

Specification for

Electrically-heated catering equipment —

Part 5: Steaming ovens

Co-operating organizations

The Electrical Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

Associated Offices' Technical Committee	Electronic Engineering Association
Association of Consulting Engineers	Engineering Equipment Users' Association
Association of Mining Electrical and Mechanical Engineers	Institution of Electrical Engineers
Association of Supervising Electrical Engineers*	Ministry of Defence
British Electrical and Allied Manufacturers' Association*	Ministry of Defence, Army Department
British Railways Board	Ministry of Defence, Navy Department
British Radio Equipment Manufacturers' Association	Ministry of Power
Crown Agents for Oversea Governments and Administrations	Ministry of Public Building and Works*
Department of Employment and Productivity*	Ministry of Technology
Electric Cable Makers' Confederation	Municipal Passenger Transport Association (Incorporated)
Electric Lamp Industry Council	National Inspection Council for Electrical Installation Contracting
Electric Light Fittings Association	National Physical Laboratory (Ministry of Technology)
Electrical Contractors' Association (Incorporated)	Oil Companies Materials Association
Electrical Contractors' Association of Scotland	Post Office
Electrical Research Association	Public Transport Association (Incorporated)
Electricity Council, the Central Electricity Generating Board and the Area Boards in England and Wales*	South of Scotland Electricity Board

The Government departments and scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Association of Supervisory Staffs, Executives and Technicians	Electrical Association for Women
Caterers' Association of Great Britain	Greater London Council
Catering Equipment Manufacturers' Association	Hospital Caterers' Association
Cookery and Food Association	Industrial Catering Association
County Councils Association	Institute of Hospital Engineers
Department of Education and Science	Institutional Management Association
Department of Health and Social Security	Ministry of Agriculture, Fisheries and Food
	National Association of Restaurant Engineers
	Tea Bureau

This British Standard, having been approved by the Electrical Industry Standards Committee, was published under the authority of the Executive Board on
28 November 1969

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The following BSI references relate to the work on this standard:
Committee reference ELE/75
Draft for comment 68/16692

ISBN 0 580 05833 6

Amendments issued since publication

Amd. No.	Date of issue	Comments
592	September 1970	Indicated by a sideline in the margin

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Foreword

This standard makes reference to the following British Standards:

BS 729, *Zinc coatings on iron and steel articles.*

BS 1224, *Electroplated coatings of nickel and chromium.*

BS 1344, *Methods of testing vitreous enamel finishes.*

BS 1358, *Colours for vitreous enamel finishes.*

BS 1484, *10-gallon tinned steel milk can and lid.*

BS 1872, *Electroplated coatings of tin.*

BS 2135, *Capacitors for radio interference suppression.*

BS 2512, *Gas-heated catering equipment.*

BS 2660, *Colours for building and decorative paints.*

BS 3042, *Standard test fingers for checking protection against electric shock and mechanical hazard.*

BS 3535, *Safety isolating transformers for industrial and domestic purposes.*

BS 3831, *Vitreous enamel finishes for domestic and catering appliances.*

BS 4410, *The connection of flexible cables and cords to appliances.*

BS 6500, *Insulated flexible cords.*

This British Standard has been prepared under the authority of the Electrical Industry Standards Committee.

Users of this standard should satisfy themselves that the installation of equipment conforming to the standard meets the requirements of any byelaws issued by the Ministry of Housing and Local Government and the Department of Health for Scotland and that pressure generating appliances comply with the requirements of the Factory Act 1961, where applicable.

This standard covers equipment for a.c. and d.c., but as equipment for d.c. is necessarily more complex than that for a.c. organizations inviting tenders to this specification should make it clear in their initial enquiry whether the equipment is for use on a.c. or d.c.

The equipment described in this standard is not necessarily suitable for use in ships or road vehicles.

NOTE The values of force are expressed in this standard in terms of the newton (symbol N). This is the unit of force in the international (SI) system. The newton is that force which, when acting on a body of mass one kilogramme, gives it an acceleration of one metre per second squared.

