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IULTCS IUF 470

Third edition
2022-10

Leather — Test for adhesion of finish

Cuir — Essai d'adhérence de la couche de finissage

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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*, in accordance with the agreement on technical cooperation between ISO and CEN (Vienna Agreement).

It is based on IUF 470 published in *J. Soc. Leather Tech. Chem.*, **74**, pp. 155–160, 1990, and was declared an official method of the IULTCS in September 1991.

This third edition cancels and replaces the second edition (ISO 11644:2009), which has been technically revised.

The main changes are as follows:

— Clause 1: addition in the Scope of exclusions from the field of application of unpigmented articles or articles without a continuous coating layer;

— Clause 7: modifications of conditioning of test specimens and specimens bonding time;

— Clause 9: modifications in the test report.

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.

Introduction

Prior to the first edition of this document in 1993, a similar test method to that specified here, using an expoxy adhesive and metal adherent plates, had been in use in the leather trade for many years, but was never declared an official method by IULTCS or ISO. The adhesive frequently penetrates thin finish films, thus increasing the adhesion value unrealistically, and it is usually not possible to measure wet adhesion as there is insufficient adhesion to the metal when water is present. Finishes with insufficient adhesion to the adhesive also occur quite frequently. In spite of these drawbacks, this old method was used regularly and was referred to in many specifications. The method specified in this document eliminates most of these drawbacks.

The adhesives used in this method harden quickly and there is no time for them to penetrate even quite thin finishes unless the finish has open cracks in it. While adhesion to most finishes is sufficient, a few cases still exist in which the adhesion is insufficient and either a different adhesive has to be used or the surface lightly roughened. As the adhesive does not penetrate, it is quite possible to test different layers of a multi-layer finish separately. Such a finish can be tested several times until all the layers have been removed from the leather. It would be advisable for specifications to make allowance for this fact.

A strip of hard PVC is used as the adherent plate; this gives good adhesion under wet conditions. Wet adhesion can therefore be measured easily. Experience has shown that this "real" wet-adhesion value is often lower, a fact that is also to be considered when drawing up specifications based on this method.

Leather — Test for adhesion of finish

1 Scope

This document specifies a method for measuring the adhesion of the finish to leather or the adhesion between two adjacent layers of the finish.

The method is valid for all finished flexible leathers with a smooth surface that can be bonded to an adherent plate without the adhesive penetrating into the finish. Preliminary experiments can be necessary to determine whether these conditions are met.

This test method applies to finished leathers with a thick finish-coat.

The method specified in this document does not apply to unpigmented articles or articles without a continuous coating layer, such as:

— nubuk;

— aniline;

— pull-up;

— suede;

— perforated leather.

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

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, *Water for analytical laboratory use — Specification and test methods*

EN 15987, *Leather — Terminology — Key definitions for the leather trade*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15987 and the following apply.

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/

3.1
adhesion
force required to pull the leather away from its surface finish layer, the force being applied steadily, at an angle of about 90°, to a rigid adherent plate to which the finished side of the leather has been bonded

4 Principle

The finished side of part of a strip of leather is bonded to an adherent plate by means of an adhesive film. Force is applied to the free end of the strip to peel the leather from the finish over a given distance, the finish layer remaining on the adherent plate together with the film of adhesive. The force required is measured and reported as the adhesion value of the finish.

The test is usually carried out on specimens conditioned in a standard atmosphere before testing. If required, the test may additionally be carried out on wetted specimens or on specimens that have previously been subjected to other treatments.

5 Apparatus and materials

5.1 Tensile-testing machine, incorporating the following features:

a) a force range appropriate to the specimen under test;

b) a uniform speed of separation of the jaws of 100 mm/min ± 5 mm/min;

c) suitable means for fixing the adherent plate holder (5.3) and either the hook link (5.4) or clamp (5.5);

d) provision for recording a force-distance diagram during the test.

5.2 Adherent plate, comprising a piece of hard polyvinyl chloride (PVC), or another suitable material, measuring approximately 70 mm × 20 mm × 3 mm, to which the leather specimen is bonded. PVC with a high infrared (IR) absorption is preferred.

5.3 Adherent plate holder (see Figure 1), made of any suitable material, for holding the adherent plate, to which the leather specimen has been bonded, in the lower clamp of the tensile-testing machine. Optionally, the plates can be held firmly by screws through the sides of the plate holder, see Figure 5.

