

# SLOVENSKI STANDARD

## SIST EN ISO 15009:2016

01-december-2016

Nadomešča:

SIST EN ISO 15009:2013

---

**Kakovost tal - Določevanje hlapnih aromatskih ogljikovodikov, naftalena in hlapnih halogeniranih ogljikovodikov s plinsko kromatografijo - Metoda "purge-and-trap" s toplotno desorpcijo (ISO 15009:2016)**

Soil quality - Gas chromatographic determination of the content of volatile aromatic hydrocarbons, naphthalene and volatile halogenated hydrocarbons - Purge-and-trap method with thermal desorption (ISO 15009:2016)

Bodenbeschaffenheit - Gaschromatographische Bestimmung des Anteils an flüchtigen aromatischen Kohlenwasserstoffen, Naphthalin und flüchtigen Halogenkohlenwasserstoffen - Purge- und Trap-Anreicherung mit thermischer Desorption (ISO 15009:2016)

Qualité du sol - Détermination par chromatographie en phase gazeuse des teneurs en hydrocarbures aromatiques volatils, en naphtalène et en hydrocarbures halogénés volatils - Méthode par purge et piégeage avec désorption thermique (ISO 15009:2016)

**Ta slovenski standard je istoveten z: EN ISO 15009:2016**

---

**ICS:**

13.080.10	Kemijske značilnosti tal	Chemical characteristics of soils
71.040.50	Fizikalnokemijske analitske metode	Physicochemical methods of analysis

**SIST EN ISO 15009:2016**

**en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 15009:2016](#)

<https://standards.iteh.ai/catalog/standards/sist/93e4ffdd-bce5-499e-ad65-49bfd045ad9d/sist-en-iso-15009-2016>

EUROPEAN STANDARD

EN ISO 15009

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2016

ICS 13.080.10

Supersedes EN ISO 15009:2013

English Version

## Soil quality - Gas chromatographic determination of the content of volatile aromatic hydrocarbons, naphthalene and volatile halogenated hydrocarbons - Purge-and-trap method with thermal desorption (ISO 15009:2016)

Qualité du sol - Détermination par chromatographie en phase gazeuse des teneurs en hydrocarbures aromatiques volatils, en naphthalène et en hydrocarbures halogénés volatils - Méthode par purge et piégeage avec désorption thermique (ISO 15009:2016)

Bodenbeschaffenheit - Gaschromatographische Bestimmung des Anteils an flüchtigen aromatischen Kohlenwasserstoffen, Naphthalin und flüchtigen Halogenkohlenwasserstoffen - Purge-und-Trap-Anreicherung mit thermischer Desorption (ISO 15009:2016)

This European Standard was approved by CEN on 23 January 2016.

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.

SIST EN ISO 15009:2016

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, 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: Avenue Marnix 17, B-1000 Brussels**

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

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 15009:2016](https://standards.iteh.ai/catalog/standards/sist/93e4ffdd-bce5-499e-ad65-49bfd045ad9d/sist-en-iso-15009-2016)  
<https://standards.iteh.ai/catalog/standards/sist/93e4ffdd-bce5-499e-ad65-49bfd045ad9d/sist-en-iso-15009-2016>

## European foreword

This document (EN ISO 15009:2016) has been prepared by Technical Committee ISO/TC 190 “Soil quality” in collaboration with Technical Committee CEN/TC 345 “Characterization of soils” the secretariat of which is held by NEN.

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 2016, and conflicting national standards shall be withdrawn at the latest by September 2016.

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

This document supersedes EN ISO 15009:2013.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

[SIST EN ISO 15009:2016](https://standards.iteh.ai/catalog/standards/sist/02e48fd1-bce5-499e-ad65-49bfd045ad9d/sist-en-iso-15009-2016)

<https://standards.iteh.ai/catalog/standards/sist/02e48fd1-bce5-499e-ad65-49bfd045ad9d/sist-en-iso-15009-2016>

### Endorsement notice

The text of ISO 15009:2016 has been approved by CEN as EN ISO 15009:2016 without any modification.

