

---

---

**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*



This document is a preview generated by EMS



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2014

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.org](mailto:copyright@iso.org)  
Web [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
Foreword.....	iv
Introduction.....	vi
<b>1 Scope.....</b>	<b>1</b>
<b>2 Normative references.....</b>	<b>1</b>
<b>3 Terms and definitions.....</b>	<b>1</b>
<b>4 Sources of sampling error.....</b>	<b>4</b>
<b>5 Sampling quality.....</b>	<b>5</b>
5.1 General.....	5
5.2 Technical and personnel requirements.....	6
5.3 Sampling manual.....	6
5.4 Training of sampling staff.....	7
<b>6 Strategy and organization.....</b>	<b>7</b>
6.1 Time, duration and frequency of sampling.....	7
6.2 Sampling collection locations.....	8
<b>7 Sample collection and handling.....</b>	<b>8</b>
7.1 Equipment and vehicle check prior to carrying out a sampling programme.....	8
7.2 Preparation for sampling on-site.....	9
7.3 Field measurements.....	9
7.4 Taking the samples.....	9
<b>8 Sample identification.....</b>	<b>12</b>
<b>9 Field sample protocol.....</b>	<b>12</b>
<b>10 Transport and storage of samples.....</b>	<b>12</b>
<b>11 Sampling quality control techniques.....</b>	<b>13</b>
11.1 General.....	13
11.2 Replicate quality control samples.....	15
11.3 Field blank samples.....	16
11.4 Rinsing of equipment (sampling containers).....	17
11.5 Filtration recovery.....	18
11.6 Technique 1 — Spiked samples.....	20
11.7 Technique 2 — Spiked environmental samples.....	22
<b>12 Analysis and interpretation of quality control data.....</b>	<b>22</b>
12.1 Shewhart control charts.....	22
12.2 Construction of duplicate control charts.....	23
<b>13 Independent audits.....</b>	<b>23</b>
<b>Annex A (informative) Common sources of sampling error<sup>[Z]</sup>.....</b>	<b>25</b>
<b>Annex B (informative) Control charts.....</b>	<b>27</b>
<b>Annex C (informative) Sub-sampling using a homogenizer.....</b>	<b>31</b>
<b>Bibliography.....</b>	<b>34</b>

## 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](http://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](http://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 on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary information](#).

The committee responsible for this document is ISO/TC 147, *Water quality*, Subcommittee SC 6, *Sampling (general methods)*.

This second edition cancels and replaces the first edition (ISO 5667-14:1998), 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 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*
- *Part 23: Guidance on passive sampling in surface waters*

## 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 part of ISO 5667 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

**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.

## 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 might, in some circumstances, be applicable to sludge and sediment sampling.

## 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

Note 1 to entry: In practice, the accepted reference value is substituted for the true value.

Note 2 to entry: 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 to entry: Accuracy refers to a combination of trueness and precision.

[SOURCE: ISO 3534-2:2006, 3.3.1]

### 3.2

#### **bias**

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

Note 1 to entry: 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.