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Paints and varnishes — Scratch test

Peintures et vernis — Essai de rayure

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ISO/FDIS 1518

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ISO/CEN PARALLEL PROCESSING

This final draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO-lead** mode of collaboration as defined in the Vienna Agreement. The final draft was established on the basis of comments received during a parallel enquiry on the draft.

This final draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel two-month approval vote in ISO and formal vote in CEN.

Positive votes shall not be accompanied by comments.

Negative votes shall be accompanied by the relevant technical reasons.

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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 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 1518 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

This third edition cancels and replaces the second edition (ISO 1518:1992), which has been technically revised. The main changes are: **(standards.iteh.ai)**

- a) a principle clause has been added; [ISO/FDIS 1518](https://standards.iteh.ai/catalog/standards/sist/c45327a5-f7bf-4628-a012-0303b822de43/iso-fdis-1518)
- b) two versions of the test apparatus are now described; <https://standards.iteh.ai/catalog/standards/sist/c45327a5-f7bf-4628-a012-0303b822de43/iso-fdis-1518>
- c) the minimum length of the scratch has been reduced from 60 mm to 40 mm;
- d) the magnification of the lens used to examine the scratch has been specified as at least $\times 4$;
- e) the supplementary test conditions (formerly Annex A) have been integrated in the test report;
- f) precision data have been added;
- g) Annex B specifying a procedure for re-tipping scratch-test needles has been deleted.

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Paints and varnishes — Scratch test

1 Scope

This International Standard specifies a test method for determining under defined conditions the resistance of a single coating or a multi-coat system of paint, varnish or related product to penetration by scratching with a scratch stylus loaded with a specified load. Penetration of the stylus is to the substrate, except in the case of a multi-coat system, in which case the stylus can penetrate either to the substrate or to an intermediate coat.

The method specified can be carried out

- a) either as a “pass/fail” test, by testing with a single specified load applied to the stylus to assess compliance with a particular specification;
- b) or by applying increasing loads to the stylus to determine the minimum load at which the coating is penetrated.

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2 Normative references (standards.iteh.ai)

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

3 Principle

A scratch stylus loaded with a specified load is drawn over a coating at a constant speed. The following test parameters are specified:

- the geometry of the stylus tip;
- the range within which the test load may lie and the increments by which it may be increased;
- the procedure by which the stylus is lowered on to the coating;
- the speed at which the stylus travels and the minimum length of the scratch.

The scratch is examined to see if the coating has been penetrated to the extent specified for a single specified test load (“pass/fail” test) or to determine the minimum test load required for penetration.

4 Apparatus

4.1 Scratch apparatus, two versions of which are illustrated in Figure 1 and Figure 2, with the following characteristics:

- The test load acting on the scratch stylus fixed to the load beam can be produced either by a weight attached to the stylus (see Figure 1) or by a weight which slides along a graduated load beam (see Figure 2).
- The test load shall be 1 N to 20 N, shall be adjustable in increments of 0,5 N and shall be accurate to within 0,2 N.
- The test panel held in a panel holder is moved relative to the stylus by means of a linear actuator driven by a motor. The speed at which the stylus travels shall be (35 ± 5) mm/s and the length of the scratch shall be at least 40 mm. The length of the scratch can affect the result.
- A lowering device with a flat ramp brings the stylus smoothly into contact with the coating at the beginning of the movement of the panel holder. The angle of the ramp shall be $(12,5 \pm 2,5)^\circ$.

Some types of apparatus are designed so that the load beam moves and the test panel is fixed. Such types of apparatus may also be used.

4.2 Scratch stylus A, having a hemispherical hard-metal tip of radius $(0,50 \pm 0,01)$ mm.

4.3 Scratch stylus B, having a hemispherical hard-metal tip of radius $(0,25 \pm 0,01)$ mm.

4.4 Scratch stylus C, having a hemispherical synthetic-ruby tip of radius $(0,50 \pm 0,01)$ mm.

4.5 Scratch stylus D, having a hemispherical synthetic-ruby tip of radius $(0,25 \pm 0,01)$ mm.

4.6 Indicating device, based on electrical contact between the stylus and the metallic substrate, to show when the coating has been penetrated.

