

Chloride concentration for typical applications

Water @ 8.3 lbs. per gallon times the specific gravity of the deicer product gives the lbs. per gallon of the deicer solution. Take the solution total, minus the original 8.3 lbs of water to get the lbs of Chloride in the water per gallon.

I.e. $8.3 \times 1.28 = 10.624$

$10.624 - 8.3 = 2.3$ lbs of chloride per gallon

@ 40 gallons per lane mile of application and at 2.3 lbs of chloride per gallon, this is 92 lbs of chloride per mile.

@ 60 gplm = 138 lbs of chloride per lane mile

@ 80 gplm = 184 lbs of chloride per lane mile

Sand mixed with salt at	3% = 60 lbs of chloride per ton
	5% = 100 lbs of chloride per ton
	7.5% = 150 lbs of chloride per ton
	10% = 200 lbs of chloride per ton
	15% = 300 lbs of chloride per ton
	20% = 400 lbs of chloride per ton
	25% = 500 lbs of chloride per ton
	30% = 600 lbs of chloride per ton

At 500 lbs per ton applied to the road	3% = 15 lbs per lane mile of chloride
	5% = 25 lbs per lane mile of chloride
	7.5% = 37.5 lbs per lane mile of chloride
	10% = 50 lbs per lane mile of chloride
	15% = 75 lbs per lane mile of chloride
	20% = 100 lbs per lane mile of chloride
	25% = 125 lbs per lane mile of chloride
	30% = 150 lbs per lane mile of chloride

Clean sand treated with liquid chloride at a per ton rate

@ 4 gallons = 9.2 lbs of chloride per ton.

@ 5 gallons = 11.5 lbs of chloride per ton.

@ 6 gallons = 13.8 lbs of chloride per ton.

@ 7 gallons = 16.1 lbs of chloride per ton.

@ 8 gallons = 18.4 lbs of chloride per ton.

@ 9 gallons = 20.7 lbs of chloride per ton.

@ 10 gallons = 23 lbs of chloride per ton.

@ 15 gallons = 34.5 lbs of chloride per ton.

@ 20 gallons = 46 lbs of chloride per ton.

Applied at 500 lbs per lane mile

- 4 gallon mixture = 2.3 lbs of chloride per lane mile
- 5 gallon mixture = 2.88 lbs of chloride per lane mile
- 6 gallon mixture = 3.45 lbs of chloride per lane mile
- 7 gallon mixture = 4.02 lbs of chloride per lane mile
- 8 gallon mixture = 4.6 lbs of chloride per lane mile
- 9 gallon mixture = 5.17 lbs of chloride per lane mile
- 10 gallon mixture = 5.75 lbs of chloride per lane mile
- 15 gallon mixture = 8.63 lbs of chloride per lane mile
- 20 gallon mixture = 11.5 lbs of chloride per lane mile

800 gallons @ 6 gallons per ton = 133 tons. 8 tons per V-Box load = 17 loads.
 6500 gallons of storage loads 8 loads at 800 gallons per load. 8 loads will treat 136 loads of sand at 8 tons per load.

Meltdown: 10.85#/gallon; 1.29 -1.31 specific gravity; 3.255# of active per gallon
 Apex: Same as Meltdown
 Apogee: 9.95#/gallon; 1.18 – 1.20 specific gravity; 6.567# of active per gallon
 Caliber M1000: 10.85#/gallon; 1.29 – 1.31 specific gravity; 3.581# active per gallon
 For Caliber M 2000 the weight per gallon is the same at 10.85#. However, the # of active per gallon is different. At 36% solids it is 3.906# active per gallon of product.

Ice Slicer- according to Redmond Minerals
 2.96 lbs of Ice Slicer = 1 gallon of mag chloride equivalent
 3.55 lbs of Ice Slicer = 1 gallon of APEX equivalent
 3.75 lbs of Ice Slicer = 1 gallon of cold temp mag chloride equivalent

Best management practice application rate recommendations

*All shot rates below are temperature dependent and storm intensity relative. As temperatures drop and storm intensity increases you will probably need to go from a lower shot rate to a higher shot rate.

Application rates- (lm=lane mile which is a 12' lane 5,280' long)

<u>Material</u>	<u>Min per lm</u>	<u>Max per lm</u>
Solid De-icer/Sand 3 to 30%	100 lbs	500 lbs
Sand/Mag 4 to 8 gal per ton	100 lbs	500 lbs
Mag Chloride	20 gal	100 gal (de-icing)
Cold Temp Mag	20 gal	100 gal (de-icing)
APEX	15 gal	75 gal (de-icing)
Salt Brine	20 gal	100 gal (de-icing)
Ice Slicer	100 lbs	300 lbs (de-icing)
Quick Salt	80 lbs	300 lbs (de-icing)
Rapid Thaw	100 lbs	300 lbs (de-icing)

Best management practice temperature range for ultimate material performance

* As conditions warrant there may be situations when the best practice temperature range for application may need to be exceeded with the discretion of the supervisor.

<u>Material</u>	<u>Min temp</u>	<u>Max temp</u>
Salt/Sand xx%	<0	32
Sand/Mag xx gal per ton	<0	32
Sand/Ice-Slicer xx%	<0	32
Mag Chloride	16	32
Cold Temp Mag	5	17
APEX	0	17
Salt Brine	16	32
Ice Slicer	5	32
Quick Salt	17	32
Rapid Thaw	17	32

Post storm assessment of operations should be conducted.

Lessons can be learned from both the successes and failures of any winter maintenance operation. It is imperative that we share the experiences learned across the state. The use of TAPER logs can assist in these assessments, as can storm debriefing forms.

TAPER Logs

TAPER logs will be our way of tracking what we do and the effects we get from our efforts. A sample form is provided in this document, however any variation of a TAPER log may be used so long as it contains at a minimum, this information

- **T=** **Temperature**
- **A=** **Application**
- **P =** **Product**
- **E=** **Event**
- **R=** **Results**

This can also be a valuable tool in conducting post storm debriefings.

The following page is a sample TAPER log, the page after that are the instructions for filling out this sample log and the page after that is an example of how the TAPER log should be filled out.