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

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

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 23 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 4167 specifies the general requirements and tests for steaming ovens normally used for steaming food and covers atmospheric types and those having a safe working pressure of less than 3.5 kN/m².

The standard applies to equipment designed for operation on either single-phase or polyphase supplies where the voltage to earth does not exceed 250 V a.c. or d.c.

It establishes a satisfactory standard of safety and performance when the equipment is used under normal conditions.

2 Definitions

For the purposes of this Part of this British Standard the following definitions apply:

NOTE The terms "voltage" and "current" imply the r.m.s. values, unless otherwise specified.

2.1

rated voltage

the voltage (for a three-phase appliance, the line to line voltage) assigned to the equipment and marked on it

2.2

rated current or input

the current or input assigned to the appliance by the maker and marked on it

2.3

rated voltage range

the voltage limits assigned to the appliance by the maker and marked on it

2.4

safe working pressure

the operating pressure assigned to the appliance by the maker

2.5

maximum rated input

the maximum rated input when an input range is marked on the appliance, is the highest input of the range. When the mean input is marked, the maximum rated input is given by the formula:

$$\text{Mean rated input} \times \left[\frac{\text{maximum rated voltage}}{\text{mean rated voltage}} \right]^2$$

2.6

extra low voltage

voltage normally not exceeding 50 V a.c. with a maximum voltage to earth of 30 V, or 50 V d.c.

2.7

non-detachable flexible cord or cable

a flexible cord, or cable, so connected to the equipment that it can only be removed with the use of tools

2.8

thermostat

a preset or adjustable device which in normal use, keeps the temperature of the appliance, or of parts of it, between certain limits by automatically opening and closing the circuit or by varying the current

2.9

thermal cut-out

a safety device limiting the temperature of an appliance under abnormal conditions by automatically opening the circuit or by reducing the current. The device may be reset by hand or may be self-resetting and is so constructed that there is no provision for adjustment of the setting by the user

2.10

energy regulator

a device which provides a variable rate of energy transmitted to an electrically-heated appliance by charging the ratio of the ON and OFF periods in a progressive manner between the minimum and maximum setting

2.11

cooking space

the space defined by:

- Width: The distance between shelf runners.
- Depth: The front to back of grid shelves.
- Height: The top of a shelf placed in the lowest runners to the top of the door opening.

2.12

indicated level

the maximum water level to which an appliance may be filled for correct operation

2.13

transportable appliance

an appliance which can readily be removed from one place to another

2.14

stationary appliance

an appliance intended to be fixed to its supporting surface or used in one place

3 General requirements

3.1 The appliance shall be so designed and constructed that in normal use it is reliable and will operate without danger to the user or surroundings.

3.2 Where an appliance incorporating a steaming oven also incorporates other electrically-heated units, the other units shall comply with the relevant Parts of this standard.

3.3 TEST. Compliance shall be in general checked by carrying out the relevant tests specified.

3.4 Instructions for connecting, maintaining and operating the equipment shall be available for each appliance.

4 General conditions of tests

4.1 The tests are type tests and are made on a single sample as delivered which shall pass all the relevant tests and specific requirements.

4.2 Unless otherwise specified, the tests shall be carried out in the order of the clauses except that the tests of Clause 28 are to be carried out following the test of Clause 14.

4.3 The tests shall be carried out at an ambient temperature of 20 ± 5 °C, unless otherwise specified. Details of the test room and of the preparation of the appliance before testing are given in Appendix A.

4.4 The temperature shall be measured by fine wire thermocouples which are positioned so that they have the minimum effect on the temperature of the part under test.

4.5 Appliances designed for both a.c. and d.c. operation shall be tested using the system of supply which will prove most exacting to the appliance.

When testing with d.c. the possible influence of polarity on the operation of switching devices shall be taken into account.

