# Material Specification for Magnesium Chloride Flake and Magnesium Chloride Solution

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## Appendices

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## 2503.01 Scope

This specification covers the requirements for magnesium chloride flake and magnesium chloride solution for use as dust suppressant and de-icer.

## 2503.01.01 Significance and Use of Appendices

Appendices are not a mandatory part of this specification unless invoked by the Owner.

**Appendix 2503-A** is a commentary appendix to provide designers with information on the use of the specification in a Contract.
2503.02 REFERENCES

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

ASTM International

D 1293-99 Standard Test Methods for pH of Water

American Public Health Association - American Water Works Association - Water Environment Federation


2004 Pacific Northwest Snowfighters Snow and Ice Control Chemical Products Specifications and Test Protocols

Test Method B Corrosion Rate as Conducted from the NACE Standard TMO169-95 (1995 Revision) and as Modified by the Pacific Northwest States

Test Method C Total Settleable Solids and Percent Solids Passing on a No. 10 Sieve

U.S Environmental Protection Agency – National Environmental Publications Information System

EPA-600/R-94/111 May 1994 Methods for the Determination of Metals in Environmental Samples, Supplement 1, Method No. 200.7 - Determination of Metals and Trace Elements in Water and Wastes by Inductively Coupled Plasma - Atomic Emission Spectrometry

2503.05 MATERIALS

2503.05.01 Magnesium Chloride Flake

Magnesium chloride flake or pellets shall be in the form of loose dry flakes, be magnesium dichloride hexahydrate (MgCl$_2$.6H$_2$O), and meet the requirements of Table 1.

2503.05.02 Magnesium Chloride Solution

Magnesium chloride solution used as dust suppressant shall contain a minimum 30%, by mass, of pure magnesium chloride and shall meet the requirements of Table 1.

Magnesium chloride solution used as de-icer shall:

a) Contain a minimum of either 22 or 30%, by mass, of pure magnesium chloride as specified in the Contract Documents or purchasing order.

b) Contain a corrosion control inhibitor when specified in the Contract Documents or purchasing order.

c) Meet the requirements of Table 1.
2503.07 PRODUCTION

2503.07.01 Packaging and Delivery

Magnesium chloride flakes or pellets shall be delivered in moisture-proof 22.6 or 1,000 kg bags. Magnesium chloride solution shall be delivered by railway tank car or truck tank.

2503.07.02 Marking

Bags shall be legibly marked with the following information:

a) Name of the manufacturer.

b) Words "Magnesium Chloride Hexahydrate."

c) The concentration of pure magnesium chloride.

d) Net content mass.

2503.08 QUALITY ASSURANCE

2503.08.01 Sampling and Testing

Magnesium chloride flake and magnesium chloride solution 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 by the Owner.

2503.08.01.01 Sampling Magnesium Chloride Flake

Not less than three bags shall be selected by the Owner at random from the shipment. The contents of each bag shall be sampled 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 samples unduly to atmospheric moisture. The individual samples from each bag shall be mixed thoroughly and immediately to form a composite sample of material and then be stored and sealed in a suitable glass or plastic container.

2503.08.01.02 Sampling Magnesium Chloride Solution

Not less than three samples from each tank of each shipment shall be taken 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 samples 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.

2503.08.02 Certificate

Upon request, a manufacturer’s certificate stating that an independent laboratory has tested the product and found it to be in complete conformance with this specification shall be provided.
2503.09

OWNER PURCHASE OF MATERIAL

2503.09.01 Measurement and Payment

Magnesium chloride flake shall be measured by mass in kilograms and weighed according to the purchasing order.

Magnesium chloride solution shall be measured by mass in tonnes of solution.

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

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

As an alternative to weighing for measurement in tonnes, the solution may be measured by means of a metering device specified in the purchasing order and the volume converted to an equivalent mass in tonnes. In converting the volume of solution to an equivalent mass of solution, the following conversion factors shall be used:

a) 1.29 kg/litre shall be used for a minimum 30% solution.

b) 1.21 kg/litre shall be used for a minimum 22% solution.

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 in litres of solution delivered in each tank load.

Payment at the price specified in the purchasing order shall be for the supply and delivery of the magnesium chloride flake or magnesium chloride solution to the destination at the date and time specified.

The cost of all testing, except that performed in the Owner’s laboratory, shall be included in the price.
### TABLE 1
**Material Properties**

<table>
<thead>
<tr>
<th>Material/Property</th>
<th>Dust Suppressant</th>
<th>De-icing</th>
<th>Flake</th>
<th>Test Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium Chloride (MgCl₂) % Minimum</td>
<td>30.0</td>
<td>30.0</td>
<td>22.0</td>
<td>46.0</td>
</tr>
<tr>
<td>Potassium (K) % Maximum</td>
<td>0.5</td>
<td>0.5</td>
<td>0.4</td>
<td>--</td>
</tr>
<tr>
<td>Sodium (Na) % Maximum</td>
<td>0.7</td>
<td>0.7</td>
<td>0.6</td>
<td>--</td>
</tr>
<tr>
<td>Calcium Chloride (CaCl₂) % Range</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>2.0 - 3.0</td>
</tr>
<tr>
<td>Potassium Chloride (KCl) % Range</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.5 - 1.0</td>
</tr>
<tr>
<td>Sodium Chloride (NaCl) % Range</td>
<td>--</td>
<td>--</td>
<td>--</td>
<td>0.5 - 1.0</td>
</tr>
<tr>
<td>Total Settleable Solids</td>
<td>--</td>
<td>&lt;1% (Note 1)</td>
<td>--</td>
<td>PNS Test Method C</td>
</tr>
<tr>
<td>Corrosion Inhibitor</td>
<td>--</td>
<td>Minimum 70% less corrosive than Sodium Chloride</td>
<td>--</td>
<td>PNS Test Method B</td>
</tr>
<tr>
<td>pH range (Note 2)</td>
<td>6 to 9</td>
<td>--</td>
<td>ASTM D 1293</td>
<td></td>
</tr>
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</table>

**Notes:**

1. 99% of the solids passing through a 2.00 mm sieve after being stored for 168 hours at -17.8°C ± 1°C.
2. Dilute 1 part product to 4 parts distilled water before attempting a reading.
Appendix 2503-A, Commentary for OPSS 2503, November 2005

Note: This appendix does not form part of the standard specification. It is intended to provide information to the designer on the use of this specification in a Contract.

Designer Action/Considerations

The designer should specify the following in the Contract Documents or purchasing order:

- Concentration of de-icer. (2503.05.02)

The designer should determine if the following is required and, if so, specify it in the Contract Documents or purchasing order:

- Corrosion inhibitor. (2503.05.02)

The designer should ensure that the Ontario Provincial Standards General Conditions of Contract and the 100 Series General Specifications are included in the Contract Documents.

Related Ontario Provincial Standard Drawings

None.