



**SLOVENSKI STANDARD
SIST EN ISO 3696:1998**

01-maj-1998

Voda za analitsko laboratorijsko uporabo - Specifikacija in preskusne metode (ISO 3696:1987)

Water for analytical laboratory use - Specification and test methods (ISO 3696:1987)

Wasser für analytische Laborzwecke - Spezifikation und Prüfverfahren (ISO 3696:1987)

Eau pour laboratoire à usage analytique - Spécification et méthodes d'essai (ISO 3696:1987)

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Ta slovenski standard je istoveten z: EN ISO 3696:1995

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71.040.01 Analitska kemija na splošno Analytical chemistry in
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EUROPEAN STANDARD

EN ISO 3696

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 1995

ICS 71.040.30

Descriptors: inorganic chemistry, chemical analysis, chemical reagents, water, classification, specifications, tests, storage

English version

**Water for analytical laboratory use - Specification
and test methods (ISO 3696:1987)**Eau pour laboratoire à usage analytique -
Spécification et méthodes d'essai
(ISO 3696:1987)Wasser für analytische Laborzwecke -
Spezifikation und Prüfverfahren (ISO 3696:1987)**STANDARD PREVIEW**
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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CENEuropean Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

The text of the International Standard has been taken as a European Standard by the Technical Committee CEN/TC 19 "Petroleum products, lubricants, and related products" from ISO/TC 47 "Chemistry" of the International Organization for Standardization (ISO).

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of an identical text or by endorsement, at the latest by October 1995, and conflicting national standards shall be withdrawn at the latest by October 1995.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 3696:1987 has been approved by CEN as a European Standard without any modification.

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INTERNATIONAL STANDARD

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INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Water for analytical laboratory use — Specification and test methods

Eau pour laboratoire à usage analytique — Spécification et méthodes d'essai

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 3696 was prepared by Technical Committee ISO/TC 47, *Chemistry*.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

STANDARD PREVIEW
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Water for analytical laboratory use — Specification and test methods

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1 Scope and field of application

This International Standard specifies the requirements and corresponding test methods for three grades of water for laboratory use for the analysis of inorganic chemicals.

It is not applicable to water for organic trace analysis, to water for the analysis of surface active agents, or to water for biological or medical analysis.

NOTE — For some purposes (for example for certain analytical methods or for tests in which the water is required to be sterile or pyrogen-free or of specified surface tension), additional specific tests and further purification or other treatment may be necessary.

2 Description

The material shall be a clear, colourless liquid as assessed by visual inspection.

3 Classification

This International Standard covers three grades of water as follows :

Grade 1

Essentially free from dissolved or colloidal ionic and organic contaminants and suitable for the most stringent analytical requirements including those of high-performance liquid chromatography; should be produced by further treatment of grade 2 water (for example reverse osmosis or deionization followed by filtration through a membrane filter of pore size

0,2 µm to remove particulate matter or redistillation from a fused silica apparatus).

Grade 2

Very low in inorganic, organic or colloidal contaminants and suitable for sensitive analytical purposes, including atomic absorption spectrometry (AAS) and the determination of constituents in trace quantities; should be produced, for example, by multiple distillation, or by deionization or reverse osmosis followed by distillation.

Grade 3

Suitable for most laboratory wet chemistry work and preparation of reagents solutions; should be produced, for example, by single distillation, by deionization, or by reverse osmosis. Unless otherwise specified, it should be used for ordinary analytical work.

NOTE — It is assumed that the initial feed stock water is potable and reasonably pure. If it is heavily contaminated in any respect, some pretreatment may be necessary.

4 Requirements

The material shall comply with the appropriate requirements of the table. Testing for compliance shall be carried out by means of the methods specified in clause 7.

Table — Requirements

Parameter	Grade 1	Grade 2	Grade 3	Test method
pH value at 25 °C inclusive range	Not applicable (see note 1)	Not applicable (see note 1)	5,0 to 7,5	Sub-clause 7.1
Electrical conductivity mS/m at 25 °C, max.	0,01 (see note 2)	0,1 (see note 2)	0,5	Sub-clause 7.2
Oxidizable matter Oxygen (O) content mg/l, max	Not applicable (see note 3)	0,08	0,4	Sub-clause 7.3
Absorbance at 254 nm and 1 cm optical path length, absorbance units, max.	0,001	0,01	Not specified	Sub-clause 7.4
Residue after evaporation on heating at 110 °C mg/kg, max.	Not applicable (see note 3)	1	2	Sub-clause 7.5
Silica (SiO ₂) content mg/l, max.	0,01	0,02	Not specified	Sub-clause 7.6

NOTES

1 Because of the difficulties associated with measurement of the pH value of high-purity water, and the doubtful significance of the value obtained, limits for the pH of grade 1 and grade 2 water have not been specified.

2 The values of conductivity for grade 1 and grade 2 water apply to freshly prepared water; during storage, it is possible for contaminants such as atmospheric carbon dioxide and alkalis from glass containers to be dissolved, leading to changes in conductivity.

3 A limit for oxidizable matter and residue after evaporation for grade 1 water is not specified because of the difficulty of testing for compliance at this level of purity. The quality of grade 1 water is, however, assured by compliance with the other requirements and by its method of preparation.

5 Sampling

A representative sample of the material of not less than 2 litres shall be taken from the bulk for the purpose of examination in accordance with this specification.

NOTE — This sample is not used for measurements of conductivity on grade 1 and grade 2 water (see 7.2.2.1).

