CALIBRATING SANDERS 9/16/2009
TOWN OF SOUTH WINDSOR STREET
SERVICES DIVISION

SO WHY SHOULD WE CALIBRATE SANDERS?????

Here are some of the reasons why:

1. The environment such as plants and trees.
2. Drinking water contamination.
3. Silting in of streams and ponds.
4. Less catch basin maintenance.
5. To check actual usage against the calibrations.
6. To assist a substitute driver on a sanding route.
7. Aids driver in severe weather conditions with poor visibility.
8. Less wasting of sand and salt.
9. A problem with the truck or sander can be detected by a change in material usage.
10. Consistent results from route to route.
11. Allows sanding different speed limit areas where you will know the correct auger setting for the speed the truck is traveling.
12. Allows you to switch to straight salt or different sand and salt ratios quickly, eliminating the guesswork.
13. Trucks wear equipment ages and things change.
14. The introduction of new products such as ice ban and calcium chloride may dictate more controlled usage.
15. Best management practices
16. Sand may be a thing of the past. This year we are hearing that there isn’t much sand around here. We may all be using straight salt in the next few years.

NECESSARY EQUIPMENT FOR CALIBRATING SANDERS
1. Scale (bathroom type will do) to weigh the sand and salt mix you will collect.
2. Piece of plywood or a sign blank to use as a platform or a 5-gallon pale.
3. A 5 by 5 foot tarp to collect the sand you will weigh.
4. A stopwatch used for timing.
5. A paint pen to mark the shaft you will count the revolutions of.
6. A calculator for the simple math required.
7. A steel tire rim for a base under the weighing platform.

You need three people to do the work.

One pay-loader operator to load trucks and assists in the operation.
One truck driver to operate the truck.
One record keeper

THE PROCESS AND HOW TO DO:

We are now going to discuss certain constants that must be adhered to, in order to successfully accomplish this task.

1. The truck you are using must be completely warmed up, both the engine and the hydraulic system. Fifteen minutes is required. Why? Because hydraulic fluid flows different when it gets hot. It thins out and requires less engine speed to the pump for it to flow.
2. You must drive each truck with at least a half load in its sander, in the proper gear selection at 20-mpm to find the engine r.p.m. Speed needed to simulate the 20-mph speed at which we all sand. If you do not lock out the other gears, cycling of the transmission will occur, resulting in a change of engine speed.
3. You must have a half load in the sander while calibrating because it creates drag and weight on the hydraulic system requiring more engine speed to run the pump, which pressurizes the system.
4. You need dry sand. Sand can absorb water resulting in a significant amount of added weight. Weight and speed are determining factors in the process.
5. You must have an open mind to do the work. It can work for you.

We are now going to go to the next the page and review the sample calibration sheet. I will take you step by step through this. Some of the
information you are receiving was obtained from Snow Fighters Handbook prepared by the Salt Institute published in 1999 and the Snow and Ice Guidelines 2001-2002 CT. D.O.T. along with the Town of So. Windsor’s practical experience and findings over the last 20 years.
## Sample Calibration Sheet

### Agency:
Town of CT. DPW.

### Location:
Town Garage

### Truck No.:
62

### Date:
1-1-98

### Spreader No.:
62 - 6

### By:
J.D.

---

### Gate Opening:

<table>
<thead>
<tr>
<th>Shaft RPM's (Loaded)</th>
<th>Discharge Revolution (Pounds)</th>
<th>Discharge Rate (Lbs/Min)</th>
<th>10 mph</th>
<th>20 mph</th>
<th>25 mph</th>
<th>30 mph</th>
<th>35 mph</th>
<th>40 mph</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.60</td>
<td>1.20</td>
<td>1.50</td>
<td>1.80</td>
<td>2.10</td>
<td>2.40</td>
</tr>
</tbody>
</table>

1. Have truck warmed up and at least half full.
2. Find RPM setting on engine which equals 20 mph.
3. Close or open gate three or four inches from auger chain to the bottom of the gate. Circle the gate setting above.
4. Take one shaft revolution of sand and salt mix and weigh it. Record the amount above.
5. Set your engine RPM's to simulate 20 mph sanding operation.
6. Count each shaft revolution for one minute while the truck RPM's are set to represent 20 mph sanding at each auger setting and record revolutions above. (Note: Must be at least a half full sander.)
7. Multiply each control setting by the 20 pound factor and record above. Next, multiply by 3 which represents 20 mph. That will give you how many pounds per lane mile of sand and salt mix at each auger setting.

