

Specification for

Electrical safety of domestic gas appliances

Confirmed
December 2011

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

BSI
Documents

AVA

Document Sharing Hub

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Gas Standards Policy Committee (GSE/-) to Technical Committee GSE/17, upon which the following bodies were represented:

- Association for Consumer Research (ACRE)
- British Gas plc
- Consumer Policy Committee of BSI
- Department of Energy (Energy Efficiency Office)
- Department of the Environment (Construction Directorate)
- Department of Trade and Industry (Consumer Safety Unit, CA Division)
- Gas Consumers' Council
- Institution of Gas Engineers
- Liquefied Petroleum Gas Industry Technical Association (UK)
- National Caravan Council Limited
- Royal Society for the Prevention of Accidents
- Society of British Gas Industries

This British Standard, having been prepared under the direction of the Gas Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 29 November 1991

© BSI 02-2000

The following BSI references relate to the work on this standard:
Committee reference GSE/17
Draft for comment 89/79516 DC

ISBN 0 580 19817 0

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	iii
1 Scope	1
2 Definitions	1
3 General requirements	3
4 General conditions for the tests	3
5 Rating	4
6 Classification	4
7 Marking	4
8 Instructions	6
9 Protection against electric shock	9
10 Starting of motors	11
11 Input and current	12
12 Temperature limits	12
13 Leakage current and dielectric strength at operating temperature	13
14 Moisture resistance	15
15 Insulation resistance and electric strength	19
16 Overload protection	20
17 Motors	21
18 Stability and mechanical hazards	22
19 Mechanical strength	22
20 Construction	23
21 Internal wiring	25
22 Components	26
23 Supply connection and external flexible cables and cords	27
24 Terminals for external conductors	32
25 Provision for earthing	35
26 Electrical connections and screws	35
27 Creepage distances, clearances and distances through insulation	37
28 Resistance to heat, fire and tracking	39
29 Resistance to rusting	41
Appendix A Electronic circuits	42
Appendix B Classification of controls as type 1 or type 2 in accordance with BS 3955	44
Appendix C Measurement of creepage distances and clearances	44
Figure 1 — Standard test finger	10
Figure 2 — Special test finger	10
Figure 3 — Test pin	11
Figure 4 — Load for rotating accessory	12
Figure 5 — Diagram for leakage current measurement at operating temperature for class II parts	14
Figure 6 — Diagram for leakage current measurement at operating temperature	14
Figure 7 — Diagram for electric strength test at operating temperature	15
Figure 8 — Vertical rain apparatus	17
Figure 9 — Spray apparatus	18
Figure 10 — Splash apparatus	18
Figure 11 — Device for testing shoulders in conduit entries	23

	Page
Figure 12 — Schematic representation of cord anchorages	31
Figure 13 — Typical examples of pillar, screw and stud terminals	34
Figure 14 — Ball-pressure apparatus	39
Figure 15 — Hot mandrel apparatus	40
Figure 16 — Arrangement and dimensions of electrodes for tracking test	41
Table 1 — Maximum temperature rises	7
Table 2 — Test voltages for electric strength test	20
Table 3 — Limiting temperatures of windings	21
Table 4 — Maximum temperature rises during motor tests	21
Table 5 — Test force for screwed glands	22
Table 6 — Size of cable and conduit entries	28
Table 7 — Dimensions of pillar terminals	32
Table 8 — Dimensions of screw terminals	33
Table 9 — Dimensions of stud terminals	33
Table 10 — Torque values for screws and nuts	36
Table 11 — Creepage distances and clearances	38
Table 12 — Creepage distances and clearances for electronic circuits	44
Publication(s) referred to	Inside back cover

Foreword

This British Standard has been prepared under the direction of the Gas Standards Policy Committee. Its primary purpose is to supplement standards for the safety of domestic gas appliances, e.g. BS 5258, which, while purporting to cover electrical as well as gas and mechanical safety aspects, do so only by general reference to BS 3456-101.

This British Standard is intended for appliances of gas heat input not exceeding 60 kW and in which there is no intentional additional electrical heating. It is based on, and the format closely follows that of, BS 3456-101 which itself is the implementation in a British Standard of CENELEC¹⁾ Harmonization Document 251 S3.

