

International Standard



6860

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Paints and varnishes — Bend test (conical mandrel)

Peintures et vernis — Essai de pliage (mandrin conique)

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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 developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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 6860 was developed by Technical Committee ISO/TC 35, *Paints and varnishes*, and was circulated to the member bodies in October 1982.

It has been approved by the member bodies of the following countries:

Australia	Iran	Romania
Belgium	Iraq	South Africa, Rep. of
Brazil	Israel	Sri Lanka
Bulgaria	Italy	Sweden
Czechoslovakia	Jamaica	Switzerland
Egypt, Arab Rep. of	Kenya	Thailand
France	Mexico	United Kingdom
Germany, F.R.	Netherlands	USSR
Hungary	Norway	
India	Poland	

The member body of the following country expressed disapproval of the document on technical grounds:

Canada

Paints and varnishes — Bend test (conical mandrel)

0 Introduction

This International Standard is one of a series of standards dealing with the sampling and testing of paints, varnishes and related products.

This International Standard is one of four documents (see also ISO 1519, ISO 1520, and ISO/TR 6272) which specify empirical test procedures for assessing the resistance of coatings of paints, varnishes and related products to cracking and/or detachment from the substrate under different conditions of deformation.

For any particular application, the method of test described in this International Standard needs, to be completed by the following supplementary information. This information should be derived, in part or totally, from the (inter)national standard or other document related to the product under test or, if appropriate, should be agreed between the interested parties.

- a) Material, thickness and surface preparation of the substrate (see 5.1).
- b) Method of application of the test coating to the substrate.
- c) Duration and conditions of drying of the coat (or conditions of stoving and ageing, if applicable) before testing.
- d) Thickness, in micrometres, of the dry coating and method of measurement, in accordance with ISO 2808, and whether it is a single coating or a multi-coat system.
- e) Temperature and humidity for the test, if different from those specified in 5.3 and 6.1 (see also ISO 3270).

1 Scope and field of application

1.1 This International Standard describes an empirical test procedure for assessing the resistance of a coating of paint, varnish or related product to cracking and/or detachment from a metal substrate when subjected to bending around a conical mandrel under standard conditions.

1.2 For a multi-coat system, each coat may be tested separately or the complete system may be tested.

2 References

- 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.*
- ISO 1519, *Paints and varnishes — Bend test (cylindrical mandrel).*
- ISO 1520, *Paints and varnishes — Cupping test.*
- ISO 2808, *Paints and varnishes — Determination of film thickness.*¹⁾
- ISO 3270, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing.*
- ISO/TR 6272, *Paints and varnishes — Falling weight test.*

¹⁾ At present at the stage of draft. (Revision of ISO 2808-1974.)

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3 Apparatus

A suitable apparatus is shown in figure 1.

The mandrel of the test assembly shall be in the form of a truncated cone, such that its small diameter (d_0) is 3,2 mm and its large diameter, (d_1) is 38 mm, over a length (h) of 203 mm (see figure 2).

The mandrel is mounted horizontally on a base plate. An operating lever with draw bar is provided for bending the test panel around the mandrel. The assembly is also fitted with a device for clamping the test panel.

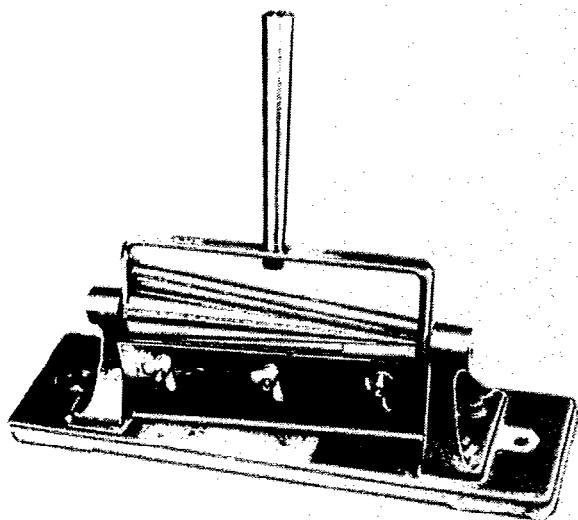


Figure 1 — Conical mandrel test apparatus

4 Sampling

Take a representative sample of the product to be tested (or of each product in the case of a multi-coat system) as specified in ISO 1512.

Examine and prepare the sample for testing as specified in ISO 1513.

5 Test panels

5.1 Material and dimensions

Unless otherwise specified or agreed, the test panels shall comply with the requirements of ISO 1514 and shall be of burnished steel, burnished tinplate or soft aluminium.

