SLOVENSKI STANDARD
SIST EN 27828:1997

01-januar-1997

Kakovost vode - Metode vzorčenja bioloških vzorcev - Navodilo za vzorčenje bentoških nevretenčarjev z ročno mrežo (ISO 7828:1985)

Water quality - Methods of biological sampling - Guidance on handnet sampling of aquatic benthic macro-invertebrates (ISO 7828:1985)

Wassergüte - Methoden für biologische Probenentnahme - Richtlinien für die Probenentnahme mit Handnetz von aquatischen benthischen Makroinvertebraten (ISO 7828:1985)

Qualité de l'eau - Méthodes d'échantillonnage biologique - Guide pour le prélevement des macro-invertébrés benthiques a l'épuisette (ISO 7828:1985)

Ta slovenski standard je istoveten z: **EN 27828:1994**

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

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Descriptors: Water, quality, water tests, bioassay, sampling, sampling equipment, invertebrater, fishing nets, meshes

English version

Water quality - Methods of biological sampling - Guidance on handnet sampling of aquatic benthic macro-invertebrates (ISO 7828:1985)

Qualité de l'eau - Méthodes d'échantillonnage biologique - Guide pour le prélèvement des macro-invertébrés benthiques à l'épuisette (ISO 7828:1985)

Wassergüte - Methoden für biologische Probenentnahme - Richtlinien für die Probenentnahme mit Handnetz von aquatischen benthischen Makroinvertebraten (ISO 7828:1985)

This European Standard was approved by CEN on 1994-01-14. CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart,36 B-1050 Brussels

Foreword

On the proposal of the CEN Central Secretariat, the Technical Board decided to submit the International Standard:

"Water quality - Methods of biological sampling - Guidance on handnet sampling of aquatic benthic macro-invertebrates (ISO 7828:1985)"

to the formal vote.

The result of the formal vote was positive.

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 July 1994, and conflicting national standards shall be withdrawn at the latest by July 1994.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Endorsement notice

The text of the International Standard ISO 7828:1985 was approved by CEN as a European Standard without any modification.

International Standard 7828

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Water quality — Methods of biological sampling — Guidance on handnet sampling of aquatic benthic macro-invertebrates

Qualité de l'eau — Méthodes d'échantillonnage biologique — Guide pour le prélèvement des macro-invertébrés benthiques à l'épuisette

First edition — 1985-02-15

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Descriptors: water, quality, invertebrates, sampling, sampling equipment.

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 7828 was prepared by Technical Committee ISO/TC 147, *Water quality*.

Water quality — Methods of biological sampling — Guidance on handnet sampling of aquatic benthic macro-invertebrates

0 Introduction

A handnet is probably the most versatile sampler for benthic macro-invertebrates and can be used in a large variety of shallow waters. The methods of sampling with a handnet specified are appropriate when qualitative results are required. A handnet will not give absolute results (i.e. numbers of individuals of different species per unit area of river bed). However, it is usually possible to give some indication of the relative abundance of taxa within a sample but the results should be interpreted with caution.

1 Scope and field of application

This International Standard specifies equipment and procedures for the sampling of benthic macro-invertebrates by handnet in shallow waters (down to a depth of about 1,5 m) which are accessible either by wading or from a bank or boat.

The procedures are applicable to the sampling of all accessible aquatic habitats in rivers, streams, ponds, estuaries and lake shores. They provide qualitative data on the presence, absence, diversity and relative abundance of taxa depending on sampling effort and mesh size.

2 Definitions

2.1 benthic: Dwelling at the bottom of an aquatic environment.

2.2 biotope: An area in which the main environmental conditions are uniform.

2.3 macro-invertebrates: Invertebrates that are easily visible without magnification (> 0,5 mm).

2.4 taxa: Taxonomic units, for example families.

3 Principle

Sampling of benthic macro-invertebrates in shallow, standing or running water by manual collection using a lightweight handnet.

4 Sampling equipment

Handnet, consisting of a handle and a frame holding a net in which the organisms are collected.

