



BS 3456 : Part 3 : Section 3.15 : 1979

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Specification for

Safety of household and similar electrical appliances

Part 3. Complete particular specifications

Section 3.15 Shavers, hair clippers and similar appliances

Spécification relative à la sécurité des appareils électrodomestiques

Partie 3. Spécifications particulières complètes

Section 3.15 Rasoirs, tondeuses et appareils analogues

Spezifikation bezüglich der Sicherheit von elektrischen Haushaltsgeräten

Teil 3. Volle einzelne Spezifikationen

Abschnitt 3.15 Rasierapparate, Haarschneidemaschinen und ähnliche Geräte

British Standards Institution

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Contents

	Page		Page
Foreword	1	Tables	
Cooperating organizations	Back cover	1. No requirement	
Specification		2. Permissible variations in rated input	8
1. Scope	2	3. Permissible temperature rises	9
2. Definitions	2	4. Insulation resistance	11
3. General requirements	4	5. Test voltages	12
4. General conditions for the tests	4	6. No requirement	
5. Rating	5	7. Limiting temperatures of windings	13
6. Classification	5	8. No requirement	
7. Marking	5	9. Test force for screwed glands	15
8. Protection against electric shock	7	10. No requirement	
9. Starting of motor-operated appliances	8	11. Size of flexible cord	19
10. Input and current	8	12. Test figures for flexible cord pull and torque	21
11. Heating	8	13. No requirement	
12. No requirement		14. Conductor cross-sectional areas for which terminals shall be suitable	22
13. Electrical insulation and leakage current at operating temperature	10	15. Dimensions of pillar type terminals	23
14. Radio and television interference suppression	11	16. Dimensions of screw type terminals	23
15. Moisture resistance	11	17. Dimensions of stud type terminals	23
16. Insulation resistance and electric strength	11	18. No requirement	
17. Overload protection	12	19. Torque values for screws and nuts	24
18. Endurance	13	20. Creepage distances and clearances	25
19. Abnormal operation	13	Figures	
20. Stability and mechanical hazards	14	1. Standard test finger	27
21. Mechanical strength	14	2. Test pin	27
22. Construction	15	3. No requirement	
23. Internal wiring	17	4. Diagram for leakage current measurement at operating temperature for single-phase connection of class II appliances	28
24. Components	17	5. Diagram for leakage current measurement at operating temperature for single-phase connection of appliances other than those of class II	28
25. Supply connection and external flexible cords	18	6. No requirement	
26. Terminals for external conductors	21	7. No requirement	
27. No requirement		8. Diagram for electric strength test at operating temperature	29
28. Screws and connections	23	9. Vertical rain apparatus	29
29. Creepage distances, clearances and distances through insulation	24	10. No requirement	
30. Resistance to heat, fire and tracking	26	11. No requirement	
31. Resistance to rusting	27	12. Impact-test apparatus	30
32. No requirement		13. No requirement	
Appendices		14. Ball-pressure apparatus	30
A. No requirement		15. Hot mandrel apparatus	31
B. Measurement of creepage distances and clearances	34	16. Arrangement and dimensions of the electrodes for the tracking test	31
C. No requirement		17. Apparatus for flexing test specified in 25.10	32
		18. Schematic representation of cord anchorages	33

Foreword

This revised specification for shavers, hair clippers and similar 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 to the CENELEC harmonization document (HD) for these appliances, which comprises HD 250 and HD 251 for the general requirements and HD 254 for the particular requirements, except that it is aligned with the agreed revision of HD 250 and HD 251 which will shortly be adopted as HD 251.S2. Any minor changes that may be required as a result of the subsequent revision of HD 254 to align it with HD 251.S2 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 HD and 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.S2. Where a clause of the IEC standard does not apply to the appliances covered by this standard the clause number has been

retained and 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 shavers, hair clippers and similar 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 and the Electrical Equipment (Safety) (Amendment) Regulations 1976, 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 BS 3456 : Part 2 : Section 2.5 except in respect of rechargeable battery operated appliances. It will be amended to cover rechargeable battery operated appliances only on the date agreed by the CENELEC General Assembly for standards conflicting with HD 254 to be withdrawn. Until this date BEAB will accept for approval appliances complying either with this standard or with BS 3456 : Part 2 : Section 2.5.

