EESTI STANDARD EVS-EN 1483:2007



# Water quality - Determination of mercury - Method using atomic absorption spectrometry

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EESTI STANDARDIKESKUS

**EESTI STANDARDI EESSÕNA** **NATIONAL FOREWORD**

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| Käesolev Eesti standard EVS-EN 1483:2007 sisaldab Euroopa standardi EN 1483:2007 ingliskeelset teksti.<br><br>Käesolev dokument on jõustatud 31.05.2007 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.<br><br>Standard on kättesaadav Eesti standardiorganisatsioonist. | This Estonian standard EVS-EN 1483:2007 consists of the English text of the European standard EN 1483:2007.<br><br>This document is endorsed on 31.05.2007 with the notification being published in the official publication of the Estonian national standardisation organisation.<br><br>The standard is available from Estonian standardisation organisation. |

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| **Käsitlusala:**<br>This European Standard specifies two methods for the determination of mercury. For the method described in Clause 4, tin(II) chloride is used as the reducing agent. For the method given in Clause 5, sodium borohydride serves as the reducing agent. The choice of method depends on the equipment available and the matrix (see Clause 3). Both methods are suitable for the determination of mercury in water, for example in drinking, ground, surface and waste waters, in a concentration range from 0,1 µg/l to 10 µg/l. Higher concentrations can be determined if the water sample is diluted. Lower concentrations in the range of 0,001 µg/l to 5 µg/l can be determined if special mercury analysers with an optimised instrument are used or if atomic fluorescence spectrometry is applied (see EN 13506 or ISO 17852). | **Scope:**<br>This European Standard specifies two methods for the determination of mercury. For the method described in Clause 4, tin(II) chloride is used as the reducing agent. For the method given in Clause 5, sodium borohydride serves as the reducing agent. The choice of method depends on the equipment available and the matrix (see Clause 3). Both methods are suitable for the determination of mercury in water, for example in drinking, ground, surface and waste waters, in a concentration range from 0,1 µg/l to 10 µg/l. Higher concentrations can be determined if the water sample is diluted. Lower concentrations in the range of 0,001 µg/l to 5 µg/l can be determined if special mercury analysers with an optimised instrument are used or if atomic fluorescence spectrometry is applied (see EN 13506 or ISO 17852). |

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**Võtmesõnad:**

EUROPEAN STANDARD

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# EN 1483

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Supersedes EN 1483:1997

English Version

# Water quality - Determination of mercury - Method using atomic absorption spectrometry

Qualité de l'eau - Détermination du mercure - Méthode par spectrométrie d'absorption atomique

Wasserbeschaffenheit - Bestimmung von Quecksilber - Verfahren mittels Atomabsorptionsspektrometrie

This European Standard was approved by CEN on 28 February 2007.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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# Foreword

This document (EN 1483:2007) has been prepared by 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 October 2007, and conflicting national standards shall be withdrawn at the latest by October 2007.

This document supersedes EN 1483:1997.

NOTE This revision of EN 1483:1997, without stating details, takes into account new state of the art methods. This revision also describes continuous flow methods whilst the batch tests have been deleted as they are no longer used.

In Annex A.1, a bromate bromide conservation/digestion step is included, thus allowing to avoid potassium permangante resp. potassium chromate.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

# Introduction

It should be investigated as to whether, and to what extent, particular problems will require additional marginal specification conditions.

In natural water sources, mercury compounds generally occur only in very small concentrations of less than 0,1 µg/l, although higher concentrations may be found, for example, in waste water.

Both inorganic and organic compounds of mercury may be present as mercury can accumulate in sediment and sludge.

To fully decompose all of the mercury compounds, a digestion procedure is necessary. Digestion can be omitted only if it is certain that the mercury concentration can be measured without this pre-treatment.

For measurements in the low concentration range, highest purity reagents, clean reaction vessels, mercury-free air in the laboratory and a very stable measurement system are essential.

**WARNING — Persons using this European Standard should be familiar with normal laboratory practice. This standard does not purport to address all 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.**

**Mercury and mercury compounds are very toxic. Extreme caution should be exercised when handling samples and solutions which contain or may contain mercury.**

**Potassium dichromate is toxic. Caution should be exercised when handling the solid material or its solutions.**

**IMPORTANT — It is absolutely essential that tests conducted according to this European Standard be carried out by suitably trained staff.**

## 1 Scope

This European Standard specifies two methods for the determination of mercury. For the method described in Clause 4, tin(II) chloride is used as the reducing agent. For the method given in Clause 5, sodium borohydride serves as the reducing agent. The choice of method depends on the equipment available and the matrix (see Clause 3). Both methods are suitable for the determination of mercury in water, for example in drinking, ground, surface and waste waters, in a concentration range from 0,1 µg/l to 10 µg/l. Higher concentrations can be determined if the water sample is diluted. Lower concentrations in the range of 0,001 µg/l to 5 µg/l can be determined if special mercury analysers with an optimised instrument are used or if atomic fluorescence spectrometry is applied (see EN 13506 or ISO 17852).

## 2 Normative references

The following referenced 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.

EN ISO 3696, *Water for analytical laboratory use — Specification and test methods (ISO 3696:1987)*

EN ISO 5667-1, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes and sampling techniques (ISO 5667-1:2006)*

EN ISO 5667-3, *Water quality — Sampling — Part 3: Guidance on the preservation and handling of water samples (ISO 5667-3:2003)*

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*

ISO 8466-2, *Water quality — Calibration and evaluation of analytical methods and estimation of performance characteristics — Part 2: Calibration strategy for non-linear second-order calibration functions*

## 3 General interferences

With mercury there is a risk that exchange reactions, that is adsorption and desorption, will occur on the walls of containers, reaction cell, gas- liquid separator etc.

Mercury vapour can diffuse through various plastics, thus this phenomenon needs to be considered in the choice of tubing material. Glass or special plastics tubing, e.g. FEP tubes (FEP = Fluorinated Ehtylene-Propylene) and pump tubes based on polypropylene compounds may be used. Silicone tubing, for example, is not suitable.

Volatile organic substances can absorb in the UV range and be mistaken for mercury. If present, these are, for the most part removed prior to reduction. Potassium permanganate is added until the solution is permanently coloured purple and an inert gas is bubbled through the solution for 10 min. Often, such interferences by non-specific absorption can also be eliminated by a background compensation system of atomic absorption equipment.

It is necessary to bring all solutions to the same temperature (< 25 °C) before reducing and stripping the mercury vapour. Water condensation on the cuvette windows can be prevented by heating the cuvette to temperatures slightly above 100 °C.

The interferences due to the presence of other elements in the matrix depend on the choice of reducing agent. Element concentrations in excess of those listed in Table 1 can cause negative bias.