Water quality - Guidance standard for the routine sampling and preparation of benthic diatoms from rivers and lakes

EVS EESTI STANDARDIMIS- JA AKREDITEERIMISKESKUS
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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN 13946:2025 sisaldab Euroopa standardi EN 13946:2025 ingliskeelset teksti.	This Estonian standard EVS-EN 13946:2025 consists of the English text of the European standard EN 13946:2025.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 24.09.2025.	Date of Availability of the European standard is 24.09.2025.
Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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English Version

Water quality - Guidance standard for the routine sampling and preparation of benthic diatoms from rivers and lakes

Qualité de l'eau - Guide pour l'échantillonnage en routine et le prétraitement des diatomées benthiques de rivières et de plans d'eau

Wasserbeschaffenheit - Anleitung zur Probenahme und Probenaufbereitung von benthischen Kieselalgen aus Fließgewässern und Seen

This European Standard was approved by CEN on 4 August 2025.

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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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 13946:2025) has been prepared by 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 March 2026, and conflicting national standards shall be withdrawn at the latest by March 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.

This document supersedes EN 13946:2014.

EN 13946:2025 includes the following significant technical changes with respect to EN 13946:2014:

— the method has been adapted to process the samples obtained for subsequent molecular methods by adding additional solvents and requirements to avoid contamination of samples.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

Introduction

Diatoms are an important component of aquatic ecosystems and constitute a water quality monitoring tool where the primary objective is either a measure of ecological status or the impact of specific components of water quality (e.g. eutrophication, acidification). The method is appropriate for assessments required by the Water Framework Directive (2000/60/EC) and Urban Wastewater Treatment Directive (2024/301) in addition to other EU Directives and international agreements. This document covers aspects of sampling and preparation relevant to assessment of water quality and ecological status using benthic diatoms. These instructions will result in samples suitable for quantifying relative numbers of benthic diatom taxa present using either light microscopy or molecular methods. If it is necessary to quantify absolute numbers of taxa, or fresh weight per unit area, modifications to the method are required, which are not within the scope of this document.

The use of diatoms as indicators of river and lake quality is widely accepted both in Europe and beyond. The method is based on observations that all diatom species have distinct preferences for particular environmental conditions such as nutrients, organic pollution and acidity. Polluted waters will tend to support an increased abundance of those species whose optima correspond with the levels of the pollutant in question. Conversely, certain species are intolerant of elevated levels of one or more pollutants, whilst others may occur in a wide range of water qualities.

Methods using diatoms to assess water quality have been developed in several European countries (recent work is summarized in references [1] to [4]). Methods for evaluating the data vary but the sampling and preparation processes are similar [5, 6]. In recent years, molecular methods such as metabarcoding have been developed to the point where they are suitable for routine use [7, 8] and modifications to procedures appropriate for this approach have been included in this revision of the standard.

According to the precise usage to which this document is to be put, it is essential for specifiers and users to mutually agree on any necessary variations or optional procedural details prior to use.

All numerical values given in this document are approximate.

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 health and safety 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 specifies a method for the sampling and laboratory preparation of benthic diatoms for ecological status and water quality assessments. The sampling and preparation procedures described can be used for later investigations using either light microscopy or molecular methods. Data produced by this method are suitable for production of indices based on the relative abundance of taxa.

Analysis using molecular methods is not within the scope of the document.

2 Normative references

There are no normative references in this document.

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
benthic diatoms
diatoms living on substrata, rather than suspended in the water column

3.2
boulder
mineral substratum with a diameter > 256 mm

3.3
cobble
mineral substratum with a diameter > 64 mm and ≤ 256 mm

3.4
ecological status
measure of the structure and functioning of aquatic ecosystems

3.5
euphotic zone
part of the water column in which there is sufficient light for photosynthesis

3.6
frustule
cell wall of diatoms, composed of silica and consisting of two valves linked by two or more girdle bands

3.7
habitat
specific environment in which an organism lives

3.8
introduced substratum
substratum (often artificial) introduced into river or lake specifically for colonisation by diatoms