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Leather — Tests for colour fastness — Colour fastness to migration into polymeric material

Cuir — Essais de solidité des coloris — Solidité des coloris à la migration dans les matériaux polymères

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

IULTCS, originally formed in 1897, is a world-wide 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.

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

It is based on IUF 442 published in *J. Soc. Leather Tech. Chem.*, **56**, pp. 395–400, 1972, with a minor amendment in **65**, p. 128, 1981, declared an official method of the IULTCS in 1973 and reconfirmed in 1989.

This third edition cancels and replaces the second edition (ISO 15701:2015), which has been technically revised.

The main changes are as follows:

— to indicate the method is applicable for polymeric materials, the general references in the text to “plasticized poly(vinyl chloride)” have been changed to “polymeric material”;

— the note previously at the end of the Scope has been deleted;

— Clause 3 has been added;

— 5.1 has been revised to allow the use of plates of an inert material in the test apparatus.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Leather — Tests for colour fastness — Colour fastness to migration into polymeric material

1 Scope

This document specifies a method for assessing the propensity of dyes and pigments to migrate from leather to a synthetic substrate by determining the transfer of colour from the leather to white polymeric material in contact with it.

This method is applicable to leather of all kinds at any stage of processing.

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.

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

3 Terms and definitions

No terms and definitions are listed in this document.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Principle

The side under test of the leather specimen is placed on a polymeric sheet, for example a white-pigmented sheet of plasticized poly(vinyl chloride), and the resultant composite specimen is exposed to heat under pressure in a suitable apparatus. The transfer of colour from the leather to the white sheet is assessed with the standard grey scale for assessing staining and, if applicable, any change in hue of the staining is also assessed.

The use of standard sheets of polymeric material makes it possible to determine the tendency of colour to migrate from the leather to synthetic materials used in conjunction with the leather.

If the leather has a finish, the test may be carried out with the finish intact or broken.

The general colour fastness testing principles used are in accordance with those described in ISO 105-A01, taking into account the differences between textile substrates and leather.

5 Apparatus and materials

The usual laboratory apparatus and, in particular, the following shall be used.

5.1 Test apparatus, in which the composite specimen can be subjected, **between plates of an inert material (e.g. plates of glass or plastic)** to a uniform pressure of (81,7 ± 4,0) kPa using an approximately 5 kg load weight. The pressure tolerance includes a maximal supplementary mass due to the glass plates of 250 g. The construction of the test apparatus shall ensure that the pressure is constant during the whole test.

NOTE 1 The 81,7 kPa pressure from a 5 kg load weight is equivalent to 833 g/cm^2 on the (30 × 20) mm leather specimen.

NOTE 2 A test apparatus that allows removal of the load weight after fixing the composite specimens is not suitable for this test.

NOTE 3 Examples of suitable apparatus available commercially are given in Annex A.

5.2 Oven, maintained at (50 ± 2) °C.

5.3 Sheet of suitable polymeric material, preferably pigmented white.

If no additional information is provided, use **plasticized poly(vinyl chloride)**, pigmented white, (0,5 ± 0,1) mm thick, measuring approximately (50 × 30) mm.

NOTE Examples of suitable commercial sources for the prepared sheets of polyvinyl chloride and the specifications are given in Annex A.

5.4 If the finish is to be broken, **fine-grained abrasive paper,** grade P 180, as defined in the P-series grain size standard for coated abrasive products, see FEPA 43-1:2006.

5.5 Press knife, the inner wall of which is a rectangle (30 ± 1) mm × (20 ± 1) mm.

5.6 Grey scale for assessing staining, conforming with ISO 105-A03 or an **instrumental system for assessing staining**, conforming with ISO 105-A04.

6 Test specimens

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

6.2 If the leather has no finish, or if it has a finish but is to be tested with the finish intact, or the reverse side of the leather is to be tested, with the press knife (5.5) simply cut out a representative test specimen measuring (30 × 20) mm.

In the case of a differing load weight, it is possible to realize the pressure stated in 5.1 either by adding a supplementary load (only possible for lower load weights) or by adjusting the dimensions of the specimen. The second possibility is restricted by the dimensions of the polymeric material sheet that has to exceed the dimensions of the test specimen.

A modality to recalculate the specimen area is given in the formula:

$$A_1 = \frac{(m_1 \times A_0)}{m_0}$$

where

A_0 is the area of the specimen stated by this document;

A_1 is the recalculated area of the specimen;

m_0 is the load weight stated by this document;

m_1 is the load weight existing in the laboratory.

EXAMPLE If the available load weight m_1 is 4,5 kg, additional loading pieces of 0,5 kg are permitted to be added or a specimen with a different area is allowed to be used. The new area would be in this case 5,4 cm^2, i.e. (27 × 20) mm, instead of 6 cm^2.

6.3 If the leather has a finish and is to be tested with the finish broken, prepare the test specimen as follows:

Cut out a piece of leather measuring approximately (80 × 60) mm and lay it out, finish side down, on a sheet of abrasive paper (5.4), measuring about (150 × 200) mm, held flat on a work surface. Load the upper side of the piece of leather uniformly with a 1-kg weight. Move the piece of leather 100 mm to-and-fro on the abrasive paper, carrying out 10 to-and-fro cycles.

