MATERIAL SPECIFICATION FOR CALCIUM CHLORIDE AND CALCIUM-MAGNESIUM CHLORIDE BLEND

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2501.01 SCOPE

This specification covers the requirements for calcium chloride and calcium-magnesium chloride blend for use as a dust suppressant or de-icer.

2501.02 REFERENCES

This specification refers to the following standards, specifications, or publications:

Canadian General Standards Board (CGSB)

15.1-92 Standard for Calcium Chloride

ASTM International

D1293-18 Standard Test Methods for pH of Water
E449-18 Analysis of Calcium Chloride

Pacific Northwest Snowfighters (PNS)

Test Method B Corrosion Rate as Conducted from the NACE Standard TM0169-95 (1995 Revision) and as Modified by the Pacific Northwest States *
Test Method C Percent Total Settleable Solids and Percent Solids Passing on a No. 10 Sieve *
* [Part of 2008 Pacific Northwest Snowfighters Snow and Ice Control Chemical Products Specifications and Test Protocols]

2501.03 DEFINITIONS

For the purpose of this specification, the following definitions apply:

Calcium Chloride Solid means a granular form of anhydrous calcium chloride ($CaCl_2$) that may be applied directly or dissolved in water to form calcium chloride solution.

Calcium Chloride Solution means an aqueous solution of calcium chloride solid.

Calcium-Magnesium Chloride Blend means an aqueous solution containing predominantly calcium chloride with supplemental magnesium chloride ($MgCl_2$).

2501.05 MATERIALS

2501.05.01 Calcium Chloride Solid

Calcium chloride solid shall be loose, dry, and according to CAN/CGSB 15.1, Type S:

a) Grade 1, Class A;

b) Grade 2, Class B; or

c) Grade 3, Class B.

2501.05.02 Calcium Chloride Solution

Calcium chloride solution shall be according to CAN/CGSB 15.1, Type L, Class 1, and shall be homogeneously mixed.

Calcium chloride solution used as a dust suppressant shall contain a minimum of 35% by mass of pure calcium chloride and shall meet the requirements shown in Table 1.

Calcium chloride solution used as a de-icer shall:

a) Contain a minimum of 29% by mass of pure calcium chloride.

b) Meet the requirements shown in Table 1.

2501.05.03 Calcium-Magnesium Chloride Blend

Calcium-magnesium chloride blend used as a dust suppressant shall have a minimum of 27% by mass of calcium chloride, a minimum calcium chloride equivalence of 35% and shall meet the requirements shown in Table 2. Calcium-magnesium chloride blend shall exhibit no crystallization above 5 °C.

Calcium-magnesium chloride blend used as a de-icer shall:

a) Contain a minimum of calcium chloride equivalence of 29% and shall meet the requirements shown in Table 2.

b) Meet the requirements shown in Table 1.

2501.07 PRODUCTION

2501.07.01 Packaging and Delivery

Calcium chloride solid shall be delivered in moisture-proof 20, 40, or 1,000 kg bags by railway hopper car or by truck and in a dry and useable condition.

Calcium chloride solution and calcium-magnesium chloride blend shall be delivered by railway tank car or truck tank.

2501.07.02 Labelling

2501.07.02.01 Calcium Chloride Solid and Calcium Chloride Solution

Labelling shall be according to CAN/CGSB 15.1 with each container legibly marked with the following:

a) Cautionary information specified in CAN/CGSB 15.1.

b) Manufacturer's or supplier's name.

c) Date packaged (i.e., yyyy-mm-dd).

d) Type, grade, and class.

e) Concentration of pure calcium chloride.

f) Unit size (mass or volume).

g) Standard number (i.e., CAN/CGSB 15.1).

When bulk shipping is provided, the shipping manifest shall include the same information.

2501.07.02.02 Calcium-Magnesium Chloride Blend

The shipping manifest shall include the following information:

a) Manufacturer's or supplier's name.

b) Date shipped (i.e., yyyy-mm-dd).

c) Words "Calcium-Magnesium Chloride Blend".

d) Concentration of pure calcium chloride and percent calcium chloride equivalency.

e) Unit size (volume).

2501.08 QUALITY ASSURANCE

2501.08.01 Sampling and Testing

2501.08.01.01 General

Calcium chloride solid, calcium chloride solution, and calcium-magnesium chloride blend may be subject to sampling and testing for conformity to the specified requirements. All materials that fail to meet the specified requirements shall be rejected.

2501.08.01.02 Sampling Calcium Chloride Solid

A minimum of three samples shall be selected by the Owner at random from the shipment. Samples shall be taken by the Owner by scraping aside the top layer of material to a depth of approximately 25 mm and taking a 0.5 kg representative sample by means of a sampling tube or other method. Precautions shall be taken during the sampling operation to avoid exposing the sample unduly to atmospheric moisture. Immediately after collecting the three samples, the individual samples shall be mixed thoroughly to form a composite sample of material, and then be stored and sealed in a suitable glass or plastic container.