Handles are usually made of metal, wood or reinforced plastics. Frames, usually constructed in metal, have been made in various shapes, for example round, triangular, rectangular. Of these alternatives the rectangular shape (see figure 1) is preferred since the flat edge can be placed in close contact with the bed during use and the vertical sides permit a better cross-sectional area of water to enter the net than does a triangular shape. The frame should be large enough to allow a reasonable sample to be taken but not be so large that the complete handnet offers too much resistance to the flow of water, which could make sampling difficult in fast flows. Suitable rectangular handnets currently in use have evolved in the light of experience and have frame dimensions in the following ranges (see figure 1):

width, w	200 to 400 mm
height, h	200 to 300 mm
shoulder, s	100 to 200 mm (for example)

In choosing an appropriate net two interrelated factors have to be considered:

a) the dimensions and shape of the net;

b) the mesh size of the net material.

Finer mesh sizes increase the risk of clogging with organisms and debris which reduces net efficiency by increasing the tendency of water and organisms to flow around rather than into the net. This effect can be minimized by increasing the depth, d, of the net (see figure 1) or frequent emptying. On the other hand, an unnecessarily deep net can be inconvenient in use. For guidance, the table gives examples of the most suitable depths of nets as a function of their size of openings.

The shape of the net is not particularly important from a sampling point of view but may be determined by practical considerations in manufacture, for example figure 2a) shows how two conical nets can be cut from material 1 m wide, whilst figure 2 b) is the pattern for one of the more usual bag-shaped nets. The net material is normally sewn to strong canvas which is attached to an inner frame thereby reducing abrasion. Methods of joining the inner and main frames, which facilitate replacement in the field, are clearly advantageous. Net material may be of a monofilament weave or knitted but the latter, being stronger, may be preferred for this reason. Synthetic fibre is

Table — Recommended handnet mesh sizes

Values in millimetres

Survey objective	Maximum size of openings	Recommended minimum depth, *d*	Comments
General/routine biological monitoring: data for surveys using biotic scores/indices	0,5 to 0,75	400	May not capture small stages of most benthos
For surveillance with more complete records of taxa present	0,5	450	May not capture early instar stages of many insects
For special surveys requiring complete taxa lists	0,25	550	Ensures capture of first instar stages and very small organisms which may prove of value in water quality determination

preferable since it is stronger and less liable to decompose, but shall be selected to ensure sufficient flexibility. The mesh size should be appropriate for the objectives of the study; the maximum recommended sizes of openings are given in the table.

5 Sampling procedures

The factors which influence the selection of a sampling procedure are

a) the sampling objective — which may be a comprehensive species list for the site and/or the relative abundance of taxa within a selected biotope;

b) the characteristics of the site — including depth, current velocity, type of bed and amount of vegetation;

c) safe working conditions — water depth, current velocity and bed stability. Lone working is not recommended.

No sampling is appropriate to all types of water and it is necessary to describe a number of sampling procedures to meet different requirements. Sampling effort should be appropriate to the objectives and the site, and hence be based on a suitable distance, area or time. When it is intended to collect as many species as possible, take a sample by a combination of the methods specified in 5.1 to 5.3. It is customary to explore thoroughly all the types of substratum by this method including sweeps through weed patches and between the roots of overhanging trees.

Except in deep or static water or when sweeping the net through weeds or in the surface of mud or silt deposits, place the handnet on the bed and carry out the sampling in such a way that the animals drift into it, i.e. with the opening of the net facing upstream. Carry out sampling in an upstream direction to avoid disturbance to the area not yet sampled.

5.1 Sampling in flowing shallow water by hand

Hold the straight lower edge of the handnet against the stream bed whilst turning over the stones immediately upstream by hand in the flowing water. Dislodged animals are carried into the net by the current. Examine the stones, remove any attached or clinging species and add them to the sample. Disturb the finer lower deposits to dislodge any further organisms. Repeat this process at several places across the river to include different microhabitats within the riffles. It may be appropriate to sample these habitats proportionately.

