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Paints and varnishes — Determination of volatile organic compound (VOC) — Gas-chromatographic method with headspace injection for VOC determination

Peintures et vernis — Détermination de la teneur en composés organiques volatils (COV) et/ou en composés organiques semi-volatils (COVS) — Méthode chromatographique par chromatographie en phase gazeuse avec injection dans l'espace de tête pour la détermination des COV

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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 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).

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. ISO shall not be held responsible for identifying any or all such patent rights.

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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 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).

This second edition cancels and replaces the first edition (ISO 17895:2005), which has been technically revised.

The main changes are as follows:

- ~~the document has been technically revised;~~
- ~~used methods have been further specified;~~
- ~~normative references have been updated.~~

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

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Paints and varnishes — Determination of volatile organic compound (VOC) and/or semi-volatile organic compound (SVOC) content — Gas chromatographic method with headspace injection for VOC determination

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 specifies the sampling and testing of low VOC volatile organic compound (VOC) coating materials and their raw materials. In particular, this document specifies a gas-chromatographic method to quantitatively determine the volatile organic compound (VOC) content (i.e. the content of organic compounds with boiling points up to 250 °C) under standard conditions (101,325 kPa). It is applicable to VOC contents between 0,01 % and 0,1 % by mass.

This document ~~cannot be used for~~ **does not apply to** the determination of the semi-volatile organic compounds (SVOC) content, which is covered in ISO 11890-2.

~~Volatile~~ **This document does not apply to** volatile organic and volatile inorganic compounds that cannot be determined by gas chromatography ~~are not considered~~.

~~The procedure for identifying the appropriate method for the determination of VOC content and the SVOC content of coating materials and their raw materials is described in this document.~~ **ISO/TR 5601.**

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/ TR 5601, Paints and varnishes — Determination of volatile organic compound (VOC) and /or semi volatile organic compound (SVOC) content — Guidance for the selection of test methods~~

~~ISO 2811-1, Paints and varnishes — Determination of density — Part 1: Pycnometer method~~

~~ISO 2811-2, Paints and varnishes — Determination of density — Part 2: Immersed body (plummet) method~~

~~ISO 2811-3, Paints and varnishes — Determination of density — Part 3: Oscillation method~~

~~ISO 2811-4, Paints and varnishes — Determination of density — Part 4: Pressure cup method~~

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

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3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 volatile organic compound VOC

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*, (3.9), see *volatile organic compound content* (3.4)(3.3).

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.

[SOURCE: ISO 4618:2023, 3.266, modified — Note 3 to entry has been removed.]

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:—Regarding current usage of the term SVOC in the field of *coating materials*, (3.9), see *semi-volatile organic compound content* (3.5)(3.4).

[SOURCE: ISO 4618:2023, 3.227]

3.3 volatile organic compounds VOC content

mass of the *volatile organic compounds* (3.1)(3.1) present in a *coating material*, (3.9), as determined under specified conditions

Note 1—to entry:—The properties and the amounts of the compounds to be taken into account 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* (3.2)(3.2) or *non-volatile organic compounds* (3.3).

[SOURCE: ISO 4618:2023, 3.267 modified — Note 2 to entry has been added.]

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