SLOVENSKI STANDARD
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Steklasti in porcelanski emajli - Določanje obstojnosti na vrelo vodo in vodno paro

Vitreous and porcelain enamels -- Determination of resistance to boiling water and water vapour

Émaux vitrifiés -- Détermination de la résistance à l'eau bouillante et à sa vapeur

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ICS:

25.220.50 Emajlne prevleke Enamels

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International Standard 2744

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Vitreous and porcelain enamels — Determination of resistance to boiling water and water vapour

Émaux vitrifiés — Détermination de la résistance à l'eau bouillante et à sa vapeur

Second edition — 1983-10-15

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

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International Standard ISO 2744 was developed by Technical Committee ISO/TC 107, *Metallic and other non-organic coatings.*

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This second edition was submitted directly to the ISO Council, in accordance with sub-clause 6.11.2 of Part 1 of the Directives for the technical work of ISO. It cancels and replaces the first edition (i.e. ISO 2744-1973), which had been approved by the member bodies of the following countries:

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No member body expressed disapproval of the document.

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Vitreous and porcelain enamels — Determination of resistance to boiling water and water vapour

1 Scope and field of application

This International Standard specifies a method of test for determining the resistance of flat surfaces of vitreous and porcelain enamels to boiling water and/or water vapour.

NOTE — If temperatures below the boiling point of water are used or if other than distilled water is used, this should be stated in the test report.

The method allows determination of the resistance of enamels to the liquid and vapour phases of the corrosive medium.

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2 References

ISO 2723, *Vitreous and porcelain enamels for sheet steel — Production of specimens for testing.*

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ISO 2724, *Vitreous and porcelain enamels for cast iron — Production of specimens for testing.*

ISO 2733, *Vitreous and porcelain enamels — Apparatus for testing with acid and neutral liquids and their vapours.*

ISO 4788, *Laboratory glassware — Graduated measuring cylinders.*

3 Principle

Each set of similarly enamelled specimens is exposed to attack by boiling distilled or demineralized water for 48 h (2 days) or 336 h (14 days), the specimens being placed in the liquid chamber and in the vapour chamber of the testing apparatus as required.

The loss in mass is determined and the corrosion speed calculated therefrom.

The lower the corrosion speed, the higher is the resistance of the vitreous and porcelain enamel to boiling water or water vapour.

4 Reagents

4.1 Distilled or demineralized water.

A fresh supply of the water is required for each test.

4.2 Acetic acid, 5 % (*m*/*m*) solution, for cleaning test apparatus and specimens.

4.3 Grease solvent, such as trichloroethene or acetone, suitable for cleaning the specimens when necessary.

5 Apparatus

5.1 Testing apparatus and **packing B or C,** both in accordance with ISO 2733.

5.2 Hot-air oven, capable of maintaining a temperature of at least 130 °C.

5.3 Desiccator, for example with an internal diameter of 200 mm.

5.4 Graduated measuring cylinder, capacity 500 ml, complying with the requirements of ISO 4788.

5.5 Beakers.

5.6 Balance, accurate to 0,2 mg.

5.7 Sponge, soft.

6 Test specimens

6.1 The specimens to be used shall be prepared in accordance with the International Standards for the appropriate basis metal. Specimens not enamelled on both sides shall be used only for the short test period (48 h).

NOTE — Specimens for testing vitreous and porcelain enamels

- for sheet steel, see ISO 2723;
- for cast iron, see ISO 2724.

6.2 Each specimen shall be rinsed with the water (4.1). If necessary a suitable grease solvent (4.3) shall be used. Then the specimen shall be dried for 2 h in the hot-air oven (5.2) at 110 ± 5 °C, cooled for at least 2 h in the desiccator (5.3) and weighed to the nearest 0,2 mg (starting mass).

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7 Procedure

7.1 Carry out duplicate determinations.

7.2 Fix the specimens in the testing apparatus (5.1) so that the cover coat sides of the specimens are facing the interior of the cylinder.

Screw down the three wing nuts evenly to make the testing apparatus watertight.

7.3 Run 450 ml of the water (4.1) into the socket for the reflux condenser (return flow cooler), replace the latter and switch on the heater.

As soon as the water begins to boil (two to four bubbles per second), lower the current by the rheostat control so that the water simmers during the remainder of the test.

Record the temperature during the simmering.

7.4 The simmering time shall be 48 h (2 days). If the loss in mass of a specimen after this time is less than 5 mg, carry out the test with new specimens and a simmering time of 336 h (14 days).

If the test is confined exclusively or mainly to attack by one phase only (liquid or vapour) this determines the testing time (2 or 14 days respectively).

7.5 After simmering for 48 h (or 336 h), empty the cylinder and, after cooling, rinse with the water (4.1).

Take the specimens from the testing apparatus and wipe them three times with the sponge (5.7) steeped in the acetic acid (4.2) at room temperature, then rinse with water.

After carefully removing any packing residues from the edges of the specimens, dry them for 2 h in the hot-air oven (5.2) at 110 ± 5 °C. After a further 2 h in the desiccator (5.3) weigh them again to the nearest 0,2 mg (final mass).

8 Expression of results

8.1 The area exposed to the attack of water or water vapour is assumed to be 50 cm^2. If the loss in mass Δm (starting mass − final mass) is stated in milligrams, for a testing time of 48 h (2 days) the corrosion speed $v_{K(2)}$, expressed in grams per square metre per day, is given by the equation

$$v_{K(2)} = \frac{\Delta m}{10} = 0{,}1\ \Delta m \qquad \ldots (1)$$

For a testing time of 336 h (14 days) the corrosion speed $v_{K(14)}$, expressed in grams per square metre per day, is given by the equation

$$v_{K(14)} = \frac{\Delta m}{70} = 0{,}014\ 28\ \Delta m \qquad \ldots (2)$$

For the evaluation, the results of the specimens which show defects such as pinholes down to the metal, chipped edges or edge corrosion, are omitted. The corresponding number of new specimens shall be tested.

8.2 The results obtained for the specimens placed in the liquid chamber and in the vapour chamber of the testing apparatus are calculated separately. Since the determination consists of two parallel tests, two values are given for the attack in the liquid phase and two for the vapour phase, which are then averaged.

The difference between the minimum and maximum individual values of the corrosion speed shall be less than 30 %; the 30 % are calculated from the arithmetic mean of the individual values. If not, a further test shall be carried out, the results of which shall be taken into account in calculating a new arithmetic mean.

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9 Test report

The test report shall include the following particulars:

a) a reference to this International Standard;

b) the identification of the vitreous and porcelain enamel tested;

c) the testing temperature, in degrees Celsius;

d) the simmering time, in days;

e) the corrosion speed $v_{K(2)}$ or $v_{K(14)}$ in grams per square metre per day, rounded to the nearest 0,01 g/(m^2·d), separated according to vapour and liquid phases, giving the arithmetic means and the number of single values.