



**NSAI**  
Standards

Irish Standard  
I.S. EN ISO 17226-1:2021

# Leather - Chemical determination of formaldehyde content - Part 1: Method using high-performance liquid chromatography (ISO 17226-1:2021)

**I.S. EN ISO 17226-1:2021**

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

*This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):*

*NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.*

*This document is based on:*

EN ISO 17226-1:2021

*Published:*

2021-03-03

*This document was published  
under the authority of the NSAI  
and comes into effect on:*

2021-03-21

ICS number:

59.140.30

NOTE: If blank see CEN/CENELEC cover page

NSAI  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

Sales:  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

## National Foreword

I.S. EN ISO 17226-1:2021 is the adopted Irish version of the European Document EN ISO 17226-1:2021, Leather - Chemical determination of formaldehyde content - Part 1: Method using high-performance liquid chromatography (ISO 17226-1:2021)

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

For relationships with other publications refer to the NSAI web store.

**Compliance with this document does not of itself confer immunity from legal obligations.**

*In line with international standards practice the decimal point is shown as a comma (,) throughout this document.*

This page is intentionally left blank

**EUROPEAN STANDARD**  
**NORME EUROPÉENNE**  
**EUROPÄISCHE NORM**

**EN ISO 17226-1**

March 2021

ICS 59.140.30

Supersedes EN ISO 17226-1:2019

English Version

**Leather - Chemical determination of formaldehyde content  
- Part 1: Method using high-performance liquid  
chromatography (ISO 17226-1:2021)**

Cuir - Dosage chimique du formaldéhyde - Partie 1:  
Méthode par chromatographie en phase liquide à haute  
performance (ISO 17226-1:2021)

Leder - Chemische Bestimmung des  
Formaldehydgehalts - Teil 1: Verfahren mittels  
Flüssigkeitschromatographie (ISO 17226-1:2021)

This European Standard was approved by CEN on 12 February 2021.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

**EN ISO 17226-1:2021 (E)**

<b>Contents</b>	<b>Page</b>
<b>European foreword.....</b>	<b>3</b>

## **European foreword**

This document (EN ISO 17226-1:2021) has been prepared by Technical Committee IULTCS "International Union of Leather Technologists and Chemists Societies" in collaboration with Technical Committee CEN/TC 289 "Leather" the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 17226-1:2019.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## **Endorsement notice**

The text of ISO 17226-1:2021 has been approved by CEN as EN ISO 17226-1:2021 without any modification.

This page is intentionally left blank

**INTERNATIONAL  
STANDARD**

**ISO  
17226-1**

**IULTCS  
IUC 19-1**

Third edition  
2021-02

---

---

**Leather — Chemical determination of  
formaldehyde content —**

**Part 1:  
Method using high-performance liquid  
chromatography**

*Cuir — Dosage chimique du formaldéhyde —*

*Partie 1: Méthode par chromatographie en phase liquide à haute  
performance*



Reference numbers  
ISO 17226-1:2021(E)  
IULTCS/IUC 19-1:2021(E)

© ISO 2021

**ISO 17226-1:2021(E)**  
**IULTCS/IUC 19-1:2021(E)**



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2021

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

Page

<b>Foreword</b>	<b>iv</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>1</b>
<b>3 Terms and definitions</b>	<b>1</b>
<b>4 Conformity</b>	<b>1</b>
<b>5 Principle</b>	<b>1</b>
<b>6 Reagents</b>	<b>2</b>
<b>7 Apparatus</b>	<b>2</b>
<b>8 Sampling</b>	<b>3</b>
<b>9 Sample preparation and analysis</b>	<b>3</b>
9.1 Procedure for the determination of formaldehyde in the stock solution	3
9.1.1 Preparation of the formaldehyde stock solution	3
9.1.2 Determination	3
9.2 Procedure for the determination of formaldehyde in leather by the HPLC method	4
9.2.1 Extraction of the leather	4
9.2.2 Derivatization with DNPH and determination of formaldehyde in leather with HPLC	4
9.2.3 Calibration of HPLC	4
<b>10 Expression of results</b>	<b>5</b>
10.1 Calculation of the formaldehyde content in leather samples	5
10.2 Spiking — determination of recovery rate	5
10.3 Expression of the results	6
10.4 Precision	6
<b>11 Test report</b>	<b>6</b>
<b>Annex A (informative) Precision: reliability of the HPLC method</b>	<b>7</b>
<b>Annex B (informative) HPLC conditions</b>	<b>8</b>
<b>Bibliography</b>	<b>9</b>

**ISO 17226-1:2021(E)**  
**IULTCS/IUC 19-1:2021(E)**

## 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](http://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](http://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](http://www.iso.org/iso/foreword.html).

This document was prepared by the Chemical Test 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). This document is technically similar to the Colorimetric Section of the method IUC 19 which was declared an official method at the IULTCS Delegates meeting on 31st May 2003 in Cancún, Mexico.

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 third edition cancels and replaces the second edition (ISO 17226-1:2018), which has been technically revised.

The main changes to the previous edition are as follows:

- The listing of reagents in [Clause 6](#) has been reorganised.
- The composition of the dinitrophenylhydrazine (DNPH) solution ([6.10](#)) has changed. It no longer contains concentrated *o*-phosphoric acid. Under acid conditions some extracted synthetic tanning agents and resins can continue to release formaldehyde over time, giving incorrect high results.
- With the change in composition of the DNPH solution ([6.10](#)), the reaction time limits in the previous edition are no longer necessary. In [9.2.2](#) the reaction time and temperature have been increased to 180 min and 50 °C, respectively. Consequently, the text in [9.2.2](#), [9.2.3.1](#) and [9.2.3.2](#) has been modified.
- A new [Clause 10](#) has been added.

- In [Annex A](#), results of a new collaborative interlaboratory trial are presented.
- [Annex B](#) has been technically revised.

A list of all parts in the ISO 17226 series can be found on the ISO website.

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](http://www.iso.org/members.html).



# Leather — Chemical determination of formaldehyde content —

## Part 1: Method using high-performance liquid chromatography

### 1 Scope

This document specifies a method for the determination of free and released formaldehyde in leathers. This method, based on high-performance liquid chromatography (HPLC), is selective and not sensitive to coloured extracts and is intended to be used for precise quantification of formaldehyde.

The formaldehyde content is taken to be the quantity of free formaldehyde and formaldehyde extracted through hydrolysis contained in a water extract from the leather under standard conditions of use.

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

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

ISO 4044, *Leather — Chemical tests — Preparation of chemical test samples*

ISO 4684, *Leather — Chemical tests — Determination of volatile matter*

### 3 Terms and definitions

No terms and definitions are listed in this document.

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 Conformity

When compared with ISO 17226-2, the two analytical methods should give similar trends but not necessarily the same absolute result. Therefore, in cases of dispute, the method in this document shall be used in preference to ISO 17226-2.

### 5 Principle

The process is selective. Formaldehyde is separated and quantified as a derivative from other aldehydes and ketones by HPLC. Detected is the free formaldehyde and formaldehyde which is hydrolysed during extraction to yield free formaldehyde.

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- Looking for additional Standards? Visit Intertek Inform Infostore
  - Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation
-