A Guide to Spreader Constants

Spreader Constants are used with truck spreaders that have a controller, either MidTech or Raven. The spreader constant ensures an accurate output from the conveyor that results in the desired lbs/ac. The spreader constant is the number of sensor pulses divided by per cubic foot of material discharged per revolution (CFR). The constant is different for different gate settings, conveyor widths and drives.

The spreader constant is only ONE variable that yields correct pounds per acre (lb/ac). Correct density, swath and other factors are needed for accurate results.

Calculating the initial spreader constant requires accuracy on these factors:

1) Gate Height in inches **(GH)** = 1 inch of height or the actual height the gate is set
2) Width in inches of Conveyor **(CW)** Style of bed chain is also a factor.
3) Length conveyor moves during one revolution of the rear roller **(L)** in inches.
4) Formula constant = 1728 which converts cubic inches to cubic feet
5) Number of sensor pulses for one revolution of the spreader's rate sensor/slot sensor **(P)**

(GH X CW X L) / 1728 = CFR or Ft^3 of one revolution

CFR is the number **Ft^3** which is the volume in cubic feet discharged during one revolution.

Now we must relate the **Ft^3** to the **P**

Required Factors

1 The gate height **GH** settings should be checked reading from the floor of unit to bottom of gate.

2 The stainless steel conveyor width **CW** will be 16 or 24 inches and driven by a 12 or 18 tooth rear roller on a Newton Crouch spreader. Your chain type may be belt over chain (BOC), web chain, flat bar, etc.

3 **Chart for determining L**

Conveyor	Inches for ONE Revolution
SS Conveyor—12 tooth rear roller	13.125
SS Conveyor—18 tooth rear roller	19.6
667 X (BOC or Slat)	18
D88 Chain (BOC or Slat)	22.25

4 **Determine CFR Using this formula from above (GH X CW X L) / 1728**

A Guide to Spreader Constants (continued)

5 The number of sensor pulses for each revolution **P** vary by sensor type. Below are the 3 most commonly used encoders / slot sensors on NCI spreaders.

Sensor Type	**P** (Counts for ONE Revolution)	**P X 1728** (formula constant)
Dickey John	360	622,080
Raven Encoder	180	311,040
Rawson Internal	67	115,776

Using **Ft³ and P** determine spreader constant using the charts
page 4 - Dickey John Sensor page 5 - Raven Encoder page 6 - Rawson Sensor

OR

Calculate the Spreader Constant Value (**SCV)** using one of the following formulas.

A $\dfrac{\text{Counts Per Revolution}}{\text{Cubic Feet of Discharge per 1 Rear Roller Revolution}} = \dfrac{P}{Ft^3} = SCV$

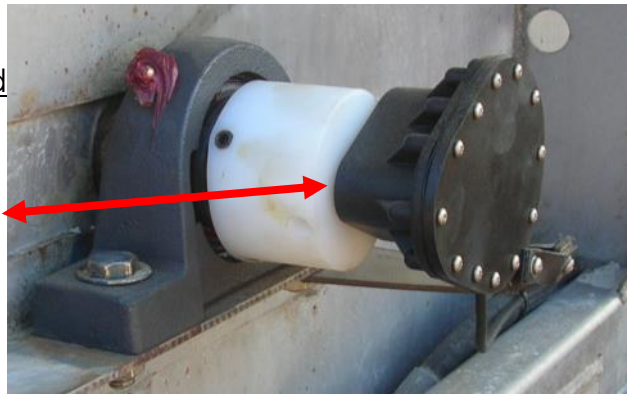
Calculate the Spreader Constant Value using direct method for 1" Gate

B $\dfrac{P \times 1728}{Ft^3} = SCV \text{ for } 1" GH$

See chart above for P X 1728 values for your encoder.

For an individual gate height other than 1" (remember the minimum is 1.5" gate height), use this formula: $\dfrac{\text{Spreader Constant Value}}{\text{Actual Gate Height}}$

Important Notes!



- Larger amounts of product generally need larger gate heights & faster chain speeds. Fertilizer should not go over 6" gate.
- Rear Roller & encoder must move jointly. Encoder must be tightened on rear roller to read properly. Check tightness regularly.
- The accuracy of the spreader constant should be verified and adjusted as necessary. The following procedure is a simple means of testing the calibration of the spreader constant.