Attention is drawn to the requirements of the Low Voltage Electrical Equipment (Safety) Regulations 1989.

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

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, pages 1 to 46, 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⁾ European Committee for Electrotechnical Standardization.

1 Scope

This British Standard specifies the electrical safety requirements for domestic gas appliances, hereinafter referred to as appliances, operating from a 240 V 50 Hz single phase supply without electrical heating and with a maximum electrical input of 1 kW and a maximum gas heat input of 60 kW.

In this standard, references to “hazards” denote those hazards arising from the electrical equipment and wiring.

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 British Standard the following definitions apply.

NOTE Unless otherwise specified, voltages and currents are expressed by their r.m.s. values.

2.1

accessible part or accessible surface

a part or surface that can be touched by means of the test finger shown in Figure 1

2.2

all-pole disconnection

disconnection of both supply conductors by a single switching action

NOTE The protective (earthing) conductor is not considered to be a supply conductor.

2.3

appliance for building-in

a fixed appliance intended to be installed in a cabinet, in a prepared recess in a wall, or in a similar situation

NOTE Appliances for building-in may not have an enclosure on all sides, full protection against electric shock being obtained after installation.

2.4

basic insulation

insulation applied to live parts to provide basic protection against electric shock

NOTE Basic insulation does not necessarily include insulation used exclusively for functional purposes.

2.5

body

includes all accessible metal parts, shafts of handles, knobs, grips, etc. and metal foil in contact with all accessible surfaces of insulating material but excluding inaccessible metal parts

2.6

class 1 appliance

an appliance in which protection against electric shock does not rely on basic insulation only, but which includes an additional safety precaution in such a way that means are provided for the connection of accessible conductive parts to the protective (earthing) conductor in the fixed wiring of the installation so that accessible conductive parts cannot become live in the event of a failure of the basic insulation

NOTE 1 Class 1 appliances may have parts with double insulation or reinforced insulation, or parts operating at safety extra-low voltage (see 2.29).

NOTE 2 For appliances intended for use with a flexible cord or cable, this provision includes a protective (earthing) conductor as part of the flexible cord or cable.

2.7

class II part

a part for which protection against electric shock does not rely on basic insulation only, but which has additional safety precautions, such as double insulation or reinforced insulation between live parts and accessible metal parts, there being no provision for protective earthing

2.8

class III part

a part in which protection against electric shock relies on supply at safety extra-low voltage and in which voltages higher than this, excluding spark ignition, are not generated

2.9

clearance

the shortest distance between two conductive parts, or between a conductive part and the bounding surface of the appliance, measured through air

NOTE The bounding surface of the appliance is the outer surface of the enclosure, considered as though metal foil were pressed into contact with accessible surfaces of insulating material.

2.10

continuous operation

operation under normal electrical load and rated heat input for an unlimited period

2.11

creepage distance

the shortest path between two conductive parts, or between a conductive part and the bounding surface of the appliance, measured along the surface of the insulating material

2.12

detachable flexible cable or cord

a flexible cable or cord, for supply or other purposes, intended to be connected to the appliance by means of a suitable appliance coupler

2.13**detachable part**

a part that can be removed without the aid of a tool

NOTE See 2.36.

2.14**double insulation**

insulation comprising both basic insulation and supplementary insulation

2.15**extra-low voltage**

a voltage supplied from a source within the appliance and, when the appliance is operated at its rated voltage, not exceeding 42 V between conductors and between conductors and earth, the extra-low voltage circuits being separated from other circuits by basic insulation only

2.16**fixed appliance**

an appliance that is fastened to a support or otherwise secured in a specific situation

2.17**hot condition**

the appliance is operated in accordance with the test methods as specified in the appliance standards for the testing of component temperatures

NOTE In BS 5258, the test methods will be those referred to under the heading "Component temperatures". In BS 5386-1 they will be found under the heading "Temperature of control handles", in BS 5386-3 and BS 5386-4 under the heading "Heating" and in BS 5386-5 under the heading "Temperature of components and control knobs".

