

# PAKISTAN STANDARD

**ELECTRIC TOASTERS FOR HOUSEHOLD AND SIMILAR PURPOSES  
- METHODS FOR MEASURING THE PERFORMANCE**



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## **ELECTRIC TOASTERS FOR HOUSEHOLD AND SIMILAR PURPOSES- METHODS FOR MEASURING THE PERFORMANCE**

### **0. FOREWORD**

- 0.1 This Pakistan Standard was adopted by the authority of the Board of Directors for Pakistan Standards and Quality Control Authority after approval by the Technical Committee for “Electric Lamps (T-2)” had been approved and endorsed by the Electrotechnical National Standards Committee on 7<sup>th</sup> October 2015
- 0.2 This Pakistan Standard was formulated on the basis of IEC: 62442 since IEC Standard have been established in 2003, hence it is deemed necessary to adopt the International standard to keep abreast with the latest technology and as per with IEC standard.
- 0.3 This Pakistan Standard is an adoption of IEC: 62442 “Electric toasters for household and similar purposes - Methods for measuring the performance and its use hereby acknowledged with thanks.
- 0.4 This standard is subject to periodical review in order to keep pace with the development in industry. Any suggestions for improvement shall be recorded and placed before the revising committee in due course.
- 0.5 This standard is intended chiefly to cover the technical provisions relating to this standard and it does not include all the necessary provisions of a Contract.

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## **ELECTRIC TOASTERS FOR HOUSEHOLD AND SIMILAR PURPOSES –**

### **Methods for measuring the performance**

#### **1 Scope and object**

This International Standard applies to electric toasters for household and similar use.

The purpose of this standard is to state and define the main performance characteristics for toasters, which are of interest to the user, to describe the standard methods for measuring these characteristics and to give some guidelines for the evaluation of test results.

Taking into account the low grade of accuracy and repeatability, due to variations in time and origin of test materials and ingredients and to the influence of the subjective judgement of test operators, the described test methods may be applied more reliably for comparative testing of a number of appliances at approximately the same time, in the same laboratory, by the same operator and with the same utensils, rather than for testing of single appliances in different laboratories.

This standard is not concerned with safety.

It does not apply to appliances designed exclusively for commercial or industrial use.

#### **2 Normative reference**

The following normative document contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All normative documents are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the normative document indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

BS 3999: "Shade chart" Part 5 C. 1983

#### **3 Definitions**

For the purpose of this International Standard the following definitions apply:

##### **3.1**

##### **radiant toaster**

toaster intended for toasting slices of bread by radiant heat. The slices are toasted either on one side or both sides at a time

NOTE Radiant toasters may be provided with attachments for heating rolls and for toasting sandwiches.

**3.2**

**contact (horizontal) toaster**

toaster with one or more heating surfaces which can be brought into contact with slices of bread

NOTE Contact (horizontal) toasters are intended for toasting only on one side at a time. Some contact toasters heat both sides at the same time, particularly when toasting sandwiches.

**3.3**

**roll heating device**

device for holding rolls to be heated on the toaster

NOTE This device can be built in or supplied with the toaster.

**3.4**

**toasting control device**

device that automatically terminates the toasting process

**3.5**

**bread carriage**

the part of the toaster that supports the bread and releases it at the end of the toasting process

**3.6**

**browning control range**

a certain setting on a scale that can be marked with number, symbols or shades of colour

**3.7**

**toasting chamber**

space intended for the loading of the slices of bread

**3.8**

**evenness of browning**

the brownness visually determined and averaged over one surface of the toasted slice of bread in each individual case

**3.9**

**toasting degree**

average brownness reached by the slices of bread at the end of the toasting process

**3.10**

**toasting range**

range of the toasting degree from the minimum brownness to the maximum brownness

**4 General conditions for measurements**

Unless otherwise specified, the measurements shall be made under the following conditions:

Ambient temperature: 20 °C ± 5 °C

Electrical supply: the measurements shall be made at rated frequency and at a voltage which is within ±0,5 % of the rated voltage or the mean of the rated voltage range.

