



Highway Maintenance Manual
Chapter 06 Winter Maintenance
Section 15 Snow Removal
Subject 55 Anti-Icing Techniques

Bureau of Highway Maintenance
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1.0 General

Anti-icing is a proactive snow and ice control strategy aimed at preventing the formation or the development of bonded snow and ice by the timely application of a freezing point depressant. Anti-icing can be efficient and cost effective when correctly used and approached with realistic expectations. Anti-icing has the potential of providing increased traffic safety at a reduced cost even on high volume highways.

2.0 When to Anti-ice

- Anti-icing should be the first in a series of strategies considered for each winter storm.
- Anti-icing **should** be conducted prior to forecasted frost, freezing fog, or black ice events on bridge decks and pavement trouble spots as a minimum, assuming conditions in this guideline for anti-icing are met. Other areas (hills, curves, shaded areas, ramps, or intersections) may be treated as determined by the county, on an as-needed basis.
- Treatment for frost or black ice incidents in trouble spots can be made on a regular twice per week schedule during the typical frost season at the beginning and ending of the winter months or in accordance with weather forecast information. Applications in anticipation of a possible frost incident or snow event on a Saturday or Sunday may be made on the preceding Friday.
- Anti-icing should be done during normal, low traffic volume, non-overtime work hours. In the case of a service provider with normal overnight working hours, anti-icing could be done at night or other off peak traffic times if conditions warrant. In maintenance areas where split shifts are not used, anti-icing should be done so as to minimize disruption to the traveling public. Applications for forecasted frost events should normally be made 12-18 hours prior to a predicted frost or snow event depending on the material used. Some anti-icing agents can last longer than others.
- When traffic volumes are high, use of a following vehicle for traffic control may be necessary. Due to high traffic volumes, additional application may be required if the anti-icing agent residue is worn off the bridge deck or pavement surface.
- Anti-icing may also be conducted prior to predicted light sleet and light (<0.5"/hr.) or moderate (0.5-1.0"/hr.) snow events. If precipitation persists, additional anti-icing applications may be necessary to prevent re-freeze due to dilution of the chemical or switching to de-icing applications may be necessary.
- Anti-icing should be conducted when the pavement temperature is at or above 20°F or the pavement temperatures are forecast to rise or stay above 20°F.
- Liquid agents are the preferred material for anti-icing treatments. Although applying pre-wetted salt prior to an event can technically be considered anti-icing, liquid agents work more effectively than solids for anti-icing and there is also less waste with liquid applications.

3.0 When Not to Anti-ice

- Liquid anti-icing should not be conducted prior to forecasted rain or freezing rain events.
- Anti-icing should not be conducted when winds are more than 15 m.p.h. especially when using a hygroscopic anti-icing agent such as magnesium or calcium chloride as they will attract moisture onto the roadway and may lead to refreeze.
- Anti-icing should not be conducted when the anti-icing agents have the potential of causing snow to stick to the roadway under blowing and /or drifting snow conditions.

- Anti-icing should not be conducted when the pavement temperature is below 20°F or forecast to fall below 20°F.
- Applying anti-icing agents prior to heavy (> 1.0 in./hr.) snowfall events can be an effective way of keeping the snow from bonding to the pavement. Discretion is advised however, and this technique should only be used by experienced anti-icing service providers.

4.0 Precautions

- Liquid anti-icing application equipment should be calibrated at the beginning of every winter season. Application equipment that has been transferred to another truck, modified, or repaired should be recalibrated. Equipment should be monitored during use and recalibrated when performance appears questionable.
- “Drip” or “pencil” spray type nozzle heads are preferred over fan type nozzle heads in order to minimize the drifting of liquid anti-icing agents from the bridge deck or pavement surface. Consideration should be given to using “drip” or “pencil” spray nozzle heads with drop rubber tubing extensions that reach the surface when truck speeds will exceed 25-30 m.p.h.
- Liquid anti-icing agents residual material can remain on the surface for up to four days after application if not diluted by rain or snow. Refreezing of the surface can occur when rain or snow or moisture in the air dilutes the liquid anti-icing agent remaining on the surface and reapplication of the anti-icing agent has not occurred.
- Application rates should be reduced when done after extended dry spells with no rain or snow events especially during the late fall or early spring seasons when pavement temperatures are in the 45°-50° F. range and humidity is in the 45%-55% range. Application of a liquid on a bridge deck or pavement surface containing a buildup of oil-based residuals and/or rubber residuals may produce a slick surface.

5.0 Application Rates

Refer to [HMM 06-20-20](#) for appropriate anti-icing application rates.

6.0 Anti-Icing “Best Practices” Reference Materials

Technical support information related to the anti-icing technique is available at the Clear Roads Project website:

- [Project 12-02: Establishing Effective Salt and Anti-Icing Application Rates](#)
- [Project 19-01: Expanding Application Rate Guidance for Salt Brine Blends for Direct Liquid Application and Anti-Icing](#)

- Anti-Icing application decision making flowchart:

