



Specification for

Safety of household and similar electrical appliances

Part 3. Complete particular specifications

Section 3.17 Toasters, grills, waffle irons, roasters and other dry cooking appliances

Spécification relative à la sécurité des appareils électrodomestiques et appareils analogues

Partie 3. Spécifications particulières complètes

Section 3.17 Grille-pain, grills, gaufriers, rôtissoires et autres appareils de cuisson à sec

Spezifikation bezüglich der Sicherheit von elektrischen Haushaltsgeräten und ähnliche Zwecke

Teil 3. Volle einzelne Spezifikationen

Abschnitt 3.17 Toaster, Grills, Waffeleisen, Bratöfen und andere Trockenkochgeräte

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Foreword

This revised specification for toasters, grills, waffle irons, roasters and other dry cooking appliances has been prepared under the direction of the Light Electrical Engineering Standards Committee and is one of the new series of stand-alone specifications that will replace the existing sections of Part 2 of BS 3456.

A need for revision of the whole of the BS 3456 series has arisen from the harmonization programme of the European Committee for Electrotechnical Standardization (CENELEC). This standard is technically identical with the CENELEC harmonization document (HD) for these appliances, which comprises HD 251.52 for the general requirements and HD 265 for the particular requirements. Any minor changes that may be required as a result of the subsequent revision of HD 265 will be introduced by amendment action as soon as this revision has been agreed by CENELEC.

CENELEC harmonization documents recognize certain national deviations that cannot, for the moment, be removed. Such UK departures, in accordance with CENELEC regulations, are denoted in the text by a marginal marking as shown below*. Deviations for other countries may be ascertained by reference to the relevant CENELEC harmonization documents.

For ease of cross-referencing between this standard, the CENELEC HDs and the IEC standards on which the HDs are based, the clause and subclause numbers have been kept in line with those of the second edition of International Electrotechnical Commission Publication 335-1 : 1976, which is the reference document for HD 251.52. Where a clause of the IEC standard does not apply to the appliances covered by this standard the clause number has been retained marked 'No requirement'.

Additional subclauses introduced by either the CENELEC HD or by UK deviations from the HD are numbered with the main clause number, followed by .I, .II etc., for additional clauses for general requirements and .101, .102 etc., for additional clauses for requirements particular to toasters, grills, waffle irons, roasters and other dry cooking appliances.

Appliances complying with the requirements of British Standards in the BS 3456 series of specifications are not necessarily suitable for use in premises to which the Offices, Shops and Railway Premises Act of 1963 and the Factories Act apply.

Compliance with the Electrical Equipment (Safety) Regulations: 1975 will generally be assured if appliances comply with the requirements of BS 3456. For more precise details regarding the relevance of BS 3456 to the regulations, reference should be made to the 'Administrative Guidance on the Electrical Equipment (Safety) Regulations: 1975 and the Electrical Equipment (Safety) (Amendment) Regulations 1976', available from HMSO (ISBN 0 11 511831 4).

Certification. The British Electrotechnical Approvals Board (BEAB) uses the series of specifications in BS 3456 as the requirements for granting its certification mark (see the inside back cover for details).

This standard supersedes part of BS 3456 : Part 2 : Section 2.6 : 1970 which will be withdrawn on the date agreed by the CENELEC General Assembly for standards conflicting with HD 265 to be withdrawn. Until this date BEAB will accept for approval appliances complying either with this standard or with BS 3456 : Part 2 : Section 2.6 : 1970.

*The marginal marking used in the text to indicate national deviations from CENELEC harmonization documents is as follows:



British Standard Specification for

Safety of household and similar electrical appliances

Part 3. Complete particular specifications

Section 3.17 Toasters, grills, waffle irons, roasters and other dry cooking appliances

1. Scope

1.1 BS 3456 : Part 3 : Section 3.17 specifies safety requirements for electric toasters, grills, waffle irons, roasters and similar dry cooking appliances for household and similar purposes.

NOTE 1. Where the term 'grills' is used, it covers rotary grills, radiant grills, and contact grills.

NOTE 2. Grills and similar appliances for baking and grilling for building in or incorporated into other appliances e.g. ranges are not within the scope of this standard; these are covered by BS 3456 : Part 2 : Section 2.1.

This standard does not take into account the special hazards that exist in nurseries and other places where there are young children or aged or infirm persons without supervision; in such cases additional requirements may be necessary.

This standard does not apply to:

- appliances designed exclusively for industrial purposes;
- appliances intended to be used in locations where special conditions prevail, such as the presence of a corrosive atmosphere (dust, vapour or gas);
- high frequency heating appliances;

NOTE 3. This standard cannot be applied to commercial catering equipment without modification but it may be used as a guide for requirements and tests for such equipment.

For appliances intended to be used in vehicles or on board ships or aircraft, additional requirements may be necessary.

For appliances intended to be used in tropical countries, special requirements may be necessary.

1.2 This standard is concerned with safety and takes into account the influence on safety of components that are necessary to achieve a required degree of radio and television interference suppression.

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

2. Definitions

Where the terms 'voltage' and 'current' are used, they imply the r.m.s. values unless otherwise specified.

For the purposes of this British Standard the following definitions, with the exception of definitions **2.16** and **2.17**, apply. Definitions **2.16** and **2.17** have been included because, although these classes of appliance are not permitted in the United Kingdom, they are referred to in corresponding international standards.

2.1 rated voltage. The voltage assigned to the appliance by the manufacturer.

2.2 rated voltage range. The voltage range assigned to the appliance by the manufacturer, expressed by its lower and upper limits.

2.3 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.

2.4 rated input. The input under conditions of adequate heat discharge assigned to the appliance by the manufacturer.

2.5 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 purposes of this standard is determined by calculation from the rated input and the rated voltage.

2.6 rated frequency. The frequency assigned to the appliance by the manufacturer.

2.7 rated frequency range. The frequency range assigned to the appliance by the manufacturer expressed by its lower and upper limits.

2.8 No requirement.

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

2.10 power supply cord. A flexible cable or cord, for supply purposes, fixed to, or assembled with, the appliance according to one of the following methods.

type X attachment. A method of attachment such that the flexible cable or cord can easily be replaced, without the aid of special purpose tools, by a flexible cable or cord not requiring any special preparation.

type M attachment. A method of attachment such that the flexible cable or cord can easily be replaced, without the aid of special purpose tools, by a special cable or cord with, for example, a moulded-on cord guard or crimped terminations.

type Y attachment. A method of attachment such that the flexible cable or cord can be replaced only with the aid of special purpose tools normally available only to the manufacturer or his agents.

NOTE. Type M and type Y attachments may be used either with common flexible cables or cords or with special cables or cords.