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN ISO 15009:2016](#)

<https://standards.iteh.ai/catalog/standards/sist/93e4ffdd-bce5-499e-ad65-49bfd045ad9d/sist-en-iso-15009-2016>

INTERNATIONAL  
STANDARD

ISO  
15009

Third edition  
2016-02-15

---

---

**Soil quality — Gas chromatographic  
determination of the content of  
volatile aromatic hydrocarbons,  
naphthalene and volatile halogenated  
hydrocarbons — Purge-and-trap  
method with thermal desorption**

iTeh STANDARD PREVIEW

*Qualité du sol — Détermination par chromatographie en phase gazeuse des teneurs en hydrocarbures aromatiques volatils, en naphthalène et en hydrocarbures halogénés volatils — Méthode par purge et piégeage avec désorption thermique*

<https://standards.iteh.ai/catalog/standards/sist/93e4ffdd-bce5-499e-ad65-49bfd045ad9d/sist-en-iso-15009-2016>



Reference number  
ISO 15009:2016(E)

© ISO 2016

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

SIST EN ISO 15009:2016

<https://standards.iteh.ai/catalog/standards/sist/93e4ffdd-bce5-499e-ad65-49bfd045ad9d/sist-en-iso-15009-2016>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, 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  
Ch. de Blandonnet 8 • CP 401  
CH-1214 Vernier, Geneva, Switzerland  
Tel. +41 22 749 01 11  
Fax +41 22 749 09 47  
copyright@iso.org  
www.iso.org



# 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 Principle</b> .....	<b>2</b>
<b>4 Reagents</b> .....	<b>2</b>
4.1 Water, free of volatile aromatic and volatile halogenated hydrocarbons.....	2
4.2 Internal standards.....	2
4.3 Standard compounds.....	3
4.3.1 Volatile aromatic hydrocarbons.....	3
4.3.2 Volatile halogenated hydrocarbons.....	3
4.4 Methanol.....	4
4.5 Adsorbing agent.....	4
4.6 Cooling water for purge and trap.....	4
4.7 Inert gas for the gas chromatograph.....	5
4.8 Nitrogen or helium as inert gas for the purge equipment.....	5
4.9 Standard solutions.....	5
4.9.1 Standard stock solutions for volatile aromatic and halogenated compounds in methanol, 4 g/l.....	5
4.9.2 Internal standard solutions in methanol, 4 g/l.....	5
4.9.3 Calibration solutions.....	5
4.10 Methanol containing internal standards.....	6
<b>5 Apparatus</b> .....	<b>6</b>
<b>6 Sampling, preservation and sample pretreatment</b> .....	<b>7</b>
6.1 General.....	7
6.2 Sampling using vials pre-filled with methanol.....	8
6.3 Sampling using coring tube method.....	8
<b>7 Procedure</b> .....	<b>8</b>
7.1 Blank determination.....	8
7.2 Extraction.....	9
7.3 Purge and trap.....	9
7.4 Gas chromatographic analysis.....	9
7.4.1 Gas chromatographic conditions.....	9
7.4.2 Calibration.....	10
7.4.3 Measurement.....	11
<b>8 Calculation</b> .....	<b>12</b>
8.1 Calculation of the concentration of a volatile compound in the water sample.....	12
8.2 Calculation of the concentration of a volatile compound in the soil sample.....	12
<b>9 Expression of results</b> .....	<b>13</b>
<b>10 Precision</b> .....	<b>13</b>
<b>11 Test report</b> .....	<b>13</b>
<b>Annex A (informative) Relative retention time with respect to ethylbenzene-D10 of volatile aromatic hydrocarbons and volatile halogenated hydrocarbons on following columns: CP-Sil 5 CB and CP-Sil 13 CB</b> .....	<b>14</b>
<b>Annex B (normative) Check on internal standards</b> .....	<b>16</b>
<b>Annex C (informative) Validation</b> .....	<b>17</b>
<b>Annex D (informative) Information on purge and trap instruments</b> .....	<b>20</b>

## ISO 15009:2016(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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#)

The committee responsible for this document is ISO/TC 190, *Soil quality*, Subcommittee SC 3, *Chemical methods and soil characteristics*.

This third edition cancels and replaces the second edition (ISO 15009:2012), which has been technically revised.

# Soil quality — Gas chromatographic determination of the content of volatile aromatic hydrocarbons, naphthalene and volatile halogenated hydrocarbons — Purge-and-trap method with thermal desorption

## 1 Scope

This International Standard specifies a method for quantitative gas-chromatographic determination of volatile aromatic hydrocarbons, naphthalene and volatile halogenated hydrocarbons in soil.

