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## Cookware — Ovenware for use in traditional domestic ovens

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## National foreword

This British Standard is the UK implementation of EN 13834:2020. It supersedes BS EN 13834:2007+A1:2009, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CW/9, Cooking and catering containers.

A list of organizations represented on this committee can be obtained on request to its committee manager.

Attention is drawn to Subclause 6.1.8, which introduces a method for determining thermal shock resistance that differs from the method defined in BS EN 1183:1997, Subclause 6.3. The UK committee considers that the test methods for determining thermal shock and thermal shock endurance contained within BS EN 1183:1997 are the most appropriate to use for evaluating the suitability of brittle materials such as ceramic, glass or glass-ceramics intended for use in ovens or as tableware.

The committee would like to recommend that articles designated by suppliers as 'ovenware', 'oven-proof', 'oven-safe', 'oven to tableware', or any other similar description which suggests that the articles can be safely used in an oven, should when tested in accordance with BS EN 1183:1997, Test Method B, have a thermal shock endurance,  $\Delta T_{50}$ , of not less than 150 °C.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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**Compliance with a British Standard cannot confer immunity from legal obligations.**

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EUROPEAN STANDARD

**EN 13834**

NORME EUROPÉENNE

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September 2020

ICS 97.040.60

Supersedes EN 13834:2007+A1:2009

English Version

**Cookware - Ovenware for use in traditional domestic**Articles culinaires - Articles culinaires à usage  
domestique pour la cuisson au four traditionnelKochgeschirre - Ofengeschirre zur Verwendung in  
Haushalts-Backöfen

This European Standard was approved by CEN on 3 August 2020.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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## European foreword

This document (EN 13834:2020) has been prepared by Technical Committee CEN/TC 194 "Utensils in contact with food", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2021, and conflicting national standards shall be withdrawn at the latest by March 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13834:2007+A1:2009.

The major technical changes in this document compared to EN 13834:2007+A1:2009 concern requirements for handle fatigue resistance (7.4 and Annex B).

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 1 Scope

This document specifies safety and performance requirements for items of ovenware for use in domestic ovens. It is applicable to ovenware regardless of material or method of manufacture.

It is applicable to products intended for use both on top of the stove and in oven.

This document is not applicable to items for single use, throwaway ovenware or ovenware intended for use in a microwave oven only.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1183:1997, *Materials and articles in contact with foodstuffs — Test methods for thermal shock and thermal shock endurance*

EN 12875-1:2005, *Mechanical dishwashing resistance of utensils — Part 1: Reference test method for domestic articles*

EN 14916, *Domestic cookware — Graphical symbols (pictograms)*

EN ISO 2064, *Metallic and other inorganic coatings — Definitions and conventions concerning the measurement of thickness (ISO 2064)*

EN ISO 2360, *Non-conductive coatings on non-magnetic electrically conductive base metals — Measurement of coating thickness — Amplitude-sensitive eddy-current method (ISO 2360)*

EN ISO 2409:2013, *Paints and varnishes — Cross-cut test (ISO 2409:2013)*

EN ISO 28706-2:2017, *Vitreous and porcelain enamels — Determination of resistance to chemical corrosion — Part 2: Determination of resistance to chemical corrosion by boiling acids, boiling neutral liquids, alkaline liquids and/or their vapours (ISO 28706-2:2017)*

ISO 2747, *Vitreous and porcelain enamels — Enamelled cooking utensils — Determination of resistance to thermal shock*

ISO 4532, *Vitreous and porcelain enamels — Determination of the resistance of enamelled articles to impact — Pistol test*

ISO 13805, *Vitreous and porcelain enamels for aluminium — Determination of the adhesion of enamels on aluminium under the action of electrolytic solution (spall test)*

### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

#### 3.1

##### **ovenware**

utensil, in the form of a hollow or flat container, the intended use of which is cooking solid or liquid food

Note 1 to entry: Ovenwares include, but are not restricted to, the follow items:

- gratin and roasting dishes used in the preparation and cooking of vegetable and meat dishes;
- ceramic pots used in the preparation and cooking of meats and/or vegetables;
- bakeware used in the preparation and cooking of various types of dough mixtures (bakeware varies in shape and may include removable parts);
- pate mould used in the preparation and cooking of pates.

#### 3.2

##### **fixing system**

attachment method, or methods, utilized in fastening a handle to the body of an item of ovenware or to fix a knob to a lid where the handle or knob are not an integral part of the body or lid

#### 3.3

##### **furniture**

handles and knobs which are attached to the body or lid of ovenware using a fixing system (3.2) and intended to facilitate the carrying and handling of the utensil in normal use

#### 3.4

##### **removable furniture**

furniture designed to be attached and removed from the body or lid of ovenware without the use of tools

#### 3.5

##### **capacity**

volume of water held when the ovenware is filled to the brim while standing on a level surface

#### 3.6

##### **usable capacity**

two thirds of the capacity

Note 1 to entry: The true usable capacity of the ovenware varies with the food being cooked. The figure given here is an average value intended for use in test situations only and not as information to the consumer.

