BS EN 16381:2013

BSI Standards Publication

Chemicals used for treatment of swimming pool water — Sodium peroxodisulfate

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 16381:2013.

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.

ISBN 978 0 580 77294 8

ICS 71.100.80

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2013.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 16381

December 2013

ICS 71.100.80

English Version

Chemicals used for treatment of swimming pool water - Sodium peroxodisulfate

Produits chimiques utilisés pour le traitement de l'eau des piscines - Péroxodisulfate de sodium

Produkte zur Aufbereitung von Schwimm- und Badebeckenwasser - Natriumperoxodisulfat

This European Standard was approved by CEN on 26 October 2013.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

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

Contents

Page

Foreword

This document (EN 16381:2013) 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 2014, and conflicting national standards shall be withdrawn at the latest by June 2014.

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

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

Introduction

In respect of potential adverse effects on the quality of water for swimming pools, caused by the product covered by this European Standard:

a) this European Standard 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 European Standard 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 European Standard is subject to regulation or control by National Authorities.

1 Scope

This European Standard is applicable to sodium peroxodisulfate used for treatment of water for swimming pools. It describes the characteristics of sodium peroxodisulfate and specifies the requirements and the corresponding test methods for sodium peroxodisulfate. It gives information on its use in swimming pool water treatment. It also determines the rules relating to safe handling and use (see Annex B).

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 12926, *Chemicals used for treatment of water intended for human consumption — Sodium peroxodisulfate*

3 Description

3.1 Identification

3.1.1 Chemical name

Sodium peroxodisulfate.

3.1.2 Synonym or common name

Sodium persulfate.

3.1.3 Relative molecular mass

238,11.

3.1.4 Empirical formula

$Na_2S_2O_8$.

3.1.5 Chemical formula

$Na_2S_2O_8$.

3.1.6 CAS[1)] Registry Number

7775-27-1.

3.1.7 EINECS[2)] reference

231-892-1.

---

1) Chemical Abstracts Service.

2) European INventory of Existing Commercial Chemical Substances.

3.2 Commercial form

Sodium peroxodisulfate is available as a crystalline powder.

3.3 Physical properties

3.3.1 Appearance and odour

The product is a white, odourless, crystalline free-flowing salt.

3.3.2 Density

The bulk density of the product is approximately 1,15 g/cm^3.

3.3.3 Solubility in water

The solubility of the product in water is approximately:

— 515 g/l at 10 °C;

— 545 g/l at 20 °C;

— 605 g/l at 40 °C;

— 680 g/l at 60 °C.

3.3.4 Vapour pressure

Not applicable.

3.3.5 Boiling point at 100 kPa[3)]

Not applicable.

3.3.6 Melting point

The product decomposes above 65 °C.

3.3.7 Specific heat

Not known.

3.3.8 Viscosity (dynamic)

Not applicable.

3.3.9 Critical temperature

Not applicable.

3) 100 kPa = 1 bar.

3.3.10 Critical pressure

Not applicable.

3.3.11 Physical hardness

Not applicable.

3.4 Chemical properties

Sodium peroxodisulfate is a powerful oxidising agent.

Sodium peroxodisulfate also serves as a source of radicals.

The standard reduction potential E_0 of sodium peroxodisulfate for the reaction:

$$S_2O_8^{2-} + 2e^- \rightarrow 2SO_4^{2-} \quad (1)$$

is + 2,06 V at 25 °C.

4 Purity criteria

4.1 General

This European Standard specifies the minimum purity requirements for sodium peroxodisulfate used for the treatment of swimming pools water. 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 swimming pool water, taking into account raw water quality, required dosage, contents of other impurities and additives used in the product not stated in the product standard.

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 leads 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 commercial product shall contain not less than a mass fraction of 99 % of $Na_2S_2O_8$.

4.3 Impurities and main by-products

Sodium peroxodisulfate does not contain significant concentrations of impurities or by-products.

4.4 Chemical parameters

NOTE For the purpose of this European Standard, “chemical parameters” are those defined in the EU Directive 98/83/EC of 3 November 1998 (see [1]).

The content of chemical parameters shall conform to the requirements specified in Table 1.

Table 1 — Chemical parameters

Parameter		Limit (mg/kg) of $Na_2S_2O_8$	
		Type 1	Type 2
Arsenic (As)	max.	0,05	5
Cadmium (Cd)	max.	0,05	2
Chromium (Cr)	max.	0,5	5
Mercury (Hg)	max.	2	2
Nickel (Ni)	max.	0,2	5
Lead (Pb)	max.	0,05	5
Antimony (Sb)	max.	5	10
Selenium (Se)	max.	5	10
NOTE Cyanide is usually not relevant in a strong oxidising medium. Pesticides and polycyclic aromatic hydrocarbons are not by-products of the manufacturing process.			

