

Deicing and Anti-icing Decisions For Runways and Ramps

TONY MYHRA

CRYOTECH DEICING TECHNOLOGY

800/346-7237 www.cryotech.com

What is De-icing?

De-icing is an measure where a deicer is applied to the top of an accumulation of snow, ice or frost that is already bonded or formed to the pavement surface. Reactive approach.

What is Anti-icing?

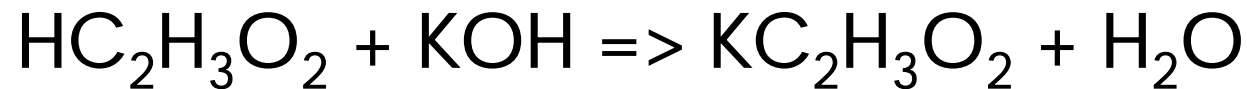
Anti-icing is a snow and ice control measure to prevent a strong bond between frozen precipitation or frost on a pavement surface by timely application of a chemical freezing point depressant. Proactive approach.

Available Runway Deicer Chemicals

- **Glycol & Glycol/potassium acetate** – Environmental, slippery, Highest BOD
- **Urea** – Farm fertilizer, Not Certified to FAA AMS 1431B, works best above 25F (-4C) & Environmentally unacceptable - EPA. Banned at U.S. AFBs
- **Potassium Formate** – Liquid in Europe.
- **Sodium Formate Solid** – Granular works to low temperatures. Dusty
- **Potassium Acetate Liquid** – low Freeze point, has been the liquid of choice for all U.S. & Canadian Airports, more later.
- **Anhydrous Sodium Acetate Solid (NAAC)** – Low temp. melter, low dust, keeps well in storage.
- **Potassium Acetate/Bio- Based (Susterra™) New**
Propanediol - Low conductivity, carbon brake, compatibility issues (BX36) Reduced ASR Expansion.
- **Sodium Acetate/Bio- Based (Susterra™) New**
Propanediol (PDO) - Low conductivity.
- **100% Bio- Based (Susterra™) New** Propanediol (PDO) - Low conductivity lower freeze point.

E36 Runway Deicer Potassium Acetate-Based

Acetic Acid + Potassium Hydroxide
yields **Potassium Acetate** + Water
(plus proprietary corrosion Inhibitors)



E36 Runway Deicer Potassium Acetate-Based

- Approved in 1991 for airports
- Recommended by EPA as alternative to glycol and urea
- Used at most major airports in USA, Canada, and Europe
- Industry Std: 50% Potassium acetate solution
- Freeze Point < -76°F (-60°C)
- Effective to < -26°F (-32°C)

Potassium Acetate Based (KAC) E36

- Working temperature - -26°F (-32°C)
- Eutectic temperature - -76°F (-60°C)
- Liquid – 50% solution
- Rate of liquid application – $\frac{1}{4}$ to 2 gallons per 1000 FT²
- Deice – anti-ice – pre wet
- E36 – no agitation – indefinite storage life
- Used by most airports world wide

E36 Liquid (KAc based) Runway Deicer

Performance

- Alaska: Effective to -20°F (-29°C)
- Quicker: 5-10 Minutes
 - Urea
 - Glycols
- Less slippery than glycols
- Performance Enhanced:
 - Thin Ice
 - Warmer Temperatures
 - Fractured Ice

Anhydrous Sodium Acetate (NAAC)

- Since 1997
- Environmentally safe
- Low corrosion
- Effective performance
- Approved for airports
- Residual Effect
- Stores Well
- Biodegradable
- Low Toxicity
- Not Cheap!

Anhydrous Sodium Acetate (NAAC)

- Working temperature - + 0°F (-18°C)
- Eutectic temperature- -8°F (-22°C)
- Spherical pellets 97% active deicer - 35% more ingredients
- Spread – 5-20# PER 1000 FT² (25-65 g/m²)
- Deicing or anti-icing
- Stores and spreads well
- Shipped in bulk, metric ton super sacs, and 25 Kg (55#) bags
- Most airports and on many parking garages

Super Sack Care and Use

- Protect bags from the weather
- Do not stack for safety and pressure set
- Drop bags to loosen up product.
- Lift bag with all 4 straps
- Spreader should have a screen/grate
- To empty - cut bag at the bottom seam
- Wear dust mask if it is dusty during spreader fill.
- Use a cover over spreader.

Other Uses for NAAC

- Parking Garages
- Bridges
- Elevated Roadways
- Passenger Unloading
- Doorways and sidewalks
- Contains no chloride
- Safe for steel and reinforced concrete

Why Choose Anti-Icing Over De-Icing?

- Most liquid deicers usually stay where you put them
- Usually less chemical is used
- Can be applied before the storm or early in the storm
- Service levels are raised
- Maintenance costs are lower
- Reduced environmental impact

To Be Successful Using Anti-Icing Methods You Must...

- Conduct in-depth training
- Understand how deicers work
- Establish realistic expectations
- Try for a positive crew attitude
- Keep records of usage
- Use the records and learn from any mistakes experienced!

Eutectic Temperature is....

The freeze point temperature of a solution and is based on the percentage of material in a solution, not volume

How Do Anti-Icing Chemicals Work

- They lower the freeze point temperature of water
- Dependent on the percentage of chemical in solution
- Percentage of chemical concentration dilutes with snow/ice melt water
- Melting temperature changes with dilution – key point!

How Long Will It Last?

