SLOVENSKI STANDARD
SIST EN 13752:2012

01-oktober-2012

Nadomešča:
SIST EN 13752:2009

Izdelki, ki se uporabljajo za pripravo pitne vode - Manganov dioksid

Products used for treatment of water intended for human consumption - Manganese dioxide

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Mangandioxid

Produits chimiques utilisés pour le traitement de l'eau destinée à la consommation humaine - Dioxyde de manganèse

Ta slovenski standard je istoveten z: EN 13752:2012

ICS:

13.060.20	Pitna voda	Drinking water
71.100.80	Kemikalije za čiščenje vode	Chemicals for purification of water

SIST EN 13752:2012 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13752

August 2012

ICS 71.100.80

Supersedes EN 13752:2009

English Version

Chemicals used for treatment of water intended for human consumption - Manganese dioxide

Produits chimiques utilisés pour le traitement de l'eau destinée à la consommation humaine - Dioxyde de manganèse

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Mangandioxid

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Ref. No. EN 13752:2012: E

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Foreword

This document (EN 13752:2012) 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of an identical text or by endorsement, at the latest by February 2013, and conflicting national standards shall be withdrawn at the latest by February 2013.

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This document supersedes EN 13752:2009.

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Introduction

In respect of potential adverse effects on the quality of water intended for human consumption, 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 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 manganese dioxide used for treatment of water intended for human consumption. It describes the characteristics of manganese dioxide and specifies the requirements and the corresponding test methods for manganese dioxide. It gives information on its use in water treatment. Two classes of product are specified: Class 1 with hardness greater than or equal to 6 Mohs, Class 2 with hardness less than 6 Mohs.

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 12901:1999, *Products used for treatment of water intended for human consumption – Inorganic supporting and filtering materials – Definitions*

EN 12902, *Products used for treatment of water intended for human consumption – Inorganic supporting and filtering materials – Methods of test*

EN ISO 385, *Laboratory glassware – Burettes (ISO 385)*

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

ISO 6333, *Water quality – Determination of manganese – Formaldoxime spectrometric method*

3 Terms, definitions and symbols

For the purposes of this document, the terms, definitions and symbols given in EN 12901:1999 apply.

4 Description

4.1 Identification

4.1.1 Chemical name

Manganese dioxide.

4.1.2 Synonym or common names

Manganese(IV) oxide, pyrolusite.

4.1.3 Chemical formula

MnO_2.

NOTE Manganese dioxide used as a catalytic filtering medium is a natural ore, usually pyrolusite. Manganese dioxide ores differ widely in their chemical composition depending on their origin. Most are composed of manganese dioxide together with silica, alumina, iron oxide and numerous other elements present in varying proportions which might affect mechanical strength.

4.1.4 CAS Registry number [1)]

Manganese dioxide: 1313-13-9.

4.1.5 EINECS reference [2)]

Manganese dioxide: 215-202-6.

4.2 Commercial form

Manganese dioxide is a granular material usually available in three size ranges: 0,355 mm to 0,850 mm, 0,50 mm to 1,00 mm and 0,5 mm to 3,00 mm.

5 Physical properties

5.1 Appearance

The product is a granular material varying in colour from dark brown to dark grey to black, depending upon its origin. It consists of amorphous grains which can be rounded or sub-angular.

The product shall be generally homogeneous and shall be visibly free of extraneous matter.

5.2 Particle size distribution

The particle size distribution shall be described by either:

a)

- effective size: (d_{10}) with a maximum deviation of ± 5 %;
- uniformity coefficient: (U) less than 1,5 for Class 1 and Class 2 products with particles smaller than or equal to 1 mm; and less than 2,5 for Class 1 and Class 2 products with particles greater than 1 mm.
- minimum size: (d_1) with a limit deviation of ± 5 %;

NOTE The particle size can decrease during transportation and handling.

b) or, particle size range and mass fraction of oversize and undersize particles according to application.

The maximum contents of oversize and undersize shall be a mass fraction of 10 % for application of the product in multimedia filters and a mass fraction of 5 % for use in single media filters. See A.2.3 for examples of available particle sizes that are used.

Other values can be necessary for certain applications.

