



# SLOVENSKI STANDARD

## SIST EN 936:2007

01-januar-2007

Nadomešča:  
SIST EN 936:1999

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### Kemikalije, ki se uporabljajo za pripravo pitne vode - Ogljikov dioksid

Chemicals used for treatment of water intended for human consumption - Carbon dioxide

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch -  
Kohlenstoffdioxid

Produits chimiques utilisés pour le traitement de l'eau destinée à la consommation  
humaine - Dioxyde de carbone

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#### ICS:

13.060.20	Pitna voda	Drinking water
71.100.80	Kemikalije za čiščenje vode	Chemicals for purification of water

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EUROPEAN STANDARD

EN 936

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2006

ICS 71.100.80

Supersedes EN 936:1997

English Version

## Chemicals used for treatment of water intended for human consumption - Carbon dioxide

Produits chimiques utilisés pour le traitement de l'eau destinée à la consommation humaine - Dioxyde de carbone

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Kohlenstoffdioxid

This European Standard was approved by CEN on 26 June 2006.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, 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.

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## Contents

Page

Foreword.....	3
Introduction .....	4
1 Scope .....	5
2 Description .....	5
2.1 Identification.....	5
2.2 Commercial form .....	5
2.3 Physical properties.....	6
2.4 Chemical properties .....	6
3 Purity criteria.....	7
3.1 General.....	7
3.2 Composition of commercial product.....	7
3.3 Impurities and main by-products.....	7
3.4 Chemicals parameters .....	7
4 Test methods.....	7
4.1 Sampling.....	7
4.2 Analysis .....	7
5 Labelling - Transportation - Storage.....	8
5.1 Means of delivery.....	8
5.2 Risk and safety labelling according to the EU Directives .....	8
5.3 Transportation regulations and labelling.....	8
5.4 Marking .....	9
5.5 Storage.....	9
Annex A (informative) General information on carbon dioxide.....	10
A.1 Origin .....	10
A.2 Use .....	12
A.3 General rules relating to safety.....	12
Bibliography .....	14

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SIST EN 936:2007

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## Foreword

This document (EN 936:2006) has been prepared by Technical Committee CEN/TC 164 "Water supply", the secretariat of which is held by AFNOR.

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 February 2007, and conflicting national standards shall be withdrawn at the latest by February 2007.

This European Standard supersedes EN 936:1997.

Significant technical differences between this edition and EN 936:1997 are as follows:

- a) deletion of the reference to EU Directive 80/778/EEC of July, 15 1980 in order to take into account of the last Directive in force (see [1]);
- b) updating of the transportation regulations and labelling.
- c) the requirement for carbon dioxide content is now only 99% instead of 99.7% in the latest edition

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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.

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## Introduction

In respect to the potential adverse effects on the quality of water intended for human consumption caused by the product covered by this European Standard:

- a) this European Standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA;
- d) it should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

NOTE Conformity with this European Standard does not confer or imply acceptance or approval of the product in any of the Member States of the EU or EFTA. The use of the product covered by this European Standard is subject to regulation or control by National Authorities.

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## 1 Scope

This European Standard is applicable to carbon dioxide used for treatment of water intended for human consumption. It describes the characteristics of carbon dioxide and specifies the requirements and corresponding analytical methods for carbon dioxide. It also gives information on its use in water treatment.

## 2 Description

### 2.1 Identification

#### 2.1.1 Chemical name

Carbon dioxide.

#### 2.1.2 Synonym or common name

Carbonic acid gas (carbonic anhydride).

#### 2.1.3 Relative molecular mass

44,011.

#### 2.1.4 Empirical formula

CO<sub>2</sub>.

#### 2.1.5 Chemical formula

CO<sub>2</sub>.

#### 2.1.6 CAS Registry Number <sup>1)</sup>

124-38-9.

#### 2.1.7 EINECS reference<sup>2)</sup>

204-696-9.

### 2.2 Commercial form

The carbon dioxide is supplied as a liquefied gas.

NOTE The solid form is not usually used for the treatment of water intended for human consumption.

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1) Chemical Abstracts Service Registry Number.

2) European Inventory of Existing Commercial Chemical Substances.