GOAL: The correct amount of pounds of sand and salt mix should be 1,564 pounds per two lane mile of road.
Close up of the count that gives the shaft revolutions.
## APPLICATION RATES VS STORM CONDITIONS

### 2004/2005

<table>
<thead>
<tr>
<th>CONDITION</th>
<th>TEMPERATURE</th>
<th>SALT LBS</th>
<th>50/50 GUIDE LINE RATE</th>
<th>7/2 MIX</th>
</tr>
</thead>
<tbody>
<tr>
<td>FREEZING RAIN</td>
<td>NEAR 30</td>
<td>200 LBS</td>
<td>500 LBS</td>
<td>700 LBS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1100 LBS</td>
</tr>
<tr>
<td>SLEET</td>
<td>NEAR 30</td>
<td>500 LBS</td>
<td>1100 LBS</td>
<td>1700 LBS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td>SNOW</td>
<td>NEAR 30</td>
<td>200 LBS</td>
<td>500 LBS</td>
<td>700 LBS</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1100 LBS</td>
</tr>
<tr>
<td>PLOW AS NECESSARY, REPEAT 200 LB AS NEEDED UNLESS DIRECTED OTHERWISE.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### APPLICATION RATE LIQUID CALCIUM OR MAGNESIUM CHLORIDE 8 gal. Per Ton.

<table>
<thead>
<tr>
<th>SNOW</th>
<th>BELOW 20</th>
<th>500 LBS</th>
<th>1100 LBS</th>
<th>700 LBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNOW . PLOW AS NECESSARY, REPEAT 200 LB AS NEEDED UNLESS DIRECTED OTHERWISE.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SNOW, SLEET, FRZ, R.</th>
<th>BELOW 20</th>
<th>600-800 LBS</th>
<th>1500-1800 LBS</th>
<th>1700 LBS</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLOW AS NECESSARY. REPEAT 200 LB AS NEEDED UNLESS DIRECTED OTHERWISE.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SNOW OR FREEZING</th>
<th>BELOW 10</th>
<th>500 LBS</th>
<th>1100LBS</th>
<th>1700 LBS</th>
<th>2550LBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCUMULATION OF PACKED SNOW OR ICE. SAND FIRST WITH 7:2 MIX CONTAINING SALT AT THE 500 LBS PER 2 LANE MILE THEN AS DIRECTED.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SAMPLE TABLE OF RATES

<table>
<thead>
<tr>
<th>50-50 Mix 45.38%</th>
<th>SALT PER 2-LANE MILE</th>
<th>7:2 Mix 19.18%</th>
<th>SALT PER 2-LANE MILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT. 1.1 Mix</td>
<td>2.1 Mix 29.35%</td>
<td>7:2 Mix 19.18%</td>
<td>SALT PER 2-LANE MILE</td>
</tr>
<tr>
<td>POUNDS</td>
<td>2453 lb/cu.yd</td>
<td>2502 lb/cu.yd</td>
<td>2502 lb/cu.yd</td>
</tr>
<tr>
<td>2380 lb/cu.yd</td>
<td>1080</td>
<td>2453</td>
<td>720</td>
</tr>
<tr>
<td>1500</td>
<td>681</td>
<td>1500</td>
<td>440</td>
</tr>
<tr>
<td>1300</td>
<td>550</td>
<td>1300</td>
<td>382</td>
</tr>
<tr>
<td>1100</td>
<td>499</td>
<td>1100</td>
<td>323</td>
</tr>
<tr>
<td>800</td>
<td>363</td>
<td>800</td>
<td>235</td>
</tr>
<tr>
<td>600</td>
<td>272</td>
<td>600</td>
<td>176</td>
</tr>
<tr>
<td>500</td>
<td>500</td>
<td>500</td>
<td>147</td>
</tr>
</tbody>
</table>