2.18**live (part)**

any part deliberately connected or intended to be connected to one or other pole of the electrical supply

2.19**non-detachable part**

a part that cannot be removed without the aid of a tool

NOTE See 2.36.

2.20**non-self-resetting cut-out**

a thermal cut-out that requires resetting by hand, or replacement of a part, in order to restore the current

2.21**normal load**

the load to be applied to an appliance incorporating a motor so that the stress imposed corresponds to that occurring under normal conditions of use

2.22**power supply cord**

a flexible cable or cord, for supply purposes fixed to, or assembled with, the appliance such that it can easily be replaced, without the aid of special purpose tools, by a similar flexible cable or cord not requiring any special preparation

2.23**rated current**

the current assigned to the appliance by the manufacturer

NOTE If no current is assigned to the appliance, the rated current for the purpose of this standard is determined by calculation from the rated input and the rated voltage and/or by measuring the current when the appliance is operating at rated voltage under normal load and at normal operating temperature.

2.24**rated frequency**

the frequency assigned to the appliance by the manufacturer

2.25**rated input**

the electrical input assigned to the appliance by the manufacturer

2.26**rated voltage**

the voltage assigned to the appliance by the manufacturer

2.27**rated voltage range**

the voltage range assigned to the appliance by the manufacturer, expressed by its lower and upper limits

2.28**reinforced insulation**

a single insulation system applied to live parts that provides a degree of protection against electric shock equivalent to double insulation under the conditions specified in this standard

NOTE The term "insulation system" does not imply that the insulation should be one homogeneous piece. It may comprise several layers that cannot be tested singly as supplementary or basic insulation.

2.29**safety extra-low voltage**

a nominal voltage not exceeding 42 V between conductors and between conductors and earth, the no-load voltage not exceeding 50 V

NOTE 1 When safety extra-low voltage is obtained from the supply mains, it is essential that it be through a safety isolating transformer (see 2.30) or a converter with separate windings.

NOTE 2 The voltage limits given are based on the assumption that the safety isolating transformer is operated at its rated supply voltage.

2.30**safety isolating transformer**

a transformer, the input winding of which is electrically separated from the output windings by an insulation at least equivalent to double insulation, and which is designed to supply a distribution circuit, an appliance or other equipment at safety extra-low voltage

NOTE Transformers complying with BS 3535, without provision for earthing and with the appropriate output voltages, are considered to be safety isolating transformers for the purposes of this standard.

2.31**self-resetting thermal cut-out**

a thermal cut-out that automatically restores the current after the relevant part of the appliance has cooled down sufficiently

2.32**stationary appliance**

either a fixed appliance or an appliance having a mass exceeding 18 kg and not provided with a carrying handle

2.33**supplementary insulation**

independent insulation applied in addition to basic insulation, in order to ensure protection against electric shock in the event of failure of the basic insulation

2.34**thermal cut-out**

a device which, during abnormal operation, limits the temperature of an appliance, or of parts of it, by automatically opening the circuit or by reducing the current, and which is so constructed that its setting cannot be altered by the user

2.35**thermostat**

a temperature-sensing device, the operating temperature of which may be either fixed or adjustable and which, during normal operation, keeps the temperature of an appliance, or parts of it, between certain limits

2.36**tool**

a screwdriver, a coin or any other object that may be used to operate a screw or similar fixing means

2.37**type X attachment**

the method of attachment of a power supply cord

NOTE See 2.22.

2.38**working voltage**

the maximum voltage to which the part under consideration can be subjected when the appliance is operating at its rated voltage and under normal conditions of use

NOTE 1 Normal conditions of use include changes of voltage within the appliance imposed by likely occurrences, such as the operation of a circuit-breaker or the failure of a lamp.

NOTE 2 When deducing the working voltage, the effect of possible transient voltages on the supply mains is ignored.

3 General requirements

Appliances shall be so designed and constructed that, in normal use, the electrical function shall be safe so as to cause no danger to persons or surroundings, even in the event of such careless use as may occur in normal service, e.g. spillage due to a pan boiling over.