#### 3.7

##### **coating**

deposit and/or coating applied to a substrate to obtain specific performance properties independent of the properties of the substrate



### 3.8

#### **non-stick coating**

coating applied to the interior of the ovenware claimed to achieve an anti-adherent effect during cooking and to facilitate cleaning

### 3.9

#### **easy to clean coating**

coating applied to the interior of the ovenware claimed to facilitate cleaning

### 3.10

#### **vitreous enamel**

inorganic non-metallic material formed from a mixture of mineral compounds, applied to a metallic substrate and fused at high temperature to form a homogeneous coating

### 3.11

#### **glaze**

substance resulting from the melting or sintering of inorganic constituents and designed to form a surface layer which is fused or is capable of being fused in one or more coats and the firing temperature of which is higher than 500 °C

### 3.12

#### **organic coating**

material formed from a mixture of resins and polymers, applied to a metallic substrate, cured at low temperatures to form a homogeneous coating

### 3.13

#### **tinuing or tin plating**

deposition of a thin coating of tin onto a steel substrate to ensure protection against corrosion

### 3.14

#### **glass**

inorganic non-metallic material produced by the complete fusion of raw materials at a high temperature into a homogeneous liquid which is then cooled to a rigid condition essentially without crystallisation/crystallise

### 3.15

#### **glass-ceramic**

inorganic, non-metallic material produced by the complete fusion of raw materials at high temperatures into a homogeneous liquid which is then cooled to a rigid material and heat treated to achieve mainly sub-microscopic small crystallites

### 3.16

#### **ceramic**

inorganic, non-metallic material produced by firing a mixture of raw materials at high temperature

Note 1 to entry: The firing temperature is high enough to give the necessary strength to the utensil, which is already shaped, but lower than the temperature which is necessary to achieve complete fusion of the mixture.

### 3.17

#### **popping**

distinctive sound made by the application of a load to the apparently flat base of an item of ovenware due to the sudden transformation of the base from convex to concave

### 3.18

#### **flexible bakeware**

utensil, in the form of a hollow or flat container, intended for use in the cooking of food and deformable in any point by manual pressure

## 4 Materials

Ovenware shall be made of materials of a type and purity that, under normal conditions of use, present no toxic hazards nor in any way affect the organoleptic qualities of food prepared in it.

## 5 General conditions for testing

Unless otherwise specified, all measurements shall be carried out at ambient temperature of  $(23 \pm 5)$  °C with unused ovenware.

## 6 Construction

### 6.1 General

#### 6.1.1 Introduction

Requirements 6.1.2, 6.1.3, 6.1.4, 6.1.5, 6.1.6 and 6.1.7 may be verified on the same ovenware.

#### 6.1.2 Stability

The product shall be stable (i.e. shall not tilt), the base shall be in intended contact with the surface (a slide could be accepted), when placed empty without lid on a 5° inclined surface in the least favourable position.

#### 6.1.3 Hygiene

All surfaces intended to come into contact with food shall be easily cleanable under normal circumstances. When a dishwasher is used for cleaning, requirement of EN 12875-1:2005 shall be fulfilled.

#### 6.1.4 Mechanical hazards

All components shall be free from burrs, splinters or sharp edges that could cause injury or discomfort to the user.

#### 6.1.5 Handle position with respect to ovenware

Handles shall be positioned above the centre of gravity of an item of ovenware when filled with sand to its capacity.

#### 6.1.6 Lid design

It shall be possible to remove it from the body using a force equal to the weight of the lid, + 2 N, in any position at ambient temperature. This test shall be carried out both before and after exposing the product, filled to its usable capacity with water, to a temperature 20 °C above the manufacturer's maximum recommended temperature for 1 h and allowing cooling in ambient combinations for 10 min. This test shall also be carried out when the item has cooled to ambient temperature. Where no maximum temperature is recommended, the temperature used shall be 250 °C.

The lid shall remain in place throughout the heating and cooling stages. If the lid is fitted with a locking device, this test shall be carried out with the device disengaged.

### 6.1.7 Lid knob design

It shall be possible to use the knob for its normal purposes while using an oven glove or cloth. In addition, the knob shall remain firmly attached to the lid after exposing it to a temperature 20 °C above the manufacturer's maximum recommended temperature, or 250 °C where no recommendation is given, for 1 h.

### 6.1.8 Thermal shock resistance of brittle materials

All ceramic, glass-ceramic and glass ovenware and their lids shall be tested in accordance with Method B of EN 1183:1997, 6.2. The test shall be carried out on 3 samples at the temperature difference  $\Delta T$  of 180 °C.

Samples which do chip, crack, craze or break are considered as having failed the test.

If the 3 samples pass the test, no additional test is needed. If one fails, 7 additional samples shall be tested with  $\Delta t_{50}$  according to EN 1183:1997.

### 6.1.9 Heat resistance

After testing in accordance with Annex A at a temperature of 20 °C above the manufacturer's recommended maximum temperature, or 250 °C where no maximum temperature is given, for 1 h, the ovenware shall show no damage.

### 6.1.10 Resistance to leakage

The design of ovenware, including those with folded seams and loose bottoms, shall be such that it does not leak when prepared according to the manufacturer's instructions and filled with any preparation which could be expected to be cooked in it.

## 6.2 Geometry

### 6.2.1 General

The points of measurement of any claimed dimensions shall be made clear to the consumer, e.g. by means of a simple sketch.

