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**Testing methods for paints—
Part 4 : Visual characteristics
of film—
Section 7 : Specular gloss**

ICS 87.040

Descriptors : paints, painting, membranes, visual perception, gloss (of surface),
reflection factor, optical properties of materials

Reference number : JIS K 5600-4-7 : 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JIS K 5400 corresponding to this Standard will be withdrawn and replaced with this Standard in April 2002, at the time of three years passed after establishment of this Standard.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	<i>General rule</i>
JIS K 5600 Part 2 Section 1 to Section 7	<i>Characteristics and stability of paints</i>
JIS K 5600 Part 3 Section 1 to Section 6	<i>Film formability</i>
JIS K 5600 Part 4 Section 1 to Section 7	<i>Visual characteristics of film</i>
JIS K 5600 Part 5 Section 1 to Section 11	<i>Mechanical property of film</i>
JIS K 5600 Part 6 Section 1 to Section 3	<i>Chemical property of film</i>
JIS K 5600 Part 7 Section 1 to Section 8	<i>Long-period performance of film</i>
JIS K 5600 Part 8 Section 1 to Section 6	<i>Evaluation of degradation of paint coatings</i>

JIS K 5600-4 consists of the following sections under the title of "*Testing methods for paints—Part 4 : Visual characteristics of film*".

JIS K 5600 Part 4 Section 1	<i>Hiding power (for light-coloured paints)</i>
JIS K 5600 Part 4 Section 2	<i>Hiding power (for dark-coloured paints)</i>
JIS K 5600 Part 4 Section 3	<i>Visual comparison of the colour of paints</i>
JIS K 5600 Part 4 Section 4	<i>Colorimetry (Principles)</i>
JIS K 5600 Part 4 Section 5	<i>Colorimetry (Measurement)</i>
JIS K 5600 Part 4 Section 6	<i>Colorimetry (Calculation of colour differences)</i>
JIS K 5600 Part 4 Section 7	<i>Specular gloss</i>

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Testing methods for paints— Part 4 : Visual characteristics of film— Section 7 : Specular gloss

Introduction This Japanese Industrial Standard has been prepared based on the third edition of *ISO 2813 Paints and varnishes—Determination of specular gloss of non-metallic paint films at 20°, 60° and 85°* and the Amendment 1, partially supplementing the technical contents (primary reference standard).

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

1 Scope This Japanese Industrial Standard is one of a series of standards dealing with the sampling and testing of paints and related products. This Standard specifies the testing method for determining the specular gloss of paint film using a reflectometer geometry of 20°, 60° or 85°. The method is not suitable for the measurement of the gloss of metallic paints.

- a) The 60° geometry is applicable to all paint films, but for very high gloss and near-matt films 20° or 85° may be more suitable.
- b) The 20° geometry, which uses a smaller receptor aperture, is intended to give improved differentiation between high-gloss paint films (i.e. films with a 60° specular gloss higher than about 70 units).
- c) The 85° geometry is intended to give improved differentiation between low-gloss paint films (i.e. films with a 60° specular gloss lower than about 10 units).

Remarks 1 The same geometry shall, of course, be retained for a series of measurements even if this means disregarding the suggested limits.

2 In some cases, the determination of specular gloss may not correspond to visual evaluation.

The corresponding International Standard to this Standard is as follows.

ISO 2813 : 1994 *Paints and varnishes—Determination of specular gloss of non-metallic paint films at 20°, 60° and 85°*

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. If the indication of the year of coming into effect (or the year of publication) is given to these referred standards, only the edition of indicated year constitutes the provision of this Standard but the revision and amendment made thereafter are not applied. The normative references without the indication of the year of coming into effect (or the year of publication) apply limiting only to the most recent edition (including the amendment).

