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Shop focus: Snow and ice control 101

The winter of 2008-2009 is off to a wet, white, slippery start in Iowa. To remove snow and ice from roads, local agencies use a combination of strategies: anti-icing and deicing, plowing, and abrasives.

Anti-icing and deicing

Anti-icing and deicing consist of applying chemicals to the road that lower the freezing point of water.

Anti-icing is a proactive approach in which chemicals are applied to the pavement before, or at the very beginning of, a storm. The chemicals create a barrier layer that helps prevent snow and ice from bonding to the pavement surface.

Deicing is a reactive strategy of applying chemicals to the pavement after a storm to break the bond between snow or ice and pavement.

Chemicals used for anti-icing and deicing

Salt is the most common deicing material and, in the form of brine, the most common anti-icing material used in Iowa. Salt is cost-effective and, in its dry form, can provide rapid anti-skid protection while starting the melting process.

To melt snow and/or ice, salt must be in a liquid solution. The salt dissolves into the solution, lowering the freezing point of water. For effective melting action, there must be enough salt concentrated in the solution to lower the freezing point of water to a temperature that is below the current air temperature.

Salt brine is produced by circulating water through salt to achieve a desired concentration level of brine. For anti-icing, the brine is spread on the roadway before a storm begins. However, salt brine is only effective at temperatures above 20 degrees F.



Know your options for snow and ice control.

For deicing, it has become common to pre-wet salt so that some of the salt is already in solution when applied. Wet salt has another advantage: it is less likely to bounce off the road or to be blown off by traffic, saving 20 to 30 percent in wasted salt.

Salt can be pre-wet by spraying it as it is loaded into the truck or, with truck-mounted equipment, as it leaves the spreader.

Common chemicals used for pre-wetting salt are liquid calcium chloride, magnesium chloride, and salt brine.

Liquid calcium chloride and magnesium chloride are widely used because they draw moisture from the air and release heat when they dissolve. Calcium chloride has the added advantage of melting snow/ice at lower temperatures—down to 0 degrees F in proper concentrations.

Using salt brine to pre-wet is becoming more common because of its lower cost. But remember, salt brine should only be used for pre-wetting in temperatures above 20 degrees F.

Applying salt for deicing

On two-lane pavements with low to medium traffic volumes, apply a windrow of salt in a strip along the centerline. Traffic will move salt off the centerline. The salt brine will move down the pavement cross slope and toward the shoulders, melting snow and ice across the entire road width. This application pattern wastes less salt

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Acronyms in Technology News

AASHTO	American Association of State Highway and Transportation Officials
APWA	American Public Works Association
CTRE	Center for Transportation Research and Education (at ISU)
FHWA	Federal Highway Administration
Iowa DOT	Iowa Department of Transportation
ISU	Iowa State University
LTAP	Local Technical Assistance Program
MUTCD	Manual on Uniform Traffic Control Devices
NACE	National Association of County Engineers
TRB	Transportation Research Board



U.S. Department of Transportation
Federal Highway Administration



Iowa Department
of Transportation

LTAP is a national program of the FHWA. Iowa LTAP, which produces this newsletter, is financed by the FHWA and the Iowa DOT and administered by CTRE.

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and quickly gives vehicles clear pavement under at least two wheels.

On multiple-lane pavements with medium to high traffic volumes, apply salt in a pattern that covers the full width of the roadway to provide melting action over the full width of the pavement.

Plowing

Snow plowing is used to clear snow and loose ice from the road during and after a storm. Plowing can be a challenge in both rural and urban areas. Operators in rural areas face challenges such as blowing and drifting snow and decreased visibility. In urban areas, operators must deal with parked cars, narrow streets, and cul-de-sacs.

To minimize dilution and waste of deicing chemicals, plow immediately before applying chemicals to the road.

For more on snow plow operations, see the safety tips on this page and the snow plow checklist on page 4.

Abrasives

Abrasives provide little to no snow- and ice-melting capability, but they are most useful in providing traction. The most popular abrasive is sand.

Many agencies in Iowa combine sand with salt as a half-and-half mixture. This mixture helps provide some traction support with some melting capability. In a winter where salt stores may be scarce, reducing the amount of salt used can be a useful strategy.

Final thoughts

Know your route

Snow plow drivers who know their routes well can navigate them more easily and avoid hazards. Review your route before the storm.

Know traffic volumes

Traffic volumes can impact the rate of chemical application since traffic can help work salt into the snow/ice and aid the melting process. Agencies can use a lower rate of application with higher traffic volumes.

Know the weather

Weather conditions can also affect the rate of application. A windy route, for example, will be more prone to rock salt blowing around.

Iowa's Roadway Weather Information System (RWIS) can assist agencies by providing road surface temperatures and atmospheric weather data.

For more information

For more information on snow and ice control strategies, contact the Iowa LTAP's local roads safety liaison Bob Sperry, 515-294-7311, rsperry@iastate.edu. ■

Safety tips for snowfighters

Check with your supervisor and follow your agency's policies and procedures.

Suggested personal safety gear

- Layers of clothes, extra gloves, heavy boots
- Shovel and ice scraper
- Flashlight for night operations
- Sunglasses for glare
- Water and/or hot liquid

Advance preparation

- Be properly trained and thoroughly familiar with all equipment and chemicals.
- Make sure an up-to-date first-aid kit, emergency contact information, and handheld radios or cell phones are available in your vehicle.
- Be in good physical condition with adequate rest.
- Perform a pre-trip safety check of truck and equipment. Make sure the vehicle has adequate warning lights in good working order.
- Make a practice run of assigned route to check for obstacles and potential problem areas.
- Know the contact procedures for reporting crashes or equipment breakdowns.

During operations

- Dress in layers with heavy boots.
- Wear highly visible apparel when out of your vehicle.
- Plow at appropriate speed.
- Watch for pedestrians and other vehicles.
- Don't back up without a spotter.
- Operate wings carefully.
- Make sure warning lights are activated.