BS EN 15513:2014

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Chemicals used for treatment of swimming pool water — Carbon dioxide

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National foreword

This British Standard is the UK implementation of EN 15513:2014. It supersedes BS EN 15513:2007 which is withdrawn.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.

ISBN 978 0 580 82881 2

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 March 2014.

Amendments issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 15513

March 2014

ICS 71.100.80

Supersedes EN 15513:2007

English Version

Chemicals used for treatment of swimming pool water - Carbon dioxide

Produits chimiques utilisés pour le traitement de l'eau des piscines - Dioxyde de carbone

Produkte zur Aufbereitung von Schwimm- und Badebeckenwasser - Kohlenstoffdioxid

This European Standard was approved by CEN on 5 January 2014.

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Foreword

This document (EN 15513:2014) 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of an identical text or by endorsement, at the latest by September 2014 and conflicting national standards shall be withdrawn at the latest by September 2014.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 15513:2007.

The significant technical difference between this edition and EN 15513:2007 is as follows:

— Updating of 6.2 in line with current legislation.

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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

With respect for potential adverse effects on the quality of swimming pool water, 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 carbon dioxide used for treatment of swimming pool water. It describes the characteristics of carbon dioxide and specifies the requirements and the corresponding test methods for carbon dioxide. It gives information on its use in swimming pool 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 936, *Chemicals used for treatment of water intended for human consumption - Carbon dioxide*

3 Description

3.1 Identification

3.1.1 Chemical name

Carbon dioxide.

3.1.2 Synonym or common name

Carbonic acid gas (carbonic anhydride).

3.1.3 Relative molecular mass

44,011.

3.1.4 Empirical formula

CO_2.

3.1.5 Chemical formula

CO_2.

3.1.6 CAS Registry Number [1)]

124-38-9.

3.1.7 EINECS reference [2)]

204-696-9.

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1) Chemical Abstracts Service Registry Number.

2) European Inventory of Existing Commercial Chemical Substances.

3.2 Commercial form

The carbon dioxide is supplied as a liquefied gas.

3.3 Physical properties

3.3.1 Appearance

The carbon dioxide is a colourless gas or liquid.

3.3.2 Density

The density of the gas at 0 °C and 101,3 kPa [3)] is 1,9 768 kg/m^3, while the density of the liquid at 0 °C and 4 000 kPa is 933,318 kg/m^3.

3.3.3 Solubility in water

The solubility of the gas in water is 1,72 g/l at 20 °C and 101,3 kPa.

3.3.4 Vapour pressure

The vapour pressure of the liquid is 5 733,0 kPa at 20 °C.

3.3.5 Boiling point at 100 kPa[3]

(See 3.3.6).

3.3.6 Melting point

The sublimation point of solid CO_2 is −78,9 °C and 101,3 kPa.

3.3.7 Specific heat

The specific heat of carbon dioxide is 0,827 kJ/kg x K at 0 °C and 100 kPa.

3.3.8 Viscosity (dynamic)

The viscosity of the liquid is 147 × 10^{-7} Pa x s at 20 °C.

3.3.9 Critical temperature

The critical temperature of the liquid is 31 °C.

3.3.10 Critical pressure

The critical pressure of the carbon dioxide is 7 383 kPa.

3.3.11 Physical hardness

Not applicable.

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3) 100 kPa = 1 bar

3.4 Chemical properties

The carbon dioxide CO_2 forms a weak acid when dissolved in water. It reacts with alkalis to form carbonates and bicarbonates.

4 Purity criteria

4.1 General

This European Standard specifies the minimum purity requirements for carbon dioxide used for the treatment of swimming pool 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 the relevant authorities.

Users of the product should check national regulations in order to clarify whether it is of appropriate purity for treatment of swimming pool water, taking into account water quality, required dosage, and contents of other impurities and additives used in the product not stated in the product European 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 other 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 requirements specified in Table 1.

Table 1 — Composition of commercial product

Carbon dioxide, CO_2	≥ 99,9 % (*V/V*)

NOTE The minimum requirements of the commercial product are defined in the EU Directive 2008/84/EC of August 27, 2008 (see[2]) and additional Changes RL 2010/67/EU from 20th October 2010.

