

**Water quality - Guidance standard on assessing the
hydromorphological features of lakes**

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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English Version

Water quality - Guidance standard on assessing the hydromorphological features of lakes

Qualité de l'eau - Guide pour l'évaluation des caractéristiques hydromorphologiques des lacs

Wasserbeschaffenheit - Anleitung zur Beurteilung hydromorphologischer Eigenschaften von Standgewässern

This European Standard was approved by CEN on 6 August 2011.

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Foreword

This document (EN 16039:2011) 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of an identical text or by endorsement, at the latest by March 2012, and conflicting national standards shall be withdrawn at the latest by March 2012.

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.

WARNING — Working in or around water is inherently dangerous. Surveyors should conform to EU and national health and safety legislation, and any additional guidelines appropriate for working in or near lakes.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard contains lists of lake features and guidance on how to record, analyse and interpret the data obtained from desk-top, remote sensing and field surveys. In this document the word 'lake' is used as a generic term for standing waters including natural and modified lakes, reservoirs and excavated pits.

The physical character of a lake is defined by its morphometry (size and shape) and by its hydrological regime, both of which are contingent on the landscape setting of the lake-catchment system and its environmental history. Ensuring that the key features and associated physical processes operating within lakes are consistently recognised enables legitimate comparisons to be made among different lake types. This is required for a range of purposes, including the EC Water Framework Directive (WFD), the EC Habitats Directive, and lake management and restoration. The WFD requires physical features of surface waters to be considered when assessing 'ecological status' and refers to these features as hydromorphological. Annex V of the WFD lists two categories of hydromorphological 'quality elements' for assessing lakes – 'hydrological regime' and 'morphological conditions' – each sub-divided into a number of specified 'quality elements'. Those in the hydrological category comprise the quantity and dynamics of flow, level, residence time and connection to groundwaters, whilst those in the morphological category are lake depth variation, quantity and structure of the substrate and the structure and condition of the lake shore zone.

The Habitats Directive applies to a wide range of terrestrial, freshwater and marine habitats and species. The Directive requires Member States to maintain or restore these to 'favourable conservation status', partly by designating Special Areas of Conservation (SACs). For lakes, the process of selection and monitoring SACs involves recording and regularly assessing a suite of physical, chemical and biological features. A standard approach to hydromorphological assessment, while not specifically required by the Directive, thus enables the contribution of physical structure and hydrology to favourable conservation status to be assessed, and allows comparisons to be made between Member States.

NOTE In this document, 'assessment' is used as a broad term referring to the general description and characterization of lake features and the pressures that impinge upon them. It is not used to imply particular levels of 'quality' or 'value', whether related to ecological status under the WFD or more generally.

1 Scope

This European Standard is applicable to lakes, which are water bodies occupying one or more basins with surface areas greater than 1 ha (0,01 km²) and maximum depths (at mean water level) greater than 1 m. All types of permanent lakes, including natural, modified and artificial, freshwater and brackish, except for those systems which regularly connect to the sea, are included in this European Standard, though canals are excluded.

Based on these criteria, it can be estimated that there are at least 500 000 natural lakes across Europe, most of which are located in the glaciated landscapes in northern and western provinces and in Scandinavia. Lakeland districts also occur locally in areas such as the Danubian plain and around the Alps. Elsewhere, naturally occurring lakes are relatively sparse and in such areas reservoirs or pits are more common.

This European Standard is designed to:

- a) support environmental and conservation agencies in meeting the monitoring requirements of the WFD (Article 8, Annex II and Annex V);
- b) generate data sets appropriate for monitoring and reporting of *Natura* 2000 sites designated under the Habitats Directive and the Birds Directive;
- c) provide information supporting other environmental reporting requirements (e.g. in relation to biodiversity or environmental impact assessment);
- d) support lake management and restoration initiatives.

This European Standard:

- e) defines the key term of 'hydromorphology' and other terms relating to the physical characteristics of lakes and their hydrological regimes;
- f) details essential features and processes of lakes that should be characterised as part of a hydromorphological survey and for determining the hydromorphological condition of a lake;
- g) identifies and defines the key pressures affecting European lakes;
- h) provides guidance on strategies for collecting hydromorphological data depending on resources available and the anticipated use of the assessment; a hierarchy of approaches is recognised from the 'overview method' utilising existing databases, maps and remote sensing data through to recognised field-based survey techniques such as Lake Habitat Survey (LHS);
- i) offers guidance on data presentation;
- j) establishes guidance on data quality assurance issues.

This European Standard does not deal with biological assessments in lakes such as the presence or absence of individual species or community composition, nor does it attempt to link specific hydromorphological features with their associated biological communities or to create a classification based on such links. However, it is relevant where plants or other organisms form significant structural elements of the habitat (e.g. a gradation from riparian to littoral vegetation).

With respect to the WFD, the hydromorphological condition of a lake only contributes to its status classification at high ecological status (HES). Hydromorphological conditions are not defined for good and moderate status but shall be sufficient to support the biological elements.

2 Normative references

EN 14614, *Water Quality — Guidance standard for assessing the hydromorphological features of rivers*

3 Terms and definitions

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

3.1

aquatic macrophyte

larger plant of fresh water which is easily seen with the naked eye, including all aquatic vascular plants, bryophytes, stoneworts (Characeae) and macro-algal growths

NOTE This definition includes plants associated with open water or wetlands with shallow water.

3.2

attribute

specific recorded elements of a hydromorphological feature

EXAMPLE 'Silt' and 'boulders' are natural substrate texture attributes, 'sheet piling' and 'gabions' are attributes of engineered banks.

3.3

bank

physical edge of the lake shore, or of the island(s) within

NOTE Generally defined by a wave-cut break in slope at or near the water's edge of the lake, but can also be defined as the line along which riparian (terrestrial or land) conditions change to littoral in-lake conditions.

3.4

basin

defined hollows which are permanently or temporarily filled with water

NOTE Basin size and shape (morphometry) strongly control the fluxes of substances in lakes and the structure and function of lake food webs.

3.5

bathymetry

systematic survey of size, shape and water depth distribution in a lake

NOTE Bathymetry is the basis of deriving morphometric parameters and to predict thermal stratification, residence time and sediment redistribution processes.

3.6

bay

indent of the lake shore which can span from metres to many kilometres in size

NOTE Bays are normally protected by a promontory (or headland) projecting from the shore which reduces exposure. Bays often contain beach deposits.

3.7

bedform patterns

topography of the lake bed may be simple or complex depending on the size and shape of the system and the nature of local sediment transport processes

NOTE Deposition produces bedforms such as sand and gravel bars, whilst erosion results in scour features such as troughs.