
**Leather — Tests for colour fastness —
Colour fastness to cycles of to-and-fro
rubbing**

*Cuir — Essais de solidité des coloris — Solidité des coloris au
frottement en va-et-vient*

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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 2.

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

ISO 11640 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 289, *Leather*, in collaboration with the Fastness Tests Commission of the International Union of Leather Technologists and Chemists Societies (IUF Commission, IULTCS), in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

The first edition was based on IUF 450 published in *J. Soc. Leather Tech. Chem.*, **71**, pp. 24-25 (1987), and declared an official method of the IULTCS in October 1989.

This second edition cancels and replaces the first edition (ISO 11640:1993). This new version is a technical update of the procedures and a revision of the definition of the wool felts (4.2). It includes the option for instrumental grey scale measurement (7.8) and precision information (8).

IULTCS, originally formed in 1897, is a worldwide organization of professional leather societies to further the advancement of leather science and technology. IULTCS has three Commissions, which are responsible for establishing international methods for the sampling and testing of leather. ISO recognizes IULTCS as an international standardizing body for the preparation of test methods for leather.

The rubbing of a leather surface with a wool felt is also known as the “VESLIC rub test”. VESLIC (Association of Swiss Leather Chemists and Technologists) was the original developer of the test method and equipment.

Leather — Tests for colour fastness — Colour fastness to cycles of to-and-fro rubbing

1 Scope

This International Standard specifies a method for determining the behaviour of the surface of a leather on rubbing with a wool felt.

It is applicable to leathers of all kinds.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 105-A01, *Textiles — Tests for colour fastness — Part A01: General principles of testing*

ISO 105-A02, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour*

ISO 105-A03, *Textiles — Tests for colour fastness — Part A03: Grey scale for assessing staining*

ISO 105-A04, *Textiles — Tests for colour fastness — Part A04: Method for the instrumental assessment of the degree of staining of adjacent fabrics*

ISO 105-A05, *Textiles — Tests for colour fastness — Part A05: Instrumental assessment of change in colour for determination of grey scale rating*

ISO 2418, *Leather — Chemical, physical and mechanical and fastness tests — Sampling location*

ISO 2419, *Leather — Physical and mechanical tests — Sample preparation and conditioning*

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*

ISO 4045, *Leather — Chemical tests — Determination of pH*

ISO 9073-2, *Textiles — Test methods for nonwovens — Part 2: Determination of thickness*

ISO 11641, *Leather — Tests for colour fastness — Colour fastness to perspiration*

3 Principle

One side of the leather specimen is rubbed with pieces of reference wool felt under a given pressure for a given number of forward and backward motions.

The degree of colour staining of the wool felt and the change in colour of the leather are assessed with grey scales. Any other visible change in, or damage to, the surface of the leather is also reported.

The general colour fastness testing principles shall be in accordance with those described in ISO 105-A01, taking into account that the substrate is leather.

4 Apparatus and materials

Ordinary laboratory apparatus and

4.1 Rub fastness test apparatus incorporating the elements specified in 4.1.1 to 4.1.3, and optionally including those described in 4.1.4.

4.1.1 A carriage with:

- a) a horizontal, completely planar metal platform;
- b) a holder for fastening the leather to the platform, leaving approximately 80 mm exposed;
- c) a device with which the leather may be extended at least 20 % linearly in the direction of rubbing.

4.1.2 A finger, 500 g $\pm$ 25 g in mass, removable, yet able to be fixed firmly in place and able to freely move vertically, with:

- a) a base measuring 15 mm $\times$ 15 mm;
- b) a device for attaching pieces of wool felt (4.2) to the base; the depth of the cavity shall be 3,9 mm $\pm$ 0,1 mm;
- c) a weight-piece of mass 500 g $\pm$ 10 g to load the finger up to a total mass of 1 000 g $\pm$ 35 g;
- d) means of lowering the finger with the base flat onto the test specimen.

4.1.3 Means for driving the carriage to and fro with a distance of travel of 35 mm to 40 mm at a frequency of 40 cycles/min $\pm$ 2 cycles/min for the complete forward and backward motion.

4.1.4 Convenient, but not essential, elements as follows:

- a) means of adjusting the position of the finger at right angles to the direction of rubbing, so that two or three positions may be used for rubbing on one piece of leather;
- b) a motor to drive the carriage forward and backward (see 4.1.3);
- c) means for pre-selecting a given number of cycles.

4.2 Rubbing material, square pieces of white or black wool felt, measuring approximately 15 mm $\times$ 15 mm, punched out of a sheet of pure wool felt meeting the following specification:

- pH of water extract between 4,5 and 8,0, according to ISO 4045;
- mass per unit area: 1 900 g/m² $\pm$ 150 g/m²;
- thickness, determined in accordance with ISO 9073-2, Method A: 6,0 mm $\pm$ 0,5 mm.

The black felt shall be dyed with Acid Black 24 (C.I. 26370).

NOTE An example of suitable wool felts available commercially is given in Annex A.

4.3 Vessel suitable for evacuation, e.g. vacuum-desiccator.

4.4 Vacuum pump, capable of evacuating the vessel (4.3). For the wetting of leather, according to 6.3, the vacuum pump shall be capable of achieving approximately 5 kPa.