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1) Chemical Abstracts Service Registry Number.

2) European Inventory of Existing Commercial Chemical Substances.

5.3 Density

5.3.1 Bulk density loose

The bulk density loose shall be in the range of 1 750 kg/m^3 to 1 850 kg/m^3 for Class 1 and Class 2 products with particles smaller than or equal to 1 mm and 1 800 kg/m^3 to 2 200 kg/m^3 for Class 1 and Class 2 products with particles greater than 1 mm.

5.3.2 Bulk density packed

The bulk density packed shall be in the range of 1 950 kg/m^3 to 2 050 kg/m^3 for Class 1 and Class 2 products with particles smaller than or equal to 1 mm and 2 000 kg/m^3 to 2 400 kg/m^3 for Class 1 and Class 2 products with particles greater than 1 mm.

6 Chemical properties

For the composition of the commercial product, see A.2.1.

After filling, washing and commissioning of a filter system producing drinking water, manganese dioxide should not increase the concentrations of chemical parameters above the regulated values (see [1]).

NOTE Water extractable substances, determined in accordance with the method for granular materials given in EN 12902, can be used to estimate the leaching of the chemicals specified in EN 12902.

Users of this product 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, contents of other impurities and additives used in the products not stated in the product standard.

7 Specific properties

The oxidation capacity of manganese dioxide shall be at least 500 bed volumes when tested according to the method described in 8.2.4.

NOTE For a Class 1 product, a greater oxidation capacity may be specified.

8 Test methods

8.1 Sampling

Prepare the laboratory sample(s) required by the relevant procedure described in EN 12902.

8.2 Analysis

8.2.1 Particle size distribution

The particle size distribution shall be determined on samples taken at the point of manufacture using the method of test given in EN 12902.

8.2.2 Bulk density loose

The bulk density loose shall be determined in accordance with EN 12902.

8.2.3 Bulk density packed

The bulk density packed shall be determined in accordance with EN 12902.

8.2.4 Oxidation capacity

8.2.4.1 Principle

A solution of manganese sulfate is passed through a bed of “regenerated” manganese dioxide. Portions of the effluent are analysed for manganese and the cumulative volume, until breakthrough of manganese, is determined.

8.2.4.2 Reagents

8.2.4.2.1 General

All reagents shall be of a recognised analytical grade and the water used shall conform to grade 2 in accordance with EN ISO 3696.

8.2.4.2.2 Manganese sulfate stock solution, *c*(Mn) = 5 mg/l

Dissolve 1,00 g of sodium hydrogen carbonate ($NaHCO_3$) in water and add 0,154 g of manganese sulfate monohydrate ($MnSO_4 \cdot H_2O$). Dilute to 10,0 l with water and adjust the pH to 7,0 ± 0,5 using dilute sulfuric acid or sodium hydroxide solution as required.

8.2.4.2.3 Manganese sulfate test solution, *c*(Mn) = 1 mg/l

Dilute 2 l of the manganese sulfate stock solution (8.2.4.2.2) to 10 l with water and adjust the pH to 7,0 ± 0,5 using dilute sulfuric acid or sodium hydroxide solution as required.

8.2.4.2.4 Sodium hypochlorite solution, approximately 1 200 mg/l Cl_2

Dilute 10 ml of sodium hypochlorite solution, available chlorine concentration approximately 120 g/l, to 1 l with water.

8.2.4.3 Apparatus

Ordinary laboratory apparatus and glassware together with the following.

8.2.4.3.1 Glass burette of 50 ml capacity conforming to the requirements of EN ISO 385.

8.2.4.3.2 Graduated measuring cylinder, 200 ml capacity.

8.2.4.3.3 Borosilicate glass bottle, 10 l capacity.

8.2.4.4 Preparation of test sample

Take approximately 100 g of the manganese dioxide and sieve to obtain that fraction of the material sized between 0,355 mm and 0,850 mm, using the procedure for determination of particle size described in EN 12902. Use this fraction for the determination.

Take approximately 20 g of the manganese dioxide (0,355 mm to 0,850 mm), place in a 250 ml beaker and gently wash with successive portions of water until all adherent fines have been removed. Dry the beaker and contents to constant mass at (100 ± 5) °C.