DMS-6400, De-icer/Anti-icer (Magnesium Chloride/Sodium Chloride)

Overview


This Specification governs for the Quality Monitoring Program (QMP) for safe de-icer/anti-icer and describes procedures that will identify prequalification requests and procedures; disqualification; sampling; requalification; and quality control (QC) and material requirements.

Chemical and Physical Composition for Magnesium Chloride

Magnesium chloride-based, corrosion-inhibiting material must conform to the following requirements.

The magnesium chloride must be active at an ambient temperature of at least -15°C (5°F). If active at this temperature, the de-icer/anti-icer will melt ice on roadways and bridges.

Chemical Properties

The following table outlines the chemical requirements of the material.

<table>
<thead>
<tr>
<th>Chemical Properties</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Magnesium Chloride Concentration</td>
<td>26 to 30% (Liquids) 18 to 21% (Solids)</td>
</tr>
<tr>
<td>Cyanide</td>
<td>0.20 ppm maximum</td>
</tr>
<tr>
<td>Chromium</td>
<td>0.5 ppm maximum</td>
</tr>
<tr>
<td>Cadmium</td>
<td>0.15 ppm maximum</td>
</tr>
<tr>
<td>Sulfate</td>
<td>0.5% maximum</td>
</tr>
</tbody>
</table>

1Except a 1% solution will be used. (To prepare a 1% solution, place 10 mL [0.34 fl. oz.] of sample into 500 mL [17 fl. oz.] distilled or DI water contained in a 1 L [1 qt.] volumetric flask to which 2.5 mL [0.08 fl. oz.] 1 + 1 sulfuric acid has been added. Swirl the contents and make up to 1000 mL [34 fl. oz.] with distilled water.)

Physical Properties

The following table outlines the physical property specifications of the material.

<table>
<thead>
<tr>
<th>Physical Properties</th>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH, ASTM E 70-90</td>
<td>6-9</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.24 to 1.28 (Liquids)</td>
</tr>
<tr>
<td>Corrosive Property, Test Method “Tex-624-J, Corrosion Test of De-icers and Anti-icers”</td>
<td>70% less corrosive than NaCl</td>
</tr>
</tbody>
</table>
Frictional Analysis, per PNS specification: 0.3 minimum
Settleable Solids and Solidification, “Tex-625-J, Determining Settleable Solids and Solidification” 1% maximum

Unless otherwise specified, the Department will allow appropriate industry accepted methods of wet titration and instrumental testing.

**Chemical and Physical Composition for Sodium Chloride (De-Icing Salt)**

The sodium chloride may be obtained from either natural deposits (rock salt), or produced artificially (evaporated, solar, or other salt). The material must be in a free-flowing, usable condition when received.

Sodium chloride furnished under this Specification must meet or exceed the following requirements.

**Chemical Properties**

The following table outlines the chemical property specifications of the material.

<table>
<thead>
<tr>
<th>Chemical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Property</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Chlorides, as NaCl (% by weight), ASTM &quot;D 632, Standard Specification for Sodium Chloride,&quot; Paragraph A1</td>
</tr>
<tr>
<td>Sulfate, %</td>
</tr>
</tbody>
</table>

\(^3\)Grind at least a 20-g portion of the reduced sample to pass a No. 50 (300 mm) standard sieve. Use 2 mL (0.068 fl. oz.) potassium chromate instead of 3 mL (0.10 fl. oz.).

**Physical Properties**

The following table outlines the physical property specifications of the material.

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Property</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>Particle size, ASTM &quot;C 136 Standard Test Method for Sieve Analysis of Fine and Course Aggregates,&quot; (% by weight) retained on sieve size</td>
</tr>
<tr>
<td>No. 8 (2.36 mm)</td>
</tr>
<tr>
<td>No. 30 (600 µm)</td>
</tr>
</tbody>
</table>

\(^4\)Sample must not be moistened as directed ASTM C136, 4.1.

The material supplied must not have constituents which would cause residual waste to meet the definition of a hazardous waste, as found in 40 CFR 261.
Quality Monitoring Program

Prequalified Materials List

The Materials and Pavements Section of the Construction Division (CST/M&P) maintains a prequalified list of all materials conforming to the requirements of this program. Materials appearing on the prequalified materials list for de-icers and anti-icers require no further testing unless deemed necessary by the Project Engineer or CST/M&P. To obtain a place on this list, the product must be accepted into the QMP. Materials not on the list require project specific testing.

Prequalification Requests

Submit a written request for QMP prequalification to: Texas Department of Transportation, Construction Division, Materials and Pavements Section (CP-51), 125 E. 11th Street, Austin, TX 78701-2483.

Include the following information in the request:
  company name
  physical and mailing addresses
  type of material
  contact person and telephone number.

Prequalification Procedures

After receiving a request for QMP prequalification, CST/M&P will use the following procedure to approve the material.

The producer will provide a laboratory test report with test data showing compliance of the material with the requirements stated in this Specification.

The producer will submit a minimum of 1 sample (at least 1 gal.) for each de-icer to be considered for prequalification.

