

विट्रियस एनामेलवेयर  
भाग 2 परीक्षण पद्धतियाँ  
अनुभाग 8 ऊष्मा का प्रतिरोध  
( दूसरा पुनरीक्षण )

**Vitreous Enamelware**  
**Part 2 Test Methods**  
**Section 8 Resistance to Heat**  
( *Second Revision* )

ICS 25.220.50

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## NATIONAL FOREWORD

This Indian Standard (Part 2/Sec 8) (Second Revision), which is identical to ISO 4530 : 2022 'Vitreous and porcelain enamelled manufactured articles — Determination of resistance to heat' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Ceramicware Sectional Committee and approval of the Chemical Division Council.

This standard was first published in 1968. The committee, while reviewing IS 3972 : 1968 decided to publish this standard in two parts. Part 1 deals with production of specimens for testing. Part 2 deals with various test methods applicable to vitreous enamelled sheet steel and vitreous enamelled cast iron. The committee had also decided that Part 2 shall have various sections and each section will deal with a particular test method.

This standard (Part 2/Sec 8) prescribes the basic conditions concerning the method for determining the resistance of vitreous and porcelain enamelled articles to heat. The other sections of Part 2 are as follows:

Sec 2 Low and high voltage test for detection and locating defects

Sec 3 Resistance to boiling acids, boiling liquids, alkaline liquids and their vapours

Sec 4 Resistance to thermal shock

Sec 5 Resistance to hot alkali (sodium hydroxide)

Sec 6 Reflectance and specular gloss

Sec 9 Resistance to dilute sulphuric acid

Sec 11 Resistance to abrasion

Sec 12 Resistance to torsion

Sec 13 Resistance to warpage

Sec 14 Resistance to adherence

Section 1, Section 3 and Section 7 of this standard IS 3972 (Part 2) have been merged and published as IS 3972 (Part 2/ Sec 3).

The first revision of this standard was published in 1990 which aligned the test method for determination of resistance to heat with ISO 4530 : 1983. Now, this revision has been taken up in order to align it with latest version of ISO 4530 : 2022.

The text of ISO standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions and terminologies are, however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear referring to this standard, they should be read as 'Indian Standard'; and
- b) Comma (,) has been used as a decimal marker in the International Standard, while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards do not exist. So the Committee has reviewed the provisions of the following International Standards/documents referred in this adopted standard and has decided that they are acceptable for use in conjunction with this Standard:

*Indian Standard*  
**VITREOUS ENAMELWARE**  
**PART 2 TEST METHODS**  
**SECTION 8 RESISTANCE TO HEAT**  
( *Second Revision* )

## **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.

[\(Continued from second cover\)](#)

*International Standard*

*Title*

ISO 19496-1

Vitreous and porcelain enamels — Terminology — Part 1:  
Terms and definitions

In this adopted standard, reference appears to certain International Standards/documents where the standard atmospheric conditions to be observed are stipulated which are not applicable to tropical/subtropical countries. The applicable standard atmospheric conditions for Indian conditions are  $(27 \pm 2)$  °C and  $(65 \pm 5)$  percent relative humidity and shall be observed while using this standard.

In reporting the result of a test or analysis made in accordance with this standard, if the final value, observed or calculated, is to be rounded off, it shall be done in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'.



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This Indian Standard has been developed from Doc No.: CHD 09 (22746).

### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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