



JAPANESE
INDUSTRIAL
STANDARD

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Japanese Standards Association

JIS K 5600-5-5 : 1999
(ISO 1518 : 1992)

**Testing methods for paints—
Part 5 : Mechanical property
of film—
Section 5 : Scratch hardness
(Stylus method)**

ICS 87.040

Descriptors : paints, film-forming capacity, cross-cut test, painting, membranes,
scratch hardness tests, mechanical testing

Reference number : JIS K 5600-5-5 : 1999 (E)

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law.

JIS K 5400 corresponding to this Standard will be withdrawn and replaced with this Standard in April 2002, at the time of three years passed after establishment of this Standard.

Consequently it is recommended to comply with this Standard.

JIS K 5600 consists of the following parts.

JIS K 5600 Part 1 Section 1 to Section 8 *General rule*
 JIS K 5600 Part 2 Section 1 to Section 7 *Characteristics and stability of paints*
 JIS K 5600 Part 3 Section 1 to Section 6 *Film formability*
 JIS K 5600 Part 4 Section 1 to Section 7 *Visual characteristics of film*
 JIS K 5600 Part 5 Section 1 to Section 11 *Mechanical property of film*
 JIS K 5600 Part 6 Section 1 to Section 3 *Chemical property of film*
 JIS K 5600 Part 7 Section 1 to Section 8 *Long-period performance of film*
 JIS K 5600 Part 8 Section 1 to Section 6 *Evaluation of degradation of paint coatings*

JIS K 5600-5 consists of the following sections under the title of "Testing methods for paints—Part 5 : Mechanical property of film".

JIS K 5600 Part 5 Section 1 *Bend test (cylindrical mandrel)*
 JIS K 5600 Part 5 Section 2 *Cupping test*
 JIS K 5600 Part 5 Section 3 *Falling-weight test*
 JIS K 5600 Part 5 Section 4 *Scratch hardness (Pencil method)*
 JIS K 5600 Part 5 Section 5 *Scratch hardness (Stylus method)*
 JIS K 5600 Part 5 Section 6 *Adhesion test (Cross-cut test)*
 JIS K 5600 Part 5 Section 7 *Adhesion test (Pull-off methods)*
 JIS K 5600 Part 5 Section 8 *Abrasion resistance (Rotating abrasive-paper-covered wheel method)*
 JIS K 5600 Part 5 Section 9 *Abrasion resistance (Rotating abrasive rubber wheel method)*
 JIS K 5600 Part 5 Section 10 *Abrasion resistance (Reciprocating test panel method)*
 JIS K 5600 Part 5 Section 11 *Washability*

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 the original JIS is to be the final authority.

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**Testing methods for paints—
Part 5 : Mechanical property of film—
Section 5 : Scratch hardness
(Stylus method)**

Introduction This Japanese Industrial Standard has been prepared based on ISO 1518 *Paints and varnishes—Scratch test* issued in 1992 as the second edition without changing the technical contents.

The portions underlined with dots in this Standard are not stated in the original International Standard.

1 Scope

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

It 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 hemispherically tipped needle. Penetration of the needle is to the substrate, except in the case of a multi-coat system, where the penetration of the needle may be either to the substrate or to an intermediate coat.

1.2 The method is intended for application as follows:

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

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions (including the amendment) of the standards indicated below.

JIS K 5600-1-2 *Testing methods for paints—Part 1 : General rule—Section 2 : Sampling of products*

Remarks : ISO 1512 : 1991 *Paints and varnishes—Sampling of products in liquid or paste form* is identical with the said standard.

JIS K 5600-1-3 *Testing methods for paints—Part 1 : General rule—Section 3 : Examination and preparation of samples for testing*

Remarks : ISO 1513 : 1992 *Paints and varnishes—Examination and preparation of samples for testing* is identical with the said standard.

*JIS K 5600-1-4 Testing methods for paints—Part 1 : General rule—Section 4 :
Standard panels for testing*

Remarks : **ISO 1514 : 1993** *Paints and varnishes—Standard panels for testing* is identical with the said standard.

*JIS K 5600-1-6 Testing methods for paints—Part 1 : General rule—Section 6 :
Temperatures and humidities for conditioning and testing*

Remarks : **ISO 3270 : 1984** *Paints and varnishes and their raw materials—Temperatures and humidities for conditioning and testing* is identical with the said standard.

*JIS K 5600-1-7 Testing methods for paints—Part 1 : General rule—Section 7 : De-
termination of film thickness*

Remarks : **ISO 2808 : 1997** *Paints and varnishes—Determination of film thickness* is equivalent to the said standard.

3 Required supplementary information For any particular application, the test method specified in this Standard needs to be completed by supplementary information. The items of supplementary information are given in Annex A.

4 Apparatus

4.1 Scratch apparatus The principle of which is illustrated in Fig. 1; other arrangements which give a similar performance can be used, however.

This apparatus consists essentially of a horizontally sliding test panel holder (A) driven by a constant-speed motor (B) at a rate of 30 mm/s to 40 mm/s beneath the point of a scratching needle (C), which is perpendicular to the test panel. The needle is fixed in a chuck, directly above which is a holder capable of carrying weights up to a mass of 2 kg. The maximum load for which the apparatus is designed shall be marked on the test apparatus.

The apparatus is adjusted so that the needle comes smoothly into contact with the film, i.e. before the stop (D) reaches the bottom of the sloping ramp, to form a straight scratch not less than 60 mm in length. A ramp with an angle of 10° to 15° to the horizontal has been found to be satisfactory. The panel holder can be designed to allow a lateral movement of test pieces so that more than one scratch test can be carried out on the same test piece.

Note 1 Apparatus is now becoming available which will permit a scratch test to be conducted under continuously increasing load.