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IULTCS - IUP 56

Second edition
2020-04

**Leather — Identification of leather
with microscopy**

Cuir — Identification du cuir par microscopie

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Reference numbers
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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.

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

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 sampling and the testing of leather. ISO recognizes IULTCS as an international standardizing body for the preparation of test methods for leather.

This second edition cancels and replaces the first edition (ISO 17131:2012), which has been technically revised. The main changes to the previous edition are as follows:

- light microscope phase contrast cross-section photographs added in a new normative [Annex C](#);
- [Clauses 5](#) and [6](#) have been modified to include the preparation for this light microscopy technique.

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

The identification of leather is best made by operators experienced in material identification using microscopy, which is the preferred method. With other methods, such as chemical analysis, it can be difficult to absolutely determine that the material is leather.

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Leather — Identification of leather with microscopy

1 Scope

This document specifies a method using microscopy to identify leather and distinguish it from other materials. The method is not applicable for identifying specific leathers (e.g. sheep 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 17186, *Leather — Physical and mechanical tests — Determination of surface coating thickness*

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 apply.

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

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

4 Principle

A cross-section of the material is cut perpendicular to the surface. The material structure is compared with typical pictures or known samples by means of microscopy.

The method should be carried out by operators experienced in material identification by microscopy.

5 Apparatus and materials

5.1 Light microscope (optical, phase-contrast or stereo) or scanning electron microscope, capable of giving a normal magnification of at least 20 ×.

NOTE For some materials it is necessary to use a microscope with a magnification of 500 ×.

5.2 Razor blade, capable of cutting a clean cross-section in leather, if the microscope illuminates from above or a scanning electron microscope is used.

5.3 Cryomicrotome, if the microscope illuminates from below or a phase-contrast microscope is used.

5.4 Coating unit, sputter or evaporation, including a suitable element or alloy (e.g. gold) for coating, if a scanning electron microscope is used.

5.5 Specimen stubs, suitable for a scanning electron microscope, if used.

5.6 **Reference materials**, with known designation.

6 Procedure

6.1 From the material being tested, cut two test pieces approximately 10 mm × 10 mm using a suitable cutting device and then section each of the test pieces in accordance with [6.2](#) or [6.3](#).

6.2 Place the cutting edge of the razor blade ([5.2](#)) with the blade perpendicular to the surface and press the blade through the whole thickness of the test piece, ensuring that the blade remains vertical and the section is cleanly cut. If the test piece is considered to be leather, make the cut with the flesh or inner side uppermost.

NOTE 1 It is useful to prepare the second test piece section perpendicular to the first.

NOTE 2 A section made as in [6.2](#) is suitable for examination under a microscope illuminated from above or by scanning electron microscopy.

6.3 Place the leather sample soaked in water in a cryomicrotome ([5.3](#)) and cut a slice of appropriate thickness.

NOTE A section made as in [6.3](#) is suitable for examination under a microscope illuminated from below or a phase-contrast optical-microscope. It is useful with a dark sample or a sample with transparent coating.

6.4 When using a scanning electron microscope, ensure that the prepared section adheres to a specimen stub ([5.5](#)) with the cut surface uppermost. Coat the stub and section in the coating unit ([5.4](#)) so that good image quality can be obtained.

6.5 Place the sections under the microscope and compare the material structure with [Figures A.1](#) to [A.12](#) in [Annex A](#) (scanning electron microscope photos), [Figures B.1](#) to [B.12](#) in [Annex B](#) (light microscope photos) and/or [Figures C.1](#) to [C.3](#) in [Annex C](#) (phase contrast cross-section photos), or with known reference materials ([5.6](#)). Use a suitable magnification to distinguish the typical fibre structure of leather from other materials. Consider the appropriate terms for leather defined in EN 15987.

For the absolute identification of leather it is necessary to identify the more or less intact original fibrous structure.

6.6 If necessary, determine the surface coating thickness and the total thickness in accordance with ISO 17186. The cryomicrotome method shall only be used for material identification analyses, as the intrinsic original structure of the material can be changed during the sample preparation processes. Additional structure analyses (e.g. total thickness or thickness of coating) on samples prepared for cryomicrotome give false results.

6.7 Define the designation of the material considering the results of [6.5](#) and [6.6](#) and the leather terms defined in EN 15987.

