INTERNATIONAL STANDARD

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AMENDMENT 5
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High-pressure decorative laminates — Sheets made from thermosetting resins —

Part 2: Determination of properties

AMENDMENT 5: Resistance to scratching

Stratifiés décoratifs haute pression — Plaques à base de résines thermodurcissables —

Partie 2: Détermination des caractéristiques

AMENDEMENT 5: Résistance à la rayure

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 Amendment may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

Amendment 5 to International Standard ISO 4586-2:1997 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 11, *Products*.

High-pressure decorative laminates — Sheets made from thermosetting resins —

Part 2:
Determination of properties

AMENDMENT 5: Resistance to scratching

This clause replaces clause 14 of ISO 4586-2:1997.

14 Resistance to scratching

14.1 Principle

Increasing loads are applied in specified steps to a diamond scratching point of defined geometry. The resistance to scratching of the decorative laminate sheet under test is expressed as a rating which defines the maximum applied load which does not produce a continuous surface scratch. The test result is verified by visually confirming that the next-higher load-step produces a continuous scratch.

14.2 Materials

14.2.1 Contrast medium, e.g. graphite, talcum, or a solution of dye in alcohol, to contrast with the colour of the sheet under test.

14.2.2 Supply of cotton fabric.

14.3 Apparatus

14.3.1 Scratch test apparatus (see Figure 9), consisting of the following parts:

14.3.1.1 Stand, with a device to indicate the horizontal, for example a spirit level.

14.3.1.2 Motor-driven turntable (A), able to rotate about a vertical axis without play. The rotational frequency shall be (5 ± 1) r/min.

14.3.1.3 Arm (B), carrying the holder for the diamond, mounted on a ball bearing, with a horizontal axis. The height of this axis shall be adjustable so that the arm is exactly horizontal when the scratching point rests on the test specimen.

14.3.1.4 Means of applying a known load, with an accuracy of ± 0,01 N to the scratching point with weights (C + D).

14.3.1.5 Hemispherical diamond scratching point (E), with a point radius of (0,090 ± 0,003) mm and an included angle of (90 ± 1)° (see also Figure 10)[1)]. The diamond shall be mounted in the holder with the flat part on the leading side of the shank facing the working direction.

1) Diamond points conforming to these dimensions and profile are available from Cie Weinz, Industrie Edelstein Fabrik, Postfach 2740, D-55743 Idar-Oberstein, Germany. The same product is available through Erichsen GmbH & Co. KG, D-58675 Hemer-Sundwig/Westfalien, Germany. This is an example of a suitable product available commercially. This information is given for the convenience of users of this part of ISO 4586 and does not constitute an endorsement by ISO of this product.