2.11 No requirement.

2.12 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.

2.13 supplementary insulation. Independent insulation applied in addition to basic insulation, in order to ensure protection against electric shock in the event of a failure of the basic insulation.

2.14 double insulation. Insulation comprising both basic insulation and supplementary insulation.

2.15 reinforced insulation. A single insulation system applied to live parts, which 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 is one homogeneous piece. It may comprise several layers that cannot be tested singly as supplementary or basic insulation.

2.16 class 0 appliance. An appliance in which protection against electric shock relies upon basic insulation; this implies that there are no means for the connection of accessible conductive parts, if any, to the protective (earthing) conductor in the fixed wiring of the installation, reliance in the event of a failure of the basic insulation being placed upon the environment.

NOTE 1. Class 0 appliances have either an enclosure of insulating material which may form a part or the whole of the basic insulation, or a metal enclosure which is separated from live parts by an appropriate insulation. If an appliance with an enclosure of insulating material has provision for earthing internal parts, it is considered to be of class I or class OI construction.

NOTE 2. Class 0 appliances may have parts with double insulation or reinforced insulation, or parts operating at safety extra-low voltage.

2.17 class OI appliance. An appliance having at least basic insulation throughout and provided with an earthing terminal, but with a power supply cord without an earthing conductor and a plug without an earthing contact and which cannot be introduced into a socket-outlet with an earthing contact.

NOTE. Class OI appliances may have parts with double insulation or reinforced insulation, or parts operating at safety extra-low voltage.

2.18 class I 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 I appliances may have parts with double insulation, or parts operating at safety extra-low voltage.

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.

2.19 class II appliance. An appliance in which protection against electric shock does not rely on basic insulation only, but in which additional safety precautions, such as double insulation or reinforced insulation, are provided, there being no provision for protective earthing or reliance upon installation conditions.

Such an appliance may be of one of the following types:

- (a) an appliance having a durable and substantially continuous enclosure of insulating material that envelops all metal parts, with the exception of small parts, such as nameplates, screws and rivets, which are isolated from live parts by insulation at least equivalent to reinforced insulation; such an appliance is called an 'insulation-encased class II appliance';
- (b) an appliance having a substantially continuous metal enclosure, in which double insulation is used

throughout, except for those parts where reinforced insulation is used, because the application of double insulation is manifestly impracticable; such an appliance is called a 'metal-encased class II appliance';

(c) an appliance which is a combination of the types (a) and (b).

NOTE 1. The enclosure of an insulation-encased class II appliance may form a part or the whole of the supplementary insulation or of the reinforced insulation.

NOTE 2. If an appliance with double insulation and/or reinforced insulation throughout has an earthing terminal or earthing contact, it is considered to be of class I or class OI construction. Class II appliances may be provided with means for maintaining the continuity of protective circuits, provided that such means are within the appliance and are insulated from accessible conductive parts by double insulation or reinforced insulation.

NOTE 3. Class II appliances may have parts operating at safety extra-low voltage.

2.20 class III appliance. An appliance in which protection against electric shock relies on supply at safety extra-low voltage and in which voltages higher than these are not generated.

NOTE. Appliances intended to be operated at safety extra-low voltage and having internal circuits that operate at a voltage other than safety extra-low voltage are not included in the classification and are subject to additional requirements.

2.21 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 circuit being separated from other circuits by basic insulation only.

2.22 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 or a converter with separate windings.

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

2.23 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 or reinforced insulation, and which is designed to supply a distribution circuit, an appliance or other equipment at safety extra-low voltage.

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

2.24 portable appliance. Either an appliance that is moved while in operation or an appliance that can easily be moved from one place to another while connected to the supply.

2.25 No requirement.

2.26 stationary appliance. Either a fixed appliance or an appliance having a mass exceeding 18 kg and not provided with a carrying handle.

2.27 fixed appliance. An appliance that is fastened to a support or otherwise secured in a specific situation.

2.28 No requirement.

2.29 conditions of adequate heat discharge. The conditions that apply when the appliance is operated under the following conditions.

Automatic waffle irons are operated with the thermostat at the highest setting; other waffle irons are operated with the switch at the highest setting or at a setting such that the average temperature at the centre of the heating surface is as close as possible to, but not less than, 210 °C, with temperature variations not exceeding ± 15 °C, whichever gives the lower temperature.

Contact grills, contact sandwich toasters, contact sandwich toasters combined with waffle irons and incorporating reversible grills, and similar appliances for baking and grilling, are operated as described for waffle irons, the average temperature specified for the centre of the heating surface being, however, increased to 275 °C. Other sandwich toasters are operated as described for toasters.

Table-type roasters are operated with the thermostat at the highest setting or at a setting such that the average temperature in the centre of the usable space of the roaster is 240 ± 4 °C, whichever gives the lower temperature, the door being closed throughout the period of operation.

Toasters, with slices of white bread inserted, are operated intermittently in still air, each cycle comprising an operating period and a resting period; the latter having a duration of 30 s or the minimum period required by the automatic control mechanism, whichever is the longer. The bread is about 24 h old and the dimensions of the slices are approximately 100 mm x 90 mm x 10 mm. For non-automatic toasters, the bread is replaced as soon as it shows a golden-brown colour; for automatic toasters, the control mechanism is adjusted so as to give the bread a golden-brown colour.

Radiant grills are operated empty with the control device at the setting indicated in the manufacturer's instructions or, in the absence of such instructions, at the highest setting. The grill pan, grid or food support is placed in the highest position and the door or hood, if any, in the position indicated in the manufacturer's instructions; in the absence of such instructions, the door or hood is opened completely. Reflectors if any, intended to be placed above heating elements are to be in position.

2.30 No requirement.

2.31 rated operating time. The operating time assigned to the appliance by the manufacturer.

2.32 continuous operation. Operation in accordance with conditions of adequate heat discharge for an unlimited period.

2.33 short-time operation. Operation in accordance with conditions of adequate heat discharge for a specified period, starting from cold, the intervals between each period of operation being sufficient to allow the appliance to cool down approximately to room temperature.

2.34 intermittent operation. Operation in a series of specified identical cycles, each cycle being composed of a period of operation in accordance with conditions of adequate heat discharge, followed by a rest period with the appliance running idle or switched off.

2.35 non-detachable part. A part that can be removed only with the aid of a tool.

2.36 detachable part. A part that can be removed without the aid of a tool.

2.37 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 of parts of it, between certain limits by automatically opening and closing a circuit.

2.38 temperature limiter. A temperature-sensing device, the operating temperature of which may be either fixed or adjustable and which, during normal operation, operates by opening or closing a circuit when the temperature of an appliance, or of parts of it, reaches a predetermined value.