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 5600-1-7 Testing methods for paints—Part 1 : General rule—Section 7 : Determination of film thickness

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

JIS Z 8741 : 1997 Specular glossiness—Methods of measurement

3 Definition of term For the purposes of this Standard, the following definition shall apply:

3.1 specular gloss The ratio of the luminous flux reflected from an object in the specular direction for a specified source and receptor angle to the luminous flux reflected from gloss with a refractive index of 1.567 in the specular direction.

Remarks 3 To define the specular-gloss scale, polished black glass with a refractive index of 1.567 is assigned the value of 100 for geometries of 20°, 60° and 85°.

4 Required supplementary information For any information, the testing methods specified in this Standard need to be completed by supplementary information. The items of supplementary information are given in Annex A.

5 Apparatus Ordinary laboratory apparatus and glassware, including the following:

5.1 Test panels for the liquid paint sample The test panels shall be glass of mirror quality, of thickness at least 3 mm and of dimensions at least 150 mm × 100 mm.

Remarks 4 Although the method as described is restricted to paints, clear varnishes may be tested by using as the test panel either black glass or clear glass roughened and covered on the back and edges by black paint.

5.2 Film applicator A film applicator, having a recess ground from the underface to form a gap $150\ \mu\text{m} \pm 2\ \mu\text{m}$ deep when placed on an optically plane surface, or other means of applying a paint film, shall be used.

Remarks 5 The film applicator produces a wet-film thickness of approximately 75 μm .

5.3 Glossmeter The glossmeter shall consist of a light source and a lens that directs a parallel beam of light onto the surface under test, and a receptor housing containing a lens, field stop and photoelectric cell to receive the required cone of reflected light.

The glossmeter shall have the characteristics as specified in a) to d).

a) **Geometry** The axis of the incident beam shall be at $20^\circ \pm 0.5^\circ$, $60^\circ \pm 0.2^\circ$ or $85^\circ \pm 0.1^\circ$ (refer to Table 1) to the normal line of the surface under test. The

axis of the receptor shall coincide with the mirror image of the axis of the incident beam to within $\pm 0.1^\circ$.

With a flat surface of polished black glass or a mirror in the test panel position, an image of the source shall be formed at the centre of the receptor field stop (refer to Fig. 1 Fundamental conceptual diagram). To ensure averaging over the whole surface, the width of the illuminated area of the test panel shall be significantly larger than likely surface structures. A generally accepted value is 10 mm. The dimensions of the source image and receptor apertures and the associated tolerances shall be as indicated in Table 1. The angular dimensions of the receptor field stop shall be measured from the receptor lens.

- b) **Filtering at the receptor** Filtering at the receptor shall be done in such a way that the transmittance of the filter $\tau(\lambda)$ is given by

$$\tau(\lambda) = k \frac{V(\lambda) \cdot S_e(\lambda)}{s(\lambda) \cdot S_s(\lambda)}$$

where, $V(\lambda)$: the CIE relative luminous efficiency

$S_e(\lambda)$: the spectral power distribution of CIE standard illuminant D_{65}

$s(\lambda)$: the spectral sensitivity of the receptor

$S_s(\lambda)$: the spectral power distribution of the illuminating source

k : a calibration coefficient

Remarks 6 The tolerances have been chosen so that the errors in the source and receptor apertures will not produce reading errors of more than one gloss unit at any point on a 100-unit scale (refer to 5.4.1).

By agreement, CIE standard illuminant A or C may also be used for a transition period. This shall be described in the test report.

- c) **Vignetting** There shall be no vignetting of rays that lie within the field angles specified in 5.3 a).
- d) **Receptor meter** The receptor measurement device shall give a reading proportional to the light flux passing the receptor field stop to within 1 % of the full-scale reading.

Remarks 7 A commonly used receptor meter arrangement uses a barrier-layer photocell in conjunction with a high-resistance galvanometer. This is not satisfactory as the galvanometer output is markedly non-linear, but this can be overcome by connecting a low-input-impedance electronic amplifier between the photocell and the galvanometer. In addition, the apparatus shall have a sensitivity control enabling the photocell current to be set to any desired value on the instrument scale.