SIST

SLOVENSKI STANDARD
SIST ISO 5667-9:1996

01-avgust-1996

Kakovost vode - Vzorčenje - 9. del: Navodilo za vzorčenje morskih vod

Water quality -- Sampling -- Part 9: Guidance on sampling from marine waters

Qualité de l'eau -- Échantillonnage -- Partie 9: Guide général pour l'échantillonnage des eaux marines

Ta slovenski standard je istoveten z: **ISO 5667-9:1992**

ICS:

13.060.10	Voda iz naravnih virov	Water of natural resources
13.060.45	Preiskava vode na splošno	Examination of water in general

SIST ISO 5667-9:1996 **en**

INTERNATIONAL STANDARD

ISO 5667-9

First edition 1992-10-15

Water quality — Sampling —

Part 9: Guidance on sampling from marine waters

Qualité de l'eau — Échantillonnage —

Partie 9: Guide pour l'échantillonnage des eaux marines

Reference number
ISO 5667-9:1992(E)

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.

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.

International Standard ISO 5667-9 was prepared by Technical Committee ISO/TC 147, *Water quality*, Sub-Committee SC 6, *Sampling (general methods)*.

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

— *Part 1: Guidance on the design of sampling programmes*

— *Part 2: Guidance on sampling techniques*

— *Part 3: Guidance on the preservation and handling of samples*

— *Part 4: Guidance on sampling from lakes, natural and man-made*

— *Part 5: Guidance on sampling of drinking water and water used for food and beverage processing*

— *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 the sampling of wet deposition*

— *Part 9: Guidance on sampling from marine waters*

— *Part 10: Guidance on sampling of waste waters*

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

— *Part 11: Guidance on sampling of groundwaters*

— *Part 12: Guidance on sampling of sludges and sediments*

Annex A forms an integral part of this part of ISO 5667. Annex B is for information only.

Introduction

This part of ISO 5667 is one of a group of standards dealing with the sampling of specific types of water. It should be read in conjunction with ISO 5667-1, ISO 5667-2 and ISO 5667-3, which deal respectively with the design of sampling programmes, sampling techniques and on the preservation and handling of samples.

Water quality — Sampling —

Part 9:
Guidance on sampling from marine waters

1 Scope

This part of ISO 5667 provides guidance on the principles to be applied to the design of sampling programmes, sampling techniques and the handling and preservation of samples of sea water from tidal waters (for example, estuaries and tidal inlets, coastal regions and the open sea). It does not apply to the collection of samples for microbiological or biological examination. General guidance on sampling for microbiological purposes is given in ISO 8199.

The main objectives of this part of ISO 5667 are specified in 1.1 to 1.4.

1.1 Quality characterization measurement

Measurement of variations in spatial distribution and temporal trends in water quality to establish the effects of climate, biological activity, water movements and the influences of man, and also to assist in determining the magnitude and consequences of future changes.

1.2 Quality control measurement

Measurement of water quality over a long period of time at one or more defined places to establish whether water quality, once characterized, remains suitable for defined uses such as bathing, protection of aquatic life, demineralization or cooling purposes, and to establish whether observed changes are unacceptable.

1.3 Measurements for specific reasons

Assessment of the cause, magnitude and effect of significant variations in water quality and investigation of the sources and subsequent fate of pollutants discharged into marine waters. Identification of pollution, for example invertebrate, fish or bird mortality, or other conspicuous phenomena such as colour or turbidity development, or formation of floating layers of dirt or oil, which can be ascribed to discharges, spillages or even plankton blooms. However, it must be stressed that this objective is often very difficult to achieve. Mortalities may be caused by natural phenomena and cumulative pollutants may often remain largely unseen.

1.4 Examination of the effects of man-made structures

Assessment of water quality variations caused by engineering developments such as barrages, jetties, bridges, breakwaters or ports, and resulting from the extensive use of marine waters for waste disposal.

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 of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 5667-1:1980, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes.*

ISO 5667-2:1991, *Water quality — Sampling — Part 2: Guidance on sampling techniques.*

ISO 5667-3:1985, *Water quality — Sampling — Part 3: Guidance on the preservation and handling of samples.*

ISO 5667-4:1987, *Water quality — Sampling — Part 4: Guidance on sampling from lakes, natural and man-made.*

ISO 6107-2:1989, *Water quality — Vocabulary — Part 2.*

ISO 8199:1988, *Water quality — General guide to the enumeration of micro-organisms by culture.*

3 Definitions

For the purposes of this part of ISO 5667, the following definitions apply.

3.1 spot sample: A discrete sample taken randomly (with regard to time and/or location) from a body of water. [ISO 6107-2]

3.2 depth profile samples: A series of water samples taken from various depths of a body of water at a specific location. [ISO 5667-4]

NOTE 1 In order to obtain a characterization of the water quality throughout the water body it is necessary to take depth profile samples at various locations.

3.3 area profile samples: A series of water samples taken from a particular depth of a body of water at various locations: in tidal waters, either length profiles (along the length of the channel) or cross profiles (across the length of the channel), in coastal waters and the open sea along either a one- or two-dimensional plan-view grid. [ISO 5667-4]

NOTE 2 As in 3.2, characterization may demand a three-dimensional approach to sampling.

3.4 composite samples: Two or more samples or subsamples, mixed together in appropriate known proportions (either discretely or continuously), from which the average result of a desired characteristic may be obtained. The proportions are usually based on time or flow measurements. [ISO 6107-2]

4 Sampling equipment

4.1 Sample container

General guidance is given in ISO 5667-2.

