SLOVENSKI STANDARD
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Kakovost vode - Navodilo za vzorčenje mezozooplanktona v morskih in brakičnih vodah s pomočjo mrež

Water quality - Guidance for the sampling of mesozooplankton from marine and brackish waters using mesh

Wasserbeschaffenheit - Anleitung für die Probenahme von Mesozooplankton aus marinen und Übergangsgewässern mittels Netzen

Qualité de l'eau - Document d'orientation pour l'échantillonnage du mésozooplancton dans les eaux de mer ou saumâtres à l'aide de filets

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Water quality - Guidance on sampling of mesozooplankton from marine and brackish water using mesh

Qualité de l'eau - Document d'orientation pour l'échantillonnage du mésozooplancton dans les eaux de mer ou saumâtres à l'aide de filets

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

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European foreword

This document (prEN 17218:2018) has been prepared by Technical Committee CEN/TC 230 “Water analysis”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

Introduction

Zooplankton abundance and community structure constitute an important part of the pelagic food web, since it forms the link between primary producers and higher trophic levels. Changes in phytoplankton biomass and species/size composition change mesozooplankton community structure and productivity. Such changes potentially influence fish stock recruitment and sedimentation (i.e. indirectly affecting oxygen concentration in the bottom water) [4].

Surveys of zooplankton have provided valuable information for the environmental monitoring of marine and brackish waters, because this group includes species which:

— occur in a wide range of marine and brackish waters over a large geographical area and at the same time have specific environmental requirements;

— are well known with regard to their geographical distribution and environmental requirements;

— have a generally high capacity for dispersal enabling them to respond rapidly to remedial actions; while

— sampling requires only a modest expenditure of time and equipment.

A procedure for analysing zooplankton (identification, counting and biomass determination) in marine and brackish waters is given in prEN 17204. This procedure comprises how to identify and enumerate zooplankton collected in nets which is utilized to estimate quantitative information on diversity, abundance and biomass with regard to spatial distribution and long-term temporal trends for a given body of 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.

1 Scope

This document specifies procedures for sampling of mesozooplankton using nets and ribbon-sampling devices in marine and brackish waters for the purpose of water quality assessment and determination of ecological status of ecosystems.

Guidance on sampling procedures and the subsequent steps of preservation and storage are given. The sampling procedures allow estimates of species occurrence and their abundance (relative or absolute), including spatial distribution and seasonal and long-term temporal trends, for a given body of water.

The described methods are restricted to the sampling of mesozooplankton that inhabit marine and brackish waters and exclude the shallow littoral zones which require a different type of sampling (e.g. zooplankton in salt marshes).

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

3 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:

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

— ISO Online browsing platform: available at http://www.iso.org/obp

3.1
pelagic zone
free body of water beyond the bottom

3.2
thermocline
layer in a thermally stratified body of water in which the temperature gradient is at a maximum

3.3
habitat
area of the environment in which a particular organism lives, including its characteristic assemblages of plants and animals

Note 1 to entry: It can be either the geographical area over which it extends, or the particular station in which a specimen is found.

[SOURCE: EN ISO 10870:2012, 2.6, modified – Note 1 to entry has been added]

3.4
biomass concentration
total mass (unit: g l^{-3}, g ml^{-3}, or g carbon m^{-3}) of living organic matter within a taxon. Measured as wet weight, dry weight or ash free dry weight

3.5
plankton
organisms drifting or suspended in water, consisting chiefly of minute plants or animals, but including larger forms having only weak powers of locomotion

[SOURCE: ISO 6107-5:2004, definition 41]

3.6
zooplankton
animals present in plankton

[SOURCE: ISO 6107-5:2004, definition 49]

3.7
mesozooplankton
zooplankton of 0,2 mm to 20 mm size

3.8
sampling site
general area within a body of water from which samples are taken

Note 1 to entry: A station is defined in terms of its location (geographical position, depth) and invariant conditions (e.g. type of bottom in shallow-water areas) and is delimited on the basis of the accuracy with which these are given. In cases of doubt when sampling stations have to be re-identified, most weight should be placed on depth and type of bottom.

3.9
sampling station
precise location where samples are collected

Note 1 to entry: A sampling station is defined by its geographical position (latitude, longitude), its depth (relative to chart datum and normalized to mean low water as given in tide tables) and any other invariant or physical conditions. The station is delineated using the given level of precision possible when revisiting sampling stations. Emphasis should be placed on landmarks and water depth.

[SOURCE: EN ISO 16665:2013, definition 2.2.5]

3.10
trend monitoring
study intended to reveal any changes in diversity and in the ecological status of a body of water over time

3.11
preservation
protection from (bio) chemical degradation of organic matter

4 Principle

The sampling strategy determines which information on the current status of the zooplankton community can be achieved. The selection of sampling sites (numbers and location), sampling depth, time and frequency of sampling, number of replicates and type of sampling gear is of great importance for the evaluation of the data collected. As a general guidance EN ISO 5667-1 should be consulted.

5 Sampling device

5.1 General

The choice of the sampling devices to be used depends on the aims of the investigation. This document provides some general recommendations and then focuses on standard requirements for net sampling. Table 1 describes advantages and disadvantages of different common zooplankton sampling devices.

