FRAME MOUNTED SEEDER

MINIMUM FAN SPEED CHART MANUAL

0252-90-61

This manual is intended to be used as a supplement to the Frame Mounted Seeder Operator’s Manual.

Original Instructions

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Effective L.N. 44910CD - DATE
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1 Fan Speed Charts

Important

The charts listed in the following manual were created using a Bourgault air cart and Bourgault seeding unit/distribution system. The charts listed in this manual are only accurate and valid with a Bourgault seeding system.

Changes to the Bourgault distribution system, installing a Bourgault air kit on a competitor seeding unit, or using a Bourgault tank with a competitive drill will require the end user to calculate their own minimum fan speeds needed for each product. These charts are not applicable for those scenarios.

Bourgault ships all FMS systems with 3/4" fan circuit hydraulic couplers, and all cross tillage hydraulic hoses with 3/4" couplers to supply the fan's hydraulic requirements. For maximum fan efficiency and RPM these couplers should not be downsized for any reason.

The stationary method listed in the *Section 1.2* was used to construct the charts listed in this manual.

Terminology

1. **Cleanout** - This is when the airstream goes from carrying product in the air stream to having only air traveling through the transfer lines.
2. **Loaded Fan Speed** - Stable fan RPM displayed when product is being metered into the distribution system.
3. **Unloaded Fan Speed** - Stable fan RPM displayed when there is no product being metered into the distribution system.
4. **Ports** - Number of manifolds feeding the drill from the Primary Manifold.

Important

Any seeding condition, including product density, product size, relative humidity, and seed treatments, can all have an effect on the minimum required fan speed for any product. The charts listed herein are a guide based on optimum conditions.

Operators should calculate the required fan speed using the method listed in the *Section 1.2* for any change to seeding conditions.

Important

When the metering augers are shut off, count the number of seconds that elapse until most of the product has cleared the seed boots.

The interval between shutting off the augers and product coming out of the seed boots should be less than 4 seconds at the main frame (expect the odd kernel to come out for 5~10 seconds after the majority of product has cleared). If it is greater, the fan speed must be increased.

Changes in performance may occur over time due to factors including seed treatments and high humidity.

1.1 Reading Fan Charts

The following information will assist in reading the fan charts provided.

1. Verify your model and width.
2. Check your opener spacing. If unsure of the spacing, measure the distance between 2 adjacent openers, this measurement is your unit spacing.
3. Count the number of ports on the primary manifold. This is the manifold being fed by the 5” (127 mm) pipe from the air seeder tank, refer to *Figure 1.1*.
4. Verify the type of fan on your air cart.
5. There are 2 methods to distinguish between the Standard and High Speed fans.
   a. To help identify what fan is installed, identifying decals are placed on fan assembly. Refer to *Figure 1.2*.
   b. By inspecting the fan motor. Refer to *Figure 1.3*.
      i. Standard fan has a straight body.
      ii. High Speed fan has a bent body.
6. Once you have recorded this information refer to *Figure 1.4 - Minimum Fan Speed Chart Legend* to find the charts specific to your seeding system and applied product.

Note

If you are applying a blend or there is no chart for your product please follow the instructions in *Section 1.1.2 - Determining Fan Speed For Unlisted Products* to calculate a minimum fan speed required.

7. **Example:** For a CD 848-6 @ 10" spacing with High Speed fan use Chart 16A - 16F, depending on the used product.

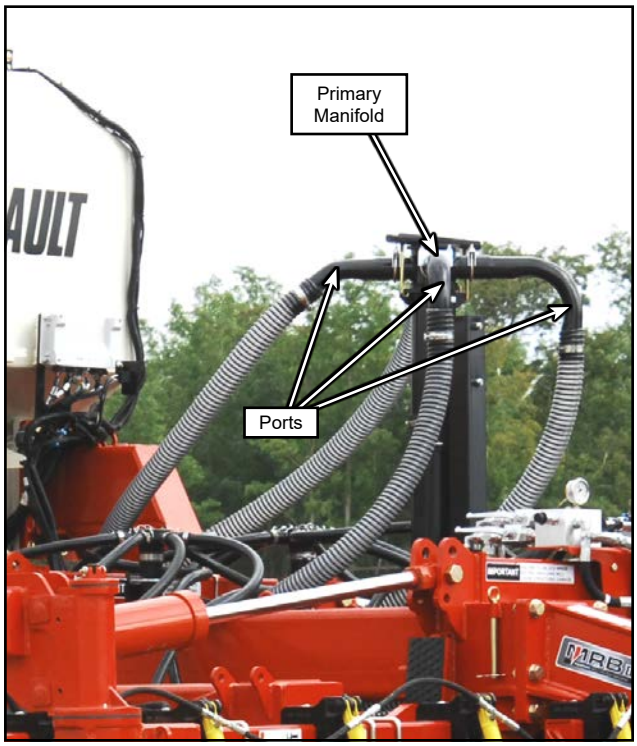


Figure 1.1 - Primary Manifold and Ports

(Single Shoot is shown)

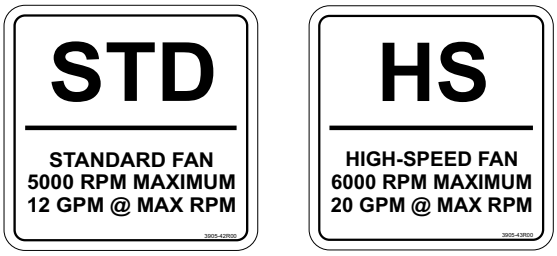
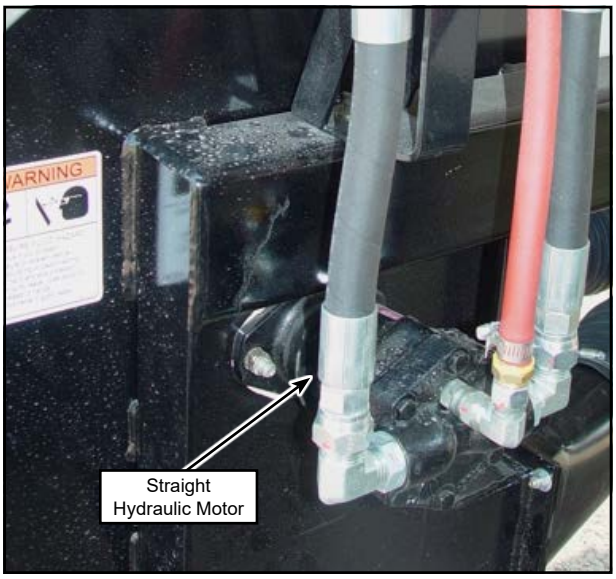