The sample shall be placed in a suitable, clean, airtight container, reserved solely for water samples, which shall be of such a size that it is completely filled by the sample. Care shall be taken to avoid the risk of contaminating the contents in any way.

Aged containers (i.e. containers boiled for at least 2 h in a solution of hydrochloric acid, $c(\text{HCl}) \approx 1 \text{ mol/l}$, then twice for 1 h in distilled water) made of borosilicate glass can be used as well as suitable inert plastics containers (for example polyethylene or polypropylene), but it is essential to establish that the sample is unaffected by storage therein, particularly in respect of oxidizable matter and absorbance.

6 Storage

Contamination of water during storage may arise principally from dissolution of soluble constituents from glass or plastics

containers or absorption of atmospheric carbon dioxide and of any other impurities present in the laboratory atmosphere.

For this reason, the storage of grade 1 and grade 2 water is not recommended, the water being prepared, as required, for immediate use.

Nevertheless, grade 2 water may be prepared in reasonable quantity and stored in suitable, inert, clean, airtight, full containers which have been thoroughly pre-rinsed with water of similar grade.

The storage of grade 3 water presents little problem, but the containers and storage conditions should be the same as those used for the storage of grade 2 water.

It is recommended that any storage container be reserved exclusively for the storage of a particular grade of water.

7 Methods of test

It is essential that the determinations specified in this clause are carried out in a dust-free, pure atmosphere and that suitable precautions are taken to prevent any contamination of the sample and test portions.

7.1 Measurement of pH

7.1.1 Apparatus

Ordinary laboratory apparatus and

pH-meter, fitted with a glass measuring electrode and an Ag/AgCl reference electrode.

7.1.2 Procedure

Calibrate the pH-meter (7.1.1) in accordance with the manufacturer's instructions, using buffer solutions having pH values covering the range 4,0 to 8,0.

Transfer some of the laboratory sample to a suitable vessel and adjust the temperature of the water to 25 ± 1 °C. Introduce the electrodes and determine the pH.

7.2 Measurement of conductivity

7.2.1 Apparatus

Ordinary laboratory apparatus and

7.2.1.1 Conical flask, fitted with a guard tube containing self-indicating granular soda lime.

7.2.1.2 Conductivity meter with cell for circulation, having an "in-line" conductivity cell, with automatic temperature compensation, for measurements on grade 1 and grade 2 water.

NOTE — If the instrument is not temperature-compensated an in-line heat-exchanger, capable of adjusting the temperature of the water under test to 25 ± 1 °C, should be fitted.

7.2.1.3 Conductivity meter, for measurements on grade 3 water.

7.2.2 Procedure

7.2.2.1 Grade 1 and grade 2 water

Using the conductivity meter (7.2.1.2), temperature-compensated to 25 ± 1 °C, measure the conductivity.

7.2.2.2 Grade 3 water

Transfer 400 ml of the sample into the flask (7.2.1.1), insert the guard tube and adjust the temperature of the water to 25 ± 1 °C. Measure the conductivity by means of the conductivity meter (7.2.1.3) in accordance with the manufacturer's operating instructions.

7.3 Limit test for oxidizable matter

NOTE — The limits are equivalent to oxidizable matter, expressed as milligrams of oxygen (O) per litre, of 0,08 and 0,4 for grade 2 and grade 3 water respectively.

7.3.1 Reagents

Use grade 2 water to prepare the following reagent solutions.

7.3.1.1 Sulfuric acid, approximately 1 mol/l solution.

7.3.1.2 Potassium permanganate, standard volumetric solution, $c(1/5 \text{ KMnO}_4) = 0,01$ mol/l.

7.3.2 Procedure

7.3.2.1 Test portion

1 000 ml of grade 2 water or 200 ml of grade 3 water.

7.3.2.2

Test
Add 10 ml of the sulfuric acid solution (7.3.1.1) and 1,0 ml of the standard volumetric potassium permanganate solution (7.3.1.2) to the test portion (7.3.2.1), bring to the boil and boil for 5 min. Check that the colour of the test mixture is not completely discharged.

7.4 Measurement of absorbance

7.4.1 Apparatus

Ordinary laboratory apparatus and

7.4.1.1 Spectrometer, with selectors for continuous variation, or

7.4.1.2 Spectrometer, with selectors for discontinuous variation, fitted with filters providing maximum transmission in the neighbourhood of 254 nm.

7.4.1.3 Optical cells, of the same silica material, 1 cm and 2 cm path length.

NOTE — If the available spectrometer is not sufficiently sensitive, the sensitivity may be increased by using optical cells of greater path length.

7.4.2 Procedure

Fill the 2 cm optical cell (7.4.1.3) with some of the sample. Measure the absorbance of this optical cell with the spectrometer (7.4.1.1), at a wavelength of about 254 nm, or with the spectrometer (7.4.1.2) fitted with suitable filters, after having adjusted the instrument to zero absorbance against the same water in the 1 cm optical cell.

7.5 Determination of residue after evaporation on heating at 110 °C

7.5.1 Apparatus

Ordinary laboratory apparatus and

7.5.1.1 Rotary evaporator, with a flask of capacity about 250 ml.

7.5.1.2 Steam bath.

7.5.1.3 Dish, of platinum, silica or borosilicate glass, of capacity about 100 ml.

7.5.1.4 Oven, capable of being controlled at 110 ± 2 °C.

7.5.2 Procedure

7.5.2.1 Test portion

Transfer 1 000 ml of the laboratory sample into a stoppered measuring cylinder.