

PRO Checklist: Winter Operations

Prevent ice buildup, tank freeze-ups and holding tank cracking as subzero temperatures approach. Protect equipment and stop service disruptions.

Step 1: Chemical ratios and calculations

Propylene glycol antifreeze

- ☐ Determine expected ambient temperatures and total holding tank capacity.
- ☐ Maintain baseline target concentrations:
 - Mild frosts (down to 20°F/-6°C): 25% to 30% concentration.
 - Sustained subzero temps: 40% to 50% concentration.
- ☐ Formula: Antifreeze Volume (gal) = Total Tank Capacity (gal) × Target % Concentration
 - *Example:* 60-gallon tank in subzero temps = $60 \times 0.50 = 30$ gallons of antifreeze.
 - *Example:* 120-gallon tank in mild frost = $120 \times 0.30 = 36$ gallons of antifreeze.

Salt/magnesium chloride brine solutions

- ☐ Ensure complete solubilization before filling nonpotable waste tanks to prevent salt crystallization and pump damage.
- ☐ Follow temperature-specific target mixing ratios:
 - 26°F/-3°C: 0.50 lb per gallon
 - 19°F/-7°C: 1.00 lb per gallon
 - 11°F/-12°C: 1.50 lb per gallon
 - 0°F/-18°C: 2.00 lb per gallon
 - -20°F/-29°C: 2.25 lb per gallon (*Eutectic maximum* – do not exceed 2.25 lb/gal).
- ☐ Formula: Total Weight of MgCl_2 (lb) = Tank Volume (gal) × Target Mixing Ratio (lb/gal)

- *Example:* 75-gallon tank at 10°F = 75 gal × 2.0 lb/gal = 150 lbs magnesium chloride.

Step 2: Eco-safe deicers

- ☐ Verify antifreeze is nontoxic, biodegradable propylene glycol (do NOT use ethylene glycol).
- ☐ Select biodegradable commercial deicers for step pads and porta potty thresholds to prevent corrosion of aluminum or plastic parts.

Step 3: Winter-specific protocols

Yard and pretrip checklist

- ☐ Charge tanks with winter-formulated deodorizers and antifreeze/brine solution before leaving yard.
- ☐ Ensure solution completely covers bottom of tank before deployment.
- ☐ Apply silicone-based lubricant to slide valves, rubber gaskets and dump valves.
- ☐ Integrate seasonal protocols into pretrip and post-trip checklists.

Deployed unit guidelines

- ☐ Implement extreme freeze advisory procedures.
- ☐ Follow overnight tank-draining protocols.
- ☐ Stage equipment indoors temporarily during severe cold exposure.

Step 4: Operational details and maintenance

- ☐ Order of operations: ALWAYS add salt-based brines TO water (never water to salt) to prevent clumping.
- ☐ Splash cleanup: Immediately rinse deicer splashes with freshwater to avoid white residue and equipment degradation.
- ☐ Premade brines: Premade 30% liquid magnesium chloride solution meets targeted mixing ratios as-is and can be poured directly into tanks per manufacturer instructions.