



SLOVENSKI STANDARD
SIST EN 16811-1:2016

01-oktober-2016

**Oprema za zimska vzdrževalna dela - Sredstva za odtajanje - 1. del: Natrijev klorid -
Zahteve in preskusne metode**

Winter service equipment - De-icing agents - Part 1: Sodium chloride - Requirements
and test methods

Winterdienstausrüstung - Enteisungsmittel - Teil 1: Natriumchlorid - Anforderungen und
Prüfmethoden

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EUROPEAN STANDARD

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Winter service equipment and products - De-icing agents - Part 1: Sodium chloride - Requirements and test methods

Matériels de viabilité hivernale - Fondants routiers -
Partie 1 : Chlorure de sodium - Exigences et méthodes
d'essai

Winterdienstausrüstung - Enteisungsmittel - Teil 1:
Natriumchlorid - Anforderungen und Prüfmethoden

This European Standard was approved by CEN on 15 April 2016.

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

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EN 16811-1:2016 (E)**European foreword**

This document (EN 16811-1:2016) has been prepared by Technical Committee CEN/TC 337 “Road operation equipment and products”, 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of an identical text or by endorsement, at the latest by February 2017, and conflicting national standards shall be withdrawn at the latest by February 2017.

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.

EN 16811, *Winter service equipment and products — De-icing agents*, is currently composed with the following parts:

- *Part 1: Sodium chloride — Requirements and test methods*;
- *Part 2: Calcium chloride and Magnesium chloride — Requirements and test methods*;
- *Part 3: Other solid and liquid de-icing agents — Requirements and test methods* [CEN/TS].

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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

De-icing agents are important for the winter maintenance of roads. They can prevent and, in addition to it, eliminate slippery conditions.

The standard describes the requirements for de-icing salt and their testing methods. The requirements are different for using, storage and type of distribution (spreading and spraying). These need different properties.

The aim of this standard is an easy description of the product specifications for tenders and other purchasing procedures.

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EN 16811-1:2016 (E)**1 Scope**

This European Standard specifies the essential requirements of sodium chloride (salt) for spreading on roads for winter maintenance and includes tests of these requirements. The requirements are specified for salt in crystallized form and for salt in solution (brine), which is delivered to the customer.

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 932-1, *Tests for general properties of aggregates — Part 1: Methods for sampling*

EN 1235, *Solid fertilizers — Test sieving (ISO 8397:1988 modified)*

EN 1236, *Fertilizers — Determination of bulk density (loose) (ISO 3944:1992 modified)*

EN 1484, *Water analysis — Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)*

EN 15144, *Winter maintenance equipment — Terminology — Terms for winter maintenance*

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

EN ISO 9377-2, *Water quality — Determination of hydrocarbon oil index — Part 2: Method using solvent extraction and gas chromatography (ISO 9377-2)*

EN ISO 10523, *Water quality — Determination of pH (ISO 10523)*

ISO 565, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*

ISO 649-2, *Laboratory glassware — Density hydrometers for general purposes — Part 2: Test methods and use*

ISO 758, *Liquid chemical products for industrial use — Determination of density at 20 degrees C*

ISO 2479, *Sodium chloride for industrial use — Determination of matter insoluble in water or in acid and preparation of principal solutions for other determinations*

ISO 2480, *Sodium chloride for industrial use — Determination of sulphate content — Barium sulphate gravimetric method*

ISO 2482, *Sodium chloride for industrial use — Determination of calcium and magnesium contents — EDTA complexometric methods*

ISO 2483, *Sodium chloride for industrial use — Determination of the loss of mass at 110 degrees C*

ISO 2591-1, *Test sieving — Part 1: Methods using test sieves of woven wire cloth and perforated metal plate*

ISO 6227, *Chemical products for industrial use — General method for determination of chloride ions — Potentiometric method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15144 and the following apply.

3.1

sodium chloride

salt

NaCl,

substance which is produced as rock salt, as solar salt and as vacuum salt

Note 1 to entry: Rock salt is extracted by mechanical mining of natural salt beds. Solar salt is produced by solar evaporation of sea water or brine from salt deposits and by extraction from salt lakes. Solar salt from sea water is named as sea salt. Vacuum salt is prepared by the evaporation of water from brine. Used salt (waste salt) comes from secondary aluminium smelters, from fishery industry, from leather industry, etc. REACH [4] registered synthetic by-product salts derive from chemical reactions (e.g. from gas cleaning in waste incinerators).

3.2

brine

solution of sodium chloride in water

Note 1 to entry: Brine is available as natural brine from underground deposits and from solar salt/sea salt production, and as solution of rock salt, solar salt/sea salt or vacuum salt in water. Further sources are used salts and by-product salts.

4 Requirements for sodium chloride

4.1 Chemical Requirements

The sodium chloride shall conform to the requirements specified in Table 1:

Table 1 — Chemical requirements for sodium chloride

Parameter	Limit Weight %
NaCl	min. 90 ^a
Sulfate	max. 3 ^a
NOTE 1	NaCl is determined as total chloride content and expressed as NaCl (weight % in the dry product).
NOTE 2	Sulfate is determined as water soluble sulfate and expressed as SO ₄ (weight % in the dry product).
^a The NaCl and sulfate content of salt can be specified within these limits by the purchaser depending on his individual needs. It can also be specified within these limits at the national level (National Annexes to this European Standard).	

4.2 Moisture

The sodium chloride shall conform to the requirements specified in Table 2.

Table 2 — Moisture limits for sodium chloride

	Limit Weight %		
	Dry salt	Semi-dry salt	Wet salt
Moisture	max. 0,6	max. 2,0	max. 6,0
For storage in silos dry salt is recommended. For rock salt a minimum moisture content of 0,2 weight % is recommended (to avoid dust during stocking and salt usage).			
NOTE 1 For undried vacuum salt the limit is max. 3,5 weight %.			
NOTE 2 The moisture contents are expressed as H ₂ O in the delivered undried salts.			

4.3 Sieve analysis

The sodium chloride shall conform to the requirements specified in Table 3.

Table 3 — Sieve analysis for sodium chloride

Weight % passing test sieve			
Grade EF (extra fine salt)	Grade F (fine salt)	Grade M (medium salt)	Grade C (coarse salt)
0,125 mm max. 5	0,125 mm max. 5	0,125 mm max. 7	0,8 mm max. 35
0,8 mm 25 to 100	0,8 mm 10 to 40	0,8 mm 5 to 35	3,15 mm 30 to 80
2,0 mm 100 (2 weight % production related tolerance with max. 3 mm grain size)	1,6 mm 30 to 80 3,15 mm 90 to 100 5,0 mm 100 (2 weight % production related tolerance with max. 8 mm grain size)	1,6 mm 10 to 60 3,15 mm 45 to 90 6,3 mm 100 (2 weight % production related tolerance with max. 8 mm grain size)	6,3 mm 75 to 95 10 mm 100 (2 weight % production related tolerance with max. 12 mm grain size)

4.4 General requirements

The sodium chloride shall arrive at purchaser's delivery point in a free-flowing and usable condition and shall conform to the requirements specified in Table 4.

Table 4 — General requirements for sodium chloride

Parameter	Limit	Unit
Anti-caking agent (sodium-, potassium-, or calcium ferrocyanide)	min. 3 to max. 125 (expressed as Fe(CN) ₆ -anion)	mg/kg
pH of 10 weight % solution	between 5 and 10	
Al (Aluminium)	≤ 50	mg/kg
As (Arsenic)	≤ 2,5	mg/kg
Cd (Cadmium)	≤ 2	mg/kg
Co (Cobalt)	≤ 2	mg/kg
Cr (Chromium)	≤ 5	mg/kg
Cu (Copper)	≤ 5	mg/kg
Hg (Mercury)	≤ 0,5	mg/kg
Ni (Nickel)	≤ 5	mg/kg
Pb (Lead)	≤ 5	mg/kg
Zn (Zinc)	≤ 20	mg/kg
Hydrocarbons	≤ 100	mg/kg
NOTE 1	Other anti-caking agents are allowed if they have the same performance as the ferrocyanides.	
NOTE 2	The limits for Al (Aluminium) and hydrocarbons are foreseen for by-product salts and waste salts. There is no need to determine these parameters in natural based salts (rock salt, solar salt, vacuum salt).	
NOTE 3	The determination of heavy metals is performed in a solution with pH 4 (except mercury).	
NOTE 4	The parameters stated as mg/kg of dry product.	

