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

**Part 1:  
Method by flow injection analysis (FIA)**

*Qualité de l'eau — Dosage des orthophosphates et du phosphore total  
par analyse en flux (FIA et CFA) —*

*Partie 1: Méthode par analyse avec injection en flux (FIA)*



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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.

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 15681-1 was prepared by Technical Committee ISO/TC 147, *Water quality*, Subcommittee SC 2, *Physical, chemical and biochemical methods*.

ISO 15681 consists of the following parts, under the general title *Water quality — Determination of orthophosphate and total phosphorus contents by flow analysis (FIA and CFA)*:

- *Part 1: Method by flow injection analysis (FIA)*
- *Part 2: Method by continuous flow analysis (CFA)*

## Introduction

Methods of determining water quality using flow analysis automated wet chemical procedures, and 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) <sup>[1], [2]</sup> or continuous flow analysis (CFA) <sup>[3]</sup>. 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 part of ISO 15681 describes the FIA 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 1: Method by flow injection analysis (FIA)

**WARNING** — Persons using this part of ISO 15681 should be familiar with normal laboratory practice. This part of ISO 15681 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 and to ensure compliance with any national regulatory conditions. Molybdate and antimony waste solutions should be disposed of properly. It is absolutely essential that tests conducted according to this part of ISO 15681 be carried out by suitably qualified staff.

### 1 Scope

This part of ISO 15681 specifies flow injection analysis (FIA) methods for the determination of orthophosphate in the mass concentration range from 0,01 mg/l to 1,0 mg/l (P), and total phosphorus by manual digestion in accordance with ISO 6878 [5], [6] for the mass concentration range from 0,1 mg/l to 10 mg/l (P). The range of application can be changed by varying the operating conditions.

This part of ISO 15681 is applicable to various types of water (such as ground, drinking, surface, leachate and waste waters).

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

### 2 Normative references

The following reference documents are indispensable for the application 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*

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

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

ISO 6878:—<sup>1)</sup>, *Water quality — Determination of phosphorus — Ammonium molybdate spectrometric method*

ISO 8466-1, *Water quality — Calibration and evaluation of analytical methods and estimation of performance characteristics — Part 1: Statistical evaluation of the linear calibration function*

1) To be published.