4.6 Unless otherwise specified, appliances to be connected to a water supply shall be connected to a supply of appropriate pressure and the water level adjusted in accordance with the manufacturer's instructions. If not designed to be connected to a water supply the water container shall be filled to the indicated level for each test and where necessary be maintained at this level during the test.

4.7 Unless otherwise specified, appliances with thermostats or regulating or limiting devices shall be tested with those devices at their maximum setting, if the setting is intended to be altered by the user.

4.8 When it is specified that the appliance shall be connected to a test voltage so that the input is greater than the rated input, the test voltage as defined in the relevant clauses applies only to heating elements without appreciable positive temperature coefficient of resistance (in general the temperature coefficient is deemed to be appreciable if, at rated voltage, the input of the equipment in the cold condition differs by more than 25 % from the input at operating temperature).

For the other elements the test voltage shall be determined in the following manner:

The rated voltage shall be applied until the heating element reaches its operating temperature. The voltage shall then be rapidly increased to the value necessary to give the required test loading, and the tests are made as specified, this value of the voltage being maintained throughout.

4.9 Where it is stipulated that equipment shall be operated at extra low voltage from a particular transformer supplied with it, the test shall be made with this transformer.

5 Finish

5.1 Finishes shall not be subject to excessive deterioration in normal use and shall adequately protect against corrosion at the temperature and in the humidity conditions to which they will be subjected in normal use.

The surfaces of parts which are liable to come into contact with food, food containers and food splashes shall be capable of being kept hygienically clean and shall be of such a material or so protected as to avoid contamination of the contents.

5.1.1 TEST. Compliance shall be checked by visual examination for signs of pin holes, blistering, roughness or exposed untreated areas and for paint finishes by the tests of 5.2 and 5.3.

5.2 The appliance shall be filled with water to the indicated level and operated at its rated input, with all controls set at maximum, for a continuous period of five hours, topping up with water as necessary. Afterwards there shall be no appreciable change of colour on any part of the appliance and the finish shall not become tacky or show other signs of deterioration.

After the initial burning-off period, there shall be no detectable odour from the paint when the appliance is operated normally.

5.3 Paint films shall be subjected to a scratch test with a steel ball 1 mm in diameter. The ball shall be mounted in an apparatus in such a way that it shall be pressed against the surface with a force of 16 N (1.63 kgf) and it shall be caused to move once over the surface for a distance of approximately 65 mm at a speed of 30 mm/s to 40 mm/s. The design of the apparatus shall be such that the ball shall be applied to the surface gently, e.g. by allowing the ball carrier to run down a ramp.

The ball shall not penetrate completely through the film and if flakes are lifted from the edge of the scratch the major dimension of every flake shall be less than 1 mm. For electrically conducting paints penetration shall be determined by visual observation. For other paints penetration shall be shown by an electrical contact indicator, the voltage applied between the ball and the metal surface to which the paint shall be applied being not greater than 6 V.

The ball shall be cleaned after each test and inspected frequently to ensure that it has not worn significantly.

5.4 The colour of paint and similar finishes on exterior surfaces shall be in accordance with BS 1358¹⁾ or BS 2660²⁾.

5.4.1 TEST. Compliance shall be checked by inspection.

5.5 Finishes other than painted finishes shall comply with one of the following British Standards as appropriate:

BS 729, "*Zinc coatings on iron and steel articles*".

BS 1224, "*Electroplated coatings of nickel and chromium*" (Service condition no. 2).

BS 1344, "*Methods of testing vitreous enamel finishes*".

BS 1484, "*10-gallon tinned steel milk can and lid*".

BS 1872, "*Electroplated coatings of tin*" (classification 12S or 12C).

BS 3831, "*Vitreous enamel finishes for domestic and catering appliances*".

5.5.1 TEST. Compliance shall be checked as detailed in the appropriate standard.

6 Voltage rating

6.1 The highest rated voltage shall be 250 V for single-phase a.c. or d.c. or 440 V for 3 phase-4 wire a.c. No individual component other than the contact assembly of switching devices shall have a rated voltage exceeding 250 V.

