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

**Part 1:
Swab test for non-profiled surfaces**

*Émaux vitrifiés — Essai à basse tension pour la détection et la
localisation des défauts —*

Partie 1: Essai avec tampon pour les surfaces non profilées

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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).

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).

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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.

This document was prepared by 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, including for corrosion protection and corrosion testing of metals and alloys*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This first edition cancels and replaces ISO 8289:2000, which has been technically revised.

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.

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

Part 1: Swab test for non-profiled surfaces

1 Scope

This document specifies two low voltage tests for detecting and locating defects that extend to the basis metal in vitreous and porcelain enamel coatings.

Method A (electrical) is applicable to the rapid detection and determination of the general location of defects. Method B (optical), based on colour effects, is applicable to the more precise detection of defects and their exact locations. Both methods are commonly applied to flat surfaces. For more intricate shapes, such as undulated and/or corrugated surfaces, ISO 8289-2 is applicable.

NOTE 1 Selection of the correct test method is critical to distinguish the areas of increased conductivity detected by method B from actual pores that extend to the basis metal, which can be detected by both methods.

NOTE 2 The low voltage test is a non-destructive method of detecting defects and, therefore, is completely different from the high voltage test specified in ISO 2746. The results of the high and low voltage tests are not comparable and will differ.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1

defect

pore, crack or spall that penetrates or extends to the basis metal

Note 1 to entry: In certain areas, defects can be unavoidable, being caused during the production of the article, e.g. burnishing tool marks.

4 Principle

Defects are detected by an electrical or electroacoustical method (method A) or an optical one (method B) based on colour effects. Testing is carried out at a low voltage, contact being made with the defect by means of a conductive solution.

5 Test reagent

Dissolve 3,0 g \pm 0,1 g sodium nitrite (NaNO_2) 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 colour effects (method B), add 4 ml of phenolphthalein ethanolic solution having a mass fraction of 0,5 % phenolphthalein.

WARNING — Care should be taken when using the sodium nitrite and phenolphthalein solution.

Instead of sodium nitrite, other water-soluble salts may be used provided that the article is not re-enamelled after testing. The salt solution shall be used in such an amount that the alternative test reagent has a conductivity of 35 mS \pm 3 mS and a pH value of 7,5 \pm 1.

6 Apparatus

6.1 Method A

6.1.1 Power source.

The power source for method A shall consist of a 9 V battery device with an accuracy of ± 1 V. For example, a transistor battery, 6 F 100, as specified in IEC 60086-2, is suitable.

6.1.2 Test electrode.

The test electrode for method A consists of a sponge made of plastic, cellulose or similar material. For rough scanning of large enamelled surfaces, test electrodes with an area of not greater than 100 cm² shall be used. Any defects that are detected shall then be more precisely located using a test electrode with an area of about 1 cm² or by using an edge or corner of the larger electrode.

6.1.3 Measuring instrument.

A sensitive microammeter or an electronic circuit that produces an acoustical signal that indicates when the electrical resistance of the vitreous enamel drops below 90 k Ω \pm 9 k Ω shall be used to detect and locate defects in the coating.

6.2 Method B

6.2.1 Power source.

The power source for method B shall consist of a source of direct voltage (DC voltage), 24 V \pm 4 V. Alternatively, a voltage divider, or three transistor radio batteries, 6 F 100, as specified in IEC 60086-2, connected in series may be employed.

6.2.2 Test electrode.

Wet paper, for example, kitchen tissue, with an area of at least 500 cm², shall be used as the test electrode for method B.

7 Test specimen

The test specimen may be a commercial item, a part thereof or a sample plate especially prepared for this test. In any case, the test specimen shall have an uncovered (not enamelled) area of metal for contact with the negative electrode.