GLACIAL TECHNOLOGIES
Tel: 800.328.4150 ext.2696
mail@anti-icers.com

Caliber® M1000

ENGINEERED PERFORMANCE

Caliber M1000 provides a variety of applications in one, non-toxic, cost-effective product.

ANTI-ICING:
As an anti-icer, Caliber M1000 provides superior "anti-bonding" properties, allowing removal of snowpack with simple plowing.

DE-ICING:
As a liquid de-icer, Caliber M1000 provides increased performance vs. other liquid products. When applied in a stream pattern, Caliber M1000 vertically penetrates the snowpack and breaks the bond at the road surface

PRE-WETTING:
As a pre-wetting agent for salt and sand, Caliber M1000 reduces bounce and scatter, increases the speed at which the salt begins working, increase the melting capacity of the salt, and permits the use of salt at lower temperatures. Additionally, Caliber M1000 also reduces corrosion, inhibits crystal formation and product fallout at lower temperatures, and improves roadway traction when compared to other liquid products.

Enhancing Performance While Inhibiting Corrosion:
Caliber M1000 is a blend of Caliber de-icer with 30% $MgCl_2$. Caliber de-icer is derived from corn and is specifically engineered to enhance the eutectic point, anti-icing properties and viscosity of the $MgCl_2$. Caliber de-icer inhibits corrosion and suppresses crystal formation within the $MgCl_2$. While Caliber de-icer increases the friction coefficient of the $MgCl_2$ it also aids in the prevention of the "slickness" period sometimes experienced when using chloride brines.

Typical Corrosion Performance:
Caliber M1000 de-icer passes the test developed by the National Association of Corrosion Engineers Standard TM-01-69 as modified by the PNS. The specification set by the PNS is 70% less corrosive than salt.

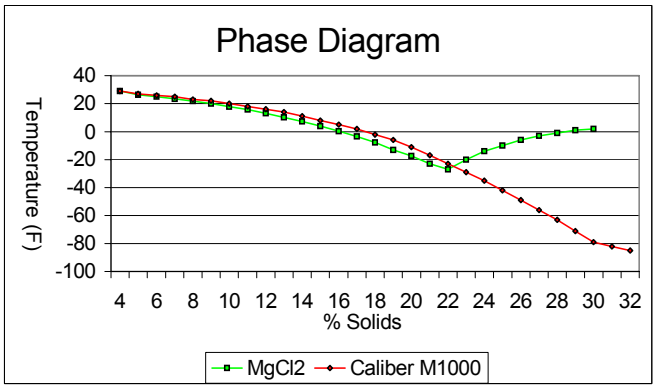
Metal Corrosion Tendency

Deicing Fluid	PNSDOT Relative Corrosion Rate
Distilled Water	0
Rock Salt (NaCl)	100
Calcium Chloride ($CaCl_2$) 30%	121
Magnesium Chloride ($MgCl_2$)30%	80
M-1000	13.85

Total Immersion Corrosion ASTM F483

Test Metal Coupon	SAE AMS 1424 Requirements Wt. Loss, mg/cm²/24h	*M-1000* Results
Carbon Steel	0.8 max.	<0.05
Galvanized Steel	N/A	<0.75
Aluminum 2024 Anodized	0.3 max.	<0.01
Aluminum 2024 Alclad	0.3 max.	<0.01
Aluminum 7075 Alclad	0.3 max.	<0.01
Copper	Not Established	<0.01

Typical Performance Properties:
Caliber de-icer significantly improves the eutectic point and phase change properties of $MgCl_2$.
The extremely low eutectic point of Caliber M1000, approximately -85° F, coupled with its absence of a recrystalization phase results in the elimination of crystal fallout problems. The long flattened curve in the phase diagram below is an indication of improved cold weather performance.



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Field Performance:
"I was impressed. The product performed as advertised with no precipitates, odor or equipment issues" – Mark Cornwell, University of Michigan.