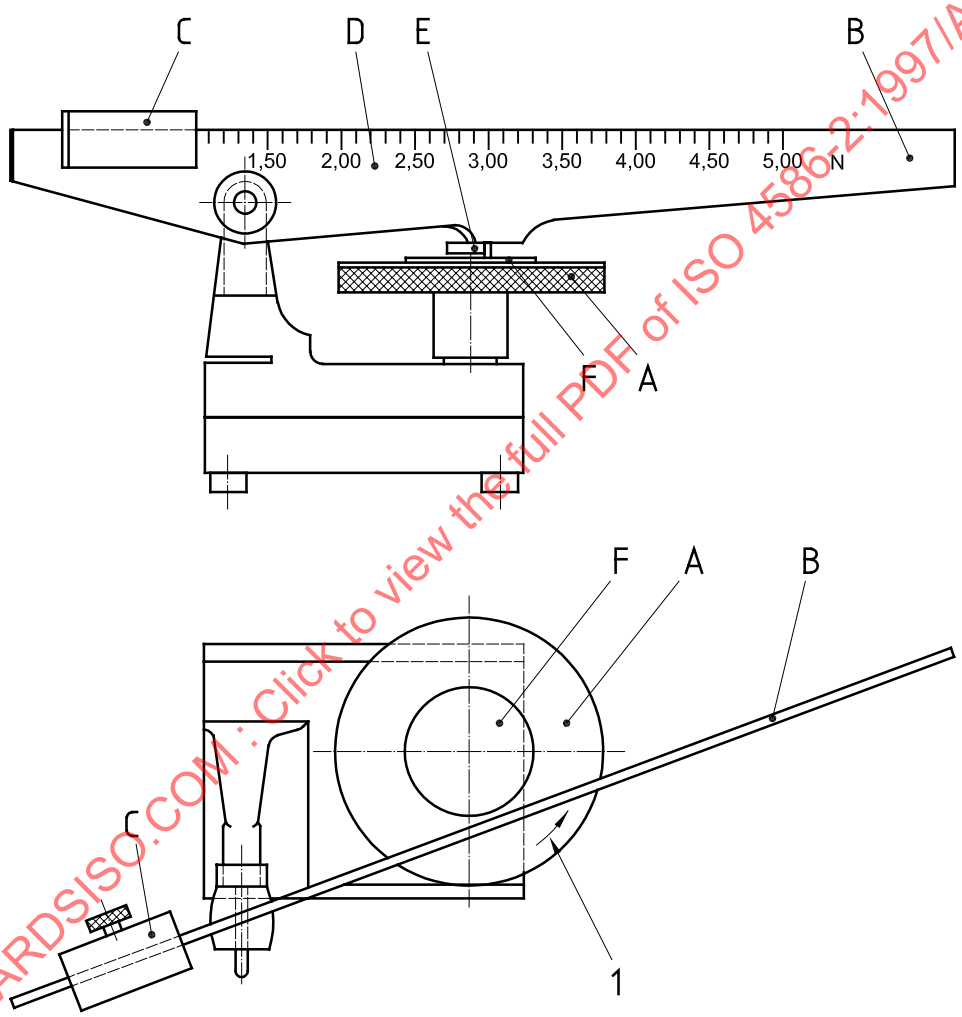
14.3.1.6 Clamping disc (F), to keep the test specimen flat.

14.3.2 Viewing enclosure, having a matt black interior and a light source (defined below) located at the top. Its dimensions shall be such that the test specimen is located vertically below the light source and at distance of (600 ± 5) mm. An aperture in the front shall allow inspection of the test specimen at various angles from a distance of (400 ± 10) mm. A diagram of a suitable enclosure is shown in Figure 11.

The light source shall consist of a 100 W frosted bulb, mounted in a white reflector having an aperture of approximately 140 mm diameter and producing an illumination of 800 lx to 1 000 lx at the specimen surface.