Figure. 1.2 - Fan Type Identifier Decals

Standard Fan



High Speed Fan

Figure 1.3 - Fan Identification

FMS System Configuration				
Model	Spacing	# of Ports	Standard Fan	High Speed Fan
CD 872-6	6.5" (17 cm)	4	**16A - 16F**	**16A - 16F**
	7.5" (19 cm)			
	10" (25 cm)			
	12" (30 cm)			
CD 872-8	6.5" (17 cm)	4	**16A - 16F**	**16A - 16F**
	7.5" (19 cm)			
	10" (25 cm)			
	12" (30 cm)			
CD 848-6	6.5" (17 cm)	4	**16A - 16F**	**16A - 16F**
	7.5" (19 cm)			
	10" (25 cm)			
	12" (30 cm)			
CD 848-6	6.5" (17 cm)	4	**16A - 16F**	**16A - 16F**
	7.5" (19 cm)			
	10" (25 cm)			
	12" (30 cm)			
HD 872-6	10" (25 cm)	4	**16A - 16F**	**16A - 16F**
	12" (30 cm)			
HD 872-8	10" (25 cm)	4	**16A - 16F**	**16A - 16F**
	12" (30 cm)			
HD 848-6	10" (25 cm)	4	**16A - 16F**	**16A - 16F**
	12" (30 cm)			
HD 848-8	10" (25 cm)	4	**16A - 16F**	**16A - 16F**
	12" (30 cm)			
CD9120-12	7.5" (19 cm)	8	**31A - 31F**	**31A - 31F**

Figure 1.4 - Minimum Fan Speed Charts Legend

1.1.1 Fan Speed Interpolation for the Unlisted Ground Speeds

For ground speeds not listed on the chart, operators will have to interpolate the fan speed based on the ground speeds listed in the charts. Follow the procedure below for unloaded and loaded minimum fan speeds.

1. From the chart specific to your configuration locate the rate in lb/ac (kg/ha).
2. Follow where the loaded/unloaded speed curve that are above and below your intended speed crosses the rate required and record.
3. Calculate the difference from the speed you wish to travel vs the lower speed curve listed. The difference between chart lines is 1 MPH and your calculated difference is the factor used to calculate the new minimum fan RPM.
4. Subtract the higher ground speed fan RPM from the lower ground speed fan RPM. Multiply this value by the speed difference factor calculated above.
5. Add this value to the lower ground speed fan RPM previously recorded. This is your fan speed.

Example (Imperial):

Minimum unloaded fan speed required to travel 5.7 MPH with a HD 848-8 unit, 10” spaced, 4 port and high speed fan applying wheat at 150 lb/ac. (Using *Chart 16*)

1. It is determined that *Chart 16a* is the chart specific for seeding system configuration. On the chart locate the rate - 150 lb/ac.
2. Determine unloaded fan speed:
3. Between 5 MPH and 6 MPH curves Unloaded Fan speed at 5 MPH and 6 MPH:
   a. 5 MPH - 150 lb/ac unloaded minimum fan speed = 4350 RPM
   b. 6 MPH - 150 lb/ac unloaded minimum fan speed = 4610 RPM
4. Calculate the difference between speeds:
   a. (5.7 MPH - 5 MPH)/(6 MPH - 5 MPH) = 0.7 MPH
5. Change in fan RPM required:
   a. (4610-4350) x 0.7 = 182 RPM
6. Calculate your fan speed:
   a. Estimated unloaded fan speed = 4350 RPM + 182 RPM = 4532 RPM minimum no load fan speed for a ground speed of 5.7 MPH
   b. Set fan to 4500 RPM in the unloaded state (round RPM to nearest 50 RPM +/- 25 RPM).

Important

Do not exceed 6000 RPM with the High Speed fan.

Do not exceed 5000 RPM with the Standard fan.

Operating above these ranges can damage product, lid seals and tank.

Example (Metric):

Minimum unloaded fan speed required to travel 9.2 km/h with a HD 848-8 unit, 10" spaced, 4 port and high speed fan applying wheat at 168 kg/ha. (Using *Chart 16*)

1. It is determined that *Chart 16a* is the chart specific for seeding system configuration. On the chart locate the rate - 168 kg/ha.
2. Determine unloaded fan speed:
3. Between 8 km/h and 9.7 km/h curves Unloaded Fan speed at 8 km/h and 9.7 km/h:
   a. 8 km/h - 168 kg/ha unloaded minimum fan speed = 4350 RPM
   b. 9.7 km/h - 168 kg/ha unloaded minimum fan speed = 4610 RPM
4. Calculate the difference between speeds:
   a. (9.2 km/h - 8 km/h)/(9.7 km/h - 8 km/h) = 0.7 km/h
5. Change in fan RPM required:
   a. (4610 - 4350) x 0.7 = 182 RPM
6. Calculate your fan speed:
   a. Estimated unloaded fan speed = 4350 RPM + 182 RPM = 4532 RPM minimum no load fan speed for a ground speed of 9.2 km/h
   b. Set fan to 4500 RPM in the unloaded state (round RPM to nearest 50 RPM +/- 25 RPM).

Important

Do not exceed 6000 RPM with the High Speed fan.

Do not exceed 5000 RPM with the Standard fan.

Operating above these ranges can damage product, lid seals and tank.

1.1.2 Determining Fan Speed For Unlisted Products

Listed in *Figure 1.5* are several common products that do not have fan charts, along with the recommended minimum fan chart that can be used as a starting point. If there is no product listed, go to instructions below and follow the procedure to get the minimum fan speed required.

Note

These are recommended charts to follow.

Operators should go through the procedure below if there is any concern with the minimum fan speed required.

In order to calculate the minimum fan speed for blended products, or products not listed on the charts, use the following formula:

1. Calculate the total amount of product to be applied, (in lb/ac or kg/ha).
2. For any product in the blend that has a chart listed in the following pages, look at the chart and find the loaded fan speed required for the **Total Product** to be applied and write it down.
3. For all products that do not have a chart listed in this document select a product that is the closest match to what you wish to apply for your unit and do the same as in *step 2*.
4. Calculate the percentage of each individual product in the blend and multiply that percentage by the fan speed recorded previously for each product.
5. Add the weighted fan speeds together from each product and the result will be your initial loaded fan speed.
6. Repeat *steps 1 - 5*, to calculate the unloaded minimum fan speed required for the same rate required. This will provide the initial starting point.