The test panels shall be plane and free from distortion and the surface shall be free from any visible ridges or cracks.

The test panels shall be rectangular with sides approximately 100 mm × 180 mm and shall have a maximum thickness of 0,8 mm. The test panels may be cut to size after coating and drying, provided no distortion occurs. In the case of aluminium panels, the longer side shall be parallel to the longitudinal direction of metallurgical rolling.

5.2 Preparation and coating

Unless otherwise specified, prepare three test panels in accordance with ISO 1514. Coat the panels by the specified method with the product or system under test. If the product under test is applied by brushing, any brush marks shall be parallel to the shorter side of the panel.

5.3 Drying and conditioning

Dry (or stove and age) each coated test panel for the specified time. Then condition the coated panels at 23 ± 2 °C and a relative humidity of 50 ± 5 % for a minimum period of 16 h. Carry out the test procedure as soon as possible.

5.4 Thickness of coating

Determine the thickness, in micrometres, of the dry coating using one of the procedures described in ISO 2808.

6 Procedure

Carry out the determinations in triplicate.

6.1 Test conditions

Carry out the test at 23 ± 2 °C and a relative humidity of 50 ± 5 %, unless otherwise specified [see 0 e].

Avoid warming or undue handling of the test panel.

6.2 Bending procedure

Make incisions in the coating through to the substrate, parallel to the short edges of the panel at distances of 20 mm.

Insert the panel with the coated side towards the draw bar and in such a position that one short edge touches the small end of the mandrel. Clamp the panel and, using the draw bar, bend the panel evenly and without jerking over the mandrel through 180° in a period of 2 to 3 s.

NOTE — A sheet of paper may be inserted over the coated surface between the panel and the draw bar to prevent the coating being damaged by the drawbar during the bending operation.

Mark the end of the crack that is farthest from the small end of the mandrel and then release the test panel.

6.3 Examination of the test panel

Immediately examine the coating for cracking and/or detachment from the substrate, either visually or, by agreement, with a lens of X 10 magnification.

Measure the length of the extent of cracking along the panel from the small end of the mandrel, in centimetres.

Calculate the mean of the three determinations and report the result to the nearest centimetre.

7 Test report

The test report shall contain at least the following information:

- a) the type and identification of the product tested;
- b) a reference to this International Standard (ISO 6860);
- c) the items of supplementary information referred to in the Introduction to this International Standard;
- d) a reference to the (inter)national standard or other document supplying the information referred to in c) above;
- e) the result of the test and whether the examination was carried out visually or with a lens;
- f) any deviation, by agreement or otherwise, from the procedure specified;
- g) the date of the test.

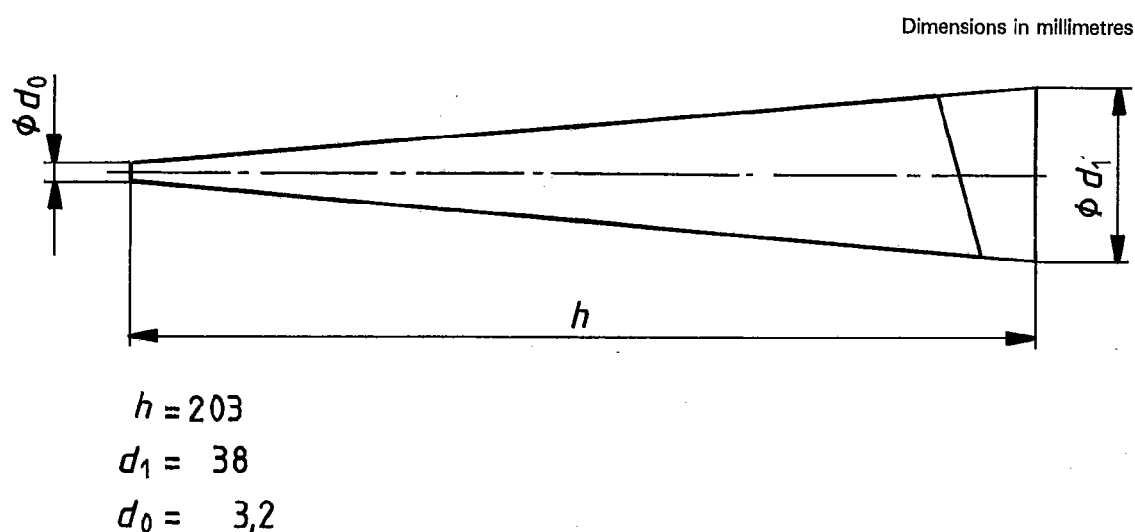


Figure 2 — Cone with bent test panel