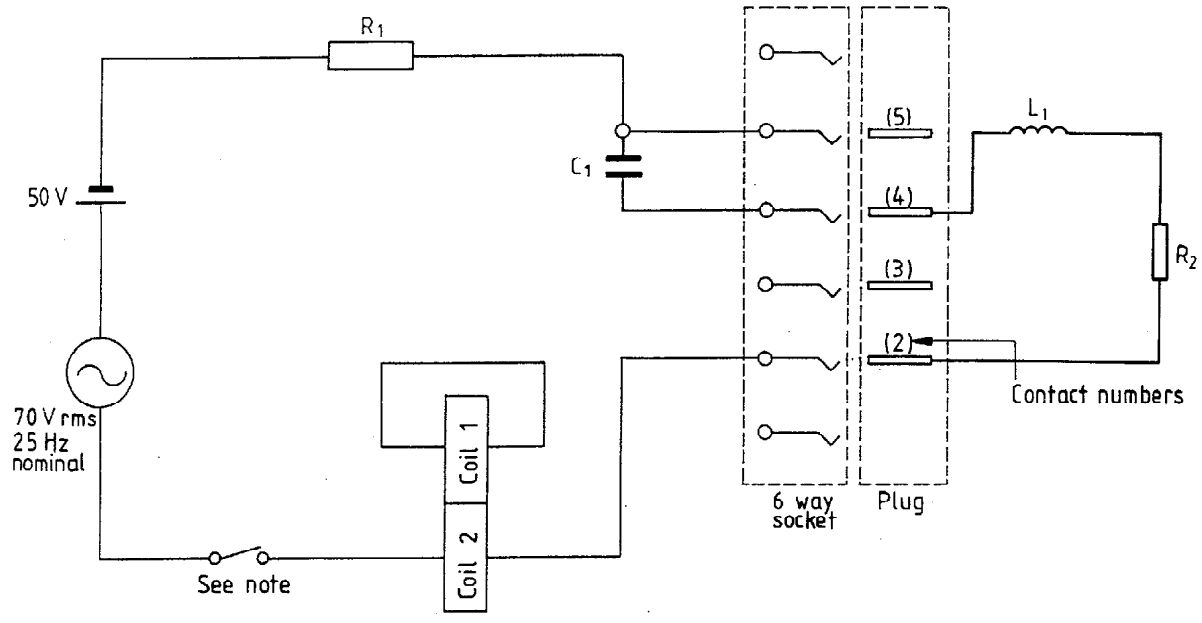
Connect one plug and socket combination to the ringing current test circuit shown in figure 3, and the other plug and socket combination to the direct current test circuit shown in figure 4.

Subject each plug and socket combination to 15 complete manual insertion and withdrawal cycles, at a rate of approximately 15 cycles/min.

During the cycles, ensure that the latch is made to function during insertion but is made inoperative during each withdrawal.

After 15 cycles, disconnect each plug and socket combination from their respective test circuits, and unmate them. Subject the unmated plugs and sockets to the test described in BS 2011 : Part 2.1 : 1977, Test Kc (with the conditioning atmosphere generated by combustion, as described in appendix B of that standard) for a period of 10 days.

After this period, measure the termination resistance of each plug and socket combination as specified in **6.4.2** and perform the tests specified in **6.1.2** and **6.2.2**. Finally measure the insulation resistance of the socket as specified in **6.5.2** to ensure conformity with **6.5.1**.



3000 type relay code 17552X

The characteristics of 3000 type relay, code no. 17552X, are as follows:

Characteristic	Coil 1	Coil 2
Resistance $I_{operate}$ $I_{non\text{-}operate}$	400 Ω ± 10 % 40 mA	300 Ω ± 10 % 18 mA 9 mA
Armature travel Residual gap	(1.09 ± 0.05) mm (0.10 ± 0.05) mm	

