Application Rate Guidelines

Develop your own application rates using the guidelines on pages 16-18 as a starting point and modify them incrementally over time to fit your needs. You can summarize information gathered from your truck logs into application rates for your area. Be aware, though, that sample rate charts vary greatly from one area to another, and most are very high. Make it a goal to reduce application rates while keeping our roads safe. You can reduce rates by following ant-icing and other strategies covered in this field handbook.

GUIDELINES FOR DETERMINING APPLICATION RATES

- Sand/salt mix isn't advised but may help in some situations such as freezing rain.
- Always blade before applying chemical. For reapplication, start with the lowest rate in the range.
- High traffic volume will work salt into the snow and aid in melting – so use a lower rate.
- Higher traffic speeds will blow salt off the road and hinder melting – so increase use of prewetted materials.
- Use sand for short-term traction only. It will never melt anything.
- For application on a single lane, cut rates in half. For an 18-foot-wide road, use ¾ of the listed rate (i.e., multiply rate by 0.75).
- It is usually not cost-efficient to apply salt (sodium chloride) at pavement temperatures below 20°F.

Anti-icing Application Rate Guidelines

These guidelines are a starting point. Reduce or increase rates incrementally based on your experience.

Condition	Gallons/Lane Mile		Other Products
	$MgCl_2$	Salt Brine	
1. Regularly scheduled application	15 - 25	20 - 40	Follow Manufacturers' recommendation
2. Prior to frost or black ice event	15 - 25	20 - 40	
3. Prior to light or moderate snow	15 - 25	20 - 50	

Pounds of Ice Melted Per Pound of Salt		
Pavement Temp. °F	One Pound of Salt (NaCl) melts	Melt Times
30 25 20 15	46.3 lbs. of ice 14.4 lbs of ice 8.6 lbs of ice 6.3 lbs of ice	5 min. 10 min. 20 min. 1 hour
10 5 0 -6	4.9 lbs of ice 4.1 lbs of ice 3.7 lbs of ice 3.2 lbs of ice	Dry salt is ineffective and will blow away before it melts anything.

It is not cost-efficient to apply salt (sodium chloride) at pavement temperatures less than 20°F.

Deicing Application Rate Guidelines
24' of pavement (typical two-lane road)

These rates are not fixed values, but rather the middle of a range to be selected and adjusted by an agency according to its local conditions and experience.

			Lbs/two-lane mile			
Pavement Temp. (°F) and Trend (↑↓)	Weather Condition	Maintenance Actions	Salt Prewetted/ Pretreated with Salt Brine	Salt Prewetted/ Pretreated with Other Blends	Dry Salt*	Winter Sand (abrasives)
>30°↑	Snow	Blade, treat intersections only	80	70	100*	Not Recommended
	Frz. Rain	Apply Chemical	80-160	70-140	100-200*	
30°↓	Snow	Blade & apply chemical	80-160	70-140	100-200*	Not Recommended
	Frz. Rain	Apply Chemical	150-200	130-180	180-240*	
25-30°↑	Snow	Blade & apply chemical	120-160	100-140	150-200*	Not Recommended
	Frz. Rain	Apply Chemical	150-200	130-180	180-240*	
25-30°↓	Snow	Blade & apply chemical	120-160	100-140	150-200*	Not Recommended
	Frz. Rain	Apply Chemical	160-240	140-210	200-300*	400
20-25°↑	Snow or Frz. Rain	Blade & apply chemical	160-240	140-210	200-300*	400
20-25°↓	Snow	Blade & apply chemical	200-280	175-250	250-350*	Not Recommended
	Frz. Rain	Apply Chemical	240-320	210-280	300-400*	400
15-20°↑	Snow	Blade & apply chemical	200-280	175-250	250-350*	Not Recommended
	Frz. Rain	Apply Chemical	240-320	210-280	300-400*	400
15-20°↓	Snow or Frz. Rain	Blade & apply chemical	240-320	210-280	300-400*	500 for frs. Rain
0-15°↑↓	Snow	Blade, treat with blends, sand hazardous areas	Not Recommended	300-400	Not Recommended	500-7050 spot treat as needed
<0°	Snow	Blade, treat with blends, sand hazardous areas	Not Recommended	400-600**	Not Recommended	500-7050 spot treat as needed

*Dry salt is not recommended. It is likely to blow off the road before it melts ice.