TEST. In general, compliance shall be checked by carrying out all the relevant tests specified.

4 General conditions for the tests

4.1 Before testing, appliances shall be installed in accordance with both the manufacturer's instructions and the relevant gas appliance standard.

4.2 As far as practicable, the tests shall be carried out in the order of the clauses of this standard.

4.3 The test room shall be adequately ventilated but free from draught likely to affect the performance of the appliance.

If the test results are influenced by the temperature of the ambient air, the room temperature shall be maintained at 20 ± 5 °C, except where specified otherwise within this standard.

4.4 Appliances provided with a thermostat, a regulating device or a similar control shall be tested with these controls adjusted to their most unfavourable setting, with respect to the electrical system, if the setting can be altered by the user.

NOTE 1 If the adjusting means of the control is accessible without the aid of a tool, **4.4** applies whether the setting can be altered by hand or with the aid of a tool. If the adjusting means is not accessible without the aid of a tool, **4.4** applies only if the setting can be altered by hand.

NOTE 2 Adequate sealing is regarded as preventing alteration of the setting by the user.

4.5 For the purposes of **9.4**, **15.3**, **23.9** and **25.1**, parts separated from live parts by double insulation or reinforced insulation shall be regarded as not being likely to become live in the event of an insulation fault. Connection of accessible metal parts to an earthing terminal or earthing contact does not remove the necessity for carrying out the relevant tests.

4.6 If class 1 appliances have accessible metal parts that are not permanently and reliably connected to an earthing terminal or earthing contact and that are not separated from live parts by an intermediate metal part which is connected to an earthing terminal or earthing contact, such parts shall be checked for compliance with the requirements specified for class II parts (see **9.5**, clause **13**, clause **15**, **20.19** and **23.9**).

Spark ignition electrodes shall be regarded as class II parts.

4.7 Electronic circuits shall comply with Appendix A.

4.8 Unless otherwise specified in this standard, appliances intended to be supplied by means of a flexible cable or cord shall be tested with the appropriate flexible cable or cord connected to the appliance.

5 Rating

Appliances covered by this standard shall be single-phase intended for direct connection to the UK mains supply and shall have a rated voltage that covers use at 240 V and a rated frequency that covers use at 50 Hz.

6 Classification

Appliances shall be classified as follows:

- a) according to degree of protection against electric shock:
 - 1) class I appliances;
 - 2) class II appliances;
 - 3) class III appliances.
- b) according to degree of protection against moisture:
 - 1) ordinary appliances;
 - 2) drip-proof appliances;
 - 3) splash-proof appliances.

NOTE 1 The class numbers are not intended to reflect the safety level of the appliances, but only the means by which the safety is obtained.

NOTE 2 The requirements with regard to the classification of appliances are given in **20.1** and **20.2**.

7 Marking

7.1 A data plate shall be affixed to the appliance in a position accessible and visible to the installer.

NOTE 1 The data plate may be that required in the relevant gas appliance standard.

It shall contain at least the following information:

- a) the manufacturer's name and/or trade mark, complete with address for correspondence;
- b) the appliance type name and/or number;
- c) the rated voltage, frequency and symbol for nature of supply;
- d) rated electrical input (in watts or kilowatts) if greater than 25 W;
- e) rated current of the appropriate fuse-link (in amperes) for an appliance incorporating a motor where the inrush current requires a fuse of a higher current rating than the marked rating (see **10.2**);

If the rated current of the appropriate fuse-link is marked and if the fuse-link is of the time-lag type, information about the time/current characteristic rating shall be included in the relevant marking;

- f) symbol for degree of protection against moisture, if applicable.

If an appliance has alternative components that can be selected by a control device, the rated input given shall be that corresponding to the highest loading possible.

Motors with windings insulated with class B, class F or class H material only (see BS 2757) shall be marked with the class designation of their winding insulation.

NOTE 2 If the motor of an appliance is marked separately, the marking of the appliance and that of the motor should be such that there can be no doubt with regard to the rating and manufacturer of the appliance itself.

NOTE 3 Additional markings are allowed, provided they do not give rise to misunderstanding.