Product	Recommended Chart to Follow
Canary Seed	Barley
Faba Beans	Chickpea/Pea
Flax	Barley
Lentils	Chickpea/Pea
11-0-0-50	11-51-00
20-00-00-24	46-0-0

Figure 1.5 - Recommended Chart to Follow for Non Listed Products

Example (Imperial):

Applying a blend of 150 lbs/ac wheat and 50 lbs/ac 11-51-0-0 at 5 MPH with an HD848-6 unit with 10" spacing, 4 port and with a High Speed fan.

Using *Figure 1.4* (if required) and *Chart 16* to calculate fan speed.

1. Total Product:
   a. 150 lbs/ac + 50 lbs/ac = 200 lbs/ac
2. Loaded fan RPM:
   a. Wheat @ 200 lbs/ac: 4990 RPM
   b. 11-51-00 @ 200 lbs/ac: 4720 RPM
3. Percentage of each product:
   a. 150 lbs/ac Wheat / 200 lbs/ac total = 75%
   b. 50 lbs/ac 11-51-0-0 / 200 lbs/ac total = 25%
4. Estimated loaded fan speed
   a. (75% x 4900) + (25% x 4720) = 4922 RPM minimum loaded minimum fan speed for this blend.
   b. Initial loaded fan RPM should be 4950 RPM (round RPM to nearest 50 RPM +/- 25 RPM).

Example (Metric):

Applying a blend of 168 kg/ha Wheat and 56 kg/ac 11-51-0-0 at 8 km/h with an HD848-6 unit with 10" spacing, 4 port and with a High Speed fan.

Using *Figure 1.4* (if required) and *Chart 16* to calculate fan speed.

1. Total Product:
   a. 168 kg/ha + 56 kg/ha = 224 kg/ha
2. Loaded fan RPM:
   a. Wheat @ 224 kg/ha: 4750 RPM
   b. 11-51-00 @ 224 kg/ha: 5430 RPM
3. Percentage of each product:
   a. 168 kg/ha Wheat / 224 kg/ha total = 75%
   b. 56 kg/ha 11-51-0-0 / 224 kg/ha total = 24%
4. Estimated loaded fan speed
   a. (75% x 4750) + (24% x 5430) = 4920 RPM minimum loaded minimum fan speed for this blend.
   b. Initial loaded fan RPM should be 4900 RPM (round RPM to nearest 50 RPM +/- 25 RPM).

Important

Do not exceed 6000 RPM with the High Speed fan.

Do not exceed 5000 RPM with the Standard fan.

Operating above these ranges can damage product, lid seals and tank.

1.1.3 Determining Fan Speed for Double Shoot Configuration

1.1.3.1 Transfer Line Gate Valves

These gates are used to control the amount of air flowing through the air line when there are two transfer lines driven by one air seeder fan. Opening and closing the gate valves is dependent on the amount of product being metered into each air stream.

1.1.3.2 Knife Valve Setting

When configured for double-shoot, the Frame Mounted Seeder (FMS) has two transfer lines attached to one hydraulic fan. Each transfer line has a knife valve which allows the operator to balance the air delivery based on how the product lines are being used.

1. If only the main product (seed) line is in use, the knife valve on that line should be **fully open**, and the knife valve on the double-shoot (fertilizer) line should be **fully closed**.
2. If only the double-shoot (fertilizer) line is in use, the knife valve on that line should be **fully open**, and the knife valve on the main product (seed) line should be **fully closed**.
3. If **BOTH** product lines are in use, and the product rate in the main (seed) line exceeds 100 lbs/acre (112 kg/ha) or more at 6 MPH (9.7 km/h), **BOTH** knife valves should be **fully open**.
4. If **BOTH** product lines are in use, and the product rate in the main (seed) line is 100 lbs/acre (112 kg/ha) or less at 6 MPH (9.7 km/h), the knife valve on the secondary line (fertilizer line) should be fully open, and the knife valve on the main product line (seed line) should be **closed half-way**.

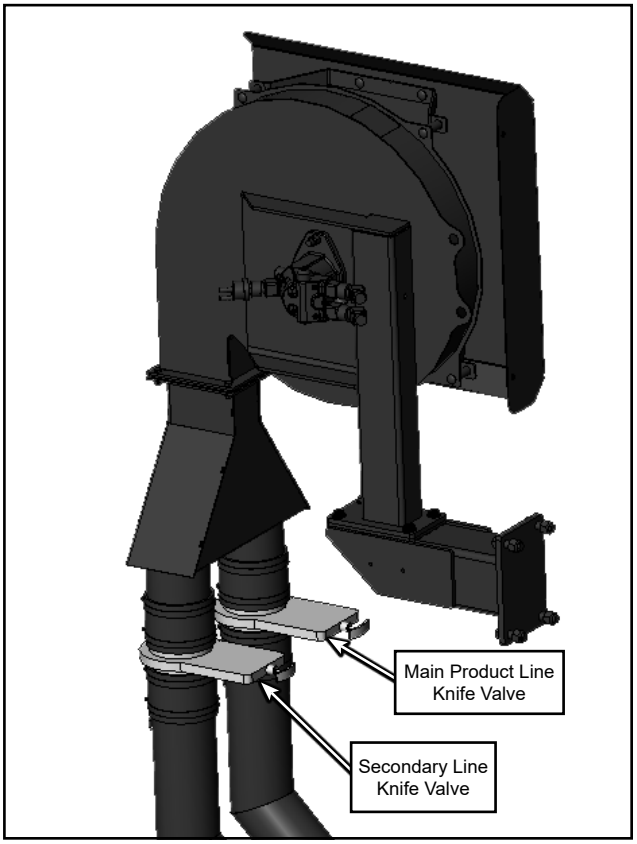


Figure 1.6 - Knife Valves

With the double-shoot scenario there will be a little effort required to truly optimize things, with the 3 variables to be adjusted:

a. Seed line gate valve.

b. Fertilizer line gate valve.

c. Fan speed.

Double-shoot Fan speed Scenario's:

1. Calculate the total rate of product being applied:
   a. **Example 1:** 100 lb/ac down the seed line and 150 lb/ac down the fertilizer line = 250 lb/ac of total product.
   b. **Example 2:** 112 kg/ha down the seed line and 168 kg/ha down the fertilizer line = 280 kg/ha of total product.
2. To calculate fan speed for total product in seed run refer to *Section 1.1.2 - Determining Fan Speed For Unlisted Products*.
3. One other option to help to adjust things properly is an "open hose test".
   a. Remove a tertiary hose from both an outer wing seed opener and fertilizer opener and tie them to the frame pointed upwards.
   b. Make adjustments to achieve around 6" to 10" of product height when it exits the tertiary hoses.
   c. Then again do a final evaluation and adjustment when seeding and evaluating product placement in the trench.

