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Leather — Tests for colour fastness — Colour fastness to perspiration

Cuir — Essais de solidité des teintures — Solidité des teintures à la sueur

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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.

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.

International Standard ISO 11641 was prepared by the Fastness Tests Commission of the International Union of Leather Technologists and Chemists Societies (IUF Commission, IULTCS). It is based on IUF 426 published in *J. Soc. Leather Tech. Chem.*, **71**, pp. 22-24 (1987), and declared an official method of the IULTCS in October 1989.

Annexes A and B of this International Standard are for information only.

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Leather — Tests for colour fastness — Colour fastness to perspiration

1 Scope

This International Standard specifies a method for determining the colour fastness to perspiration of leather of all kinds at all stages of processing, but it applies particularly to gloving, clothing and lining leathers, as well as leather for the uppers of unlined shoes.

NOTE 1 During the test, the adjacent fabric used may become stained and the colour of the leather may change.

The method uses an artificial perspiration solution to simulate the action of human perspiration. Since perspiration varies widely from one individual to the next, it is not possible to design a method with universal validity, but the alkaline artificial perspiration solution specified below will give results corresponding to those with natural perspiration in most cases.

NOTE 2 In general, human perspiration is weakly acidic when freshly produced. Microorganisms then cause it to change, the pH usually becoming weakly alkaline (pH 7,5 to 8.5). Alkaline perspiration has a considerably greater effect on the colour of leather than has acid perspiration. An alkaline, rather than acidic, perspiration solution is therefore used to simulate the most demanding conditions encountered in practice.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 105-A02:1993, *Textiles — Tests for colour fastness — Part A02: Grey scale for assessing change in colour.*

ISO 105-A03:1993, *Textiles — Tests for colour fastness — Part A03: Grey scale for assessing staining.*

ISO 105-F10:1989, *Textiles — Tests for colour fastness — Part F10: Specification for adjacent fabric: Multifibre.*

ISO 2419:1972, *Leather — Conditioning of test pieces for physical tests.*

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

3 Principle

A leather specimen is soaked in artificial perspiration solution and a piece of adjacent fabric, also soaked in artificial perspiration solution, laid against each side to be tested. The composite specimen is left under pressure for a specified time in a suitable apparatus. The leather specimen and adjacent fabric are then dried, and the change in colour of the specimen and the staining of the adjacent fabric assessed with the grey scales.

Leathers with a finish may be tested intact or with the finish broken.

4 Apparatus and materials

Ordinary laboratory apparatus and

4.1 Test apparatus[1], capable of subjecting the composite specimen to a uniform pressure of 1,23 N/m^2 (equivalent to loading with a mass of 125 g/cm^2).

4.2 Oven, maintained at 37 °C ± 2 °C.

4.3 Plain-weave fabric, measuring 100 mm × 36 mm, for use as adjacent fabric.

NOTE 3 Type DW multifibre fabric[2] conforming with ISO 105-F10 is normally used.

4.4 Demineralized water, grade 3 in accordance with ISO 3696.

4.5 Artificial perspiration solution, containing, per litre of solution:

5,0 g of sodium chloride,

5,0 g of tris(hydroxymethyl)aminomethane $[NH_2C(CH_2OH)_3]$,

0,5 g of urea and

0,5 g of nitrilotriacetic acid $[N(CH_2COOH)_3]$,

and adjusted to pH 8,0 ± 0,1 with hydrochloric acid.

To prepare for example 1 litre of alkaline artificial perspiration solution, dissolve the weighed-out components in about 900 ml of demineralized water in a 2 litre beaker with a 1 000 ml mark. Add 2 M hydrochloric acid solution drop by drop while stirring until the pH, measured with a pH-meter, reaches 8,0 ± 0,1. Make up to 1 000 ml. Check the pH periodically and discard the solution if the pH is not within 8,0 ± 0,1. Also discard the solution if colonies of microbes become visible.

4.6 Fine-grained abrasive paper, grade P 180, as defined in the P-series grain size standard published by the Federation of European Producers of Abrasive Products (FEPA)[3].

4.7 Grey scale for assessing staining, in accordance with ISO 105-A03, and **grey scale for assessing change in colour**, in accordance with ISO 105-A02.

