INTERNATIONAL STANDARD

ISO 9117-5

First edition
2012-08-15

Paints and varnishes — Drying tests —

Part 5: Modified Bandow-Wolff test

Peintures et vernis — Essais de séchage —

Partie 5: Essai Bandow-Wolff modifié

Reference number
ISO 9117-5:2012(E)

COPYRIGHT PROTECTED DOCUMENT

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 9117-5 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

ISO 9117 consists of the following parts, under the general title *Paints and varnishes — Drying tests*:

— *Part 1: Determination of through-dry state and through-dry time*

— *Part 2: Pressure test for stackability*

— *Part 3: Surface-drying test using ballotini*

— *Part 4: Test using a mechanical recorder*

— *Part 5: Modified Bandow-Wolff test*

— *Part 6: Print-free test*

Introduction

With regard to drying stages 2 to 7 (see Table 1) defined in this part of ISO 9117, it should be noted that the drying of different coats applied to the same substrate does not proceed uniformly. The processes which take place during film formation in the case of physical drying or oxidative/reaction-controlled drying are so different that a clear distinction between grades is not possible. Therefore, when testing using this part of ISO 9117, it is possible that, within the range covered by drying stages 4 to 7, a higher drying stage might be reached before a lower drying stage. For this reason, a difference of one drying stage within this range does not necessarily mean a specific difference in drying speed. Elasto-plastic coatings might never reach drying stages 5 to 7. If the surface is tacky, it is also possible that the high drying stages will not be reached, although the surface appears completely dry. Generally, the visible changes involved in drying stages 4 and 6 (see Table 1) can be evaluated more exactly on glossy surfaces than on matt or structured surfaces.

The test described in this part of ISO 9117 should therefore be seen as a technological tool with relatively limited usefulness. The test (if used in connection with other test procedures) should, however, ensure that the interested parties can agree on a measure for the performance characteristic referred to as “drying speed”.

Paints and varnishes — Drying tests —

Part 5: Modified Bandow-Wolff test

1 Scope

This part of ISO 9117 specifies a method for determining whether coatings, including those produced using multi-coat systems, have reached various stages of drying (see Table 1). Furthermore, it allows the drying speed to be assessed.

In the case of plastic coatings, it is only possible to determine to a limited extent whether drying stages 4 to 7 have been reached, as the elasto-plastic behaviour of these coatings cannot be evaluated on the basis of a temporary visible change in the coating surface.

2 Normative references

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

ISO 1513, *Paints and varnishes — Examination and preparation of test samples*

ISO 1514, *Paints and varnishes — Standard panels for testing*

ISO 2808, *Paints and varnishes — Determination of film thickness*

ISO 3270, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing*

ISO 9117-3, *Paints and varnishes — Drying tests — Surface-drying test using ballotini*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

3 Apparatus

3.1 Small transparent glass spheres (ballotini), as specified in ISO 9117-3.

3.2 Brush, soft-haired.

3.3 Paper discs, diameter 26 mm, made of commercial typing paper with a mass per unit area of 60 g/m^2 to 80 g/m^2.

3.4 Rubber discs, diameter (22 ± 1) mm, thickness (5,0 ± 0,5) mm, hardness (50 ± 5) IRHD[1)].

3.5 Weights, of 20 g, 200 g, 2 kg and 20 kg.

3.6 Stopwatch.

1) International rubber hardness degrees (see ISO 48).

4 Sampling

Take a representative sample of the product to be tested (or of each product in the case of a multi-coat system), in accordance with ISO 15528.

Examine and prepare each sample for testing, in accordance with ISO 1513.

5 Test panels

5.1 Substrate

Use standard test panels as specified in ISO 1514, made of steel, 150 mm long, 95 mm wide and 0,5 mm to 2 mm thick, as the substrate for the test coating.

5.2 Preparation and coating

Prepare each test panel in accordance with ISO 1514 and then coat it by the specified method with the product or system under test. For cleaning, metal brushes are not allowed.

5.3 Thickness of coating

Determine the wet-film thickness, in micrometres, of the coating, near to those positions on the test panel at which the drying stage reached by the coating is to be determined, by one of the methods specified in ISO 2808.

6 Procedure

6.1 Test conditions

Carry out the procedure in triplicate at (23 ± 2) °C and ambient relative humidity, unless otherwise agreed (see also ISO 3270).

6.2 General

In cases when nominal drying-time values are available, determine whether a particular drying stage has been reached after the respective drying time. To determine the drying time required to reach an agreed drying stage, carry out determinations at selected intervals.

6.3 Test for drying stage 1

Perform the test specified in ISO 9117-3.

Pour approximately 0,5 g of ballotini (3.1) on to the surface of the coating from a height of not less than 50 mm and not more than 150 mm.

NOTE It is convenient to pour the ballotini down a glass tube of appropriate length and with an internal diameter of approximately 25 mm, in order to avoid excess scattering of the ballotini and thus enable further tests to be made, if necessary, in other areas of the same panel.

After 10 s, hold the panel at an angle of 20° to the horizontal and brush the coating lightly with a soft-haired brush (3.2).

Examine the surface of the coating, using normal corrected vision. Drying stage 1 has been reached if all the ballotini can be brushed off without damage to the surface (see Table 1).

6.4 Test for drying stage 2

Place a paper disc (3.3) and, on top of that, a rubber disc (3.4) on the test panel. Then place a weight (20 g) centrally on the rubber disc. After 60 s, remove the weight and rubber disc. Drop the test panel vertically from a height of approximately 30 mm on to a wooden support approximately 20 mm thick with a flat horizontal surface (e.g. a table top). If the paper disc drops off, drying stage 2 (see Table 1) has been reached.

6.5 Test for drying stages 3 to 7

Carry out the test as specified in 6.4, but using the following loads:

— for drying stage 3, use a 200 g load;

— for drying stages 4 and 5, use a 2 kg load;

— for drying stages 6 and 7, use a 20 kg load.

Determine whether the coating fulfils the requirements for the respective drying stage, as given in Table 1.

Table 1 — Drying-stage characteristics

Drying stage	Type of test	Test result
1	Pouring ballotini on to surface of coating	The ballotini can be brushed away easily and completely with a soft brush.
2	Load with 20 g	The paper does not stick to the coating.
3	Load with 200 g	The paper does not stick to the coating.
4	Load with 2 kg	The paper does not stick to the coating. In the area acted on by the load, the coating surface shows visible changes.
5	Load with 2 kg	The paper does not stick to the coating. In the area acted on by the load, the coating surface shows no visible changes.
6	Load with 20 kg	The paper does not stick to the coating. In the area acted on by the load, the coating surface shows visible changes.
7	Load with 20 kg	The paper does not stick to the coating. In the area acted on by the load, the coating surface shows no visible changes.

7 Precision

No precision data are currently available.

8 Test report

The test report shall include the following information:

a) all details necessary to identify the product under test;

b) a reference to this part of ISO 9117 (ISO 9117-5);

c) details of the preparation of the test panels, including

   1) the thickness and surface preparation of the substrate (see 5.1 and 5.2),

2) the method of application of the test coating to the substrate, including the duration and conditions of drying between coats in the case of a multi-coat system (see 5.2),

3) the wet-film thickness, in micrometres, of the coating and the method of measurement in ISO 2808 used (see 5.3);

d) the result of each of the three determinations in terms of the drying stages, as defined in Table 1, together with the respective drying times;

e) any deviation, by agreement or otherwise, from the test procedure specified;

f) any unusual features (anomalies) observed during the test;

g) the date of the test.

Bibliography

[1] ISO 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD)*

ICS 87.040

Price based on 5 pages