



Infrastructure and Transportation

SPECIFICATIONS FOR THE APPROVAL, SUPPLY, AND APPLICATION OF DUST CONTROL

Specification No. 1280

March 2011

SPECIFICATIONS FOR THE APPROVAL, SUPPLY, AND APPLICATION OF DUST CONTROL

1280.1.0 Scope

This Specification governs the approval, supply and application of chemicals used for dust control and stabilization on gravel roads.

.1.1 References

ASTM D 98 – Standard Specification for Calcium Chloride

ASTM D 1293 – Standard Test Methods for pH of Water

ASTM D 1429 – Standard Test Methods for Specific Gravity of Water and Brine

ASTM E 449 – Standard Test Methods for Analysis of Calcium Chloride

Pulp and Paper Association of Canada

Standard H1 – Determination of Solids Content of Pulp and Paper Mill Effluents

Standard Methods for the Examination of Water and Wastewater,
3120 – Metals by Plasma Emission Spectroscopy

1280.2.0 Materials

Manitoba Infrastructure and Transportation (MIT) will specify delivery and application of one or more of the following products:

1. 38% Liquid Calcium/Magnesium Chloride
2. 35% Liquid Calcium/Magnesium Chloride
3. 34% Liquid Calcium/Magnesium Chloride
4. 30% Liquid Calcium/Magnesium Chloride
5. 77% Flake Calcium/Magnesium Chloride
- 6. 32.6% Liquid Magnesium Chloride**
7. 30.3% Liquid Magnesium Chloride
8. 28% Liquid Magnesium Chloride
9. Lignosulfonate - Solution (Liquid)
10. Lignosulfonate - Solution & Carbohydrates (Liquid)

.2.1 Specification for Supply of Material

The chemicals shall comply with the requirements of Table 1.

.2.2 Chemical Requirements

Liquid Calcium/Magnesium Chloride (Ca/MgCl₂) shall be composed of CaCl₂ or a

combination of CaCl₂ and MgCl₂.

The quantity for chloride chemicals shall be calculated to achieve strength equivalency with a 77% pure flake calcium chloride (CaCl₂).

2.2.1 Water

Water used in the solution shall be free of contaminants that could adversely affect either field material performance or the environment.

Table 1: Chemical Specification

Requirements	CHEMICAL									Test Method ⁽¹⁾
	Calcium/ Magnesium Chloride Liquid				Calcium/ Magnesium Chloride Flake	Magnesium Chloride Liquid			Lignosulfonate (Liquid)	
									Solution	
Minimum Concentration Percentage (by mass) ⁽²⁾	38%	35%	34%	30%	77%	32.6%	30.3%	28%		ICP-AES as described in "Standard Methods for the examination Water and Waste Water", Sec. 3120, APHA-AWWA-WEF
Gradation (Percent Passing) 9.5 mm 4.75 mm 600 :m					100 80-100 0-5					ASTM D98
Minimum Percentage of Total Solids (by mass)									27%	Canada Pulp and Paper Association Standard Method H.1
Product Specific Gravity	1.38	1.35	1.35	1.30			1.30	1.28	1.125	ASTM D-1429
pH									3-8	ASTM D-1293
Equivalency %	88	98	100	118		88	100	108		
NOTES: 1. All Test Methods refer to the current version. 2. Alkali Chloride determination, as required for Minimum Concentration analysis, is calculated by use of ASTM E449.										

1280.3.0 Pre-Approval of Suppliers

Products that have been approved and are on the Department's Product Standards List, do not need to go through the procedures in sections 3.1, 3.2 and 3.3.

.3.1 Sampling

If a product has not been approved by the Department, a three-litre sample of the applicable liquid chemical or 30 Kg of flakes shall be supplied clearly labelled and sent to:

Manager, Materials Engineering Central Lab
Manitoba Infrastructure and Transportation
1181 Portage Avenue (Annex)
Winnipeg, Manitoba R3G 0T3

If the chemical in the requisition is classified as a Controlled Product, as defined in the Hazardous Products Act, Canada, and the Supplier has not previously submitted a Material Safety Data Sheet to THE DEPARTMENT, then the Supplier at the time of submitting the tender shall submit a valid Material Safety Data Sheet and any required updates to both the above address and to the following address:

Manager, Occupational Safety, Health & Risk Management
Manitoba Infrastructure and Transportation
17th Floor, 215 Garry Street
Winnipeg, Manitoba R3C 3Z1

Suppliers shall, in the submission for approval, include the following information:

1. Technical data and chemical composition (ion concentration mg/L) of the product to be supplied,
2. Names, addresses and telephone numbers of sales agents, dispatchers and technical support staff.

.3.2 Sample Testing

All samples submitted shall be tested by the Department or a lab accredited by Standards Council of Canada (SCC) or Canadian Association for Environmental Analytical Laboratories (CAEAL).

Suppliers will be notified of the test results in writing.