NOTE If the rated voltage differs from the nominal supply voltage of the country concerned, measurements carried out at rated voltage may be misleading. Therefore, for comparative testing the voltage used for the tests should conform to the nominal supply voltage and this should be reported.

Testing room: substantially draught free.

Placing of the appliances: at a distance of at least 30 cm away from walls, on a dull black painted wooden support.

Unless otherwise specified, toasters with roll heating device or sandwiches device are tested without such devices.

## **5 Overall dimensions**

The overall dimensions of the appliance (length, height and width, doors, if any, closed, including any controls, handles or other protrusions) shall be measured and the dimensions shall be indicated in millimetres.

## **6 Length of the flexible cord**

The length between the point of entry of the cord to the toaster and the entry point in the plug, including any cord guard, shall be measured and indicated in metres, to the nearest 0,05 m.

The existence of a cord storage device or a cord chamber for the supply cord shall be stated.

## **7 Mass of the appliance**

The mass of the toaster, without accessories and with flexible cord and plug if attached, is determined and indicated in kilograms, to the nearest 0,1 kg.

## **8 Number and dimensions of the toasting chambers (radiant toasters), toasting surfaces (contact toasters)**

The number of the toasting chambers into which the bread slices can be placed to be toasted on both sides at a time, or of the toasting surfaces on which the bread slices are put to be toasted on one side at a time, shall be determined and indicated.

For each toasting chamber or toasting surface, the dimensions (length, height, width) which are applicable, shall be determined and indicated in millimetres. In case of variable toasting chambers and toasting surfaces, the maximum useable dimensions are given.

The dimensions of the largest slice of bread, having a thickness of 12 mm, which can be inserted into the toasting chamber without force or which can be placed on the toasting surface, shall be determined and indicated in millimetres.

The number of standard bread slices having dimensions of 100 mm × 100 mm × 12 mm which can be toasted at one time, on both sides or on one side only, shall be determined and indicated.

## **9 Force necessary to operate the bread carriage**

The force necessary to operate the bread carriage to start the toasting process shall be measured (e.g. by using a spring balance) and indicated, rounded off to the nearest newton.

## **10 Bread to be used for the tests on toasters**

The measurements according to clauses 11 to 14 are made with factory-made white bread common in the relevant country, but care has to be taken that, if more than one loaf is necessary, bread from the same batch is used and treated the same way.

The dimensions of the bread shall be 100 mm × 100 mm × 12 mm ± 1 mm. The bread is put into suitable plastic bags and stored in a draught-free room, away from direct sunlight at an ambient temperature of 20 °C ± 2 °C. The end slices of each loaf are discarded.

NOTE The storage in plastic bags is necessary to avoid moisture loss, since the duration of the test is considerably longer than normal toasting time.

For all the following tests, the bread slices are used with crusts.

## **11 Browning control setting**

These tests have to be carried out with minimum and maximum load as indicated in the manufacturer's instructions.

### **11.1 Browning control setting for bread**

The browning control is set to a medium position or to the position for medium brownness (golden brown) declared by the manufacturer. Starting from "cold" with the toaster fully loaded, two toasting cycles are made, with an interval of 15 s or longer if recommended by the manufacturer.

If the result of "golden brown" is not reached, the appliance is cooled down completely and two further cycles are made with an appropriate corrected setting.

### **11.2 Browning control setting for sandwiches**

The same procedure of 11.1 is applied, but the toaster is loaded with sandwiches made with two slices of bread filled with one slice of appropriate cheese, having approximately an area equal to one slice of bread and a thickness of approximately 5 mm.

NOTE Processed cheese and other cheese which readily melts on heating (such as sliced cheese with a fat content of 75 % ± 5 % or Emmenthal cheese) are suitable, but care has to be taken that the same cheese of the same batch of production is used for one complete test.

The initial temperature of the cheese has to be 8 °C ± 2 °C.