4.5 Demineralized water, grade 3 in accordance with ISO 3696:1987.

4.6 Grey scale for assessing staining, in accordance with ISO 105-A03.

4.7 Grey scale for assessing change in colour, in accordance with ISO 105-A02.

4.8 Spectrophotometer or colorimeter for assessing change in colour and staining, complying with ISO 105-A04 and ISO 105-A05.

5 Test specimens

5.1 If the piece of leather available for testing is a whole hide or skin, then first take a sample in accordance with ISO 2418.

5.2 Test specimens shall be rectangular pieces of leather, at least 100 mm long and, for each position of the finger [see 4.1.4 a)], at least 20 mm wide.

Usually with one set of conditions (conditioning of leather and felt, number of cycles, etc.) only one specimen is tested. In case of dispute, it is strongly recommended to test several specimens, sampled from different positions on the hide or skin.

6 Conditioning of test specimens and pieces of felt

6.1 Dry leather and dry felt

Condition leather and wool felt in accordance with ISO 2419.

6.2 Wet felt

Wet the felt by placing pieces of felt in demineralized water (4.5). Heat the water to boiling and allow it to boil gently until the felt pieces sink. Then decant off the hot water and replace it with cold demineralized water. Allow to stand until the wetted felt pieces have reached room temperature. Take each piece of felt from the water just before use and squeeze or wipe it in order to reduce its water uptake to approximately 1 g. The wet pieces of felt shall not be allowed to soak in the water for more than 24 h.

6.3 Wet leather

Wet the leather by immersing specimens in demineralized water (4.5) in such a way that there is no contact between specimens. Place the containing vessel in the vacuum vessel (4.3), produce a vacuum of approximately 5 kPa and hold it for 2 min. Restore normal pressure. Carry out this procedure two more times.

Just before use, take the specimens out of the water and remove excess water on their surfaces with blotting paper.

The specimens shall not be allowed to soak in the water for more than 1 h.

6.4 Felt wetted with artificial perspiration solution

Wet the felt with the alkaline artificial perspiration solution, prepared as specified in ISO 11641. Place the containing vessel in the vacuum vessel (4.3), evacuating and restoring pressure repeatedly until the felt

pieces sink. Just before use, take each felt piece out of the solution and squeeze or wipe it in order to reduce its uptake of artificial perspiration solution to approximately 1 g.

The felt shall not be allowed to soak in the artificial perspiration solution for more than 24 h.

7 Procedure

7.1 Mount a conditioned specimen on the apparatus and stretch it 10 % in the direction of rubbing. If the specimen cannot be extended linearly by 10 %, stretch it less or not at all. If the specimen at 10 % extension does not remain stable during rubbing, stretch it sufficiently to achieve stability. In both of the latter cases, state the extension in the test report.

7.2 For normal leathers, attach the weight-piece so that the total mass of the finger is $1\,000\text{ g} \pm 35\text{ g}$ (4.1.2).

NOTE Due to the higher friction on suede leathers and suede-like leathers, it can be desirable in such cases to carry out the test with a total mass of $500\text{ g} \pm 25\text{ g}$ (i.e. without the additional weight-piece).

7.3 Attach a piece of conditioned felt to the finger (4.1.2). Place the finger on the leather and carry out the required number of cycles.

At completion of the test, lift the finger off the leather test specimen, especially if using wet felts.

7.4 If required, repeat the test with another number of cycles with the finger in a fresh position on the specimen (or a new specimen) and after replacing the felt by a new piece.

7.5 In the case of a pilling effect on the felt, the test should be repeated. If the pilling effect re-occurs, report this in the test report.

7.6 Release the specimen and assess the rubbed area on the specimen and/or on the pieces of felt for change in colour and staining, respectively, as specified in 7.7. Wetted specimens and pieces of felt shall be dried at ambient temperature before assessment.

If required by the client, white or light coloured leathers can be tested with a black felt. Slight discoloration of the leather, due to colour rub-off from the felt, may be possible. In this case, do not assess the change in colour of the leather. This shall be assessed after rubbing in a different place with a white felt.

7.7 Using D65 illumination according to ISO 105-A01, visually assess the change in colour of the leather (4.7) and the staining (4.6) of the pieces of felt with the grey scales in accordance with ISO 105-A02 and ISO 105-A03. For the assessment of the felts after the test, reference felts shall be used which have been treated in the same way as the tested felt, e.g. for wet test, the reference felt is wetted with water and dried.

Note any other visible changes in the surface of the specimen, e.g. loss of gloss, development of polish, flattening of the nap or destruction of finish.

7.8 Alternatively, provided the staining and colour change is even, the grey scale staining and colour difference can be assessed instrumentally (4.8) in accordance with ISO 105-A05 and ISO 105-A04 respectively.

8 Precision

For the visual grey scale evaluations, an inter-person precision of $\pm 0,5$ grey scale units is normal.

9 Test report

The test report shall include the following information:

- a) a reference to this International Standard, ISO 11640;
- b) a description of the type of leather tested;
- c) an indication as to which surface of the leather was tested;
- d) the conditions under which the leather and felt were conditioned before testing and the type of felt used (white or black);
- e) the number of cycles completed;
- f) the numerical grey scale ratings for the change in colour of the specimens and for the staining of each piece of felt;
- g) details of any other visible change in the surface of the specimen;
- h) details of any deviations from the method specified in this International Standard.