7.2 When symbols are used, they shall be as follows.

V	volts
A	amperes
Hz	hertz
W	watts
kW	kilowatts
μ F	microfarads
L	litres
kg	kilograms
h	hours
min	minutes
s	seconds
~	alternating current
	fuse-link (417-IEC-5016a, BS 6217:1981)
 XA	rated current of the appropriate fuse-link where X is the numerical value of the current
 x	time-lag miniature fuse link where X is the symbol for time/current characteristic as given in BS 4265
	drip-proof construction
	splash-proof construction
	earth (417-IEC 5017a, BS 6217:1981)

The symbol for the nature of supply shall be placed next to the marking for rated voltage.

NOTE This list of symbols is not exclusive and other symbols for different purposes can be used if they do not lead to misunderstanding.

7.3 The line terminal shall be indicated by the letter L.

Terminals intended exclusively for the neutral conductor shall be indicated by the letter N.

Earthing terminals shall be indicated by the earth symbol shown in 7.2.

These indications shall not be placed on screws, removable washers or other parts that might be removed when conductors are being connected.

7.4 Unless it is obviously unnecessary, electrical controls shall be so marked or placed that they indicate clearly which part of the appliance they control.

7.5 The different positions of switches and the different positions of electrical controls and switches which are part of a control shall be indicated by figures, letters or other visual means.

If figures are used for indicating the different positions, the “off” position shall be indicated by the figure 0 and the position for a greater heating or cooling effect, speed etc. shall be indicated by a higher figure.

The figure 0 shall not be used for any other indication, unless it is so positioned and associated with other numbers that it does not give rise to confusion with the indication of the “off” position.

NOTE The figure 0 may, for example, also be used in a digital programming keyboard.

7.6 (See also 23.1.) A wiring diagram shall be marked on the appliance in a position easily visible to the installer/service engineer.

Wiring coding shall be such that it is easily identifiable with the wiring diagram, e.g. colours, numbers.

Every fuse or circuit breaker shall have on its case or cover, or in an adjacent position, indelible indication of its rated current appropriate to the circuit(s) it protects.

Any electrical component intended for service replacement shall be marked with its electrical characteristics, e.g. capacitance, resistance.

7.7 A warning notice shall be permanently affixed in a readily visible position near to the mains supply cord entry to the appliance or, for built-in appliances, on the access panel for internal wiring. The notice shall state the following.

“The appliance must be isolated from the electrical supply before carrying out any service operation.”

7.8 A label shall be attached to any flexible cord supplied with the appliance having cores coloured green-and-yellow, blue and brown. This label shall state the following.

“IMPORTANT

The wires in this mains lead are coloured in accordance with the following code.

Green-and-yellow: Earth

Blue: Neutral

Brown: Live”

In addition, the user instructions and label shall include the substance of the following.

“As the colours of the wires in the mains lead of this appliance may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows.

The wire that is coloured green-and-yellow must be connected to the terminal in the plug which is marked with the letter E or by the earth symbol or coloured green or green-and-yellow.

The wire that is coloured blue must be connected to the terminal that is marked with the letter N or coloured black.

The wire that is coloured brown must be connected to the terminal that is marked with the letter L or coloured red.”

7.9 All markings which are required by **7.1**, **7.3**, **7.5**, **7.6** and **7.7** shall be easily legible and shall comply with the durability requirements as detailed below.

TEST. Compliance shall be checked by inspection and by rubbing the marking by hand for 15 s with a piece of cloth soaked with water and again for 15 s with a piece of cloth soaked with petroleum spirit.

After all the tests specified in this standard, the marking shall be easily legible. It shall not be possible to remove marking plates easily and they shall show no signs of curling.

NOTE In considering the durability of the marking, the effect of normal use is taken into account. Thus, for example, marking by means of paint or enamel other than vitreous enamel on containers that are likely to be cleaned frequently is not considered to be durable.

8 Instructions

8.1 General

Instruction sheets and other texts required by this standard shall be written in English.

Where symbols are used, they shall be those indicated in this standard, although additional symbols can be used if they do not give rise to misunderstandings.

