



Standard Operating Guideline for the use of Liquid products, Solid Deicers, and Sanding Material

ANTI-ICING: is a snow and ice control strategy in which a de-icing product, either in a liquid, solid, or pre-wetted solid form, is spread directly onto the pavement at the beginning of winter precipitation event but before any snow or ice bonds to the pavement. This action prevents a hard to remove ice or snow pack from forming during the storm by reducing the freeze point of the water in contact with the pavement. Some areas, depending on the set LOS, may anti-ice throughout the storm to maintain a wet road with timely applications of a de-icing product during the entire precipitation event as long as the amount of snow does not overwhelm the use of the melting product. It is not advised to spread liquids or solids on bare roads prior to precipitation; it could lead to unfavorable public perception if the storm does not develop. Treating the road before the storm starts and prior to the road turning wet (Pretreating) can be a waste of materials. Vehicles will pick up the applied material make a portion of it air born and track a portion of it. Applying to dry roads can also cause a slippery condition.

PRE-WETTING: The intention of prewetting sanding material is to enhance the ability of the sand to stick to the road reducing bounce or whipping off by wind or traffic. Application rate for spraying liquids on de-icer/sand piles or to hot shot a load is approximately 4 to 8 gallons per ton. Stockpiles can be treated with a thicker viscosity mag chloride to minimize leaching for best results, but any of the approved liquid chlorides will work. There are fill stations that are set up to treat a load of solid material prior to leaving the maintenance yard. Some units are capable of spraying liquids onto solids at the back of the truck. The same 4 to 8 gallons per ton is suggested. If you apply too much liquid to the sand, the sanding material may burn through the pack and fail to provide the traction on top of the pack that was intended. Less liquid may be better. Remember that by treating sanding material that already has a solid de-icer mixed in; you are adding chlorides that could very well be wasting product. Sand is a product we use for traction only. We should never make applications of sanding material in an effort to anti-ice.

DE-ICING: is a snow and ice control strategy in which a de-icing product, either in a liquid, solid, or pre-wetted solid form, is spread directly onto the top of an accumulation of snow, ice or frost that is already bonded to the pavement surface. The application rate for de-icing could be in excess of 80 gallons per lane mile, depending on the built up thickness of the ice or snow pack, and surface temperature. After 80 gallons a lane mile, the cost effectiveness of the operation should be evaluated for alternative methods of clearing the bonded snow or ice, this could include mechanical means to remove the buildup or utilize a solid de-icer. The preferred choice for application of liquid de-icer is driller type nozzles that can penetrate the snow pack. Always plow off as much snow, slush or ice as possible prior to using any de-icing products to minimize dilution of solution (DOS). Depending on the location and the

amount of traffic a sand truck may need to follow the liquid applicator truck. If following any unit dispensing product, don't plow off any product that the lead vehicle just put down. There will often be times that traffic control will need to be utilized. Implement Variable Message Signs (VMS) if they are available Sand is a product we use for traction only. We should never make applications of sanding material in an effort to de-ice.

INITIAL OPERATION:

The areas targeted for liquid application, or any alternative de-icer use for that matter, need to be site specific and be supported by the budgeted LOS. The operators and crews need to know what is expected for their patrols and how best to meet the targeted LOS without wasting materials, equipment or other resources to achieve this LOS.

The initial anti-icing operation is most often the application of liquid products to the pavement. If liquid de-icing products are placed on the road in advance of precipitation, the highest concentration of these materials is then in direct contact with vehicles and not diluting out. This will cause an acceleration of metal deterioration.

The use of anti-icing/de-icing products is only necessary to melt snow and ice, if the temperatures are low enough to sustain freezing. If the surface temperatures are above 32 degrees Fahrenheit (F), snow and ice could melt on its own. It is imperative that when snow and ice control products are applied, that as much snow and ice be removed from the road ahead of the dispensing of product as possible, you can accomplish this by plowing.

