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Kakovost vode - Vzorčenje - 1. del: Navodilo za načrtovanje programov in tehnik vzorčenja (ISO 5667-1:2020)

Water quality - Sampling - Part 1: Guidance on the design of sampling programmes and sampling techniques (ISO 5667-1:2020)

Wasserbeschaffenheit - Probenahme - Teil 1: Anleitung zur Erstellung von Probenahmeprogrammen und Probenahmetechniken (ISO 5667-1:2020)

Qualité de l'eau - Échantillonnage - Partie 1: Recommandations relatives à la conception des programmes et des techniques d'échantillonnage (ISO 5667-1:2020)

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13.060.45	Preiskava vode na splošno	Examination of water in general
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Water quality - Sampling - Part 1: Guidance on the design of sampling programmes and sampling techniques (ISO 5667-1:2020)

Qualité de l'eau - Échantillonnage - Partie 1:
Recommandations relatives à la conception des
programmes et des techniques d'échantillonnage (ISO
5667-1:2020)

Wasserbeschaffenheit - Probenahme - Teil 1: Anleitung
zur Erstellung von Probenahmeprogrammen und
Probenahmetechniken (ISO 5667-1:2020)

This European Standard was approved by CEN on 21 February 2022.

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European foreword

This document (EN ISO 5667-1:2022) 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of an identical text or by endorsement, at the latest by August 2022, and conflicting national standards shall be withdrawn at the latest by August 2022.

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 5667-1:2006, EN ISO 5667-1:2006/AC:2007.

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Endorsement notice

The text of ISO 5667-1:2020 has been approved by CEN as EN ISO 5667-1:2022 without any modification.

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Water quality — Sampling —

Part 1:

Guidance on the design of sampling programmes and sampling techniques

Qualité de l'eau — Échantillonnage —

*Partie 1: Recommandations relatives à la conception des programmes
et des techniques d'échantillonnage*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 6, *Sampling management*.

This third edition cancels and replaces the second edition (ISO 5667-1:2006), which has been technically revised. The main changes compared to the previous edition are as follows:

- incorporation of updated references;
- addition of a section on variation from normal sampling conditions;
- expansion of [Clause 7](#) on sampling from specific types of water;
- introduction of a clause on passive sampling;
- incorporation of sample container provisions in [Clause 12](#);
- expansion of [Clause 15](#) to address data management;
- addition of annexes on field documentation, emerging sampling techniques, preparation of sampling equipment.

A list of all parts in the ISO 5667 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Water quality — Sampling —

Part 1:

Guidance on the design of sampling programmes and sampling techniques

1 Scope

This document sets out the general principles for, and provides guidance on, the design of sampling programmes and sampling techniques for all aspects of sampling of water (including waste waters, sludges, effluents, suspended solids and sediments).

It does not include detailed instructions for specific sampling situations, which are covered in the various other parts of ISO 5667 and in ISO 19458.

2 Normative references

There are no normative references.

3 Terms and definitions

No terms and definitions are listed in this document.

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/>

4 General safety precautions

Attention is drawn to the requirements of national and/or regional health and safety regulations.

The following are general examples of safety considerations.

4.1 Safety of Personnel

The enormously wide range of conditions encountered in sampling water bodies and bottom sediments can subject sampling personnel to a variety of safety and health risks. Precautions should be taken to avoid inhalation of toxic gases and ingestion of toxic materials through the nose, mouth and skin. Personnel responsible for the design of sampling programmes and for carrying out sampling operations should ensure that sampling personnel are informed of the necessary precautions to be taken in sampling operations.

Weather conditions should be taken into account in order to ensure the safety of personnel and equipment and it is essential that life jackets and lifelines should be worn when sampling large masses of water. Before sampling from ice-covered waters, the location and extent of weak ice should be carefully checked. If self-contained underwater breathing apparatus or other diving equipment is used, it should always be checked and maintained in accordance with relevant ISO or national standards to ensure reliability.

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Boats or platforms used for sampling purposes should be capable of being maintained in a stable condition. In all waters, precautions should be taken in relation to commercial ships and fishing vessels; for example, the correct signal flags should be flown to indicate the nature of the work being undertaken.

Sampling from unsafe sites, such as unstable river banks, should be avoided wherever possible. If this is not possible, the operation should be conducted by a team using appropriate precautions rather than by a single operator. Wherever possible, sampling from bridges should be used as a substitute for bank sampling unless bank conditions are the specific subject of the sampling study.

Safe access to sampling sites in all weather is essential for frequent routine sampling. Where relevant, precautions should be taken where additional natural hazards are present, such as fauna or flora, that can endanger the health or safety of personnel.

