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Leather — Determination of degradability by micro-organisms

Cuir — Détermination de la dégradabilité par les micro-organismes

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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 Chemical Tests Commission of the International Union of Leather Technologists and Chemists Societies (IUC 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).

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 second edition cancels and replaces the first edition (ISO 20136:2017), which has been technically revised. The main changes to the previous edition are as follows:

— Method B in the first edition described a closed O_2 circuit system. This system had the inconvenience that, over time, the O_2 concentration decreased and, therefore, so did the activity of the microorganism. Now an open O_2 circuit system has been developed where there is no O_2 limitation and, therefore, the activity of the microorganism is always optimal.

— An explanation about the results calculation method has been added to method B. The CO_2 accumulated in the test (area under the CO_2 moles curve vs time) is calculated.

— The possibility of using municipal wastewater instead of tannery wastewater as an inoculum has been included.

— A new Annex C has been added which compares the biodegradability with different inoculum sources.

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.

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Introduction

One of the main issues faced by the footwear industry is waste treatment. Such wastes, and especially leather, even though they are considered non-hazardous by the regulations in force, are generated in vast quantities and mostly end up in landfills, where natural degradation time is much longer than the product's useful life.

Faced with this problem, there is a growing search for alternative tanning agents that confer the same properties on leather as those provided by the agents currently employed, but which in turn reduce the time to biodegrade in nature.

This document allows the measurement of leather biodegradability in a liquid system by using aerobic microorganisms as an inoculum. The test is considered valid when collagen (positive control) degrades by at least 70 % in a maximum period of 50 days. In order to determine how biodegradable a leather sample (test material) is, its percentage degradability value is compared with the percentage degradability value obtained in collagen, in the same test and period of time. The closer the percentage degradability values, the shorter the time to biodegrade in nature. Therefore, those test materials showing percentage degradability values well below the collagen value will require a longer time for biodegradation in nature.

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Leather — Determination of degradability by micro-organisms

1 Scope

This document specifies a test method to determine the degree and rate of aerobic biodegradation of hides and skins of different animal origin, whether they are tanned or not, through the indirect determination of CO_2 produced by the degradation of collagen.

The test material is exposed to an inoculum (activated sludge from tannery wastewater) in an aqueous medium. If there is not a tannery nearby then urban wastewater can be used as the inoculum.

The conditions established in this document correspond to optimum laboratory conditions to achieve the maximum level of biodegradation. However, they might not necessarily correspond to the optimum conditions or maximum level of biodegradation in the natural medium.

In general, the experimental procedure covers the determination of the degradation degree and rate of the material under controlled conditions, which allows the analysis of the evolved carbon dioxide produced throughout the test. For this purpose, the testing equipment complies with strict requirements with regard to flow, temperature and agitation control.

This method applies to the following materials:

— natural polymers of animal stroma (animal tissue/skins);

— animal hides and skins tanned (leather) using organic or inorganic tanning agents;

— leathers that, under testing conditions, do not inhibit the activity of microorganisms present in the inoculum.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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/

3.1
filter pore No. 1
diffuser with pore size from 100 µm to 160 µm

Note 1 to entry: This measurement is standard.

3.2
inoculum
activated sludge from tannery wastewater

Note 1 to entry: If there is not a tannery nearby then urban wastewater can be used as the inoculum.

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