The removal of the catch can be facilitated by washing it into a corner of the net using the flowing water and gently shaking the net whilst removing it from the water. Then turn the net inside out to aid the transfer of the sample to a container of water and remove by hand any animals clinging to the net and add them to the sample. It is recommended that the net be thoroughly washed between taking samples. Further sample treatment, such as decanting surplus water (for example to minimize predation by carnivores), reducing sample bulk by removing sticks, stones, leaves and other debris and the addition of preservatives, depends upon operator preference and the objective of the sampling programme. A small sieve, of the same mesh as the net, can be used to reduce sample bulk.

5.2 Foot sampling usually in deeper water

Where the fauna is suspected, perhaps superficially, of being sparse or where the water is too deep for hand sampling, foot sampling may be used and is generally satisfactory. Foot sampling can also be used in shallow water between sites of different depths or where depth variation may not, at times, allow hand sampling.

Hold the net vertically on the river bed downstream of the foot. Disturb the substratum forcefully with the toe or heel of the boot and catch the released material in the net.

By working across the river different habitats are sampled. This method is somewhat selective in that fewer of the attached animals may be taken. Where practicable therefore, lift some of the stones and examine them for these. Transfer the animals to a container as described in 5.1.

5.3 Sampling in slow-flowing and static water

In static water the handnet may not be the most appropriate method for sampling. Consideration should be given to the use of sieves, grabs, dredges, corers, colonization or air-lift samplers.

Some habitats, such as stony shores of lakes, may be sampled by the hand-picking method (5.1) but collecting efficiency may be lower. The best procedure is to remove stones carefully and agitate them vigorously in the net, after which any animals remaining may be picked off by hand.

When sampling other slow-flowing or static habitats, the absence or reduction of water movement necessitates a different

procedure from that used in flowing water where the current is used to advantage in order to sweep dislodged animals into the net. In static water the relative motion of the fauna and net must be supplied by the operator. Disturb the substratum with the feet and catch the dislodged fauna by repeated sweeps of the net through the water immediately above the disturbed area.

In deeper static water where the substratum consists of mud or silt, draw or push the handnet or a sieve through the surface layer, preferably over a predetermined area or distance.

6 Assessment of relative abundance

A consistent indication of relative abundance of taxa within a sample from a clearly defined substrate can be obtained by any of the qualitative methods described in 5.1 to 5.3, but results should always be interpreted with caution. By sampling over a fixed distance or area or for a defined period of time (area probably being optimal) relative abundance within samples may be compared at different sites for water quality monitoring purposes provided that the sites have similar substrates. For hand sampling (5.1), up to 10 min may be required and with foot sampling (5.2) a shorter period, up to 2 min, is usually sufficient with additional time for picking off attached and clinging organisms. The operator should endeavour to apply similar techniques of hand or foot disturbance and a similar frequency of net emptying at the different sites.

For this reason only one operator for any single survey is best involved. Even then different conditions such as current velocity, depth, temperature (with hand sampling) and nature of the substratum may affect the sampling efficiency. Long periods of foot sampling (5.2) in a river with a rich benthic fauna can result in excessive catches to process and when carried out frequently at the same station can adversely affect the aquatic community.

7 Validation of method

The handnet method is widely used for qualitative sampling of benthic macro-invertebrates and gives consistent results when used repeatedly at a given site. Such observations are not, however, sufficient in themselves as evidence that the method is valid.

Quadrat samplers have received widespread acceptance for quantitative estimates of benthic macro-invertebrate abundance. The method furnishes a useful technique for the validation of the handnet since it is possible to compare the qualitative aspects of results from quadrat sampling with those from handnet sampling.

Data from quadrat samples and net samples from two major British rivers and their tributaries were compared. Plots were made of the numbers of species obtained at several sites by means of the quadrat sampler and the number of species obtained by the use of a handnet at the same site. The same operators were involved in taking both kinds of samples.

This analysis showed highly significant correlations ($p < 0,001$) between the number of species recovered by means of net samples and those obtained by the use of the quantitative quadrat sampler (see figure 3).