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METHODS OF
MEASURING THE PERFORMANCE OF
household ELECTRICAL APPLIANCES

Part 3
FOOD PREPARATION
MACHINES

METRIC UNITS
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BRITISH STANDARDS INSTITUTION

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THIS BRITISH STANDARD, having been approved by the Electrical Industry Standards Committee and endorsed by the Chairman of the Engineering Divisional Council, was published under the authority of the General Council on 29 December, 1967.

The Institution desires to call attention to the fact that this British Standard does not purport to include all the necessary provisions of a contract.

In order to keep abreast of progress in the industries concerned, British Standards are subject to periodical review. Suggestions for improvements will be recorded and in due course brought to the notice of the committees charged with the revision of the standards to which they refer.

A complete list of British Standards, numbering over 4000, fully indexed and with a note of the contents of each, will be found in the British Standards Yearbook, price 15s. The BS Yearbook may be consulted in many public libraries and similar institutions.

This standard makes reference to the following British Standards:

- BS 410. Test sieves.
- BS 1363. Two-pole and earthing-pin fused-plugs and shuttered socket-outlets for a.c. circuits up to 250 volts.
- BS 3456. The testing and approval of domestic electrical appliances. Part B. Motor-operated appliances. Section B1. General requirements. Section B5. Electric food preparation machines.
- *BS 3999. Methods of measuring the performance of domestic electrical appliances. Part 5. Electric cookers.

*In course of preparation.

British Standards are revised, when necessary, by the issue either of amendment slips or of revised editions. It is important that users of British Standards should ascertain that they are in possession of the latest amendments or editions.

The following BSI references relate to the work on this standard:
Committee references ELE/94 and ELE/94/2.
Draft for comment D65/13638.

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

Consumer Council
 Electrical Association for Women
 Good Housekeeping Institute
 Women's Advisory Committee of the BSI

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BRITISH STANDARD METHODS OF
MEASURING THE PERFORMANCE OF household ELECTRICAL
APPLIANCES

PART 3. FOOD PREPARATION MACHINES

FOREWORD

The British Standards Institution is preparing standard methods for measuring the performance of a wide range of consumer goods. Originally prepared at the request of the Consumer Council, these methods may be used to provide some of the data required for an informative labelling scheme.

The methods of measurement for household electric appliances will form parts of BS 3999. Each part will apply to a particular appliance.

In the case of household electrical appliances, the relevant safety requirements are contained in appropriate sections of BS 3456, 'The testing and approval of household electrical appliances'.

This part of BS 3999 prepared under the authority of the Electrical Industry Standards Committee, deals with the standard methods of measuring the performance of food preparation machines.

Appendix Y gives a method of selecting eggs. Appendix Z gives notes on the methods of measurements.

Annex A gives suggested information required for an informative labelling scheme for food preparation machines.

Annex B gives use and care instructions.

NOTE. This standard is in metric units. Annex A is in British units because the Teltag label is in those units and will remain so until the change has been made in retail trade.

METHODS

1. SCOPE

This part of BS 3999 covers the principal performance characteristics of household food preparation machines, which are of interest to the user, and it describes the standard methods of measuring these characteristics.

2. DEFINITIONS

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

(1) *Food preparation machine*. An appliance designed for food preparation. It may be a machine designed to perform one or more of the functions defined in items (2) to (12).

(2) *Blender*. An appliance or attachment having a goblet or similar container with high speed rotary cutting blades, designed to mix liquids or to pulverize other materials.

(3) *Mincer*. An appliance or attachment designed to cut up cooked or raw meat and similar materials into small particles, usually by the action of a feed scroll, cutting knives and a perforated screen.

(4) *Shredder and slicer*. An appliance or attachment designed to cut up fruit, vegetables or cheese into fine shreds or thin slices, usually by the action of rotating cutters.

(5) *Juice extractor*. An appliance or attachment designed to remove juice from citrus fruits by means of a rotating reamer and a strainer, normally when pressure is applied to the bisected fruit by hand.

(6) *Fruit press*. An appliance or attachment designed to remove the juice from berry or currant fruit by compression usually applied by means of a scroll.

(7) *Potato peeler*. An appliance or attachment designed to remove the skin from potatoes or similar vegetables usually by means of an abrasive or cutting action.

(8) *Juice separator*. An appliance or attachment designed to remove juice from fruit or vegetables usually by centrifugal action.

(9) *Sieve*. An appliance or attachment designed to sieve cooked fruit or vegetables in order to produce a purée free from large particles of food, skin and stones.

(10) *Coffee grinder*. An appliance or attachment in which coffee beans are supplied from a container to a grinding system consisting of two grinding disks or cones; one rotating, one fixed. After being ground, the coffee leaves the grinding system. Normally, the mean diameter of the coffee may be varied by a mechanical adjustment altering the clearance between the two members.

