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Paints and varnishes — Determination of resistance to liquids

Peintures et vernis — Détermination de la résistance aux liquides

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (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 set up 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.

International Standard ISO 2812 was drawn up by Technical Committee ISO/TC 35, *Paints and varnishes*, and circulated to the Member Bodies in May 1972.

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It has been approved by the Member Bodies of the following countries :

ISO 2812:1974

Austria	Iran	South Africa, Rep. of
Canada	Ireland	Sweden
Chile	Israel	Switzerland
Czechoslovakia	Netherlands	Thailand
Egypt, Arab Rep. of	New Zealand	Turkey
France	Poland	United Kingdom
Germany	Portugal	U.S.A.
India	Romania	U.S.S.R.

No Member Body expressed disapproval of the document.

Paints and varnishes — Determination of resistance to liquids

0 INTRODUCTION

This International Standard is one of a series dealing with the sampling and testing of paints, varnishes and related products. It should be read in conjunction with ISO 1512, *Paints and varnishes — Sampling*, ISO 1513, *Paints and varnishes — Examination and preparation of samples for testing*, ISO 1514, *Paints and varnishes — Standard panels for testing* and ISO 2808, *Paints and varnishes — Determination of film thickness*.

The method of test specified requires to be completed for any particular application by the following supplementary information. This information shall be derived from the national standard or other document for the product under test or, where appropriate, shall be the subject of agreement between the interested parties.

- 1) Nature of substrate.
- 2) Method of application of test coating and details of edge sealing of test panels and protection of the back surface (if required).
- 3) Thickness, in micrometres, of the dry coating including method of measurement and whether it is a single coating or a multicoat system.
- 4) Duration and conditions of drying of coated test piece before testing (or conditions of stoving and ageing, if applicable).
- 5) Full details of the immersion liquid or liquids to be used for the test.
- 6) The method of test to be used (see 1.1) together with full details such as duration of test and the test temperature (if this is different from the normal 23 ± 2 °C). If Method 1 is to be used, the information supplied shall include depth of immersion, whether rods or panels are to be used, any aeration, agitation or circulation required, and whether the original volume or concentration is to be maintained. If Method 2 is to be used, the information supplied shall include details of the compressed paper-board and whether replacement of the discs is necessary. If Method 3 is to be used, the information shall include whether or not the test area is to be covered.
- 7) When and how inspection of the test coating is to be carried out, including details of recovery period if applicable, and, where required, the method of removing the coating from the substrate.

8) What characteristics of the test coating and substrate are to be considered in evaluating the resistance properties of the coating.

1 SCOPE AND FIELD OF APPLICATION

1.1 This International Standard specifies general methods for determining the resistance of single-coat paint films, paint systems or allied products to the action of liquids.

Three methods of test are specified and the method to be used depends on the particular requirements of the test material.

Thus Method 1 is intended for more resistant coatings, requiring longer periods of exposure than those which may be tested by Methods 2 or 3.

1.2 The methods enable the effect of the test liquid on the coating and, where necessary, deterioration of the substrate to be assessed.

2 SAMPLING

A representative sample of the product to be tested (or of each product in the case of a multicoat system) shall be taken as specified in ISO 1512. The sample shall then be examined and prepared for testing as specified in ISO 1513.

3 TEST PIECES

3.1 Material

3.1.1 Panels

The test panels shall be of the specified material and where steel, tinplate, aluminium or glass is specified, they shall comply with the requirements of ISO 1514. Unless otherwise specified, the test panels shall be 150 mm X 100 mm. 150 mm X 100 mm.

3.1.2 Rods (for Method 1 only)

One end of each rod shall be rounded to approximately the radius of the rod itself. Unless otherwise specified, the rods shall be of steel or aluminium. Suitable dimensions for the rods are 150 mm X 15 mm diameter.

NOTE — For Method 1, the use of rods is preferred to eliminate edge effects.

3.2 Preparation and coating

3.2.1 Panels

The test panels shall be prepared as specified and, where appropriate, in accordance with ISO 1514, and shall then be coated by the specified method with the product or system under test.

For Method 1, it is normally preferable to paint both faces of the panel and to protect the edges. It will be necessary to specify whether the back of the panel is to be coated with a suitable protective paint or whether both sides of the panel are to be coated with the product or system under test.

If specified, the edges of the test panel, after coating with the product or system under test, shall be sealed by a suitable means.

3.2.2 Rods

The rods shall be prepared as specified, and coated by the specified method with the product or system under test.

3.2.3 Drying the test pieces

The coated test pieces shall be dried (or stoved and aged) for the specified time and, unless otherwise agreed, shall be conditioned at a temperature of 23 ± 2 °C and a relative humidity of 50 ± 5 % for a minimum of 16 h. The appropriate test procedure shall then be carried out as soon as possible.

3.3 Thickness of coating

The thickness, in micrometres, of the dry coating shall be determined by the method specified, using one of the methods given in ISO 2808.

4 TEST PROCEDURE – METHOD 1 (immersion method)

4.1 Materials required

Test liquid as specified.

4.2 Temperature of test

The test shall be carried out at a temperature of 23 ± 2 °C unless otherwise specified.

4.3 Precautions to be taken

It is preferable to immerse the test pieces individually in the test liquid, particularly when using liquids of high electrical conductivity in which electrolytic effects could be of some importance. In certain cases, however, it may be more convenient to immerse several test pieces in a single tank; in these cases, the nature of the test pieces shall be identical and every precaution shall be taken to ensure that the test liquid is unaffected by the test pieces.

