

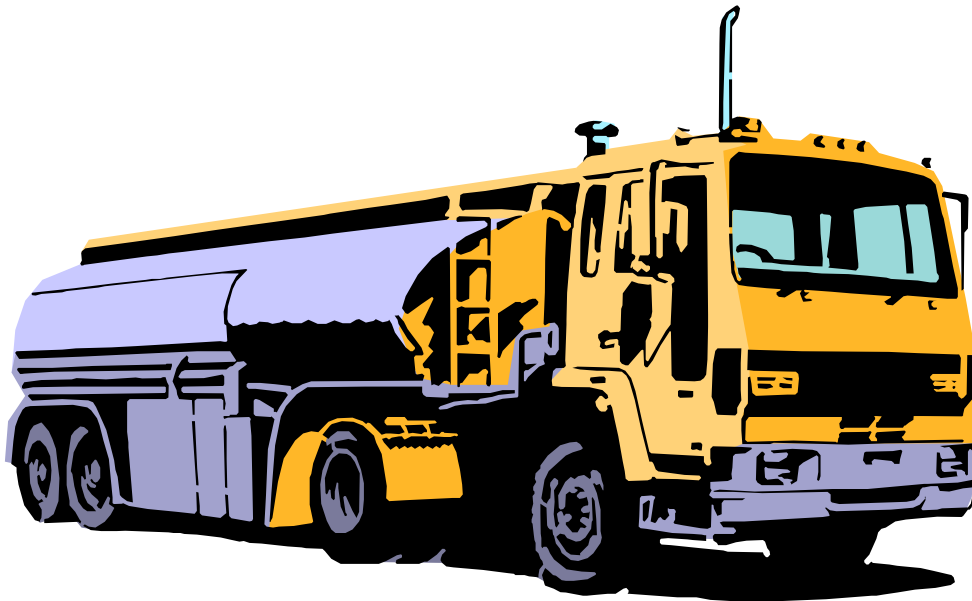
Mn/DOT Field Chemical Testing: Anti-icing and De-icing Liquids

Overview

As the number of liquid chemicals used for snow and ice control increases, so does the need for quality control. Field personnel are in direct contact with the chemical shipments and in many cases the overseers of the deliveries. To insure that liquid chemicals will perform as needed, a standardized quality assurance testing method is required.

This manual will introduce field maintenance personnel to basic tests and sampling procedures for liquid chemicals. Handling and personal protection will be covered. It will also explain the process for sending samples to the Mn/DOT Materials and Research Lab in Maplewood, MN and what information can be expected in return.

Liquid chemicals can be an important tool during the battle against snow and ice. Their use can significantly lower costs, provide a higher level of service, and maintain the safest possible driving conditions throughout the winter season in Minnesota. The use of properly blended and quality products is critical to the success of those efforts.



Field Testing - Specific Gravity

There are several different tests that can be performed in the field, at delivery sights, or elsewhere. Because of test equipment needed and related costs, our efforts will concentrate only on the specific gravity of liquid chemicals.

Hydrometers are used to measure the specific gravity of liquid solutions. There are several different types but all basically work the same. One type is allowed to float in the solution. It is weighted on one end which causes the hydrometer to float at various levels similar to a bobber used for fishing. A scale of graduations is on the unit which change according to the density of the liquid and at what depth the hydrometer is floating. This reading is the specific gravity of that solution.

Another type measures the percent of salt or other chemical in the solution. This can then be compared to a chart to get the freezing point of the solution. There are different hydrometers and charts for sodium chloride, magnesium chloride, etc. One thing that must be remembered when checking specific gravity, the temperature of the liquid must be checked and recorded.

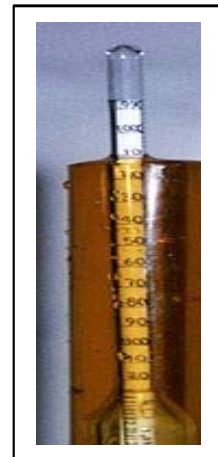
At least one sample from each load should be tested for specific gravity when solutions are received from venders. Samples should be taken directly from the delivery truck at the time of delivery. This insures that contaminants that may already exist in the storage tank are not mixed with the sample. It is imperative that the container and lid be free from all previous materials to insure the integrity of the test specimen. A clean one pint or one quart container should be used for the sample.