14.3.3 Conditioning chamber, with a standard atmosphere of (23 ± 2) °C and relative humidity of (50 ± 5) %.

14.3.4 Electronic balance, suitable for verifying the force applied to the diamond point.

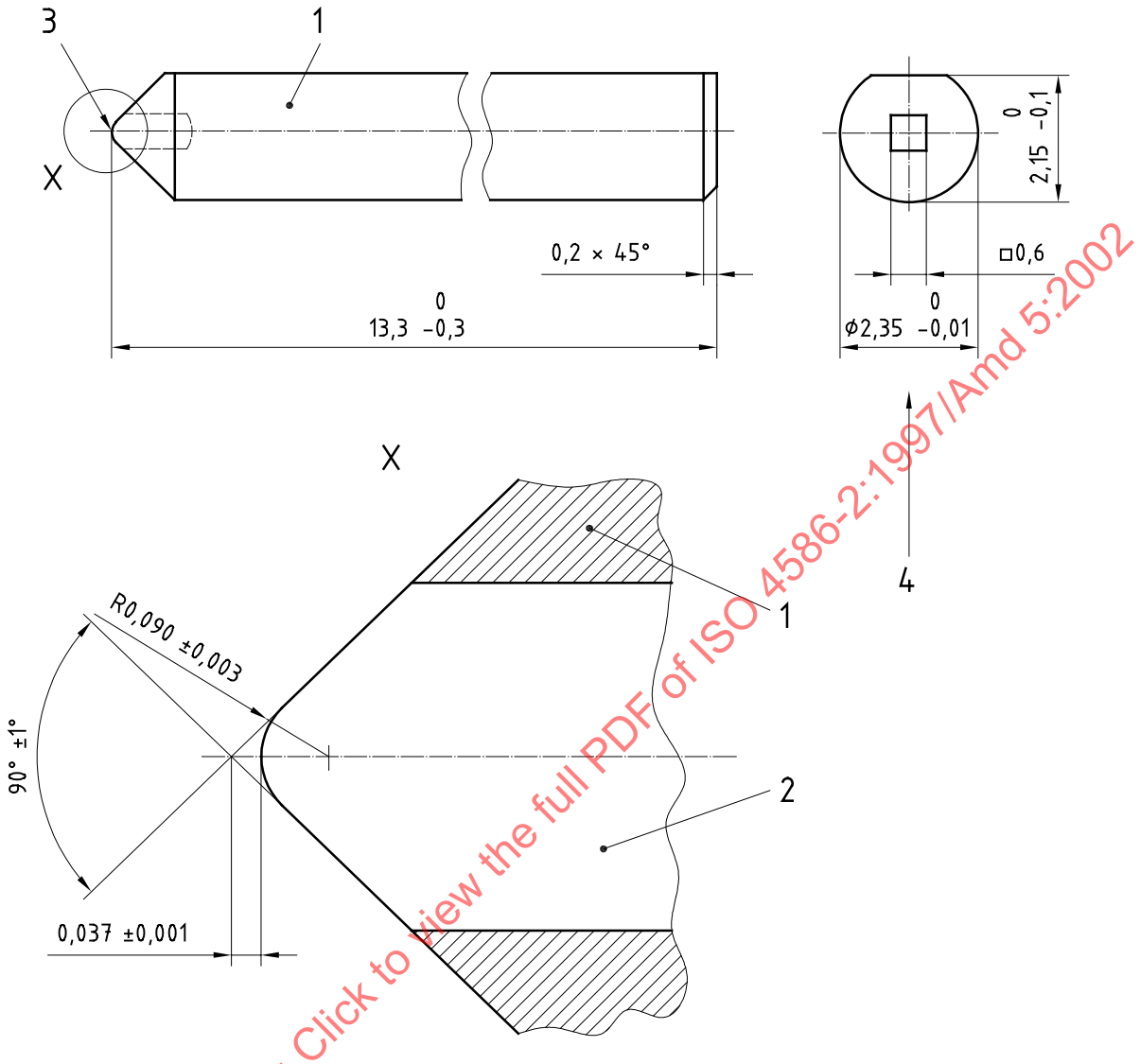


Key

1 Direction of rotation

Figure 9 — Type of apparatus for measuring resistance to scratching (see 14.3.1)