The test pieces shall be at least 30 mm from the sides of the tank and if several pieces are immersed in the same tank they shall be at least 30 mm apart. The test pieces shall be electrically insulated from their supports.

4.4 Procedure A using a single-phase liquid

4.4.1 Place a sufficient amount of the liquid in a suitable vessel to completely or partially immerse the test piece (rod or panel) as specified. Immerse the test piece in an approximately vertical position using suitable supports if necessary.

4.4.2 Cover the container for the duration of the test to minimize loss of liquid by evaporation or splashing.

4.4.3 If specified, aerate, agitate or circulate the liquid. Aeration shall be carried out by means of a slow stream of air free from oil and grease. If specified, make good any liquid losses by the addition of the test liquid or distilled water at suitable intervals in order to maintain the original volume or concentration.

4.4.4 At the end of the specified immersion period, wash the test piece thoroughly in running water if an aqueous test solution has been used or with a solvent known to be non-injurious to the coating if a non-aqueous test liquid has been used. Remove any residual liquid from the surface by dabbing with a suitable absorbent paper or cloth, and examine the test piece immediately for any signs of deterioration of the coating, if necessary comparing with an identically prepared, but un-immersed, test piece. Examination and comparison shall be repeated after a recovery period if so specified.

4.4.5 If it is required to examine the substrate for signs of attack, remove the coating by the specified method.

4.5 Procedure B using a two-phase liquid

4.5.1 Insert the coated test piece into a suitable vessel so that it rests by means of suitable supports in an approximately vertical position and, in the case of panels, with the 100 mm side horizontal.

4.5.2 Prepare each of the test liquids by saturating it with the other liquid immediately before use.

4.5.3 Carefully pour the liquid of higher density down the side of the vessel until the test piece (rod or panel) is immersed to a depth of 75 mm, unless otherwise specified.

NOTE – Care must be taken not to contaminate the test piece above this level.

4.5.4 Add the second liquid in the same manner until the test piece is immersed to a further depth of 75 mm, unless otherwise specified. Cover the vessel and allow to stand, without agitation.

4.5.5 At the end of the specified immersion period remove the test piece from the test liquids, remove any test liquid from the surface by dabbing with a suitable absorbent paper or cloth, and examine the test piece immediately for any signs of deterioration of the coating in contact with each liquid phase, comparing it if necessary with an identically prepared, but un-immersed, test piece. Examination and comparison shall be repeated after a recovery period if so specified.

NOTE — Specimens must not be removed for intermediate examination without subsequent cleaning and repetition of the immersion procedure (see 4.5.1, 4.5.2 and 4.5.3).

4.5.6 If it is required to examine the substrate for signs of attack, remove the coating by the specified method.

5 TEST PROCEDURE — METHOD 2 (using an absorbent medium)

5.1 Materials required

5.1.1 Discs of absorbent material, not affected by the test liquid (the type of material shall be agreed), approximately 25 mm in diameter. For most purposes, compressed paper-board 1,25 mm thick will be suitable.

5.1.2 Test liquid, as specified.

5.1.3 Watch-glasses of suitable size.

5.2 Temperature of test

The test shall be carried out at a temperature of 23 ± 2 °C unless otherwise specified.

5.3 Procedure

Dip the appropriate number of absorbent discs in the test liquid and allow the excess liquid to drain. Place the discs on the test panel, ensuring that they are evenly distributed and at least 12 mm from the edge of the panel. Cover the discs individually with watch-glasses of approximately 40 mm diameter and of such a curvature that they do not touch the discs. Note by a suitable method the position of each disc. Leave the panel undisturbed in an atmosphere free from draughts for the period of test (this period shall not exceed 7 days for this test), except that in the case of volatile liquids it may be necessary to replace the discs with further saturated ones (if so, this shall be recorded in the test report).

After the specified period, remove the discs and wash the panel thoroughly in running water if an aqueous test solution has been used, or with a solvent known to be non-injurious to the coating if a non-aqueous test liquid has been used. Remove any residual liquid from the surface by dabbing with a suitable absorbent paper or cloth, and examine the panel immediately for any signs of deterioration of the coating. Examination and comparison shall be repeated after a recovery period if so specified.

If it is required to examine the substrate for signs of attack, remove the coating by the specified method.

6 TEST PROCEDURE — METHOD 3 (spotting method)

6.1 Materials required

Test liquid, as specified.

6.2 Temperature of test

The test shall be carried out at a temperature of 23 ± 2 °C, unless otherwise specified.

6.3 Procedure

Place the test panel in a horizontal position and apply to the coating an appropriate number of drops of the test liquid, each approximately 0,1 ml in volume. The centres of the drops shall be at least 20 mm apart and at least 12 mm from the edge of the panel.

Leave the panel undisturbed for the specified time, with free access to air, at a temperature of 23 ± 2 °C, unless otherwise stated. If specified, a suitable means of covering the test area shall be used to prevent excessive evaporation.

At the end of the specified period, wash the panel thoroughly in running water if an aqueous test liquid has been used or with a solvent known to be non-injurious to the coating if a non-aqueous liquid has been used, and immediately examine the panel for any signs of deterioration of the coating.

If it is required to examine the substrate for signs of attack, remove the coating by the specified method.

7 TEST REPORT

The test report shall include the following particulars :

- a) a reference to this International Standard or to a corresponding national standard;
- b) type and identification of the product under test;
- c) the items of supplementary information referred to in the Introduction to this International Standard;
- d) the national standard or other document supplying the information referred to in c) above;
- e) any deviation, by agreement or otherwise, from the test procedure specified, including whether the discs have been replaced when Method 2 has been used;
- f) the result of the test in terms of the stated requirements;
- g) date of the test.