

Water quality - Sampling - Part 16: Guidance on biotesting of samples

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 5667-16:2001 sisaldab Euroopa standardi EN ISO 5667-16:1998 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 18.06.2001 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 5667-16:2001 consists of the English text of the European standard EN ISO 5667-16:1998.</p> <p>This document is endorsed on 18.06.2001 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala:</p> <p>This international standard gives practical guidance on sampling, pretreatment, performance and evaluation of waters in the context of biotesting. Information is given on how to cope with the problems for biotesting arising from the nature of the sample and the suitability of the test design.</p>	<p>Scope:</p> <p>This international standard gives practical guidance on sampling, pretreatment, performance and evaluation of waters in the context of biotesting. Information is given on how to cope with the problems for biotesting arising from the nature of the sample and the suitability of the test design.</p>
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English version

Water quality – Sampling

Part 16: Guidance on biotesting of samples
(ISO 5667-16 : 1998)

Qualité de l'eau – Échantillonnage –
Partie 16: Lignes directrices pour les
essais biologiques des échantillons
(ISO 5667-16 : 1998)

Wasserbeschaffenheit – Probe-
nahme – Teil 16: Anleitung zur
Probenahme und Durchführung
biologischer Testverfahren
(ISO 5667-16 : 1998)

This European Standard was approved by CEN on 1998-10-01.

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.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

CEN

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

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

Foreword

International Standard

ISO 5667-16 : 1998 Water quality – Sampling – Part 16: Guidance on biotesting of samples, which was prepared by ISO/TC 147 'Water quality' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 230 'Water analysis', the Secretariat of which is held by DIN, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by April 1999 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 5667-16 : 1998 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA (normative).

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Introduction

Biological tests are suitable for determining the effect of chemical and physical parameters on test organisms under specific experimental conditions. In principle, the methods of chemical analysis are not suitable for determining the biological effects. These effects can be enhancing or inhibiting, and can be determined by the reaction of the organisms, e.g. death, growth, proliferation, morphological, physiological and histological changes. Inhibiting effects are triggered by toxic water constituents or by other noxious influences.

Effects can refer to various levels, e.g. proceeding from (sub)cellular structures or enzyme systems, concerning the whole organism, and eventually the supra-organism or community level.

In the context of this part of ISO 5667, toxicity is the ability of a substance to exert a deleterious effect on organisms or biocenoses due to its chemical properties and its concentration.

The deleterious potential of a toxic substance can be counteracted by the protective potential of the biological system, for instance by metabolic detoxification and excretion. The apparent toxicity measurable in the biological test is the result of the interaction between the substance and the biological system.

Apart from the direct toxic effect of one or more water constituents, damaging biological effects can be exerted by the combined action of all noxious substances, e.g. by substances which are not toxic *per se* but affect the chemical or physical properties of the medium and, consequently, the living conditions for the organisms. This applies for instance to oxygen-depleting substances, coloured substances or turbid matter which reduce light exposure. It also includes non-substance-related effects such as impairment or damage due to extreme temperature.

Biological tests also include those tests which examine the effect of organisms on substances, e.g. microbial degradation studies.

The results of the biological tests refer primarily to the organisms used in the test and the conditions stipulated in the test procedure. A harmful effect stated by means of standardized tests can justify concern that aquatic organisms and biocenoses might be endangered. The results, however, do not permit direct or extrapolative conclusions as to the occurrence of similar effects in the aquatic environment. This applies in particular to sub-organism systems, as important properties and physiological functions of intact organisms (e.g. protective integuments, repair mechanisms) are removed or deactivated.

In principle there is no organism and no biocenosis which can be used to test all the effects on the ecosystem possible under the various

constellations of abiotic and biotic conditions. Only a few ("model") species representing relevant ecological functions can be tested in practice.

Besides these fundamental and practical limitations in the selection of test organisms, the sample to be tested can also pose experimental problems on biotesting. Waters, in particular waste waters, are complex mixtures and often contain sparingly soluble, volatile, unstable, coloured substances and/or suspended, sometimes colloidal, particles. The complexity and heterogeneity of materials give rise to a variety of experimental problems when performing biotests.

Special problems are related to the instability of the test material due to reactions and processes such as:

- physical (e.g. phase separation, sedimentation, volatilization);
- chemical (e.g. hydrolysis, photodegradation, precipitation); and/or
- biological (e.g. biodegradation, biotransformation, biological uptake in organisms).

Other problems, especially if spectrometric measurements are applied, relate to turbidity and colour.

This part of ISO 5667 is one of a group of International Standards dealing with the sampling of waters. It should be read in conjunction with the other parts and in particular with ISO 5667-1, ISO 5667-2 and ISO 5667-3.

1 Scope

This part of ISO 5667 gives practical guidance on sampling, pretreatment, performance and evaluation of waters in the context of biotesting. Information is given on how to cope with the problems for biotesting arising from the nature of the water sample and the suitability of the test design.

It is intended to convey practical experience concerning precautions to be taken by describing methods successfully proven to solve or to circumvent some of the experimental problems of biotesting of waters.

Reference has been made as far as possible to existing International Standards and guidelines. Information taken from published papers or oral communication is utilized as well.

Primarily dealt with are substance-related problems concerning sampling, pretreatment and preparation of water samples for biotesting and treatment of samples during the test, especially when performing tests with waters and waste waters containing unstable or removable ingredients. Basic principles of quality assurance, evaluation of data and presentation of results are outlined.

Special emphasis is laid on ecotoxicological testing with organisms ('single-species biotests'). Some features addressed in this general guidance apply as well to biodegradation and/or bioaccumulation studies as far as sampling and sample preparations is concerned. Preparation of poorly soluble substances and testing beyond the water-solubility limit is also addressed.

This part of ISO 5667 is not applicable to bacteriological examination of water. Appropriate methods are described in other International Standards.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 5667. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 5667 are encouraged to investigate the possibility applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5667-3 :1994, *Water quality — Sampling — Part 3: Guidance on the preservation and handling of samples.*

ISO 5667-10 :1992, *Water quality — Sampling — Part 10: Guidance on sampling of waste waters.*

3 Sampling

3.1 General

The choice of representative sampling points, frequency of sampling, type of samples taken, etc. is dependent on the objective of the study. In general, the sampling approach for chemical analysis is compatible with the purpose of biotesting.