The timing of the application of liquids can vary depending on the residual of previously placed products left from recent storms. The ideal time to apply material would be after the road turns wet and before any accumulation of snow or ice. If there is no residual material on the road, build up of snow and ice could happen very quickly, while the more residual remaining on the road the longer accumulation will take.

Under application of anti-icer could cause a premature freezing\re-freezing of the roadway surface due to dilution of solution (DOS) and must be avoided. If roadway surface begins to prematurely freeze\re-freeze this is generally caused by the dilution of the deicing product to the point that it is too diluted to work any longer or the product is not capable to continue to melt at the temperature that it is exposed to.

Over-application of de-icers during storms leads to excessive residue on the roadway after the storm. This has a significant effect on the corrosion to metal parts on vehicles using the highways, wastes materials, may increase stopping distance and increases operational costs. If a little bit works that is all you should to apply.

All storm events will require an appropriate decision to be made for the type of treatment prior to storm and as the storm evolves. Some patrols will have more than one tactic. There are several types of treatments that can be utilized. Supervisors and operators must

agree on the treatment strategy for the specific route that meets the LOS and stays within the budget.

- Do-nothing if the pavement temperature is not going to reach freezing and the accumulation will not be significant. Plow if necessary.
- Plow and sand as necessary. Use no liquids or solid de-icer. (Traditional Method)
- Anti-ice driving lanes only, do not apply to shoulders. As in the picture on page 2.
- Anti-ice and continue with liquids throughout the storm event to try to maintain a wet road, convert to de-icer/sand, solid, or pre-wetted solids if the intensity of the storm is overwhelming to the use of liquids. If this falls within the LOS for this road and you follow policy and procedure.
- Anti-ice, one application, and plow and sand throughout the storm.
- De-ice specific locations after the storm is over, with supervisor's approval to meet the post storm LOS bare regain time. Utilizing forecasts is critical.

Depending on the intensity and duration of the storm it may be impossible to maintain a wet road. The use of abrasives may be necessary.

If during a storm, the intensity of the storm is too overwhelming for dispensing any materials, plow until the storm lets up.

After choosing the strategy for the specific stretch of highway several pieces of information need to be assembled upon first notice of a storm event. This information could include treatment recommendations for products, application rates, and timing of application (s), weather forecasts, radar data, RWIS data, and conditions on adjacent patrols. There is an unlimited amount of weather data on the Internet that can be utilized. The most useful piece of equipment during the storm is the truck mounted pavement/ambient temperature sensor.

*Maintenance Decision Support System (MDSS) is a technology that assists maintenance professionals in making decisions to better manage winter storm operations, using a scientific logic to support recommendations. Where implemented, MDSS shall be used to its fullest potential.

Each storm event is unique and should be treated as such. Colorado temperatures and elevations vary dramatically depending on the location of the storm and type of storm event.

The forecasted storm should be evaluated for anticipated start & end time, intensity, duration, wind, total accumulation, and temperature (both ambient and pavement). Other factors that should be considered are relative humidity and dew point.

For pavement temperatures warmer than 16 degrees F, magnesium chloride (mag chloride) should be the preferred liquid product relative to its cost. For temperatures colder than 16 degrees Cold temperature modified mag chloride (i.e. Apex, Ice ban ultra, Caliber M-1000) should be the preferred liquid product due to its effectiveness. For specific areas targeted to maintain a wet pavement surface throughout the storm event both liquid products could be needed. If the pavement temperature is above 16 degrees start out with magnesium chloride and when the pavement temperature drops below 16 degrees switch to Cold temperature modified mag chloride. Cold temperature modified mag chloride, simply works at colder temperatures at the same application rates as Mag Chloride.

Another tactic for areas that do not have enough tanks for more than one product, use magnesium chloride until December, and then switch to Cold temperature modified mag chloride. Use the Cold temperature modified mag until March and then switch back to magnesium chloride for the remainder of the season.

In areas that have crosswinds at speeds in excess of 15 mph the use of liquids should be reviewed for appropriateness. A dry pavement, made wet with the use of liquid de-icer, could accumulate snow and drifts after the storm is over and blowing snow begins.