SLOVENSKI STANDARD
SIST EN 16150:2026

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Nadomešča:
SIST EN 16150:2012

Kakovost vode - Navodilo za vzorčenje bentoških nevretenčarjev v vodotokih v sorazmerju z zastopanostjo habitatov

Water quality - Guidance on pro-rata multi-habitat sampling of benthic macroinvertebrates from rivers and streams

Wasserbeschaffenheit - Anleitung für die pro-rata Multi-Habitat-Probenahme benthischer Makroinvertebraten in Fließgewässern

Qualité de l'eau - Lignes directrices pour l'échantillonnage des macro-invertébrés benthiques en rivières et cours d'eau au prorata des surfaces de recouvrement des habitats présents

Ta slovenski standard je istoveten z: **EN 16150:2026**

ICS:

13.060.10	Voda iz naravnih virov	Water of natural resources
13.060.70	Preiskava bioloških lastnosti vode	Examination of biological properties of water

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16150

April 2026

ICS 13.060.70

Supersedes EN 16150:2012

English Version

Water quality - Guidance on pro-rata multi-habitat sampling of benthic macroinvertebrates from rivers and streams

Qualité de l'eau - Lignes directrices pour l'échantillonnage des macro-invertébrés benthiques en rivières et cours d'eau au prorata des surfaces de recouvrement des habitats présents

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This European Standard was approved by CEN on 13 March 2026.

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

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

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European foreword

This document (EN 16150:2026) 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of an identical text or by endorsement, at the latest by October 2026, and conflicting national standards shall be withdrawn at the latest by October 2026.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 16150:2012.

EN 16150:2026 includes the following significant technical changes with respect to EN 16150:2012:

— provide more complete guidance about the standard’s application, aims and purpose;

— updated and enlarged list of normative references;

— revised list of terms and definitions reflecting the revised content of the main document and transfer of description of STAR-AQEM method to an Annex;

— major revision, replacing the description of the STAR-AQEM method by a description of the pro-rata multi-habitat approach;

— new part describing features common to all methods based on pro-rata multi-habitat sampling;

— new part describing the most widely used methods based on pro-rata multi habitat sampling;

— this part has been reduced to a description of common procedures with detailed description of the STAR-AQEM method transferred to A.1;

— A.1: Description of STAR-AQEM method, transferred from Part 5 of the previous version;

— A.2: New part describing the Austrian method for large rivers;

— A.3: New part describing the RIVPACS method;

— A.4: New part describing the French method for shallow rivers; and

— Annex B: New part listing methods based on pro-rata multi-habitat sampling.

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

This document sets out the fundamental principles of pro-rata multi-habitat sampling, its objectives and the circumstances in which it should be applied. Whereas, EN 16150:2012 described one of the possible techniques among the existing pro-rata multi-habitat sampling techniques. The aim of this revision is to provide a better understanding of the rationale for this approach, describing more than one technique, including that described in the previous version of this document as examples in the Annexes.

Pro-rata multi-habitat sampling can be applied to all surface waters, including small streams, large rivers, springs, subterranean streams, temporary and intermittent streams. Standard sampling methods for some of these types of habitats are still in development and not all these habitats are included in national monitoring schemes.

It is suitable for national and regional monitoring networks for classifying ecological status under the European Water Framework Directive (WFD) [1]. All water bodies in all European Union member states are classified under this Directive. Annex A describes several examples of sampling protocols that follow the pro-rata multi-habitat approach. Annex B indicates the approach to sampling undertaken for Water Framework Directive monitoring in numerous European countries.

In contrast to small streams, large rivers cannot be inspected on foot, even at low flow. Deeper water with relatively poor visibility sometimes makes the habitats invisible to the observer and prevents the selective collection of samples. Where water depth varies through the year, sessile and less mobile macroinvertebrates are more commonly found below the low-flow water level. For these reasons, representative sampling from the banks is restricted to low-flow periods, but the water level of large rivers is often too high for very long periods to get representative samples from the bank. In such cases, it is advisable to survey with a sampling technique independent of the water level; for example, using a grab, air-lift sampler, or dredge. Deployed from a boat or ship, samples should be taken across large rivers to cover the main habitat gradients of flow and depth even if they are not visible. In all cases, the sampling method should not be changed within one water body.

The pro-rata multi-habitat sampling technique does not replace other techniques. If the same habitat is present at all monitoring sites, pro-rata multi-habitat sampling is not necessary because samples can always be collected from this habitat and both reference values and samples associating different environmental qualities will also be based on samples from that habitat. Results will be more directly comparable between sites. Annex B lists several counties that have not adopted pro-rata multi-habitat approach for Water Framework Directive monitoring. Sampling from one habitat type reduces variation and, therefore, provides a more consistent overall assessment. It also avoids variation caused by observer bias in the assessment of habitat cover. The training burden is also reduced. The best habitat for practical and biological reasons are shallow riffles with gravel substrates.