This International Standard is applicable to all types of soil.

NOTE In the case of unsaturated peaty soils, absorption of the extraction solution may occur.

The lower limit of quantification is dependent on the equipment used and the quality of the methanol grade used for the extraction of the soil sample.

Under the conditions specified in this International Standard the following limits of quantification apply (expressed on basis of dry matter):

Typical limit of quantification when using GC-FID:

- Volatile aromatic hydrocarbons: 0,1 mg/kg

Typical limit of quantification when using GC-ECD:

- Volatile halogenated hydrocarbons: 0,01 mg/kg

Lower limits of quantification for some compounds can be achieved by using mass spectrometry (MS) with selected ion detection.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4799, *Laboratory glassware — Condensers*

ISO 10381-1, *Soil quality — Sampling — Part 1: Guidance on the design of sampling programmes*

ISO 10381-2, *Soil quality — Sampling — Part 2: Guidance on sampling techniques*

ISO 10381-5, *Soil quality — Sampling — Part 5: Guidance on the procedure for the investigation of urban and industrial sites with regard to soil contamination*

ISO 11465, *Soil quality — Determination of dry matter and water content on a mass basis — Gravimetric method*

ISO 15680, *Water quality — Gas-chromatographic determination of a number of monocyclic aromatic hydrocarbons, naphthalene and several chlorinated compounds using purge-and-trap and thermal desorption*

ISO 18512, *Soil quality — Guidance on long and short term storage of soil samples*

## ISO 15009:2016(E)

ISO 22892, *Soil quality — Guidelines for the identification of target compounds by gas chromatography and mass spectrometry*

### 3 Principle

Test samples are taken from an untreated field moist soil sample. To prevent losses of the volatiles, samples are taken as undisturbed as possible in the field with a tube corer or by adding methanol immediately in the field.

The test sample is extracted with methanol. After centrifugation, if necessary, part of the methanol extract is brought into a purge vessel filled with water. The volatile compounds are purged with nitrogen or helium and adsorbed on a suitable adsorbing agent. The adsorbed compounds are desorbed thermally and by means of a carrier gas flow, whether or not via a cold trap, brought into a gas chromatograph. The various compounds are separated by using a capillary column with an immobile phase of low polarity. Volatile organic compounds are detected with appropriate detectors such as: mass spectrometric detector (MS), flame ionization detector (FID), electron capture detector (ECD), photo ionization detector (PID) or electrolytic conductivity detector (ELCD). Identification and quantification takes place by comparison of retention times and peak heights (or peak areas) towards internal standard added with the corresponding variables of an external standard solution. The efficiency of the procedure depends on the composition of the soil that is investigated. The described procedure does not take into account incomplete extraction caused by structure and composition of the soil sample.

When using non-specific detectors such as FID and ECD, the confirmation of the identity of the detected compounds and their concentrations should be done by repeating the gas chromatographic analysis using a column of different polarity. When using gas chromatography-mass spectrometry (GC-MS), the identity confirmation and the quantification can be done in a single run.

**NOTE** This International Standard follows the description of an 'off-line purge and trap' method. The use of commercially available online instruments is allowed provided that equivalent results are obtained during validation of this equipment. With such an instrument purge and trap occurs on line with gas chromatography and detection. Follow the manual of the manufacturer especially regarding the items [5.2.1](#) to [5.2.9](#).

### 4 Reagents

All reagents shall be of recognized analytical grade. Verify whether the reagents are applicable for this specific purpose and free of interfering compounds.

#### 4.1 Water, free of volatile aromatic and volatile halogenated hydrocarbons

Usually boiler water with a temperature of at least 80 °C and 1 day old can be applied. Purging with an inert gas, e.g. a flow of 10 ml/min of nitrogen for 30 min, is another means of removing interfering compounds from water. A sufficient amount of water from the same batch should be available to complete each batch of analyses, including all preparations.

#### 4.2 Internal standards

**4.2.1** For the determination of volatile aromatic hydrocarbons preferably two internal standards shall be selected from [Table 1](#). They shall not interfere with compounds present in the sample extract.