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

7 Marking

7.1 The equipment shall be marked with the following particulars:

- 1) The number of this British Standard, i.e. BS 4167-5.
- 2) Rated voltage or voltage range in volts.
- 3) Nature of supply, if necessary for the correct operation of the appliance (e.g., single-phase a.c., 3 phase-4 wire a.c. or d.c.).
- 4) Rated input in watts or kilowatts.
- 5) The safe working pressure. Appliances which are directly vented to the atmosphere shall be marked "Atmospheric".
- 6) Maker's name or trade mark.
- 7) Maker's model or serial number.

7.2 Heating elements shall be marked with the rated voltage in volts and the rated input in watts or kilowatts.

7.3 Any cover giving access to live parts at a voltage exceeding 250 V shall be marked with the word WARNING and the appropriate voltage. This marking shall not be incorporated with the markings prescribed in 7.1.

7.4 If the appliance can be set to different rated voltages, the voltage to which the appliance is set shall be easily and clearly discernible.

It shall be sufficient if the rated voltage to which the appliance is set is determined from instructions given on the appliance.

NOTE The mark BS 4167-5 on or in relation to the product is a claim by the manufacturer that it complies with the requirements of the standard.

¹⁾ BS 1358, "*Colours for vitreous enamel finishes*".

²⁾ BS 2660, "*Colours for building and decorative paints*".

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7.5 For an appliance where the difference between the limits of the rated voltage range is more than 10 % of the mean value of the range, the upper and lower limits of the rated input shall be marked on the equipment so that the relation between input and voltage appears distinctly.

If the difference between the limits of the rated voltage range is not more than 10 % of the mean value of the range, the marking of rated input shall relate to the mean of the voltage range.

(Alternatively, the upper and lower limits of the rated input may be marked.)

If the input of the appliance in the 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 between brackets.

7.6 Appliances shall have the maximum level to which they may be filled, i.e. the "indicated level", marked in such a position as to be easily visible to the operator when being filled by hand. The indicated level shall be at least 75 mm below the overflow.

7.7 If abbreviations are employed the following letters shall be used:

- | | |
|-----------------------|---------|
| 1) Volts | V |
| 2) Amperes | A |
| 3) Watts or kilowatts | W or kW |
| 4) Pressure | P |

7.8 The symbols for the nature of supply shall be as follows:

- | | |
|------------------------|-----------|
| 1) Alternating current | ~ or a.c. |
| 2) A.C. 3 phase-4 wire | 3N ~ |

- | | |
|-------------------|---------------|
| 3) Direct current | ===== or d.c. |
|-------------------|---------------|

7.9 Regulating devices shall have indications for their different positions by figures, letters or other visual means.

7.10 Adjustable thermostats, energy regulators or the like shall be provided with an indication of the direction of adjustment to increase or decrease the temperature.

NOTE An indication of + and – is deemed to be sufficient.

7.11 Switches shall be marked or placed so as to indicate their function unless this is obvious. There shall be a clear indication of the OFF position on manually operated switches unless this also is obvious.

7.12 TEST. Compliance with the requirements of 7.1 to 7.11 shall be checked by inspection.

7.13 Marking of the appliance shall be durable, resistant to heat and easily legible, and shall be placed on the main part of the appliance so that it is clearly discernible from the outside, if necessary after the removal of a cover. This cover shall be removable without the use of tools, except in the case of stationary appliances, and then only if the cover has also to be removed for servicing. Marking shall not be placed on any removable part which can be replaced in such a way that the marking is misleading.

7.14 Marking of heating elements shall be easily legible and shall be placed on a main part of the element in such a way that it is clearly discernible when the element is removed from the appliance. The marking of the element shall be durable and resistant to heat.

7.15 TEST. Compliance with the requirements of 7.13 and 7.14 shall be checked at the conclusion of all the tests in this specification by inspection, and by the tests described in Appendix B.

8 Protection against electric shock

8.1 The enclosure of the appliance shall have no openings giving access to live parts other than openings necessary for the use and working of the equipment. Where such openings are necessary, sufficient protection against contact with live parts shall be provided.