7 Test report

The test report shall include the following:

- a) reference to this document, i.e. ISO 17131:2020;
- b) the type and origin of the analysed material sample;
- c) designation of the material (see [6.7](#)) as leather or another material;
- d) method used for identification;

- e) if necessary, the thickness of the coating layer and total thickness in accordance with ISO 17186;
- f) if requested, photographs of the sections;
- g) any deviations from the procedure;
- h) any additional information important for the designation;
- i) the date of the test.

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Annex A (normative)

Scanning electron microscope cross-section photographs

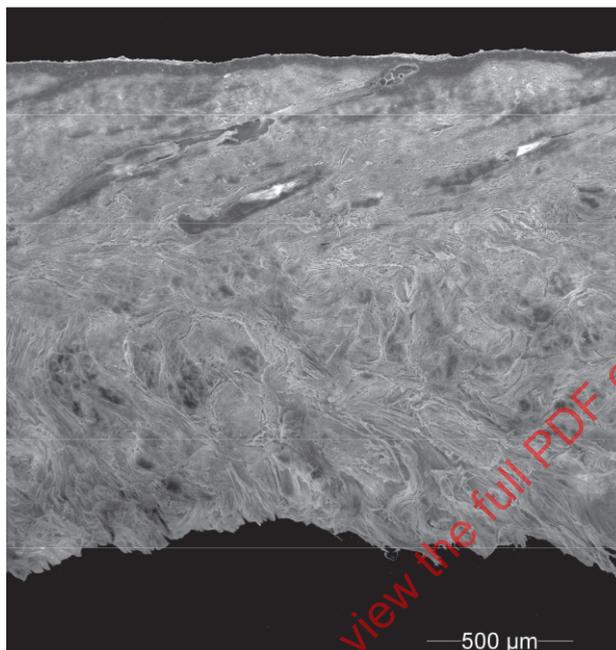


Figure A.1 — Typical section of bovine leather with surface coating of less than 150 μm