Dimensions in millimetres



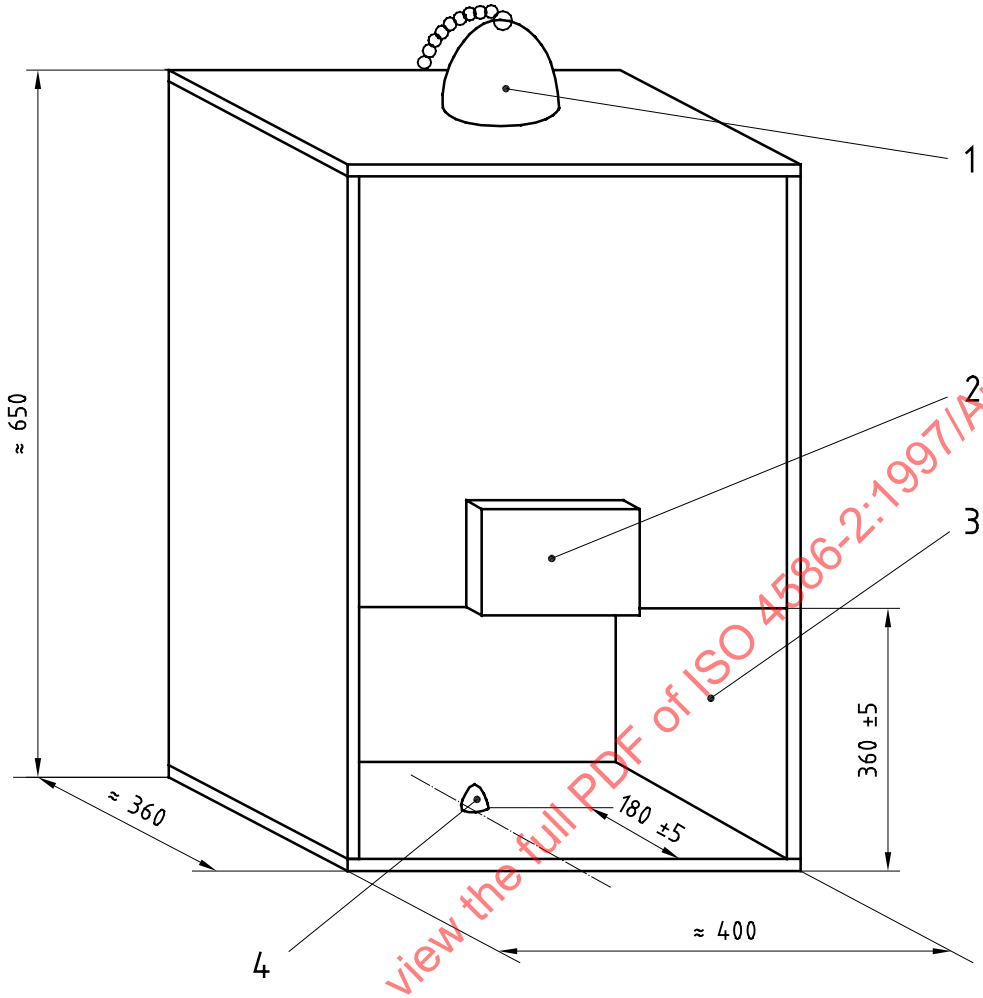
Key

1 Diamond holder
2 Diamond
3 Diamond point
4 Optical axis of projector

NOTE The crystal axis of the diamond shall be parallel to the longitudinal axis of the diamond holder. The dimensions of the diamond holder are approximate and are given for information only.

Figure 10 — Diamond scratching point (see 14.3.1.5)

Dimensions in millimetres



Key

1 Lamp holder
2 Forehead rest (foam-rubber pad)
3 Inside wall matt black
4 Device for centering test specimen

Figure 11 — Example of suitable viewing enclosure (see 14.3.2)

14.4 Calibration of apparatus

Place the diamond point on the table of the electronic balance (14.3.4) and, with the arm (B) in a horizontal position, verify that the position marks for the sliding weight (C) correspond to the load values shown in Table 1. If not, move weight C as necessary to achieve the correct loads, and mark the correct positions on the arm (B).

Table 1 — Load values

Position mark	1,0 N	2,0 N	4,0 N	6,0 N
Load (grams force)	102 ± 1	204 ± 1	408 ± 1	612 ± 1

Calibration of the apparatus shall be carried out at least once a year.

14.5 Test specimen

The test specimen shall be a square of side (100 ± 1) mm cut from the sheet under test. If required by the type of apparatus used, a hole of suitable size shall be drilled in the centre of the specimen. One specimen shall be tested.

Wipe the specimen surface using cotton fabric (14.2.2) impregnated with a solvent such as acetone. It is important that, once cleaned, the surface is not fingered in the test area.

Before making the scratch test, store the specimen for 72 h in the standard atmosphere specified in 14.3.3.

14.6 Procedure

Make sure that the stand of the test apparatus is standing horizontally.

Adjust the height of the arm (B) so that it is horizontal when the diamond point rests on the test specimen.

Start the test by making two scratches (each with one revolution of the turntable) at 1,0 N load with a spacing of 1 mm to 2 mm between the scratch marks.

On the same specimen, repeat this procedure with loads of 2,0 N, 4,0 N and 6,0 N, leaving a space of 3 mm to 5 mm between each pair of scratches.

Remove the specimen from the apparatus and rub the entire scratched area of the surface with a suitable contrast medium (14.2.1) so that it is engrained in the scratches.

Carefully wipe the surface with clean cotton fabric (14.2.2) to remove any excess contrast medium which is not engrained in a scratch.

NOTE This procedure is necessary to ensure that only true scratches are considered, and superficial hairline polish marks are ignored.

Place the specimen against the centre support in the viewing enclosure (14.3.2) at an angle such that the specimen can be viewed at right angles to the plane of the surface.

Examine the surface to determine the lowest load for which an almost continuous (i.e. > 90 %) double circle of scratch marks can be seen. The examples shown in Figure 12 can be used as a guide.

A scratch mark is where the contrast medium is engrained in the scratch, and is clearly visible as a line of colour contrasting with the colour of the specimen.

Superficial polish marks (i.e. where there is a change in gloss level but no continuous engrained contrast medium) shall be ignored.

The examination of the surface shall take no longer than 10 s, and the operator shall ensure that the double circle of scratch marks selected is truly > 90 % continuous.