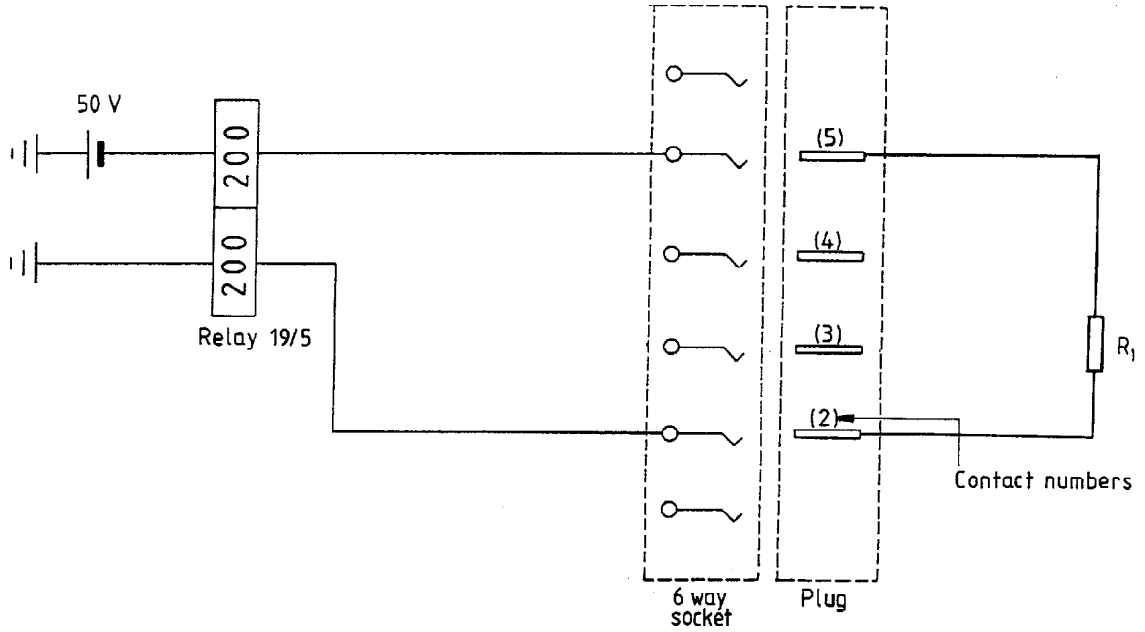
R_1: 200 Ω, 1 W
C_1: 1.8 µF, 250 V
L_1: 55 H
R_2: 7000 Ω

NOTE 1. For information on the availability of 3000 type relay, code no. 17552X, write to Customer Information, 389 Chiswick High Road, London W4 4AL.

NOTE 2. Switch to be closed during mating and unmating.

NOTE 3. The value of R_2 includes the resistance of L_1.

Figure 3. Ringing current test circuit



Characteristics of relay 19/5

Resistance per coil:	200 Ω $^{+15}_{-5}$ %
$I_{operate}$:	≥ 14 mA
$I_{release}$:	≤ 4.5 mA
Armature travel:	0.64 mm ± 0.05 mm
Residual gap:	0.30 mm ± 0.05 mm

R_1: 120 Ω ± 10 Ω

NOTE. For information on the availability of relay 19/5, write to Customer Information, BSI, 389 Chiswick High Road, London W4 4AL.

Figure 4. Direct current test circuit

7 Marking

7.1 Requirement

The plug shall be legibly and durably marked with the manufacturer's or supplier's name, identification mark or code.

NOTE. Manufacturers may wish to check with the approval authority that a proposed identification mark is unique.

Markings produced by an engraving or moulding process are deemed to conform to the durability requirement without test. All other markings shall remain legible after having been tested in accordance with **7.2**.

7.2 Test

Lightly rub the marking on the plug, 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.

Annex

Annex A (informative)
General information on licensing of intellectual property rights

Intellectual property rights necessary to implement BS 6312 : Section 2.1, owned by British Telecommunications plc, will be available in accordance with the relevant BSI rules.

For further details please contact:

Standards Licensing Adviser

Intellectual Property Department

British Telecommunications plc

151 Gower Street

LONDON WC1E 6BA

NOTE. BSI rules relating to the licensing of intellectual property rights are contained in Section 15 of BS 0 : Part 3 : 1991.

List of references

Normative references

BSI publications

BRITISH STANDARDS INSTITUION, London

BS 2011 :	*Environmental testing*
BS 2011 : Part 2.1	*Tests*
BS 2011 : Part 2.1 Kc : 1991	*Test Kc and guidance. Sulphur dioxide test for contacts and connections*
BS 6312	*Connectors for analogue telecommunication interfaces*
BS 6312 : Part 1 : 1994	*Specification for plugs*
BS 9520 : 1983	*Specification for electrical connectors of assessed quality for d.c. and low frequency application; generic data, methods of test and capability approval procedures*

Informative references

BSI publications

BRITISH STANDARDS INSTITUTION, London

BS 0:	*A standard for standards*
BS 0 : Part 3 : 1991	*Guide to drafting and presentation of British Standards*
BS 4292 :	
BS 4292 : Part 1 : 1989	*Method for specifying electroplated coatings of gold and gold alloys*

BS 6312 : Section 2.1 : 1994

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

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Tel: 0181 996 7111; Fax: 0181 996 7048.

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