SLOVENSKI STANDARD
SIST EN 17818:2024

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Naprave za proizvodnjo biocidov na kraju samem - Aktivni klor, pridobljen iz natrijevega klorida z elektrolizo

Devices for in-situ generation of biocides - Active chlorine generated from sodium chloride by electrolysis

Anlagen zur In-Situ-Erzeugung von Bioziden - Aktives Chlor hergestellt aus Natriumchlorid durch Elektrolyse

Équipements pour le production in situ de biocides - Chlore actif produit à partir de chlorure de sodium par électrolyse

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Devices for *in-situ* generation of biocides - Active chlorine generated from sodium chloride by electrolysis

Équipements pour le production *in situ* de biocides - Chlore actif produit à partir de chlorure de sodium par électrolyse

Anlagen zur *In-Situ*-Erzeugung von Bioziden - Aktives Chlor hergestellt aus Natriumchlorid durch Elektrolyse

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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 17818:2023) 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of an identical text or by endorsement, at the latest by June 2024, and conflicting national standards shall be withdrawn at the latest by June 2024.

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.

Devices according to this document may be used in different fields of application, e.g. drinking water, swimming pool water, wastewater, air treatment, surface disinfection, etc. Additional requirements to this document shall be observed, where appropriate for the specific application.

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, Türkiye and the United Kingdom.

Introduction

In respect of potential adverse effects on human and animal health and the environment, 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) note 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.

1 Scope

This document defines the minimum requirements for treatment systems, which generate the active substance - “Active chlorine” - from sodium chloride by electrolysis for on-site (*in situ*) operation.

The *in situ* generated active substance (IGAS), in this case active chlorine, may be put into a solution (“off-line”) or directly generated in the pipes (“in-line”).

This document specifies the device construction, and test methods for the equipment used for *in situ* generation of active chlorine. It specifies requirements for instructions for installation, operation, maintenance, safety and for documentation to be provided with the product.

The *in situ* generation of active substances and the placing of their precursors on the EU market are subject to the specifications of the Biocidal Products Regulation (EU) 528/2012 [“Biocidal products”]. Active substances, generated by devices, which are claiming compliance with this document, shall comply with the BPR for both the registered active chlorine, quality standards and the precursor in accordance with appropriate application and “Product Type” as listed in the BPR.

This standard does not identify applications for *in situ* devices for generation of active chlorine. The range of applications for *in situ* generation of chlorine is diverse. It is the responsibility of the economic operator/product supplier, claiming compliance with this standard, to identify the appropriate system type and operating conditions for the specific application and to:

— specify the quality of the biocide appropriate to the application. This may be defined in national or international standards;

— specify the appropriate product type and operating conditions (concentration, dosage rate and quality of the active chlorine);

— specify any other regulatory requirements relevant to the specific application;

— specify the appropriate precursor sodium chloride, for the application;

— and to label the product accordingly.

2 Normative references

The following documents are referenced in the text in such a way that some parts of these or their entire contents constitute requirements of this document. With dated references, only the referenced issue is applicable. With undated references, the last issue of the referenced document is applicable (including all changes).

EN 1717, *Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow*

EN IEC 60751, *Industrial platinum resistance thermometers and platinum temperature sensors (IEC 60751)*

EN ISO 7393-1, *Water quality — Determination of free chlorine and total chlorine — Part 1: Titrimetric method using N,N-diethyl-1,4-phenylenediamine(ISO 7393-1)*

EN ISO 7393-2, *Water quality — Determination of free chlorine and total chlorine — Part 2: Colorimetric method using N,N-dialkyl-1,4-phenylenediamine, for routine control purposes (ISO 7393-2)*

EN ISO 10304-1, *Water quality — Determination of dissolved anions by liquid chromatography of ions — Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate (ISO 10304-1)*

EN ISO 10304-4, *Water quality — Determination of dissolved anions by liquid chromatography of ions — Part 4: Determination of chlorate, chloride and chlorite in water with low contamination (ISO 10304-4)*

EN ISO 15061, *Water quality — Determination of dissolved bromate — Method by liquid chromatography of ions (ISO 15061)*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

In addition, the terminology contained in Article 3 of the BPR is to be included in the application for this document.

3.1
biocidal active substances
substance or microorganism that has an action on or against harmful organisms

[SOURCE: (Definition of active substance in BPR Article 3 (1) (c).)]

3.1.1
technical active substance (TAS)
active substance produced including minor constituents and any contaminants produced during the process

3.1.2
IGAS – in situ generated active substance
biocidal active substances, when they are generated from one or more precursors at the place of use

3.2
anolyte
medium output from the anode compartment

3.3
buffer tank
one or several tanks separate from the electrolysis cell or the reactor for temporary provision of the generated chlorine solution that is intended for the application

3.4
diaphragm
porous barrier in a divided electrolysis cell without ion selectivity between the anode and cathode compartment of the electrolysis cell

Note 1 to entry: In contrast to the membrane, the diaphragm permits the passage of a limited quantity of hydroxide ions from the cathode compartment to the anode compartment. This reduces the pH-value in the cathode compartment, while the pH-value in the anode compartment increases at the same time.

