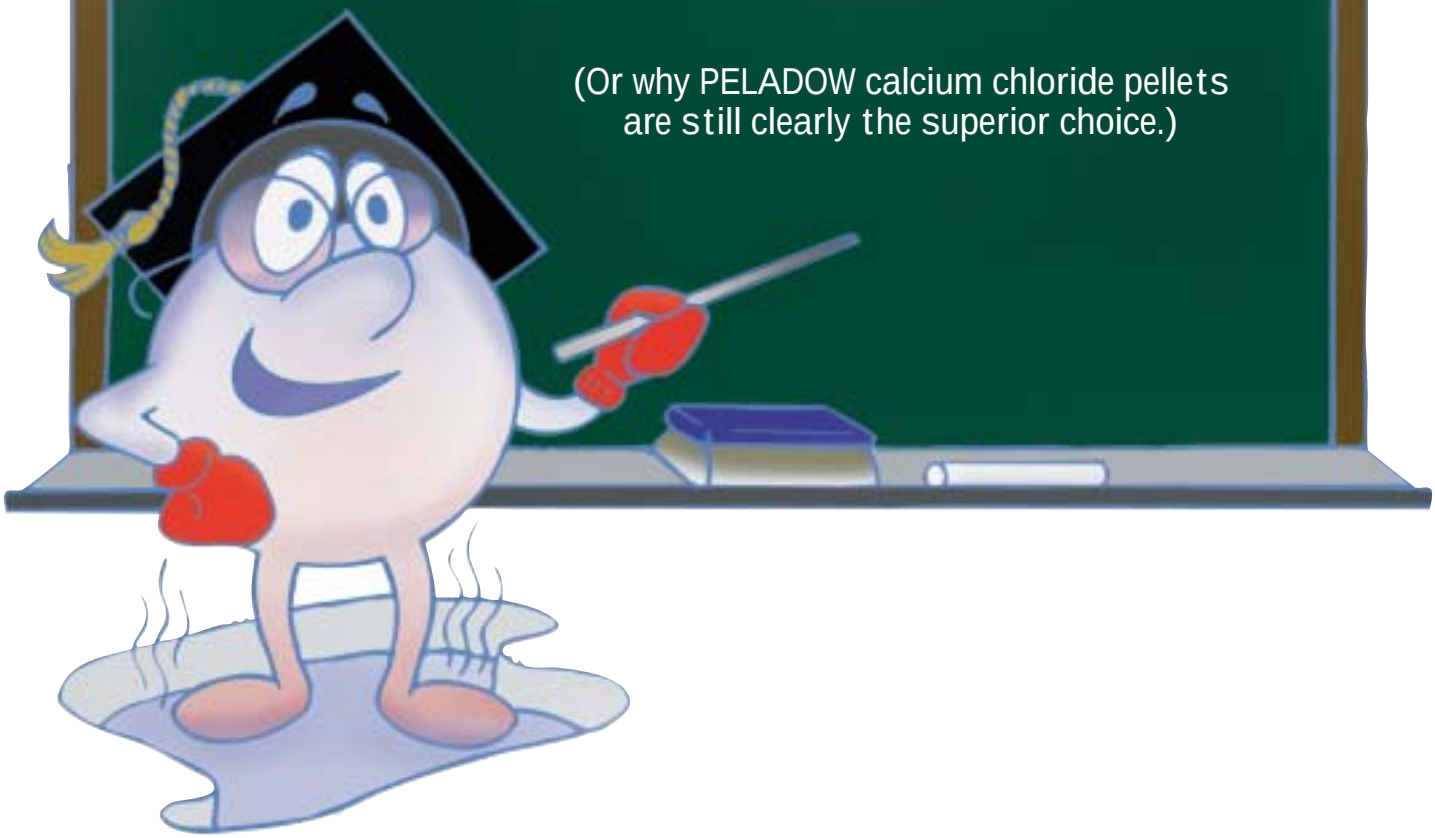
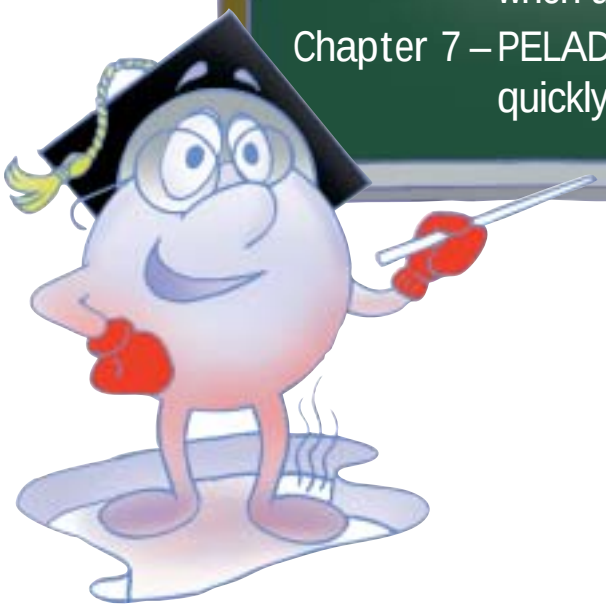
A Short Course On Ice Melters

