INTERNATIONAL STANDARD

ISO 13803

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Paints and varnishes — Determination of reflection haze on paint films at 20°

Peintures et vernis — Détermination du flou spéculaire sur des feuils de peinture à 20°

Reference number
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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.

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.

International Standard ISO 13803 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

Annex A forms an integral part of this International Standard.

Paints and varnishes — Determination of reflection haze on paint films at 20°

1 Scope

This International Standard is one of a series of standards dealing with the sampling and testing of coating materials such as paints and varnishes, as well as coatings prepared from them.

It specifies a test method for measuring at 20° the reflection haze of paint coatings.

The use of this geometry means that the method is closely related to the measurement of specular gloss at 20° in ISO 2813. The application of this method is intended to give improved differentiation between high-gloss surfaces, for example in the field of assessment of dispersion characteristics. The method is therefore a useful complement to ISO 8781-3 which uses specular gloss measurements.

For decorative coatings (e.g. automotive coatings), reflection haze is also an important criterion in evaluating the quality of the coating, in addition to colour and specular gloss.

The results obtained often depend on the following properties of the paints:

a) the binder system used and the composition of the paint;

b) the wetting and dispersing properties of the pigments;

c) the method of application;

d) the orientation of the test sample with respect to the plane of measurement.

2 Normative references

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

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

ISO 7668:1986, *Anodized aluminium and aluminium alloys — Measurement of specular reflectance and specular gloss at angles of 20°, 45°, 60° or 85°.*

ISO 7724-2:—[1], *Paints and varnishes — Colorimetry — Part 2: Colour measurement.*

ISO 8781-3:1990, *Pigments and extenders — Methods of assessment of dispersion characteristics — Part 3: Assessment from the change in gloss.*

ISO 15528:—[2], *Paints, varnishes and raw materials for paints and varnishes — Sampling.*

3 Term and definition

For the purposes of this International Standard, the following term and definition apply.

3.1
reflection haze
ratio of the luminous flux reflected and diffusely scattered from an object adjacent to the specular direction for a specified source and receptor angle to the luminous flux reflected from glass with a refractive index of 1,567 in the specular direction, this glass being assigned the value of 100 on the linear reflection haze scale.

NOTE The measurement of reflection haze is related to the measurement of specular gloss in accordance with ISO 2813. Therefore, this International Standard has been adapted, as closely as possible, to ISO 2813 and should be read in conjunction with ISO 2813. The main difference between the two standards is that specular gloss is measured in the specular direction and reflection haze is measured in slightly different directions.

4 Apparatus and materials

4.1 Substrate

The substrate should preferably be agreed on between the interested parties. In the absence of such an agreement, the substrate shall be plate glass of mirror quality, preferably of a thickness of at least 3 mm, and have a minimum test area of 150 mm × 100 mm. The larger dimension shall be at least equal to the length of the illuminated area.

NOTE Although the method, as written, is restricted to paints, clear varnishes may be tested by using as the substrate either black or clear glass roughened and covered on the back and edges by black paint.

4.2 Film applicator

Use a block applicator having a recess ground in the underface to form a gap (150 ± 2) μm deep when placed on an optically plane surface, or another suitable means, to apply the test coating.

NOTE The block applicator produces a wet-film thickness of approximately 75 μm.

