



SLOVENSKI STANDARD

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Kemikalije, ki se uporabljajo za pripravo pitne vode - Heksafluorosilicijeva kislina

Chemicals used for treatment of water intended for human consumption -
Hexafluorosilicic acid

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch -
Hexafluorkieselsäure

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

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Chemicals used for treatment of water intended for human consumption - Hexafluorosilicic acid

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

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Hexafluorkieselsäure

This European Standard was approved by CEN on 13 March 2022.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN 12175:2022) 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of an identical text or by endorsement, at the latest by October 2022, and conflicting national standards shall be withdrawn at the latest by October 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12175:2013.

In comparison with the previous edition, the following technical modifications have been made:

- a) modification of 7.3 on transportation regulations and labelling, adding the sentence “The user must be aware of the incompatibilities between transported products.”;
- b) modification of 7.4 on marking. The requirements of marking are also applied to the accompanying documents.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

EN 12175:2022 (E)**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 (see Annex A).

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1 Scope

This document is applicable to hexafluorosilicic acid used for treatment of water intended for human consumption. It describes the characteristics of hexafluorosilicic acid and specifies the requirements and the corresponding test methods for hexafluorosilicic acid. It gives information on its use in water treatment. It also determines the rules relating to safe handling and use of hexafluorosilicic acid (see Annex B).

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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)*

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

ISO 5440, *Sodium hexafluorosilicate for industrial use — Determination of phosphate content — Molybdovanadate spectrophotometric method*

ISO 5993, *Sodium hydroxide for industrial use — Determination of mercury content — Flameless atomic absorption spectrometric method*

ISO 6206, *Chemical products for industrial use — Sampling — Vocabulary*

ISO 6353-1, *Reagents for chemical analysis — Part 1: General test methods*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Description

4.1 Identification

4.1.1 Chemical name

Hexafluorosilicic acid.

4.1.2 Synonym or common name

Hydrofluosilicic acid.

Silicate-hexafluoro-dihydrogen.

Fluorosilicic acid.

HFSA.

EN 12175:2022 (E)**4.1.3 Relative molecular mass**

144,09.

4.1.4 Empirical formula

H₂SiF₆.

4.1.5 Chemical formula

H₂SiF₆.

4.1.6 CAS-Registry Number ¹

16961-83-4.

4.1.7 EINECS reference ²

241-034-8.

4.2 Commercial form

The product is an aqueous solution.

4.3 Physical properties**4.3.1 Appearance and odour**

The product is a clear, colourless liquid with a pungent odour.

4.3.2 Density

The density of a mass fraction 35 % solution at 25 °C is 1,35 g/mL.

The density of a mass fraction 20 % solution at 25 °C is 1,18 g/mL.

4.3.3 Solubility (in water)

The product is miscible in any proportion.

4.3.4 Vapour pressure

The vapour pressure at 20 °C is approximately 3 kPa ³.

4.3.5 Boiling point at 100 kPa

The product boils and decomposes at 110 °C.

4.3.6 Crystallization point

A solution of mass fraction of 35 % crystallizes at -30 °C and of a mass fraction of 20 % crystallizes at -11,6 °C.

4.3.7 Specific heat

Not known.

¹ Chemical Abstracts Service Registry Number.

² European Inventory of Existing Commercial Chemical Substances.

³ 100 kPa = 1 bar.

4.3.8 Viscosity dynamic

A solution of a mass fraction of 20 % has a dynamic viscosity of 1,4 MPa.s at 25 °C.

4.3.9 Critical temperature

Not applicable.

4.3.10 Critical pressure

Not applicable.

4.3.11 Physical hardness

Not applicable.

4.4 Chemical properties

Hexafluorosilicic acid is only stable in an aqueous solution. On evaporation, it decomposes to hydrogen fluoride (HF) and silicon tetrafluoride (SiF₄).

It produces hydrogen on contact with steel and metals (e.g. nickel and aluminium). It is a strong acid and reacts violently with alkalis. It forms hydrogen fluoride (HF) on contact with concentrated acids. It attacks glass.

5 Purity criteria

5.1 General

This document specifies the minimum purity requirements for hexafluorosilicic acid 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.