(Or why PELADOW calcium chloride pellets are still clearly the superior choice.)



The Very Short Course

Getting the facts on ice melters can be a challenge. And that's why we wrote this brochure. We hope you can spend some time with it. But, we realize you're busy, so if you can't, here are the key conclusions you'd reach.



*Trademark of The Dow Chemical Company

Chapter One
Introduction to ice melters

Here's The Whole Story

Becoming an expert on ice melters is really quite easy, even though there are so many brands and so many carefully worded claims to sort through.

The fact is, nearly all ice melters are made from just five materials (or blends of these materials). And there are clear and documented differences between them. These differences determine their true cost and your ability to get walks and drives clear and safe quickly…under all conditions...with a minimum of side effects. The five materials are:

- **Calcium chloride ($CaCl_2$)**
- **Sodium chloride (NaCl)**
- **Potassium chloride (KCl)**
- **Magnesium chloride (contains approximately 50% water)**
- **Urea (primarily used as a fertilizer)**

Once you know what's in the package and a little bit of chemistry you'll be an expert in no time.

How all ice melters work

Deicers are incapable of melting snow or ice in their solid form. They must form a liquid brine. This brine lowers the freezing point of water and effectively dissolves (melts) ice and snow on contact until it becomes diluted to a concentration where its freezing point is raised near water's. Though this process is the same for all ice melters, there are remarkable differences in how well each one works under actual conditions at the application rates recommended by their manufacturers.

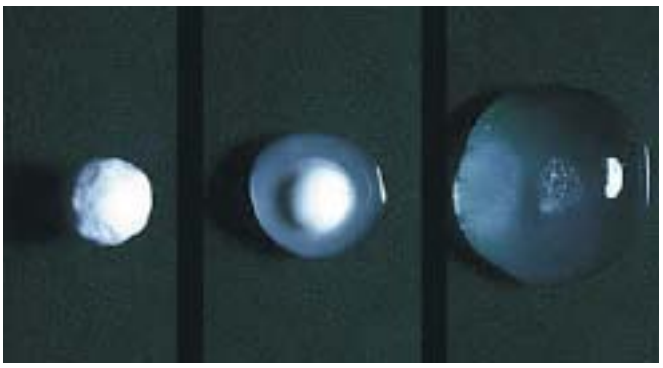
Chapter Two
PELADOW calcium chloride pellets melt ice faster

Now for the differences

Let's talk about speed first. Big differences. Here's why. Speed of action depends on how fast an ice melter becomes a brine. This depends on how quickly it takes up moisture. And this depends on the temperature, the freezing point of the brine created, and the nature of the material.

Sodium chloride, potassium chloride and urea must come in direct contact with moisture before they can dissolve. By contrast, calcium chloride actually attracts moisture from the atmosphere to form a brine very quickly. This moisture attracting ability separates calcium chloride from most others. But there's another difference that narrows the field even further.