NOTE. A temperature limiter does not make the reverse operation during the normal duty cycle of the appliance. It may or may not require manual resetting.

2.39 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.

2.40 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.

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

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

2.43 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.

2.44 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.

2.45 all-pole disconnection. For single-phase a.c. appliances and for d.c. appliances, disconnection of both supply conductors by a single switching action.

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

2.46 visibly glowing heating element. A heating element which, when the appliance is assembled ready for use, is partly or completely visible from the outside of the appliance, and the temperature of which is at least 650 °C after the appliance has been operated in accordance with conditions of adequate heat discharge until steady conditions have been established, the supply voltage being such that the input is equal to the minimum rated input.

2.47 accessible part or accessible surface. A part or surface that can be touched by means of test finger I specified in BS 3042 (see figure 1).

2.48 body. All accessible metal parts, shafts of handles, knobs, grips and the like and metal foil in contact with all accessible surfaces of insulating material but excluding inaccessible metal parts.

2.101 radiant grill. An appliance so designed that the food, supported on a spit or grid, is cooked by radiant heat from the heating element (see figure 19).

2.102 contact grill or griddle. An appliance having a flat surface on which the food to be cooked is placed directly (see figure 19).

3. General requirements

3.1 Appliances shall be so designed and constructed that, in normal use, they function safely so as to cause no danger to persons or surroundings, even in the event of such careless use as may occur in normal service.

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

3.1 Additionally; where the standard is used for the purposes of granting nationally recognized certification marks, designs or constructions to which the tests specified do not fully apply but which give an equivalent degree of safety and durability of safety, may be regarded as complying with the requirements of this standard, subject to the findings of a special investigation by the authority granting the certification mark and pending the issue of an amendment or extension to this standard.

4. General conditions for the tests

4.1 Tests carried out according to this standard are type tests.

4.2 Unless otherwise specified, the tests shall be carried out on a single sample as delivered, which shall withstand all the relevant tests.

NOTE 1. If it is evident from the design of the appliance that a particular test is not applicable, this test is not carried out.

NOTE 2. If the appliance is designed for different supply voltages, for both a.c. and d.c., for different speeds, etc., more than one sample may be required.

NOTE 3. If it is necessary to dismantle a class II appliance for the relevant tests, one additional sample is required.

NOTE 4. The testing of components may necessitate the submission of additional samples of these components. When the submission of such samples is necessary, they should be submitted together with the appliance.

4.3 Unless otherwise specified, the tests shall be carried out in the order of the clauses of this specification.

NOTE. Before testing is started, the appliance is operated at rated voltage in order to verify that it is in working order.

4.4 The tests shall be carried out with the appliance, or any movable part of it, placed in the most unfavourable position that may occur in normal use.

4.5 If the test results are influenced by the temperature of the ambient air, the room temperature shall be, in general, maintained at 20 ± 5 °C. If, however, the temperature attained by any part is limited by a temperature-sensitive device, or is influenced by the temperature at which a change of state occurs, for example, the temperature of boiling water, the room temperature is, in case of doubt, maintained at 23 ± 2 °C.

4.6 Appliances for a.c. only shall be tested with a.c., at rated frequency, if marked; those for d.c. only shall be tested with d.c. and those for a.c./d.c. shall be tested at the more unfavourable supply.

Appliances for a.c. that are not marked with a rated frequency shall be tested at 50 Hz.

Appliances for a.c. that are marked with a rated frequency range of 50 Hz to 60 Hz shall be tested at 50 Hz or 60 Hz, whichever is the more unfavourable.

Appliances marked with a rated frequency range other than 50 Hz to 60 Hz shall be tested at the most unfavourable frequency within the range.

Appliances designed for more than one rated voltage shall be tested at the most unfavourable voltage.

Unless otherwise specified, appliances designed for one or more rated voltage ranges shall be tested at the most unfavourable voltage within the relevant range.

When testing appliances for d.c. only, the possible influence of polarity on the operation of the appliance shall be taken into consideration.

NOTE. If an appliance is designed for one rated voltage range, the upper limit of the voltage range will be the most unfavourable voltage within the range. If the appliance is designed for more than one rated voltage or rated voltage range, it may be necessary to carry out some of the tests at the minimum, the mean and the maximum values of the rated voltage or rated voltage range in order to establish the most unfavourable voltage.

4.7 Appliances for which alternative accessories are available shall be tested with those accessories that give the most unfavourable results, provided that the accessories used are within the appliance manufacturer's specification.

4.8 No requirement.

4.9 Unless otherwise specified, appliances provided with a thermostat, a regulating device or a similar control shall be tested with these controls adjusted to their most unfavourable setting, 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, this subclause 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, this subclause 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.

4.10 No requirement.

4.11 Unless otherwise specified, 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.

4.12 When it is specified that the appliance has to be supplied at a voltage such that the input is greater than rated input, this voltage shall apply only to heating elements without an appreciable positive temperature coefficient of resistance. For other heating elements, this voltage shall be determined as follows.

First, the rated voltage is supplied until the heating element reaches its operating temperature. The supply voltage is then rapidly increased to the value necessary to give the input required for the relevant test and the test is carried out as specified, the value of the supply voltage being maintained throughout the test.

NOTE. In general, the temperature coefficient is considered to be appreciable if, at rated voltage, the input of the appliance in cold condition differs by more than 25 % from the input at operating temperature.

4.13 No requirement.

4.14 Class III appliances shall be tested together with their supply transformers if these are sold with the appliances.

4.15 For the purposes of 8.6, 8.7, 16.4, 25.11 and 27.1, 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.

4.16 If class I appliances have accessible metal parts that are not 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 appropriate requirements specified for class II appliances.

4.17 If class I or class II appliances have parts operating at safety extra-low voltage, such parts shall be checked for compliance with the appropriate requirements specified for class III appliances.

4.18 For testing appliances incorporating electronic circuits, see appendix A.

4.101 Waffle irons, table-type roasters, toasters, rotary grills, separate radiant grills and separate contact grills shall be tested as portable appliances, except that rotary grills and separate radiant grills shall be tested as stationary appliances if it is clear from their design and the manufacturer's instructions that they are intended to be fixed.

5. Rating

5.1 The maximum rated voltage is 250 V.

TEST. Compliance shall be checked by inspection of the marking.

NOTE. The requirements of this standard are based on the assumption that, in normal use, the voltage between the supply lines and earth does not exceed 254 V.

5.I Appliances intended for direct connection to the UK mains supply shall have a rated voltage that covers use at 240 V and a rated frequency that covers use at 50 Hz.

TEST. Compliance shall be checked by inspection of the marking.

