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**Vitreous and porcelain enamelled  
manufactured articles —  
Determination of resistance to heat**

*Pièces manufacturées recouvertes d'émaux vitrifiés — Détermination  
de la résistance à la chaleur*



Reference number  
ISO 4530:2022(E)

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ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 262, *Metallic and other inorganic coatings*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 4530:1983), which has been technically revised.

The main changes compared to the previous edition are as follows:

- the scope has been expanded to include flue pipes;
- normative references and terms and definitions have been added;
- a clarification has been provided on the test apparatus, procedure and reporting requirements.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Vitreous and porcelain enamelled manufactured articles — Determination of resistance to heat

## 1 Scope

This document specifies the basic conditions concerning the method for determining the resistance of vitreous and porcelain enamelled articles to heat.

The method specified is applicable to vitreous and porcelain enamelled articles that are, in service, subjected to high temperature, for example, to some cooker components, exhaust pipe silencers, gas heating chimneys and flue pipes.

## 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.

ISO 19496-1, *Vitreous and porcelain enamels — Terminology — Part 1: Terms and definitions*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 19496-1 apply.

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

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

## 4 General

The method of test specified shall be completed, for any particular application, using test conditions that shall be the subject of agreement between the interested parties. These test conditions shall confirm:

- a) test temperature;
- b) type of heating (direct and/or radiant);
- c) temperature measuring points;
- d) rate of temperature increase;
- e) duration of maintaining the test temperature;
- f) number of heating and cooling cycles;
- g) the requirements for damage and defects to the vitreous and porcelain enamel coating for the evaluation of the resistance of the vitreous and porcelain enamel coating to heat.

## 5 Principle

Submit an article to a series of single heating and cooling tests in which it is heated to an agreed surface temperature and then, after a period of maintaining this temperature, allow to cool to room temperature. Examine the article for any defects caused by heating.

## 6 Apparatus

**6.1 Heat source**, suitable for direct or radiant heating of the article to the test temperature.

**6.2 Temperature measuring equipment (e.g. pyrometer)** with an accuracy of  $\pm 2$  °C.

**6.3 Stop-watch.**

## 7 Sampling

**7.1** The articles to be tested shall be used as specimens without any modification.

**7.2** The specimens shall be representative of the entire consignment. The method of sampling shall be agreed upon between the interested parties.

## 8 Procedure

**8.1** Heat the specimen either by direct or radiant heat, or both, to the agreed test temperature  $\pm 5$  °C.

**8.2** The agreed test temperature should be 50 °C above the highest temperature which the article encounters in service.

**8.3** The heating of the specimen should be such that the temperature of the vitreous and porcelain enamelled surfaces rises at an agreed rate, which should be representative of the article's normal service conditions, for example, between 30 °C/min and 40 °C/min.

**8.4** Measure the temperature at the measuring points agreed between the interested parties using suitable temperature measuring equipment.

**8.5** As soon as the required test temperature has been attained, maintain the specimen at this constant temperature for the agreed duration. Then remove the heat source and allow the specimen to air cool to ambient temperature. If other specific cooling rates are required, these shall be agreed between the interested parties.

**8.6** The specimen shall be visually examined for damage and defects such as cracking, chipping, flaking or blistering.

**8.7** If no damage or defects are present, repeat the heating and cooling treatment for the number of cycles agreed between the interested parties to confirm the sample achieves the requirement for its resistance to heat.

## 9 Test report

The test report shall include the following information:

a) reference to this document, i.e. ISO 4530:2022;

- b) the description and identification of the specimen tested, and its corresponding article;
- c) method of sampling;
- d) number of specimens tested;
- e) type of heat source used (direct or radiant);
- f) the type of temperature measuring equipment used;
- g) the typical rate of heating used;
- h) the test temperature;
- i) the duration of maintaining test temperature;
- j) the number of heating and cooling cycles applied;
- k) whether damage or defects were present;
- l) a description of damage or defects observed in the vitreous and porcelain enamel coating, if any, and a photograph, if necessary.
- m) any deviations to the test procedure;
- n) any unusual features observed;
- o) the date of the test.

