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Pohištvo - Ocenjevanje odpornosti površine proti mikrorazenju

Furniture - Assessment of the surface resistance to microscratching

Möbel - Bestimmung der Mikrokratzbeständigkeit von Möbeloberflächen

Ameublement - Évaluation de la résistance des surfaces aux micro-rayures

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Furniture

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English Version

Furniture - Assessment of the surface resistance to microscratching

Ameublement - Évaluation de la résistance des surfaces aux micro-rayures

Möbel - Bestimmung der Mikrokratzbeständigkeit von Möbeloberflächen

This European Standard was approved by CEN on 17 March 2023.

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[SIST EN 16611:2023](https://standards.iteh.ai/catalog/standards/sist/3dd123af-bb02-4614-891e-f5452d105896/sist-en-16611-2023)

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents	Page
European foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	4
4 Principle	5
5 Apparatus and materials	5
5.1 Martindale tester	5
5.2 Holder for scrub material	5
5.3 Diffuse light source.....	5
5.4 Glossmeter.....	6
5.5 Positioning device	6
5.6 Scrub materials.....	6
5.7 Double-sided tape.....	7
5.8 Cleaning cloth.....	7
5.9 Reference black high gloss HPL	7
6 Assembly and maintenance of the Martindale tester	7
7 Preparation and conditioning	7
7.1 Conditioning	7
7.2 Test surface.....	7
8 Test procedure	7
8.1 General.....	7
8.2 Testing	8
8.2.1 Procedure A	8
8.2.2 Procedure B	9
9 Test report	9
Annex A (normative) Method for checking the Lissajous figure	10
Annex B (normative) Classification of the image after scratching according to procedure B	11

European foreword

This document (EN 16611:2023) has been prepared by Technical Committee CEN/TC 207 “Furniture”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2023, and conflicting national standards shall be withdrawn at the latest by October 2023.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CEN/TS 16611:2016.

The main changes compared to the previous edition are listed below:

- revised Clause 5 regarding 5.1 “Martindale tester”, 5.3 “Diffuse light source”, 5.6 “Scrub materials”, 5.9 “Reference black high gloss HPL”;
- additional test parameter “load” added to Table 1;
- revised 8.2.1 “Procedure A” regarding calibration of ultra fine scrub material and microscratching of test area;
- revised 8.2.2 “Procedure B” regarding microscratching of test area;
- revised explanation in Table B.1;
- document editorially revised in its entirety.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

EN 16611:2023 (E)

1 Scope

This document specifies a method for the assessment of the surface resistance to microscratching and relates to rigid surfaces of all finished products, considering the following exceptions:

- Method A is suitable for all types of surface coatings and coverings except for lacquers with pearly or metallic effects.
- Method B is suitable for all types of surface.
- No method applies to finishes on leather and fabrics.

This document is applicable to the test intended to be carried out on a part of finished furniture, but it can be carried out on test panels of the same material, finished in an identical manner to the finished product, and of a size sufficient to meet the requirements of the test.

It is essential that the test be carried out on unused surfaces.

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.

EN ISO 2813, *Paints and varnishes - Determination of gloss value at 20°, 60° and 85° (ISO 2813)*

EN ISO 12945-2, *Textiles - Determination of fabric propensity to surface pilling, fuzzing or matting - Part 2: Modified Martindale method (ISO 12945-2)*

EN ISO 12947-1, *Textiles - Determination of the abrasion resistance of fabrics by the Martindale method - Part 1: Martindale abrasion testing apparatus (ISO 12947-1)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1

test surface

part of the test panel

3.2

test panel

panel including the test surface

Note 1 to entry: It can be cut from a finished item of furniture or it can be a separate panel produced in the same manner as the finished item of furniture.

3.3

test area

part of the test surface affected by the scrub material (5.6)

3.4

rub

one revolution of the two outer drives of the Martindale tester

3.5

cycle

completion of all the translational movements tracing a Lissajous figure comprising 16 rubs

Note 1 to entry: This comprises 16 revolutions of the two outer drives and 15 revolutions of the inner drive of the Martindale tester.

3.6

Lissajous figure

figure created by movement which ranges changes from a circle gradually narrowing ellipses, until it becomes a straight line, from which progressively widening ellipses develop, in a diagonally opposite direction before the pattern is repeated

4 Principle

The test surface shall be fixed on a horizontal table. A circular scrub material fixed on a holder impacts on the test surface with a specified load. Table and holder shall be moved perpendicular to each other, in a translational movement, with specified frequencies, tracing a Lissajous figure. The holder is additionally freely rotatable around its own axis perpendicular to the horizontal plane.

The test surface is exposed to the scrub material for a predetermined number of rubs. The changes of the surface are determined by gloss measurement or visual assessment.