6. Classification

The appliances covered by this standard shall be classified:

(a) according to protection against electric shock:

- class I appliances;
- class II appliances;
- class III 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. If class III appliances are sold with a separate safety isolating transformer for their supply from the mains, their classification is not altered.

(b) according to degree of protection against moisture:
ordinary appliances.

7. Marking

7.1 Appliances shall be marked with:

- (a) rated voltage(s) or rated voltage range(s), in volts;
- (b) symbol for nature of supply, if applicable;
- (c) rated frequency or rated frequency range, in hertz, unless the appliance is designed for d.c. only or for a.c. of both 50 Hz and 60 Hz;
- (d) rated input in watts or kilowatts;
- (e) manufacturer's or responsible vendor's name, trade mark or identification mark;

(f) manufacturer's model or type reference;

(g) symbol for class II construction, for class II appliances only.

NOTE 1. The rated input is the total maximum input of the circuits that can be in operation simultaneously.

NOTE 2. If an appliance has alternative components that can be selected by a control device, the rated input is that corresponding to the highest loading possible.

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

7.2 No requirement.

7.3 No requirement.

7.4 If the appliance can be adjusted to suit different rated voltages or different rated inputs, the voltage or input to which the appliance is adjusted shall be easily and clearly discernible.

NOTE. For appliances for which frequent changes in voltage setting are not required, this requirement is considered to be complied with if the rated voltage or the rated input to which the appliance is adjusted can be determined from a wiring diagram fixed to the appliance; the wiring diagram may be on the inside of a cover which has to be removed to connect the supply conductors. This diagram may be on a card riveted to the cover, or on a paper or similar label secured to the cover by an adhesive, but it must not be on a label loosely attached to the appliance.

7.5 For appliances marked with more than one rated voltage or rated voltage range, the rated input for each of these voltages or ranges shall be marked.

The upper and lower limits of the rated input shall be marked on the appliance so that the relation between input and voltage appears distinctly unless the difference between the limits of a rated voltage range does not exceed 10% of the mean value of the range in which case the marking for rated input may be related to the mean value of the range.

If the input of the appliance in cold condition differs by more than 25% from the input at operating temperature, the input in cold condition shall be marked in addition, and shall be placed in parentheses after the marking of the input at operating temperature.

7.6 When symbols are used, they shall be as follows:

V	volts
A	amperes
Hz	hertz
W	watts
kW	kilowatts
kg	kilograms
~	alternating current
---	direct current



Class II construction

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

The dimensions of the symbol for class II construction shall be such that the length of the sides of the outer square is about twice the length of the sides of the inner square. The length of the sides of the outer square shall be not less than 5 mm, unless the largest dimension of the appliance does not exceed 150 mm, in which case the dimensions of the symbol may be reduced, but the length of the sides of the outer square shall be not less than 3 mm.

The symbol for class II construction shall be so placed that it will be obvious that it is a part of the technical information and is unlikely to be confused with any other marking.

7.7 For class I appliances, 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 symbol $\perp$.

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

7.8 No requirement.

7.9 Unless it is obviously unnecessary, switches, the operation of which might cause a hazard, shall be so marked or placed as to indicate clearly which part of the appliance they control.

Indications used for this purpose shall, wherever practicable, be comprehensible without a knowledge of languages, national standards, etc.

7.10 The different positions of regulating devices, and the different positions of switches on stationary appliances shall be indicated by figures, letters or other visual means. The 'off' position shall not be indicated by words only.

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 output, input, speed, etc., shall be indicated by a higher figure.

The figure 0 shall not be used for any other indication.

7.11 Thermostats, regulating devices and the like, intended to be adjusted during installation or in normal use, shall be provided with an indication for the direction of adjustment to increase or to decrease the value of the characteristic being adjusted.

NOTE. An indication of + and - is considered to be sufficient.

7.12 If it is necessary to take special precautions when installing or using the appliance, details of these shall be given in an instruction sheet that accompanies the appliance. If a stationary appliance is not provided with a non-detachable flexible cable or cord intended to be connected to a plug, or with other means for disconnection from the supply having a contact separation of at least 3 mm in all poles, the instruction sheet shall state that such means for disconnection must be incorporated in the fixed wiring.

If the supply wires of an appliance can come into contact with parts of a terminal block or compartment for fixed wiring and these parts have, under conditions of normal use, a temperature such that the insulation of the wire is subjected to a temperature rise exceeding that specified in table 3, the instruction sheet shall also state that the appliance must be connected by means of wires having appropriate 7-marking or 7-rating.

7.13 Instruction sheets and other texts required by this standard shall be written in the official language(s) of the country in which the appliance is to be sold. For appliances for sale in the United Kingdom instructions shall be in English.

Where symbols are used, they shall be those indicated in this standard, although additional symbols are permitted provided they do not give rise to misunderstanding.

TEST. Compliance with the requirements of **7.1**, **7.4** to **7.7**, and **7.9** to **7.13** shall be checked by inspection.

7.14 Marking required by this standard shall be easily legible and durable.

Marking specified in **7.1**, **7.4** and **7.5** shall be on a main part of the appliance.

The marking of fixed appliances shall be clearly discernible from the outside after the appliance has been fixed as in normal use but, if necessary, after removal of a cover.

The marking of other appliances shall be clearly discernible from the outside, if necessary after removal of a cover; for portable appliances, the removal of this cover shall not require the use of a tool.

For stationary appliances, the marking shall be beneath a cover only if it is near to the terminals for external conductors.

Marking on, and indications for, switches, thermostats, thermal cut-outs and other control devices shall be placed in the vicinity of these components; they shall not be placed on removable parts if these parts can be replaced in such a way that the marking is misleading.

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 easily possible to remove marking plates and they shall show no curling.

NOTE 1. A revision of the test for checking the durability of the marking is under consideration.

NOTE 2. 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.

7.1 A label shall be attached to the flexible cord of all class I appliances fitted with a flexible cable or cord 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 $\perp$ or coloured green or green-and-yellow.

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

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

For class II appliances fitted with a flexible cord, instructions shall be given by the manufacturer for the correct connection of the plug. These instructions shall make it clear that neither core is to be connected to the earth terminal of a three-pin plug.

TEST. Compliance shall be checked by inspection.

7.II For portable class I appliances the following warning notice shall be given on a label attached to the end of the flexible cord.

'WARNING - THIS APPLIANCE MUST BE EARTHED'

For all class I appliances the warning shall be included in the user instructions.

NOTE. The label specified in 7.I may be used for this purpose: a separate label is not required.

TEST. Compliance shall be checked by inspection.

NOTE. For appliances intended for export, labelling other than that specified in 7.I and 7.II may be required.