### 6.2.2 Capacity

If a capacity is claimed, the actual capacity shall not be less than the claimed capacity.

### 6.2.3 Dimensions

Any claimed dimension shall be within  $\pm 5$  mm of the average of two measurements of the actual dimension.

NOTE Ceramic ovenware is exempted from this requirement due to the inherent size variations caused by firing during its manufacture.

## 7 Furniture

### 7.1 General

The requirements of this clause are applicable only to equipment which is attached to the ovenware by means of a fixing system.

It is not the intention that all these tests are passed in sequence. Except where otherwise stated, each test shall stand alone.

## 7.2 Materials

No specific requirements for materials or combinations of materials for the manufacture of ovenware furniture are given in this document but any material used shall comply with the requirements of the appropriate tests.

## 7.3 Heat resistance

All furniture designed to be attached to the main body of a product and the lid knob shall show no damage after completion of the test described in Annex A for 4 cycles of heating to a temperature 20 °C higher than the recommended maximum temperature, or 250 °C where no recommendation is made, for 1 h, and allowing it to cool to ambient temperature.

## 7.4 Fatigue resistance

A handle assembly shall withstand 15 000 cycles, without permanent distortion or permanent loosening of the handle or its fixing system, when tested as described in Annex B. If any loosening of the handle is noticed it is acceptable to retighten as mentioned in the use and care manual. Distortion of less than 5 % of the handle length measured at the end of the handle is ignored unless it affects safety or function.

# 8 Coatings

## 8.1 General

Coatings can be:

- decorative,
- non stick,
- protective, or
- energy related.

## 8.2 Non-stick coatings

### 8.2.1 Cross-cut adhesion test

There shall be no removal of the coating greater than classification 2 when tested in accordance with EN ISO 2409 for hard substrates, with the following modifications:

- a) precondition the test piece by immersing it in continuously boiling water for 15 min, allowing it to cool to ambient temperature and wiping it dry;
- b) repeat EN ISO 2409:2013, Annex A a further 3 times applying the tape at 90° to the previous application each time.

### 8.2.2 Non-stick performance tests

**8.2.2.1** When tested in accordance with Annex C for 5 cycles, any item of bakeware with a non-stick coating shall permit the test food to be fully released and the surface to be wiped clean.

**8.2.2.2** When roasting and gratin dishes are tested in accordance with Annex D for 5 cycles, the test food shall not adhere to the surface and it shall be wiped clean.

**NOTE** The surface is deemed to be clean if unaided visual examination made subsequent to wiping reveals no trace of solid material.

### 8.3 Vitreous enamel on steel and cast iron

#### 8.3.1 Boiling citric acid test

When the interior enamel coat is tested in accordance with EN ISO 28706-2:2017, Clause 11, the maximum acceptable weight loss shall be 5,0 g/m<sup>2</sup> for the liquid phase and 10,0 g/m<sup>2</sup> for the vapour phase.

#### 8.3.2 Boiling water test

When the interior enamel coat is tested in accordance with EN ISO 28706-2:2017, Clause 14, the maximum acceptable weight loss shall be 1,5 g/m<sup>2</sup> for the liquid phase and 4,5 g/m<sup>2</sup> for the vapour.

#### 8.3.3 Thermal shock test

When tested in accordance with ISO 2747, the minimum acceptable failure temperature shall be 250 °C.

#### 8.3.4 Resistance to impact

When tested in accordance with ISO 4532, the exterior enamel shall resist a minimum impact of 20 N, showing no damage greater than 2 mm after 24 h.

### 8.4 Adhesion test for vitreous enamel on aluminium

When tested in accordance with ISO 13805, exposure of the base metal shall not exceed 3 mm from the test edge.

### 8.5 Hard anodized aluminium

#### 8.5.1 Thickness

When measured as specified in EN ISO 2064 and EN ISO 2360, the minimum average thickness of an anodized layer shall be 25 µm.

This check shall be carried out only where the hard anodized coating is not covered by a separate coat of a different material.

#### 8.5.2 Stain resistance

When tested in accordance with Annex E, there shall be no staining visible on any surface intended to come into contact with food.

#### 8.5.3 Alkali resistance

When tested in accordance with Annex F, the measure under F.3.7 shall not differ from that measure under F.3.6 by more than 10 %.

#### 8.5.4 Hardness

Coatings claimed to be hard anodized shall have a hardness greater than 350 HV 0,5 or equivalent.

### 8.6 Organic coatings – Cross-cut adhesion test

There shall be no removal of the coating greater than classification 2 when tested in accordance with EN ISO 2409 for hard substrates, with the following modifications:

- a) precondition the test piece by immersing in continuously boiling water for 15 min, allow it to cool to ambient temperature and wipe it dry;
- b) repeat EN ISO 2409:2013, Annex A a further 3 times applying the tape at 90° to the previous application each time.

## 8.7 Tinning

8.7.1 When tested in accordance with Annex C for 5 cycles, an item of tinned bakeware shall show no trace of oxidation. It is permissible to use a tool (wooden or plastic spatulas) to remove residues to assist examination.

8.7.2 When tested in accordance with Annex D for 5 cycles, tinned roasting and gratin dishes shall show no trace of oxidation.

## 8.8 Easy clean coatings

8.8.1 When tested in accordance with Annex C for 5 cycles, easy clean bakeware shall permit the complete removal of all food residues.

