



BSI Standards Publication

Water quality - Determination of orthophosphate and total phosphorus contents by flow analysis (FIA and CFA)

Part 2: Method by continuous flow analysis (CFA)

National foreword

This British Standard is the UK implementation of EN ISO 15681-2:2018. It is identical to [ISO 15681-2:2018](#). It supersedes [BS EN ISO 15681-2:2004](#), which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EH/3/2, Physical chemical and biochemical methods.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Water quality - Determination of orthophosphate and
total phosphorus contents by flow analysis (FIA and CFA)
- Part 2: Method by continuous flow analysis (CFA) (ISO
15681-2:2018)

Qualité de l'eau - Dosage des orthophosphates
et du phosphore total par analyse en flux
(FIA et CFA) - Partie 2: Méthode par analyse
en flux continu (CFA) (ISO 15681-2:2018)

Wasserbeschaffenheit - Bestimmung von
Orthophosphat und Gesamtposphor
mittels Fließanalytik (FIA und CFA) - Teil
2: Verfahren mittels kontinuierlicher
Durchflussanalyse (CFA) (ISO 15681-2:2018)

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN ISO 15681-2:2018) 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of an identical text or by endorsement, at the latest by June 2019, and conflicting national standards shall be withdrawn at the latest by June 2019.

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 15681-2:2004.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of [ISO 15681-2:2018](#) has been approved by CEN as EN ISO 15681-2:2018 without any modification.

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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).

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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 2, *Physical, chemical and biochemical methods*.

This second edition cancels and replaces the first edition ([ISO 15681-2:2003](http://www.iso.org/iso/15681-2:2003)), which has been technically revised. The main changes compared to the previous edition are as follows:

- a) the reagents have been adjusted to decrease the pH to enhance the colour reaction;
- b) the figures in [Annex A](#) have been revised.

A list of all parts in the ISO 15681 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.

Introduction

Methods of determining water quality using flow analysis automated wet chemical procedures are particularly suitable for the processing of many analytes in water in large sample series at a high analysis frequency.

Analysis can be performed by flow injection analysis (FIA)^{[6][8]} or continuous flow analysis (CFA)^[9]. Both methods share the feature of an automatic dosage of the sample into a flow system (manifold) where the analyte in the sample reacts with the reagent solutions on its way through the manifold. The sample preparation may be integrated in the manifold. The amount of reaction product is measured in a flow detector (e.g. flow photometer). This document describes the CFA method.

The user should be aware that particular problems could require the specification of additional marginal conditions.

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Water quality - Determination of orthophosphate and total phosphorus contents by flow analysis (FIA and CFA) —

Part 2:

Method by continuous flow analysis (CFA)

WARNING — Persons using this document should be familiar with normal laboratory practice. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices.

IMPORTANT — It is absolutely essential that tests conducted in accordance with this document be carried out by suitably qualified staff.

1 Scope

This document specifies continuous flow analysis (CFA) methods for the determination of orthophosphate in the mass concentration range from 0,01 mg/l to 1,00 mg/l P, and total phosphorus in the mass concentration range from 0,10 mg/l to 10,0 mg/l P. The method includes the digestion of organic phosphorus compounds and the hydrolysis of inorganic polyphosphate compounds, performed either manually, as described in [ISO 6878](#) and in References [4], [5] and [7], or with an integrated ultraviolet (UV) digestion and hydrolysis unit.

This document is applicable to various types of water, such as ground, drinking, surface, leachate and waste water. The range of application can be changed by varying the operating conditions.

This method is also applicable to the analysis of seawater, but with changes in sensitivity by adapting the carrier and calibration solutions to the salinity of the samples.

It is also applicable to analysis using 10 mm to 50 mm cuvettes depending on the desired range. For extreme sensitivity, 250 mm and 500 mm long way capillary flow cells (LCFCs) can be used. However, the method is not validated for these two uses. Changes in sensitivity and calibration solutions could be required.

[Annex A](#) provides examples of a CFA system. [Annex B](#) gives performance data from interlaboratory trials. [Annex C](#) gives information of determining orthophosphate-P and total-P by CFA and tin(II) chloride reduction.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

[ISO 3696](#), *Water for analytical laboratory use — Specification and test methods*

[ISO 5667-1](#), *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes and sampling techniques*

[ISO 5667-3:2018](#), *Water quality — Sampling — Part 3: Preservation and handling of water samples*

[ISO 6878:2004](#), *Water quality — Determination of phosphorus — Ammonium molybdate spectrometric method*