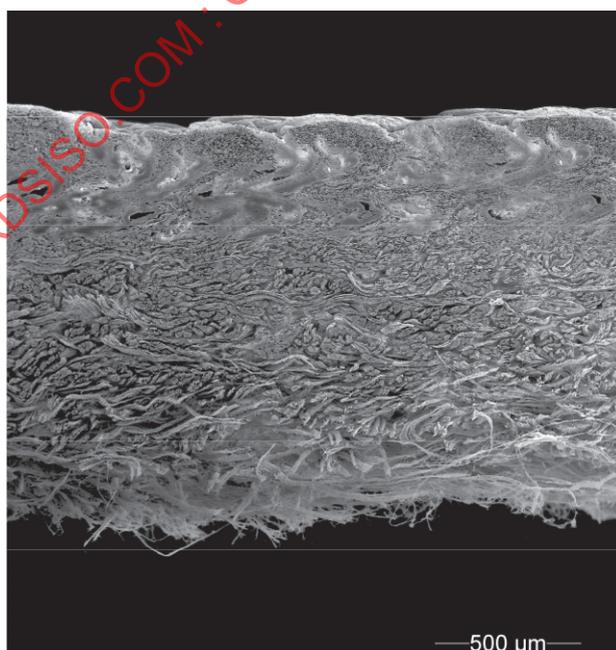


Figure A.2 — Typical section of sheep leather

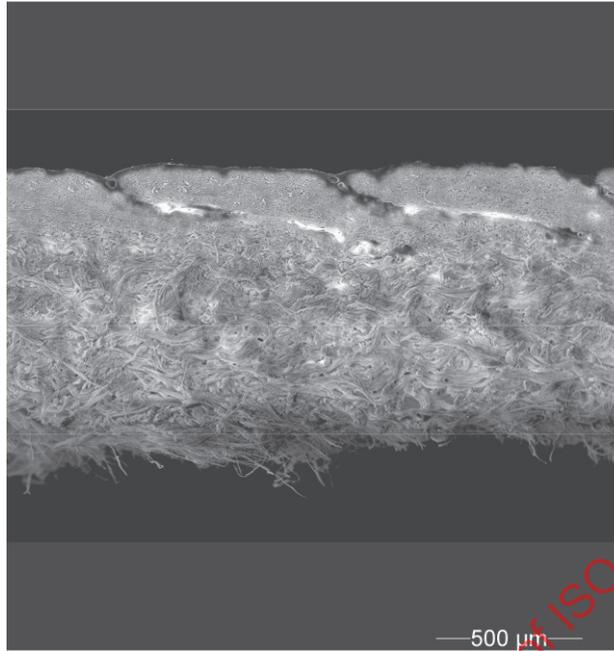


Figure A.3 — Typical section of goatskin leather