1.2 Troubleshooting

If you experience plugging or that the fan cannot achieve the loaded minimum fan RPM required perform one of the following stationary tests.

1.2.1 Stationary Test if System Plugs

The stationary method should be used any time you experience issues with the air system delivering product.

Note

Each airstream must be checked separately.

1. Verify that augers for the tanks you are testing are charged and full of product.
2. With the unit stationary and the openers out of the ground, set the fan RPM at your anticipated unloaded RPM required.
3. Engage the metering augers from the tanks you are applying product from, (utilizing the control box on the side of the tank), for that airstream.
4. Meter product until the fan RPM stabilizes at the loaded RPM, approximately 5~10 seconds minimum. If after one minute the fan speed has not stabilized and is still increasing, shut off the metering augers, allow the system to clean out and retest with a higher unloaded fan speed.
5. Shut off the metering augers.
6. Count the number of seconds that elapse until product stops coming out of the seed boots at the mainframe. (This is when the majority of product stops – expect the odd kernel to come out for 5~10 seconds beyond the majority of product stopping).
7. If the interval between shutting off the augers vs product coming out of the seed boots is greater than 4 seconds, the unloaded fan speed must be increased.
8. Repeat the above process until the interval is below 4 seconds. The RPM that has a clean out of less than 4 seconds is your required minimum fan RPM for this product.

Note

Measure fan speed against your acceptable seed bounce. Be sure to use enough fan RPM to meet the 4 second minimum cleanout.

Important

Excessive fan speed can result in premature hose wear, seed damage, and the potential for abnormally higher percentage of seed bounce.

1.2.2 Stationary Test if Minimum Loaded Fan Speed is Unachievable

Note

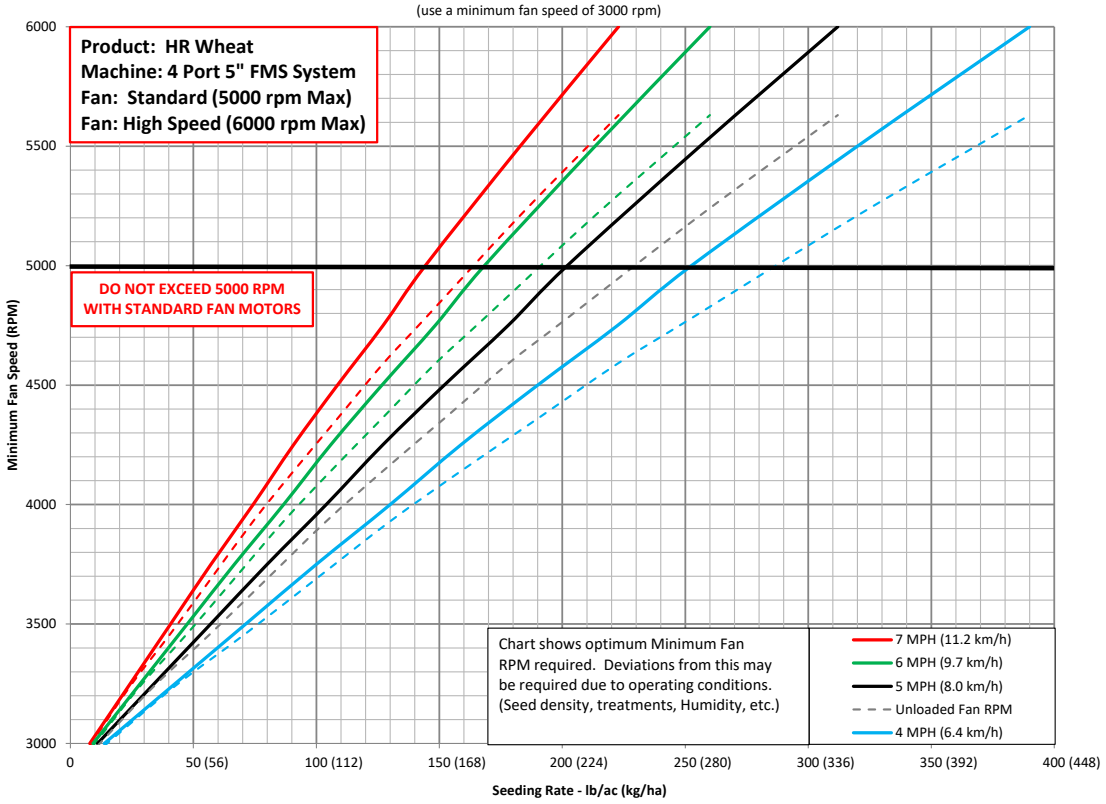
Each airstream must be checked separately.

1. Verify that augers for the tanks you are testing are charged and full of product.
2. With the unit stationary and the openers out of the ground, set the fan RPM at the maximum unloaded fan speed available.
3. Engage the metering augers from the tanks you are applying product from, (utilizing the control box on the side of the tank), for that airstream.
4. Meter product until the fan RPM stabilizes at the loaded RPM, (5~10 seconds minimum). If after 1 minute the fan speed has not stabilized and is still increasing, shut off the metering augers, allow the system to clean out and retest with a lower ground speed or with less total product. Continue to next step if the fan speed is stable.
5. Shut off the metering augers.
6. Count the number of seconds that elapse until product stops coming out of the seed boots at the mainframe. (This is when the majority of product stops – expect the odd kernel to some out for 5~10 seconds beyond the majority of product stopping).
7. If the interval between shutting off the augers vs product coming out of the seed boots is greater than 4 seconds, the seeding speed will need to be decreased or the total amount of product being applied will need to be lowered.
8. Repeat the above process until the interval is below 4 seconds. The RPM that has a clean out of less than 4 seconds is your required minimum loaded fan RPM for this product.
9. The stationary method should be used any time you experience issues with the air system delivering product.

1.3 Frame Mounted Seeder (FMS) Charts

Chart 16A

(use a minimum fan speed of 3000 rpm)



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 3000 RPM.