8.2 Installation instructions (see also **23.1**)

8.2.1 The installation instructions shall include instructions on the method of connecting the appliance to the electrical supply.

8.2.2 If the appliance is not fitted with either:

- a) a non-detachable flexible cable or cord intended to be connected to a plug; or
- b) with other means for disconnection from the supply having a contact separation of at least 3 mm in both poles,

the installation instructions shall state that it is required that such means for disconnection be incorporated in the fixed wiring or, alternatively, the instructions shall state the method of fitting the cord in accordance with item 2) of **23.2**.

8.2.3 The installation instructions shall include the temperature rating or *T*-marking of the insulation of the supply cable or cord if, where it can contact any part of the appliance operating under any condition of normal use, its temperature rise exceeds that specified in Table 1.

8.2.4 The installation instructions shall include a statement that all external wiring shall be in accordance with the current IEE wiring regulations.

8.2.5 For appliances for building-in, in order to ensure that after building-in the conditions necessary to comply with this standard are achieved, the instructions for appliances for building-in shall give clear information with regard to the connection of the appliance to the supply and interconnection of separate components, if any.

Table 1 — Maximum temperature rises (but see 12.2)

Part	Maximum temperature rise ^a
	K
Windings, if the winding insulation is:	
of class A material ^b	75 (65)
of class E material ^b	90 (80)
of class B material ^b	95 (85)
of class F material ^b	115
of class H material ^b	140
Terminals, including earthing terminals, for external conductors of stationary appliances, unless they are provided with a power supply cord	60
Ambient temperature of switches and thermostats ^c :	
without <i>T</i> -marking or temperature rating	30
with <i>T</i> -marking or temperature rating	<i>T</i> – 25
Rubber or polyvinyl chloride (PVC) insulation of internal and external wiring including power supply cords ^c :	
without <i>T</i> -marking or temperature rating	50 ^d
with <i>T</i> -marking or temperature rating	<i>T</i> – 25 ^e
Cord sheaths used as supplementary insulation	35
Rubber, other than synthetic, used for gaskets or other parts, the deterioration of which could affect safety:	
when used as supplementary insulation or as reinforced insulation	40
in other cases	50
Lampholders E26 and E27:	
metal or ceramic type	160
insulated type, other than ceramic	120
Lampholders E14, B15 and B22 ^c :	
metal or ceramic type	130
insulated type, other than ceramic	90
with <i>T</i> -marking	<i>T</i> – 25
Materials used as insulation other than that specified for wires and windings ^f :	
impregnated or varnished textile, paper or press board	70
laminates bonded with:	
melamine-formaldehyde, phenol-formaldehyde or phenol-furfural resins	85 (175)
urea-formaldehyde	65 (150)
mouldings of:	
phenol-formaldehyde with cellulose fillers	85 (175)
phenol-formaldehyde with mineral fillers	100 (200)
melamine-formaldehyde	75 (150)
urea-formaldehyde	65 (150)
polyester with glass fibre reinforcement	110

Table 1 — Maximum temperature rises (but see 12.2)

Part	Maximum temperature rise ^a
	K
silicone rubber	145
polytetrafluorethylene	265
pure mica and tightly sintered ceramic material, when such materials are used as supplementary insulation or reinforced insulation	400
thermoplastics material ^f	—
Outer surfaces of capacitors:	
with marking of maximum operating temperature (T)	$T - 35$
without marking of maximum operating temperature:	
small ceramic capacitors for radio and television interference suppression	50
other capacitors	20
Parts in contact with oil having a flash point of t_f °C	$t_f - 50$
Any point where the insulation of supply wires can come into contact where the appliance is not already fitted with a power supply cord ^c :	
where the instructions require T -marked or temperature rated wires	$T - 25^e$
in other cases	50 ^d
^a To allow for the fact that the temperature of windings of universal motors, relays, solenoids, etc. is usually below the average at the points where the thermocouples are placed, the figures without parentheses apply when the resistance method (see 12.1) is used and those within parentheses apply when thermocouples are used. For windings of vibrator coils and a.c. motors, the figures without parentheses apply in both cases. ^b The classification is in accordance with BS 2757. For totally enclosed motors, the temperature limits for class A, class E and class B materials may be increased by 5 K. A totally enclosed motor is a motor so constructed that the circulation of air between the inside and outside of the case is prevented but it is not necessarily sufficiently enclosed to be called airtight. ^c T signifies the maximum operating temperature. ^d This limit applies to cables, cords and wires complying with BS 6500. ^e This limit applies to cables and flexible cords complying with BS 6141 for use in high temperature areas. ^f There is no specific limit for thermoplastics material, which instead has to withstand the tests specified in 28.1 or 28.2 for which purpose the temperature has to be determined.	