7.III No requirement.

7.101 Appliances intended to be used with a connector incorporating a thermostat shall be marked with, or the instruction sheet accompanying the appliance shall include, the substance of the following warning.

'This appliance must only be used with the appropriate connector'.

7.102 For toasters provided with a hinged crumb tray that can be opened without the aid of a tool and that, when opened, enables live parts that are not live when the toaster is connected to the supply, but is not operating, to be touched with the standard test finger, the crumb tray shall be marked with the substance of the following warning.

'Pull out plug before opening'.

8. Protection against electric shock

8.1 Appliances shall be so constructed and enclosed that there is adequate protection against accidental contact with live parts and, for class II appliances, with metal parts separated from live parts by basic insulation only. This requirement applies for all positions of the appliance when it is wired and operated as in normal use, even after opening of lids and doors and removal of detachable parts, except for lamps located behind a detachable cover, provided that the appliance can be isolated from the supply by means of a plug or an all-pole switch, the 'off' position of which is clearly indicated. During the insertion or removal of lamps, protection against accidental contact with live parts of the lamp cap shall also be ensured.

There shall be, in addition, adequate protection against the risk of contact with basic insulation. Such insulation may, however, be accessible after removing a cover that requires the use of tools for removal and has to be removed for user maintenance, or after removing a cover that can be removed without tools if marked 'Remove plug before removing this cover' or 'Disconnect from the mains before removing this cover'.

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.

The enclosure of the appliance shall have no openings, other than those necessary for the use and working of the appliance, giving access to live parts and, for class II appliances, to parts separated from live parts by basic insulation only.

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

NOTE 2. If a manufacturer instructs the user to remove a part during normal operation or user maintenance, that part is regarded as a detachable part even if a tool has to be used for its removal.

NOTE 3. This requirement excludes the use of screw-type fuses and screw-type miniature circuit-breakers if they are accessible without the aid of a tool.

NOTE 4. Self-hardening resins are not regarded as sealing compound.

TEST. Compliance shall be checked by inspection and, except as specified hereinafter, for visibly glowing heating elements and parts supporting such elements, by a test with test finger I specified in BS 3042 (see figure 1).

In addition, all apertures in class II appliances, and apertures in class I appliances other than those in metal parts connected to an earthing terminal or earthing contact, and those giving access to live parts in socket outlets and lamp caps, shall be tested with test pin I specified in BS 3042 (see figure 2). The test finger and the test pin are applied, without appreciable force, in every possible position.

An appliance designed as a single appliance but delivered as a number of units shall be tested after assembly.

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

It shall not be possible to touch bare live parts or live parts protected by lacquer, enamel, ordinary paper, cotton, oxide film, beads or sealing compound only, with test finger I specified in BS 3042.

It shall not be possible to touch basic insulation with test finger I unless it is under a detachable cover which either requires the use of a tool for removal or is marked, 'Remove plug before removing this cover' or 'Disconnect from the mains before removing this cover'.

For class II appliances it shall not be possible to touch bare live parts with the test pin I specified in BS 3042 or to touch metal parts separated from live parts by basic insulation only with test finger I specified in BS 3042.

For toasters other than those of class II, the test for live parts of visibly glowing heating elements, all poles of which can be disconnected by a single switching action, and for parts supporting such elements, provided that it is obvious from the outside of the toaster, without removing covers and the like, that these parts are in contact with the element, shall be made with the test probe specified in BS 3042 (see figure 3) instead of the test finger, the probe being applied without appreciable force. It shall not be possible to touch live parts with this probe.

For toasters provided with a crumb tray that can be removed only with the aid of a tool, or with a hinged crumb tray marked in accordance with 7.1, test finger I is not applied, through the crumb tray opening, to live parts that are not live when the toaster is connected to the supply, but is not operating; however, it shall not be possible to touch these parts with the test probe.

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

NOTE 2. It is recommended that a lamp be used for the indication of contact and that the voltage be not less than 40 V.

NOTE 3. The fact that appliances for wall-mounting are tested as delivered does not imply that such appliances must be completely enclosed; the basic insulation of wiring in appliances other than those of class II may give the required protection against electric shock, provided it is adequately protected or enclosed after installation of the appliance.

NOTE 4. The test with the straight unjointed test finger is not carried out.

8.2 No requirement.

8.3 No requirement.

8.4 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 voltages not exceeding 24 V.

For class II appliances, such liquids shall not be in direct contact with basic insulation or with metal parts insulated from live parts by basic insulation only.

8.5 Shafts of operating knobs, handles, levers and the like shall not be live.

TEST. Compliance with the requirements of **8.4** and **8.5** shall be checked by inspection.

8.6 For appliances other than those of class III, handles, levers and knobs that are held or actuated in normal use shall not become live in the event of an insulation fault. 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, they shall either be adequately covered by insulating material or their accessible parts shall be separated from their shafts or fixings by supplementary insulation.

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 separated from live parts by earthed metal.

TEST. Compliance shall be checked by inspection and, if necessary, by the tests specified for supplementary insulation.

8.7 For appliances other than those of class III, handles which, in normal use, are continuously held in the hand, shall be so constructed that, when gripped as in normal use, contact between the operator's hand and metal parts that may become live in the event of an insulation fault is unlikely.

TEST. Compliance shall be checked by inspection and by manual test.

8.8 For class II appliances, 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.

8.9 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 ten times.

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

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.

One second after disconnection, the voltage between the pins of the plug is measured with an instrument which 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.

8.101 Appliances, other than automatic toasters, non-automatic toasters provided with an appropriate device for bringing the bread into position, rotary grills and radiant grills with heating elements at the top of the grilling compartment, shall be so protected that it is not possible to touch their heating elements with a fork or similar pointed object.

TEST. Compliance shall be checked by a test with test pin II specified in BS 3042 (see figure 20).

9. No requirement.

Table 1. No requirement

10. Input and current

10.1 The input of the appliance at rated voltage and at normal operating temperature shall not deviate from the rated input by more than + 5 % or - 10 %.

Table 2. No requirement.

NOTE. For appliances marked with a rated voltage range having limits differing by more than 10 % of the mean value of the range, the permissible deviations apply for both limits of the range.

TEST. Compliance shall be checked by measuring the input of the appliance operated at rated voltage and in accordance with conditions of adequate heat discharge when the input has stabilized.

NOTE. For appliances marked with one or more rated voltage ranges, the test specified in **10.1** is carried out at both the upper and lower limits of the ranges, unless the marking of the rated input is related to the mean value of the relevant voltage range, in which case the test is carried out at a voltage equal to the mean value of that range.