1280.3.3 Approval and Acceptance

Materials that meet the requirements of Section 2.0 shall be approved by the Department. Materials that do not meet the requirements of Section 2.0 will be rejected.

All suppliers will be notified of the results in writing within 15 working days of submission of samples.

.3.4 Bidding

All products must be pre-approved prior to submission of tenders.

The Supplier must clearly indicate which product he or she is bidding on. The Supplier is not allowed to substitute for another product once the contract has been awarded, unless approved by the Department.

1280.4.0 Material Supply

.4.1 Shipping

Calcium chloride in flake form shall be delivered in covered hopper trucks. Liquid dust control, shall be pre-mixed according to the Specifications, and shall be delivered to the site in tank trucks.

.4.2 Delivery

The material shall be delivered to the specified location within 48 hours of notification, excluding Saturdays, Sundays and statutory holidays, unless approved by THE DEPARTMENT.

Liquidated damages will be assessed against the Supplier for late delivery after 48 hours notification, unless waived by the Department.

The liquidated damages will be the cost incurred by THE DEPARTMENT as a result of the Supplier delay in delivery. THE DEPARTMENT's cost will be calculated as the staff time and equipment charges required to re-work a roadway as a result of a Supplier delay.

.4.3 Delivery Slip

A copy of the delivery slip detailing the chemical being shipped, its percent concentration, and quantity shall be provided to the Department's field representative at the time of delivery.

The Supplier shall provide a separate delivery slip for each truckload of product at the time of delivery. If there is no delivery slip, or incomplete information on the slip, the Department reserves the right to reject the product until the slip or complete information is produced by the Supplier.

The delivery slip shall be of sufficient size that the field representative can easily record a) the field measured specific gravity and b) the quantity of dust control distributed on separate sections of road.

1280.5.0 Field Application

The Supplier shall apply the applicable chemical on the specified highway(s) and shall work continuously until the work has been completed, unless inclement weather prevents the work.

Chemicals shall not be applied during periods of rain, nor if rain is expected within 12 hours of application, nor where the surface to be sprayed is in a saturated condition, nor where, in the opinion of the Engineer, it is impractical to carry out the operation.

.5.1 Rate of Application

Unless otherwise specified by the Engineer, the chemicals shall be applied at the following rates:

Chemical	Rate (L/m ²)	Rate m ² /t
38% Liquid Ca/MgCl ₂	0.8 - 0.9	
35% Liquid Ca/MgCl ₂	1.0 - 1.1	
34% Liquid Ca/MgCl ₂	1.0 - 1.1	
30% Liquid Ca/MgCl ₂	1.2 - 1.3	
77% Flake CaCl ₂		1480-1630 ⁽²⁾
32.6% Liquid Magnesium Chloride	0.8 - 0.9	
30.3% Liquid Magnesium Chloride	1.0 - 1.1	
28% Liquid Magnesium Chloride	1.1 - 1.2	
Lignosulfonate (Liquid)	2.0 – 2.2 ⁽¹⁾	

- NOTES: 1. In a single application unless otherwise permitted or specified by the Engineer.
2. One tonne shall be uniformly distributed over an area of 1480 to 1630 m².

.5.2 Field Sampling

One sample measuring approximately 2 litres in volume shall be obtained from each load of magnesium chloride and calcium/magnesium chloride using new containers as supplied by the Department.

The sample shall be obtained from the middle third of the load. Each sample must be clearly identified on the labels as provided by Materials Engineering. The ambient air temperature obtained in the field must also be recorded on the label.

Samples of flakes will be sent to the Department's Central Lab for analysis.

.5.3 Quality Control

.5.3.1 Rejection

Flake chemical may be rejected if it has become caked or sticky in shipment.

Liquid calcium/magnesium chloride as well as magnesium chloride may be rejected if in the opinion of the Department the sample is severely contaminated.

.5.3.2 Lab Testing

The specific gravity of each sample shall be tested in accordance with ASTM D1429. If the measured specific gravity does not meet the product specific gravity as stated in Table 1, the "Minimum Concentration Percentage (by mass)" of the sample shall be determined by Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES), as described in "Standard Methods for the examination Water and Waste Water", Sec. 3120, APHA-AWWA-WEF.

Random samples and additional samples (at the discretion of the Department) will also be tested to determine the "Minimum Concentration Percentage (by mass)".

All samples tested for minimum concentration that did not meet the requirements shall be subject to a pay adjustment in accordance to Section 8.1.