**EN 936:2006 (E)****2.3 Physical properties****2.3.1 Appearance**

The carbon dioxide is a colourless gas or liquid.

**2.3.2 Density**

The density of the gas at 0 °C and 101,3 kPa<sup>3)</sup> is 1,9 768 kg/m<sup>3</sup>, while the density of the liquid at 0 °C and 4 000 kPa is 933,318 kg/m<sup>3</sup>.

**2.3.3 Solubility in water**

The solubility of the gas in water is 1,72 g/l at 20 °C and 101,3 kPa.

**2.3.4 Vapour pressure**

The vapour pressure of the liquid is 5 733,0 kPa at 20 °C.

**2.3.5 Boiling point at 100 kPa<sup>3)</sup>**

(See 2.3.6).

**2.3.6 Melting point**

The sublimation point of solid CO<sub>2</sub> is -78,9 °C (and 101,3 kPa).

**2.3.7 Specific heat**

The specific heat of carbon dioxide is 0,827 kJ/kg x K at 0 °C and 100 kPa.

**2.3.8 Viscosity (dynamic)**

The viscosity of the liquid is 147 x 10<sup>-7</sup> Pa x s at 20 °C.

**2.3.9 Critical temperature**

The critical temperature of the liquid is 31 °C.

**2.3.10 Critical pressure**

The critical pressure of the carbon dioxide is 7 883 kPa.

**2.3.11 Physical hardness**

Not applicable.

**2.4 Chemical properties**

The carbon dioxide CO<sub>2</sub> forms a weak acid when dissolved in water. It reacts with alkalis to form carbonates and bicarbonates.

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<sup>3)</sup> 100 kPa = 1 bar.



### 3 Purity criteria

#### 3.1 General

This European Standard specifies the minimum purity requirements for carbon dioxide used for the treatment of water intended for human consumption. Limits are given for impurities commonly present in the product. Depending on the raw material and the manufacturing process other impurities may be present and if so, the user and when necessary to relevant authorities, shall be notified.

NOTE Users of this product should check the national regulations in order to clarify whether it is of appropriate purity for treatment of water intended for human consumption, taking into account raw water quality, required dosage, contents of other impurities and additives used in the product not stated in the product standard.

Limits have been given for impurities and chemical parameters where these are likely to be present in significant quantities from the current production process and raw materials. If the production process or raw materials lead to significant quantities of impurities, by-products or additives being present, this shall be notified to the user.

#### 3.2 Composition of commercial product

The product shall contain at least a volume fraction of 99 % of CO<sub>2</sub> in bulk and in cylinder.

NOTE The composition of the commercial product is defined in the EU Directive 96/77/EC of December 2, 1996 (see [3]).

#### 3.3 Impurities and main by-products

The residual gas content consists mostly of nitrogen, oxygen and moisture.

#### 3.4 Chemicals parameters

NOTE The chemical parameters and indicator parameters according to EU Directive 98/83/EC (see [1]) are not found in the gaseous phase. Pesticides and polycyclic aromatic hydrocarbons are not by-products of the manufacturing process.

### 4 Test methods

#### 4.1 Sampling

Observe the recommendations of ISBT "Carbon Dioxide Quality Guidelines and Analytical Procedure Bibliography March 2001" (see [4]).

#### 4.2 Analysis

##### 4.2.1 Carbon dioxide

Measure of a fixed volume of product ( $V_1$ ). Absorption in potassium hydroxide solution (KOH) 30 % by a proper CO<sub>2</sub> appliance with an accuracy of volume fraction from 0 % to 0,05 % (calibrated in 0,01 %-steps). The residue volume ( $V_2$ ) which is measured after absorption of CO<sub>2</sub> is to subtract from ( $V_1$ ). The difference ( $V_1 - V_2$ ) =  $V_3$  is equivalent to the volume part of CO<sub>2</sub> (Equipment: Orsat, Zahm, Hasselberg).

NOTE 1 Observe the recommendations of International Society of Beverage Technologists (ISBT) "Carbon Dioxide Guidelines and Analytical Procedure Bibliography March 2001" (see [4]).

NOTE 2 Alternatively the carbon dioxide may be determined by gas-chromatography.