10.2 No requirement.

10.3 No requirement.

11. Heating

11.1 Appliances and their surroundings shall not attain excessive temperatures in normal use.

TEST. Compliance shall be checked by determining the temperature rise of the various parts under the conditions specified in **11.2** to **11.4** and **11.7**.

11.2 Appliances shall be placed in a test corner. The test corner consists of two walls at right angles and a floor, all of dull black-painted plywood having a thickness of 20 mm. The appliance shall be positioned in the test corner as follows.

(a) Front-loading table-type roasters, portable rotary grills, and portable radiant grills, shall be placed with their backs as near to one of the walls of the test corner as possible, and away from the other wall. Other portable appliances are tested away from the walls.

(b) Appliances normally fixed to a wall shall be mounted on one of the walls, as near to the other wall and to the floor or ceiling as is likely to occur in normal use, unless the manufacturer has given other instructions concerning their installation.

11.3 Temperature rises other than those of windings shall be determined by means of fine-wire thermocouples so chosen and positioned that they have the minimum effect on the temperature of the part under test.

Thermocouples used for determining the temperature rise of the surface of walls and floor shall be attached to the back of small blackened discs of copper or brass, 15 mm in diameter and 1 mm thick, which are flush with the surface.

As far as possible, the appliance shall be so positioned that parts likely to attain the highest temperatures touch the discs.

In determining the temperature rises of handles, knobs, grips and the like, consideration shall be given to all parts that are gripped in normal use and, if of insulating material, to parts in contact with hot metal.

The temperature rise of electrical insulation, other than that of windings, shall be determined on the surface of the insulation at places where failure could cause a short circuit, contact between live parts and accessible metal parts, bridging of insulation or reduction of creepage distances or clearances below the values specified in 29.1.

Temperature rises of windings shall be determined by the resistance method unless the windings are non-uniform or unless it involves severe complications to make the necessary connections, in which case the temperature rise shall be determined by means of thermocouples.

NOTE 1. If it is necessary to dismantle the appliance to position thermocouples, the input is measured again to check that the appliance has been correctly reassembled.

NOTE 2. The point of separation of the cores of a multicore cable or cord and where insulated wires enter lampholders are examples of places where thermocouples are positioned.

11.4 Appliances shall be operated in accordance with conditions of adequate heat discharge, with all heating elements in circuit, the supply voltage being such that the input is 1.15 times the maximum rated input.

11.5 No requirement.

11.6 No requirement.

11.7 Waffle irons shall be operated until steady conditions are established, or for 30 min in excess of the time necessary for the centre of the heating surface to reach a temperature of 210 °C, whichever is the shorter period.

Contact grills, contact sandwich toasters, contact sandwich toasters combined with waffle irons and incorporating reversible grills, and similar appliances for baking and grilling shall be operated until steady conditions are established, or for 30 min in excess of the time necessary for the centre of the heating surface to reach a temperature of 275 °C, whichever is the shorter period.

Table-type roasters and rotary grills shall be operated until steady conditions are established.

Toasters shall be operated for 15 min. For toasters so designed that two or more slices of bread can be inserted

at the same time, a slice of bread is only inserted in that section which gives the most unfavourable results, irrespective of the manufacturer's instructions.

Radiant grills shall be operated for 15 min with their control devices at the highest setting, and then, for grills provided with means to reduce the input, for 15 min at a setting giving an input as near as possible to half the input measured at the highest setting; for grills under cyclic control, the input to be considered is the average input.

11.8 During the test, thermal cut-outs shall not operate; the temperature rises shall be monitored continuously and shall not exceed the values shown in table 3; and sealing compound, if any, shall not flow out.

The temperature rise limits in the table may be exceeded if it can be shown that the temperatures are not in excess of the thermal capabilities of the materials as determined by ageing tests made on the materials themselves. Other materials not listed in the table may be used under the same conditions.

The values in the table are based on an ambient temperature not normally exceeding 25 °C but occasionally reaching 35 °C. However, the temperature rise values specified are based on 25 °C.

The value of the temperature rise of a copper winding shall be calculated from the formula:

$$\Delta t = \frac{R_2 - R_1}{R_1} (234.5 + t_1) - (t_2 - t_1)$$

where

Δt is the temperature rise (in °C or K)

R_1 is the resistance at the beginning of the test (in Ω)

R_2 is the resistance at the end of the test (in Ω)

t_1 is the room temperature at the beginning of the test (in °C)

t_2 is the room temperature at the end of the test (in °C)

At the beginning of the test, the windings shall be at room temperature.

It is recommended that the resistance of windings at the end of the test be determined by taking resistance measurements as soon as possible after switching off, and then at short intervals so that a curve of resistance against time can be plotted for ascertaining the resistance at the instant of switching off.

NOTE. The classification of handles, knobs, grips and the like according to their materials is derived from the constant:

$$b = \sqrt{\lambda \cdot c \cdot \gamma}$$

where

λ is the thermal conductivity of the material (in W/(m K))

c is the specific heat of the material (in J/(kg K))

γ is the specific mass of the material (in kg/m³)

The materials are classified as follows:

value of b greater than 3500 metal;
value of b between 1000 and 3500 porcelain or vitreous material;
value of b less than 1000 moulded material, rubber or wood.

An alternative method of determining the constant, b , is as follows.

Samples of materials with known values of the constant, b , and a sample of the material to be classified, all samples having the same dimensions, are fixed to a heated metal plate.

The temperatures of the upper surfaces of the various samples are measured and the temperatures of the reference samples are plotted as a function of the constant, b .

The constant, b , of the material to be classified is derived from this curve by reading off the value, b , corresponding to the temperature attained by the sample under investigation.