.5.4 Distributor

The pressure distributor shall be propelled by a power unit capable of accurately maintaining any speed required for spraying and shall be provided with the following minimum equipment:

- (1) A pump capable of developing a constant uniform pressure in the spray bar.
- (2) A rear or centre-mounted spray bar having a positive and instant shut off, which can be set parallel to the surface. The spray bar shall be at least 2.4 m wide and shall be equipped with a pressure gauge accurate to 15 kPa.
- (3) Spray bar nozzles, which shall ensure uniform fan shaped spray without atomization, shall all be of the same manufacturers and size. Nozzles shall be set in the spray bar at angles which will allow each spray pattern to overlap the other in such a manner that should there be a malfunction of one nozzle, the nozzle on either side would substantially spray the area which would otherwise be missed. However nozzles shall be cleaned immediately.
- (4) A strainer installed in the feed system to prevent clogging of the spray bar and nozzles.

- (5) A transparent standpipe shall be located at the front or the rear of the tank and be accurately graduated in 500 litre increments so as to be able to verify quantities delivered and distributed. Provision shall be made to allow the Engineer to verify the accuracy of the increments on the standpipe.
- (6) When shoulder spraying, splash guards or other approved devices shall be provided which will permit spraying immediately adjacent to the pavement without spraying on the pavement surface.
- (7) A warning light shall be mounted on the vehicle roof or in an elevated position so as to be visible to traffic and shall be operating when the distributor is working or stopped on the roadway.

The warning light shall consist of an electrically driven revolving sealed beam within a weather tight amber enclosure or other approved device producing a similar result. The flash shall be visible in daylight under normal atmospheric conditions for a distance of one kilometre. The light shall flash between 50 and 70 times per minute.

- (8) A spray monitor or an automatic rate controller system readily visible and accessible to the Department. The spray monitor and controller shall be calibrated for the type of material being applied.

The Supplier's distributor must be equipped with a metering system, capable of determining variable application rate (eg. in litres per square meters), and readily visible and accessible to Department staff.

The Supplier shall specify the variable rate metering system in the tender and the Department shall approve the system before awarding the tender. The metering system indicated in the tender may be verified on-site by the Department prior to application of the product.

1280.6.0 Method of Measurement

Liquid calcium/magnesium chloride, chloride brine and lignosulfonate shall be measured in litres.

Flake calcium chloride shall be measured by the tonne.

1280.7.0 Equivalencies

Equivalencies shall be calculated using the following equation:

$$\text{Equivalency} = \frac{(4.14) \times 100 \times \text{Molecular Weight}}{\text{concentration} \times (1000) \times (S.G.)}$$

Where:

- Concentration = % Mass of the Compound in the Sample Being Analysed
- Molecular Weight = g/mole
- Standard of Comparison: CaCl₂/MgCl₂
 - @ 34 % by mass concentration
 - @ 1.35 specific gravity
 - @ 4.14 moles/L @ 110.990 (g/mole)
- SG: Specific Gravity

The moles/L of the desired liquid (MgCl₂, or CaCl₂/MgCl₂) is calculated and compared with the standard which is 4.14 moles/L.

Table 2 - Equivalency Table

Chemical	Concentration (Min) % by mass	Specific Gravity (Min) g/mL	Molecular Weight g/mole	moles/L	Equivalency %
Ca/Mg Chloride	34	1.35	110.990	4.14	100
	35	1.35	110.990	4.26	98
	38	1.38	110.990	4.72	88
	30	1.30	110.990	3.51	118
Magnesium Chloride	32.6	1.36	95.220	4.72	88
	30.3	1.30	95.220	4.14	100
	28	1.30	95.220	3.82	108

Table 2 compares different concentrations of calcium/magnesium chloride and magnesium chloride to the standard by calculating the equivalency needed to provide the same amount of dust palliative in units of moles/L.

1280.8.0 Basis of Payment

The unit price for each litre or tonne of applicable chemical will be payment in full for supplying, delivering and applying chemical on the road and for performing all operations necessary or incidental thereto.

8.1 Adjustment to Payment

Payment for products found not complying with the product "Minimum Concentration Percentage (by mass)" of this specification after application shall be reduced as follows:

$$\text{Revised payment} = \frac{\text{unit price} \times \text{measured concentration}}{\text{Bid concentration}}$$

not to exceed 100% of the bid payment.

Where:

- Bid concentration is specified for each chemical in Table 1.
- Measured concentration using Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES), as described in "Standard Methods for the examination Water and Waste Water", Sec. 3120, APHA-AWWA-WEF.

Pay adjustments will be applied where the revised payment is less than 97%, as follows:

- An adjustment will be applied to each load that is out of specification, as stipulated above.
- The cost of lab testing and a \$100.00 administration fee shall be paid by the Supplier for each out of specification load.

If the revised payment is below 80%, then no payment for this product shall be made and the product will be deemed unacceptable.

.8.2 Security

Prior to the Department awarding the materials contract, the low bidder shall provide the Department with a Letter of Credit for a value of 7.5% of the bid. The Letter of Credit shall be in effect until March 1 following the dust control season. The Letter of Credit will be released to the Supplier after performance testing indicates the concentration strength meets the Department's specification. Where testing indicates the concentration strength does not meet the Department's standards, the Department will place a claim against the Supplier's Letter of Credit.