LIQUID CALCIUM CHLORIDE MGS-92-07F

1.0 DESCRIPTION. This specification covers Liquid Calcium Chloride for use as a deicer for maintenance purposes.

2.0 MATERIALS.

2.1 Liquid Calcium Chloride. The percent liquid calcium chloride ($CaC1_2$) shall be 32 ± 1 percent when tested in accordance with MoDOT Test Method T48 included in Annex A of this specification.

3.0 PACKAGING.

3.1 The supplier shall furnish the truck driver a copy of the bill of lading, manifest, or truck ticket to be delivered to MoDOT personnel prior to unloading, showing the following information regarding the shipment:

(a) Type of Material.
(b) Purchase Order Number.
(c) Consignee.
(d) Truck Number.
(e) Weights of truck before and after loading and net weight.
(f) Destination.
(g) Date Loaded.
(h) Name and location of the source.
(i) The percent $CaC1_2$ for Liquid Calcium Chloride, typical of the material delivered.
(j) A Certification Statement.

3.1.1 The certification statement shall be signed by an authorized representative of the Supplier and substantially as follows:

"This certifies that the Liquid Calcium Chloride in this shipment complies with MoDOT specifications and the weights shown hereon were obtained on scales approved by and/or certified by the State of Missouri and are correct within the specified scale requirements."

3.1.2 The requirements for platform scales for weighing liquid calcium chloride are shown in Annex B of this specification.

4.0 ACCEPTANCE.

4.1 Acceptance of the material will be on the basis of the manufacturer's certification and satisfactory compliance with this specification as determined by inspection and samples deemed necessary by the engineer at the point of manufacture, intermediate storage, from the truck at delivery, or from the MoDOT receiving tank if it was empty before delivery.

4.2 If a sample fails to comply with the material requirements herein specified, all deliveries shall cease until such time as the engineer determines that adequate quality control has been

re-established.

4.3 If tests performed by the engineer show the material is not in compliance with the proper chemical composition, the engineer may opt to accept the material based on the agreed price being adjusted as follows:

$$\text{Adjusted Unit Price} = \frac{AP \times UP}{SP}$$

Where:

AP = Actual percent Calcium Chloride as determined by Engineer's Test Results (%)
UP = Unit Price
SP = Specified minimum percent Calcium Chloride as shown herein.

5.0 ORDERING INFORMATION.

5.1 Ordering information must include specified measure units for the unit price. "Per ton" [Mg] is recommended.

ANNEX A

Test Method
MoDOT T48
DETERMINATION OF THE PURITY OF CALCIUM CHLORIDE

1.0 SCOPE.

1.1 This method describes a procedure for determining the purity of Calcium Chloride intended for use in snow and ice removal.

2.0 REAGENTS AND APP ARATUS.

2.1 Reagents and Apparatus as described in MoDOT Test Method T26.

3.0 PROCEDURE.

3.1 Weigh, to the nearest 0.1 mg, a sample of the material sufficient to contain 1.45 to 1.55 grams of anhydrous $CaCl_2$. Transfer to a 1000 ml volumetric flask and add 200 ml H_2O. Add a few drops of HCl, Specific Gravity 1.19, to clear the solution. Add by pipette, 25 ml of the $MgCl_2$ solution. Make just alkaline to Methyl Red with NH_4OH, and dilute to volume. Determine the calcium by titrating a 20 ml aliquot, using the method described in MoDOT Test Method T26.

4.0 CALCULATIONS.

4.1 Calculate the percent Calcium Chloride as follows:

$$\% \, CaCl_2 = \frac{\text{ml of titration x Fca x 50 x 0.0495}}{\text{Wt. of Sample}}$$

Report as:

% Calcium Chloride ($CaCl_2$) to the nearest 0.1 percent

ANNEX A (continued)

Test Method
MoDOT T26
DETERMINATION OF CALCIUM CARBONATE
AND MAGNESIUM CARBONATE
IN LIME AND PIGMENT MATERIALS

1.0 SCOPE.

1.1 This method describes a procedure for determining the percent Calcium Carbonate and percent Magnesium Carbonate in Agricultural Lime and Calcium Carbonate paint pigments.

2.0 REAGENTS AND APPARATUS.

2.1 (a) Sargent - Malmstadt Automatic Spectro-Electro titrator, Model S-29700

(b) Hexaver Solution
Dissolve 65 gm Hexaver (Disodium Dihydrogen 1,2 Cyclohexanediaminetetracetate) in 2.0 liters of H_2O

(c) Magnesium Chloride Solution
Dissolve 8.00 gm $MgCl_2.6H_2O$ (Reagent Grade) in H_2O and dilute to 1 liter

(d) Calcon Indicator
Dissolve 0.30 gm Calcon in 50 ml of Methanol

(e) EBT Indicator
Dissolve 0.30 gm of Erichrome Black T in 50 ml of Methanol

(f) Potassium Hydroxide Solution
Dissolve 100 gm KOH (Reagent Grade) in 200 ml H_2O

3.0 STANDARDIZATION OF HEXAVER SOLUTION.

3.1 (a) Weigh 0.5801 gm Calcium Carbonate (Primary Standard Grade) and transfer to a 500 ml volumetric flask. Slowly add 15 ml HCL (Sp.Gr. 1.19), and boil for a few minutes to expel CO_2. Add 2 gm NH_4CL (Reagent Grade) and 200 ml H_2O. Add with a pipette 10.00 ml of the $MgCl_2$ solution, and make alkaline to methyl red with NH_40H (Sp.Gr. 0.90). Cool to room temperature and dilute to volume.

