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Processkemikalier för beredning av dricksvatten – Kalciumkarbonat, högren kalk, halvbränd dolomit, magnesiumoxid och kalciummagnesiumkarbonat (dolomit) – Provningsmetoder

**Chemicals used for treatment of water intended for human
consumption – Calcium carbonate, high-calcium lime, half-burnt
dolomite, magnesium oxide and calcium magnesium carbonate –
Test methods**

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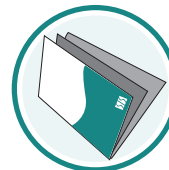
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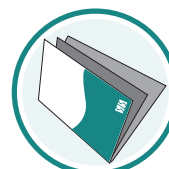
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Denna standard ersätter SS-EN 12485, utgåva 1.

The European Standard EN 12485:2010 has the status of a Swedish Standard. This document contains the official English version of EN 12485:2010.

This standard supersedes the Swedish Standard SS-EN 12485, edition 1.

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12485

April 2010

ICS 71.100.80

Supersedes EN 12485:2001

English Version

Chemicals used for treatment of water intended for human consumption - Calcium carbonate, high-calcium lime, half-burnt dolomite, magnesium oxide and calcium magnesium carbonate - Test methods

Produits chimiques utilisés pour le traitement de l'eau destinée à la consommation humaine - Carbonate de calcium, chaux et dolomie semi calcinée - Méthodes d'analyse

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Calciumcarbonat, Weißkalk, halbgebrannter Dolomit, Magnesiumoxid und Calciummagnesiumcarbonat - Analytische Verfahren

This European Standard was approved by CEN on 18 March 2010.

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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 Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 12485:2010) 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 October 2010, and conflicting national standards shall be withdrawn at the latest by October 2010.

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.

This document supersedes EN 12485:2001.

Annexes A and B are informative.

Significant technical differences between this edition and EN 12485:2001 are as follows:

- a) addition of a method for determination of sugar-soluble calcium oxide or calcium hydroxide (see 6.6);
- b) addition of a method for determination of solubility index (see 6.11).

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the methods used for the chemical analyses and the determination of physical properties of calcium carbonate, high-calcium lime, half-burnt dolomite, magnesium oxide and calcium magnesium carbonate used to treat water for human consumption.

This document describes the reference methods and, in certain cases, an alternative method which can be considered to be equivalent. In the case of a dispute, only the reference methods are used.

Any other methods may be used provided they are calibrated, either against the reference methods or against internationally accepted reference materials, in order to demonstrate their equivalence.

NOTE Schematic diagrams of the analyses are given in Annex A (Figures A.1 to A.6).

2 Normative references

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

EN 459-2, *Building lime — Part 2: Test methods*

EN 1017, *Chemicals used for treatment of water intended for human consumption — Half-burnt dolomite*

EN 1018, *Chemicals used for treatment of water intended for human consumption — Calcium carbonate*

EN 12518, *Chemicals used for treatment of water intended for human consumption — High-calcium lime*

prEN 16003, *Chemicals used for treatment of water intended for human consumption — Calcium magnesium carbonate*

prEN 16004, *Chemicals used for treatment of water intended for human consumption — Magnesium oxide*

EN ISO 3696:1995, *Water for analytical laboratory use — Specification and test methods (ISO 3696:1987)*

ISO 3165, *Sampling of chemical products for industrial use — Safety in sampling*

ISO 4793:1980, *Laboratory sintered (fritted) filters — Porosity grading, classification and designation*

3 General requirements

3.1 Number of determinations

Two analyses shall be carried out to determine the various constituents (see Clause 5 to Clause 8, see also 3.6).

3.2 Methods for analysis

The methods to be used for the analysis of half-burnt dolomite, calcium carbonate, high calcium lime, magnesium oxide and calcium magnesium carbonate and the principle of each method are listed in Table 1.

The requirement values for free MgO and free Mg(OH)₂ in half-burnt dolomite shall be expressed as free MgO in accordance with EN 1017. The same requirement is related to free CaO. The requirement value for MgO in magnesium oxide shall be expressed as MgO in dry substance in accordance with prEN 16004. Therefore,

the analysis of half-burnt dolomite and magnesium oxide shall be performed on a sample which is bound-water free. Before starting the chemical analysis, the loss on ignition at 450 °C shall be determined as described in 6.2. The analysis itself shall be performed on the material obtained after the determination of the loss on ignition.

The requirement values for calcium carbonate, hydrated lime and calcium magnesium carbonate shall be expressed in dry substance in accordance with EN 1018, EN 12518 and prEN 16003. Therefore, the analysis of these products shall be performed on a sample which has been dried in accordance with the procedure described in 6.1.

For the determination of the water-soluble content of high-calcium lime, the method in 6.5 is considered as the reference method. The sugar method described in 6.6 can be used as an alternative method if it is demonstrated that the results obtained with this method are equivalent to those of the reference method.