CST/M&P will test each sample according to the tests outlined in this Specification. An adequate correlation, as determined by CST/M&P, will be established between producer and CST/M&P test results. The material will be rejected if a correlation is not established or if the material does not meet the requirements.

CST/M&P will place passing materials on the prequalified materials list. Once on the list, report any change in formulation or manufacturing process to CST/M&P. Any changes in the material require resubmission for prequalification.
Quality Monitoring Requirements

Materials in the QMP must be prequalified every year. The prequalification period is from July 1 to June 30. Provide 1 prequalification sample and 2 QC testing reports during each prequalification period.

Prequalification Sample

Submit a sample of each prequalified material every prequalification period to CST/M&P for testing and, to allow sufficient time for testing, submit sample at least one mo. before the beginning of the prequalification period.

Any material not submitted on time may be delayed in posting on the prequalified materials list.

Quality Control (QC) Testing Reports

The Department requires that all producers in the QMP perform QC testing on their material. Testing is required for every material that is prequalified under the QMP. Submit QC testing reports to CST/M&P twice per prequalification period. The report must reflect the test data from each batch of prequalified de-icer regardless of the destination of the material. The monthly report must contain the following information:

- type of de-icer
- date of manufacture
- batch number
- quality monitoring test results.

Submit reports by the first business day of the months of October and January.

Random Testing and Auditing

The Department reserves the right to:

- conduct random sampling of prequalified materials for testing, and
- perform random audits of test reports.

Department representatives may sample material from the manufacturing plant, the project site, and the warehouse.

CST/M&P reserves the right to:

- test samples to verify compliance with this Specification, and
- inspect and approve the QC testing laboratory to ensure that all criteria meets equipment and test procedures.

Producers should also maintain a complete record of all test reports for the previous and current calendar year.
Disqualification and Requalification

Disqualification and removal of a product from the prequalified materials list may occur if:

- material tested by CST/M&P fails to meet the requirements stated in this Specification, or
- the producer fails to properly submit complete QC testing reports or prequalification sample, or
- the producer fails to report changes in the formulation or production process of the material.

If disqualified, the producer will not be allowed to supply material to the Department for six mo. or as determined by the Director of CST/M&P. After this period has expired, the producer must requalify to regain QMP status. Disqualification will only apply to the de-icer type corresponding to the infraction.

If a producer desires to requalify after this disqualification period, the producer must first submit a request to CST/M&P and include the test report with data certifying that the de-icer meets the material requirements in this Specification. Once accepted, all procedures and requirements as stated in 'Prequalification Procedures' apply.

Testing

Costs of testing are normally borne by the Department. However, the costs of sampling and testing materials failing to conform to the requirements of this Specification will be borne by the manufacturer. The Director of CST/M&P will establish the rate of sampling and testing costs of failing material in effect at the time of testing.

Amounts due the Department for conducting such tests will be charged to the producer of the failing material.

Documentation

The material supplied must include the following documentation:

- current, clearly legible Material Safety Data Sheet (MSDS)
- clear documentation of its percentage of concentration of magnesium chloride
- an application rate table that clearly states the manufacturer/vendor/supplier recommended rate for the various conditions of use at the place of delivery
- shelf life of material
- a Friction Analysis Report on all products. (Any certified lab that is set up to run the test as a function of humidity and for the type of roadway [asphalt or concrete] specified may perform the test. Required information includes: hard data, graphical analysis, and a write-up about the product typically with comparison information.)
♦ information on how low temperatures will affect storage of liquid material
♦ clear documentation on proper storage
♦ certification that any MgCl supplied meets test methods SHRP-H-205.2 for effectiveness (Strategic Highway Research Program Handbook of De-icer Test Methods).

Delivery and Equipment

The vendor is responsible for assuring delivery and complete transfer of the material through properly calibrated metered pumps for liquids or certified scales for solids and for all necessary equipment to transfer the material to existing storage facilities.

The product, including corrosion inhibitor, must be completed at the original manufacturing plant location. Post adding of corrosion inhibitors or any other ingredients and splash mixing is not allowed.

Packaging and Labeling

Package material as stated in the bid invitation. Packaging must protect material from moisture under normal storage conditions and must permit safe dispensing under a variety of storage and weather conditions.

A bill of lading with the following information must accompany each shipment:

♦ product's name, supplier and manufacturer and destination
♦ unit of measurement and number of units being delivered
♦ total weight of delivery (certified scale ticket)
♦ lot number of products being delivered (number must enable purchaser to track a delivered product back to its manufacture point, date of manufacture, and specific batch), and
♦ shipper information, including the name of the shipping company; tank, trailer, or rail car number; and point and date of origin.

Measurement

Measure and deliver the de-icer/anti-icer to the designated locations as directed on the invitation to bid.

Archived Versions

Archived versions of “DMS 6400, De-icer/Anti-icer (Magnesium Chloride/Sodium Chloride)” are available through the following links:
Click on 6400-0601 for the Specification effective June 2001 through August 2003.