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For salt which is not of natural origin the supplier shall supply the content of total organic carbon (TOC) for the evaluation of the environmental impact.

4.5 Marking and product description

The sodium chloride shall be delivered in bulk lots, or in bags or other containers acceptable to the purchaser. The following information shall be marked on the salt packaging or on associated documents:

- a) the name and address of the producer or supplier;
- b) the words "Salt for winter maintenance";
- c) sieve analysis grade (extra fine, fine, medium or coarse salt);
- d) moisture class (dry, semi-dry or wet salt);
- e) the origin of salt (rock salt, solar salt/sea salt, vacuum salt, used salt or by-product salt);
- f) the net weight;
- g) the number of this European Standard.

In tendering processes the offers shall include a product description which is dated not longer than 12 months before the date of the offer. The supplier shall supply the bulk density (loose) for information purposes (see A.1).

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All information shall be given in the languages of the countries of destination.

5 Requirements for brine

5.1 Chemical Requirements

The brine shall conform to the requirements specified in Table 5.

Table 5 — Chemical requirements for brine

Parameter	Limit Weight %
NaCl	18 to 26
Sulfate	max. 0,6 ^a
Water insoluble matter	max. 0,03 ^b
The concentration of brine shall be specified by the purchaser. Typical concentrations vary from 18 weight % to 26 weight %.	
NOTE 1	NaCl is determined as total chloride content and expressed as NaCl.
NOTE 2	Sulfate expressed as SO ₄ and measured in a 10 weight % brine.
a	For sulfate a lower limit can be defined at the national level.
b	10 l of brine shall pass a test sieve (size 0,5 mm) without water insoluble residues after washing with water on the sieve.

5.2 General requirements

The brine shall conform to the requirements in Table 6.

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Table 6 — General requirements for brine

Parameter	Limit	Unit
pH of 10 weight % solution	between 5 and 10	
Al (Aluminium)	≤ 50	mg/kg
As (Arsenic)	≤ 2,5	mg/kg
Cd (Cadmium)	≤ 2	mg/kg
Co (Cobalt)	≤ 2	mg/kg
Cr (Chromium)	≤ 5	mg/kg
Cu (Copper)	≤ 5	mg/kg
Hg (Mercury)	≤ 0,5	mg/kg
Ni (Nickel)	≤ 5	mg/kg
Pb (Lead)	≤ 5	mg/kg
Zinc (Zn)	≤ 20	mg/kg
Hydrocarbons	≤ 100	mg/kg
NOTE 1 The limits for Al (Aluminium) and hydrocarbons are foreseen for brine which is not of natural origin. There is no need to determine these parameters in brines which are based on natural salts (rock salt, solar salt, vacuum salt).		
NOTE 2 The determination of heavy metals is performed in brine with pH 4 (except mercury).		
NOTE 3 The parameters stated as mg/kg of dry product.		

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For brine which is derived from chemical reactions or made from used salts and by-products salts the supplier shall supply the content of total organic carbon (TOC) for the evaluation of the environmental impact.

5.3 Marking and product description

The brine shall be delivered in containers acceptable to the purchaser. The following information shall be marked on delivery documents:

- the name and address of the producer or supplier;
- the words "Brine for winter maintenance";
- the NaCl concentration (weight %);
- the net weight;
- the number of this European Standard.

In tendering processes the offers shall include a product description which is dated not longer than 12 months before the date of the offer. The supplier shall supply the density (20 °C) for information purposes (see A.2).

All information shall be given in the languages of the countries of destination.