SLOVENSKI STANDARD
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Kakovost vode - Vzorčenje - 14. del: Navodilo za zagotavljanje in kontrolo kakovosti vzorčenja vode v okolju in ravnanja z vzorci

Water quality - Sampling - Part 14: Guidance on quality assurance and quality control of environmental water sampling and handling

Qualité de l'eau - Échantillonnage - Partie 14: Lignes directrices pour le contrôle de la qualité dans l'échantillonnage et la manutention des eaux environnementales

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Water quality — Sampling —

Part 14:
Guidance on quality assurance and quality control of environmental water sampling and handling

Qualité de l'eau — Échantillonnage —

Partie 14: Lignes directrices pour le contrôle de la qualité dans l'échantillonnage et la manutention des eaux environnementales

[Revision of first edition (ISO 5667-14:1998)]

ICS 13.060.45

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Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 5667-14 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 6, *Sampling (general methods)*.

This second edition cancels and replaces the first edition, which has been technically revised.

ISO 5667 consists of the following parts, under the general title *Water quality — Sampling*:

- Part 1: Guidance on the design of sampling programmes;
- Part 3: Preservation and handling of water samples;
- Part 4: Guidance on sampling from lakes;
- Part 5: Guidance on sampling of drinking water;
- Part 6: Guidance on sampling of rivers and streams;
- Part 7: Guidance on sampling of water and steam in boiler plants;
- Part 8: Guidance on sampling of wet deposition;
- Part 9: Guidance on sampling from marine waters;
- Part 10: Guidance on sampling of waste waters;
- Part 11: Guidance on sampling of groundwaters;
- Part 12: Guidance on sampling of bottom sediments;
- Part 13: Guidance on sampling of water, waste water and related sludges;
- Part 14: Guidance on quality assurance and quality control of environmental water sampling and handling;
- Part 15: Guidance on preservation and handling of sludge and sediment samples;

- Part 16: Guidance on biotesting of samples;
- Part 17: Guidance on sampling of suspended sediments;
- Part 18: Guidance on sampling of groundwater at contaminated sites;
- Part 19: Guidance on sampling of marine sediments;
- Part 20: Guidance on the use of sampling data for decision making -- Compliance with thresholds and classification systems;
- Part 21: Guidance on sampling of drinking water distributed by tankers or means other than distribution pipes;
- Part 22: Guidance on design and installation of groundwater sample points); and
- Part 23: Determination of significant pollutants in surface waters using passive sampling).

— Annexes A, B and C of this part of ISO 5667 are for information only.

Introduction

Sampling is the first step in carrying out chemical, physical and biological examinations. Therefore, the goal of sampling should be to obtain a representative sample for the research question and to supply it to the laboratory in the correct manner. Errors caused by improper sampling, sample pre-treatment, transport and storage cannot be corrected.

This standard specifies quality assurance and quality control procedures and provides additional guidance on sampling of the various types of water covered in the specific parts of ISO 5667.

Quality control procedures are necessary for the collection of environmental water samples for the following reasons:

a) to monitor the effectiveness of sampling methodology;

b) to demonstrate that the various stages of the sample collection process are adequately controlled and suited to the intended purpose, including adequate control over sources of error such as sample contamination, loss of determinand and sample instability. To achieve this, quality control procedures should provide a means of detecting sampling error, and hence a means of rejecting invalid or misleading data resulting from the sampling process;

c) to quantify and control the sources of error which arise in sampling. Quantification gives a guide to the significance that sampling plays in the overall accuracy of data; and

d) to provide information on suitably abbreviated quality assurance procedures that might be used for rapid sampling operations such as pollution incidents or groundwater investigations.

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 of ISO 5667 and in particular with Parts 1,and 3.

The general terminology is in accordance with that published.

Water quality — Sampling — Part 14: Guidance on quality assurance and quality control of environmental water sampling and handling

1 Scope

This part of ISO 5667 provides guidance on the selection and use of various quality assurance and quality control techniques relating to the manual sampling of surface, potable, waste, marine and ground waters.

NOTE The general principles outlined in this part of ISO 5667 may, in some circumstances, be applicable to sludge and sediment sampling.

WARNING — Consider and minimize any risks and obey safety rules. See ISO 5667-1 for certain safety precautions, including sampling from boats and from ice-covered waters.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5667-1:2006, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes and sampling techniques*

ISO 5667-3:2012, *Water quality — Sampling — Part 3: Preservation and handling of water samples*

3 Terms and definitions

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

3.1
accuracy
closeness of agreement between a test result or measurement result and the true value

[ISO 3534-2]

NOTE 1 In practice, the accepted reference value is substituted for the true value.

