SLOVENSKI STANDARD
SIST EN 14184:2014

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Kakovost vode - Navodilo za pregledovanje vodnih makrofitov tekočih voda

Water quality - Guidance for the surveying of aquatic macrophytes in running waters

Wasserbeschaffenheit - Anleitung für die Untersuchung aquatischer Makrophyten in Fließgewässern

Qualité de l'eau - Guide pour l'étude des macrophytes aquatiques dans les cours d'eaux

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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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English Version

Water quality - Guidance for the surveying of aquatic macrophytes in running waters

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Foreword

This document (EN 14184:2014) has been prepared by Technical Committee CEN/TC 230 “Water analysis”, the secretariat of which is held by DIN.

This document supersedes EN 14184:2003.

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of an identical text or by endorsement, at the latest by September 2014, and conflicting national standards shall be withdrawn at the latest by September 2014.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document contains the following technical changes to the previous edition:

a) this document is applicable to all kinds of running surface waters (e. g. rivers, streams, artificial canals);

b) requirements for survey planning and documentation were revised concerning the requirements of the Water Framework Directive (WFD);

c) a further example for estimator scales widely used in Europe to assess aquatic macrophyte abundance was added in Table 1;

d) informative Annex A “Principles of interlaboratory comparison for macrophyte surveys in running waters – Occurrence and abundance of macrophyte species” was added.

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

Introduction

Macrophytes are an important component of aquatic ecosystems and can be used to facilitate the monitoring of ecological status. The requirement to use macrophytes in monitoring is inherent in numerous European directives (e. g. the Water Framework Directive (2000/60/EC), Urban Waste Water Treatment Directive (91/271/EEC), Nitrates Directive (91/676/EEC), etc.).

In addition to their important ecological role, the use of macrophytes as indicators of ecological quality in running waters is based on the fact that certain species and species groups are indicators for specific running water types and are adversely affected by anthropogenic impact.

In certain types of running water habitats the lack of macrophytes is not an effect of anthropogenic impact but a characteristic feature. For example, in geological formations like the flysch, or in the central part of deeper rivers macrophytes may be absent due to the habitat limitations imposed by geology and substrate, water depth, current flow velocity, turbidity, etc.

A wide range of sampling and survey methodologies has been developed for specific applications including conservation, drainage impact, management, ecological habitat enhancement etc. The methodology of this guidance standard is recommended specifically for the surveying of macrophytes in running freshwaters, of natural, heavily modified and artificial character, and for the purpose of monitoring ecological status. It could be used as the basis for investigative monitoring of water quality or other applications, as well.

According to the precise usage to which this European Standard 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.

WARNING — Working in or around water is inherently dangerous. Persons using this European Standard should be familiar with usual field and laboratory practice. This European Standard 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.

1 Scope

This European Standard specifies a method for surveying aquatic macrophytes in running waters for the purpose of assessing ecological status, using these organisms as elements of biological quality. The information provided by this method includes the composition and abundance of the aquatic macrophyte flora.

This European Standard is applicable to all kinds of surface running water bodies, like natural brooks, streams and rivers and their heavily modified equivalents, as well as to artificial water bodies like canals or run-of-river reservoirs.

The general principles of the approach described in this European Standard may also be applied when monitoring water bodies in the fluvial corridor of a river, such as side channels and oxbows.

It is recognized that for a complete assessment of ecological status, other elements of biological quality should also be assessed.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
aquatic macrophytes
larger plants of fresh water which are easily seen with the naked eye, or which usually form colonies, including all aquatic vascular plants, bryophytes, stoneworts (Characeae) and macro-algal growths

2.2
bank
permanent side of a river or island, which is above the normal water level and only submerged during periods of high river flow

Note 1 to entry: In the context of this standard, bank species include macrophytes that overhang the channel or overgrow the water surface but are rooted in the bank.

2.3
channel
course of a river or stream

Note 1 to entry: In the context of this standard, this includes only the in-stream part, i. e. that which is under water most of the time although it may be exposed temporarily under conditions of dry-weather flow or for longer periods under certain natural (climatic, geological) conditions.

2.4
belt transect
defined band across a river or stream at right angles to the bank

Note 1 to entry: This may be virtual or physically delineated within which the aquatic vegetation is analysed (species composition, abundance, cover).

2.5
ecological status
expression of the quality of the structure and functioning of aquatic ecosystems, expressed by comparing the prevailing conditions with reference conditions

Note 1 to entry: As classified in accordance with Annex V of the EC Water Framework Directive (2000/60/EC).

2.6
helophyte
plant usually rooted under water or in the wet part of the bank with emergent shoots, typically growing in marginal or marshy areas

2.7
hydrophyte
aquatic plant that is usually rooted under water with floating or submerged leaves, or totally free floating at the water surface

2.8
reference site
length of river representing the reference conditions for a given ecological type of river

2.9
reference conditions
biological conditions reflecting a totally undisturbed state, lacking human impact, or a near-natural with only minor evidence of distortion

Note 1 to entry: Biological reference conditions may be defined using field sites or, where necessary, using expert judgement or predictive modelling techniques.

2.10
representative site
length of river reach representative of the ecological quality that characterizes that reach

2.11
river reach
sub-division of a river, or surface water body with running water, defined by physical, hydrological and chemical characteristics that distinguishes it from other parts of the river upstream and downstream

2.12
survey stretch
survey unit
SU
short length of river for which community composition and abundance of aquatic species is determined

Note 1 to entry: Abundance can be assessed by quantitative or semiquantitative methods. This approach can be used for e. g. assessment of ecological status and/or for other purposes dealing with the description of the aquatic macropyhte vegetation.