NOTE 1 This device is not suitable for paints containing electrically conducting pigments, for non-metallic substrates or if penetration to an intermediate non-conducting coat is required.

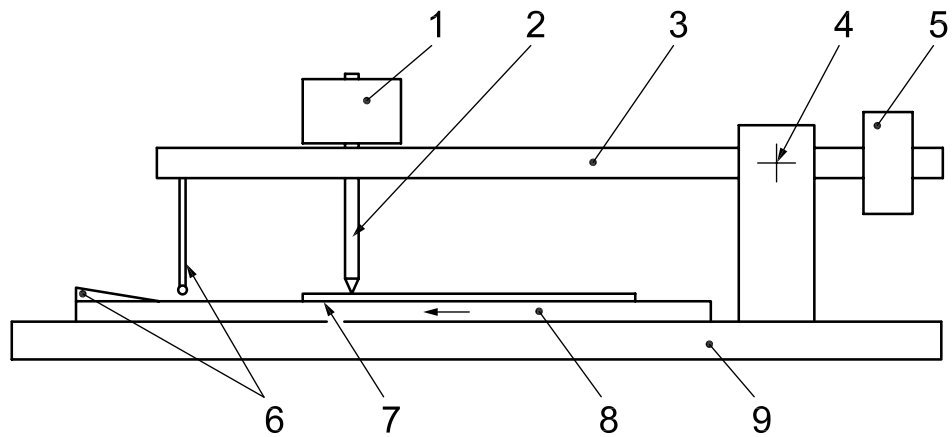
NOTE 2 The indicating device can only be used when certain parts of the scratch apparatus are electrically insulated.

4.7 Magnifying lens, with at least $\times 4$ magnification.

5 Sampling

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

Examine and prepare each sample for testing, as described in ISO 1513.

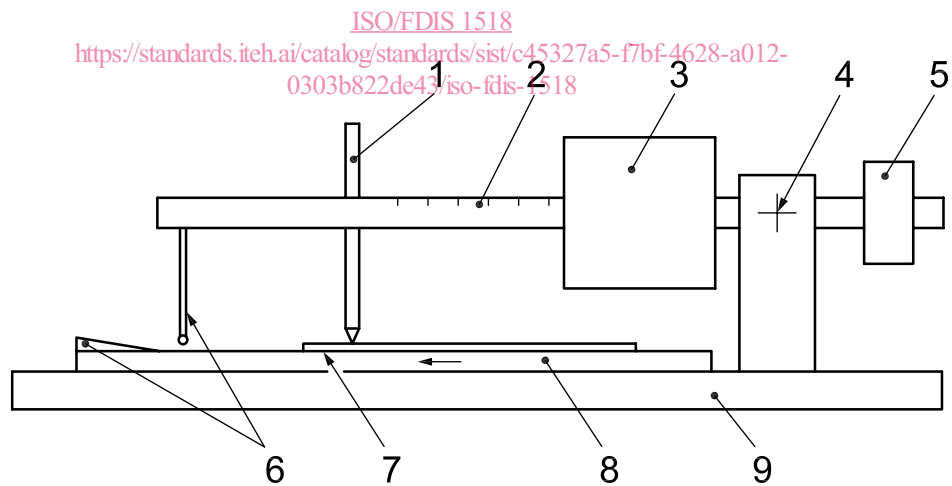


Key

- 1 weight
- 2 scratch stylus
- 3 load beam
- 4 pivot bearing for load beam
- 5 tare weight
- 6 lowering device (ramp and guide pin)
- 7 test panel
- 8 test panel holder (designed to be driven by a motor to move in the direction of the arrow)
- 9 baseplate

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Figure 1 — Scratch apparatus — Version with the weight attached to the stylus



Key

- 1 stylus
- 2 load beam with scale
- 3 sliding weight
- 4 pivot bearing for load beam
- 5 tare weight
- 6 lowering device (ramp and guide pin)
- 7 test panel
- 8 test panel holder (designed to be driven by a motor to move in the direction of the arrow)
- 9 baseplate

Figure 2 — Scratch apparatus — Version with a sliding weight