Performing a Catch Test

1 TEST PRODUCT DENSITY! Improper density will cause results to be inaccurate! NCI sells the SM-DS50895 density scale. This simple scale measures your product in pounds per cubic foot.

2 Power on the console. Scroll through the settings until you get to your **current spreader constant.** This number must be set to match gate height, chain & sensor. **Write it down!**

3 Load the spreader with a product of known density. Be sure the density is correctly entered into your console along with all other factors. Be sure total volume is clear or enter zero.

4 Weigh the truck and load. If the driver is in the truck during first weigh, make sure he is in the truck during the next weigh.

5 Back up to a location where you can safely unload the material through the conveyor. Be sure the hydraulics are engaged so that there is pressure to the conveyor control valve.

6 Turn on conveyor and discharge enough material to get an accurate measurement but be careful to keep the conveyor running full. You should discharge at least 1000 lbs.

7 Weigh the truck and load. *If the driver was in the truck during first weigh, make sure he is in the truck during this weigh.*

The difference between starting weight and ending weight is the ACTUAL WEIGHT discharged by the conveyor. To adjust the spreader constant, use this formula:

(Indicated Weight / Actual Weight) X Current Spreader Constant = NEW Spreader Constant

If the weight read from the console is greater than the weight actually measured, the calibration number will increase.

8 *Write down the spreader constants for different gate settings.* Use these numbers whenever that gate setting is selected. This will save you time!!

HINT! If you cannot perform an actual catch test, field experience will allow you to fine-tune your spreader constant. If the vehicle is applying too much, decrease the spreader constant by the same percentage as the over application. If too little material is being discharged, increase the spreader constant by the same percentage as the under application. The gate must be at the same position.

ARC 6000 with Dickey John Sensor - 360 Count

"CHEAT SHEET" – BASIC – DRY – MESH

MINIMUM VALUES DISPLAYED BY ARC6000 – TO OPERATE

SELECTION OF MODE SWITCH	OPERATE	SET-UP
PRIME	1	A
DISTANCE	2	B
IMPLEMENT WIDTH	3*1	C*2
TOTAL APPLIED	4	D
APPLICATION RATE	5	E
SPEED	10	J*0

To Operate: Select (1) Console On (2) Operate (3) A Mode Switch Other Than Test (4) Switch Box Master On (5) GSO On/Auto

Note: Numeric are in Operate & Alphas are in Set-Up & corresponds to Value Displayed on separate sheet.

Notes:

*1 Check Valve Setting Dry – Must show "Closed"
*2 Check W/Boom Control Box, Master Switch On
*0 Set GSO To Zero - For DRY
See Special Instructions To Clear - Total Area

IMPLEMENT WIDTH (SWATH) IN SETUP C*2		
C	XX	For Dry Spreading enter swath in inches in #1.
1		
2		For Split Chain enter swath in inches for each boom section you are using, and 0 in the rest.
3 - 9	0	

SETTING THE GATE HEIGHT- ESTIMATE

*CAUTION: Gate Height Must Match Constant in Console

FOR USE WITH DICKEY JOHN SLOT SENSOR ONLY

	16" Mesh / 12 Teeth RR		24" Mesh / 12 Teeth RR	
GATE HEIGHT	APPROX. LBS./ACRE	SPREADER CONSTANT	APPROX. LBS./ACRE	SPREADER CONSTANT
1		2967.9		1978.6
2	80-200	1484.0	100-300	989.3
3	200-300	989.3	200-450	659.5
4	300-400	742.0	400-600	494.7
5	400-500	593.6	500-750	395.7
6	500-1000	494.7	600-900	329.8
7	1000-2000	424.0	800-2000	282.7
8	2000-3000	371.0	2000-4000	247.3
9	3000-4000	329.8	4000-6000	219.8

Fertilizer Gate Height Should Not Exceed 6 Inches. Spreader constant for various gate heights on a Newton Crouch spreader should be verified with a catch test, with all data entered. Alarms will occur when unit is outside of the limitations of the unit or data entered. The above varies with Speed, Swath, Density, Etc.