Table 1 — Methods for analysis

Determination	Method	Principle	Standard
Screen oversize	4.1	Air-jet sieving	EN 12518
	4.2	Wet sieving	EN 12518
Free water	6.1	Gravimetry	EN 1018, EN 12518, prEN 16003
Loss on ignition at 450 °C	6.2	Gravimetry	EN 1017, EN 12518, prEN 16004
Carbon dioxide	6.3	Gravimetry	EN 1017, EN 12518, prEN 16004
Residue insoluble in hydrochloric acid	6.4	Acidimetry, Gravimetry	EN 1018, prEN 16004
Water-soluble calcium oxide or calcium hydroxide	6.5	Acidimetric titration	EN 12518
Sugar-soluble calcium oxide or calcium hydroxide	6.6	Acidimetric titration	EN 12518
Water-insoluble constituents	6.7	Gravimetry	EN 12518
Free calcium oxide	6.8	Extraction, acidimetric titration	EN 1017, prEN 16004
Calcium oxide and magnesium oxide	6.9	Complexometric titration	EN 1017, EN 1018, prEN 16003, prEN 16004
Sulfate	6.10	Gravimetry	EN 1017
Solubility index	6.11	Conductivity	EN 12518
Magnesium	7.1	AAS (flame)	EN 1017, EN 1018, prEN 16003, prEN 16004
	7.2	ICP-OES	
Silicium, Aluminium, Iron,	7.1	AAS (flame)	EN 1017, EN 12518, prEN 16003, prEN 16004
	7.2	ICP-OES	

Table 1 (continued)

Determination	Method	Principle	Standard
Manganese	7.2	ICP-OES	EN 12518
Sulfur	7.2	ICP-OES	EN 1017
Lead, Cadmium, Chromium, Nickel	8.1 or 8.2	AAS (flameless) or ICP-OES	EN 1017, EN 1018, EN 12518, prEN 16003, prEN 16004
Arsenic, Antimony, Selenium	8.3	AAS (hydride)	EN 1017, EN 1018, EN 12518, prEN 16003, prEN 16004
Mercury	8.4	AAS (cold-vapour technique)	EN 1017, EN 1018, EN 12518, prEN 16003, prEN 16004

3.3 Sample preparation

The general recommendations specified in ISO 3165 shall be observed when sampling. Sampling shall be performed in accordance with EN 459-2. For products less than 6 mm grain size, the size of the sample shall be 1 l.

Before performing the chemical analyses, the size of the sample shall be reduced by using a sample divider and/or by dividing it into four parts in order to obtain a suitable subsample. The coarse-grain material in this sample shall be reduced to a size of less than 0,2 mm before performing the chemical analysis.

When sampling milk of lime, the material from which the sample is to be taken shall be thoroughly mixed with an electrically driven stirrer of adequate power. The milk of lime shall be dried at (105 ± 5) °C (see 6.1) before being analysed chemically.

Since the subsamples under examination are altered by the absorption of moisture and carbon dioxide, their exposure to air shall be minimized. They shall therefore be transported and stored in air-tight containers and all the handling shall be carried out as quickly as possible.

3.4 Reagents

All reagents shall be of a recognized analytical grade appropriate for the method being used. The water used shall conform to grade 3 in accordance with EN ISO 3696:1995 unless otherwise specified in the method. The concentration of the analytes in the water and reagents shall be negligible compared with the lowest concentration to be determined.

The concentrated liquids used for the reagents in this standard have the following densities (ρ) (in grams per millilitre at 20 °C):

- hydrochloric acid 1,16 to 1,19;
- nitric acid 1,40 to 1,42;
- ammonium hydroxide solution 0,88 to 0,91;
- triethanolamine 1,12.

Dilutions are specified as the sum of the volumes. Thus, (1 + 2) dilute hydrochloric acid means 1 part by volume of concentrated hydrochloric acid mixed with 2 parts by volume of water.

The concentrations of reference and standard volumetric solutions are specified as amount-of-substance concentrations, c (mol/l), while those of stock and standard solutions are specified as concentrations by mass, c (g/l or mg/l).

Suitable element solutions for atomic absorption spectroscopy (AAS) and for optical emission spectroscopy by inductively coupled plasma (ICP-OES) are commercially available and can be used as stock solutions. They shall be prepared for the purposes of analysis in accordance with the manufacturer's instructions. The appropriate element standard solutions are prepared in accordance with the instructions given in this European Standard.

This European Standard makes no stipulations relating to the shelf life of stock, standard and reference solutions. In the case of stock solutions having an element concentration of 1 g/l, the manufacturer generally specifies a shelf life of one year. It is advisable to check the calibration solutions regularly.

3.5 Glassware

Glass containers and pipettes shall be cleaned with hot dilute nitric acid immediately before use and then rinse with water. If determining trace elements rinse with grade 2 water.

3.6 Expression of results

The analytical results for the major and minor constituents shall be reported as mass fraction in %, while those for trace elements shall be reported as mass fraction in milligrams per kilogram, as the mean of two determinations. In general, analytical values shall be reported to three significant figures.

EXAMPLE

(CaO) = 91,2 %;

(SiO₂) = 3,70 %;

(MnO₂) = 0,15 %;

(Cr) = 0,32 mg/kg;

(Hg) = 0,05 mg/kg.

If the results of a duplicate determination differ from one another by more than twice the repeatability standard deviation, the determination shall be repeated. The result shall then be deemed to be the mean of the two results with the lowest difference.

To assess whether the analytical results meet the requirements laid down in EN 12518 for high-calcium lime, in EN 1018 for calcium carbonate products and in EN 1017 for half-burnt dolomites, in prEN 16003 for calcium magnesium carbonate and in prEN 16004 for magnesium oxide, the results have to be converted to the form in which the requirements are stated in the above standards.

Subclauses of this standard are given in Table 2 and contain the relevant calculation methods.