4.3 Hazemeter

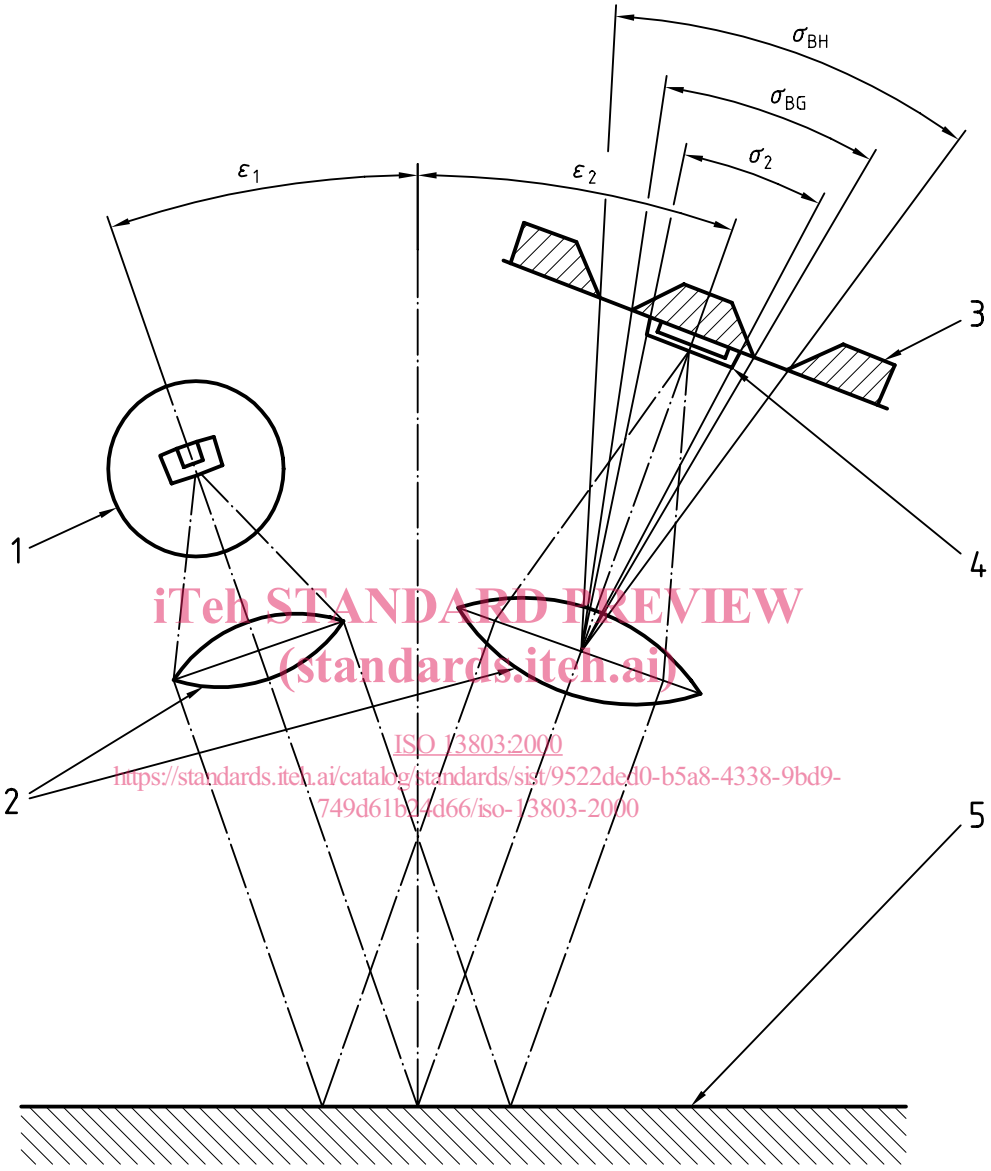
The hazemeter shall consist of a light source and a lens that directs a parallel beam of light onto the surface under test, plus a receptor housing containing a lens, field stop and photoelectric cell to receive the required cone of reflected light. The hazemeter shall have the following characteristics:

a) **Geometry:** The axis of the incident beam shall be at an angle $\varepsilon_1 = (20 \pm 0{,}1)°$ (see Figure 1) to the normal to the surface under test. The axis of the receptor shall be coincident with the mirror image of the axis of the incident beam to within ± 0,1°. With a flat piece of polished black glass or a front-silvered mirror in the test panel position, an image of the light source shall be formed at the centre of the receptor field stop

1) To be published. (Revision of ISO 7724-2:1984)

2) To be published. (Revision of ISO 842:1984 and ISO 1512:1991)