## 12 Toasting

These tests have to be carried out with minimum and maximum load as indicated in the manufacturer's instructions.

### 12.1 Toasting bread

Starting from "cold", five toasting cycles, with the toaster fully loaded, shall be made, with an interval between each other of 15 s or longer if recommended by the manufacturer, the browning control being set at the position predetermined in clause 11. This setting is kept throughout the five cycles unless instructions for an appropriate correction are given by the manufacturer.

The setting of the browning control and any correction made shall be determined and indicated.

The top edge of each slice shall be marked, and after toasting the slices are arranged in accordance with the position they had in the toaster.

### 12.2 Toasting sandwiches

The same procedure of 12.1 is applied, but the toaster is loaded with sandwiches composed as indicated in 11.2 and with the browning control set at the position predetermined in 12.1.

A fine wire thermocouple is placed in the centre of each sandwich and the temperature reached by the cheese when it starts melting or at the end of each cycle, is measured.

**NOTE** In some cases it may be possible that melting of cheese will not start before the end of the cycle.

In this case the test is stopped when the average brownness of 40 % to 60 % is reached, and only the temperature of the cheese at the end of the cycle is indicated.

### 12.3 Determination of the control setting for the heating of rolls

The test is carried out without simultaneously loading the toaster with slices of bread.

In accordance with the instructions for use the maximum number of rolls of the same type, common in the relevant country, with similar characteristics and dimensions, shall be simultaneously heated up at the browning control setting specified by the manufacturer. In the absence of information, as many rolls are heated up at a time as slices of bread can be toasted at a time; heating is done at the maximum browning control setting. After switching off the toaster, the rolls shall be turned and a renewed heating shall be carried out immediately. Should burning occur on the surface, the toasting control setting shall be reduced accordingly and the test shall be repeated.

Immediately after switching off the toaster, the following has to be assessed:

- if the internal part of the rolls is hot/warm/cold;
- presence of burned areas/spots on the outside of the rolls;

and the results are noted.



### 13 Toasting time

The time for each of the first three toasting cycles and the total time for the three cycles shall be determined and indicated in seconds.

It is recommended that a schedule as shown in annex A be used for the presentation of the results.

### 14 Evenness of browning

#### 14.1 Procedure

It shall be noted if toasting can be carried out continuously. If not, the time needed between cycles shall be noted. The average brownness of all surfaces shall be recorded.

Minor deviations of the average brownness of the surfaces of the toasted slices among each other are negligible for the assessment. Large areas of great browning differences on a surface shall be noted.

The browning of various parts shall be evaluated by means of a colour shade chart according to BS 3999 Part 5C.

#### 14.2 Assessment

The minimum and maximum shade colours for each side of the toast shall be recorded and the percentage of the surface covered by this range noted as indicated, for example, in the following table:

**Table 1**

| Cycle | Side            |                 |
|-------|-----------------|-----------------|
|       | 1               | 2               |
| 1     | 80 %<br>7 – 11  | 80 %<br>7 – 11  |
| 2     | 80 %<br>8 – 11  | 80 %<br>8 – 12  |
| 3     | 85 %<br>8 – 12  | 85 %<br>8 – 12  |
| 4     | 90 %<br>9 – 13  | 90 %<br>9 – 13  |
| 5     | 90 %<br>10 – 14 | 90 %<br>11 – 14 |

NOTE 1 This information can be supported with photographs, if required.

NOTE 2 The numbers in the table refer to toasting degree in the colour shade chart BS 3999 Part 5C.

The results of the evaluations can be expressed with the table in annex A.

Immediately after toasting, the inside of the toasted slices of bread shall be assessed for the following properties:

- soft/medium/hard
- hot/warm/cold

and the results are noted.

## 15 Browning control characteristics

In accordance with clause 11, the average browning of the complete load shall be described for each position of the browning control.

For sandwiches function, the temperature reached by the cheese shall be indicated, and a clear indication is given with reference to the temperature measured when the cheese starts melting.

When testing roll function, the temperature at the top part and at the centre of each roll shall be measured.