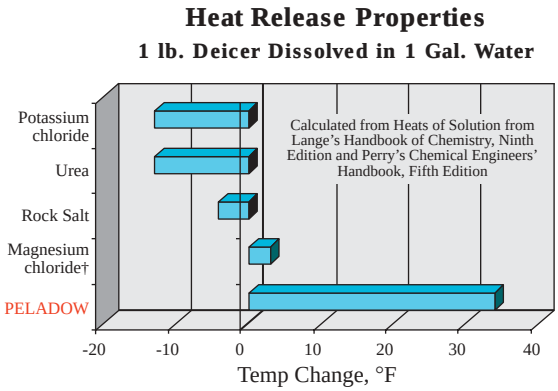
PELADOW creates brine faster



Photos illustrate the water attracting ability of PELADOW. Even on a dry surface, it will pull water from the atmosphere and go into a brine. Others need direct contact with moisture to create effective brines.

Generating heat to speed the process

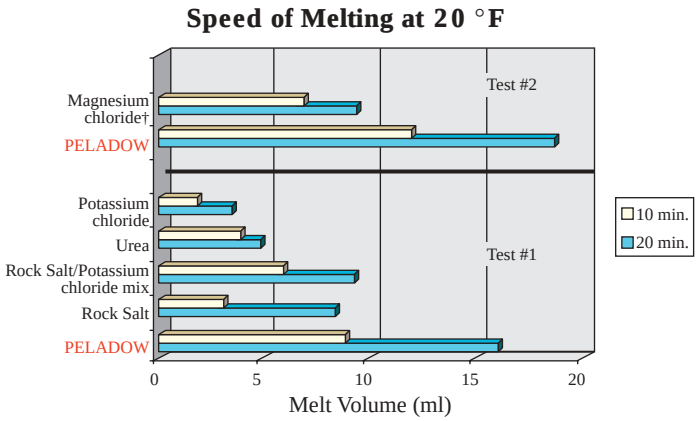
Calcium chloride actually generates heat as it dissolves. It creates an exothermic reaction. Most other deicers draw heat away from their surroundings as they melt. This is an endothermic reaction. Under practical conditions, if temperatures drop much below freezing, the rate of heat pickup from the ice and snow slows to a point where endothermic deicers have a very hard time creating brine. And no brine means no action.



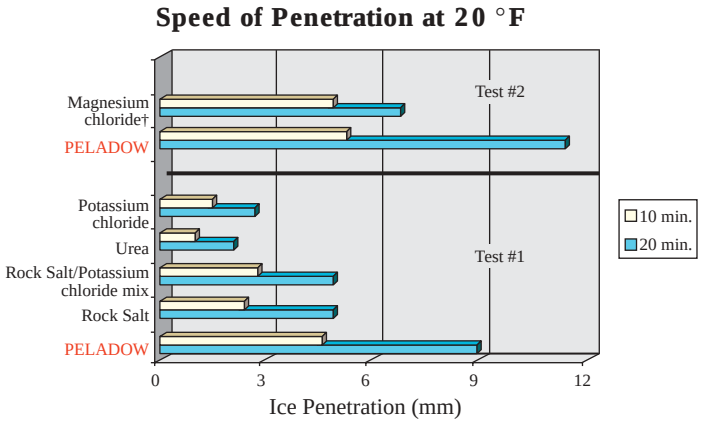
This data shows the dramatic heat-releasing capability of PELADOW, a property that makes it work faster than the rest.

How much faster?

It is easy to see in theory that PELADOW should melt snow and ice fast, but how does it perform in reality? Look below for the results of tests conducted at typical winter temperatures. As you can see, no single material or blend comes close to the speed of PELADOW calcium chloride pellets.



One might think that this is the end of the ice-melting story, but it's not. In the real world, the most efficient way to eliminate a slip hazard is for the deicer to rapidly penetrate and undercut the ice, breaking the bond between the ice and the concrete or asphalt surface. The size and shape of the deicer particles play an important role in speed of penetration. Look below to see that PELADOW beats the competition in this category as well.



There is no denying solid scientific data generated under realistic winter conditions. PELADOW both melts and penetrates ice faster than competitive products.