Dimensions in millimetres

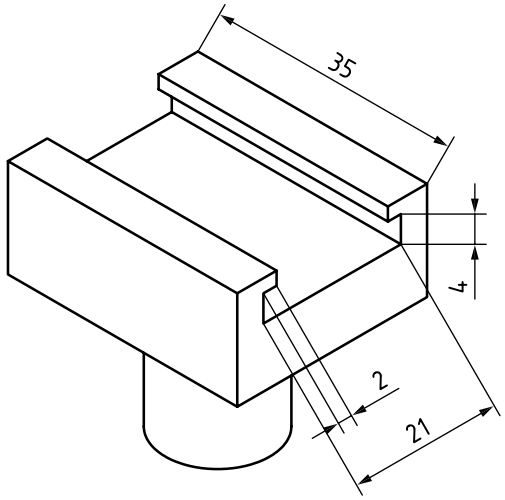

Figure 1 — Adherent plate holder (±2 mm for 35 mm, otherwise ± 1 mm)

Either:

5.4 Hook link, made of steel wire 1 mm to 2 mm in diameter, at least 200 mm long, for attaching the free end of the leather specimen to the upper clamp of the tensile-testing machine (see Figures 2 and 4). The length of the hook link ensures that the angle of peel always remains close to 90°.

Or:

5.5 Flat-jawed laboratory screw clamp (see Figure 3), suitable for clamping the leather sample with a suitable attachment for connecting the laboratory clamp to the upper jaw of the tensile-testing machine, see Figure 5. The length of this attachment should be approximately 250 mm long to ensure that the angle of peel remains close to 90°. Alternatively, a flat-jawed device fitted directly to a tensile-testing machine, such that a peel angle of 90° can be maintained throughout the test, may be used.

5.6 Punch, suitable for making a hole 2 mm to 3 mm in diameter in the leather specimen, if using the hook link (5.4).

Dimensions in millimetres

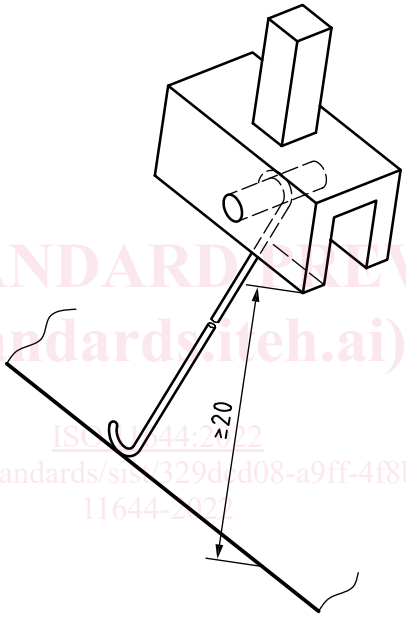

Figure 2 — Hook link

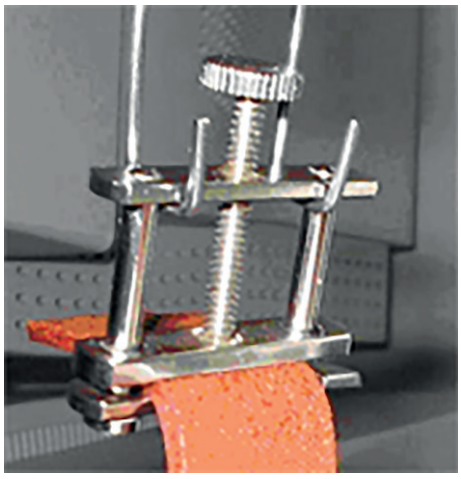

Figure 3 — Flat-jawed clamp

5.7 Adhesive, suitable for bonding the leather specimen to the adherent plate. Types of adhesives found to give satisfactory, reproducible results are:

— a single-component cyanoacrylate adhesive of the instant adhesive type, that hardens and bonds within a very short time to avoid penetration of the adhesive through the finish layer;

— a two-component polyurethane adhesive, comprising a resin and a hardener.

For the two-component adhesive, usually 20 g of solid resin is dissolved in 80 g of ethyl acetate and 5 g of hardener is added, unless otherwise instructed by the supplier of the adhesive. The adhesive shall be used within 8 h of adding the hardener, unless otherwise instructed by the supplier.

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

5.8 Infrared lamp or oven, capable of heating the adherent plate (5.2) such that the adhesive is activated. This lamp (oven) is only required if the two-component adhesive is used.

5.9 Weight-piece, of mass approximately 4,5 kg, with a flat base.

5.10 Cleaning solvent, hexane or a mixture of alkanes boiling within the range of 40 °C to 80 °C (e.g. petroleum ether), for cleaning the surface of the adherent plate and the finished side of the leather specimen before bonding.