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 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.

5.2 Composition of commercial product

The product shall contain between a mass fraction of 10 % and 47 % hexafluorosilicic acid, the remainder being water.

The concentration of hexafluorosilicic acid shall be within ± 5 % of the manufacturer's declared value.

5.3 Impurities and main by-products

Impurities must not exceed the requirements specified in Table 1.

Table 1 — Impurities

Impurity		Limit
		in mass fraction in % of commercial product
Phosphate as P ₂ O ₅	max.	0,75
Free hydrogen fluoride as HF	max.	1,5

5.4 Chemical parameters

The product shall conform to the requirements specified in Table 2.

Table 2 — Chemical parameters

Parameter		Limit
		mg/kg H ₂ SiF ₆ (100 %)
Antimony (Sb)	max.	80
Arsenic (As)	max.	400
Cadmium (Cd)	max.	40
Chromium (Cr)	max.	400
Lead (Pb)	max.	400
Mercury (Hg)	max.	10
Nickel (Ni)	max.	400
Selenium (Se)	max.	80
NOTE Other chemical parameters and indicator parameters are not relevant in hexafluorosilicic acid because the raw materials used in the manufacturing process are free of them. For parametric values of hexafluorosilicic acid on trace metal content in drinking water, see [1].		

6 Test methods

6.1 General

SAFETY PRECAUTIONS Hexafluorosilicic acid shall be handled with extreme care, see B.1.

All equipment in contact with hexafluorosilicic acid shall be made of plastics (for example polyethylene or polytetrafluoroethylene (PTFE)); avoid contact with glass.

6.2 Sampling

6.2.1 General

Observe the general recommendations of ISO 3165 and take account of ISO 6206.

The sampling is carried out at the premises of the manufacturer of the hexafluorosilicic acid unless the customer has adequate facilities to carry out this operation safely at his own premises.

6.2.2 Sampling from drums and bottles

6.2.2.1 General

6.2.2.1.1 Mix the contents of each container to be sampled by shaking the container, by rolling it or by rocking it from side to side, taking care not to damage the container or spill any of the liquid.

6.2.2.1.2 If the design of the container is such (for example, a narrow-necked bottle) that it is impracticable to use a sampling implement, take a sample by pouring after the contents have been thoroughly mixed. Otherwise, proceed as described in 6.2.2.1.3.

6.2.2.1.3 Examine the surface of the liquid. If there are signs of surface contamination, take samples from the surface as described in 6.2.2.2; otherwise, take samples as described in 6.2.2.3.

6.2.2.2 Surface sampling

Take a sample using a suitable ladle. Lower the ladle into the liquid until the rim is just below the surface, so that the surface layer runs into it. Withdraw the ladle before it fills completely and allow any liquid adhering to the ladle to drain off. If necessary, repeat this operation so that, when the other selected containers have been sampled, in a similar manner, the total volume of sample required for subsequent analysis is obtained.

6.2.2.3 Procedure of sampling from a container

The samples for testing the hexafluorosilicic acid shall be taken by means of a sampling tube, for example. A tube made of polytetrafluoroethylene (PTFE), approximately 1 500 mm long, with 14,5 mm inside diameter and 1,25 mm wall thickness tapering to an inside diameter of approximately 5 mm at one end, may be used for this; fit a rubber tube approximately 200 mm long which can be closed by means of a pinch clip, to the other end. When taking the samples, insert the sampling tube as far as possible into the acid to be tested with the clip released.

Do this slowly so that the levels of liquid in the sampling tube and in the acid container are the same.

Close the clip, withdraw the sampling tube from the acid, allow any liquid adhering at the outside of the tube to drain off, and by releasing the clip discharge the contents of the sampling tube into a polytetrafluoroethylene (PTFE) bottle of 1 000 ml nominal capacity provided with a ground PTFE stopper. Stopper the bottle immediately after filling each with the content of the sampling tube. After shaking thoroughly, fill from the collective sample three PTFE bottles, each with a volume of approximately 250 ml and provided with a ground PTFE stopper. Stopper, seal and label the bottles. One of these samples is to be tested by the consignee; the other two shall be kept in case subsequent complaint requires further testing to be carried out.