Table 1 — Examples of zooplankton sampling devices

Sampling device	Advantages	Disadvantages
Volume samplers	Simple operation. Can operate in shallow waters	Smaller amounts of water may be sampled. Required secondary processing to concentrate sample
Pumps	Medium amounts of water can be sampled. Can operate in all shallow waters	Can be damaging to gelatinous mesozooplankton particularly if using a narrow bore hose. Can be restricted to shallow depths
Simple nets	Medium amounts of water can be sampled, can operate easily as vertically hauls or in restricted areas	Can be more subject to clogging of mesh
Multiple nets	Large amounts of water can be sampled. Sample can be separated by different filter sizes to reduce damage and improve identification. Allows adjustment of sampling to physical/biological conditions (e.g. any stratification)	Difficult to operate in restricted areas
High speed samplers e.g. Gulf VII	Can be towed at higher speeds typically 5 kn	Difficult to operate in restricted areas. Increased risk of damage to delicate organisms
Continuous recorders — using ribbons of tape e.g. continuous plankton recorder	Provides spatial information Can operate over very large areas and using vessels of opportunity. Used for both phyto- and zooplankton investigations	Semiquantitative, damage to delicate organisms, e.g. gelatinous mesozooplankton. Limited sampling depth

NOTE 1 Several overviews exist on the most widely used zooplankton sampling techniques and their advantages and drawbacks (e.g. [5, 6, 7]).

NOTE 2 Ribbon-samplers have a fixed method which is largely determined by the internal mechanism and design of ribbon. Continuous plankton recorder (CPR) devices are designed for us on “vessels of opportunity” so are also restricted in their range and depth, see Annex E.

5.2 Nets

Polyamide plankton nets with a cod-end and a drain cock of various dimensions and mesh sizes may be used for sampling (Figure A.1). The purpose of the investigation determines the selection of net types and its mesh sizes.

Examples of commonly-used nets are:

a) Bongo-net (Figure A.1);

b) MOCNESS (Multiple Opening and Closing Net with an Environmental Sensing System) [8, 9];

c) WP2 net (Figure A.3);

d) Multinet (Figure A.4);

e) Gulf VII sampler (Figure A.7).

For details, see Annex A.

It is important that nets should have a large filtering surface relative to their opening in order to ensure that filtering is as efficient as possible. A net with an opening diameter of 30 cm, for example, should have a length of about one metre as a minimum. A cylindrical net section above the conical part increase the filtering area compared with a conical plankton net with the same opening diameter and length.

The size of opening itself can determine what is obtained on the mesh. Smaller openings will limit the capture of faster moving zooplankton and some larger mesozooplankton can evade 1 m ring net. A flow meter mounted in the net mouth should be used whenever possible.

Closing nets, as opposed to simple open mouthed nets should be used for sampling along transect such as at discrete depth layers.

NOTE Closing nets remain open until the haul is complete and the mouth or the entrance to the cod-end is closed. The design and mechanism varies depending on the sampling device being used [9].

Common mesh sizes are e.g. 100 µm in the Baltic Sea or 200 µm up to 500 µm in the North Sea. If early developmental stages are to be included, in order to provide information on the population dynamics of zooplankton, nets with a mesh size of up to 50 µm at a maximum are recommended. Mesh sizes above 200 µm miss a large proportion of the smaller zooplankton. Table 2 gives a summary of mesh requirements for different zooplankton.

Table 2 — Summary of mesh requirements for different zooplankton

Zooplanktonic group	Suitable mesh sizes	Mesh arrangement
Rotifers, nauplii of crustacea (which mostly belong to the microzooplankton size fraction)	Approx. 50 µm, but > 40 µm	Nets with meshes smaller than 40 µm will readily become clogged and their use should normally be avoided, although they may be useful in oligotrophic waters.
Crustacean plankton only	50 µm (max. 100 µm)	
Rotifers and crustaceans, including predatory species	45 µm for rotifers, 90 µm for most of the crustaceans, and ≥ 150 µm for predatory species	3 nets with 3 different mesh sizes
Hydromedusae		Non-filtering cod-ends should be used to reduce damage to these delicate organisms.

All the mesh sizes mentioned in this document should be regarded as for guidance only. Mesh sizes will also vary somewhat from manufacturer to manufacturer.

It is recommended that, in the case of vertically stratified habitats, the nets are equipped with a closing mechanism with case weight and a flow counter with backflow stop to allow stratified sampling.

The ribbon-based samplers such as the Continuous plankton sampler (Figure A.7) use a band of gauze rather than a net. In the case of the CPR this is 300 micron mesh. For more on ribbon-based samplers, see Annex E.

5.3 Other field equipment

If available, nets should be equipped and deployed with the help of pressure meters so that the actual vertical position of the net is known.

Field equipment in addition to sampling devices may comprise:

5.3.1 Winch with line-length counter or for coastal areas a line with length markings fitted with a shackle or similar device to enable the line to be joined to the net.

5.3.2 Flowmeter – either real time or self-logging.

5.3.3 Draining cup with nylon netting, which is capable of being attached to the net either by means of a tightening strip or tape sewn into the net. The netting of the draining cup should have the same mesh size as the net. A draining cup with hose and hose clamp can also be utilized.

5.3.4 Weight, e.g. a standard sounding lead weight, in order to minimize wire angles.

5.3.5 Closing device for depth-stratified hauls.

5.3.6 Wire angle blade.

5.3.7 Echosounder or depth finder.