5 Apparatus and materials

5.1 Martindale tester

The Martindale tester shall be as described in EN ISO 12947-1 with the following exceptions:

- the “Abrading table” is the table for the test surface;
- the “clamping ring and mechanism” is not necessary;
- the “specimen holder” is the holder for the scrub material;
- the “loading pieces” on top of the spindle are not necessary.

5.2 Holder for scrub material

The holder for scrub material shall be as described in EN ISO 12945-2, with the following exceptions:

- consists of a guide plate with an inner diameter of $(90 \pm 0,5)$ mm, a large ring weight and a spindle with an overall weight (612 ± 2) g (nominally called 6 N).

5.3 Diffuse light source

Light source with artificial light providing evenly diffused light giving an illumination on the test surface of $(1\ 200 \pm 400)$ lx.

For artificial light it is recommended that it can have a correlated colour temperature of $(6\ 500 \pm 200)$ K.

EN 16611:2023 (E)

5.4 Glossmeter

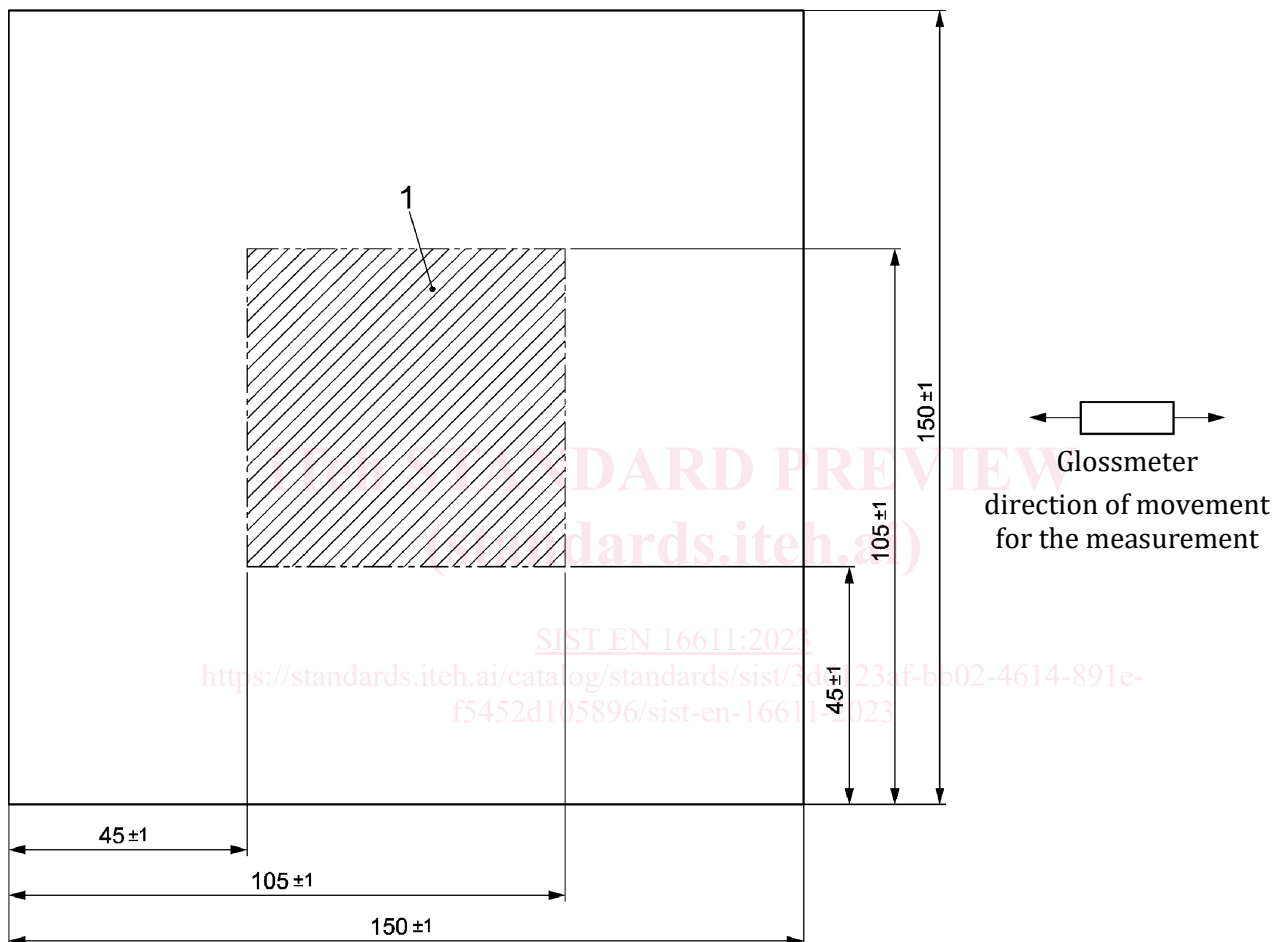
For gloss measurement with 3 angle measurement geometry as described in EN ISO 2813.