Chart 16B

(use a minimum fan speed of 3000 rpm)

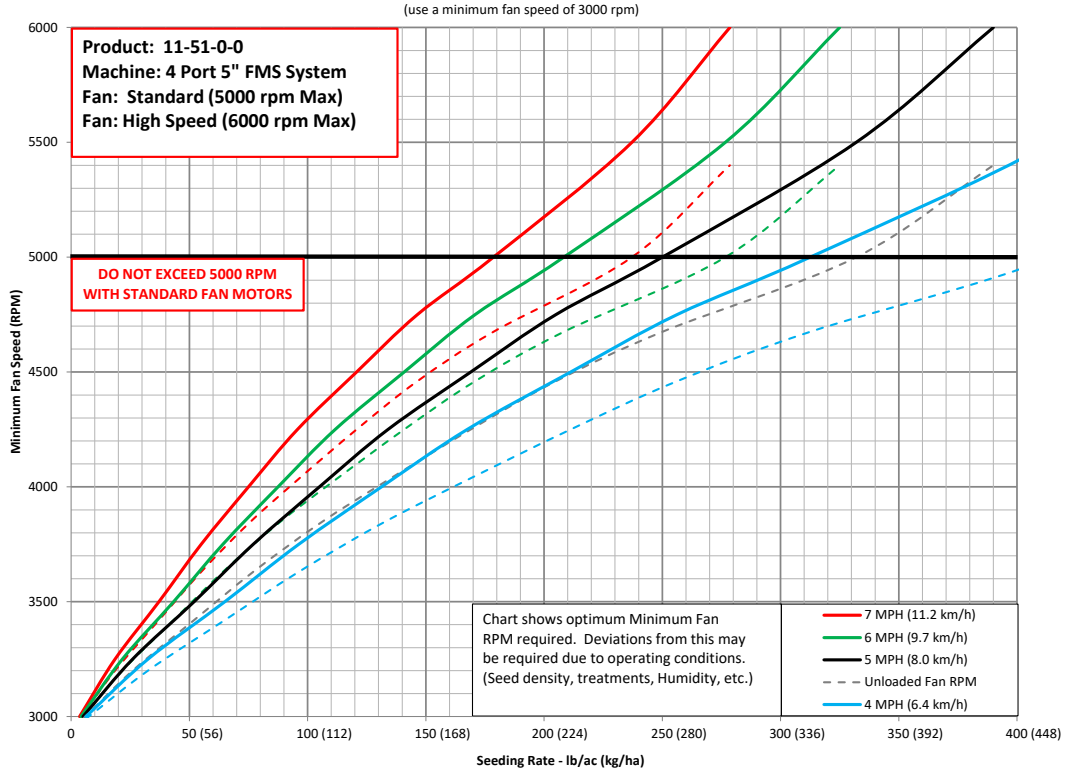
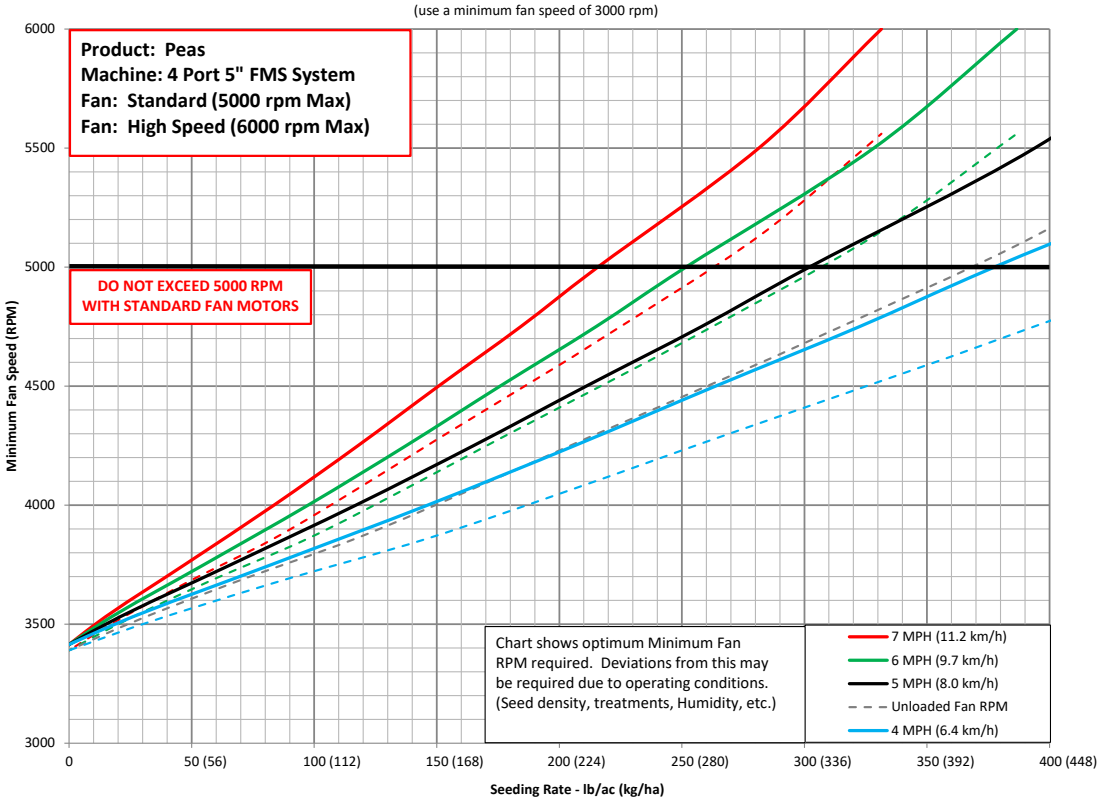


Chart 16C

(use a minimum fan speed of 3000 rpm)



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 3000 RPM.