2501.08.01.03 Sampling Calcium Chloride Solution and Calcium-Magnesium Chloride Blend

A minimum of three samples from each tank of the shipment shall be selected by the Owner. Each sample shall be representative of the contents of the tank. Precautions shall be taken during the sampling operation to avoid exposing the sample unduly to atmospheric moisture. Immediately after collecting the three samples, the individual samples shall be mixed thoroughly to form a composite sample of material, and then be stored and sealed in a suitable glass or plastic container.

2501.08.02 Certificate

Upon request, a manufacturer's certificate shall be provided stating that an independent laboratory has tested the product and found it to be according to this specification.

2501.09 OWNER PURCHASE OF MATERIAL

2501.09.01 Measurement and Payment

2501.09.01.01 General

Payment at the price specified in the purchasing order shall be for the supply of the calcium chloride solid, calcium chloride solution, or calcium-magnesium chloride blend delivered to the destination on the date and time specified.

The cost of all testing, except that performed in the Owner's laboratory, shall be included in the price.

2501.09.01.02 Calcium Chloride Solid

Measurement of calcium chloride solid shall be by mass in kilograms. Weighing shall be as specified in the purchasing order.

2501.09.01.03 Calcium Chloride Solution

Measurement of calcium chloride solution, at the concentration specified, shall be by one of the following methods:

a) Mass of solution in tonnes.

   When shipped by railway tank car or when weighed at the source of supply, the mass of solution shall be substantiated by bills of lading in as many copies as the Owner may require. Railway scales shall be as specified in the purchasing order.

   When weighing by truck tank, the mass of solution shall be determined as specified in the purchasing order.

b) Volume of solution in litres.

   The volume of solution in litres shall be measured by means of a metering device as specified in the purchasing order.

   When volumetric measurement is used, the Owner shall be provided with an invoice for each tank load of solution delivered. The invoice shall contain a note signed by the delivery person, as the official representative of the supplier of solution, indicating the total volume in litres of the delivery tanker and certifying the actual volume of solution in litres delivered in each tank load.

When calcium chloride solution is used as a dust suppressant, the mass of solution in tonnes may be converted to a mass of equivalent solid in kg. In converting the mass of solution to an equivalent mass in solid, a conversion factor for a 35% calcium chloride solution of 1 tonne of solution to 455 kg of solid shall be used.

The volume in litres of solution may be converted to an equivalent mass of solution in tonnes. In converting the volume of solution to an equivalent mass of solution, the following conversion factors shall be used:

a) 1.357 kg/litre shall be used for a minimum 35% solution.

b) 1.283 kg/litre shall be used for a minimum 29% solution.

2501.09.01.04 Calcium-Magnesium Chloride Blend

Measurement of calcium-magnesium chloride blend, at the concentration specified, shall be by one of the following methods:

a) Mass of solution in tonnes.

When shipped by railway tank car or when weighed at the source of supply, the mass of solution shall be substantiated by bills of lading in as many copies as the Owner may require. Railway scales shall be as specified in the purchasing order.

When weighing by truck tank, the mass of solution shall be determined as specified in the purchasing order.

b) Volume of solution in litres.

The volume of solution in litres shall be measured by means of a metering device as specified in the purchasing order.

When volumetric measurement is used, the Owner shall be provided with an invoice for each tank load of solution delivered. The invoice shall contain a note signed by the delivery person, as the official representative of the supplier of solution, indicating the total volume in litres of the delivery tanker and certifying the actual volume of solution in litres delivered in each tank load.

TABLE 1
Calcium Chloride Properties

Material/Property	Calcium Chloride Solution		Test Procedure
	Dust Suppressant	De-Icing	
Total Settleable Solids	-	<1% (Note 1)	PNS Test Method C
Corrosion Inhibitor	-	Minimum 70% less corrosive than Sodium Chloride	PNS Test Method B
pH (Note 2)	6 to 9	6 to 9	ASTM D1293

Notes:

1. 99% of the solids passing through a 2.00 mm sieve after being stored for 168 hours at -29 ± 1 °C.
2. Dilute 1 part product to 4 parts distilled water before attempting a reading.

TABLE 2
Calcium-Magnesium Chloride Blend Properties

Material/Property	Calcium-Magnesium Chloride Blend		Test Procedure
	Dust Suppressant	De-Icing	
Calcium Chloride ($CaCl_2$), % minimum by mass	27.0	22.0	ASTM E449
Magnesium Chloride ($MgCl_2$), % minimum by mass	As required for total $CaCl_2$ equivalence (Note 1)		ASTM E449
Total $CaCl_2$ equivalence, % minimum by mass	35.0	29.0	(Note 1)
Other Alkali Chlorides: NaCl, KCl, % maximum by mass	2.0	1.75	ASTM E449
pH (Note 2)	6 to 9	6 to 9	ASTM D1293
Corrosion Inhibitor	-	Minimum 70% less corrosive than Sodium Chloride	PNS Test Method B

Notes:

1. Total $CaCl_2$ equivalence = % $CaCl_2$ + (% $MgCl_2$ x 1.166).
2. Dilute 1 part of product to 4 parts distilled water prior to attempting a reading.