SLOVENSKI STANDARD
oSIST ISO 5667-27:2026

01-april-2026

Kakovost vode - Vzorčenje - 27. del: Navodilo za vzorčenje mikroplastike v vodi

Water quality - Sampling - Part 27: Guidance on sampling for microplastics in water

Qualité de l'eau - Échantillonnage - Partie 27: Recommandations pour l'échantillonnage des microplastiques dans l'eau

Ta slovenski standard je istoveten z: **ISO 5667-27:2025**

ICS:

13.060.45	Preiskava vode na splošno	Examination of water in general

oSIST ISO 5667-27:2026 **en,fr,de**

International Standard

ISO 5667-27

First edition
2025-03

Water quality — Sampling —

Part 27: Guidance on sampling for microplastics in water

Qualité de l'eau — Échantillonnage —

Partie 27: Recommandations pour l'échantillonnage des microplastiques dans l'eau

Reference number
ISO 5667-27:2025(en)

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Published in Switzerland

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Foreword

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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).

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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 147 *Water quality*, Subcommittee SC 6, *Sampling (general methods)*.

A list of all parts in the ISO 5667 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.

Introduction

Microplastic occurrence in the environment is a prominent concern both to the public and to the scientific community. Determining the amount and distribution of microplastics in water bodies and domestic water is therefore a critical task.[1]-[6] However, the methodology for sampling microplastics in water samples is still lacking in precision. Consistent methodology is only starting to emerge, but still no universal protocol exists for the sampling of these contaminants in water.

The presence of small plastic fragments in the ocean was first reported in 1972,[7] but it was in 2004 that the term “microplastics” was proposed for the first time to describe plastic particles of a few micrometres in diameter.[8] Since then, a wealth of information became available on the abundance and type of microplastics in the marine environment, freshwater and estuarine systems. However, the different studies have used diverse techniques to sample, extract, treat and detect microplastic present in water.

There are many reasons why different studies investigating microplastic occurrence in water and wastewater show different results. The disparity between some of the findings (for microplastic type and abundance) can be partially explained by the fact that differing sampling techniques have been used. Variables pertaining to both time of year and time of day, flow rate and volume of water sampled, grab sampling or sieving the water over an extended period, the use of plastic containers or tubing, selection of a few parts of the sample for analysis, or dissimilar devices to capture the microplastic fragments, can be the causes of variation in study results.

While several standards for water sampling and water quality already exist (e.g. ISO 5667 series and, in particular, ISO 5667-17), microplastics as particular determinands pose a specific challenge which requires a more specific approach. For example, microplastics sampling requires the use of very specific materials for collecting, handling and storing to avoid cross-contamination. Also, microplastic buoyancy can vary depending on their composition, size, shape or colonization by microorganisms, and microplastics are not homogeneously distributed in the water column. Therefore, a more targeted and detailed set of sampling protocols is required to account for these differences. To better understand the fate and impact of microplastics in the environment, a more specific standardized sampling approach should be adopted and applied.

Water quality — Sampling —

Part 27: Guidance on sampling for microplastics in 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 and to ensure compliance with any national regulatory conditions.

IMPORTANT — It is essential that tests conducted according to this document be carried out by suitably trained staff.

1 Scope

This document specifies the basic methods for sampling suspended microplastics in water (domestic water, freshwater, seawater, treated wastewater and untreated wastewater), for their subsequent characterization. Suspended particles can also include synthetic or semi-synthetic polymeric materials (such as rubber). This document does not cover chemical analysis, biological (ecotoxicological) methods or physical methods, nor the pre-treatment or digestion methods intrinsic to such analyses.

This document covers general methodologies:

— for grab sampling, sampling using a set of successive filters of different pore sizes (cascade filtration), for water samples with low, medium and high content of suspended solids, and

— for net sampling using, for example, manta, plankton or neuston nets.

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 5667-3, *Water quality — Sampling — Part 3: Preservation and handling of water samples*

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
microplastic
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 show various shapes.

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