

STATE OF KANSAS
SPECIFICATIONS
FOR
MAGNESIUM CHLORIDE DE-ICER/ANTI-ICER

The following specifications apply to purchases of **MAGNESIUM CHLORIDE DE-ICER/ANTI-ICER** for the Kansas Department of Transportation. The State reserves the right to waive minor technicalities under this specification.

1.0 DESCRIPTION:

This specification covers an effective and environmentally safe liquid de-icer/anti-icer to be used for snow and ice removal on all pavement surfaces. The material must be active at an ambient temperature of at least -15°C (5°F) to melt ice on roadways and bridges.

2.0 REQUIREMENTS:

2.1 Chemical Requirements:

2.1.1 Magnesium Chloride, %	29 minimum
2.1.2 Total Phosphates, ppm	25 maximum
2.1.3 Cyanide, ppm	0.20 maximum
2.1.4 Chromium, ppm	0.5 maximum
2.1.5 Cadmium, ppm	0.15 maximum
2.1.6 Calcium, ppm	100 maximum
2.1.7 Sulfate, %	0.8 maximum
2.1.8 pH	6-9*

*Exception to pH requirements: Recent testing has concluded that brines inhibited with organic matter that generate weak organic acids may exhibit lower pH values. Corrosion testing has indicated the weak organic acids enhance the corrosion inhibiting power of the products. Due to this, the pH requirement on materials that contain organic matter may be waived. Suppliers must apply for the waiver and provide information as to what the organic matter is and its concentration in the product. The Department reserves the right to use any and all tests to verify the supplier data.

2.2 Physical Requirements:

2.2.1 Specific Gravity	1.28 minimum
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2.2.2 Corrosive Property	65% less corrosive than NaCl
2.2.3 Settleable Solids, % (V/V)	1.0 maximum

3.0 TEST METHODS:

- 3.1 Magnesium Chloride. Determine by atomic spectroscopy as described in "Standard Methods for the Examination of Water and Waste Water", APHA-AWWA-WPCF.
- 3.2 Total Phosphates. "Standard Methods for the Examination of Water and Waste Water", APHA-AWWA-WPCF with the following exception. Use a 1% solution. Prepare the solution by adding 10ml of sample to 500ml of distilled water contained in a 1000ml volumetric flask. Add 2.5ml of 1-1 sulfuric acid, swirl to mix, and then add distilled water until the final mix solution totals 1000ml.
- 3.3 pH. Use ASTM E70. Prepare a solution of one part de-icer to four parts distilled water for analysis.
- 3.4 Corrosive Property. Test Method NACE Standard TM-01-69 (1976 Revision) using 30ml of a 3% solution per square inch of coupon surface.
- 3.5 Settleable Solids. Store material in an Imhoff Cone at 17.8°C (+/- 1°C) for 168 hours. 99% of the solids must pass a #10 sieve.

4.0 BID QUALIFICATION:

Bidders must submit with the bid response, certification stating the Magnesium Chloride concentration (%) of the product being quoted. The basis for low bid will be determined by the following formula:

$$\frac{\text{Delivered Price}}{\text{Concentration \% (as a whole \#)}} = \text{price per unit of de-icer/anti-icer chemical}$$

Example:

$$(1) \quad \frac{\$60.00}{29} = \$2.07 \text{ per unit of de-icer chemical}$$

$$(2) \quad \frac{\$61.00}{30} = \$2.03 \text{ per unit of de-icer chemical}$$

Based on the above calculations, the low bid would be #2.

For qualification testing, the apparent low bidder will be notified and will be required to submit the following items:

- 4.1 Approximately 4-liters of the Magnesium Chloride solution.
- 4.2 A certification of compliance that the material furnished complies with all applicable requirements.
- 4.3 A copy of an certified independent laboratory test report identifying all chemical and physical properties. Appropriate industry-accepted methods of wet chemistry and instrumental methods for chemical analysis will be allowed unless otherwise specified.
- 4.4 A current, legible Material Safety Data Sheet.

5.0 DELIVERY:

The de-icer/anti-icer must be measured and delivered to the designated locations as directed on the invitation to bid. Vendor must assure delivery and complete transfer of the material through properly calibrated metered pumps. The vendor is responsible for all necessary equipment to transfer the material to Department storage facilities. Supply the following documentation with each delivery.

- 5.1 Evidence of percentage of Magnesium Chloride.
- 5.2 An application rate table that clearly states the manufacturer/vendor/supplier recommended rate for the various conditions of use at the place of delivery.
- 5.3 Documentation on proper storage.
- 5.4 Information on how low temperatures will affect storage of the material.
- 5.5 A current, legible Material Safety Data Sheet.

6.0 PACKAGING & LABELING:

Ship product in clean tanks designed to transport liquid Magnesium Chloride. A bill of lading must accompany each shipment and contain the following information:

- 6.1 Name of product.
- 6.2 Supplier and manufacturer of product.
- 6.3 Destination of product.

- 6.4 Unit of measurement and number of units being delivered.
- 6.5 Total weight of delivery (certified scale ticket).
- 6.6 Lot number of product being delivered (number must enable purchaser to track a delivered product back to its manufacture point, date of manufacture, and specific batch).
- 6.7 Shipper information including the name of the shipping company; tank, trailer, or rail car number; and point and date of origin.

7.0 SAMPLING:

Samples of Magnesium Chloride will be taken as directed by the Engineer. Samples may be taken at the point of manufacture, from intermediate storage, from the truck at delivery, or from the Department's receiving tank as long as it was empty prior to delivery. For samples taken at the point of delivery, a 4-liter sample will be taken from the transfer hose only after one half of the load has been discharged. Samples may be taken from the delivery container with a bailer tube. Mark the samples with location, date, time of delivery, and delivery ticket number.

If a sample fails to comply with specification requirements, all deliveries will cease until the Engineer determines that the required specifications are being met and that adequate quality control has been re-established.

The vendor will be responsible for the cost of removal and cleanup of all delivered material that does not comply with this specification.

8.0 PAYMENT:

The accepted quantities of Magnesium Chloride de-icer/anti-icer, measured as provided under 5.0 Delivery of this specification, will be paid for at the unit bid price. This price will be full compensation for furnishing all materials, labor, certifications, samples, testing, equipment, and hauling involved in producing and delivering the specified product to the designated location(s).