The average browning is described as follows:

pale (4 of BS shade chart);

light brown (6 to 8 of BS shade chart);

medium (golden) brown (10 to 12 of shade chart);

dark brown (14 to 16 of shade chart);

burnt (18 of shade chart).

It is recommended that the schedule as shown in annex A be used for the presentation of the results.

## 16 Energy consumption

During the test of clause 12, with the maximum load, the energy consumption for each of the five toasting cycles shall be determined and indicated on the schedule shown in annex A. The average of the readings taken shall be calculated with the following formula:

$$\text{Energy consumption} = \frac{E_1 + E_2 + E_3 + E_4 + E_5}{5} \text{ kWh}$$

where

$E_n$  is the energy consumption during cycle n.

The number of slices used on each cycle has to be noted and reported.

## 17 Temperature of the side surfaces

After the five toasting cycles according to clause 12 are finished, the temperatures of the long-side surfaces of the toaster shall be measured. The measurements are made on the vertical middle line at a point 10 mm below the edge of the upper side.

The measured temperatures have to be stated in the report, together with the indication whether these temperatures were measured on plastic or metal parts.

## 18 Provision for the removal of bread crumbs

It shall be noted if the supporting surface is made dirty during toasting. The recommended method to remove the crumbs from the toaster shall be noted.

## **19 Bread carriage**

The type of bread carriage provided, e.g. lifting device or tilting device, shall be indicated.

It shall be indicated whether the bread slices can be removed before the toasting process has ended, e.g. by hand-releasing of the mechanism.

The amount by which the bread slices project over the frame of the toaster when the bread carriage is in its upper position shall be determined. The value measured is indicated in millimetres.

The effectiveness of the bread carriage damping is checked and it has to be indicated if the bread slices are ejected from toasting chamber when the bread carriage is released, either automatically or by hand.

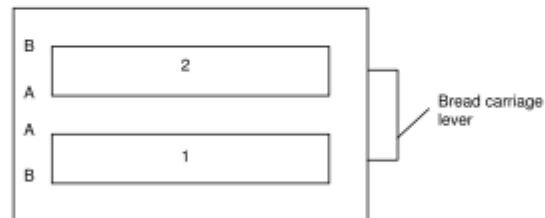
For toasters which toast only one side at a time (e.g. contact toasters), the means provided for turning the toast (e.g. a slideway), if any, shall be determined and indicated.

It has to be stated if a provision is available for the manual interruption of the toasting process, and if the appliance is switched off in case a slice remains locked in the slot.

**Annex A**  
(normative)

**Schedule for the presentation of the toasting results**

| Setting for medium toasting cycle   | Brownness slice |   | Result Evaluation and photo | Toasting time<br>s | Cheese temperature |            | Energy consumption |
|---|-----------------|---|-----------------------------|--------------------|--------------------|------------|--------------------|
|   | 1               | 2 |                             |                    | When melting       | At the end |                    |
| 1   | A               | B | 1 = 2 =                     |                    |                    |            |                    |
| 2   | B               | A |                             |                    |                    |            |                    |
| 3   | A               | B |                             |                    |                    |            |                    |
| 4   | B               | A |                             |                    |                    |            |                    |
| 5   | A               | B |                             |                    |                    |            |                    |
| Settings between minimum and maximum<br>a) minimum<br>b) –<br>c) –<br>d) –<br>e) –<br>f) –<br>g) maximum<br>n positions |                 |   |                             |                    |                    |            |                    |



NOTE This schedule, duly adapted, can be used also for the presentation of the results on toasting sandwiches and contact toasters.

**Annex B**  
(informative)

**Minimum information available at the point of sale**

- Brand name and model number
- Cord length (m)
- Number of standard slices that can be toasted at one time (Clause 8)
- Maximum thickness of bread product that can be toasted
- Additional features, for example, roll heating device (separate or integrated), removable crumb tray, etc.

*Remark:*

This Annex does not supersede the requirements for information according to safety standard IEC 60335-2-9.1)