Hazardous materials (e.g. bottles containing concentrated acids) should be properly labelled.

If instruments or other items of equipment are to be installed on a river bank for sampling purposes, locations that are susceptible to flooding or vandalism should be avoided or appropriate precautions taken.

Many other situations arise during the sampling of water when special precautions should be taken to avoid accidents. For example, some industrial effluents can be corrosive or can contain toxic or flammable materials. The potential dangers associated with contact with sewage should also not be overlooked; these can be gaseous, microbiological, radiological, virological or zoological, such as from amoebae or helminthes.

Gas protection equipment, breathing apparatus, resuscitation apparatus and other safety equipment should be available when sampling personnel need to enter sampling locations containing hazardous atmospheres. In addition, the concentration of oxygen and of any likely toxic or asphyxiating vapour or gas likely to be present should be measured before personnel enter enclosed spaces.

In the sampling of steam and hot discharges, special care is necessary, and recognized sampling techniques designed to remove hazards should be applied.

The handling of radioactive samples requires special care, and the special techniques required should be strictly applied.

The use of electrically operated sampling equipment in or near water can present special electrocution hazards. Work procedures, site design and equipment maintenance should be planned so as to minimize these hazards. Where appropriate, specific materials and equipment, e.g. 'Atmosphere Explosible' equipment, should be used.

4.2 General environmental considerations

Whilst working in the field environmental protection should be observed. In any sampling activity there should be measures taken to avoid environmental impacts on the sampling site surroundings and the working space.

Measures should be designed to avoid any harm to flora and fauna when installing equipment using machinery (subsoil compaction) or when developing the access and egress from the site.

5 Design of sampling programmes

5.1 General

Whenever a volume of water, suspended solids, bottom sediment or sludge is to be characterized, it is generally impossible to examine the whole and it is therefore necessary to take samples.

Samples are collected and examined primarily for the following reasons:

- a) to determine the concentration of associated physical, chemical, microbiological, biological and radiological parameters in space and time;
- b) with bottom sediments, to obtain a visual indication of their nature;
- c) to estimate the flux of material;
- d) to assess trends over time or over space;
- e) for conformance with, or attainment of, criteria, standards or objectives.

Sampling programmes, the outcome of which will be estimates of summary statistics and trends, should be designed in full awareness of the issues of statistical sampling error and the techniques by which these errors are quantified and how they are used to take decisions.

The samples collected should be as representative as possible of the whole to be characterized, and all precautions should be taken to ensure that, as far as possible, the samples do not undergo any changes in the interval between sampling and analysis (see ISO 5667-3 for additional guidance). The sampling of multiphase systems, such as water containing suspended solids or immiscible organic liquids, can present special problems and in such cases, specific advice should be sought (see [Clause 6](#)).

5.2 Sampling personnel

Attention is drawn to the fact that certification and accreditation of the sampling process and the individuals implementing it may be required or recommended at national level. Also refer to [7.1.6](#), ISO 5667-14 and ISO 5667-24.

5.3 Broad objectives for the design of sampling programmes

Before any sampling programme is devised, it is very important that the objectives of the programme are carefully established since they are the major factors in determining the position of sampling sites, frequency of sampling, duration of sampling, sampling procedures, subsequent treatment of samples and analytical requirements. The degree of accuracy and precision necessary for the estimation of water quality concentrations sought should also be taken into account, as should the manner in which the results are to be expressed and presented, for example, as concentrations or mass loads, maximum and/or minimum values, arithmetic means, median values, etc. The sampling programme should be designed to be capable of estimating the error in such values as affected by statistical sampling error and errors in chemical analysis.

Additionally, a list of parameters of interest should be compiled and the relevant analytical procedures consulted since these might give guidance on precautions to be observed during sampling and subsequent handling (general guidance on handling of samples is given in ISO 5667-3).

It can often be necessary to carry out a preliminary sampling and analysis programme before the final objectives can be defined. It is important to take into account all relevant data from previous programmes at the same or similar locations and other information on local conditions. Previous personal experience of similar programmes or situations can also be very valuable when setting up a new programme for the first time. Putting sufficient effort in time and money into the design of a proper sampling programme is a good investment that will ensure that the required information is obtained both efficiently and economically; failure to put proper effort into this aspect can result in either failure of the programme to achieve its objectives and/or over-expenditure of time and money.

Three broad objectives can be distinguished as follows (these are covered in more detail in [8.2](#), [8.3](#) and [8.4](#)):

- quality control measurements within water or waste water treatment plants used to decide when short-term process corrections are required;