NOTE 2 The term accuracy, when applied to a set of test or measurement results, involves a combination of random components and a common systematic error or bias component.

NOTE 3 Accuracy refers to a combination of trueness and precision.

3.2
bias
difference between the expectation of the test results or measurement result and a true value

[ISO 3534-2]

NOTE 1 Bias is the total systematic error as contrasted to random error. There may be one or more systematic error components contributing to the bias. A larger systematic difference from the true value is reflected by a larger bias value.

NOTE 2 The bias of a measuring instrument is normally estimated by averaging the error of indication over an appropriate number of repeated measurements. The error of indication is the: “indication of a measuring instrument minus a true value of the corresponding input quantity”.

NOTE 3 In practice, the accepted reference value is substituted for the true value.

3.3
precision
closeness of agreement between independent test/measurement results obtained under stipulated conditions

[ISO 3534-2]

NOTE 1 Precision depends only on the distribution of random errors and does not relate to the true value or the specified value.

NOTE 2 The measure of precision is usually expressed in terms of imprecision and computed as a standard deviation of the test results or measurement results. Less precision is reflected by a larger standard deviation.

NOTE 3 Quantitative measures of precision depend critically on the stipulated conditions. Repeatability conditions and reproducibility conditions are particular sets of extreme stipulated conditions.

3.4
representativeness
extent to which the condition of all the samples taken from the body of water reflects conditions in water of interest

3.5
comparability
degree of agreement with respect to control over random and systematic errors

3.6
Certified Reference Material
CRM
stable, homogeneous material, with a composition closely matching that of the sample to be analysed, for which the concentrations of the determinands of interest in that material are known with a known degree of uncertainty

NOTE In most chemical analyses the traceability of measurement can be obtained by a series of calibrations that demonstrates that no loss of determinand or contamination occurs during the sample treatment. This traceability can be based on the analysis of a CRM.

3.7
blank
observed value obtained when measurement is made on a sample identical to the sample of interest, but in the absence of the determinand e.g. deionised water, ultra pure water.

NOTE Field blank samples are laboratory blank samples which are taken into the field, treated as samples and analysed as a check on sampling procedures.

3.8
spike
known quantity of determinand which is added to a sample, usually for the purpose of estimating the systematic error of an analytical system by means of a recovery exercise

3.9
recovery
extent to which a known, added quantity of determinand in a sample can be measured by an analytical system

NOTE Recovery is calculated from the difference between results obtained from a **spiked** (**3.8**) and an unspiked aliquot of sample and is usually expressed as a percentage.

3.10
control chart
chart on which some statistical measure of a series of samples is plotted in a particular order to steer the process with respect to that measure and to control and reduce variation.

NOTE 1 The particular order is usually based on time or sample number order.

[ISO 3534-2]

NOTE 2 The control chart operates most effectively when the measure is a process variable which is correlated with an ultimate product or service characteristic

3.11
Shewhart control chart
control chart with Shewhart control limits intended primarily to distinguish between the variation in the plotted measure due to random causes and that due to special causes

[ISO 3534-2]

NOTE This could be a chart using attributes (for example, proportion nonconforming) for evaluating a process, or it could be a chart using variables (for example, average and range) for evaluating a process. Examples are:

a) X-bar chart – the sample means are plotted in order to control the mean value of a variable;

b) R chart – the sample ranges are plotted in order to control the variability of a variable;

c) s chart – the sample standard deviations are plotted in order to control the variability of a variable;

d) s^2 chart – the sample variances are plotted in order to control the variability of a variable;

e) C chart – the number of defectives (per batch, per day, per machine, etc.) is plotted.

3.12
action limits
control limits between which the statistic under consideration lies with a very high probability when the process is under statistical control

[ISO 3534-2]

NOTE 1 Action lines are drawn on a control chart to represent action limits.

NOTE 2 When the measure plotted lies beyond an action limit, appropriate corrective action is taken on the process.

NOTE 3 These limits are based on the assumption that only 0,3 % of normally distributed results will fall outside these limits. Such an occurrence would strongly indicate that additional, assignable causes of variation might be present and that action might be required to identify and reduce them.

3.13
warning limits
control limits between which the statistic under consideration lies with a high probability when the process is under statistical control

[ISO 3534-2]