3.5
electrochlorination system
device that uses the principle of electrolysis to produce active chlorine excluding additional equipment

3.6
electrolysis cell
system in which positively charged electrodes (anodes) and negatively charged electrodes (cathodes) are positioned face to face

3.6.1
divided electrolysis cell
electrolysis cell in which the anode and cathode compartments are divided by a membrane or diaphragm

3.6.2
non-divided electrolysis cell
electrolysis cell in which the anode and cathode compartments are not divided, therefore enabling unimpeded liquid, ion and gas transport in the space between the electrode pairs

3.7
expert
person who, due to their technical scientific training, work experience and knowledge of applicable standards and regulations, is able to assess an electrolysis system with regard to functions and safety

Note 1 to entry: This person can be from the manufacturer or an independent third-party organization (such as a test institution) without limitations, an inspector according to EN ISO/IEC 17020 Type C [8], fulfils this criterion.

3.8
feed water
water in accordance with the chemical requirements of the corresponding manufacturer's specifications for the production of sodium chloride solution and/or operation of the electrolysis system

3.9
gas separator
system for the physical separation of gases (in this case: hydrogen/chlorine) from liquids

3.10
injector
component that enables the flow of the sodium chloride solution, the active chlorine solution, the chlorine gas or their mixtures into a water flow, typically employing the venturi principle

3.11
in-line electrolysis
process in which the water to be treated is the operating medium and fed directly into the electrolysis cell

3.12
in-situ generation
reaction of at least one precursor to generate the technical active substance on site

3.13
membrane
cation-selective barrier in a divided electrolysis cell between the anode and cathode compartment

Note 1 to entry: This prevents the reaction between the chlorine gas and hydroxide ions (OH−), by allowing monovalent cations and inhibiting anions (chloride and hydroxide) to permeate through the membrane.

3.14
nominal capacity
maximum production rate of active chlorine as specified by the manufacturer

3.15
operating media
artificial or natural sodium chloride solutions that are used for electrolysis

3.16
precursor
substance that is fed to the in-situ device for production of the biocide active substance, independent of its disinfection or biocide-law related properties substance or mixture (formulation containing the precursor(s)), from which an active substance (including free radicals) is generated in situ

3.17
product range
systems that operate according to the same functional principle but with different capacities

3.18
reactor
system for converting chlorine gas and sodium hydroxide into a sodium hypochlorite solution

3.19
sodium chloride solution

3.19.1
artificial sodium chloride solution
solution produced using manufactured sodium chloride

Note 1 to entry: E.g. in accordance with EN 14805, EN 973, EN 16370 or EN 16401.

3.19.2
natural sodium chloride solution
naturally occurring sodium chloride containing solution, such as sea water and brackish water

3.20
stability curve
representation of the chlorine content and by-products at the specified temperature over time

Note 1 to entry: In systems with buffer tanks, this forms a basis in order to ensure that the active substance content and the amount of by-products such as chlorate in the generated chlorine solution in the buffer tank do not change unacceptably during the time between generation and metering the chlorine solution.

3.21
system type
system in a product range with a representative capacity

Note 1 to entry: Production capacity in kg/h chlorine.

4 Requirements

4.1 General

The manufacturer/supplier, claiming compliance with this standard, shall fulfil the following requirements:

4.2 Design

4.2.1 Temperature

The equipment shall be designed to operate to the requirements of this standard with water temperatures between 5 °C and 25 °C and with ambient temperatures between 5 °C and 35 °C minimum. For higher temperatures, the device shall be designed accordingly.

4.2.2 Backflow prevention

If connected to a drinking water supply, the device shall be fitted with a backflow prevention device appropriate to the application in accordance with EN 1717.

4.2.3 Safety

System design shall include appropriate measures for management of release potentially hazardous hydrogen gas, excess chlorine and surplus production (see Clause 7). It shall include protection against stray electrical discharge and compliance with relevant standards to the application.

4.3 Performance

The device shall be tested at the highest active chlorine concentration and maximum production rate as specified by the manufacturer and appropriate to the requirements of the end user application.

This test may be conducted on the manufacturer's premises or on the installed system.

4.4 Instructions

The manufacturer/supplier of the device shall provide detailed instructions for installation (see Clause 8), operation and maintenance for the complete system, including appropriate safety procedures (see Clause 7).

5 Electrolysis system and components

5.1 General

Electrochlorination systems shall include, as a minimum, an electrolysis cell and control unit. Optional items may also be included (see 6.3).

5.2 Electrolysis cell

The electrolysis cell comprises a vessel into which positive (anode) and negative (cathode) electrodes are appropriately located.

The electrodes, which can vary in number, shape, material and dimensions, produce the disinfectant and oxidizing agent under the action of the electric current.

NOTE Depending on its chemical composition the feed water supply might increase mineral deposits precipitating on the cathodes. The higher the total hardness of the water, the greater the scaling, thereby significantly reducing the production of disinfectant and possibly also the flow through the electrolysis cell in the case of inline electrolysis. To reduce these effects, the electrolysis cells can function with polarity reversal,