Any hard water staining shall be ignored.

8.8.2 When tested in accordance with Annex D for 5 cycles, easy clean roasting and gratin dishes shall permit the complete removal of all food residues.

Any hard water staining shall be ignored.

## 9 Stability - Deformation test

### 9.1 Central loading

When tested in accordance with Annex G, an item of ovenware shall show no permanent deformation or popping.

This requirement applies to all items of ovenware except those with a hollow central part (e.g. ring mould, kugelhopf mould).

### 9.2 Eccentric loading

When tested in accordance with Annex H, gratin and roasting dishes shall show no permanent deformation or popping.

### 9.3 Tear resistance

When tested in accordance with Annex I, all items of ovenware made of flexible material shall show no fissure or breakage.

## 10 Product Information

### 10.1 Point of sale information

All products or their packaging shall be labelled with the following information so that it is visible at the point of sale:

- a) indication as to the type and size of the product;
- b) name of the manufacturer, importer or retailer and reference of the product;
- c) maximum operating temperature;
- d) pictogram used for traditional domestic ovens in accordance with EN 14916;
- e) non-suitability of the product for use under a grill, if applicable;

- f) information on the coating type.

## 10.2 Care and use instructions

All products shall be accompanied by appropriate care, safety and use instructions including the following:

- a) advice on preparation before first use;
- b) advice on cleaning after use;
- c) general safety advice;
- d) specific advice on the care of non-stick surfaces where appropriate;
- e) special safety instructions and warnings of any hazards inherent in the use of the product;
- f) advice on what to do if the product proves to be unsatisfactory;
- g) advice on care of furniture;
- h) name and contact address of manufacturer, importer or retailer.

**Annex A**  
(normative)

**Test for heat resistance of ovenware and furniture**

**A.1 Apparatus**

**A.1.1** Air circulating oven capable of maintaining the set temperature to within  $\pm 5$  °C.

**A.1.2** Timer, capable of measuring the duration of the test to within  $\pm 1$  min.

**A.2 Procedure**

**A.2.1** Bring the oven to the required temperature.

**A.2.2** Place the item to be tested in the oven.

**A.2.3** Allow the oven to return to the set temperature.

**A.2.4** Start the timer and maintain the oven at the required temperature for the specified time.

**A.2.5** Remove the test item, place on a dry surface and allow to cool to ambient temperature.

**A.2.6** Visually examine the test item (reference distance 250 mm) for any damage. Record findings.



## Annex B (normative)

### Handle fatigue test

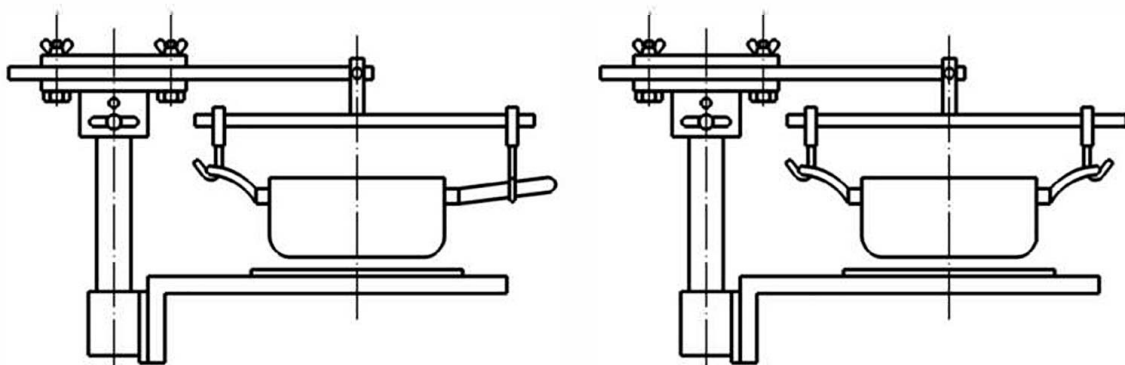
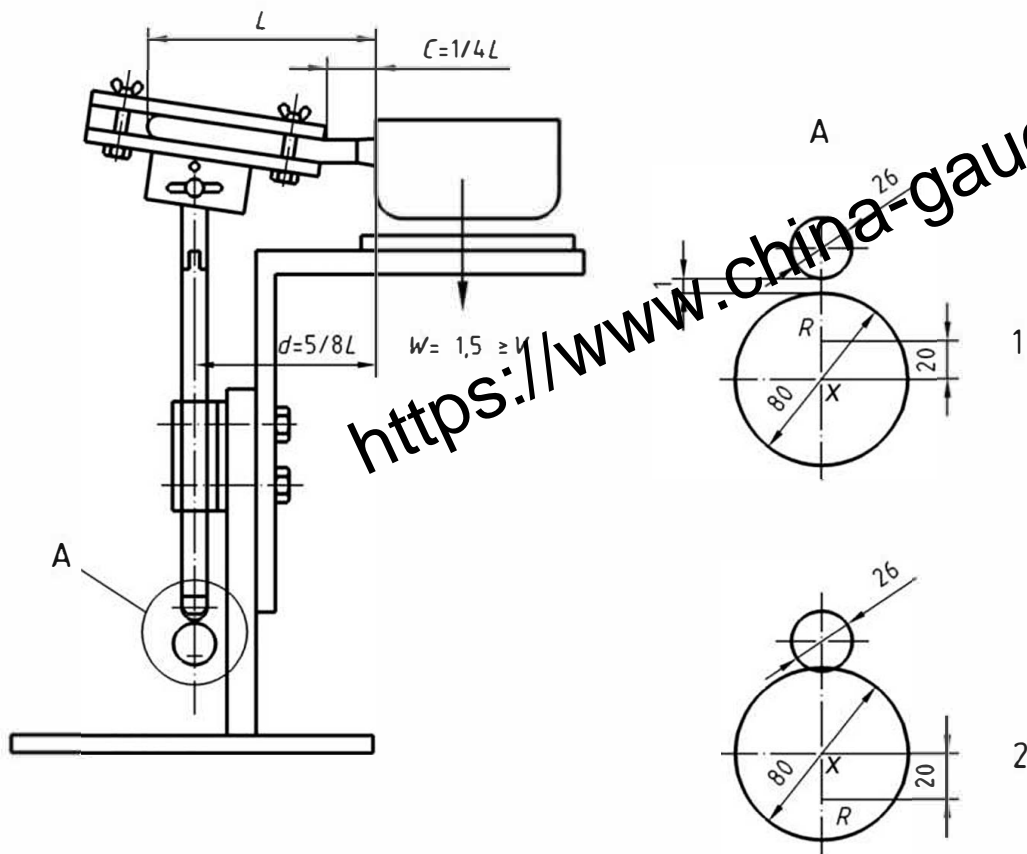
#### B.1 Apparatus