"We achieve our desired level of service using half as much material. The product just lasts longer. It is the hottest product we've ever used as a de-icer. – Larry Schneider, City of Ft. Collins, CO

"Caliber M1000 works excellent. It is the only product we use on our bridge decks." – Greg Goldman, City of LaVista, NE

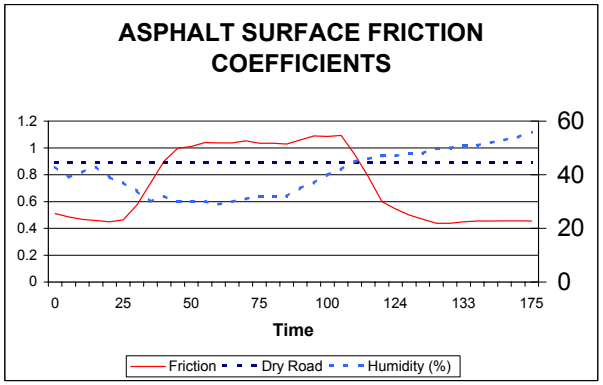
"Caliber M1000 is an excellent de-icer" – Mike Hern, Colorado Department of Transportation.

Applications:
Caliber M1000 is specifically designed for anti-icing, direct application de-icing , frost prevention, and prewetting of solids.

When used for anti-icing operations, application rates of 30 – 40 gallons per lane mile (70-95 litres/km) are typical (40 gallons per lane mile should be considered the maximum in any anti-icing situation). In direct application de-icing, 40-60 gallon per lane mile (95-14 litres/km) applications are used. For frost prevention, application rates of 15 – 20 gallons per lane mile are employed. These rates can vary depending upon storm conditions and service level goals.

As a prewetting agent, Caliber M1000 can be used at rates from 5-15 gallons per ton (15-60 litres/tonne) of substrate, depending upon the solid used and the performance objective. Caliber can also be blended with calcium and sodium chlorides to reduce corrosion and enhance performance.

Friction/Traction Performance Properties:
Based upon testing performed by Forensic Dynamics, Inc. at the request of the PNS, Caliber M1000 displayed superior friction properties as compared to the most commonly used liquid products. The testing performed investigated the effects of temperature, moisture and time upon the friction coefficient of asphalt. The following graph illustrates the friction properties of Caliber M1000 and water on a dry asphalt surface:



As the graph illustrates, an asphalt surface treated with Caliber M1000 provides a friction coefficient only slightly less than that of a water-wet road. In addition, once allowed to dry, the Caliber M1000 provided a friction coefficient greater than that of the dry asphalt! Further more, the Caliber M1000 treated surface did not experience the "slickness window" that other liquid products may.

Typical Analysis:

Solids	30% - 33%
$MgCl_2$	26% - 28%
Carbohydrates	4.5% - 5.5%
Spec. Grav.	1.28 - 1.32
PH	6.0 – 8.0
Solubility	>98%
Appearance*	Clear/Amber
Odor	Slight Sweet

*A number of non-staining colors are available.

Caliber M1000 also passes the purity requirements as set by the PNS.

	M-1000	PNS Specifications
Arsenic	< 1	5.00 ppm Max.
Barium	0.23	10.00 ppm Max.
Cadmium	< 0.02	0.20 ppm Max.
Chromium	< 0.1	0.50 ppm Max.
Copper	> 0.1	0.20 ppm Max.
Cyanide	0.09	0.20 ppm Max.
Lead	0.57	1.00 ppm Max.
Mercury	< 0.01	0.05 ppm Max.
Selenium	< 1	5.00 ppm Max.
Zinc	0.71	10.00 ppm Max.
Phosphates	.76	25.00 ppm Max.

Environmental Performance:
Caliber M1000 is one of the few products to be considered environmentally safe according to testing conducted under the auspices of the PNS. To obtain a copy of the report, visit the PNS website at: www.wsdot.gov/fossc/maint/pns.

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