If the same type of habitat is not present at every site, it can be necessary to sample from a selection of habitats. This approach is only practicable if at least one of the few habitats chosen to use are found in all monitoring sites. The steps that can be taken to make data comparable across samples taken by this approach are the same as for pro-rata multi-habitat sampling, such as expressing results as a proportion of their reference value, which can be based on reference sites or models covering the same combinations of habitats. Because not every habitat is sampled, this approach is not covered by this document.

1 Scope

This document gives guidance for pro-rata multi-habitat sampling of benthic macroinvertebrates in rivers and streams. The term “pro-rata” reflects the intention to sample all the main riverine habitats present at a monitoring site according to the proportion of the site that it covers. It is an objective way to divide sampling effort among the different habitats.

This document is applicable to all flowing waters, both artificial, modified and natural. It enables comparable samples to be collected from any type of river, regardless of the habitats present.

This document gives guidance on an overall approach rather than a specific method.

This document is applicable to:

— supporting environmental and conservation agencies, water boards, and water agencies to meet the monitoring requirements of the WFD (Article 8, Annex II, and Annex V) [1];

— generating data sets appropriate for monitoring and reporting of sites designated under the Habitats Directive and the Birds Directive to ensure that samples for comparing the overall composition of invertebrates from different stream types are comparable;

— ensuring samples for environmental quality assessments across different stream types are comparable even when sampled by different people;

— supporting river management and restoration initiatives;

— sampling sites in a consistent way that is not dependent on the presence of particular types of habitat; a user-friendly strategy for collecting biological data depending on the distribution of habitats;

— understanding the distribution of biological community types across different physical river types; and

— assessing quality based on deviation from reference, as adopted in the European Water Framework Directive [1].

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.

EN ISO 10870:2012, *Water quality — Guidelines for the selection of sampling methods and devices for benthic macroinvertebrates in fresh waters(ISO 10870:2012)*

EN 17136:2019, *Water quality - Guidance on field and laboratory procedures for quantitative analysis and identification of macroinvertebrates from inland surface waters*

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/ui/

— IEC Electropedia: available at https://www.electropedia.org/

3.1
airlift
sampling device that uses compressed air to dislodge macroinvertebrates from the stream bed and raise them into a collecting net

3.2
AQEM-STAR
development and testing of an integrated assessment system for the ecological quality of streams and rivers throughout Europe using benthic macroinvertebrates and standardization of river classifications, and the European Union's 4th and 5th framework research projects in which the AQEM-STAR sampling protocol was developed

3.3
dredge
sampling device that comprises a collecting net on a heavy frame that is dragged along the riverbed on the end of a rope or cable to collect macroinvertebrates

3.4
grab
sampling device with strong jaws that bite into the riverbed and enclose the sample, which can then be raised to the surface on a cable or rope

3.5
habitat
visibly distinct area of the stream of a specific grain size of the stream bed, plant community, debris, current speed and/or depth, in which different assemblages of macroinvertebrates are found

3.6
hand-net
sampling device comprising a collecting net on a rigid frame mounted on the end of a pole

3.7
heavily modified water body
HMWB
body of surface water which, as a result of physical alterations by human activity, is substantially changed in character

Note 1 to entry: Water bodies designated as HMWB in accordance with WFD have environmental quality objectives that accommodate the degradation in biological quality caused by the physical modification that is deemed desirable (for navigation, flood defence or other use).

3.8
Hess sampler
sampling device comprising a metal or plastic cylinder that can be driven into the riverbed to separate it, with a collecting net on one side and a screen on the opposite (front) side, which allows macroinvertebrates to flow into the collecting net when the stream bed within the cylinder is disturbed

3.9
macroinvertebrate
invertebrate animal that is retained on a 500 µm mesh, such as an insect, shrimp, snail or worm

3.10
microhabitat
habitat that cannot be distinguished visually

3.11
multi-habitat sample
sample collected from more than one type of habitat

3.12
multi-habitat sampling
MHS
multi-habitat sample collection

3.13
pro-rata
proportional to the area of stream bed at the sampling site

3.14
reference value
value of a metric or biotic index that a rive type has

Note 1 to entry: Minimally impacted WFD reference quality [11].

3.15
River Invertebrate Classification and Prediction System
RIVPACS
mathematical model to predicting reference values

3.16
sampling site
location, usually but not always a defined length or area of river, from which sampling units are collected

3.17
sampling unit
SU
sub-sample from a specific habitat; multi-habitat samples usually comprise several sampling units; in STAR-AQEM samples, they are individual 0,25 m × 0,25 m Surber sub-samples

3.18
surber sampler
collecting net on a rigid frame with another frame at right angles that delimits an area (0,25 m × 0,25 m) of the stream bed from which the sample is collected

3.19
type
river type
group of rivers characterized by geographical, natural chemical conditions that supports a particular type of macroinvertebrate assemblage

3.20
water body
stretch, stream or river of the same type, with similar risks of environmental pressure and requiring the same management actions to maintain or restore its quality

Note 1 to entry: This is the smallest geographical unit for management under WFD [12].