Do the specific gravity test immediately so that it can be determined if the solution lies within the allowable range of concentration of the active ingredient, (magnesium chloride, calcium chloride, etc.) Failure to fit into the range specified on the order is grounds for rejection of the load. Test the sample twice to insure accuracy. In the event that the load is rejected, automatically send the sample to the lab for further testing.

Every 5000 to 10,000 gallons a quality assurance sample should be taken and sent to the Mn/DOT Lab. Remember to close the lid tightly and wrap tape such as two inch masking or duct tape around the lid so that it will not work loose. This will help prevent the possibility of leakage during shipping. Place a label on the sample with the following information:

Date:
Person drawing the sample:
Your name if different from above:
Location sample was taken at:
Contact numbers:
Sample name:

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Hydrometer

Invoice number:
Requested Tests: (Standard anti or de-icing)

Box and package the sample carefully, insert a brief explanation that it is a liquid anti-icing or de-icing chemical sample, also include a copy of the M.S.D.S. sheet, and send it to:

Mn/DOT Materials and Research Laboratory
M.S. 645
1400 Gervais Ave.
Maplewood, MN 55109

Attention: James W. McGraw

Field testing insures that the chemical will do the job that's required and will give maintenance personnel the tools to do theirs. Periodic Lab testing will insure that Mn/DOT continues to receive the products that are of the highest quality and meet contract specifications.

Lab tests can take a considerable amount of time, possibly up to six months depending on what tests are to be performed. That is why specific gravity needs to be checked upon delivery in the field, and periodic quality assurance needs to be completed at the chemical lab.



Personal protection when handling chemicals

There are Material and Safety Data Sheets (MSDS) available for all chemicals used for anti-icing and de-icing. You should be aware of handling or safety hazards that may be involved with certain chemicals. Contact the Mn/DOT Safety Office in your district for more information on MSDS.

Basic personal protection devices should be used whenever working near liquid chemicals. Always wear safety goggles or safety glasses with a full face shield to protect your face and eyes. Rubber, chemical resistant gloves, aprons, and rubber boots should be worn. Many chlorides can have a very adverse effect on leather and can dry out the moisture causing excessive shrinkage.

These are all basic safety precautions when handling liquid products used for anti and de-icing. Other personal safety devices may be required depending on the chemicals and the possibility of inhalation hazards. Check the Material Safety Data Sheets for the proper equipment and precautions to be taken and follow their recommendations. Contact your Supervisor or the nearest Mn/DOT Safety Office if you cannot locate the MSDS sheets.



Step by step:

- 1. When the shipment of liquid chemical arrives check that the shipping order states what the name of the product is, the percent of active ingredients, and that all other paperwork and the MSDS sheets are in order.**
- 2. Before unloading, use a clean one pint or quart container, obtain a small amount of liquid from the drain valve on the truck tank and measure the specific gravity. Remember to check the temperature of the liquid and record it. If the specific gravity is within requirements proceed, if not, draw another sample and retest. In the event that the specific gravity is not within the order specification, reject the shipment.**
- 3. Every 5000 to 10,000 gallons a sample should be drawn and sent to the Mn/DOT Laboratory for quality assurance testing. (page 2&3) Remember to include all required names, dates, invoice numbers, and MSDS sheets and include them in the package.**
- 4. Allow sufficient time, (up to six months) and you will receive the results from the tests.**

By following the above procedures you will help insure that only quality chemicals are used for de-icing and anti-icing. This gives maintenance personnel the tools needed to provide the safest possible driving conditions throughout the winter storms in Minnesota.

For more information contact the Mn/DOT Office of Maintenance-Operations Section at Central Office, St. Paul, Minnesota, Telephone # 651/297-3598.