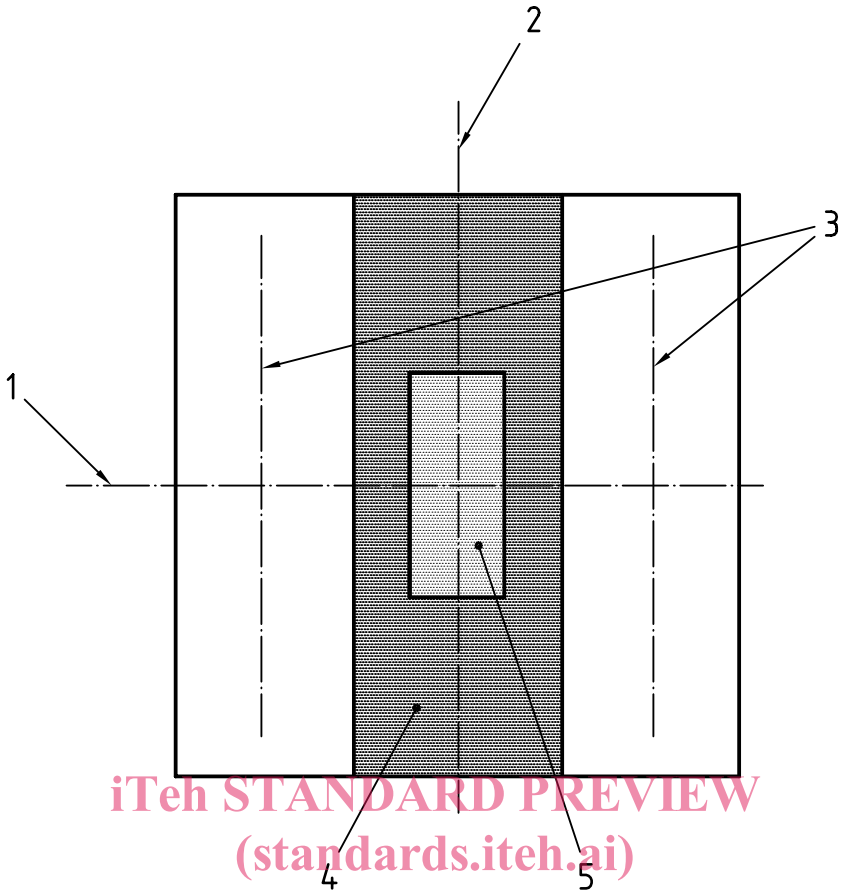
(see Figure 2 for the general disposition of the main features). To be certain of averaging out any surface uneveness, the width of the illuminated area on the test panel shall be significantly larger than possible surface irregularities: a generally accepted value is 10 mm. The dimensions of and tolerances on the image aperture and receptor aperture shall be as indicated in Table 1. The angular dimensions of the receptor field stop shall be measured from the receptor lens.



Key

1 Lamp
2 Lenses
3 Receptor field stop
4 Image of light source
5 Paint film

Figure 1 — Schematic diagram of the reflection hazemeter in the plane of measurement



Key

1 Plane of measurement
2 Plane perpendicular to plane of measurement
3 Receptor area
4 Central opaque zone
5 Image of light source

Figure 2 — Receptor field stop

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

$$\tau(\lambda) = k \frac{V(\lambda) \times S_C(\lambda)}{s(\lambda) \times S_S(\lambda)} \quad (1)$$

where

$V(\lambda)$ is the CIE photopic luminous efficiency;

$S_C(\lambda)$ is the spectral power distribution of CIE standard illuminant C;

$s(\lambda)$ is the spectral sensitivity of the receptor;

$S_S(\lambda)$ is the spectral power distribution of the illuminating source;

k is the calibration constant.

c) Vignetting: There shall be no vignetting of rays that lie within the angular fields specified in Table 1.

d) Receptor meter: The photoelectric cell shall give a reading proportional to the light flux passing the receptor field stop to within 1 % of the full-scale reading.

Table 1 — Source-image and receptor-aperture angles

	Angle in plane of measurement degrees	Angle perpendicular to plane of measurement degrees
Image of light source σ_2	0,75 ± 0,1	2,5 ± 0,1
Receptor aperture σ_{BH}	5,5 ± 0,25	5,5 ± 0,25
Central opaque part of receptor aperture σ_{BG}	2,0 ± 0,1	5,5 ± 0,25

4.4 Reference standards

4.4.1 Primary reference standard

The primary reference standard shall be in accordance with ISO 2813.

NOTE 1 Since no suitable primary reference standard for reflection haze is available, the corresponding primary gloss standard is chosen as a substitute.

NOTE 2 It is not intended that the primary reference standard be used for the daily calibration of hazemeters.

NOTE 3 The use of a quartz wedge as a primary reference standard is a recent technical improvement. In anticipation of its future use in ISO 2813, a quartz wedge may be used in this International Standard.

4.4.2 Working reference standards

Working reference standards may be of ceramic tile, vitreous enamel, opaque glass or other materials with uniform reflection haze and shall have been calibrated against a primary reference standard for an indicated area and direction of illumination. Working reference standards shall be uniform and stable and shall be calibrated by a technically competent organization. At least two standards of different reflection haze levels shall be available.

The working reference standards shall be checked periodically by comparison with primary reference standards.

4.4.3 Zero reference standard

For checking the zero point of the apparatus, a suitable standard (for example a black box or velvet) shall be used.

5 Sampling

Take a representative sample of the coating material 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.

6 Preparation of test panels

Prepare the test panels as described in ISO 2813.