

**Paints and varnishes - Determination of volatile organic compounds (VOC) and/or semi volatile organic compounds (SVOC) content - Part 2: Gas-chromatographic method (ISO 11890-2:2020 + ISO 11890-2:2020/Amd 1:2024)**

**EESTI STANDARDI EESSÕNA****NATIONAL FOREWORD**

See Eesti standard EVS-EN ISO 11890-2:2020+A1:2024 sisaldab Euroopa standardi EN ISO 11890-2:2020 ja selle muudatuse A1:2024 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 11890-2:2020+A1:2024 consists of the English text of the European standard EN ISO 11890-2:2020 and its amendment A1:2024.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.  Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 08.07.2020, muudatus A1 03.07.2024.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.  Date of Availability of the European standard is 08.07.2020, for A1 03.07.2024.
Muudatusega A1 lisatud või muudetud teksti algus ja lõpp on tekstis tähistatud sümbolitega $\boxed{A1}$ $\triangleleft A1$ .	The start and finish of text introduced or altered by amendment A1 is indicated in the text by tags $\boxed{A1}$ $\triangleleft A1$ .
Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 87.040

**Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardimis- ja Akrediteerimiskeskusele**

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardimis- ja Akrediteerimiskeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autoriõiguse kaitse kohta, võtke palun ühendust Eesti Standardimis- ja Akrediteerimiskeskusega:

Koduleht [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

**The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation and Accreditation**

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation and Accreditation.

If you have any questions about standards copyright protection, please contact the Estonian Centre for Standardisation and Accreditation:

Homepage [www.evs.ee](http://www.evs.ee); phone +372 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

EUROPEAN STANDARD

EN ISO 11890-2 + A1

NORME EUROPÉENNE

EUROPÄISCHE NORM

July 2020, July 2024

ICS 87.040

English Version

Paints and varnishes - Determination of volatile organic compounds(VOC) and/or semi volatile organic compounds (SVOC) content - Part 2: Gas-chromatographic method (ISO 11890-2:2020 + ISO 11890-2:2020/Amd 1:2024)

Peintures et vernis - Détermination de la teneur en composés organiques volatils (COV) et/ou composés organiques semi-volatils (COSV) - Partie 2: Méthode par chromatographie en phase gazeuse (ISO 11890-2:2020 + ISO 11890-2:2020/Amd 1:2024)

Beschichtungsstoffe - Bestimmung des Gehaltes an flüchtigen organischen Verbindungen (VOC-Gehalt) und des Gehaltes an halbflüchtigen organischen Verbindungen (SVOC-Gehalt) - Teil 2: Gaschromatographisches Verfahren (ISO 11890-2:2020 + ISO 11890-2:2020/Amd 1:2024)

This European Standard was approved by CEN on 28 May 2020. Amendment A1 was approved by CEN on 5 May 2024.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard and its amendment 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 and its Amendment A1 exist 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, Türkiye 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

## European foreword

This document (EN ISO 11890-2:2020) has been prepared by Technical Committee ISO/TC 35 "Paints and varnishes" in collaboration with Technical Committee CEN/TC 139 "Paints and varnishes" the secretariat of which is held by DIN.

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 January 2021, and conflicting national standards shall be withdrawn at the latest by January 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 11890-2:2013.

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 11890-2:2020 has been approved by CEN as EN ISO 11890-2:2020 without any modification.

## **A1** Amendment A1 European foreword

This document (EN ISO 11890-2:2020/A1:2024) has been prepared by Technical Committee ISO/TC 35 "Paints and varnishes" in collaboration with Technical Committee CEN/TC 139 "Paints and varnishes" the secretariat of which is held by DIN.

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 January 2025, and conflicting national standards shall be withdrawn at the latest by January 2025.

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.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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, Türkiye and the United Kingdom.

### **Endorsement notice**

The text of ISO 11890-2:2020/Amd 1:2024 has been approved by CEN as EN ISO 11890-2:2020/A1:2024 without any modification. **A1**

This document is a preview generated by EVS

# Contents

Page

Foreword .....	v
<b>A1</b> Amendment A1 Foreword <b>A1</b> .....	vi
Introduction .....	vii
<b>1</b> Scope .....	<b>1</b>
<b>2</b> Normative references .....	<b>1</b>
<b>3</b> Terms and definitions .....	<b>2</b>
<b>4</b> Principle .....	<b>4</b>
<b>5</b> Required information .....	<b>4</b>
<b>6</b> Apparatus .....	<b>5</b>
<b>7</b> Reagents .....	<b>7</b>
<b>8</b> Procedure .....	<b>8</b>
8.1 Sampling .....	8
8.2 Analysis .....	8
8.2.1 Sample preparation .....	8
8.2.2 Data acquisition for sample measurement .....	9
8.3 Calibration .....	9
8.3.1 General .....	9
8.3.2 Preparation of calibration solutions .....	9
8.3.3 Analysis of the multi-point calibration .....	9
8.4 Quality assurance .....	11
8.5 Gas chromatographic conditions .....	11
8.6 Density .....	11
8.7 Water content .....	11
<b>9</b> Data analysis .....	<b>11</b>
9.1 Integration and identification of compounds .....	11
9.2 Classification of compounds .....	13
<b>10</b> Quantitative determination of compound content .....	<b>16</b>
10.1 General .....	16
10.2 Quantitative determination of compound content .....	18
10.2.1 Quantification with respect to CSRF .....	18
10.2.2 Quantification with respect to surrogate standard .....	18
<b>11</b> Calculation of VOC and SVOC content .....	<b>18</b>
11.1 General .....	18
11.2 Method 1 — VOC content and/or SVOC content, as a percentage by mass, of the product “ready for use” .....	18
11.3 Method 2 — VOC content and/or SVOC content, in grams per litre, of the product “ready for use” .....	19
11.4 Method 3 — VOC content and/or SVOC content, in grams per litre, of the product “ready for use” less water .....	19

