International Standard 8289

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Vitreous and porcelain enamels — Low voltage test for detecting and locating defects

Émaux vitrifiés — Essai à basse tension de détection et de localisation des défauts

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Foreword

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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. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8289 was prepared by Technical Committee ISO/TC 107, *Metallic and other non-organic coatings.*

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Vitreous and porcelain enamels — Low voltage test for detecting and locating defects

1 Scope and field of application

This International Standard specifies a method of test for detecting and locating defects which extend down to the basis metal, in vitreous and porcelain enamelled articles, using a low voltage.

NOTE — The low voltage test is not intended as an alternative to the high voltage test specified in ISO 2746, but is a non-destructive test method for detecting defects (see clause 3).

2 References

ISO 2746, *Vitreous and porcelain enamels — Enamelled articles for service under highly corrosive conditions — High voltage test.*

IEC 86-2, *Primary batteries — Part 2: Specification sheets.*

3 Definition

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

defects: Pores, tears, cracks or spalls, which penetrate to the basis metal.

NOTE — In certain areas the defects may be unavoidably caused during the production of the article, for example burning tool marks.

4 Principle

Testing is carried out with low voltage, contact being made with the defect by means of an electrolyte (conductive fluid). Readings indicating the presence of a defect may be made with an electrical measuring instrument or acoustically with headphones. Additionally, the defects may be made visible by colour effects.

5 Test fluid

Dissolve 3 ± 0,5 g of sodium chloride in 100 ml of tap water and add two drops of a liquid dishwashing detergent.

If the defects are to be made visible by means of a colour effect, add about 1 ml of 0,5 % (m/m) phenolphthalein ethanolic solution.

6 Apparatus

6.1 Power source

6.1.1 Testing with direct current

Use a 9 V battery device, capable of being adjusted in the range 0 to 9 V. A transistor radio battery 6 F 100 complying with the requirements of IEC 86-2 with a voltage divider is suitable.

6.1.2 Testing with alternating current

An alternating voltage which can be continuously adjusted between 0 V and the maximum value (about 5 V).

NOTE — The signal frequency superimposed on the alternating voltage lies within the audio range (for example between 600 and 900 Hz).

6.2 Test electrode

The test electrode consists of a sponge made of plastic, cellulose or similar material, soaked with the test fluid (clause 5). Its size will depend on the desired accuracy of location. It is conductively connected, via a metal lead, to the positive pole of the apparatus.

For quick testing (coarse scanning) of large enamelled surfaces, test electrodes with an area up to 100 cm^2 are suitable. For the accurate location of defects, test electrodes with an area of a maximum of 1 cm^2 are required.

NOTE — A large test electrode suitable for quick testing may also be used for locating defects, possibly using an increased sensitivity, if the enamelled surface is only touched by a corner of the test electrode.

6.3 Means of indicating the defects

If direct current is used, the current flow through the defects may be detected by means of a short-circuit-proof micro-ammeter.

If alternating current is used, the current flowing through the defects may be detected as an acoustic signal by means of headphones. The intensity (sound level) of the signal depends on the magnitude of the current flowing through the defects.

Other methods of indication may also be used.

7 Test specimens

The test specimens may be commercial items or parts thereof.

No special preparation of the specimens is required.

8 Procedure

Connect the electrically conductive basis metal of the article to be tested to one pole (negative in the case of direct current) of the power source (6.1).

Connect the test electrode (sponge) (6.2) to the other pole (positive in the case of direct current) of the power source (6.1). Soak the test electrode (6.2) in the test fluid (clause 5) until it is dripping wet and move it over the enamel surface at a speed not exceeding 0,2 m/s.

Start the test using a middle voltage. Defects permit a current to flow, the magnitude of which depends on the area of the defect and the distance between the defect and the test electrode. Increase the voltage if no reading is obtained.

Vary the test voltage in order to adjust the sensitivity of the test, so that when measuring with direct current, the pointer of the microammeter swings within the indicated range and when measuring with alternating current, the sound level is acceptable. (See the notes.)

If it is intended to make the defects visible, ensure that a pool of the test fluid (clause 5) remains on the area under test or that the test specimen is dipped into the test fluid (clause 5). When testing with direct current (6.1.1), an intense red colour will develop in the test fluid in the vicinity of the defects after about 3 to 15 s.

NOTES

1 It is emphasized that it is not the magnitude of the reading that is of interest but its change due to the change in position of the test electrode.

2 Testing with alternating current (6.1.2), in addition to being more sensitive, enables the person carrying out the test to concentrate more fully on the article to be tested. Where there are numerous defects within the wetted testing area, an interfering signal will be obtained over the whole area. However, the intensity (sound level) depends to a large extent on the distance of the test electrode from the neighbouring defect. It is therefore possible to locate defects which are not very far (10 mm and more) from large areas of defects (for example at a rim).

9 Test report

The test report shall include the following information:

a) a reference to this International Standard;

b) identification of the article tested;

c) the number and positions of defects;

d) the description of the defects, where appropriate.