



NSAI
Standards

Irish Standard
I.S. EN ISO 2746:2015

Vitreous and porcelain enamels - High voltage test (ISO/FDIS 2746:2015)

I.S. EN ISO 2746:2015

Incorporating amendments/corrigenda/National Annexes issued since publication:

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This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):

NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.

This document is based on:

EN ISO 2746:2015

Published:

2015-10-14

This document was published under the authority of the NSAI and comes into effect on:

2015-11-02

ICS number:

25.220.50

NOTE: If blank see CEN/CENELEC cover page

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National Foreword

I.S. EN ISO 2746:2015 is the adopted Irish version of the European Document EN ISO 2746:2015, Vitreous and porcelain enamels - High voltage test (ISO/FDIS 2746:2015)

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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In line with international standards practice the decimal point is shown as a comma (,) throughout this document.

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EUROPEAN STANDARD

EN ISO 2746

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2015

ICS 25.220.50

Supersedes EN 14430:2004

English Version

Vitreous and porcelain enamels - High voltage test (ISO 2746:2015)

Emaux vitrifiés - Essai sous haute tension (ISO 2746:2015)

Emails und Emailierungen - Hochspannungsprüfung (ISO 2746:2015)

This European Standard was approved by CEN on 29 August 2015.

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European foreword

This document (EN ISO 2746:2015) has been prepared by Technical Committee ISO/TC 107 "Metallic and other inorganic coatings" in collaboration with Technical Committee CEN/TC 262 "Metallic and other inorganic coatings" the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2016, and conflicting national standards shall be withdrawn at the latest by April 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

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Endorsement notice

The text of ISO 2746:2015 has been approved by CEN as EN ISO 2746:2015 without any modification.

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**INTERNATIONAL
STANDARD**

**ISO
2746**

Third edition
2015-10-01

**Vitreous and porcelain enamels —
High voltage test**

Émaux vitrifiés — Essai sous haute tension



Reference number
ISO 2746:2015(E)

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ISO 2746:2015(E)



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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).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

ISO 2746 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 262, *Metallic and other inorganic coatings*, in collaboration with Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 2746:1998) which has been technically revised. This edition has also been adopted as a European standard, which supersedes EN 14430:2004.

Introduction

There are two different objectives for high voltage testing of vitreous and porcelain enamels.

Test A is used to detect and locate defects, which extend down to the metal base (e.g. open pores). This is a non-destructive test usually applied to thin enamel coatings. The test serves to monitor either that the parts produced are free from defects at the chosen test voltage, or to count the number of existing defects, e.g. to determine the defect density (defects/m²) of enamelled architecture panels.

Test B is used to detect and locate defects, which extend down to the metal base (e.g. open pores) and to detect weak spots. This is a destructive test, i.e. the test can generate open pores with an electric discharge through weak spots in the enamel coating. This test is usually applied to thick enamel coatings and serves:

- a) to verify that an enamel coating is safe to be used under highly corrosive conditions, e.g. to test the enamel coating of vessels used in the chemical industry, or
- b) to verify that the enamel coating is safe to be used as a dielectric.

Test A and test B require the same test equipment (see [Clause 5](#)) and follow the same test procedure (see [Clause 8](#)). However, for test B the applied voltage is higher than in test A (see [Clause 7](#)).

Vitreous and porcelain enamels — High voltage test

WARNING — This International Standard may not be compliant with some countries' health and safety legislations and calls for the use of substances and/or procedures that may be injurious to health if adequate safety measures are not taken. This International Standard does not address any health hazards, safety or environmental matters and legislations associated with its use. It is the responsibility of the user of this International Standard to establish appropriate health, safety and environmentally acceptable practices and take suitable actions to comply with any national and international regulations. Compliance with this International Standard does not of itself confer immunity from legal obligations.

1 Scope

This International Standard describes two test methods of high voltage testing:

- Test A is used to detect and locate defects in vitreous and porcelain enamels;
- Test B is used to detect and locate defects and weak spots in vitreous and porcelain enamels.

The tests are performed using DC or pulsed DC high voltage.

The tests are applicable to dry surfaces of enamel coatings. In the case of moist surfaces, care should be taken to ensure that the locating of any defects is correctly performed.

Since test voltages depend on the coating thickness, the test method, especially with test A, may not be suitable for test specimens for which the coating thickness varies to a large extent.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 2178, *Non-magnetic coatings on magnetic substrates — Measurement of coating thickness — Magnetic method*

ISO 2360, *Non-conductive coatings on non-magnetic electrically conductive basis materials — Measurement of coating thickness — Amplitude-sensitive eddy-current method*

IEC/TS 60479-1, *Effects of current on human beings and livestock — Part 1: General aspects*

IEC/TS 60479-2, *Effects of current on human beings and livestock — Part 2: Special aspects*

3 Terms and definitions

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

3.1

defect

area of an enamel layer where an open path connects the enamel surface with the metal basis

Note 1 to entry: Examples of defects are cracks or pores.

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3.2

weak spot

area of an enamel layer where the dielectric strength falls below the required value, as determined by the application of high voltage because of blisters, foreign body inclusions, spalling or cracks

4 Principle

A high voltage electrode is passed over the enamel surface. Defects (Test A) or defects and weak spots (Test B) are indicated by a spark and a simultaneous optical and/or acoustic signal. The applied voltage can be DC or pulsed DC. The test voltage might be different in each case.

At distances smaller than 2 cm of the edges/borders of the enamelled parts, an electrical arc can occur between the test electrode and edges/borders with no or only a limited enamel coating thickness. The high voltage technique may, therefore, not be applicable to such border areas.

5 Apparatus

5.1 High voltage generator.

5.1.1 Direct-current (DC)-voltage generator, conforming to the requirements of IEC/TS 60479-1, able to deliver a DC-voltage corresponding to the testing voltage, adjustable and measurable at the test probe with limiting deviation +5 %/-10 %. The total internal resistance shall be high enough to give the short circuit current of the generator an arithmetical mean from 2 mA to 3 mA maximum. The peak value of the current during a spark discharge shall be between 10 mA and 50 mA and the amount of charge per impulse shall be 25 μC maximum.

The negative pole of the generator shall be earthed (USA: grounded) and the positive pole shall be connected to the test electrode by a screened high voltage cable of suitable length.

5.1.2 Pulsed DC-voltage generator, conforming to the requirements of IEC/TS 60479-2 able to deliver a DC-voltage corresponding to the testing voltage. The voltage shall be adjustable and measurable at the test probe with limiting deviations +20 %/-10 % for test voltage greater than 10 kV and limiting deviations +40 %/-10 % for test voltages less than 10 kV.

5.2 Test electrode, made out of metal wire or conductive rubber that is unaffected by a spark discharge.

NOTE Alternative test electrodes can be used providing they are unaffected by a spark discharge.

5.2.1 Insulated hand-piece, provided externally with an earthed cover for DC-voltage and pulsed DC-voltage devices. Pulsed DC-voltage generators can produce an electric shock to users because of capacitive coupling between cable and hand-piece during operation.

5.2.2 Brush holder, of metal wire (used for the test brush), constructed such that it is completely unaffected by the spark discharge and covers as large an area as possible when sweeping the enamel surface.

5.3 Indicator device, able to give a clear optical and/or acoustic signal at each spark discharge.

5.4 Coating thickness measurement device, such as that described in ISO 2178 or ISO 2360.

6 Specimens

The specimens can be commercial items, parts thereof or test pieces which have been subjected to the same processing, and which for testing purposes are representative of the commercial item.

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