It is essential that special regard be given to the need to prevent contamination or losses through absorption of the low levels of many substances prevalent in sea water, and also to the problems which arise in relation to the high ionic strength of sea water compared to most other natural waters. Glass or other inert materials should be used if there is a risk of interaction of the sample with the container.

NOTE 3 Further details are described by Berman and Yeats (1985) [1].

When sampling at sea, fragile containers should be avoided.

4.2 Types of sampling equipment

4.2.1 Introduction

Subsurface samples can be satisfactorily collected by simple (manual) submersion of the sample container. The top can then be opened, and the container allowed to fill before recapping. It is essential for the bottle to be washed out several times with the water to be sampled before the definitive sample is collected. Plastics gloves should be worn by the operator to avoid contamination of the sample which should be taken upstream or up-tide of the sampling platform and in open water. This can be achieved by taking the sample from a point ahead of the bows of a boat as it moves slowly into the wind or current. This simple method minimizes any possible contamination and prevents possible absorptive losses on the internal surfaces of a sampling device.

The various mechanical aids developed to collect samples from different depths are described in 4.2.2 to 4.2.4.

NOTE 4 Further details are included in "Methods of Seawater Analysis" (1983) [2].

4.2.2 Open samplers and surface samplers

Open samplers are open-mouthed vessels which are used for sampling at, or immediately beneath, the water surface. Open samplers cannot usually be recommended for subsurface sampling because of contamination by the surface layer, which may contain concentrations of some compounds which are sufficiently elevated to influence the overall concentration in the bulk sample.

Samples from the surface microlayer should be taken with samplers specially designed for this purpose, but it is difficult to obtain representative samples, particularly under field conditions.

NOTE 5 The surface microlayer can only really be sampled in a qualitative manner. However, the chemistry of the microlayer and sampling methods have been extensively reviewed by Liss (1975) [3].

4.2.3 Closed-pipe devices

Closed-pipe samplers are hollow tubes fitted with valves or stoppers which are recommended for obtaining samples from defined depths (either spot samples or a series of samples) or for obtaining depth-integrated composite samples.

Most closed-pipe samplers are made of polyvinylchloride (PVC) or similar material and are, therefore, a ready source of contamination. To avoid this, samplers should be internally coated with polytetrafluoroethylene (PTFE), well-aged and have silicon rubber or PTFE "0" jointing rings. Internal springs made from rubber and external metal springs should be avoided where there is a risk of contamination with the determinands of interest.

Two types of design exist:

— air displacement;

— open ended.

Air-displacement samplers are lowered on a rope, with both orifices closed by stoppers which are attached either to a second line to the surface, or to the main lowering line by non-elastic cords which bypass a spring link in that line. Water pressure and drag limit the depth in which these samplers will operate successfully. Because of this they are most suitable for sampling in estuarine waters, but may be successfully utilized in the surface layers of more open waters.

Open-ended samplers are free-flushing as they are lowered through the water column on a hydrographic cable. It is imperative that a non-metallic rope/hydrographic cable be used if sampling for trace metals or hydrocarbons. The tubes are closed by tightly fitting end caps or shutters triggered electromagnetically, or by messenger weights or water pressure. When in position, the sampler should be allowed 5 min to "acclimatize" to its surroundings before operating. If messenger weights are to be used, they should be plastics coated. Some designs are lowered with shutters closed, preventing contamination with the surface microlayer and water from different layers.

When operating in strong currents or at great depths, the hydrographic cable is unlikely to be vertical. The location of sampling devices in the water column may be established using pressure transducers or echo sounders. In simpler situations, it is sufficient to record the length of wire drawn out and the angle of the wire and to correct to actual depth by using simple geometry.

Samples from close to the seabed should be taken with samplers specially designed for this purpose.

4.2.4 Pumping devices

Peristaltic pumps or centrifugal pumps with impellers which are unlikely to introduce contamination can be used. Sampling tubes are lowered in the water body with the aid of a non-metallic hydrographic cable. The open end of the tube should be kept well away from the cable and the pump and the tube well flushed before the sample is taken. This type of device may be used for taking spot samples or a series of samples from defined depths, or for obtaining depth-integrated or area-integrated composite samples.

Pumping devices may be used to sample chemically stable determinands in both the particulate or dissolved phase, but they are unsuitable for gaseous or volatile compounds.

4.2.5 Automatic sampling equipment

Most automatic sampling devices allow the collection of discrete samples at regular predetermined time intervals. Systems are often combined with on-site monitors, data loggers and telemetry links. Complex automatic monitoring stations have been operated from stationary vessels or fixed monitoring platforms, utilizing *in situ* probes to measure some determinands both at surface and depth. Further details on when these devices may be used are given in 5.3.

5 Sampling procedure

5.1 Sampling location

General guidance on the planning of sampling programmes is given in ISO 5667-1.

The spatial distribution of sampling locations can be decided only after detailed preliminary work using a large number of sampling locations to provide information on which statistical techniques may be applied.

NOTE 6 The wide variety of statistical techniques available is described by Sokal and Rohlf (1969) [4].

The choice of sampling positions is determined by variability in the distribution of parameters of interest, factors influencing that variability and the magnitude of variations which require characterization. It is essential to position individual sampling points in a way that allows credible interpolation between them, otherwise, localized fluctuations will remain undetected or poorly characterized. However, only in special studies of localized fluctuations can one afford to have sampling points close enough to fully reveal patchiness in the chemical constituents of interest.

Unfortunately, it is not possible to give precise guidance because each study would be a unique event.

The practical implications of tidal movement should always be borne in mind. It is important to ensure that sampling at adjacent stations is not carried out