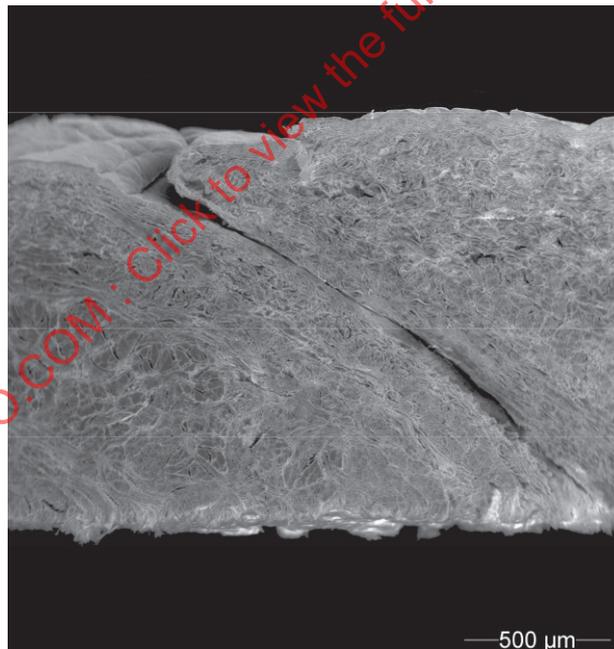


Figure A.4 — Typical section of pigskin leather

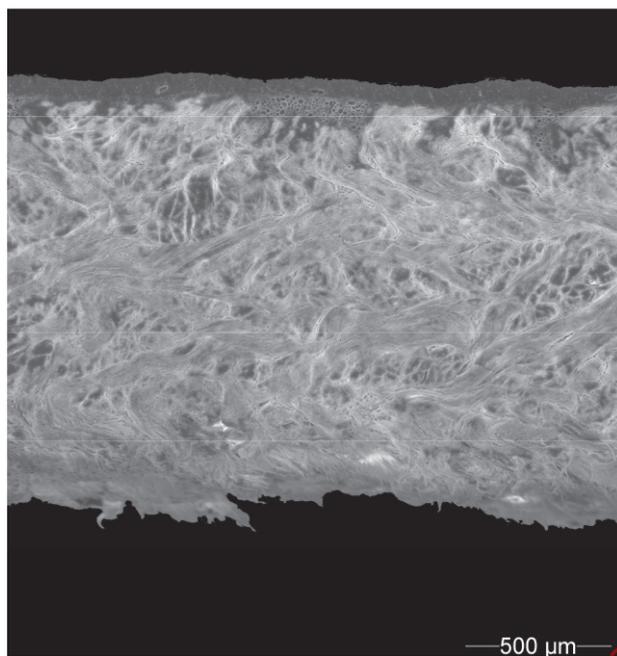
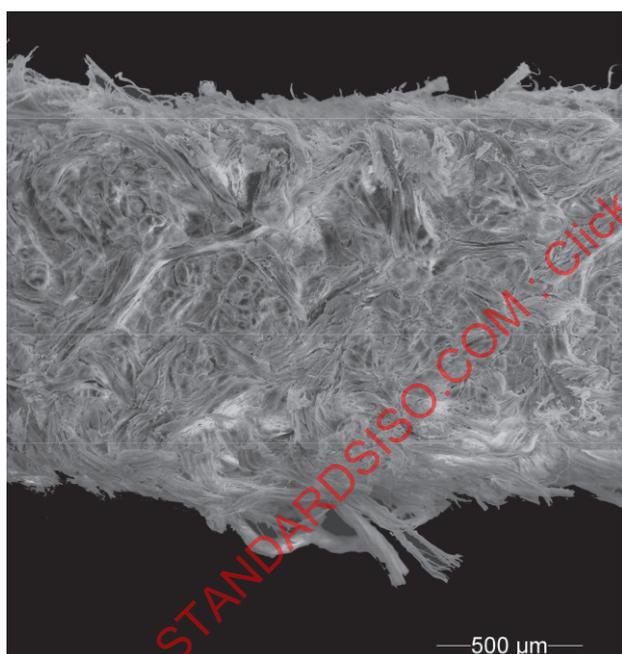
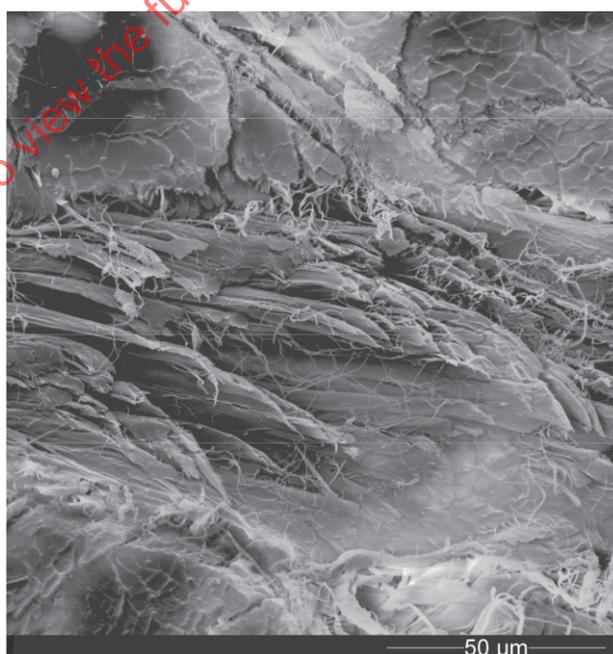