Chart 16D

(use a minimum fan speed of 3000 rpm)

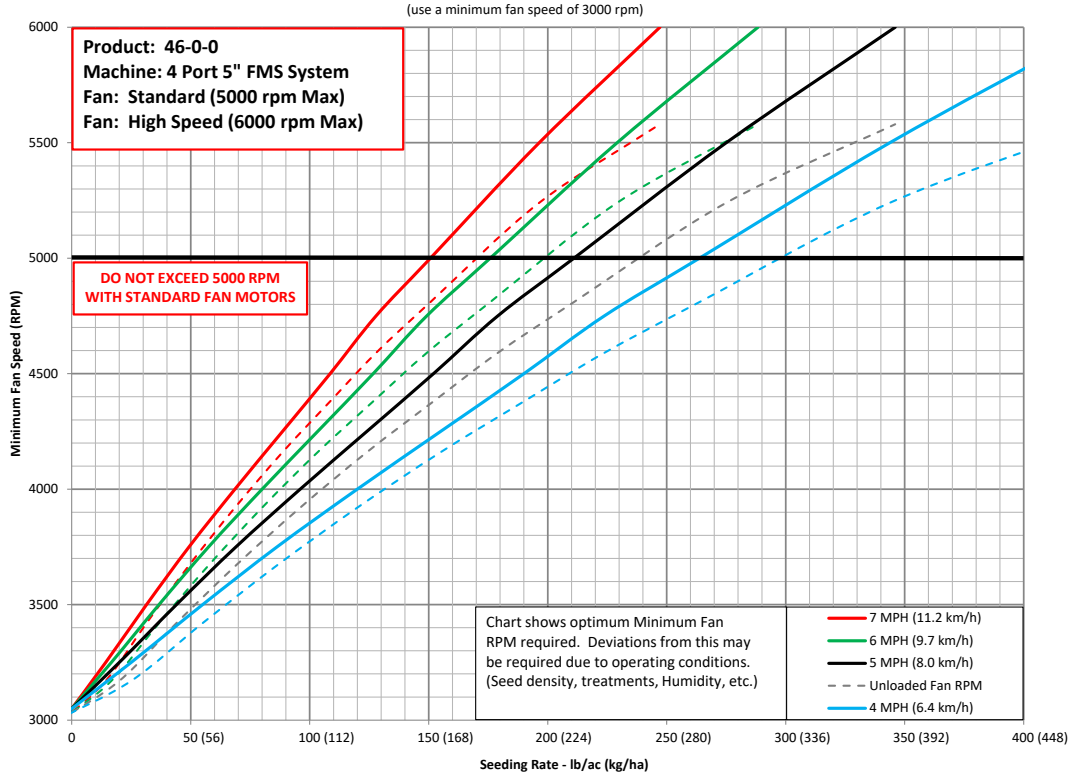
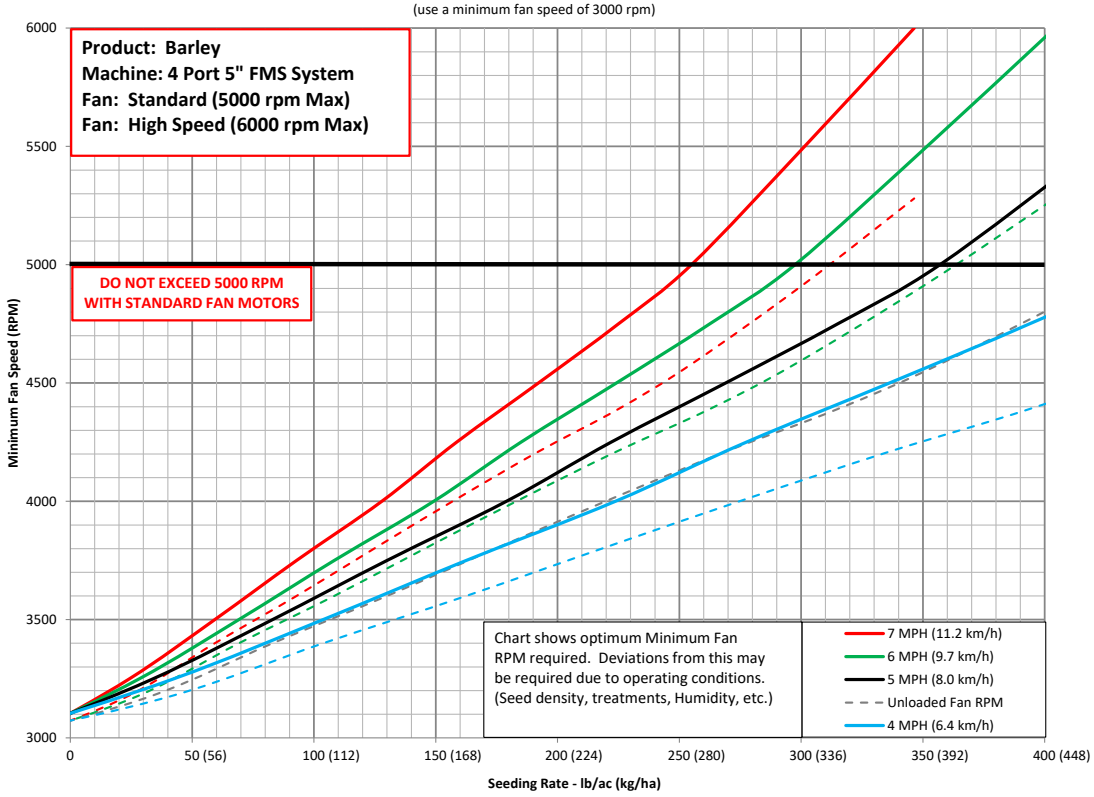


Chart 16E

(use a minimum fan speed of 3000 rpm)



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 3000 RPM.

Chart 16F

(use a minimum fan speed of 3000 rpm)