- Dilution of the solution - key point!
- Anti-icers will work until eutectic temperature of solution meets pavement surface temperature
- Refreezing occurs when an ice control chemical dilutes and melting stops at a given surface temperature

Effectiveness of Deicers is Dependant on...

- Surface temperature
- Application rate
- Moisture or water present
- Applied concentration

Anti-Icing Tactics

- Apply ahead of storm?

YES

<32°F/0°C pavement
pavement

falling temperatures

wet-snow or icing

rain

NO

>32°F/0°C

rising temperatures

dry snow or

- Plow and Broom to reduce dilution, improve friction
- Re-apply when bonding or friction falls
- Plow and Broom

Other Keys to Success

- Good accurate weather information
- What type of storm
- When will it occur
- Surface temperatures
- Air temperatures
- Wind
- Choosing the right S&I product, strategy, and application method

Reduce Dilution With Effective Use of Plows And Brooms

- More snow and ice on runways and ramps causes dilution, resulting in refreeze sooner than anticipated
- If snow and ice has accumulated before application – plow and broom!
- Plow and broom loose snow and ice before reapplication

Record Each Storm Event Application

- Time
- Low temperature at application – surface temperature
- Application rate – gallons/lane mile
- Type of S&I product
- Type of storm event and amount
- Results? Changes?
- Critique whole storm
- Recommendations for similar storm next time

Runway Deicers

- Worker Safety

E36 MSDS

- Read MSDS for user safety
- Handling spills
- Disposal methods

Worker Safety

- Toxicity – Relatively Harmless
- Not Flammable
- Not Inhalation Hazard (NAAC clay coating may be dusty – use paper dust mask if in an inclosed area)
- Use rubber gloves when loading
- Wash with luke warm water & soap
- Slight Eye Irritant
- Use goggles when loading

Equipment Considerations

- Product to be used – recirculation?
- Calibration completed
- Application rates – volume for the area
- Spray pattern – anti-icing – fan deicing – streamers
- Equipment training – classroom and hands on

Equipment Continued

- Pre-season calibration
- Pre-season practice spraying with water
- In season equipment check
- Thorough cleanup after winter storm
- End of season uncontaminated liquid should be returned to storage tank
- End of season cleanup inside and out
- May want to put RV Antifreeze in pump.

How to Guarantee Product Quality

- Specify certification to AMS 1435 at mfg.? plus...
- Minimum 50% potassium acetate content
- Minimum freeze point of -76°F (-60°C)
- Fluid density of 1.28 gm/cm³ (10.7 lb/gal)
- pH range of 11.0 ± 0.5
- Fluid shall be stable and not separate in storage
- Aquatic toxicity test data
- Biological degradation test data
- Fluid manufacturer's credentials
- Source of Technology
- Ability to deliver in a timely manner
- Provides comprehensive on-site training
- \$100 Million in Aviation Product Liability Insurance
- ISO Certification
- Compatibility with asphalt concrete pavement materials

Runway Deicers

CHECK BILL OF LADING
BEFORE UNLOADING
LIQUID TRUCK

Review

- Pre-season equipment inspection and testing.
- Preseason winter maintenance training.
- Keep NAAC dry. Good storage – cover load
- Winter storm anti-icing and deicing.
- Plowing and brooming.
- Keep records and critique each storm.
- Power spray equipment after winter storm.
- Practice good storage house keeping.
- End of season cleanup inside and out.
- Broom up and cover pile with plastic.

Runway Snow & Ice Control

New products

New Runway Deicers

NX36 Liquid
NAAC & SUSTERRA™ PROPANEDIOL

Runway Snow & Ice Control

Letter to Airports from Airlines about
Brakes, Material Compatibility and
Conductivity Issues.

Runway Deicers

BX36

Carbon Brakes, Conductivity,
Material Compatibility, Significant
reduction in ASR expansion, Bio-
based deicer.

BX36 Runway Deicer

- Passes and is Certified to FAA AMS1435
- Environmentally Safe for Toxicity and BOD
- Tested at Airports this last winter
- Ready for sale when you are ready.

Cryotech BX36 – Summary

Advantage BX36

- Formulated to reduce catalytic oxidation of carbon brakes
- Formulated for compatibility with airframe parts
- Lower conductivity – Runway Lights
- Bio-Based

Advantage E36

- E36 has slightly lower BOD and COD
- E36 costs less

SafeLane™ – Benefits for Aviation Applications

- Provides a safer pavement surface by preventing frost, ice, and snow build-up.
- Provides convenience – Can pretreat crowded ramps and return to them after priority areas like runways and taxiways are clear.
- Extends pavement life because it seals the pavement surface.
- Lessens environmental impact with reduced use of deicing chemicals.

Supply Availability - KAc

- Potassium acetate (E36) made with reaction of potassium hydroxide (KOH) and acetic acid resulting in liquid potassium acetate.
- Potash (KCL) used in Farming. Increased world wide demand both for food and ethanol.
- KCL needed to make KOH
- KCL strike in progress at three large mines in Canada
- Acetic acid is available. ($\text{HC}_2\text{H}_3\text{O}_2$)
- NAAC (pelleted) is available as alternative.
- We are sending out updates to customers.

Supply of New Runway Deicers

NAAC Solid Deicer

Supply is okay and produced already.

Runway Deicers

TONY MYHRA
CRYOTECH DEICING
TECHNOLOGY

800/346-7237

218/963-1515

www.cryotech.com

deicers@cryotech.com