Figure A.5 — Typical section of coated bovine split leather

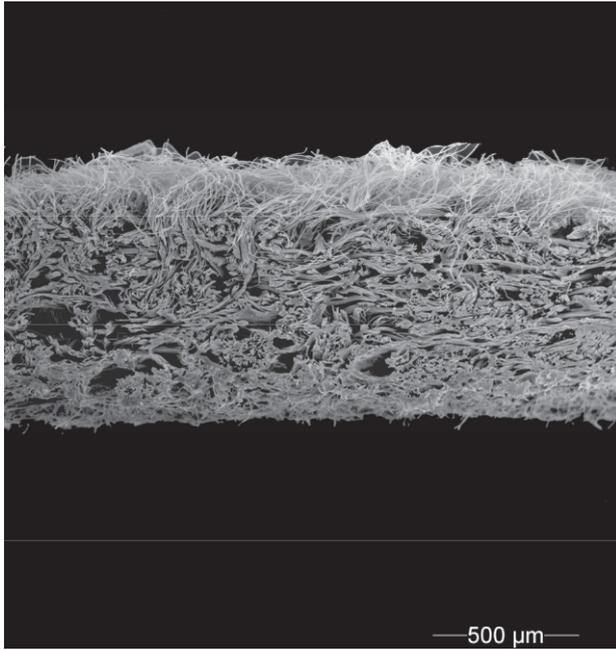


a) Moderate magnification

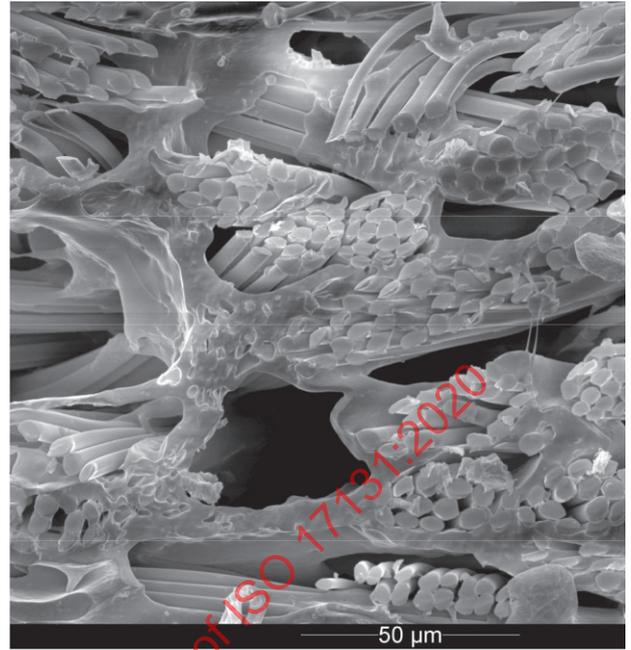


b) High magnification

Figure A.6 — Typical section of bovine suede leather



a) Moderate magnification



b) High magnification

Figure A.7 — Typical section of a microfibre material

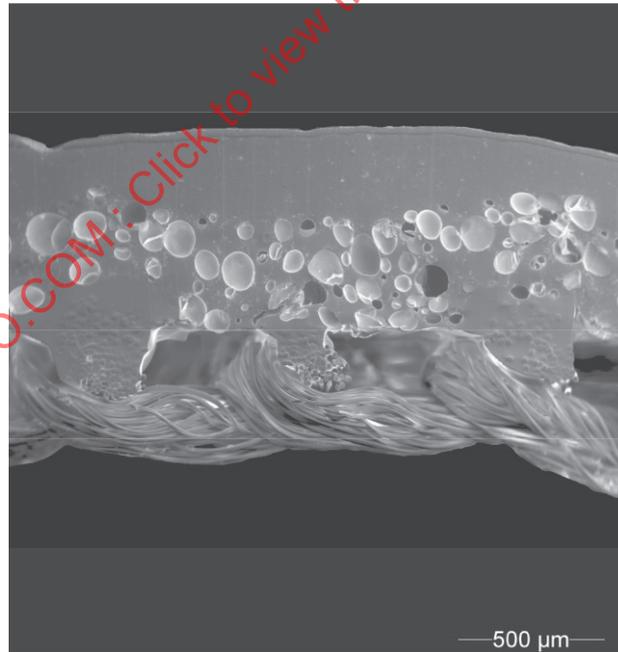


Figure A.8 — Typical section of a synthetic material with a PVC coating

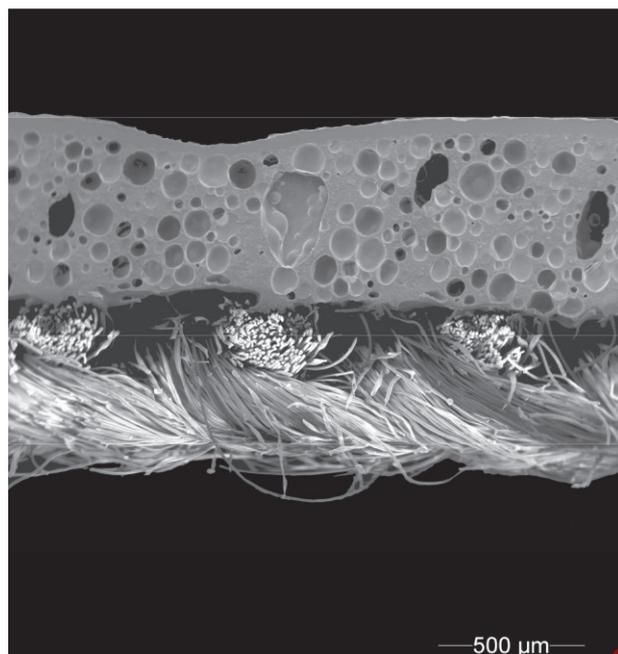
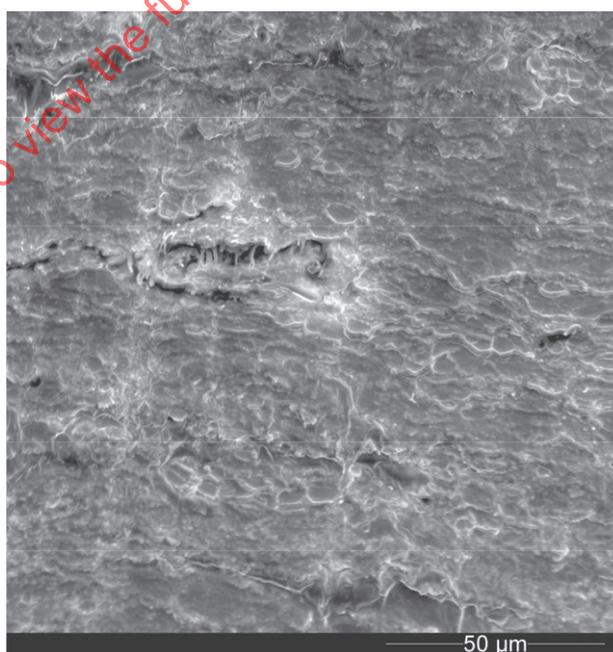


