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SWEDISH STANDARDS INSTITUTE

**Vattenundersökningar – Bestämning av turbiditet –
Del 2:Semi-kvantitativa metoder för bedömning av transparens hos vatten (ISO 7027-2:2019)**

**Water quality – Determination of turbidity –
Part 2: Semi-quantitative methods for the assessment of transparency of waters (ISO 7027-2:2019)**

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The European Standard EN ISO 7027-2:2019 has the status of a Swedish Standard. This document contains the official version of EN ISO 7027-2:2019.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS som även lämnar allmänna upplysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Kemiska vattenundersökningar, SIS/TK 424.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 7027-2

February 2019

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Supersedes EN ISO 7027:1999

English Version

Water quality - Determination of turbidity - Part 2: Semi-quantitative methods for the assessment of transparency of waters (ISO 7027-2:2019)

Qualité de l'eau - Détermination de la turbidité - Partie 2: Méthodes semi-quantitatives pour l'évaluation de la transparence des eaux (ISO 7027-2:2019)

Wasserbeschaffenheit - Bestimmung der Trübung - Teil 2: Semi-quantitative Verfahren zur Beurteilung der Transparenz von Gewässern (ISO 7027-2:2019)

This European Standard was approved by CEN on 6 January 2019.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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European foreword

This document (EN ISO 7027-2:2019) has been prepared by Technical Committee ISO/TC 147 "Water quality" in collaboration with 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of an identical text or by endorsement, at the latest by August 2019, and conflicting national standards shall be withdrawn at the latest by August 2019.

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 ISO 7027:1999.

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Endorsement notice

The text of ISO 7027-2:2019 has been approved by CEN as EN ISO 7027-2:2019 without any modification.

Introduction

Turbidity in waters is caused by the presence of undissolved and/or colloidal matter and small organisms (for example bacteria, phyto- and zooplankton) present in the water. Turbidity changes the lighting conditions in surface waters by absorption and scattering of the light and thus influences the trophic status of these waters. For the indicative assessment of the lighting conditions of waters or the transparency of the water, semi-quantitative methods can be used (Reference [2]).

Measurements of transparency can be affected by the presence of dissolved light-absorbing substances (substances imparting colour) as well as by particles (such as sediments).

In semi-quantitative methods such as the determination of transparency depth by Secchi disc, reflections on the water surface can cause interferences. These are often dependent on the light and wind conditions.

NOTE Results of a field study for the validation of this document is given in Annex B.

Water quality — Determination of turbidity —

Part 2: Semi-quantitative methods for the assessment of transparency of waters

WARNING — Working in or around water is inherently dangerous. 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.

IMPORTANT — It is absolutely essential that tests conducted in accordance with this document be carried out by suitably qualified and trained staff.

1 Scope

This document specifies the following semi-quantitative methods for the assessment of transparency of waters:

a) measurement of visual range using the transparency testing tube (applicable to transparent and slightly cloudy water), see Clause 4;

b) measurement of visual range in the upper water layers using the transparency testing disc (especially applicable to surface, bathing water, waste water and often used in marine monitoring), see 5.1;

c) measurement of visibility by divers in a destined depth, see 5.2.

NOTE The quantitative methods using optical turbidimeters or nephelometers are described in ISO 7027-1.

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 amendments) applies.

CIE S 017/E, *ILV*:*International Lighting Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CIE S 017 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

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

3.1
transparency
permeability with respect to electromagnetic waves, here especially of light

Note 1 to entry: In this document, transparency is used in terms of visibility in waters.

3.2
turbidity
reduction of transparency of a liquid caused by the presence of undissolved and/or colloidal matter and small organisms

3.3
attenuation coefficient
fraction of an incident beam of light that is absorbed or scattered per unit thickness of the target absorber

Note 1 to entry: A large attenuation coefficient means that the beam is quickly “attenuated” (weakened) as it passes through the medium, and a small attenuation coefficient means that the medium is relatively transparent to the beam. The SI unit of attenuation coefficient is the reciprocal metre (m^{-1}).

4 Laboratory

4.1 General

In cases where measurements cannot be carried out on site, it may be an option to do it in the laboratory with the approach described in 4.2.

