

SLOVENSKI STANDARD
SIST EN 881:2005**01-marec-2005****Nadomešča:**
SIST EN 881:1999**Kemikalije, ki se uporabljajo za pripravo pitne vode – Aluminijev klorid (monomerni), aluminijev klorid hidroksid (monomerni) in aluminijev klorid hidroksid sulfat (monomerni)**

Chemicals used for treatment of water intended for human consumption - Aluminium chloride (monomeric), aluminium chloride hydroxide (monomeric) and aluminium chloride hydroxide sulfate (monomeric)

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Aluminiumchlorid (monomer), Aluminiumhydroxidchlorid (monomer) und Aluminiumhydroxidchloridsulfat (monomer)

Produits chimiques utilisés pour le traitement de l'eau destinée a la consommation humaine - Chlorure d'aluminium, hydroxychlorure d'aluminium et hydroxychlorosulfate d'aluminium (monomeres)

Ta slovenski standard je istoveten z: EN 881:2004**ICS:**

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

SIST EN 881:2005**en**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 881

November 2004

ICS 71.100.80

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English version

Chemicals used for treatment of water intended for human consumption - Aluminium chloride (monomeric), aluminium chloride hydroxide (monomeric) and aluminium chloride hydroxide sulfate (monomeric)

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This European Standard was approved by CEN on 30 September 2004.

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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 881:2004) 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 May 2005, and conflicting national standards shall be withdrawn at the latest by May 2005.

This document supersedes EN 881:1997.

Significant technical differences between this edition and EN 881:1997 are as follows:

- a) replacement of the reference to EU Directive 80/778 of 15 July 1980 with the latest Directive in force (see[1]);
- b) introduction of an annex B (normative) giving general rules relating to safety;
- c) expansion of annex A by addition of A.2 "Quality of commercial product".

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Introduction

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

- a) this document provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA;
- b) 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 document 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 document is subject to regulation or control by National Authorities.

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1 Scope

This document is applicable to aluminium chloride (monomeric), aluminium chloride hydroxide (monomeric) and aluminium chloride hydroxide sulfate (monomeric) used for treatment of water intended for human consumption. It describes the characteristics and specifies the requirements of aluminium chloride, aluminium chloride hydroxide and aluminium chloride hydroxide sulfate (monomeric) and refers to the corresponding analytical methods. This document does not apply to any polymeric form of these salts (see EN 883). It also gives information for their use in water treatment. It also determines the rules relating to safe handling and use of these aluminium salts (see Annex B).

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 883, *Chemicals used for treatment of water intended for human consumption - Polyaluminium chloride hydroxide and polyaluminium chloride hydroxide sulfate.*

EN 1302, *Chemicals used for treatment of water intended for human consumption - Aluminium based coagulants - Analytical methods.*

ISO 3165, *Sampling of chemical products for industrial use - Safety in sampling.*

ISO 6206, *Chemical products for industrial use - Sampling - Vocabulary.*

ISO 8213, *Chemical products for industrial use - Sampling techniques - Solid chemical products in the form of particles varying from powders to coarse lumps.*

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3 Description

3.1 Identification

3.1.1 Chemical name

- a) aluminium chloride (monomeric);
- b) aluminium chloride hydroxide (monomeric);
- c) aluminium chloride hydroxide sulfate (monomeric).

3.1.2 Synonym or common names

- a) aluminium chloride;
- b) aluminium chloride hydroxide;
- c) aluminium chloride hydroxide sulfate.

3.1.3 Relative molecular mass

133,3 for AlCl_3 .

EN 881:2004 (E)**3.1.4 Empirical formula**

- a) AlCl_3 ;
- b) $\text{Al(OH)}_a\text{Cl}_b$ with $(a + b) = 3$ and a less than or equal to 1,05;
- c) $\text{Al(OH)}_a\text{Cl}_b(\text{SO}_4)_c$ with $(a + b + 2c) = 3$ and a less than or equal to 1,05.

3.1.5 Chemical formula

Variable (see 3.1.4).

3.1.6 CAS Registry Number¹⁾

- a) 7446-70-0;
- b)
 - 1) a and b variable: 1327-41-9 with a less than or equal to 1,05;
 - 2) $a = 1, b = 2$: 14215-15-7;
- c) a, b and c variable: 39290-78-3 with a less than or equal to 1,05.

3.1.7 EINECS reference²⁾

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- a) 231-208-1;
- b)
 - 1) 215-477-2;
 - 2) 238-071-7;
- c) 254-400-7.

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3.2 Commercial forms

Aluminium chloride in the form of hexahydrate is available as crystals.