### Additional Notes

- DRY SNOW, DRY PAVEMENT
- PLOW THEN APPLY 7:2 MIX WHEN NO MELTING IS TAKING PLACE. APPLY 2:1 MIX TO WET OR HARD PACK AREAS AT 600-800 LBS SALT PER 2 LANE MILE RATE
- PAVING WET AND STICKY, SPREAD THE 2:1 MIX, WAIT 30 MINUTES THEN PLOW. REAPPLY AS NECESSARY OR DIRECTED.
- ACCUMULATION OF PACKED SNOW OR ICE. SAND FIRST WITH 7:2 MIX CONTAINING SALT AT THE 500 LBS PER 2 LANE MILE THEN AS DIRECTED.
3.

ICE OR SNOWPACK

SPREADING OF BRINE AT TOP OF PAVEMENT

PAVEMENT

ILLUSTRATION OF AUGERING ACTION OF SALT PARTICLES
Different materials will spread at different rates at the same setting, so spreaders must be calibrated with the material it will be used.

Header Calibration Procedure
Calibration of spreaders is simply calling the pounds per mile discharged at various spreader control settings and truck speeds by first counting the number of auger or conveyor shaft revolutions per minute, measuring the salt discharged in each revolution, then multiplying the two. Finally, multiplying the discharge rate by the minutes it takes to travel one mile. With hopper-type spreaders, specific gate openings must be calibrated. Measure from floor of conveyor to bottom of gate. Each spreader must be calibrated individually; even the same models can vary slightly at the same setting.

Equipment needed:
1. Scale for weighing,
2. Canvas or bucket/collection device.
3. Chalk, crayon or other marker.
4. Watch with second hand.

Calibration steps:
1. Warm truck's hydraulic oil to normal operating temperature with spreader system running.
2. Put partial load of salt on truck.
3. Mark shaft end of auger or conveyor.
4. Dump salt on auger or conveyor.
5. Rev truck engine to operating RPM (at least 2000 RPM).
6. Count number of shaft revolutions per minute at each spreader control setting, and record.
7. Collect salt for one revolution & weigh, deducting weight of container. (For greater accuracy, collect salt for several revolutions and divide by this number of turns to get the weight for one revolution.) This can be accomplished at idle or very low engine RPM.
8. Multiply shaft RPM (Column A) by discharge per revolution (Column B) to get discharge rate in pounds per minute (Column C), then multiply discharge rate by minutes to travel one mile at various truck speeds to get pounds discharged per mile.*

Agency
Location
Truck No
By:

GATE OPENING

(HOPPER TYPE SPREADERS)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*For example, at 20 MPH with 30 Shaft RPM and 7 lbs. discharge—30 x 7 = 210 x 3.00 = 630 lbs. per mile.

Calibrating Automatic Controls
Automatic controls come with factory calibration cards that indicate the proper rate of spread for each setting. However, when there is a need to calibrate, use the following steps:
1. Remove or turn off spinner.
2. Set auger on given number, such as No. 2.
3. Tie sack or heavy canvas under discharge chute.
4. Mark specific distance, such as 100 or 100 feet.
5. Drive that distance with spreader operating.
6. Weigh salt collected in sack or canvas.
7. Multiply weight of salt by 5.2 (in case of 1,000 feet) or 52.8 (in case of 100 feet)

This will be the amount of salt discharged per mile, which remains constant regardless of speed, but calibration must be done for each control setting.
2 LANE HIGHWAY

EXHIBIT PLOTTED

18 MILES

600' to 500'

SPREADING OPERATION

7 to 2 Wt

8 MILES

8 MILES

7-6' to 8' 3-3' to 4'

7-6' to 8' 3-3' to 4'

50% of 7 to 2 sand-salt/8-mile run

Same

1264 lbs. sand & 300 lbs. salt/two-lane mile