8.3 Servicing instructions

The servicing instructions shall include the following:

- a warning in bold capital letters, on the first page, instructing the serviceman to isolate the electrical supply before carrying out any servicing procedure which might allow access to live parts. The instructions shall also state that where the appliance is connected to the supply via a plug and socket, it is essential that the plug always be withdrawn from the socket to ensure complete isolation;
- the procedures for removing or gaining access to electrical wiring and components for servicing;
- a wiring diagram showing essential connections and interconnections.

8.4 User instructions

The user instructions shall include the following:

- the warning **“WARNING. THIS APPLIANCE MUST BE EARTHED.”**;
- for appliances with lamps for replacement by the user, a warning to disconnect the appliance from the electrical supply before changing the lamps. This warning shall also state that, if the appliance is connected via a plug and socket, it is essential that the plug be withdrawn completely from the socket to ensure complete electrical isolation.

9 Protection against electric shock

9.1 All positions of the appliance, when it is wired and operated as in normal use, shall have adequate protection against accidental contact with live parts and basic insulation.

Tests 1, 2 and 3 shall be carried out on the appliance such that any part which can become live during the normal operation of the appliance is tested.

NOTE 1 Parts operating at safety extra-low voltage not exceeding 24 V are not considered to be live parts.

The insulating properties of lacquer, enamel, ordinary 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 live parts. Self-hardening resins shall not be regarded as sealing compounds.

TEST 1. The test finger shown in Figure 1 shall not touch live parts or basic insulation with the exception of lamps located behind a detachable cover provided that:

- a) the lampholders are designed such that lamp caps are inaccessible if they can become live during insertion; and
- b) the lamps can be separated from the supply by means of a plug or a double-pole switch, the “off” position of which is clearly indicated.

Detachable covers which are marked “Remove plug before removing this cover” or “Disconnect from the mains before removing this cover”, and non-detachable covers which need to be removed for user maintenance, may expose basic insulation but shall not expose live parts.

The test finger shall be applied without appreciable force in every possible position on the appliance that is accessible without the use of tools. Any user-operable lids, doors, etc. are opened and any detachable parts removed. If the manufacturer’s instructions permit the removal of a part during normal operation or user maintenance, then that part is removed even if it requires the use of tools.

For appliances provided with movable devices, such as those intended for varying the heat distribution or the tension of belts, the test shall be carried out with the devices adjusted to their most unfavourable position within the range of adjustment.

NOTE 2 When applying the test finger shown in Figure 1, either or both of the jointed sections should be turned through any angle up to 90° with respect to the axis of the finger and in the same direction only.

NOTE 3 It is recommended that a lamp be used for the indication of contact and that the voltage be not less than 40 V.

NOTE 4 The use of screw-type fuses and screw-type miniature circuit breakers is precluded if they are accessible without the use of tools.

TEST 2. Apertures preventing entry of the test finger shall be further tested by means of the test finger shown in Figure 2.

The test finger shall be applied with a maximum force of 30 N to any aperture where the entry of the tip of the test finger shown in Figure 1 has been prevented. If the test finger shown in Figure 2 enters the aperture and touches live parts, the appliance shall be considered not to comply with this British Standard. If it enters beyond the tip without touching live parts, the test with the test finger shown in Figure 1 shall be repeated, the test finger being pushed, if necessary, through the aperture and bent into any position.