Liquid forms of aluminium chloride, aluminium chloride hydroxide and aluminium chloride hydroxide sulfate (monomeric) are available as solutions or suspensions.

3.3 Physical properties**3.3.1 Appearance**

The product is colourless to yellow.

1) Chemical Abstracts Service Registry Number.
2) European Inventory of Existing Commercial Chemical Substances.

3.3.2 Density

The density depends on the particular composition, especially the aluminium ion content, expressed as mass fraction of aluminium (Al) in %.

Typical values for solutions:

- a) aluminium chloride: 1,3 g/ml for 5,8 % Al;
- b) aluminium chloride hydroxide: 1,35 g/ml to 1,40 g/ml for 9,5 % Al ;
- c) aluminium chloride hydroxide sulfate:
 - 1,18 g/ml to 1,22 g/ml for 5,3 % Al;
 - 1,18 g/ml for 4,2 % Al .

3.3.3 Solubility

Aluminium chloride, aluminium chloride hydroxide and aluminium chloride hydroxide sulfate (monomeric) are fully miscible with water.

NOTE Depending on the particular product, dilute solutions can hydrolyze and form a precipitate.

3.3.4 Vapour pressure

Not known.

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3.3.5 Boiling point at 100 kPa³⁾

Not known.

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3.3.6 Crystallization point

Typical values for solutions:

- a) aluminium chloride: - 20 °C for 5,8 %Al ;
- b) aluminium chloride hydroxide:
 - ≤ - 20 °C for 9,5 %Al;
 - ≈ - 20 °C for 12,4 % Al;
- c) aluminium chloride hydroxide sulfate:
 - 10 °C to - 15 °C for 5,3 % Al ;
 - 5 °C for 4,2 %Al .

3.3.7 Specific heat

Not known.

3) 100 kPa = 1 bar.

EN 881:2004 (E)**3.3.8 Viscosity (dynamic)**

Typical values for solutions at 20 °C:

- a) aluminium chloride solution: ≈ 10 mPa.s for 5,8 %Al ;
- b) aluminium chloride hydroxide:
 - 10 mPa.s to 50 mPa.s for 9,5 %Al;
- c) aluminium chloride hydroxide sulfate:
 - 3 mPa.s to 10 mPa.s for 5,3 % Al .

3.3.9 Critical temperature

Not applicable.

3.3.10 Critical pressure

Not applicable.

3.3.11 Physical hardness

Not applicable.

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3.4 Chemical properties

Aluminium chloride, aluminium chloride hydroxide and aluminium chloride hydroxide sulfate (monomeric) are acidic liquids which hydrolyse and form a precipitate of aluminium hydroxide when diluted beyond a particular level.

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NOTE Since aluminium compounds are amphoteric in nature, the solubility of aluminium depends on the pH value and the products should be used within an appropriate pH range.

4 Purity criteria**4.1 General**

This document specifies the minimum purity requirements for aluminium chloride (monomeric), aluminium chloride hydroxide (monomeric) and aluminium chloride hydroxide sulfate (monomeric) 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, this shall be notified to the user and when necessary to relevant authorities.

NOTE Users of these products 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 products not stated in this document.

Limits have been given for impurities and chemicals 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.

4.2 Composition of commercial product

The concentration of active matter (aluminium ion content) in the commercial product expressed as grams per kilogram of product shall be within $\pm 3\%$ of the manufacturer's declared values.

NOTE The concentration of water-soluble aluminium in commercial products varies. Typical values of aluminium content in products can be between 42 g/kg and 124 g/kg.

The commercial products vary in the proportions of chloride and sulfate ions.

The relative basicity of these products expressed as the mole ratio OH/3Al shall be less than or equal to 0,35.

4.3 Impurities and main by-products

Impurities derived from the manufacturing or extraction process include insoluble matter, trace metals and organic compounds.

Note If iron is present, it will usually be removed in the treatment process.

4.4 Chemical parameters

The products shall conform to the requirements specified in Table 1.

Table 1 — Chemical parameters

Parameter		Limit mg/kg of Al		
		type 1	type 2	type 3
Arsenic (As)	max.	14	40	100
Cadmium (Cd)	max.	3	50	100
Chromium (Cr)	max.	30	700	1 000
Mercury (Hg)	max.	10	10	20
Nickel (Ni)	max.	20	700	1 000
Lead (Pb)	max.	40	200	800
Antimony (Sb)	max.	20	40	120
Selenium (Se)	max.	20	40	120

NOTE Cyanide (CN⁻) is usually not relevant because of the acidity of the product. Pesticides and polycyclic aromatic hydrocarbons are not relevant since the raw materials used in the manufacturing process are free of them. For maximum impact of these products on trace metal content in drinking water see A.2