**B.1.1** Means of continuously raising and lowering a loaded item of ovenware, from a level surface covered by a rubber plate (thickness 5 mm; hardness 50 Shore  $\pm$  10 Shore), 25 times per minute by means of its handle.

NOTE The general form of a suitable apparatus is shown in Figure B.1.

**B.1.2** Materials allowing the ovenware to be steadily loaded during the test, for example aluminium oxide, mesh size 46.

Dimensions in millimetres



**Key**

- A circular cam
- 1 circular cam in low position
- 2 circular cam in high position
- $L$  length of the handle (from the outer wall of the utensil to the end of the handle)
- $V$  mass of the volume of water when the utensil is filled up at the capacity of the utensil
- $X$  cam centre
- $R$  rotation centre

**Figure B.1 — Handle fatigue test**

## B.2 Procedure

**B.2.1** Ensure there is a gap of 1 mm at least (from the beginning until the end of the test) between the bottom of the tested pot and the table when the cam is in the highest position.

**B.2.2** Place into the cookware a loading ( $W$ ) equivalent to 1,5 times the mass of water ( $W$ ) at the capacity of the cookware. Run the apparatus for the required number of cycles.

**B.2.3** After which remove the cookware from the apparatus and examine and record any permanent damage to the handle or fixing system.

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**Annex C**  
(normative)

**Non-stick performance test for bakeware – Easy clean performance test for metallic and ceramic bakeware – Corrosion test for tinned bakeware**

**C.1 Procedure**

**C.1.1** Prepare the bakeware by following the manufacturer's instructions or, where none are available, greasing the interior with a thin film of butter.

**C.1.2** Prepare sufficient mixture, which shall be made from the following ingredients:

- 1 egg (ca. 60 g);
- 20 g plain flour;
- 20 g butter;
- 20 g caster sugar;
- 3 g chemical raising.

If more volume is needed, use multiples of this mixture.

**C.1.3** Half fill the bakeware with the mixture or, for flat items, apply approximately 100 g of the mixture directly to the surface.

**C.1.4** Bake in an oven preheated to  $180\text{ °C} \pm 15\text{ °C}$  until the mixture will no longer adhere to a clean smooth stainless steel knife blade.

**C.1.5** Remove the cake from the oven and allow to cool for 5 min.

**C.1.6** Turn out the cake by inverting the bakeware and, if necessary, lightly tapping the base and/or the edge.

**C.1.7** Soak the metallic bakeware or tinned bakeware or the flexible bakeware in water, at  $60\text{ °C} \pm 5\text{ °C}$ , containing domestic washing up liquid for 10 s and wash using a natural sponge. Rinse in hot and then cold water and dry. Examine the surface and note results.

**C.1.8** Soak the ceramic bakeware in water, at  $60\text{ °C} \pm 5\text{ °C}$ , containing domestic washing up liquid for 2 h and wash using a natural sponge. Rinse in hot and then cold water and dry. Examine the surface and note results.

**Annex D**  
(normative)

**Non-stick performance test for roasting and gratin dishes – Easy Clean**  
**performance test for roasting and gratin dishes – Corrosion test for tinned**  
**roasting and gratin dishes**

**D.1 Procedure**

**D.1.1** Place a piece of raw rump steak, free from any visible fat, of area  $200 \text{ cm}^2 \pm 25 \text{ cm}^2$  into the sample. Place in an oven preheated to  $180 \text{ °C} \pm 10 \text{ °C}$  and cook for 1 h.