* 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 3.15 Shavers, hair clippers and similar appliances

1. Scope

1.1 BS 3456: Part 3: Section 3.15 specifies requirements for shavers, hair clippers and similar appliances for household and similar purposes incorporating mains operated motors. It also applies to similar motor units used in conjunction with accessories for hair clipping, massage, manicure, pedicure and similar purposes.

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 intended to be used in locations where special conditions prevail, such as the presence of a corrosive atmosphere (dust, vapour or gas);
- appliances for medical purposes;
- appliances incorporating batteries.

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

NOTE 2. Appliances primarily intended for massage purposes are covered in Part 3: Section 3.5.

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.

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 normal load and at normal operating temperature 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 measuring the current when the appliance is operating at rated voltage under normal load and at normal operating temperature.

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 or other 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.

type Z attachment. A method of attachment such that the flexible cable or cord cannot be replaced without breaking or destroying a part of the appliance.

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 reinforcement 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 hand-held appliance. A portable appliance intended to be held in the hand during normal use, the motor forming an integral part of the appliance.

2.26 No requirement.

2.27 No requirement.

2.28 No requirement.

2.29 No requirement.

2.30 normal load. The load obtained when the appliance is held by means of an appropriate retort clamp, with its major axis and the major axis of the cutting head or accessory in the horizontal plane, and is operated in still air with no external load other than that imposed by the accessory, if any, under the following conditions

Shavers, hair clippers intended for domestic use only, and motor units used in conjunction with accessories for hair clipping, massage, manicure, pedicure and similar purposes, are operated for 10 min, that accessory which imposes the highest load being used.

Hair clippers for animal shearing or clipping are operated continuously.

Other hair clippers are operated for 10 min and then allowed to rest for 10 min; this cycle is repeated until steady conditions are established.

NOTE The retort clamp is of light construction and is so arranged that it has negligible effect on the heat transfer from the appliance.

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

2.32 continuous operation. Operation under normal load for an unlimited period.

2.33 short-time operation. Operation under normal load 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 under normal load, 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 No requirement.

2.38 No requirement.

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. 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 No requirement.

2.47 accessible part or accessible surface. A part or surface that can be touched by means of test finger 1 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.

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.

NOTE 5. If the tests of clause 18 have to be repeated, an additional sample is required.

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, 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 it is specified, for appliances marked with a rated voltage range, that the supply voltage is equal to the rated voltage multiplied by a factor, the supply voltage shall be equal to:

the upper limit of the rated voltage range multiplied by this factor, if greater than 1;

the lower limit of the rated voltage range multiplied by this factor, if smaller than 1.

NOTE. Where reference is made to maximum or minimum rated input, the rated input related to the upper limit or lower limit respectively of the rated voltage range is meant.

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 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 Appliances provided with 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 No requirement.

4.13 When the conditions of normal load are specified, the appliance shall be loaded according to these conditions, irrespective of any marking of short-time or intermittent operation, unless it is evident from the design of the appliance that these conditions will not occur in normal use.

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 and 25.11, 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.

4.16 No requirement.

4.17 If 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 No requirement.

4.101 Before and during the tests cutting heads shall be lubricated with a few drops of light oil.

NOTE The oil is applied to imitate the lubrication provided in normal use by the skin or hair.

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.

5.1 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 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;
 - splash-proof 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, if greater than 25 W ;
- (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;
- (h) symbol for degree of protection against moisture, if applicable.

In addition, motors with windings insulated with class B, class F or class H material only shall be marked with the class designation of their winding insulation.

NOTE 1 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 2 If the motor of an appliance is marked separately, it is essential that the marking of the appliance and that of the motor 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 lead to misunderstanding.

BS 3456 : Part 3 : Section 3.15 : 1979

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.

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, if greater than 25 W

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.

