
**Paints and varnishes — Bend test
(cylindrical mandrel)**

Peintures et vernis — Essai de pliage sur mandrin cylindrique

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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.ch
Web www.iso.ch

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 1519 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

This second edition cancels and replaces the first edition (ISO 1519:1973), which has been technically revised.

Annex A forms a normative part of this International Standard.

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Introduction

This International Standard is one of five standards 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.

The other four documents are:

- ISO 1520, *Paints and varnishes — Cupping test*
- ISO 6272-1, *Paints and varnishes — Rapid-deformation tests — Part 1: Falling-weight test, large area*
- ISO 6272-2, *Paints and varnishes — Rapid-deformation tests — Part 2: Falling-weight test, small area*
- ISO 6860, *Paints and varnishes — Bend test (conical mandrel)*

The method chosen will depend on the property to be measured and on agreement between the interested parties. In principle, all these tests differ from each other technically and in their accuracy.

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Paints and varnishes — Bend test (cylindrical mandrel)

1 Scope

This International Standard specifies 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 or plastic substrate when subjected to bending round a cylindrical mandrel under standard conditions.

For a multicoat system, each coat may be tested separately or the complete system may be tested.

The method specified may be carried out

- either as a “go/no go” test, by carrying out the test with a single specified size of mandrel, to assess compliance with a particular requirement;
- or by repeating the procedure using successively smaller mandrels to determine the diameter of the first mandrel over which the coating cracks and/or becomes detached from the substrate.

Two types of apparatus are specified, type 1 being appropriate for use on test panels of thickness up to 0,3 mm, and type 2 for use on test panels of thickness up to 1,0 mm. Both types of apparatus have been found to give similar results with the same coating, but normally only one will be used for testing a given product.

2 Normative references

[ISO 1519:2002](https://standards.iteh.ai/catalog/standards/sist/a5d56612-0006-4573-a300-98d1123f0e05/iso-1519-2002)

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The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 1513:1992, *Paints and varnishes — Examination and preparation of samples for testing*

ISO 1514:—¹⁾, *Paints and varnishes — Standard panels for testing*

ISO 2808:1997, *Paints and varnishes — Determination of film thickness*

ISO 3270:1984, *Paints and varnishes and their raw materials — Temperatures and humidities for conditioning and testing*

ISO 15528:2000, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

3 Required supplementary information

For any particular application, the test method specified in ISO 1519 needs to be completed by supplementary information.

The items of supplementary information are given in annex A.

1) To be published. (Revision of ISO 1514:1993)

4 Apparatus

4.1 Bend test apparatus

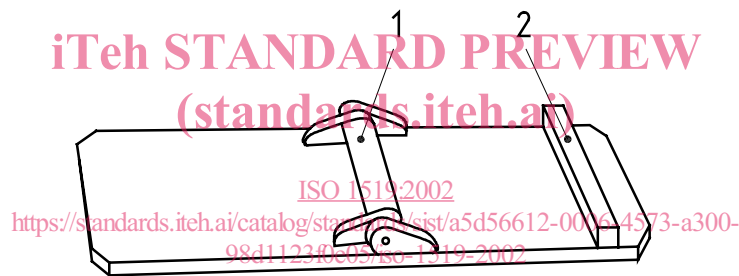
4.1.1 Material

In both types of apparatus specified below, the mandrels shall be made of a rigid and suitably corrosion-resistant material, for example stainless steel.

4.1.2 Type 1 mandrel tester

An example of a type 1 tester is shown in Figures 1 and 2. This type of tester is used with test panels of thickness not greater than 0,3 mm. A set of hinges is provided, each incorporating a cylindrical mandrel. The diameters of the mandrels are 2 mm, 3 mm, 4 mm, 5 mm, 6 mm, 8 mm, 10 mm, 12 mm, 16 mm, 20 mm, 25 mm and 32 mm, respectively, with a tolerance of $\pm 0,1$ mm. The dimensions of the apparatus are not critical, except that the gap between the surface of the mandrel and the plates of the hinges shall be $(0,55 \pm 0,05)$ mm. The mandrel shall be free to rotate on its axis and the apparatus shall be provided with a stop to ensure that, when the test panel is bent, the two parts are parallel.

NOTE Especially with the 2-mm-diameter mandrel, it is important to ensure that no distortion of the mandrel takes place during the bending process, and not to use any mandrel showing such distortion.



Key

- 1 Mandrel
- 2 Stop of similar height to mandrel

Figure 1 — Type 1 bend test apparatus

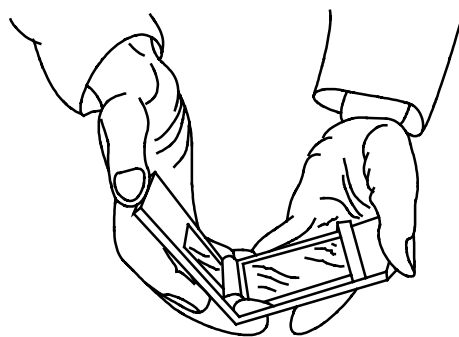


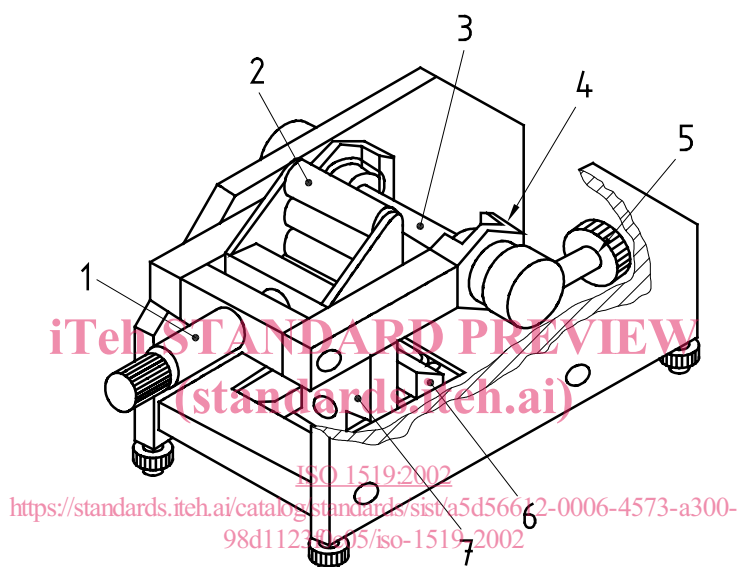
Figure 2 — Type 1 bend test apparatus in use

4.1.3 Type 2 mandrel tester

An example of a type 2 tester is shown in Figures 3 and 4. Type 2 testers are normally used for panels with a thickness of up to 1,0 mm. With coatings on soft metals, for example aluminium, and on plastic, thicker panels may be used with the provision that there is no deformation of the mandrel (see 6.3). The diameters of the mandrels are 2 mm, 3 mm, 4 mm, 5 mm, 6 mm, 8 mm, 10 mm, 12 mm, 16 mm, 20 mm, 25 mm and 32 mm, with a tolerance of $\pm 0,1$ mm.

NOTE 1 By agreement between the interested parties, mandrels of other diameters may be used with the type 2 tester.

NOTE 2 The bending piece of the type 2 tester, illustrated as an example in Figure 4, consists of three PVC rolls which are arranged side by side and run on pivoting bearings. Thus the coating is not exposed to damage or shear stress during the test.



Key

- 1 Screw handle
- 2 Bending piece
- 3 Mandrel
- 4 Mandrel bearing
- 5 Adjusting screw
- 6 Clamping jaw
- 7 Thrust bearing

Figure 3 — Example of a type 2 mandrel bending tester