5.11 Cutter, capable of cutting a specimen of 100 mm ± 2 mm × 10 mm ± 1 mm from the leather with one stroke.

5.12 Apparatus for wetting the test specimen, comprising the elements specified in 5.12.1 to 5.12.3. This apparatus is only required when wetted leathers are to be tested.

5.12.1 Vacuum-desiccator vessel, or another glass container suitable for evacuation.

5.12.2 Vacuum pump, capable of evacuating the desiccator vessel (5.12.1) to approximately 5 kPa (50 mbar) within approximately 4 min.

5.12.3 Beaker, filled with distilled water at approximately 20 °C, in which the test specimens (leather bonded to adherent plate) can be completely submerged.

5.13 Grey scale for assessing change in colour, in accordance with ISO 105-A02. (This is only required when the change in colour of the leather surface is to be assessed after undergoing the test and repolishing.)

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

6 Preparation of test specimens

6.1 From the piece of leather to be tested, cut out, with one stroke of the cutter (5.11) or by using an appropriate cutting die, strips measuring 100 mm ± 2 mm × 10 mm ± 1 mm.

As an option, to avoid the overestimation of the results due to interference of excess adhesive along the thickness of the edges (6.6), from the piece of leather cut out strips larger than 10 mm ± 2 mm × 10 mm ± 1 mm. Then, follow the same procedure from 6.2 to 6.5 using the larger strips for the leather-adherent bonding plate preparation.

NOTE 1 For example, larger strips measuring 150 mm ± 2 mm × 20 mm ± 1 mm are suitable.

Take at least four leather specimens, when possible according to ISO 2418, two with their long axis parallel to the backbone and two with their long axis at right angles to the backbone, for each leather specimen location and for each type of test specimen conditioning.

The adhesion of a finish to the leather may vary considerably, even within a single piece (e.g. skin, side, shoulder). If it is necessary to evaluate these variations, it is recommended that the leather specimens be taken not only from the positions specified in ISO 2418, but also from the shoulder and belly.

NOTE 2 For some types of shoe upper leather it will possibly be desirable to use a wider specimen size and correspondingly wider adherent plates. If another specimen size is used, this is included in the test report.

6.2 If using the hook link system of removing the finish, then using the punch (5.6), make holes approximately 2 mm to 3 mm in diameter at each end of the centreline of each strip, about 5 mm from the end.

Either:

6.3 For the **two-component adhesive**, attach the leather specimen to the adherent plate.

6.3.1 Clean the surface of the adherent plate (5.2) to which the leather specimen is to be bonded and the finished side of the leather with a clean piece of cloth wetted with cleaning solvent (5.10).

CAUTION — Use adequate ventilation, avoid contact of the solvent with the skin and wear eye protection.

6.3.2 Carefully apply the adhesive as a uniform thin layer to the cleaned surface of the adherent plate and then store at room temperature for at least 30 min. The adherent plate with the adhesive shall be used within 8 h of applying the adhesive. For leathers with a coarse grain, several layers of adhesive shall be applied, in order to ensure that the grooves in the leather will be filled.

6.3.3 Heat the adhesive film on the adherent plate, either with the IR lamp or by placing it in the oven for 10 min at 85 °C. Immediately afterwards, place the leather specimen with the finish down on the adhesive film, with the leather extending about 15 mm beyond each end of the plate, and then place the weight-piece (5.9) on the leather for at least 2 h.

Or:

6.4 For the **single-component adhesive**, attach the leather specimen to the adherent plate.

6.4.1 Clean the surface of the adherent plate (5.2) to which the leather specimen is to be bonded and the finished side of the leather with a clean piece of cloth wetted with solvent (5.10).

CAUTION — Use adequate ventilation, avoid contact of the solvent with the skin and wear eye protection.

6.4.2 Apply the adhesive (5.7) as a thin layer to the cleaned surface of the adherent plate. Take care to apply the adhesive uniformly according to the supplier's instructions and immediately after application, carefully place the leather specimen with the finish down onto the adhesive film, with the leather extending about 15 mm beyond each end of the plate, and then place the weight-piece (5.9) on the leather for at least 10 min.

CAUTION — Avoid contact of the liquid cyanoacrylate adhesive with the skin.

NOTE Especially when testing the adhesion of the finish of leathers with heavy prints, even adhesion can be ensured by rolling the upper surface of the leather with a hand roller, while applying moderate pressure, before the weight-piece is placed on the test specimen.