**D.1.2** Remove the sample from the oven, check and note whether the meat is stuck to the coating or not.

**D.1.3** Remove the meat from the sample and pour out any liquid juices.

**D.1.4** Soak the metallic sample in water, at  $60 \text{ °C}$ , containing domestic washing up liquid for 15 min and wash using a natural sponge. Rinse in hot and then cold water and dry. Examine the surface and note results.

**D.1.5** Soak the ceramic sample in water, at  $60 \text{ °C}$ , containing domestic washing up liquid for 2 h and wash using a natural sponge. Rinse in hot and then cold water and dry. Examine the surface and note results.

**Annex E**  
(normative)

**Resistance to staining of hard anodized coatings**

**E.1 Apparatus**

A means of raising the temperature of the sample and the solution to  $25\text{ °C} \pm 5\text{ °C}$  and maintaining them at that temperature during the test.

**E.2 Reagents**

**E.2.1** A  $(40 \pm 5)\%$  nitric acid ( $\text{HNO}_3$ ) solution, freshly prepared on the day of the test.

**E.2.2** Dye, Aluminium Blue 2LW dye solution prepared by dissolving 1 g in 50 ml distilled water.

**E.3 Procedure**

**E.3.1** Apply a drop of the nitric acid (E.2.1) to the anodized surface and allow to stand for  $(120 \pm 5)$  s.

**E.3.2** Wash the test area thoroughly with running water and blot dry with a clean, dry cloth.

**E.3.3** Apply a drop of the dye solution (E.2.2) to the test area and allow it to remain for  $(300 \pm 10)$  s.

**E.3.4** Wash the test area thoroughly and blot dry with a clean, dry cloth.

**E.3.5** Visually examine the test area to ascertain if the oxide coating has absorbed any of the dye.

**Annex F**  
(normative)

**Resistance to alkali of hard anodized aluminium**

**F.1 Apparatus**

**F.1.1** A means of raising the temperature of the sample and the solution to 35 °C and maintaining them at that temperature during the test.

**F.1.2** Multimeter, or any meter capable of measuring the electrical conductivity between the coating and the substrate, operating at 1 V.

**F.2 Reagents**

**F.2.1** 5 % sodium hydroxide solution, freshly prepared on the day of the test.

**F.2.2** Degreasing agent: any substance which will degrease the test specimen without leaving any residue.

**F.3 Procedure**

**F.3.1** Remove sufficient of the oxide coating to allow contact by the multimeter probe from an area close to the test area (the contact area).

**F.3.2** Clean the test area with the degreasing agent, rinse with de-ionized water and dry.

**F.3.3** Heat the sample and test solution to 35 °C.

**F.3.4** Apply the sodium hydroxide solution to the test area to cover at least a 10 mm diameter spot to a depth greater than 2 mm, allow to sit for 2 min at a temperature of 35 °C.

**F.3.5** Rinse the solution from the test area with deionized water and dry.

**F.3.6** Apply the multimeter probes between the contact area and any point of the surface not under test. Note any current flow.

**F.3.7** Apply the multimeter probes between the test area and the contact area and check if there is a difference in current flow from that found in F.3.6.

**Annex G**  
(normative)

**Central loading test**

**G.1 Apparatus**

**G.1.1** Flat surface.

**G.1.2** Two supports (70 × 70) mm ± 1 mm having sufficient height to support the ovenware.

**G.1.3** Cylinder having a mass equal to the mass of water corresponding to the ovenware capacity, or cylindrical mass equal to 5 g per cm<sup>3</sup> of base area, whichever is the greater.

**G.1.4** For flexible bakeware, in order to connect the end and the generator of the cylinder, a radius of 10 mm is accepted.

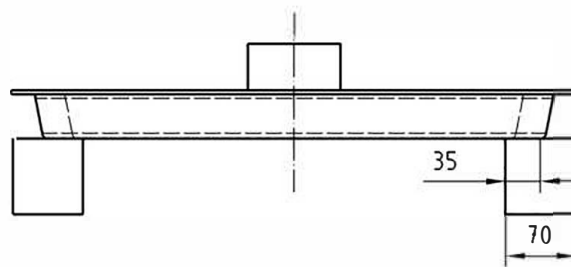
The height of both supports shall be such that during the test, the bakeware is not in contact with the surface on which these supports stand.

**G.2 Procedure**

**G.2.1** Determine the capacity and the base area of the utensil.

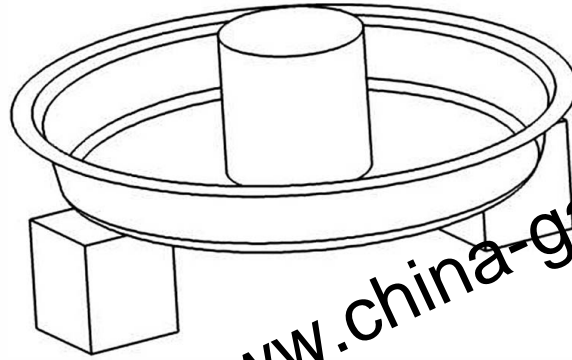
**G.2.2** Position the item of ovenware with the two supports under the normal lifting points (see Figures G.1 to G.4).

