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**Soil quality — Risk-based petroleum  
hydrocarbons —**

**Part 1:  
Determination of aliphatic and  
aromatic fractions of volatile  
petroleum hydrocarbons using gas  
chromatography (static headspace  
method)**

*Qualité du sol — Hydrocarbures de pétrole à risque —*

*Partie 1: Détermination des fractions aliphatiques et aromatiques  
des hydrocarbures de pétrole volatiles par chromatographie en phase  
gazeuse (méthode par espace de tête statique)*



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# Contents

Page

<b>Foreword</b>	<b>iv</b>
<b>Introduction</b>	<b>v</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>1</b>
<b>3 Terms and definitions</b>	<b>2</b>
<b>4 Interferences</b>	<b>3</b>
<b>5 Principle</b>	<b>3</b>
<b>6 Reagents</b>	<b>3</b>
<b>7 Apparatus</b>	<b>7</b>
<b>8 Sampling, preservation, and sample pretreatment</b>	<b>8</b>
8.1 General	8
8.2 Sampling using vials pre-filled with methanol	8
8.3 Sampling using coring tube method	9
<b>9 Procedure</b>	<b>9</b>
9.1 Blank determination	9
9.2 Extraction	9
9.3 Headspace-analysis	9
9.4 Gas chromatographic analysis	10
9.4.1 General	10
9.4.2 Calibration	10
9.4.3 Measurement	12
<b>10 Calculation</b>	<b>12</b>
10.1 Calculation of the concentration in the spiked water sample	12
10.1.1 Volatile aromatic hydrocarbon compounds with internal standard method	12
10.1.2 Volatile aliphatic fractions	12
10.2 Calculation of the concentration of a volatile compound or fraction in the soil sample	13
10.3 Calculation of the concentration of volatile oil in the soil sample	13
<b>11 Expression of results</b>	<b>13</b>
<b>12 Precision</b>	<b>13</b>
<b>13 Test report</b>	<b>13</b>
<b>Annex A (informative) Examples of GC-MS chromatograms of fuels</b>	<b>14</b>
<b>Bibliography</b>	<b>16</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 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*.

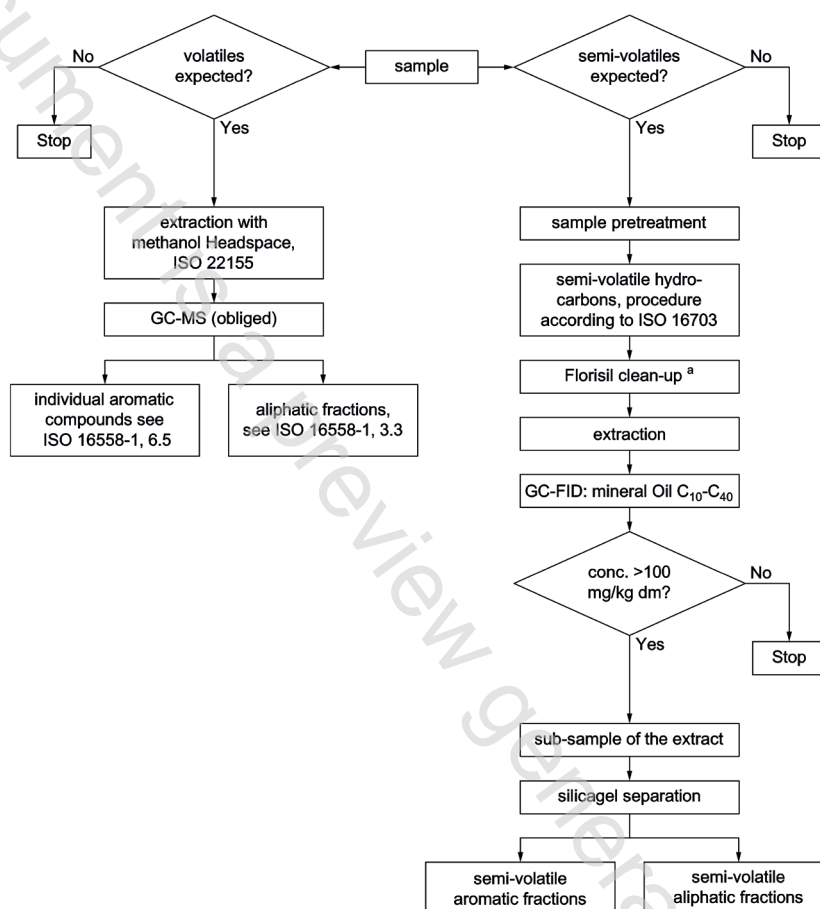
ISO 16558 consists of the following parts, under the general title *Soil quality — Risk-based petroleum hydrocarbons*:

- *Part 1: Determination of aliphatic and aromatic fractions of volatile petroleum hydrocarbons using gas chromatography (static headspace method)*
- *Part 2: Determination of aliphatic and aromatic fractions of semi-volatile petroleum hydrocarbons using gas chromatography with flame ionization detection (GC/FID)* [Technical Specification]

## Introduction

ISO 11504 establishes a basis for the choice of fractions and individual compounds when carrying out analysis for petroleum hydrocarbons in soils and soil-like materials including sediments. It provides guidance for the appropriate use of the analytical results in risks assessment. This part of ISO 16558 specifies methods for the quantitative determination of the appropriate fractions of aliphatic and aromatic compounds. The methods described are based on existing standards [mineral oil (ISO 16703) and volatile hydrocarbons (ISO 22155)].

The general use and relation between the two different parts of this International Standard is given in [Figure 1](#).



### Key

- <sup>a</sup> Florisil®<sup>b</sup> clean-up: Only to be applied in case the test according to ISO 16703 is carried out. If the aliphatic and aromatic fractions have to be analysed, floril clean-up should not be carried out. Florisil® is a trade name for a prepared diatomaceous substance mainly consisting of anhydrous magnesium silicate.
- <sup>b</sup> Florisil® is an example of a suitable product available commercially. This information is given for the convenience of users of this International Standard and does not constitute an endorsement by ISO of this product.

**Figure 1 — Use of different analytical International Standards during risk assessment of petroleum hydrocarbons**



# Soil quality — Risk-based petroleum hydrocarbons —

## Part 1:

### Determination of aliphatic and aromatic fractions of volatile petroleum hydrocarbons using gas chromatography (static headspace method)

#### 1 Scope

This part of ISO 16558 specifies a method for the quantitative determination of the total extractable volatile, the volatile aliphatic, and aromatic fractions of petroleum hydrocarbon content in field moist soil samples by gas chromatography with mass spectrometric detection. The aromatic fractions are determined by the sum of individual aromatic compounds.

The sum of the volatile aliphatic (C<sub>5</sub> to C<sub>10</sub>) and aromatic (C<sub>6</sub> to C<sub>10</sub>) fractions can be referred to as “volatile oil”.

The results of the test carried out can be used for risk assessment studies related to contaminations with petroleum hydrocarbons.

This part of ISO 16558 provides a method applicable to petroleum hydrocarbon contents from about 5 mg/kg soil expressed as dry matter for the whole aliphatic fraction C<sub>5</sub> to C<sub>10</sub> and about 5 mg/kg soil expressed as dry matter for the aromatic fraction in the boiling range of C<sub>6</sub> to C<sub>10</sub>.

With this method, all hydrocarbons with a boiling range of 36 °C to 184 °C, *n*-alkanes between C<sub>5</sub>H<sub>12</sub> to C<sub>10</sub>H<sub>22</sub>, isoalkanes, cycloalkanes, BTEX, and di- and tri-alkyl benzenes compounds are determined as total volatile petroleum hydrocarbons C<sub>5</sub> to C<sub>10</sub>. In addition, volatile aliphatic and aromatic fractions are specified.

For the determination of semi-volatile aliphatic and aromatic fractions of petroleum hydrocarbons in soil samples, see ISO/TS 16558-2.

**NOTE** The sub-fractions proposed in this part of ISO 16558 have shown to be suitable for risk assessment studies. However, other sub-fractions between C<sub>5</sub>H<sub>12</sub> to C<sub>10</sub>H<sub>22</sub> can be determined in conformity with this part of ISO 16558.

On the basis of the peak pattern of the gas chromatogram and of the boiling points of the individual *n*-alkanes listed in [Annex A](#), the approximate boiling range of the mineral oil and some qualitative information on the composition of the contamination can be achieved.

#### 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 8466-1, *Water quality — Calibration and evaluation of analytical methods and estimation of performance characteristics — Part 1: Statistical evaluation of the linear calibration function*

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*