11.9 No requirement.

Table 3. Permissible temperature rises

Part	Temperature rise	Part	Temperature rise
	°C or K		°C or K
Windings ¹ , if the winding insulation is:		laminates bonded with:	
of class A material ²	75(65)	melamine-formaldehyde, phenol-formaldehyde or phenol-furfural resins	85(175)
of class E material ²	90(80)	urea-formaldehyde resin	65(150)
of class B material ²	95(85)	mouldings of:	
of class F material ²	115	phenol-formaldehyde with cellulose fillers	85(175)
of class H material ²	140	phenol-formaldehyde with mineral fillers	100(200)
Pins of appliance inlets ³ :		melamine-formaldehyde	75(150)
for very hot conditions	130	urea-formaldehyde	65(150)
for hot conditions	95	polyester with glass-fibre reinforcement	110
for cold conditions	40	silicone rubber	145
Terminals, including earthing terminals, for external conductors of stationary appliances, unless they are provided with a power supply cord	60	polytetrafluoroethylene	265
Ambient switches and thermostats ³ :		pure mica and tightly sintered ceramic material, when such materials are used as supplementary insulation or reinforced insulation	400
without <i>T</i> -marking or temperature rating	30	thermoplastic material ⁷	—
with <i>T</i> -marking or temperature rating	<i>T</i> -25	Wood, in general ⁸	65
Rubber or polyvinyl chloride insulation of internal and external wiring including power supply cords:		For radiant grills, the wooden support, walls, and floor of the test corner	75
without <i>T</i> -marking or temperature rating	50 ⁴	Handles, knobs, grips and the like which, in normal use, are held for short periods only (e.g. of switches):	
with <i>T</i> -marking or temperature rating	<i>T</i> -25 ⁵	of metal	35
Cord sheaths used as supplementary insulation	35	of porcelain or vitreous material	45
Rubber, other than synthetic, used for gaskets or other parts, the deterioration of which could affect safety:		of moulded material, rubber or wood	60
when used as supplementary insulation	40	Any point where the insulation of wires can come into contact with parts of a terminal block or compartment for fixed wiring of a stationary appliance not provided with a power supply cord:	
or as reinforced insulation	50	where the instructions require <i>T</i> -marked or temperature rated wires	<i>T</i> -25 ⁵
in other cases		in other cases	50 ⁴
Lampholders E14, B15 and B22:			
metal or ceramic type	130		
insulated type, other than ceramic	90		
with <i>T</i> -marking	<i>T</i> -25		
Material used as insulation other than that specified for wires and windings ⁶ :			
impregnated or varnished textile, paper or press board	70		

NOTES TO TABLE 3

¹ To allow for the fact that the temperature of windings of relays, solenoids, etc. is usually below the average at the points where thermocouples are placed, the figures without parentheses apply when the resistance method is used and those within parentheses apply when thermocouples are used.

² The classification is in accordance with the requirements of BS 2757.

Examples of class A material are:

impregnated cotton, silk, artificial silk and paper; enamels based on oleo- or polyamide resins.

Examples of class B material are:

asbestos, glass fibre, melamine-formaldehyde and phenol-formaldehyde resins.

Examples of class E material are:

mouldings with cellulose fillers, cotton fabric laminates and paper laminates, bonded with melamine-formaldehyde, phenol-formaldehyde or phenol-furfural resins; cross-linked polyester resins, cellulose triacetate films, polyethylene terephthalate films; varnished polyethylene terephthalate textile bonded with oil-modified alkyd resin varnish; enamels based on polyvinylformal, polyurethane or epoxy resins.

³ *T* signifies the maximum operating temperature.

For the purposes of this test, switches and thermostats marked with

individual ratings may be considered as having no marking for the maximum operating temperature, if requested by the appliance manufacturer.

⁴ This limit applies to cables, cords and wires complying with the requirements of BS 6500.

⁵ This limit will become applicable as soon as there are British Standards for high temperature cables, cords and wires.

⁶ The values in parentheses apply if the material is used for handles, knobs, grips and the like and is in contact with hot metal.

⁷ There is no specific limit for thermoplastic material which has to withstand the tests specified in 30.1 or 30.2, for which purpose the temperature rise must be determined.

⁸ The limit specified concerns the deterioration of wood and it does not take into account deterioration of surface finishes.

⁹ For appliances intended to be used with a connector incorporating a thermostat, a higher limit is allowed for the temperature rise of the pins of the appliance inlet, provided the appliance coupler complies with the requirements of BS 4491 as far as it reasonably applies; the value of the temperature specified in 16.1.2 of BS 4491 : 1969 is, however, increased to that attained by the pins of the appliance inlet when the appliance is operated in accordance with conditions of adequate heat discharge for the time specified in this subclause and at a supply voltage such that the input is 1.15 times rated input.

12. Operation under overload conditions

12.1 Appliances shall be so designed and constructed that they withstand overloads that are liable to occur in normal use.

TEST. Compliance shall be checked by the test specified in **12.2**.

After the test, the appliance shall show no damage within the meaning of this standard.

In particular, heating wires, internal wiring and the general assembly shall not show such deformation that creepage distances and clearances are reduced below the values specified in **29.1**. Contacts and connections shall not have worked loose.

12.2 TEST. Appliances normally used on the floor or a table shall be placed on a horizontal support, away from walls.

Appliances normally fixed to a wall shall be fixed to a wall, as near as possible to the floor or to a ceiling as is likely to occur in normal use, unless specific instructions are given by the manufacturer.

Non-automatic toasters shall be subjected to 15 cycles of operation, without bread inserted, each cycle comprising an operating period of 5 min and a cooling period sufficient to allow the appliance to cool down to approximately room temperature.

Other appliances shall be subjected to 15 cycles, each cycle comprising an operating period as specified in **11.7**, in accordance with conditions of adequate heat discharge, and a cooling period sufficient to allow the appliance to cool down to approximately room temperature.

Throughout the operating period, all heating elements that can be operated at the same time shall be in circuit, the supply voltage being such that the input is 1.27 times rated input or 1.21 times rated input plus 12 W, whichever is the greater.

If a self-resetting thermal cut-out or a non-self-resetting thermal cut-out that is accessible and can be reset without the aid of a tool operates, the operating period is considered to be ended. The appliance is then allowed to cool down and the cut-out is reset for the next cycle.

During the test, non-self-resetting thermal cut-outs that are accessible only with the aid of a tool or which require the replacement of a part shall not operate and no vapour or ignitable gas shall accumulate in the appliance.

NOTE 1. Forced cooling may be used for the purpose of shortening the cooling period.

NOTE 2. Automatic toasters are not subjected to the tests specified in this clause; the test specified in clause **18** is considered to be sufficient.

12.3 No requirement.

13. Electrical insulation and leakage current at operating temperature

13.1 The electrical insulation of the appliance at operating temperature shall be adequate and the leakage current in normal use shall not be excessive.

TEST. Compliance shall be checked by the test specified in **13.2** the appliance being operated in accordance with conditions of adequate heat discharge for the time specified in **11.7**.

Appliances shall be operated with all heating elements in circuit, the supply voltage being such that the input is 1.15 times the maximum rated input.

The tests shall be carried out while the appliance is connected to the supply.

13.2 The leakage current shall be measured between any pole of the supply and:

- (a) accessible metal parts and metal foil with an area not exceeding 200 mm x 100 mm in contact with accessible surfaces of insulating material, connected together;
- (b) metal parts of class II appliances separated from live parts by basic insulation only.

The measuring circuit shall be as shown in the following figures:

- (a) if of class II, figure 4;
- (b) if other than class II, figure 5.

The resistance of the measuring circuit shall be $2000 \pm 100 \Omega$.