Dimensions in millimetres



**Figure G.1 — Cross section**





<https://www.china-gauges.com/>

Figure G.2 — Round ovenware

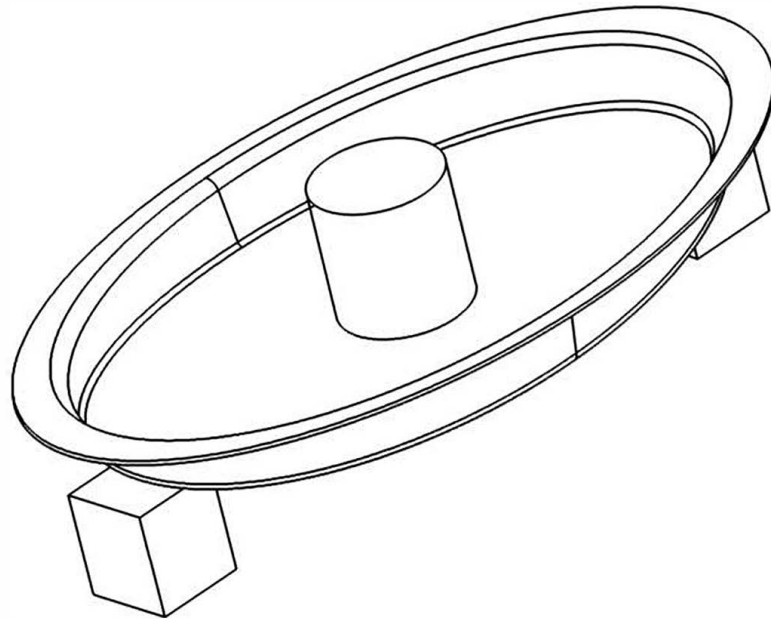


Figure G.3 — Oval ovenware

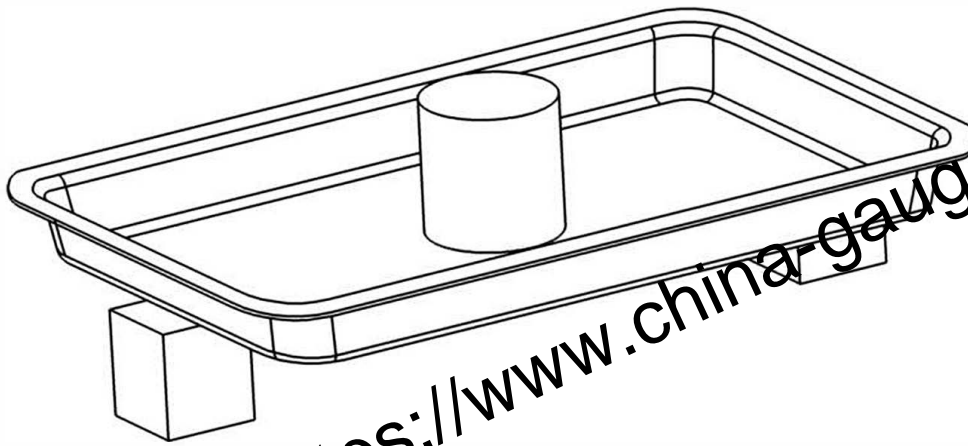


Figure G.4 — Rectangular ovenware

**G.2.3** Place the cylindrical load in the centre of sample without impact (see Figures G.1 to G.4).

**G.2.4** Record any temporary deformation under load and whether any popping occurred.

**G.2.5** Remove the load and record any permanent deformation and whether any popping occurred or in the case of the flexible bakeware whether any tearing occurred.

## Annex H (normative)

### Eccentric loading test

#### H.1 Apparatus

H.1.1 Flat surface.

H.1.2 Two supports (70 × 70) mm ± 1 mm having a sufficient height to support the ovenware.

H.1.3 Two cylinders having masses equal to the mass of water corresponding to the ovenware capacity, or cylindrical masses equal to 5 g per cm<sup>2</sup> of base area, whichever is the greater.

#### H.2 Procedure

H.2.1 Determine the capacity and the base area of the utensil.

H.2.2 Position the item of ovenware with the two supports under diagonally opposite corners, as shown in Figure H.1.

H.2.3 Place the cylindrical loads without impact in the corners along the other diagonal, as shown in Figure H.1 to H.6.

H.2.4 Record any temporary deformation under load and whether any popping occurred.

H.2.5 Remove the load and record any permanent deformation and whether any popping occurred.