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

V	volts
A	amperes
Hz	hertz
W	watts
h	hours
min	minutes
s	seconds
	alternating current
	direct current
	Class II construction



(one drop in a triangle) splash-proof 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 No requirement.

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 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, cooling effect,

etc., shall be indicated by a higher figure

The figure 0 shall not be used for any other indication

7.11 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 using the appliance, details of these shall be given in an instruction sheet that accompanies the appliance.

For appliances with type Z attachment, the instruction sheet shall contain the substance of the following information:

'The supply cord of this appliance cannot be replaced; if the cord is damaged, the appliance should be discarded.'

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 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 to 7.5 shall be on a main part of the appliance.

The marking shall be clearly discernible from the outside, if necessary after removal of a cover which shall not require the use of a tool.

Marking on, and indications for, switches, 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 For class II appliances fitted with a flexible cord, but without a moulded-on plug, 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.

7.11 No requirement.

7.111 No requirement.

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 removal of detachable parts.

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 Self hardening resins are not regarded as sealing compound.

TEST Compliance shall be checked by inspection and by a test with test finger I specified in BS 3042 (see figure 1).

In addition, all apertures in class II appliances shall be tested with test pin I specified in BS 3042 (see figure 2). The test finger and test pin are applied, without appreciable force, in every possible position.

For appliances provided with movable devices, the test shall be carried out with the devices adjusted to their most unfavourable position within their range of adjustment.

Apertures preventing the entry of the finger shall be further tested by means of a straight unjointed test finger of the same dimensions, which is applied with a force of 20 N: if this finger enters, the test with test finger I is repeated, the finger being introduced through the aperture. If the unjointed test finger does not enter, the force applied is increased to 30 N. If then the guard is so displaced or the aperture so distorted that test finger I can be inserted without force, the test with test finger I is repeated. An electrical contact indicator shall be used to show contact.

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.

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.

8.2 No requirement.

8.3 For class II appliances, flexible shafts that are handled in normal use shall be insulated from the motor shafts by suitable couplings of insulating material.

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

8.4 No requirement.

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

TEST. Compliance shall be checked by inspection.

8.6 For class II appliances, 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.

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

8.7 For class II appliances, 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.

9. Starting of motor-operated appliances

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

TEST Compliance shall be checked by starting the appliance three times at a voltage equal to 0.85 times rated voltage, the appliance being at room temperature at the beginning of the test.

The 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.

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%.

9.2 No requirement.

Table 1. No requirement.

9.3 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 the deviation shown in table 2.

Table 2. Permissible variations in rated input

Rated Input	Deviation
W	
Up to and including 33.3	+ 10 W*
Over 33.3 up to and including 150	+ 30 %*
Over 150 up to and including 300	+ 45 W*
Over 300	+ 15 %*

* The negative deviation is not limited.

NOTE 1 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.

NOTE 2 For appliances marked with one or more rated voltage ranges, the test specified in 10.1 are made 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 tests are made at a voltage equal to the mean value of that range.

TEST Compliance shall be checked by measuring the input of the appliance, operated at rated voltage under normal load, when the input has stabilized. If the motor load varies throughout the operating cycle, the input shall be measured by means of a watt-hour meter, and determined as the mean value of the input occurring during a representative period.

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 11.3 to 11.7.

11.2 No requirement.

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.

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 is an example of a place where thermocouples are positioned.

11.4 No requirement.

11.5 Appliances shall be operated under normal load and at the most unfavourable voltage between 0.94 times the minimum rated voltage and 1.06 times the maximum rated voltage.

11.6 No requirement.

11.7 The appliance shall be operated for the time stated in 2.30.

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 of parts which, in normal use, are in contact with skin or hair, or are held in the hand, shall not exceed the limits specified for handles which, in normal use, are continuously held. The temperature rise of such parts is determined for every accessory intended to be used with the appliance.

The measurements specified in 13.1 shall be made at the end of this test.