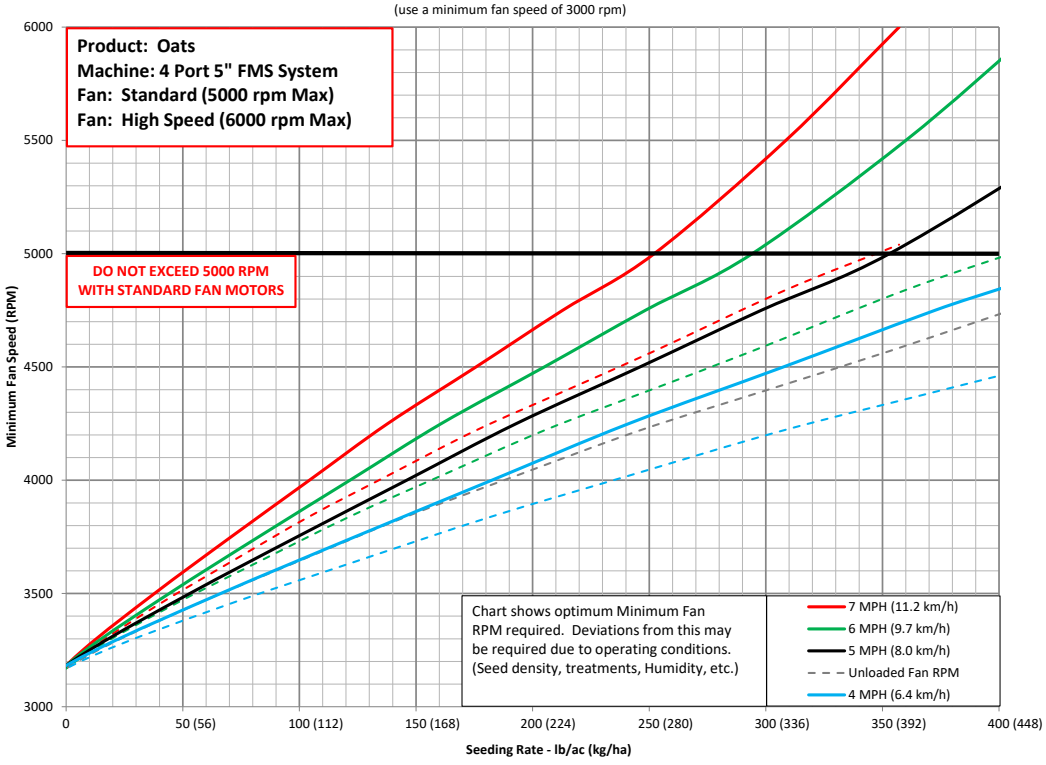
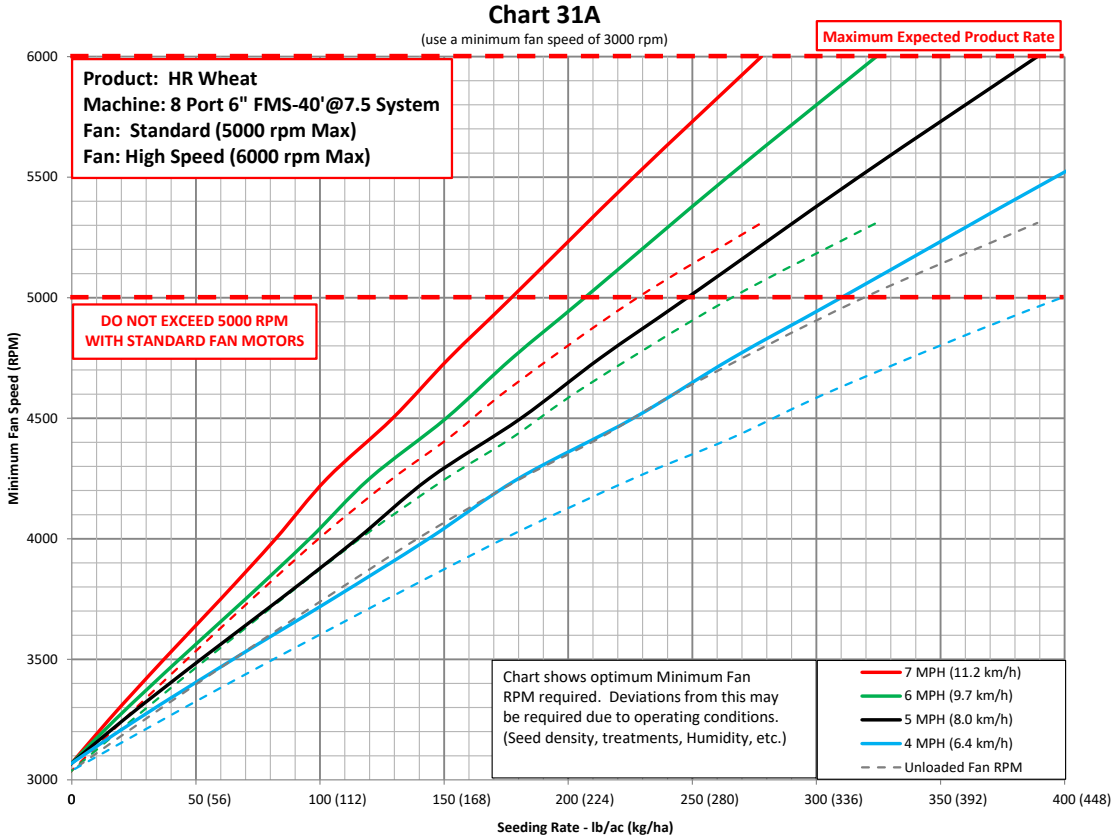


Chart 31A

(use a minimum fan speed of 3000 rpm)



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 3000 RPM.

Chart 31B

(use a minimum fan speed of 3000 rpm)