Test #1: "Comparative Study of Chemical Deicers," Transportation Research Record 1157, 1988

Test #2: "Melt Volume and Ice Penetration Study of $MgCl_2$ and $CaCl_2$ Deicers," Midwest Research Institute, 1997

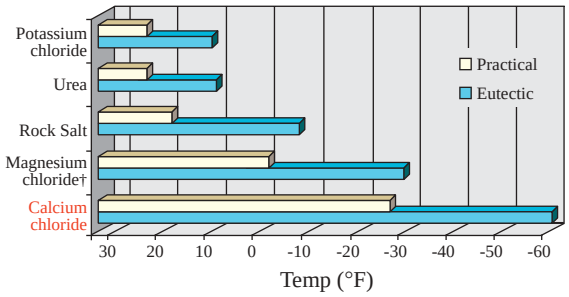
†All solid magnesium chloride deicers are hydrated salts consisting of at least 50% water by weight.

Works at low temperatures

The same properties that make PELADOW the fastest acting deicer, also make it the best performer at low temperatures.

The chart below shows the effective temperature range for various deicers. The lowest effective temperature for a deicer is defined as the temperature at which the deicer will produce reasonable amount of melting within a reasonable amount of time. Because this definition is subjective, conflicting claims for various products are common. However, it is generally accepted that no deicer has a lower effective temperature than PELADOW calcium chloride at -25 °F.

Comparing Melting Ranges



Lowest effective temperature is sometimes confused with *eutectic temperature*. The eutectic temperature is the lowest temperature at which a deicer is physically able to exist in a liquid state when it is in a water solution. It applies to a specific deicer concentration only. For example, the eutectic temperature of calcium chloride is -59 °F at a concentration of 29.6%. This sounds pretty good because -59 °F is such a low temperature, however eutectic temperature has very little to do with the melting capabilities of the product under real world conditions. Beware of any deicer claims that use eutectic temperature as a justification for performance.

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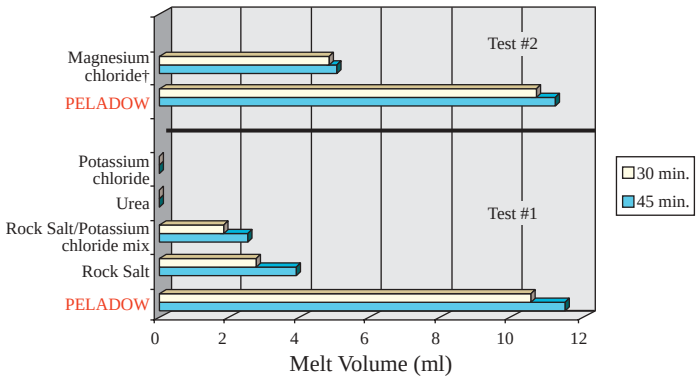
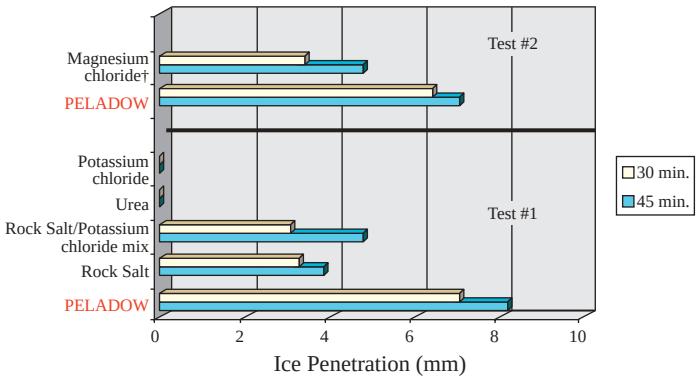
†All solid magnesium chloride deicers are hydrated salts consisting of at least 50% water by weight.

The charts below show comparative melt volume and ice penetration data at 5 °F. It is easy to see that PELADOW significantly outperforms the competition at low temperature.