3 Principle

This European Standard describes the methodological approach for determining the ecological status of river reaches using aquatic macrophytes. The status of a river reach, or surface water body with running water, is assessed by surveying short river stretches ('representative sites') which are representative for the ecological conditions in this water body. Thereafter its deviation from the conditions recorded in reference sites is determined. Reference sites are located in river reaches of similar ecological type which are still in natural or near-natural conditions. If natural conditions in river reaches no longer exist, it is necessary to reconstruct these conditions upon whatever existing records, or by modelling or expert knowledge. A published approach can be applied to situations where near-natural conditions are absent [5].

The presence of aquatic macrophyte taxa in the channels of representative river lengths is recorded. Macrophyte abundance, measured in terms of the spatial extension of taxa or macrophyte beds (coverage or macrophyte biovolume, see Table 1), is assessed by different methods adapted to the scale and purpose of the study.

Numerical derivatives (‘metrics’) of the macrophyte composition and abundance in a surveyed river length can be used to identify the divergence from type-specific “natural” conditions.

Methods for the sampling of macrophytes are given in EN ISO 10870.

4 Equipment

4.1 General

4.1.1 Maps, with scales compatible with the objectives of the survey.

4.1.2 Waterproof recording sheets, indelible pens/pencils and clipboard in a clear cover.

4.1.3 Plastic bags, small specimen tubes and waterproof labels.

4.1.4 Tape measure calibrated in metres, marking stakes and mallet.

4.1.5 Hand lens, magnification at least 10 x .

4.1.6 Identification keys and field guides.

4.1.7 Wading suit.

4.1.8 Polarizing sunglasses.

4.1.9 Camera with polarizing lens.

4.1.10 Global Positioning System (GPS)-instrument (for higher accuracy: differential GPS).

4.1.11 Rake with extendable handle and/or grapnel.

4.1.12 Underwater viewing aid/aqua-scope, bucket or box with clear Perspex base.

4.1.13 White plastic trays.

4.2 Deeper waters (optional)

4.2.1 Boat and necessary safety equipment.

4.2.2 Grapnel with depth markings in metres on the rope.

4.2.3 Underwater viewing aid/aqua-scope, viewing tube, bucket or box with clear Perspex base.

4.2.4 Wet-suit, diving equipment.

5 Survey planning

5.1 General

At the beginning of a survey the geographic region (or ‘ecoregion’), the river order, the river type and the respective reference conditions characteristic for the river reach under investigation should be defined.

5.2 Timing of initial and subsequent surveys

As far as possible, macrophyte surveys should be undertaken between late spring and early autumn, usually May to late September, but dependent on local climate and geographical region, when macrophyte growth will be at the optimum.

NOTE 1 This may not necessarily be the optimum growing period for macroscopic algae. Surveying may need to be later in Northern Europe.

Preferably, field survey should follow several days of lower flow where water clarity is maximised and water depths are reasonably low, thereby enhancing visibility and the possibility to detect submersed forms of macrophytes. Information regarding the timing of vegetation cutting is essential prior to surveying, where this is known to be usual management practice.

NOTE 2 When water depths are enhanced and water clarity is reduced following periods of high flow, the observation of smaller species is difficult and the recording of abundance may be inaccurate. This will in turn reduce the reliability of the data.

Macrophyte species grow and reach sexual maturity at different times over the summer period. Therefore, surveys at sites in the same river system should be undertaken in quite close chronological succession where comparative data are required.

When trying to assess the optimum development period of the macrophyte vegetation for the first time in unknown rivers or areas it is beneficial to survey on two separate occasions (e. g. May/June and August/September) to cover possible different vegetation development occurring during the vegetation period.

Once the optimum survey period for macrophyte assessment is known, practical experience all over Europe shows that a single survey per recording year is sufficient (running waters are not necessarily surveyed every year).

Comparative surveys in subsequent years shall be performed at the same period of vegetation development as the original survey. This will ensure that changes resulting from different seasonal development patterns are minimised. But knowledge on inter-annual natural changes in species number and abundance and in the dominance pattern in survey sites should be known to avoid misinterpretation regarding aspects of water quality and ecological status.

5.3 Survey protocols

There are many different survey protocols in use throughout Europe, therefore only general guidelines are given in this document. Macrophyte surveys can be undertaken at different levels of sophistication. In addition to the surveying of sites exhibiting reference conditions this can involve the surveying of the following.

— Approach 1: short lengths of river which are representative for a river stretch of water body. This requires relatively little time and is recommended for the routine survey of aquatic macrophytes, e. g. within the process of assessing the ecological status under Water Framework Directive rules. When only the short reach of a representative site needs to be described, it still can be used for spatial and temporal monitoring.

— Approach 2: longer river lengths in the process of defining the best location of representative sites; when defining representative sites a longer stretch of a river should be surveyed first using the second approach thereafter to prove “evenness” within this stretch of physical and biological variables.

— Approach 3: complete river length surveys to produce inventories of whole rivers. To fulfil more specialized needs. For example, as part of the procedure to provide statistical data for the numerical differentiation of reference sites in different ecological river types. It is a labour-intensive approach not to be applied for routine surveys. It is used in special cases, e. g. single-river long-term monitoring and for