4.2 Measurement using the transparency testing tube

4.2.1 Apparatus

4.2.1.1 **Transparency testing tube**, consisting of a colourless glass tube 600 mm ± 10 mm long and of internal diameter 25 mm ± 1 mm, graduated in divisions of 10 mm. Typically, the transparency testing tube features a hole in the bottom of the tube or a suitable outlet, allowing the water level to be lowered in the tube.

4.2.1.2 **Shield**, close fitting, to protect the transparency testing tube from lateral light.

4.2.1.3 **Print sample**, to place under the tube (4.2.1.1), consisting of black print on a white background (height of characters 3,5 mm; line width 0,35 mm) or a test mark (for example, a black cross on white paper), provided with the apparatus.

4.2.1.4 **Constant light source**, low voltage tungsten lamp (3 W), to illuminate the print sample or test mark (4.2.1.3).

4.2.2 Sampling and samples

All sample bottles shall be clean. If necessary, wash bottles before use with hydrochloric acid (e.g. 1 mol/l) or a surfactant cleaning solution.

Collect samples in glass or plastic bottles, and carry out the determinations as soon as possible after collection. The bottles shall be filled completely (bubble free). If storage is unavoidable, store the samples in a cool, dark room (10 ± 5) °C but for no longer than 24 h. If the samples have been stored cool, allow them to come to room temperature before measurement. Prevent contact between the sample and air, and avoid unnecessary changes in the temperature of the sample.

The transparency testing tubes should be clean and not clouded. The individual tubes should be identical in their optical properties.

4.2.3 Procedure

The sample should be mixed by hand, without creating bubbles and turbulence, and then be transferred to the transparency testing tube (4.2.1.1). Steadily lower the sample level until the print sample or test

mark (4.2.1.3) is clearly recognizable as viewed from above. Read the liquid height from the graduations on the tube.

If the procedure is repeated, the mean from all replicates has to be calculated and reported as the transparency depth.

4.2.4 Expression of results

Report the measured liquid height, to the nearest 10 mm, together with the apparatus used (name of the manufacturer).

5 In situ methods (field methods)

5.1 General

The in situ methods are performed as described in 5.2 to 5.3.

5.2 Measurement using the transparency testing disc

The depth at which a matt white, circular disc (5.2.1.1) is no longer visible is taken as a measure of the transparency of surface water bodies. The readings do not provide an exact measure of transparency, as the results are influenced e.g. by sun's glare on the water, water current and/or individually different eyesight of the staff.

NOTE 1 This method was originally developed by A. Secchi (1865)[4], and modified by George C. Whipple (1899) [5], and is commonly known as Secchi depth.

NOTE 2 For assessments in connection with phytoplankton investigations, the transparency depths are normally used.

NOTE 3 In very tide-influenced coastal waters or in reservoirs with turbidity currents (e.g. from tributaries), the results in relation to phytoplankton are not very informative because the results are influenced by very high concentrations of suspended mineral matter. Humic substances can considerably reduce the transparency.

5.2.1 Apparatus

5.2.1.1 Transparency testing disc, normalized circular matt white testing disc with a density and weight that it sinks (e.g. 1,7 kg) to determine transparency depth.

This disc hangs from a measuring tape or rope (5.2.1.2) so as to be precisely horizontal. To facilitate the horizontal position of the disc, six large holes [see Figure A.1 a)] may be helpful.

For the measurement of the transparency depth, the discs shall be clean and without scratches and shall be maintained to limit the loss of their original colour.

The following diameters are recommended:

a) for inland waters: 20 cm; e.g. with six holes or black and white sectors (see A.1);

b) for marine waters: 30 cm, e.g. without holes and sectors (see A.1).

NOTE Other diameters of the discs might also be suitable, depending on the requirements of the sampling programme (e.g. disks with a diameter of 10 cm connected to Limnos water samplers, see Figure A.2).

If other types of testing discs are used, the comparability of results is not given. If for example custom made testing discs are required, it is important to ensure that within a monitoring study or period and for the defined monitoring sites the same type of device is always to be used. Whenever possible, it is also recommended that the measurements are carried out by the same staff.