5.5 Positioning device

For gloss measurement on the same position before and after the test with 4 measurement points.

An example of a positioning device is shown in Figure 1.

Dimensions in millimetres



Key

- 1 measurement area

Figure 1 — Scheme of positioning device for the glossmeter on the shaded measurement area

5.6 Scrub materials

The scrub material shall be a polyamide 6.6web imbedded with alumina abrasive. Two types of scrub materials (very fine and ultra fine) shall be used. The scrub materials shall be cut or stamped on a diameter of (89 ± 2) mm.

NOTE Scotch Brite fleece 7447+ (very fine) and 7448+ (ultra fine) are examples of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by CEN of this product.

5.7 Double-sided tape

To attach the scrub material on the guide plate of the holder and the test surface on the table.

5.8 Cleaning cloth

White soft absorbent cloth.

5.9 Reference black high gloss HPL

Black high gloss lacquered HPL (Gloss value $R' \geq 100$ GU (gloss unit)), measured with 60° geometry of a glossmeter according to 5.4 with antiscratch surface provided by corundum in the top lacquer.

NOTE James Heal Article Nr. JH701-501 is an example of a suitable product available commercially. This information is given for the convenience of users of this document and does not constitute an endorsement by CEN of this product.

6 Assembly and maintenance of the Martindale tester

The assembly of the tester shall be carried out in accordance with the instructions of the apparatus manufacturer. For the described test, the outer position C shall be used for both axes to create the larger Lissajous figure as explained in EN ISO 12947-1 or the manufacture guidebook.

The checking of the Lissajous figure shall be done according to Annex A.

7 Preparation and conditioning

7.1 Conditioning

Conditioning of test surface shall begin at least one week before testing and shall be carried out in air at a temperature of $(23 \pm 2)^\circ\text{C}$ and relative humidity of $(50 \pm 5)\%$.

The conditioning time shall be stated in the test report.

NOTE Some finishing systems cannot have achieved full cure after one week of conditioning.

7.2 Test surface

Six test surfaces with dimensions of $150\text{ mm} \times 150\text{ mm}$ shall be prepared.

The test surface shall be carefully wiped with a cleaning cloth (5.8) before the test without scratching the surface.

The test surface shall be substantially flat.

8 Test procedure

8.1 General

Two different procedures (A/B) are described. All the necessary parameters (scrub material, speed factor, number of cycles) are shown in Table 1.

Table 1 — Test procedures for determination of resistance to micro scratches

Test parameter	Procedure A	Procedure B
Scrub material	ultra fine	very fine
Speed	48 Rev/min	48 Rev/min
Load	6 N	6 N
Number of rubs	80 rubs (= 5 Lissajous movements)	80 rubs (= 5 Lissajous movements)
Assessment	gloss change after 24 h	Visual assessment according to Annex B after 24 h

8.2 Testing

8.2.1 Procedure A

8.2.1.1 Calibration of ultra fine scrub material

Procedure A is also valid for checking of every new batch of ultra fine scrub materials (5.6). In this case, 3 test surfaces shall be taken from reference high gloss HPL (5.9). The batch of ultra fine scrub materials shall be used for testing if the mean value of gloss change, determined with 60° glossmeter geometry, is in the range from 0 % to 10 % according to EN ISO 2813.

8.2.1.2 Microscratching of test area

Immediately after conditioning, the test shall be carried out in a test temperature of (23 ± 2) °C at 3 test surfaces.

4 gloss measurements on each test surface using the glossmeter (5.4) with a geometry of 60° and the positioning device (5.5) shall be carried out. If there is a decor or preferential structure direction on the test surface the measurement shall be done parallel to this direction. Calculate the mean value for each test surface.

Fix the test surface on the table of the Martindale tester using the adhesive tape (5.7). The ultra fine scrub material shall be fixed with the adhesive tape on the guide plate of holder.

Select 80 rubs on the counter of the Martindale device and start the test.

After finishing remove the test surface from the table and clean it with the cleaning cloth (5.8). Remove also the used scrub material.

Measure the gloss again according to the above described procedure.

Calculate for each test surface the gloss change $\Delta R'$ in % according to the following formula:

$$\Delta R' = \frac{R'I - R'F}{R'I} \times 100 \quad (1)$$

where

$R'I$ is the mean value at initial state;

$R'F$ is the value after finishing the test.

In the case of negative sign of calculated $\Delta R'$ value use the absolute value for further calculation.

Calculate the mean value of the gloss change of the 3 test surfaces and round it on the next integral number.