11.5	Method 4 — VOC content and/or SVOC content, in grams per litre, of the product “ready for use” less water and less exempt compounds .....	20
<b>12</b>	<b>Data evaluation and calculation of final results.....</b>	<b>21</b>
<b>13</b>	<b>Precision.....</b>	<b>21</b>
13.1	General.....	21
13.2	Repeatability limit, <i>r</i> .....	21
13.3	Reproducibility limit, <i>R</i> .....	21
<b>14</b>	<b>Test report.....</b>	<b>22</b>
<b>Annex A</b>	<b>(normative) Non-exhaustive list of VOC, SVOC and NVOC compounds.....</b>	<b>23</b>
<b>Annex B</b>	<b>(informative) Information on thermal unstable products.....</b>	<b>31</b>
<b>Annex C</b>	<b>(informative) Examples for GC method conditions.....</b>	<b>37</b>
<b>Annex D</b>	<b>(informative) Results of the round robin test for the determination of precision data.....</b>	<b>39</b>
<b>Bibliography</b>	<b>.....</b>	<b>41</b>

## 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 Technical Committee ISO/TC 35, *Paints and varnishes*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 139, *Paints and varnishes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 11890-2:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

- the scope has been expanded to include the determination of semi volatile organic compounds (SVOC);
- the scope has been expanded to include concentration ranges from 0,01 % to 100 %;
- the specifications for determination of semi-volatile organic compounds have been added.

A list of all parts in the ISO 11890 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).

## **A1** Amendment A1 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 document 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)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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 Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 16, *Chemical analysis*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 139, *Paints and varnishes*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 11890 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). **A1**

## Introduction

This document is one of a series of standards dealing with the sampling and testing of coating materials and their raw materials. It specifies a method for the determination of the volatile organic compounds (VOC) content and the semi-volatile organic compounds (SVOC) content of coating materials and their raw materials.

This document is a preview generated by EVS

This document is a preview generated by EVS

# Paints and varnishes — Determination of volatile organic compounds (VOC) and/or semi volatile organic compounds (SVOC) content —

## Part 2: Gas-chromatographic method

WARNING — The use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of users of this document to take appropriate measures to ensure the safety and health of personnel prior to the application of the document, and to determine the applicability of any other restrictions for this purpose.

### 1 Scope

This document is applicable for the determination of VOC and SVOC with an expected VOC and/or SVOC content greater than 0,01 % by mass up to 100 % by mass.

The method given in ISO 11890-1 is used when the VOC is greater than 15 % by mass. This document (method ISO 11890-2) applies when the system contains VOC and SVOC as the VOC result of ISO 11890-1 can be influenced by the SVOC. For VOC content smaller than 0,1 %, the head space method described in ISO 17895 is used as an alternative. ISO 11890-1 and ISO 17895 cannot be used for the determination of the SVOC content.

NOTE 1 Some ingredients of coating materials and their raw materials can decompose during analysis and cause artificial VOC and/or SVOC signals. When determining VOC and/or SVOC for coating materials and their raw materials, these signals are artefacts of the method and are not taken into account (examples are given in Annex B).

This method assumes that the volatile matter is either water or organic. However, other volatile inorganic compounds can be present and might need to be quantified by another suitable method and allowed for in the calculations. The method defined in this document is not applicable for determination of water content.

NOTE 2 If organic acids or bases and their corresponding salts are present in the coating material or its raw materials, the amount that is quantified by this method might not be accurate due to a change in the acid or base equilibrium.

### 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 760, *Determination of water — Karl Fischer method (General method)*

ISO 1513, *Paints and varnishes — Examination and preparation of test samples*

ISO 2811 (all parts), *Paints and varnishes — Determination of density*

ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling*

ISO 23168, *Paints and varnishes — Determination of water content — Gas-chromatographic method* <sup>(A1)</sup>

### 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 <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

#### 3.1 volatile organic compound VOC

any organic liquid and/or solid that evaporates spontaneously at the prevailing temperature and pressure of the atmosphere with which it is in contact

Note 1 to entry: As to current usage of the term VOC in the field of coating materials, see *volatile organic compounds content (VOC content)* (3.4).

Note 2 to entry: Under US government legislation, the term VOC is restricted solely to those compounds that are photochemically active in the atmosphere (see ASTM D3960). Any other compound is then defined as being an *exempt compound* (3.6).

[SOURCE: ISO 4618:2014, 2.270]

#### 3.2 semi-volatile organic compound SVOC

organic liquid and/or solid that evaporates spontaneously but slower in comparison to VOC at the prevailing temperature and pressure of the atmosphere with which it is in contact

Note 1 to entry: As to current usage of the term SVOC in the field of coating materials, see *semi-volatile organic compounds content (SVOC content)* (3.5).

#### 3.3 non-volatile organic compound NVOC

organic liquid and/or solid not classified as *VOC* or *SVOC*

#### 3.4 volatile organic compounds content VOC content VOCC

mass of the *volatile organic compounds* (3.1) present in a coating material, as determined under specified conditions

Note 1 to entry: The properties and the amounts of the compounds to be taken into account will depend on the field of application of the coating material. For each field of application, the limiting values and the methods of determination or calculation are stipulated by regulations or by agreement.

Note 2 to entry: If the term VOC refers to compounds with a defined maximum boiling point, the compounds considered to be part of the VOC content are those with boiling points below and including that limit, and compounds with higher boiling points are considered to be semi-volatile or non-volatile organic compounds.

[SOURCE: ISO 4618:2014, 2.271, modified — Note 2 to entry has been added.]