4.3 Impurities and main by-products

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

Table 2 - Requirements

Moisture	≤ 50 ppm v/v (≤20 ppm *w/w* max.)
Ammonia	≤ 2,5 ppm v/v
Oxygen	≤ 30 ppm v/v
Oxides of Nitrogen (NO/NO_2)	≤ 2,5 ppm v/v each
Non-volatile residue(particulates)	≤ 10 ppm *w/w*
Non-volatile organic components (oil and fat)	≤ 5 ppm *w/w*
Phosphine [1)]	≤ 0,3 ppm v/v
Total volatile hydrocarbons (calculated as methane)	≤ 50 ppm v/v of which ≤ 20 ppm v/v non-methane hydrocarbons.
Acetaldehyde	≤ 0,2 ppm v/v
Benzene	≤ 0,02 ppm v/v
Carbon Monoxide	≤ 10 ppm v/v
Methanol	≤ 10 ppm v/v
Hydrogen Cyanide [2)]	≤ 0,5 ppm v/v
Total Sulfur (as S) [3)]	≤ 0,1 ppm v/v
Taste and Odour in Water	Acceptable to consumers and no abnormal change
[1)] Analysis necessary only for carbon dioxide from phosphate rock sources [2)] Analysis necessary only for carbon dioxide from coal gasification sources [3)] If the total sulfur content exceeds 0.1 ppm v/v as sulfur then the species should be determined separately and the following limits apply: Carbonyl Sulfide ≤ 0,1 ppm v/v Hydrogen Sulfide ≤ 0,1 ppm v/v Sulfur Dioxide ≤ 1,0 ppm v/v	

4.4 Chemical parameters

NOTE Further chemical parameters and indicator parameters according to EU Directive 98/83/EC (see [3]) are not found in the gaseous phase. Pesticides and polycyclic aromatic hydrocarbons are not by-products of the manufacturing process.

5 Test methods

The methods for sampling and analysis are those specified in EN 936.

6 Labelling – Transportation – Storage

6.1 Means of delivery

The carbon dioxide shall be delivered in pressurised cylinders or by tankers.

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)]

Carbon dioxide is not subject to labelling regulations at the date of publication of this European Standard.

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

Liquid carbon dioxide is listed as UN Number [5)] 1013. Refrigerated liquid carbon dioxide is listed as UN Number 2187.

For liquid carbon dioxide:

RID [6)] ADR [7)]: class 2, classification code 2A.

IMDG [8)]: class 2.

For refrigerated carbon dioxide:

RID [3)] ADR [4)]: class 2, classification code 3A.

IMDG [5)]: class 2.

6.4 Marking

The marking shall include the following:

— name “carbon dioxide” and trade name;

— net mass;

— name and address of supplier and/or manufacturer;

— statement “this product conforms to EN 15513”.

6.5 Storage

The product is stable during long term storage.

Pressure cylinders containing, carbon dioxide shall be protected from direct heat and storage rooms shall be well-ventilated, especially if they are below ground level. Cylinders shall preferably be stored horizontally; if upright, they shall be secured to prevent them toppling over.

For more details about use, see Annex A.

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4) See [1].

5) United Nations Number.

6) Regulation concerning the International Carriage of Dangerous Goods by Rail (RID).

7) European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR).

8) International Maritime Dangerous Goods Code (IMDG).

Annex A
(informative)

General information on carbon dioxide

A.1 Origin

A.1.1 Raw materials

Natural carbon dioxide or as a product from chemical processes or from combustion, which differs from natural carbon dioxide chiefly in the components of residual gases.

A.1.2 Manufacturing process

Carbon dioxide is condensed gradually in one or more steps up to the corresponding liquefy pressure, than cleaned, dried up, if needed filtered and subsequently liquefied in large scaled refrigerators, after that stored in pressure vessels (tanks).

A.2 Use

A.2.1 Function

The product is used for adjustment of pH value of pool water.

A.2.2 Form in which it is used

The product is used in gaseous form.

A.2.3 Treatment dose

The treatment dose is variable depending on the composition of swimming pool water.

For example, to increase the hydrogen carbonate content of the water, expressed as calcium carbonate, by 10 mg/l a dose of 4,4 mg CO_2/l would be required.

A.2.4 Means of application

Carbon dioxide is dissolved under pressure through an injector into a circulating system of swimming pool.

A.2.5 Secondary effects

In some conditions the product can increase the carbonated alkalinity.

A.2.6 Removal of excess of product

Excess carbon dioxide is removed by aeration, binding with alkaline reacting chemicals or by stripping with other inert gases.

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 inhalation, the affected person should be moved into the open air, laid down in a comfortable position and protected against hypothermia;

— in case of freeze-burns, the affected skin should be rinsed with plenty of water and treated as for first degree burns;

— in case of cessation of breathing, artificial ventilation should be given, (e.g. from mouth-to-mouth or oxygen).

A.3.2.2 Spillage

Affected and lower-lying areas should be left immediately. Ventilation and the escape of carbon dioxide should be ensured.

A.3.2.3 Fire

The product is 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)

[2] 2008/84/EC, *Commission Directive of 27 August 2008 laying down specific purity criteria on food additives other than colours and sweeteners*

[3] 98/83/EC, *Council Directive of 3 November 1998 on the Quality of Water intended for Human Consumption*

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