5 Test methods

The sampling and the analytical methods are those described in EN 12926.

6 Labelling - Transportation - Storage

6.1 Means of delivery

Sodium peroxodisulfate shall be delivered in polyethylene bags, with net contents of 1 kg to 50 kg or fibre drums with polyethylene linings, with net contents of 1 kg to 100 kg.

Never use paper bags.

In order that the purity of the product 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 Labelling according to the EU legislation [4)]

The following labelling requirements apply to sodium peroxodisulfate at the date of the publication of this standard:

4) See [2].

a) GHS07 **b) GHS08** **c) GHS03**

Figure 1 — Hazard pictograms

— Signal word: **Danger.**

— Hazard statements:

H272	May intensify fire; oxidiser.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H334	May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H317	May cause an allergic skin reaction.

Precautionary statements ('P statements') should be provided by the company being responsible for the marketing of the substance. They should be indicated on the packaging label and in the extended safety data sheet (eSDS) of the substance.

The regulation [2], 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

Sodium peroxodisulfate is listed as UN Number [5] 1505

— RID [6]: Class 5.1, Classification Code O_2, Packaging Group III;

— ADR [7]: Class 5.1, Classification Code O_2, Packaging Group III;

— IMDG [8]: Class 5.1, Packaging Group III, EmS: F-A, S- Q;

— IATA [9]: Class 5.1, Packaging Group III.

6.4 Marking

The marking shall include the following:

— the name: “sodium peroxodisulfate” and trade name;

— the net mass;

5) United Nations Number.

6) Regulations concerning International carriage of Dangerous goods by rail.

7) European Agreement concerning the international carriage of Dangerous goods by Road.

8) International Maritime transport of Dangerous Goods.

9) International Air Transport Association.

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

— the statement “This product conforms to EN 16381” and type.

6.5 Storage

6.5.1 Generals

The product shall be stored in original packages in a cool and dry place, away from any sources of heat or incompatible materials. For more details about use, see Annex A.

6.5.2 Long term stability

The product is stable with no decrease in active substance for one year, when the product is stored at below 30 °C.

6.5.3 Storage incompatibilities

Avoid heat and moisture (decomposes above 65 °C).

Avoid contact with alkaline or reducing substances.

Avoid contact with oxidisable organic substances and combustible materials.

Keep away from metals and metal compounds (e.g. copper, cobalt, nickel, manganese, iron).

Annex A
(informative)

General information on sodium peroxodisulfate

A.1 Origin

A.1.1 Raw materials

Sodium peroxodisulfate is manufactured from sodium hydrogen sulfate ($NaHSO_4$) and sulfuric acid.

A.1.2 Manufacturing process

It is produced by electrolytic oxidation of $NaHSO_4$ in sulfuric acid, following by precipitation.

A.2 Use

A.2.1 Function

The product is used to oxidise oxidisable impurities (organic and inorganic) in water.

A.2.2 Form in which it is used

It is used as delivered, or as an aqueous solution in demineralised water, containing 20 g/l to 200 g/l of sodium peroxodisulfate.

A.2.3 Treatment dose

A typical dose is 50 g of sodium peroxodisulfate per cubic metre (m^3) of raw water.

A.2.4 Means of application

The product is usually applied using a metering pump or directly into the swimming pool.

A.2.5 Secondary effects

Increase of sodium and sulfate content of the treated water. Lowering of the pH value of the water by formation of $NaHSO_4$.

A.2.6 Removal of excess product

Addition of reducing agents (e.g. SO_2,HSO_3^-, $S_2O_3^{2-}$).

Annex B
(normative)

General rules relating to safety

B.1 Rules for safe handling and use

The supplier shall provide current safety instructions.

B.2 Emergency procedures

B.2.1 First aid

Wash affected skin area with plenty of water and soap.

In case of contact with eyes, rinse immediately and thoroughly with plenty of water for at least 15 min and seek medical advice.

If swallowed, give plenty of water to drink. Seek medical advice.

If inhaled, remove to fresh air. Seek medical advice.

B.2.2 Spillage

Sweep up into dry plastics containers. Rinse residues away with water. Observe locally valid waste disposal regulations.

B.2.3 Fire

Extinguish with water or water mist.

Bibliography

[1] Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption

[2] 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)

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™