Dimensions in millimetres

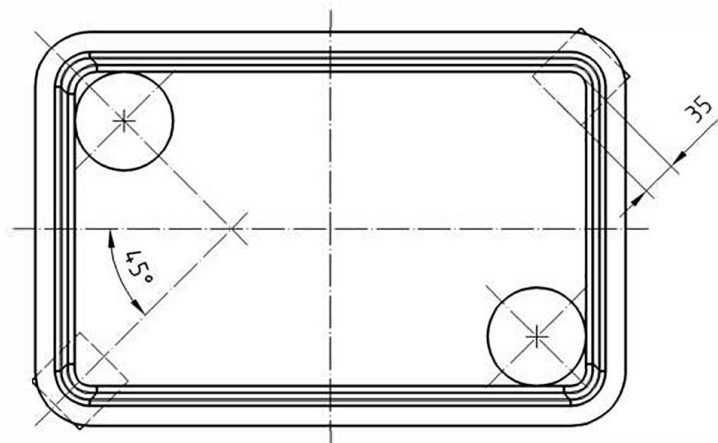


Figure H.1 — Top view, rectangular ovenware



Figure H.2 — Side view, rectangular ovenware

Dimensions in millimetres

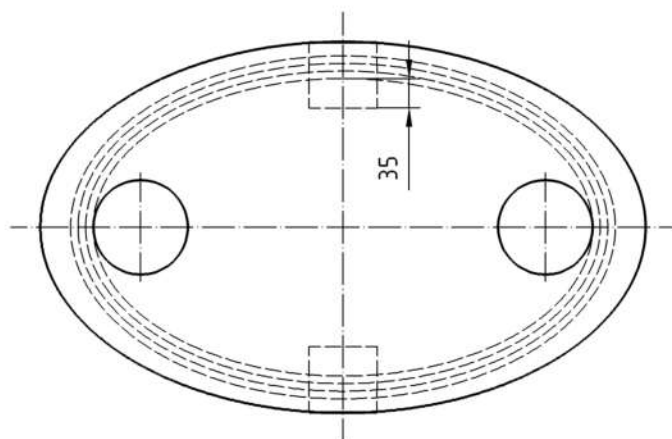


Figure H.3 — Top view, oval ovenware

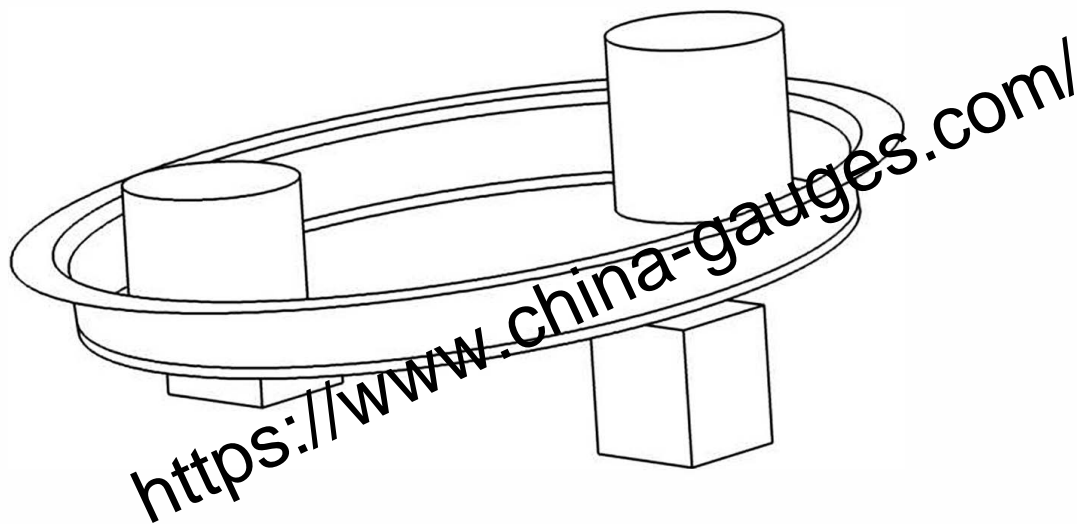


Figure H.4 — Side view, oval ovenware

Dimensions in millimetres

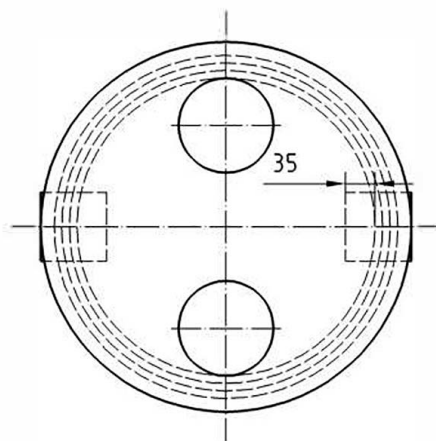


Figure H.5 — Top view, round ovenware



Figure H.6 — Side view, round ovenware

## Annex I (normative)

### Tearing test for flexible ovenware

#### I.1 Apparatus

**I.1.1** Supports, the height of which shall be such that the ovenware is not in contact with the surface on which the supports stand.

**I.1.2** Material to load the test item uniformly during the test, e.g. aluminium oxide, mesh size 46, or sand.

**I.1.3** Oven, capable of holding ovenware and maintaining a constant temperature at least 20 °C above the manufacturer's recommended temperature or, if no maximum temperature is recommended, a temperature of 250 °C.

#### I.2 Procedure

**I.2.1** Determine the usable capacity of the test item (see 3.6).

**I.2.2** Evenly distribute a mass of material (I.1.2) equal to 1,5 times the mass of water required to fill the test item to the usable capacity across the base of the sample.

**I.2.3** Place the test item on the supports (I.1.1) and hold for 30 s.

**I.2.4** Examine the test item and record any tearing or fissure.

**I.2.5** Heat the oven (I.1.3) to a temperature 20 °C above the manufacturer's recommended temperature. Where no maximum temperature is recommended, the temperature used shall be 250 °C. Put the test item in the oven for 1 h.

**I.2.6** Remove the test item from the oven using potholders or an oven glove.

**I.2.7** Place the item on the supports (I.1.1) and hold for 30 s.

**I.2.8** Remove the load.

**I.2.9** Examine the test item and record any tearing or fissure.

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