The test shall be carried out with a.c., unless the appliance is for d.c. only, in which case the test shall be carried out with d.c.

The leakage current shall be measured with the selector switch, shown in figures 4 and 5, in each of the positions 1 and 2.

After an operating time as specified in **11.7**, the leakage current shall not exceed the following values:

(a) to accessible metal parts and metal foil:

- | | |
|---|--|
| (1) for portable class I grills | 0.75 mA per kW rated input with a maximum of 3 mA |
| (2) for other portable class I appliances | 0.75 mA |
| (3) for stationary class I heating appliances with heating elements that can be switched off separately | 0.75 mA or 0.75 mA per kW rated input for each element or group of elements, whichever is the greater, with a maximum of 5 mA for the appliance as a whole |
| (4) for stationary class I grills | 1 mA per kW rated input with a maximum of 5 mA |
| (5) for other stationary class I heating appliances | 0.75 mA or 0.75 mA per kW rated input of the appliance, whichever is the greater, with a maximum of 5 mA |
| (6) for class II appliances | 0.25 mA |
| (7) for class III appliances | 0.5 mA |

(b) to metal parts of class II appliances separated from live parts by basic insulation only 5.0 mA.

If the appliance incorporates a thermostat, the leakage current shall be measured immediately before the thermostat operates.

If the appliance incorporates one or more capacitors and is provided with a single-pole switch, the measurements shall be repeated with the switch in the 'off' position.

NOTE 1. It is recommended that the appliance be supplied through an isolating transformer; otherwise, it should be insulated from earth.

NOTE 2. The metal foil has the largest area possible on the surface under test, without exceeding the dimensions specified. If its area is smaller than the surface under test, it is moved so as to test all parts of the surface; the heat dissipation of the appliance should not, however, be affected by the metal foil.

NOTE 3. The test with the switch in the 'off' position is carried out to verify that capacitors connected behind a single-pole switch do not cause an excessive leakage current.

13.3 No requirement.

14. Radio and television interference suppression

The incorporation of components necessary to achieve an adequate degree of radio and television interference suppression shall not adversely affect the safety of the appliance.

TEST. Compliance shall be checked by the tests specified in this standard.

NOTE. Attention is drawn to the fact that compliance with the requirements concerning the limits for interference effects generated by the appliance, as specified in BS 800, and when measured in accordance with that standard, will in most cases ensure that the appliance has the required degree of radio and television interference suppression.

15. Moisture resistance

15.1 The enclosure of appliances that can be partially or totally immersed in water for cleaning shall provide the necessary degree of protection against moisture.

TEST. Compliance shall be checked by the appropriate treatment specified in 15.2.

Immediately after the treatment for appliances that can be immersed in water for cleaning, the appliance shall withstand the electric strength test specified in 16.4, with the exception of the test already made on the immersed appliance.

Appliances shall be allowed to stand in normal test-room atmosphere for 24 h before being subjected to the test specified in 15.4.

15.2 Appliances provided with an appliance inlet shall be fitted with an appropriate connector and flexible cable or cord; appliances with type X attachment shall be fitted with the lightest permissible type of flexible cable or cord of the smallest cross-sectional area specified in 26.2, and other appliances shall be tested as delivered.

Electrical components, covers and other parts that can be removed without the aid of a tool shall be removed and subjected, if necessary, to the relevant treatment with the main part.

Sealing rings of glands and other sealing means, if any, shall be aged in an atmosphere having the composition and pressure of the ambient air by suspending them freely in a heating cabinet ventilated by natural circulation.

They shall be kept in the cabinet at a temperature of 70 ± 2 °C, for 10 days (240 h).

Immediately afterwards, the samples shall be taken out of the cabinet and left at room temperature, avoiding direct daylight, for at least 16 h before being reassembled. The glands and other sealing means shall then be tightened with a torque equal to two-thirds of that applied during the test specified in 21.3.

NOTE. The use of an electrically-heated cabinet is recommended. Natural circulation may be provided by holes in the walls of the cabinet.

Appliances that can be partially or totally immersed for cleaning shall then be subjected for 24 h to the immersion test specified in 15.101.

During this test, the pins of the plug, if any, shall be connected together and mains switches, if any, shall be in the 'on' position.

NOTE 1. For class II appliances, the watertightness may be achieved by means of the supplementary insulation or the reinforced insulation, or by means of an enclosure exterior to this insulation.

NOTE 2. This test does not imply suitability for operation where the appliance is subjected to water pressure.

15.3 No requirement.

15.4 Appliances shall be proof against humid conditions that may occur in normal use.

TEST. Compliance shall be checked by the humidity treatment described in this subclause, followed immediately by the tests specified in clause 16.

Electrical components, including covers and other parts that can be removed without the aid of a tool, shall be removed and subjected, if necessary, to the humidity treatment with the main part.

The humidity treatment shall be carried out in a humidity cabinet containing air with a relative humidity of $93 \pm 2\%$. The temperature of the air, at all places where samples can be located, is maintained within 1 °C (1K) of any convenient value t between 20 °C and 30 °C.

Before being placed in the humidity cabinet, the sample shall be brought to a temperature of between t and $t + 4$ °C.

The sample shall be kept in the cabinet for:

- (a) 2 days (48 h) for ordinary appliances;
- (b) 7 days (168 h) for appliances that can be partially or totally immersed in water for cleaning.

NOTE 1. In most cases, the sample may be brought to the specified temperature by keeping it at this temperature for at least 4 h before the humidity treatment.

NOTE 2. A relative humidity of $93 \pm 2\%$ can be obtained by placing in the humidity cabinet a saturated solution of sodium sulphate (Na_2SO_4) or potassium nitrate (KNO_3) in water having a sufficiently large contact surface with the air.

NOTE 3. In order to achieve the specified conditions within the cabinet, it is necessary to ensure constant circulation of the air within and, in general, to use a cabinet which is thermally insulated.

After this treatment, the appliance shall show no damage within the meaning of this standard.

15.101 Appliances intended to be partially or fully immersed in water while cleaning shall be subjected to the following tests, which are carried out on three additional samples.

During these tests, the appliances are operated without oil in the container, with the thermostat, if any, at the highest setting and at a supply voltage such that the input is 1.15 times rated input, until the thermostat switches to the 'low' position or to the 'off' position and starts to cycle regularly or, for appliances without a thermostat, until the centre of the heating surface reaches a temperature of 250 °C.

The samples are then disconnected from the supply, the connector, if any, being removed, and immediately immersed completely in water having a temperature between 10 °C and 25 °C, unless the appliance is marked with an indication of the maximum depth of immersion, in which case the samples are immersed to the depth indicated.