Melting Capability at 5 °F



Penetration Capability at 5 °F



Chapter Four
PELADOW does not chemically attack concrete

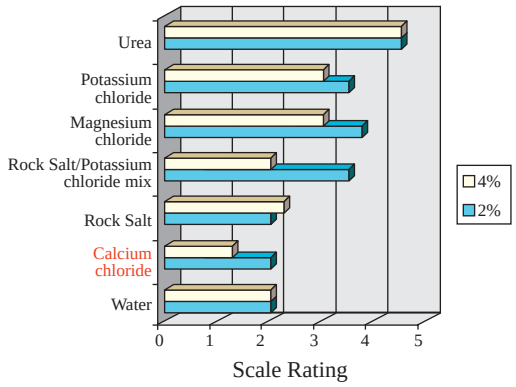
PELADOW and concrete

According to the American Concrete Institute, the rate of chemical attack of calcium chloride on concrete is "negligible".[1]

In an article titled, "Winter Weather, Deicers Need Not Damage Concrete," published by the Portland Cement Association, calcium chloride is called one of the "safest deicers for concrete".[2]

Independent laboratory tests produced results consistent with the above statements.[3] The data indicates that scaling from calcium chloride was less than or equal to that of other deicers, and comparable to that of pure water.

Scale Rating of Various Deicers
after 500 Freeze/Thaw Cycles



For concrete to be resistant to surface scaling caused by freeze/thaw cycling, it must be formulated, finished and cured according to well-known guidelines from the American Concrete Institute. Concrete that fails to meet these guidelines will be subject to surface scaling regardless of the type of deicer used.

References

1. *"A Guide to Durable Concrete," American Concrete Institute, 1991*
2. *Concrete Technology Today, Portland Cement Association, Vol. 8, No. 40, 1988*
3. *"Effects of Deicing Agents Upon Concrete Surfaces," Pittsburgh Testing Lab, September 1982*

Chapter Five
PELADOW properties help minimize tracking problems

PELADOW helps minimize tracking problems

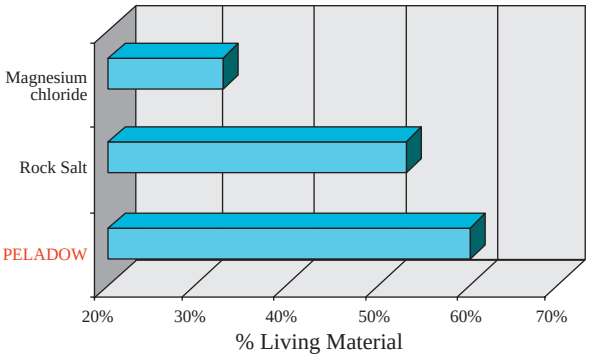
No deicer can claim that it will not track indoors if applied near an entranceway. However, the fast action and low application rate of PELADOW (2-4 oz/sq. yd.) means that there is less opportunity for tracking when compared to slower acting products. Also, PELADOW will not leave behind a powdery residue.

Chapter Six
PELADOW is safe around vegetation when used as directed

PELADOW and vegetation

The impact of deicers on vegetation is a complex subject. Variables include deicer type, required application rate, plant species and route of exposure. The truth is that all deicers…even those used as fertilizers…have the potential to harm vegetation. Turf grass research at Iowa State University suggests that calcium chloride is as safe or safer for vegetation when compared to other chloride-based deicers on an equal active ingredient basis.

Deicer Impact on Turf Grass
after 9 winter applications



"Iowa Turfgrass Research Report," Iowa State University, July 1996; Application rate for $MgCl_2$ hexahydrate was 2X that for others, to compare equal amounts of active ingredient.

Chapter Seven
PELADOW pellets are shaped to quickly bore through ice

The extra advantage with pellets

One last thing. The shape of a deicer makes a difference. A round pellet gives PELADOW an added advantage. Each pellet contacts a very small area of ice so it quickly bores downward. Flakes and chips penetrate more slowly because, with their flatter surfaces, they tend to work as hard horizontally as vertically. Since the whole idea is to penetrate ice and snow and break the bond with the pavement, it's better to have a pellet-shaped material that penetrates downward faster.

How to ace your final exam

As you can see, there's only one thing to know to be an expert in ice melters: to clear walks and drives faster at lower total cost, specify PELADOW calcium chloride pellets. For the name of a distributor in your area, please call us at 1-800-447-4369 or visit our web site, www.peladow.com.

PELADOW calcium chloride pellets come in a variety of convenient package types and sizes. Plus, PELADOW is readily available all winter long due to Dow's unmatched distribution network.

PELADOW Is Available From:

For More Information, Call 1-800-447-4369
or visit us on the web at www.peladow.com

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