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International Standard 8291

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Vitreous and porcelain enamels — Method of test of self-cleaning properties

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Foreword

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International Standard ISO 8291 was prepared by Technical Committee ISO/TC 107, *Metallic and other non-organic coatings.*

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INTERNATIONAL STANDARD ISO 8291-1986 (E)

Vitreous and porcelain enamels — Method of test of self-cleaning properties

0 Introduction

0.1 The combustion of oil or fat coming into contact with the enamelled walls of self-cleaning roasting and baking devices is an oxidation process. The porosity of the wall, resulting in a larger total surface area of the coating, enables the oil or fat to spread out into a thin film and facilitates the action of oxygen.

As combustion at 250 °C cannot be complete, non-oxidizable combustion residues build up in the pores during operation, resulting in the formation of a visible glossy coating. The test method specified in this International Standard is more severe than this process as a testing oil is applied directly to the cold coating and the quantity of the oil on the surface is greater than that seen in practical use.

0.2 Household refined soya oil serves as the testing oil. The composition of commercial grades of this oil is well defined. The freshly prepared soya oil may be supplied by the producer.

0.3 The test method specified in this International Standard can serve only as a comparative method, for the following reasons:

a) the combustion process is dependent on the draught conditions in the oven — these vary from oven to oven;

b) soya oil which is old or of different composition may give different results;

c) the assessment of the gloss is subjective — the surface roughness of self-cleaning vitreous and porcelain enamels and the patchiness of the gloss do not allow objective measurement.

0.4 It is recommended that specifications should contain the following statement:

> **To evaluate the self-cleaning properties of the test specimen, the number of cleaning cycles carried out shall be compared to the number of cycles carried out on the reference specimen. If the difference is not more than 1 cycle, the test specimen and the reference specimen shall be considered to have the same self-cleaning properties.**

1 Scope and field of application

This International Standard specifies a method of test for the determination of the self-cleaning properties of vitreous and porcelain enamelled walls of roasting devices, grills and baking devices; self-cleaning consists in the capacity first to absorb oil or fat in droplet form, and then to volatilize the greater part of the fat or oil by the sequential processes of distillation, decomposition, and combustion (referred to collectively as "combustion" in the following text).

This International Standard is not applicable to pyrolytically cleaning vitreous and porcelain enamels.

2 References

ISO 648, *Laboratory glassware — One-mark pipettes.*

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

3 Definition

For the purpose of this International Standard, the following definition applies.

continuously self-cleaning enamel finish: Porous enamel finish which absorbs splashes of fat given off during roasting or baking, and simultaneously allows the fat to burn without subsequent increase in temperature.

4 Principle

Dropping of defined amounts of soya oil on to specified areas on vitreous and porcelain enamelled test specimens, and combustion by heating at 250 ± 10 °C for 1 h, followed by cooling to ambient temperature. Repetition of this cycle until a visible gloss appears as a result of the accumulation of non-combustible residues. Comparison, as a means of assessment, of the number of cycles carried out on the test specimen with the number of cycles carried out on a reference specimen until the gloss appears.

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5 Testing oil

Refined soya oil, household quality.

Ensure that the oil is not more than 3 months old.

When not in use, store the oil in a closed container at a temperature between 5 and 7 °C.

6 Apparatus

6.1 Muffle furnace, ventilated (for example a hot air oven or baking oven) and capable of being maintained at 250 ± 10 °C.

6.2 Grille, which can be placed in the muffle furnace (6.1) at a height of at least 30 mm.

6.3 Instrument for producing soya oil drops with a mass of 20 to 25 mg (for example a one-mark pipette of nominal capacity 5 ml in accordance with ISO 648, a burette or an injection syringe).

6.4 Template, with five holes each of diameter 15 mm, a mark at one corner (see the figure) and four feet at the corners to act as spacing supports.

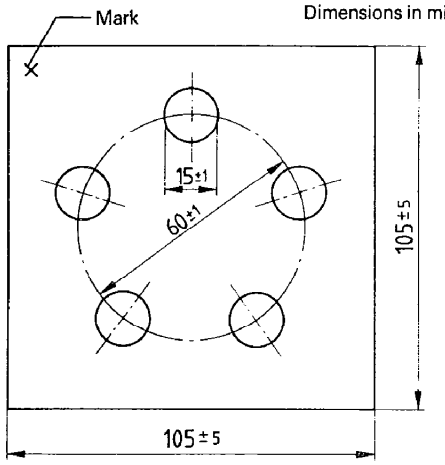

Figure — Template

7 Test specimens and reference specimen

7.1 Test specimens

The test specimens are parts of vitreous and porcelain enamelled articles, and shall be taken in accordance with ISO 2723. The number of test specimens shall be agreed between the interested parties.

7.2 Reference specimen

A specimen with a self-cleaning vitreous and porcelain enamel specially prepared in accordance with ISO 2723 is used as a reference specimen. The production of the reference specimen shall be agreed between the interested parties. The reference specimen may be used only for one test.

7.3 Coating thicknesses

Measure the coating thicknesses of both the test specimen (7.1) and the reference specimen (7.2). When this International Standard is applied for quality control, the coating thicknesses of the test specimen and the reference specimen shall not differ by more than 20 µm.

NOTE — The coating thickness of self-cleaning vitreous and porcelain enamels is at least 150 µm.

7.4 Marking

Mark test specimens and reference specimens to ensure reproducible positioning of the template (6.4).

NOTE — If it is not possible to cut flat specimens from the vitreous and porcelain enamelled articles to be tested, the positions for the drops may be marked by other appropriate means.

8 Procedure

8.1 Lay the template (6.4) on the cold test specimen parallel to the edges, by superimposing the mark on the template on the mark on the specimen.

Fill the pipette or other instrument (6.3) to the mark with soya oil (clause 5) at 23 ± 2 °C and clean the outside with a filter paper. Allow a drop of soya oil of mass about 20 to 25 mg to fall on to the test specimen through each of the five holes of the template from a height of 20 mm. In the same way apply five drops of soya oil to the cold reference specimen.

Then simultaneously place the test specimen and reference specimen closely together on the grille (6.2) in the muffle furnace (6.1) so that both specimens are exposed to the same thermal and atmospheric conditions. Expose the specimens to a temperature of 250 ± 10 °C for 1 h.

After removal from the muffle furnace (6.1), leave the specimens to cool in air to ambient temperature of 18 to 28 °C (first cycle).

8.2 Repeat the test (8.1) with the reference specimen and the test specimen until a surface gloss can be observed on at least three of the five areas exposed by the holes in the template. Record the number of cycles at which this occurs separately for the reference specimen and the test specimen.

9 Test report

The test report shall contain the following information:

a) a reference to this International Standard;

b) the type of test specimen, including the coating thickness of the vitreous or porcelain enamel;

c) the type of reference specimen, including the coating thickness of the vitreous or porcelain enamel;

d) the number of specimens tested;

e) the number of cycles carried out with each test specimen;

f) the number of cycles carried out with each reference specimen.

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