
Paints and varnishes — Scratch test using a spring-loaded pen

*Peintures et vernis — Essai de rayage manuel utilisant un barreau
d'essai de dureté*





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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Paints and varnishes — Scratch test using a spring-loaded pen

1 Scope

This document specifies a method for determining the resistance of a coating to scratches introduced by a usually hand-held loaded stylus.

The test can be carried out using a point stylus (method A) or using a disc stylus (method B).

Both methods are generally applicable and can be used in the field as well as on curved surfaces. Method A can also be applied on small test specimens (minimum dimensions 30 mm × 50 mm).

The test can be carried out as a “pass/fail” test (test requirement I) or as a classification test (test requirement II).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness)*

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

ISO 4618, *Paints and varnishes — Terms and definitions*

ISO 13076, *Paints and varnishes — Lighting and procedure for visual assessments of coatings*

ISO 14526-1, *Plastics — Phenolic powder moulding compounds (PF-PMCs) — Part 1: Designation system and basis for specifications*

CEN/TS 13388, *Copper and copper alloys — Compendium of compositions and products*

EN 10027-2, *Designation systems for steels — Part 2: Numerical system*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4618 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

stylus

scratching tool with specified geometry

3.2

writing effect

smoothing of the surface profile of a coating by impact of a loaded stylus (3.1) being moved over the surface

3.3
writing mark
gash

scratch with continuous *writing effect* (3.2) damage

3.4
metal marking

writing mark (3.3) which is introduced with a metal *stylus* (3.1) and covered with abraded stylus material

4 Principle

A stylus loaded with a test load between 0,5 N to 20 N is manually moved over the coating surface. The so introduced damage is visually (magnifier) examined and assessed.

The test can be carried out as method A using a point stylus (diameter 0,50 mm, 0,75 mm, or 1,00 mm) or as method B using a disc stylus (made of stainless steel, copper, thermoset, or PMMA [Polymethyl methacrylate]).

5 Apparatus

5.1 Hardness pen, as illustrated in [Figures 1](#) and [2](#), with the following properties:

5.1.1 The pressure spring, which is compressed by the locking slider, generates the test load exerting on the stylus. This test load can be read in newtons by means of the slider position on the scale.

In order not to change the elastic behaviour of the spring, it shall be relaxed in case the hardness pen is not in use for any length of time.

5.1.2 The range of the test load shall be between 0,5 N to 20 N.

With regard to common hardness pens test load, ranges between 0,5 N to 3 N (graduation 0,1 N), 1,5 N to 10 N (graduation 0,5 N) and 3 N to 20 N (graduation 1 N) are available by means of exchangeable pressure springs.

Due to the non-linearity of the spring characteristics and the friction within the hardness pen, the specified lower limits of the test load ranges shall not be underrun.

5.1.3 The removable head piece is the guide bush for the point stylus or the test disc holder respectively. The test load, set by means of the slider, is effective if

- for the apparatus in accordance with [Figure 1](#), the point stylus is pushed into the head piece so that only the tungsten-carbide insert protrudes, and if
- for the apparatus in accordance with [Figure 2](#), the test disc is pushed into the head piece so that both supporting wheels touch the counter surface.

NOTE For the apparatus in accordance with [Figure 1](#), scratches might be introduced unintentionally by the head piece. These scratches hinder the evaluation of the test. Therefore, head piece options with supporting wheels are also available (see [Figure 3](#)).