BS EN 15041:2014

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Chemicals used for treatment of water intended for human consumption — Antiscalants for membranes — Polyphosphates

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National foreword

This British Standard is the UK implementation of EN 15041:2014. It supersedes BS EN 15041:2006 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee CII/59, Chemicals for drinking water treatment.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Chemicals used for treatment of water intended for human consumption - Antiscalants for membranes - Polyphosphates

Produits chimiques pour le traitement de l'eau destinée à la consommation humaine - Produits antitartre pour membranes - Polyphosphates

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Antiscalants für Membranen - Polyphosphate

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CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 15041:2014) 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of an identical text or by endorsement, at the latest by September 2014 and conflicting national standards shall be withdrawn at the latest by September 2014.

This document supersedes EN 15041:2006.

Significant technical differences between this edition and EN 15041:2006 are as follows:

- replacement of warning and safety precautions notes by labelling according to REGULATION (EC) No 1272/2008.

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WARNING – The use of this standard may involve hazardous materials, operations and equipment. This standard does not purport to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

Introduction

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

a) this European Standard provides no information as to whether the products 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 these products remain in force.

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

1 Scope

This European Standard is applicable to polyphosphates used as antiscalants for membranes for treatment of water intended for human consumption. It describes the characteristics and specifies the requirements and the corresponding analytical methods for polyphosphates. It gives information on their use as antiscalants for membranes in water treatment.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1212:2005, *Chemicals used for treatment of water intended for human consumption - Sodium polyphosphate*

EN 1483, *Water quality — Determination of mercury — Method using atomic absorption spectrometry*

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696:1987)*

EN ISO 5961, *Water quality - Determination of cadmium by atomic absorption spectrometry (ISO 5961:1994)*

EN ISO 11885, *Water quality - Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES) (ISO 11885:2007)*

EN ISO 11969, *Water quality - Determination of arsenic - Atomic absorption spectrometric method (hydride technique) (ISO 11969:1996)*

ISO 6703-1, *Water quality — Determination of cyanide — Part 1: Determination of total cyanide*

ISO 8288:1986, *Water quality — Determination of cobalt, nickel, copper, zinc, cadmium and lead — Flame atomic absorption spectrometric methods*

ISO 9174, *Water quality — Determination of chromium — Atomic absorption spectrometric methods*

ISO 9965, *Water quality — Determination of selenium — Atomic absorption spectrometric method (hydride technique)*

3 Description

For the identification, the commercial form, the physical properties and the chemical properties see the relevant sub-clauses of EN 1212.

4 Purity criteria

4.1 General

This European Standard specifies the minimum purity requirements for polyphosphates used as antiscalants for membranes for the treatment of water intended for human consumption. Limits are given for impurities commonly present in the products. 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 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 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.

4.2 Composition of commercial product

The products shall conform to the following requirements on a dry mass basis:

— phosphate content expressed as P_2O_5: mass fraction of (64 to 69) %;

— sodium content expressed as Na_2O: mass fraction of (29 to 34,5) %.

4.3 Impurities and main by-products

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

Table 1 — Impurities

Impurity		Limit mg/kg of dry product
Sulfate (SO_4^{2-})	max.	500
Fluoride (F^-)	max.	10

4.4 Chemical parameters

4.4.1 Generals

Content of various chemical parameters depends on the origin of the raw materials, most of these elements are present only as traces. The content of antimony, arsenic, cadmium, chromium, cyanides, lead, mercury, nickel and selenium shall conform to the requirements specified in Table 2 of EN 1212:2005.

When preparing the products for analysis, it is important to ensure that the chemical parameters are effectively dissolved. The concentration of the solution should be sufficient to permit adequate sensitivity in analysis of the chemical parameters and appropriate steps should be taken to compensate for any matrix interference caused by the concentration of the products.

4.4.2 Determination of antimony (Sb), arsenic (As), cadmium (Cd), chromium (Cr), cyanide (CN^-), lead (Pb), mercury (Hg), nickel (Ni) and selenium (Se)

4.4.2.1 Principle

The elements antimony, arsenic, cadmium, chromium, lead, mercury, nickel and selenium are determined by atomic absorption spectrometry. Cyanide is determined by molecular absorption spectrometry.

4.4.2.2 Reagents

4.4.2.2.1 General

All reagents shall be of a recognized analytical grade and the water used shall conform to grade 3 specified in EN ISO 3696.

4.4.2.2.2 Hydrochloric acid, concentrated density ρ = 1,42 g/ml.

4.4.2.3 Procedure

4.4.2.3.1 Test portion

Weigh, to the nearest 0,001 g, 2,5 g (*m*) from the laboratory sample into a 100 ml one - mark volumetric flask.

4.4.2.3.2 Test solution

Add 20 ml of water and 2 ml of the hydrochloric acid (4.4.2.2.2), dissolve and make up to the mark with water and mix.