4.8 Vacuum-desiccator vessel, or other glass container suitable for evacuation.

4.9 Vacuum pump, capable of evacuating the desiccator vessel (4.8) to 5 kPa (50 mbar) within 4 min.

5 Procedure

5.1 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 about 120 mm × 50 mm and lay it out, finish-side down, on a sheet of abrasive paper (4.6), measuring about 150 mm × 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 4 With practice, the same roughening effect can be achieved holding the abrasive paper in the hand.

Brush the roughened area thoroughly to remove all dust. From the roughened area of the leather, cut out a test specimen measuring 100 mm × 36 mm.

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

5.2 If the leather has no finish, or if it has a finish but is to be tested with the finish intact, simply cut out a test specimen measuring 100 mm × 36 mm.

5.3 Cut out one or two pieces of adjacent fabric (4.3), also measuring 100 mm × 36 mm.

5.4 Immerse the leather specimen and adjacent fabric(s) in artificial perspiration solution (4.5) in separate vessels, using e.g. bent glass rods to keep them immersed. (If testing more than one specimen simultaneously, several pieces of adjacent fabric may be immersed in the same vessel, but each leather specimen shall be immersed in a separate vessel.) Place the vessels in the vacuum desiccator (4.8), produce a vacuum of 5 kPa within 4 min, and hold this vacuum for 2 min. Restore normal pressure. Repeat the procedure a further two times. Lay a piece of adjacent fabric out on a glass plate and cover it with the leather specimen, with the side under test facing down. If both sides are to be tested, cover the leather

1) Examples of suitable apparatus available commercially are given in annex A.

2) Examples of commercial sources for multifibre fabric are given in annex A.

3) FEPA Standard 43-GB-1984, obtainable from The British Abrasive Federation, P.O. Box 58, Trafford Park Road, Trafford Park, Manchester M17 1JD, United Kingdom.

specimen with a second piece of adjacent fabric. Cover the composite specimen with a second glass plate.

5.5 Preheat the loading weight of 4,5 kg in the oven (4.2) at 37 °C ± 2 °C for at least 1 h. Place the composite specimen, between the two glass plates, in the test apparatus (4.1) and load it with the 4,5 kg weight. In order to allow excess perspiration solution to run off, tilt the apparatus about 30° to each side for a few seconds. (When testing several composite specimens simultaneously, take care to ensure that each is placed centrally between two plates in such a way that the pressure is exerted evenly on it.) Place the loaded apparatus in the oven and leave at 37 °C ± 2 °C for 3 h.

5.6 At the end of the 3 h period, take off the load, remove the composite specimen from the apparatus, stitch it together at one corner, and dry it by hanging it in air under standard conditions as specified in ISO 2419 (20 °C and 65 % relative humidity), with the specimen and its adjacent fabric(s) in contact only at the point of stitching.

5.7 Assess the staining of each kind of fibre in the adjacent fabric(s), using the appropriate grey scale in accordance with ISO 105-A03, and also assess the change in colour of the specimen in accordance with ISO 105-A02.

6 Test report

The test report shall include the following information:

a) a reference to this International Standard;

b) a description of the type of leather tested;

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

d) whether there was a finish and, if so, whether the finish was broken;

e) the numerical ratings obtained for the staining of the adjacent fabric(s), giving a separate rating for each of the different types of fibre;

f) the numerical rating obtained for the change in colour of the specimen;

g) details of any deviations from the procedure.

Annex A
(informative)

Commercial sources for apparatus and materials

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

A.1 The recommended apparatus is the "Hydrotest" (manufactured by, for instance, Karl Schröder KG, D-6940 Weinheim, Germany), which consists of a stainless-steel frame, into which a rectangular piston 4,5 kg in mass and 115 mm × 60 mm in cross-section fits accurately, and rectangular plates of an inert material, e.g. glass, of the same length and width as the piston and about 1,5 mm thick. Any other apparatus may be used, provided it gives the same results, e.g. the "Perspirometer" of the American Association of Textile Chemists and Colorists, supplier: Atlas Electric Devices Co., Chicago, IL, USA.

A.2 Examples of suppliers for DW Multifibre fabric:

Society of Dyers and Colourists, P.O. Box 244, Bradford, West Yorkshire BD1 2JB, UK;

Testfabrics Inc., P.O. Drawer "O", Middlesex, NJ 08846, USA.

Annex B
(informative)

Bibliography

The following IULTCS publications describe related methods:

[1] IUF 120, *General principles of colour fastness testing of leather.*

[2] IUF 424, *Colour fastness of leather to water.*

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