

Water quality - Analysis of microplastic in water - Part 2: Vibrational spectroscopy methods for waters with low content of suspended solids including drinking water (ISO 16094-2:2025)

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>See Eesti standard EVS-EN ISO 16094-2:2025 sisaldab Euroopa standardi EN ISO 16094-2:2025 ingliskeelset teksti.</p> <p>Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 01.10.2025.</p> <p>Standard on kättesaadav Eesti Standardimis- ja Akrediteerimiskeskusest.</p>	<p>This Estonian standard EVS-EN ISO 16094-2:2025 consists of the English text of the European standard EN ISO 16094-2:2025.</p> <p>This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.</p> <p>Date of Availability of the European standard is 01.10.2025.</p> <p>The standard is available from the Estonian Centre for Standardisation and Accreditation.</p>
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EUROPEAN STANDARD

EN ISO 16094-2

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English Version

Water quality - Analysis of microplastic in water - Part 2:  
Vibrational spectroscopy methods for waters with low  
content of suspended solids including drinking water (ISO  
16094-2:2025)

Qualité de l'eau - Analyse des microplastiques dans  
l'eau - Partie 2: Méthodes de spectroscopie  
vibrationnelle pour les eaux à faible teneur en matières  
en suspension, y compris l'eau potable (ISO 16094-  
2:2025)

Wasserbeschaffenheit - Analyse von Kunststoff in  
Wasser - Teil 2: Verfahren mittels  
Vibrationspektroskopie (ISO 16094-2:2025)

This European Standard was approved by CEN on 14 September 2025.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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

## European foreword

This document (EN ISO 16094-2:2025) has been prepared by Technical Committee ISO/TC 147 "Water quality" in collaboration with Technical Committee CEN/TC 230 "Water analysis" 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of an identical text or by endorsement, at the latest by April 2026, and conflicting national standards shall be withdrawn at the latest by April 2026.

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.

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## Endorsement notice

The text of ISO 16094-2:2025 has been approved by CEN as EN ISO 16094-2:2025 without any modification.

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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 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)).

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This document was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 230, *Water analysis*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

A list of all parts in the ISO 16094 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).

## Introduction

Pollution linked to microplastics is recognized as a global phenomenon. The standardization of the sampling, quantification and identification protocols is required to ensure reliability and comparability of the data produced for health and environmental risk assessments.

Microplastics in water can be identified and quantified using various methodological approaches. Depending on the measurement objectives, several complementary approaches shall be used to cover the full spectrum of microplastics (size and chemical nature). [Table 1](#) resumes the characteristics and the information obtained with spectroscopic techniques.

**Table 1 — Characteristics of the various analytical techniques and information obtained.**

Characteristics and information obtained	Raman micro spectroscopy	Infrared micro spectroscopy
Type of sample	Water filtrate residues	
Chemical nature of the polymer	Yes	
Information provided by analytical technique	Functional groups	
Results expression	Polymer type, number of particles, size of particles	
Minimum measurable size range of particles	1 µm to 5 µm	20 µm
Minimum mass subject to measurement after preparation	Undefined	
Consequences for the test sample after measurement	Non-destructive	
Main interferences	mineral particles, coloured particles, pigments, fluorescence, fatty acids, fatty amides, proteins, surface alterations by biofilms or weathering, carbohydrates, generated by microbes	mineral particles, proteins, surface alterations by biofilms or weathering, particles loaded with carbon black, presence of water, carbohydrates generated by microbes

# Water quality — Analysis of microplastic in water —

## Part 2: Vibrational spectroscopy methods for waters with low content of suspended solids including drinking water

**WARNING** — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices.

**IMPORTANT** — It is absolutely essential that tests conducted in accordance with this document be carried out by suitably qualified staff.

### 1 Scope

This document establishes key principles for the investigation of microplastics in drinking water and water with low content of natural suspended solids using a microscopy technique coupled with vibrational spectroscopy.

This method is applicable to:

- determine the size of microplastics [which range from 1  $\mu\text{m}$  to 5 000  $\mu\text{m}$ ], count them and classify them by size range;
- identify the chemical composition of microplastics, the main ones (most used in industry and most abundant in the environment) being: polyethylene (PE), polypropylene (PP), polyethylene terephthalate (PET), polycarbonate (PC), polystyrene (PS), polytetrafluoroethylene (PTFE), polyvinyl chloride (PVC), polyamide (PA), polymethyl methacrylate (PMMA) and polyurethane (PU);

This method is applicable to water with a low content of organic matter and other suspended matter as defined in ISO 6107 (1 mg/l to 100 mg/l or lower when interfering with the determination), i.e.,

- ultrapure water;
- water intended for human consumption;
- raw groundwaters.

Given the very low concentrations of microplastics usually present in these waters, special attention needs to be paid to potential sources of contamination during sample preparation.

This method is intended to determine and characterize large numbers of particles in the sample in automatic mode.

This method can also identify the nature of the other particles that are outside the scope of this document, for example minerals, proteins, cellulose and pigments.

This method does not apply to the characterization of substances intentionally added to or adsorbed on the surface of microplastics. This method does not apply to the determination of the geometric shape of microplastics.

## 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 14644-1:2015, *Cleanrooms and associated controlled environments — Part 1: Classification of air cleanliness by particle concentration*

ISO/IEC Guide 99:2007, *International vocabulary of metrology — Basic and general concepts and associated terms (VIM)*

## 3 Terms, definitions and abbreviations

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

#### 3.1.1

##### **microplastics**

solid plastic or synthetic polymer particle insoluble in water with the largest dimension between 1 µm and 5 mm

Note 1 to entry: Microplastics can have various shapes.

Note 2 to entry: This definition encompasses the ISO/TR 21960 definitions of large microplastics and microplastics.

Note 3 to entry: The term “microplastics” covers the sum of several individual microplastic particles.

#### 3.1.2

##### **microparticle**

solid particle insoluble in water, with the largest dimension between 1 µm and 5 mm

#### 3.1.3

##### **Raman spectroscopy**

spectroscopy in which the *Raman effect* (3.1.4) is used to investigate molecular energy levels

[SOURCE: ISO 18115-2:2021, 5.129]

#### 3.1.4

##### **Raman effect**

emitted radiation, associated with molecules illuminated with monochromatic radiation, characterized by an energy loss or gain arising from rotational or vibrational excitations

[SOURCE: ISO 18115-2:2021, 5.128]

#### 3.1.5

##### **infrared spectroscopy**

analytical chemical technique based on absorption of infrared radiation by chemical moieties (functional groups) in the specimen, used to identify and quantitate the absorbing chemical moieties

[SOURCE: ISO/TS 14101:2012, 3.3]

#### 3.1.6

##### **particle-free water**

water not containing *microplastics* (3.1.1) or with the lowest possible concentration of *microplastics* (3.1.1)