**A blend of 6-8 gal/ton $MgCl_2$ or $CaCl_2$ added to NaCl can melt ice as low as -10°

How to use the table on page 18:

1. Select the row with the appropriate pavement temperature, temperature trend, and weather conditions.
2. Select the column that has the type of material you are using.
3. Find the box where the row and columns intersect to find the application rate. These rates are not fixed values, but rather the middle of a range to be selected and adjusted by your agency according to your local conditions and experience.
4. Dial the correct setting for the rate indicated on the Application Rate Guidelines.
5. If you are not treating a 24-foot-wide road (typical two-lane road), adjust the rate as follows: for application on a single lane, cut rates in half. For an 18-foot-wide road, use ¾ of the listed rate (i.e., multiply rate by 0.75).

Chemical Melting Temperatures

Multiple products can be used in a snow and ice control program. This chart helps you choose the correct product and apply it at the correct times.

Chemical	Lowest Practical Melting Temperature	Concentration
* NaCl (Sodium Chloride) - Delivered as solid rock salt; also can be made into a brine. The basis of most deicing materials. Very corrosive. Inexpensive.	20°F	23.3%
* $MgCl_2$ (Magnesium Chloride) – Delivered as flakes, pellets, or liquid. Often used to wet NaCl crystals to increase adherence to road and reduce melting points. Corrosive. Higher cost.	-10°F	27 to 30%
* $CaCl_2$ (Calcium Chloride) – Delivered as flakes, pellets, or liquid. Powerful deicer but extremely corrosive. Sometimes used incorrectly to open storm drains. Higher cost.	-20°F	30%
CMA (Calcium Magnesium Acetate) – Delivered as a powder, crystals, pellets, or liquid. Liquid CMA is used mainly on automated bridge deicing systems. Non-corrosive, biodegradable. Sometimes added to sodium chloride as a corrosion inhibitor. Alternative for areas where chloride use must be limited. Higher cost.	20°F	32%
KAc (Potassium Acetate) – Delivered as a liquid. Used on automated bridge deicing systems. Use for anti-icing, deicing, and prewetting. Non-corrosive, biodegradable. Alternative for areas where chloride use must be limited. Higher cost.	-15°F	50%
Winter Sand/Abrasives – Winter sand is sand treated with brine or another blend. It is often used as an abrasive for low-temperature conditions when chemicals are not effective. Sand provides temporary traction and only works when it is on top of the ice.	Never melts – traction only	

* Liquid chlorides are available with corrosion inhibitors.

Material Conversions

The following quick reference table and the formulas below will help you convert between tons and cubic yards. Weights will vary depending upon moisture content.

Sand		Salt	
Yards	Tons	Yards	Tons
1	1.4	1	1.1
2	2.8	2	2.2
3	4.2	3	3.2
4	4.6	4	4.3
5	7.0	5	5.4
6	8.4	6	6.5
7	9.8	7	7.6
8	11.2	8	8.6
9	12.6	9	9.7
10	14.0	10	10.8
11	15.4	11	11.9
12	16.8	12	13.0
13	18.2	13	14.0
14	19.6	14	15.1
15	21.0	15	16.2
16	22.4	16	17.3
17	23.8	17	18.4
18	25.2	18	19.4
19	26.6	19	20.5
20	28.0	20	21.6

1. To convert tons of clean sand to cubic yards:
   # tons divided by 1.4 = cubic yards
2. To convert cubic yards of clean sand to tons:
   # cubic yards multiplied by 1.4 = tons
3. To convert tons of winter sand to cubic yards:
   # tons divided by 1.37 = cubic yards
4. To convert cubic yards of winter sand to tons:
   # cubic yards multiplied by 1.37 = tons
5. To convert tons of straight salt to cubic yards:
   # tons divided by 1.08 = cubic yards
6. To convert cubic yards of straight salt to tons:
   # cubic yards multiplied by 1.08 = tons