Figure A.9 — Typical section of a synthetic material with a polyurethane coating



a) Moderate magnification



b) High magnification

Figure A.10 — Typical section of a leather fibre board material

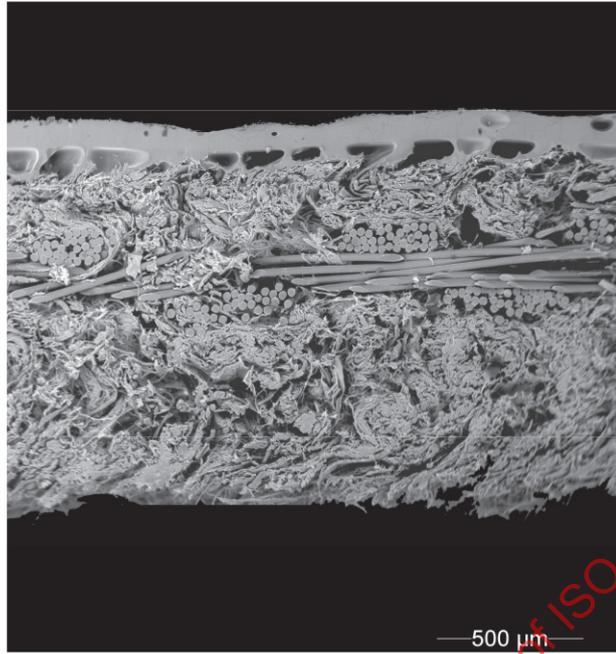


Figure A.11 — Section of textile material coated with leather fibres

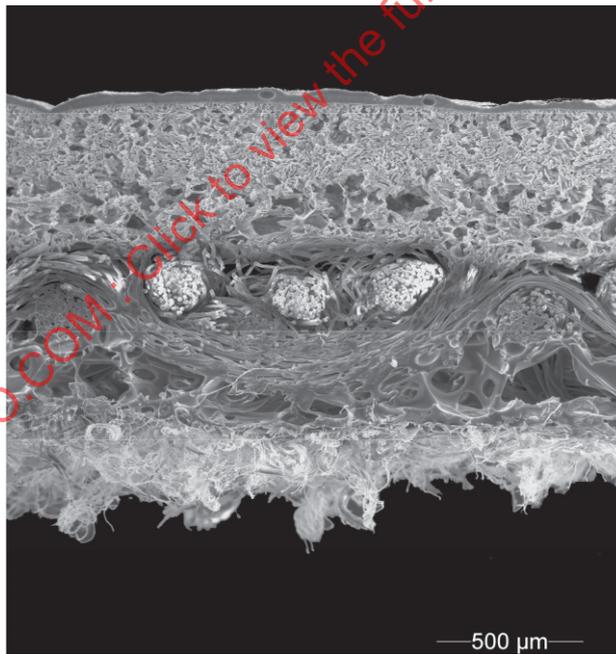


Figure A.12 — Synthetic material with leather fibres on back

Annex B (normative)

Light microscope cross-section photographs



Figure B.1 — Typical section of bovine leather with surface coating of less than 150 µm



Figure B.2 — Typical section of sheep leather

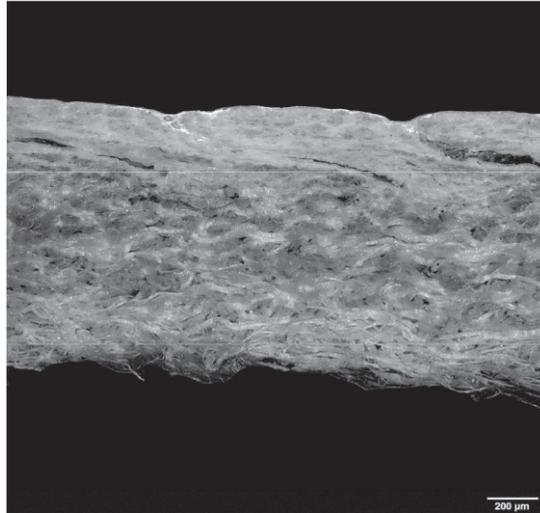


Figure B.3 — Typical section of goatskin leather

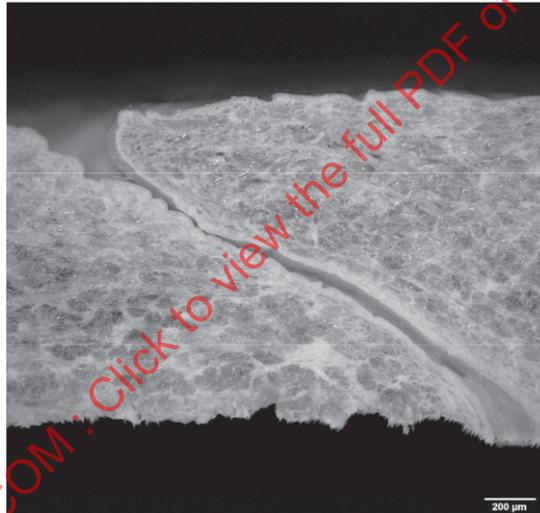


Figure B.4 — Typical section of pigskin leather



Figure B.5 — Typical section of coated bovine split leather