4.4.2.3.3 Determination

Determine the content of chemical parameters in the test solution (4.4.2.3.2) in accordance with the following methods :

Ni and Pb: in accordance with ISO 8288:1986, method A;

Cd: in accordance with EN ISO 5961;

CN^-: in accordance with ISO 6703-1;

Cr: in accordance with ISO 9174;

As: in accordance with EN ISO 11969;

Se: in accordance with ISO 9965;

Sb: in accordance with EN ISO 11885;

Hg: in accordance with EN 1483.

These methods provide an interim result (*y*) expressed in mg/l, which needs to be converted to give the final concentration according to the equation in 4.4.2.3.4.

4.4.2.3.4 Expression of results

From the interim result (*y*) determined (see 4.4.2.3.3), the content, w_3, of each element in the laboratory sample, expressed in mg/kg of dry antiscalant products is given by the following equation (1).

$$w_3 = y \times \frac{V}{m} \qquad (1)$$

y is the interim result (4.4.2.3.3) ;

V is the volume, expressed in ml, of the test solution (4.4.2.3.2) (= 100 ml) ;

m is the mass, expressed in g, of the test portion.

NOTE Pesticides and polycyclic aromatic hydrocarbons are not relevant in polyphosphates since the raw material used in the manufacturing process are free of them.

5 Test methods

The sampling and the analytical methods are those described in EN 1212.

6 Labelling - Transportation - Storage

6.1 Means of delivery

In order that the purity of the products is not affected, the means of delivery shall not have been used previously for any different product or it shall have been specially cleaned and prepared before use.

6.2 Risk and safety labelling according to the EU legislation[1)]

The following labelling requirements shall apply to polyphosphates at the date of the publication of this standard:

Hazard pictogram(s)

– Signal word

Warning

– Classification - Hazard statements :

H302: Harmful if swallowed

Figure 1 GHS07

The legislation [1], and its amendments for the purposes of its adaptation to technical and scientific progress, contains a list of substances classified by the EU. Substances not listed in this regulation should be classified on the basis of their intrinsic properties according to the criteria in the regulation by the person responsible for the marketing of the substance.

6.3 Transportation regulations and labelling

Polyphosphates are not listed under a UN number[2)].

Polyphosphates are not classified as a dangerous product for road, rail, sea and air transportation.

6.4 Marking

The marking shall include the following information:

— the name "antiscaling polyphosphates", trade name and grade;

— the net mass;

— the name and the address of the supplier and/or manufacturer;

— the statement "this product conforms to EN 15041".

6.5 Storage

6.5.1 Material

Use plastics, avoid contact with metals.

1) See [1].

2) United Nations Number.

6.5.2 Long term stability

Product is stable for at least one year if stored in closed containers.

6.5.3 Storage incompatibilities

No special requirement.

Annex A (informative)

General information on polyphosphates

A.1 Origin

A.1.1 Raw materials

Polyphosphates are manufactured from phosphoric acid and sodium hydroxide.

A.1.2 Manufacturing process

Sodium or potassium hydroxide is added to phosphoric acid in a molar ratio of 1:1.Then the resulting product is dewatered and melted at temperatures above 800 °C.

A.2 Use

A.2.1 Function

Polyphosphates are used as antiscalant especially for reverse osmosis (RO) and nanofiltration membranes. They will not pass the membranes and are rejected to the wastewater with the concentrate.

Disposal of waste water should be done in accordance with all applicable local, national, and federal regulations.

In its concentrated form polyphosphates are corrosive. Corrosion resistant dosing equipment should therefore be used.

The prime application for polyphosphates is for the inhibition of calcium carbonate fouling.

A.2.2 Form in which it is used

Polyphosphates are mainly used as a solution and within the range of a mass fraction of 0,5 % to 40 %.

A.2.3 Treatment dose

A typical dosage rate is from 1 mg/l to 20 mg/l in the make-up water.

A.2.4 Means of application

The products can be pumped directly from the containers as supplied or the products can be diluted with permeate water prior to dose into the RO feed water stream.

Dosage point: feed water prior to the high pressure pumps

Dosage frequency: continuous using a suitably sized dosing pump

Product dosage: neat as supplied or diluted with permeate water

A.2.5 Secondary effects

The product has no secondary effects.

A.2.6 Removal of excess product

Not applicable.

A.3 General rules relating to safety

A.3.1 Rules for safe handling and use

The supplier will provide current safety instructions.

A.3.2 Emergency procedures

A.3.2.1 First aid

In case of contact with eyes or skin, it is recommended to rinse immediately with plenty of water.

A.3.2.2 Spillage

It is recommended to remove mechanically as much as possible of the solid product, then to rinse the area with plenty of water.

A.3.2.3 Fire

The products are not combustible.

Bibliography

[1] Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (REACH)

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BSI Group Headquarters

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