SETTING THE CHUTE - ESTIMATE

1/4" SS or Carbon Steel	Standard Stainless Steel	LBS Per ACRE
5	4	120-140
4.75	3.75	160-240
4.5	3.5	260-340
4.25	3.25	360-380
4	3	400-480
3.75	2.75	520-580
3.5	2.5	600-660
3.25	2.25	680-760
3	2	780-980
2.5	1.5	1000-1100

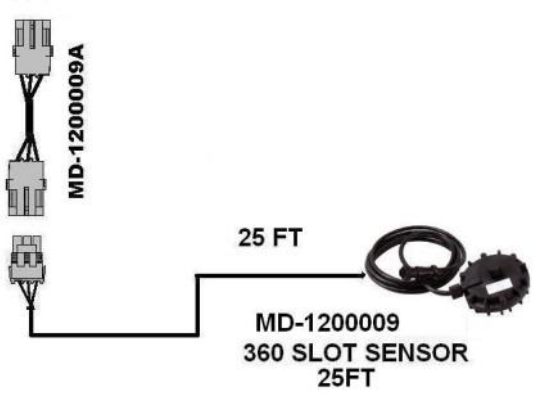
NOTES FOR SETTING THE CHUTE:

1. Find Lbs. per Acre #, match **front edge** of chute bracket to chute scale on right side of spreader.
2. All chute settings must be checked by a spread pattern test for correctness.
3. For **Lime**, set chute to one on scale.
4. Different material blades do spread differently, do not mix.

When calling on questions, fill out Values found in All Blanks PRIOR to calling and NOTE UNITS OF MEASURE

Error (Err) Message Displayed?	
CAUSE	REMEDY
Error 1 Too Fast	Can't Open Valve/Limitations
Error 3 Conveyor Not Running	Rate Sensor/Valve/Console Mechanical
Error 5 Exceeding Rate 15%	Limitations - Sensor
Error 0 - With Display	Constant set to "0", Specific

Any Time a Dickey John 360 Slot Sensor is used, the unit must have the MD-1200009 and MD-1200009A



Raven Controller only

Spreader Constant for Raven 180 Encoder

Spreader Constants for Gate Height
16" & 24" Conveyors

SETTING THE GATE HEIGHT- ESTIMATE

FOR USE WITH RAVEN (180 COUNT) SLOT SENSOR ONLY

	16" Mesh / 12 Teeth RR		24" Mesh / 12 Teeth RR	
GATE HEIGHT	APPROX. LBS./ACRE	SPREADER CONSTANT	APPROX. LBS./ACRE	SPREADER CONSTANT
1		1484.0		989.3
2	80-200	742.0	100-300	494.7
3	200-300	494.7	200-450	329.8
4	300-400	371.0	400-600	247.3
5	400-500	296.8	500-750	197.9
6	500-1000	247.3	600-900	164.9
7	1000-2000	212.0	800-2000	141.3
8	2000-3000	185.5	2000-4000	123.7
9	3000-4000	164.9	4000-6000	109.9

180 SLOT SENSOR
RA-0630171443

Fertilizer Gate Location should be checked for height reading from the floor of the unit. Never exceed 6 inches in gate height for best fertilizer spread. (Spreader constant for various gate heights on a Newton Crouch spreader should be verified with a catch test, with verified data entered [density, swath, lbs/AC, etc.]). The above lbs/AC varies with Speed, Swath, Density, etc.

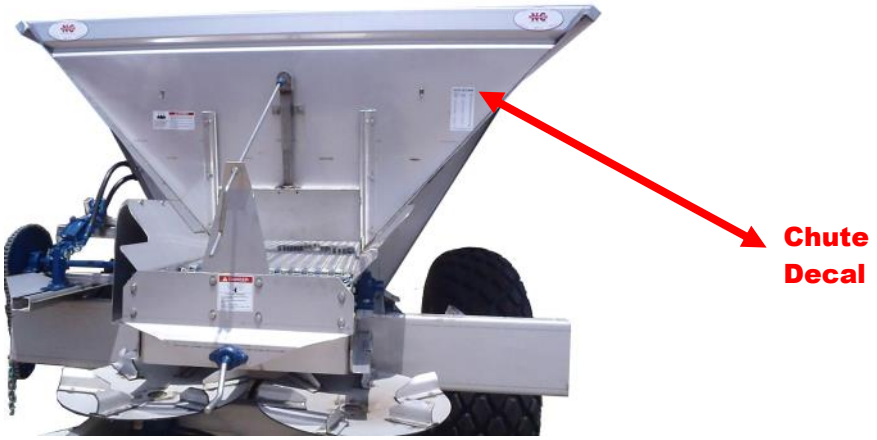
This spreader constant is only one factor that yields the pounds per acre.