NOTE With practice, it is possible to achieve the same roughening effect holding the abrasive paper in the hand.

Brush the roughened area thoroughly to remove all dust. From the roughened area of the leather, use the press knife (5.5) to cut out a test specimen measuring (30 × 20) mm.

The fact that the finish has been broken shall be mentioned in the test report.

6.4 Make up a composite specimen by placing the test specimen, with the side to be tested face down, in the centre of an approximately (50 × 30) mm piece of the polymeric material sheet (5.3).

7 Procedure

7.1 The load weight shall be preheated in the oven (5.2) at (50 ± 2) °C for at least 2 h. Place the composite specimen between two glass plates, place the plates in the apparatus (5.1) and load with an approximately 5 kg load weight [corresponding to a pressure of (81,7 ± 4,0) kPa on the leather].

It is possible to test several composite specimens simultaneously, but care shall be taken to place each centrally between two plates so that pressure is exerted evenly over the specimen surfaces.

7.2 Place the apparatus in the oven at (50 ± 2) °C for 16 h.

NOTE Different test temperatures can be used as appropriate for assessing particular aspects of colour migration, for example the higher temperatures encountered in some processing procedures.

7.3 On completion of the heat treatment, take the apparatus from the oven, remove the load weight from the composite specimens and allow them to cool to room temperature.

7.4 As soon as the composite specimens have cooled, separate them into their component elements and assess any staining of the polymeric material sheet with the grey scale (5.6). This is done by assessing, either visually in accordance with ISO 105-A03 or instrumentally in accordance with ISO 105-A04, the contrast between that part of the polymeric material sheet which has been in contact with the specimen and that part which has not. If any dust or loose fibres adhere to the polymeric material, remove them by wiping with a damp cloth before assessment.

If required, the staining on the back of the polymeric material sheet may also be assessed.

The assessment of the staining of the polymeric material sheet shall be carried out immediately after the composite specimen has cooled, since the stain often migrates over time into the sheet, thus decreasing the intensity of the staining on the side being assessed.

If necessary, an intermediate assessment may also be made, for example, after heating the weighted composite specimen for only 2 h.

If the colour of the staining on the polymeric material sheet is different from the colour of the leather, note the hue of the staining.

8 Precision

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

9 Test report

The test report shall at least include the following information:

a) a reference to this document, i.e. ISO 15701:2022;

b) a description of the leather tested;

c) an indication as to which surface of the leather was tested;

d) whether there was a finish and, if so, if the test was carried out with the finish broken;

e) the test temperature, if not 50 °C;

f) the grey scale method used and the grey scale rating obtained for the staining of polymeric material, describing also the hue of the staining where it differs from that of the leather;

g) the source of the polymeric material used (e.g. PVC according to Annex A);

h) a detailed description of any other polymeric material, if used;

i) details of any deviations from the procedure;

j) the date of the test.

Annex A
(informative)

Commercial sources for apparatus and materials

A.1 General

Examples of suitable products available commercially are given in this annex. This information is given for the convenience of users of this document and does not constitute an endorsement by ISO of these products.

A.2 Apparatus

A suitable apparatus is the Perspirometer "Hydrotest" (manufactured by, for example, Karl Schröder KG, Mierendorffstrasse 28, D-69469 Weinheim, Germany, https://www.schroeder-prueftechnik.de/unternehmen.php), which consists of a stainless-steel frame, into which fits precisely a piston of mass 5 kg and cross-section (115 × 60) mm, and glass plates of the same cross-section and about 1,5 mm thick. Plates made of, for example, poly(methyl methacrylate) are not suitable because in time they can become distorted and discoloured.

Any other apparatus may be used, provided it gives the same results. For example, the Perspiration Tester M231/PR1 available from SDL Atlas LLC, 3934 Airway Drive, Rock Hill, SC 29732, USA, https://sdlatlas.com/.

A.3 Polymeric sheets

It is advisable to use sheets of a white pigmented polymeric material that has been prepared for the purpose.

For example, white pigmented, plasticized poly(vinyl chloride) in the form of standard sheets containing 12 pieces of approximately (50 × 30) mm and obtainable from Swissatest Testmaterialien AG, Mövenstrasse 12, CH-9015 St. Gallen, Switzerland, https://www.swissatest.ch/en/.

These sheets are made from a compound of the following composition, in % mass fraction, calendered at (150 ± 5) °C:

Poly(vinyl chloride):	(48,0 ± 1,0) %
Plasticizer, mix of isodecyl diphenyl phosphate and a high molecular hydrocarbon fraction:	(48,0 ± 1,0) %
Stabilizer, dibutyltin maleate:	≈ 1,0 %
Pigment, titanium dioxide (anatase):	≈ 3,0 %
Total:	100,0 %

It is necessary that the quality of the plasticizers used is such that the sheets are white. It is necessary for the stabilizer to be free from lead. The migration properties of each new production batch are checked against the previous batch.

Bibliography

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

[2] FEPA 43-1:2006, *Grains of fused aluminium oxide, silicon carbide and other abrasive materials for coated abrasives Macrogrits P 12 to P 220*