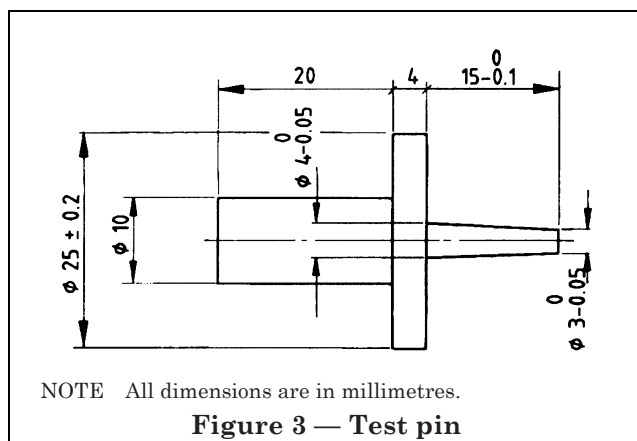
NOTE 5 Care should be taken to avoid wedge or lever action when applying the test finger shown in Figure 2.

Figure 1 — Standard test finger

Figure 2 — Special test finger

TEST 3. Apertures in parts which are not reliably connected to the appliance earth terminal, other than live parts in sockets outlets and lamp caps, are tested using the test pin shown in Figure 3.

The test pin is inserted and moved in any direction. It shall not touch live parts.



9.2 Conducting liquids that are or may become accessible in normal use shall not be in direct contact with live parts other than those operating at safety extra-low voltage not exceeding 24 V.

9.3 Shafts of operating knobs, handles, levers, etc. shall not be live.

9.4 Handles, levers and knobs that are held or actuated in normal use shall not become live in the event of an insulation fault.

Except as provided for in the note, if these handles, levers or knobs are of metal, and if their shafts or fixings are likely to become live in the event of an insulation fault, either they shall be covered adequately by insulating material, or their accessible parts shall be separated from their shafts or fixings by supplementary insulation.

NOTE For stationary appliances, this requirement does not apply to handles, levers and knobs, other than those of electrical components, provided they are either reliably connected to an earthing terminal or earthing contact, or they are separated from live parts by earthed metal.

TEST. Compliance shall be checked by inspection and, if necessary, by the tests specified for supplementary insulation (see clause 15).

9.5 For class II parts, capacitors shall not be connected to accessible metal parts, and their casings, if of metal, shall be separated from accessible metal parts by supplementary insulation.

TEST. Compliance shall be checked by inspection and by the tests specified for supplementary insulation (see clause 15).

9.6 Appliances intended to be connected to the supply by means of a plug shall be so designed that in normal use there is no risk of electric shock from charged capacitors when touching the pins of the plug.

TEST. Compliance shall be checked by the following test, which is carried out 10 times.

The appliance is operated at rated voltage or at the upper limit of the voltage range, whichever is applicable.

The appliance switch, if any, is then moved to the "off" position and the appliance is disconnected from the supply by means of the plug.

The voltage between the pins of the plug is measured 1 s after disconnection with an instrument that does not appreciably affect the value to be measured. This voltage shall not exceed 34 V.

NOTE Capacitors having a rated capacitance not exceeding 0.1 μF are not considered to entail a risk of electric shock.

10 Starting of motors

10.1 Motors shall start under all normal voltage conditions that may occur in use.

Centrifugal and other automatic starting switches shall operate reliably and without contact chattering.

TEST. Compliance shall be checked by starting the appliance motor three times at a voltage equal to 0.85 times rated voltage or 0.85 times the lower voltage of the rated voltage range, whichever is applicable, the appliance motor being at room temperature at the beginning of the test.

When testing a motor for a rotating spit or similar accessory, a weight as shown in Figure 4, having a mass of 4.5 kg, is attached to the rotating part.

Any motor shall be started each time under the conditions occurring at the beginning of normal operation or, for automatic appliances, at the beginning of the normal cycle of operation, the motor being allowed to come to rest between successive starts.

For appliances provided with motors having other than centrifugal starting switches, this test shall be repeated at a voltage equal to 1.06 times rated voltage.

In all cases, the appliance shall function in such a way that safety is not affected.

NOTE The supply source is such that, during the test, the drop in voltage does not exceed 1 %.