Mid Tech requires:

(1) 404-0023 - Adaptor from 3 pin amp to 2 pin with potted boot w/circuit board when using 18056H sensor

Raven requires:
(2) Adaptor that divides by 2 - when using 360 Slot Sensor. Check connection order cable. Use setting for 360.

A unit with a MidTech or Raven controller will NOT have a rate chart on the back of the unit. It WILL have chute setting decal.



Before **you call NCI for technical assistance, know the serial number from your equipment located on the left side rail on the unit.**
1-800-241-1350

ARC 6000 with Rawson Rate Sensor - 67 Count
"CHEAT SHEET" – BASIC – DRY – MESH
MINIMUM VALUES DISPLAYED BY ARC6000 – TO OPERATE

SELECTION OF MODE SWITCH	OPERATE	SET-UP
PRIME	1	A
DISTANCE	2	B
IMPLEMENT WIDTH	3*1	C*2
TOTAL APPLIED	4	D
APPLICATION RATE	5	E
SPEED	10	J*0

To Operate: Select (1) Console On (2) Operate (3) A Mode Switch Other Than Test (4) Switch Box Master On (5) GSO On/Auto

Note: Numeric are in Operate & Alphas are in Set-Up & corresponds to Value Displayed on separate sheet.

Notes:

*1 Check Valve Setting Dry – Must show "Closed"

*2 Check W/Boom Control Box, Master Switch On

*0 Set GSO To Zero - For DRY

See Special Instructions To Clear - Total Area

IMPLEMENT WIDTH (SWATH) IN SETUP C*2		
C	XX	For Dry Spreading enter swath in inches in #1.
1		
2		For Split Chain enter swath in inches for each boom section you are using, and 0 in the rest.
3 - 9	0	

SETTING THE CHUTE - ESTIMATE		
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5	4	120-140
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NOTES FOR SETTING THE CHUTE:

1. Find Lbs. per Acre #, match **front edge** of chute bracket to chute scale on right side of spreader.
2. All chute settings must be checked by a spread pattern test for correctness.
3. For **Lime**, set chute to one on scale.
4. Different material blades do spread differently, do not mix.

SETTING THE GATE HEIGHT- ESTIMATE				
*CAUTION: Gate Height Must Match Constant in Console				
FOR USE WITH RAWSON RATE SENSOR ONLY				
	16" Mesh / 12 Teeth RR		24" Mesh / 12 Teeth RR	
GATE HEIGHT	APPROX. LBS./ACRE	SPREADER CONSTANT	APPROX. LBS./ACRE	SPREADER CONSTANT
1		552.4		368.2
2	80-200	276.2	100-300	184.1
3	200-300	184.1	200-450	122.8
4	300-400	138.1	400-600	92.1
5	400-500	110.5	500-750	73.7
6	500-1000	92.1	600-900	61.4
7	1000-2000	78.9	800-2000	52.6
8	2000-3000	69.1	2000-4000	46.0
9	3000-4000	61.4	4000-6000	40.9

Fertilizer Gate Height Should Not Exceed 6 Inches. Spreader constant for various gate heights on a Newton Crouch spreader should be verified with a catch test, with all data entered. Alarms will occur when unit is outside of the limitations of the unit or data entered. The above varies with Speed, Swath, Density, Etc.

When calling on questions, fill out Values found in All Blanks PRIOR to calling and NOTE UNITS OF MEASURE

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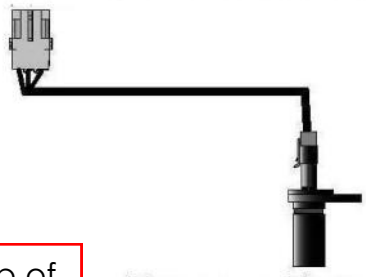

Rawson Rate Sensor
MD-1605004KIT

Standard rear roller with sensor on top of gear box uses the MD-1605004KIT