Table 3. Permissible temperature rises

Part	Temperature rise	Part	Temperature rise
	°C or K		°C or K
Windings ¹ , if the winding insulation is:		phenol-formaldehyde with mineral fillers	100 (200)
of class A material ²	75 (65)	melamine-formaldehyde	75 (150)
of class E material ²	90 (80)	urea-formaldehyde	65 (150)
of class B material ²	95 (85)	polyester with glass-fibre reinforcement	110
of class F material ²	115	silicone rubber	145
of class H material ²	140	polytetrafluoroethylene	265
Pins of appliance inlets:	40	pure mica and tightly sintered ceramic material, when such materials are used as supplementary insulation or reinforced insulation	400
Ambient of switches		thermoplastic material ⁷	—
without T-marking or temperature rating	30	Wood, in general ⁸	65
with T-marking or temperature rating	7-25	Outer surface of capacitors:	
Rubber or polyvinyl chloride insulation of internal and external wiring including power supply cords:		with marking of maximum operating temperature (T)	7-35
without T-marking or temperature rating	50 ⁴	without marking of maximum operating temperature:	
with T-marking or temperature rating	7-25 ⁵	small ceramic capacitors for radio and television interference suppression	50
Cord sheaths used as supplementary insulation	35	other capacitors	20
Rubber, other than synthetic, used for gaskets or other parts, the deterioration of which could affect safety:		External enclosure of appliances except handles held in normal use	60
when used as supplementary insulation or as reinforced insulation	40	Handles, knobs, grips and the like which, in normal use, are continuously held.	
in other cases	50	of metal	30
Material used as insulation other than that specified for wires and windings ⁶ :		of porcelain or vitreous material	40
impregnated or varnished textile, paper or press board	70	of moulded material, rubber or wood	50
laminates bonded with:		Handles, knobs, grips and the like which, in normal use, are held for short periods periods only (e.g. of switches):	
melamine-formaldehyde, phenol-formaldehyde or phenol-furfural resins	85 (175)	of metal	35
urea-formaldehyde resin	65 (150)	of porcelain or vitreous material	45
mouldings of:		of moulded material, rubber or wood	60
phenol-formaldehyde with cellulose fillers	85 (175)		

NOTES TO TABLE 3

¹ 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 thermocouples are placed, the figures without parentheses apply when the resistance method 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.

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. For totally enclosed motors the temperature rise limits for class A, class E and class B may be increased by 5 °C (5 K).

A totally enclosed motor is a motor so constructed that the circulation of the air between the inside and the outside of the case is prevented but it is not necessarily sufficiently enclosed to be called airtight.

³ T signifies the maximum operating temperature.

For the purposes of this test, switches 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.

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

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

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

$$b = \sqrt{\frac{\lambda c \gamma}{\rho}}$$

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.

12. 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 under normal load.

Appliances shall be operated at a supply voltage equal to 1.06 times rated voltage

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 $2000 \pm 100 \Omega$ and, if it is suspected that high-frequency currents are being generated in a motor-operated appliance, the measuring instrument shall have an accuracy of at least 5 % for all frequencies within the range of 20 Hz to 5000 Hz, but it shall be insensitive to higher frequencies.

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 class II appliances 0.25 mA

(2) for class III appliances 0.5 mA

(b) to metal parts of class II appliances separated from live parts by basic insulation only, if the appliance is classified according to degree of protection against moisture as:

(1) ordinary appliance 5.0 mA

(2) splash-proof appliance 3.5 mA

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 The cut-off frequency of 5000 Hz may, for example, be obtained by connecting a capacitor of 150 ± 7.5 nF in parallel with the resistive components of the measuring circuit. The measuring circuit may be partly or completely incorporated in the measuring instrument. If an instrument of the rectifier type is used, it should rectify linearly from 0.2 mA upwards within the frequency range of 20 Hz to 10000 Hz, and should be calibrated in r.m.s. values with a current of substantially sine-wave form. If high-frequency voltages are not present, the cut-off frequency of the measuring instrument may exceed 5000 Hz.

NOTE 2 It is recommended that the appliance be supplied through an isolating transformer; otherwise, it should be insulated from earth

NOTE 3 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 4 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.