(11) *Coffee mill*. An appliance or attachment in which the coffee beans are broken by means of cutting blades at high speed in a container. Normally the contents remain in this container, and the mean diameter of the ground coffee is reduced by increasing the operating time.

(12) *Food mixer*. An appliance or attachment designed to perform one or more of the following functions: whisking, beating, kneading, usually with the agitator rotating at speeds below 1500 rev/min.

(13) *Hand-held machine*. A machine designed to be held in the hand during normal use.

(14) *Rated input*. The input in watts or kilowatts marked on the machine.

(15) *Rated voltage*. The voltage or voltage range marked on the machine.

3. GENERAL CONDITIONS OF MEASUREMENT

The following conditions shall apply unless other conditions are stated for a particular measurement.

The measurements shall be made at the rated voltage or at the mean of the voltage range, except that if the voltage range includes 240V the measurements shall be made at that voltage.

The ambient temperature and the temperature of all utensils and ingredients shall be maintained at $20 \pm 5^\circ\text{C}$.

Hand-held machines designed for cake mixing and similar operations shall be operated with the beaters in the bowl, the beaters being moved as necessary to achieve good mixing but at a speed not exceeding 30 movements per minute.

The mixing shall be carried out with the bowl supplied by the manufacturer, and also in one of the bowls shown in Fig. 1 and Fig. 2.

If a bowl is not supplied, use is made of one of the standard bowls shown in Fig. 1 and Fig. 2. The attachments and speeds used shall be those recommended by the manufacturer. The ingredients specified have been selected primarily to ensure uniform and reproducible results. A method of selecting eggs is given in Appendix Y. A list of ingredients known to be suitable is given in Appendix Z.

4. SPLASHING

4.1 Procedure. Weigh enough blotting paper to cover the inside surfaces of an enclosure measuring 60 cm × 60 cm × 45 cm high. Cover the enclosure with the blotting paper. Place the mixing bowl on the base of the enclosure so that it is central in the base area. Adjust the beater blades to their maximum depth in the bowl. Add enough of a mixture of 2 parts barium sulphate to 1 part multi-grade motor oil (10/30 W), by weight, to cover the stationary blades to 80% of their overall axial length. Operate the machine for 5 min at the maximum speed for mixing moist ingredients recommended by the manufacturer. Reweigh the blotting paper.

NOTE. Since the angle of the beater to the vertical affects the splashing of hand-held machines it is necessary for the machine to be supported with the beaters vertical.

4.2 Result. Record, in grammes, any increase in the weight of the blotting paper.

5. WHISKING EGG WHITES

5.1 Ingredients. The whites of eggs having a Haugh unit reading between 65 and 75, as defined in Appendix Y.

5.2 Procedure. Put the egg whites into the mixing bowl, which is completely dry and free from grease, and whisk for not more than 3 min. Whisking is considered to be achieved when the mixture remains in the bowl after it has been inverted for 5 seconds. When determining the minimum quantity for mixers not provided with a bowl the 850 ml bowl shown in Fig. 2 is used.

5.3 Result. Record the maximum and minimum numbers of egg whites that can be whisked, in integral numbers.

6. CREAMING

6.1 Ingredients. Equal weights of margarine and sugar.

6.2 Procedure. Cut the margarine into cubes of side approximately 2 cm. Put the margarine and the sugar in the mixing bowl and cream the ingredients using the machine for approximately 2 min. Scrape the sides of the bowl down and then continue the creaming if necessary up to a total time of 6 min. Determine whether the mixture is satisfactorily creamed as follows:

Select six samples, each approximately 1 cm³ in volume, so that they are representative of the whole mixture.

Drop each sample separately into a liquid of specific gravity 0.92 (+0, -0.002) which does not interact with either the margarine or the sugar*.

Observe whether the samples sink or float. A sample is considered to float if any part of the sample breaks the surface of the liquid. If four or more samples float, the mixture is taken to be satisfactorily creamed.

The ambient temperature and the temperatures of all utensils and ingredients is to be $23 \pm \frac{1}{2}^{\circ}\text{C}$ and the relative humidity of the room is to be between 40% and 70%. When determining the minimum quantity for mixers not provided with a bowl, the 850 ml bowl shown in Fig. 2 is used.

6.3 Result. Record the maximum and minimum weights, made up of equal amounts of fat and sugar, that can be creamed satisfactorily after processing for not more than 6 min.

7. VICTORIA SANDWICH

7.1 Proportion of ingredients to each egg. Its own weight of margarine, sugar and flour; baking powder 2 g and a pinch of salt. The number of eggs used is the maximum that will give satisfactory mixing of the ingredients.