(b) Turn on the power switch of the automatic titrator and allow to warm up for about 15 minutes. Set the controls as folbws:

Function Switch - Spectro
Polarity Switch - No. 2
Wavelength Selector - 650
The Hupp Cadmium Sulfide photocell should be used.

Pipette 25.00 ml aliquots into two 100 ml tall form beakers. To one beaker add 3 ml KOH Solution, 10 ml H_2O, and 10 drops of Calcon indicator. Place the beaker on the titration platform and start the titrator. The burette should be adjusted so that the rate of delivery is about 45 seconds between the 35 ml mark and the 45

ml mark. When the titrator shuts off, record the burette reading as Tca. To the second beaker, add 10 ml NH_4OH and 8 drops of EBT Indicator. Titrate as described above, and record the burette reading as Tmg.

Calculate the Calcium and Magnesium equivalents of the Hexaver as follows:

$$\text{CaO Equiv. } (F_{ca}) = \frac{65}{T_{ca}}$$

$$\text{MgO Equiv. } (F_{mg}) = \frac{F_{ca}}{1.391}$$

$$K = T_{mg} - T_{ca}$$

4.0 PROCEDURE.

4.1 Weigh 0.5000 gm sample of the material and transfer to a 250 ml beaker. Moisten with H_2O and add 10 ml HCL. Remove the insoluble matter, SiO_2, and R_2O_3 by the methods set forth in ASTM C25. Collect all the filtrates and washings from the R_2O_3 filtration in a 500 ml volumetric flask. Pipette 10 ml $MgCl_2$ solution into the flask, cool and dilute to volume.

Tritrate 25 ml aliquots for calcium and magnesium as described above in Section 3. Record the burette readings as T_{ca} and T_{mg}

5.0 CALCULATIONS.

5.1 Calculate the percent Calcium Carbonate and percent Magnesium Carbonate as follows:

$$\% \, CaCO_3 = F_{ca} \times T_{ca} \times 1.7848$$

$$\% \, MgCO_3 = F_{mg} \times (T_{mg} - T_{ca} - K) \times 2.0915$$

Report the results, to the nearest 0.1 percent, as follows:

% Calcium Carbonate ($CaCO_3$)

% Magnesium Carbonate ($MgCO_3$)

ANNEX B

SPECIFICATIONS FOR PLATFORM SCALES

1.0 Equipment for weighing material shall consist of accurate and reliable platform scales approved by MoDOT.

2.0 Calibration shall be to within an accuracy of 0.4 percent of the load applied, regardless of the location of the load on the platform. The value of the smallest unit of graduation on a scale shall be not greater than 20 pounds [10 kg]. Sensitivity requirements of scales not equipped with balance indicators shall be twice the value of the minimum graduated interval on the weigh beam, or 0.2 percent of the nominal capacity of the scale, whichever is less. For scales equipped with balance indictors, the sensitivity requirement shall be the value of the minimum graduated interval on the weigh beam.

3.0 When equipment to be weighed is of such length that all axles cannot be weighed simultaneously, a level area of portland cement concrete or asphaltic concrete pavement shall be provided permitting those axles not on the scale platform to be on the pavement during the weighing operation. The approach shall be the same width as the platform and of sufficient length to insure the level positioning of vehicles during weight determinations. The weighing shall be performed with all brakes released. When equipment to be weighed is equipped with an air bag suspension unit on any axle, the equipment including semitrailers or pup trailers shall be weighed on platform scales of sufficient size to weigh all axles of the combination simultaneously.

4.0 Scales shall have been calibrated within the six month period immediately prior to any material being delivered or any time the MoDOT representative has cause to question the accuracy of the scale. A scale acceptance shall be based on one of the following:

(a) A valid certification or seal of approval by the Division of Weights and Measures of the Missouri Department of Agricultural will be acceptable.
(b) A valid certification or seal of approval by a State of Missouri duly appointed "sealer of weights and measures" in cities or counties of seventyfive thousand population or more will be acceptable.
(c) Certification of calibration from a commercial scale service company showing that the scale meets the requirements of these specifications. The Supplier shall furnish the certification of calibration to the MoDOT representative.

4.1 Regardless of the form of acceptance, the calibration shall be within the accuracy requirements specified herein and the scales shall meet all requirements of these specifications.

4.2 Verification of a platform scale may be required of a hauling unit on another recently calibrated and certified scale.

4.3 All Cost incurred in obtaining a certification of calibration or verification shall be borne by the Supplier.