SLOVENSKI STANDARD
oSIST prEN 17818:2022

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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

Dispositifs pour la production in situ de biocides - Chlore actif produit par électrolyse du chlorure de sodium

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 17818:2022) has been prepared by Technical Committee CEN/TC 164 “Water supply”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

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.

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 (see Clause 7) 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 (natural or artificial brine), 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 60751, *Industrial platinum resistance thermometers and platinum temperature sensors*

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*

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*

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 11206, *Water quality — Determination of dissolved bromate — Method using ion chromatography (IC) and post column reaction (PCR) (ISO 11206)*

EN ISO 19340, *Water quality — Determination of dissolved perchlorate — Method using ion chromatography (IC) (ISO 19340)*

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
active substances
text of the definition

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 organisation (such as a test institution) without limitations, an inspector according to EN ISO-EC 17020 Type C, 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 entirely 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 (primarily chloride) 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
produced using manufactured sodium chloride, 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; in systems with buffer tanks, this forms a basic load in order to ensure that the active substance content of the generated chlorine solution and the amount of by-products such as chlorate do not change unacceptably during the time between generation and metering the chlorine solution in the buffer tank

3.21
system type
systems in a product range with a specific respective capacity (production capacity in kg/h chlorine)

4 Empty

NOTE The continuing numbering has been kept after merging terms and definitions 3 and 4. This needs attention during the CEN Enquiry.

5 Requirements

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

5.1 Design

5.1.1 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.

5.1.2 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.

5.1.3 Safety

System design shall include appropriate measures for management of release potentially hazardous hydrogen gas, excess chlorine and surplus production (see Clause 8). It shall include protection against stray electrical discharge and compliance with relevant regulations to the application.

5.2 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 (see Clause 11).

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

5.3 Instructions

The manufacturer/supplier of the device shall provide detailed instructions for installation (see Clause 9), operation and maintenance for the complete system, including appropriate safety procedures (see Clause 8).

6 Electrolysis system and components

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

6.1 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 The water supply may increase mineral deposits precipitating on the cathodes. The harder the water (high TH), the greater the deposits, 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, automatic/semi-automatic acid washing systems or alternatively, the water supply can be (softened) treated appropriately.

Sufficiently resistant materials shall be used for all parts of the systems and devices that come into contact with the chemicals and their solutions that are utilised and generated.

The electrochlorination system should be assembled and installed in accordance with the manufacturer's instructions and in compliance with the requirements of the applicable standards and regulations – e.g., electrical.

6.2 Control unit

The control unit can be built into or independent of the electrochlorination device.

The control unit integrates the components that control the cell power supply and therefore the production of disinfectant. The control unit shall deliver a Safety Extra-Low Voltage (SELV) supply as defined in the Low Voltage Directive.

Where the control unit is not included in the device, it shall bear a manufacturer's plate indicating the data, required according to the Low Voltage Directive, in particular:

— the identification of the distributor (commercial name or logo, etc.),

— the power supply voltage in Volt,

— the frequency in Hertz,

— the power input in Watt

— the current in Ampere,

— the protection index (IP),

— and the insulation class if necessary.

The control unit shall be installed in accordance with:

— the information indicated on this plate;

— the manufacturer's requirements and recommendations;

— the standards and regulations in effect.

6.3 Optional items

6.3.1 Flow detector

This component informs the electrochlorination system of an adequate flow, required for the electrolysis process. This flow can be used to control or shut down the chlorine production.

6.3.2 System for dissipating stray electrical currents

This system enables the safe dissipation of stray currents of all origins present.

6.3.3 Production adjustment feature

This feature allows the level of production of disinfectant and oxidizing agent chlorine by the electrochlorination system to be adjusted according to one or more predetermined parameters set by the manufacturer (operating time, production power, etc.) independently of the actual needs of the application or depending on external signals, such as redox measurement, chlorine level measurement by amperometric sensors or photocolorimetry, etc.