7.2 Procedure. Cut the margarine into cubes of side 2 cm in length. Mix the ingredients in the bowl in accordance with the manufacturer's instructions. If instructions are not provided put the margarine and sugar in the mixing bowl and cream the mixture in accordance with the method described in 6.2; then beat in the egg and add the other ingredients. Continue the

*Brown and Polson's 'Mazola' corn oil, which has a specific gravity of 0.918 at 23°C is suitable. The specific gravity at t°C is 0.925 - (t-15.5) 0.000 69. The specific gravity of 'Mazola' can be increased by adding castor oil and reduced by adding illipe oil.

operation and determine visibly whether all the ingredients are adequately mixed. The sides of the bowl may be scraped down twice during this operation.



The total number of times the bowl may be scraped down is limited to 3.

7.3 Result. Record the maximum weight, in grammes, that can be adequately mixed. The weight is to be expressed in relation to the number of eggs used, if one egg is used, the weight is recorded as 225 g. If more than one egg is used the weight is expressed as the corresponding multiple of 225 g.

8. RICH FRUIT CAKE

8.1 Proportion of ingredients to each egg. Margarine 45 g, sugar 45 g, flour 57 g, sultanas 30 g, currants 30 g, glacé cherries 20 g, candied peel 20 g, baking powder 1 g. The number of eggs to be used is the maximum that will enable the machine to mix the ingredients satisfactorily with even distribution of the fruit.

8.2 Procedure. Mix the ingredients in the bowl in accordance with the manufacturer's instructions. If instructions are not provided cream the margarine and the sugar in accordance with the method described in 6.2. Then beat in the egg and add the flour and baking powder; then gently add the other ingredients. Continue the operation and determine visibly whether all the ingredients are evenly mixed. The sides of the bowl may be scraped down three times during this operation.

The total number of times the bowl may be scraped down is limited to 4.

8.3 Result. Record the maximum weight, in grammes, that can be mixed evenly. The weight is to be expressed in relation to the number of eggs used. If one egg is used the weight is recorded as 300 g. If more than one egg is used the weight is expressed as the corresponding multiple of 300 g.

9. SHORT CRUST PASTRY

9.1 Proportion of ingredients. 4 parts of flour, 1 part margarine, 1 part cooking fat. Water as required. The quantity of ingredients is the amount that can be satisfactorily mixed in either the dry or the wet condition. The temperature of the ingredients is not to exceed 20°C.

9.2 Procedure. Sift the flour through a 1 mm sieve into the mixing bowl. Cut the margarine and fat into cubes of side approximately 2 cm and add them to the flour. Mix the ingredients and continue the operation until the mixture resembles fine breadcrumbs. Add water in accordance with the manufacturers' instructions and continue mixing until a small pliable ball of pastry has been formed.

9.3 Result. Record the weight, in grammes, of flour in the mixture that can be mixed dry.

Record whether the machine is capable of mixing the pastry to a satisfactory consistency after water has been added to the dry mixture.

The result is to be expressed as 100 g plus multiples of 50 g.

10. DOUGH

10.1 Ingredients

Quantity of bread	1 loaf	2 loaves	3 loaves	4 loaves
Flour	340 g	680 g	1020 g	1360 g
Salt	7 g	14 g	21 g	28 g
Cooking fat	7 g	14 g	21 g	28 g
Dried yeast	5 g	9 g	11 g	14 g
Sugar	5 g	7 g	7 g	7 g
Water (at a temperature of 43°C)	198 ml	396 ml	594 ml	792 ml

10.2 Procedure.

Mix the ingredients in the bowl in accordance with the manufacturer's instructions. When instructions are not provided, Add the sugar to about a cupful of the water used in the recipe (the water should be at a temperature of 43°C). Sprinkle the yeast on top of this water and leave for 10 min.

Cut the fat into cubes of side approximately 1 cm. Place the fat and the liquid in the bowl. Start the machine, add the flour and salt and knead the mixture for a maximum of 6 min.

Allow the mixture to rise in the mixing bowl for 1 hour or until the dough springs back when pressed lightly with a floured finger. The temperature is to be 30-35°C and the bowl is covered with a greased polythene* sheet or cooking film.

Re-knead the dough, using the machine, and continue if necessary up to a time of 6 min. Divide the dough into the correct number of pieces so that each piece weighs approximately the same (if applicable).

Shape each piece of dough by folding in three or rolling up like a swiss roll and tucking the ends under so that the shaped dough exactly fits the baking tin. The tin should be lightly greased and of the type recommended in Appendix X of BS 3999 : Part 5.† Cover the tin with a greased polythene sheet or cooking film, and allow the dough to rise at a temperature of 30 to 35°C for 40 min or until the dough rises just above the top of the tin. Bake in an electric oven according to the method described in Clause 14 of BS 3999 : Part 5†.

10.3 Result. Record the weight, in grammes, of flour in the maximum weight of dough which the machine can knead satisfactorily following the method described in 10.2. Record the number of loaves produced from the maximum weight of dough which the machine can knead.

*It should be noted that the name 'polythene' is equivalent to the name 'polyethylene'.

†BS 3999, 'Methods of measuring the performance of domestic electrical appliances', Part 5, 'Electric cookers'. (In course of preparation.)