NOTE Lacquering or enamelling is not deemed to be adequate protection or insulation for the purpose of this requirement.

8.1.1 TEST. Compliance shall be checked by inspection and by means of the test fingers A and D prescribed in BS 3042³⁾.

³⁾ BS 3042, "Standard test fingers for checking protection against electric shock and mechanical hazard".

Test finger A is inserted into such holes and apertures as are accessible in every way possible, without appreciable force as follows:

A transportable appliance weighing not more than 35 kg shall be tested with the appliance in all positions, except that when inserted into apertures which are only accessible when the appliance is overturned, the circular stop plate on the test finger shall not be inserted beyond the plane of the opening in the base.

A transportable appliance weighing more than 35 kg shall be tested with the appliance in its normal position or positions of use.

A stationary appliance is tested with the appliance installed in position.

In no case shall it be possible for test finger A to touch live parts, even if the position of the jointed members is altered after insertion.

If the aperture is such that it prevents the entry of the tip of test finger A, then test finger D is applied, with a force not exceeding 30 N (3.06 kgf). If this test finger then enters, the test with test finger A is repeated, the finger being pushed through the aperture if necessary.

The test shall be made after the removal of all parts which can be removed without the use of tools.

A voltage of not less than 40 V is used with a lamp for indication of contact.

8.2 Edison-screw-type lamp holders shall be fully shrouded or otherwise protected so as to prevent contact with the cap of the lamp during insertion and withdrawal unless access to the lamp can be gained only with the use of a tool. The screwed shell shall be connected to the terminal intended for the neutral connection.

8.2.1 TEST. Compliance shall be checked by applying the standard test finger according to **8.1.1**.

8.3 Operating spindles of knobs, etc., shall be adequately insulated from live parts.

8.4 For appliances other than those designed for extra low voltages, handles, levers and knobs shall be either of insulating material or adequately covered by insulating material if their shafts or fixings can become live in the event of an insulation fault. For a stationary appliance, 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 separated from live parts by earthed metal.

8.5 TEST. Compliance with the requirements of **8.3** and **8.4** shall be checked by inspection and the tests specified in Clause **12**.

8.6 Parts providing protection against accidental contact with live parts, or parts which are liable to become live in the event of a defect, shall have adequate mechanical strength and shall not work loose during normal use. It shall not be possible to remove these parts without the use of tools.

8.6.1 TEST. Compliance shall be checked by inspection and by manual test, after the tests prescribed by Clause **18** have been completed.

9 Input

9.1 The input of the appliance at rated voltage and with the elements at operating temperature shall not differ from the rated input by more than $\pm 7\frac{1}{2}\%$.

9.1.1 TEST. Compliance shall be checked by the following test:

The appliance shall be connected to the rated voltage and filled with water to the indicated level. The input shall be measured as soon as it reaches a steady value.

If the appliance is marked with a rated voltage range, the test shall be made either at both the upper and lower limits of the range if the difference between these limits is more than 10 % of the mean value of the range or at the mean value of the range if the difference between the limits is not more than 10 % of the mean value of the range.

10 Operation under overload conditions

10.1 The appliance shall be designed and constructed to withstand electrical overloads liable to occur in normal use.

10.1.1 TEST. Compliance shall be checked by the following tests:

An appliance normally used on a floor or table shall be placed on a horizontal support away from walls.

An appliance normally fixed to a wall shall be mounted on a vertical support, free from the ceiling.

The appliance, filled with water to the indicated level, shall be subjected to five cycles of operation, each cycle comprising an operating period and a cooling period during which the appliance cools to ambient temperature. Forced cooling may be used for shortening the cooling period. The water level shall, if necessary, be restored to the indicated level before each cycle of operation.

The operating period shall be the time taken for the appliance to reach steady temperature conditions. Throughout the operating period, all heating elements in the appliances are connected to a voltage so that the input is 1.2 times the maximum rated input.