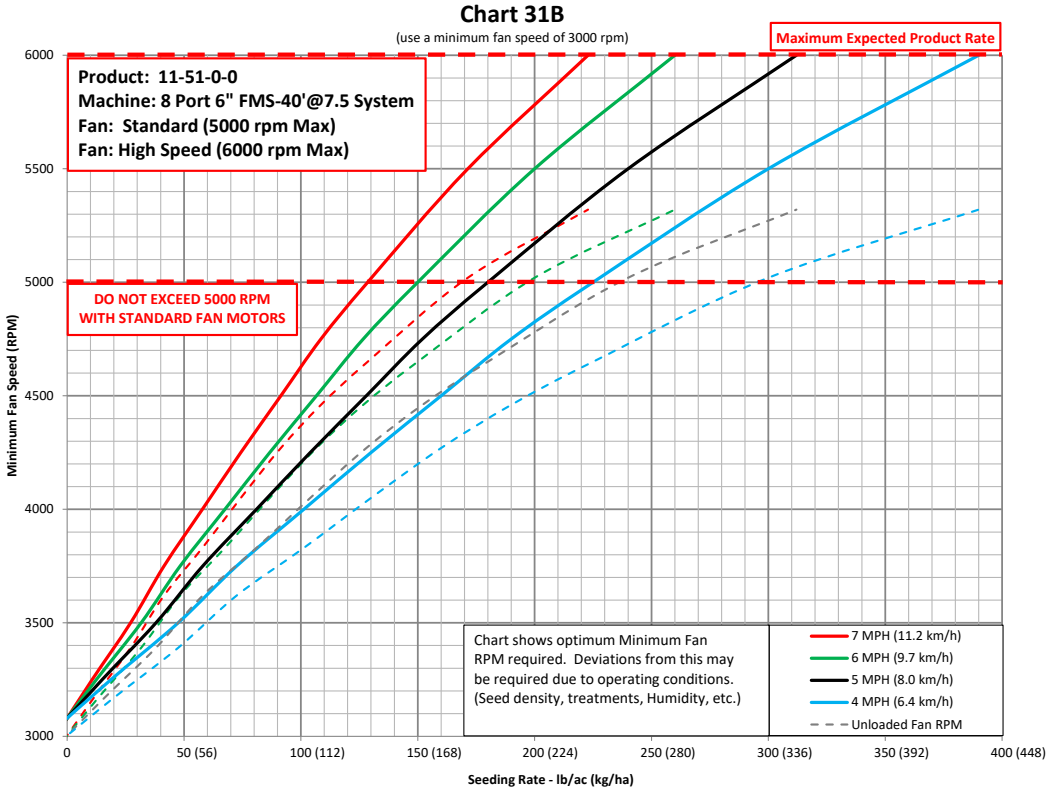
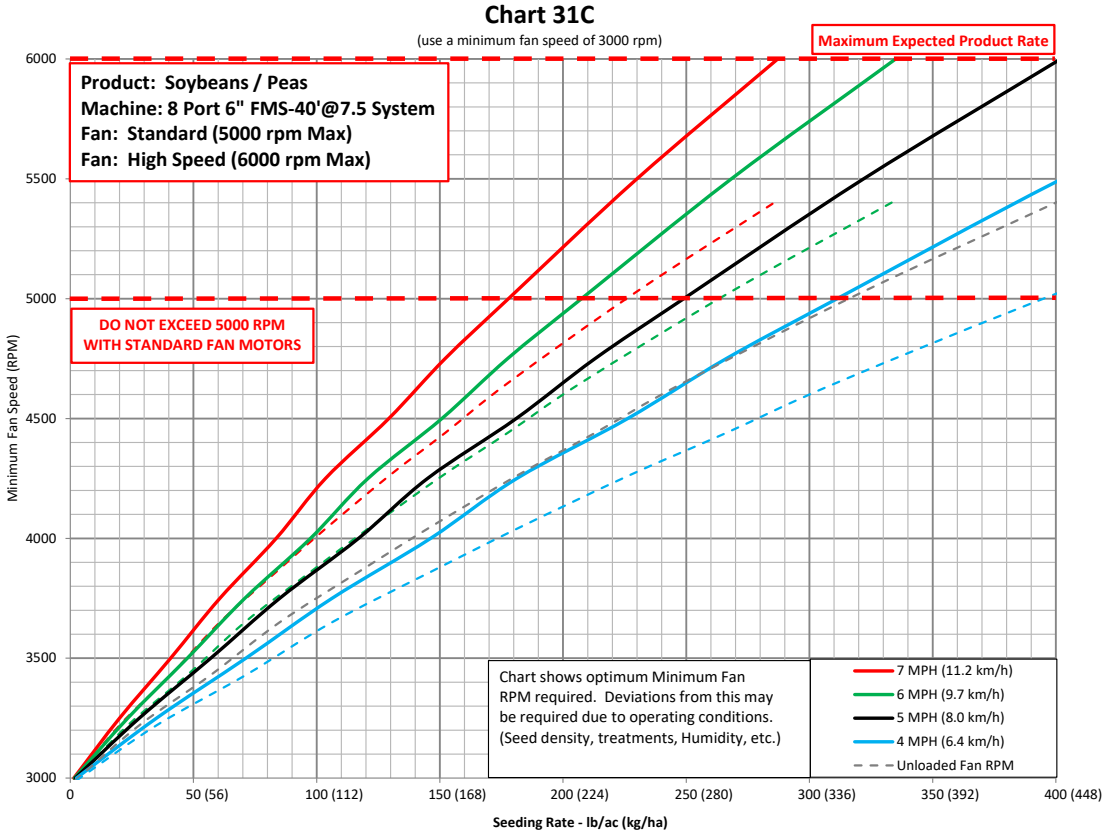


Chart 31C

(use a minimum fan speed of 3000 rpm)



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 3000 RPM.

Chart 31D

(use a minimum fan speed of 3000 rpm)

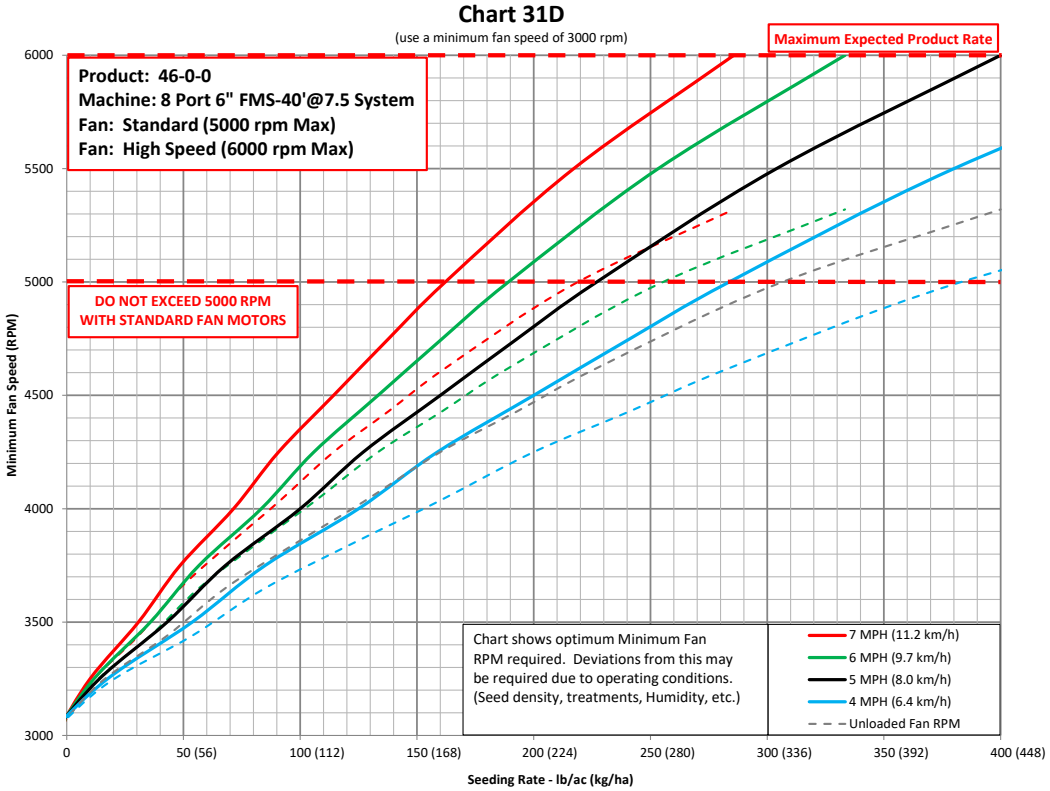
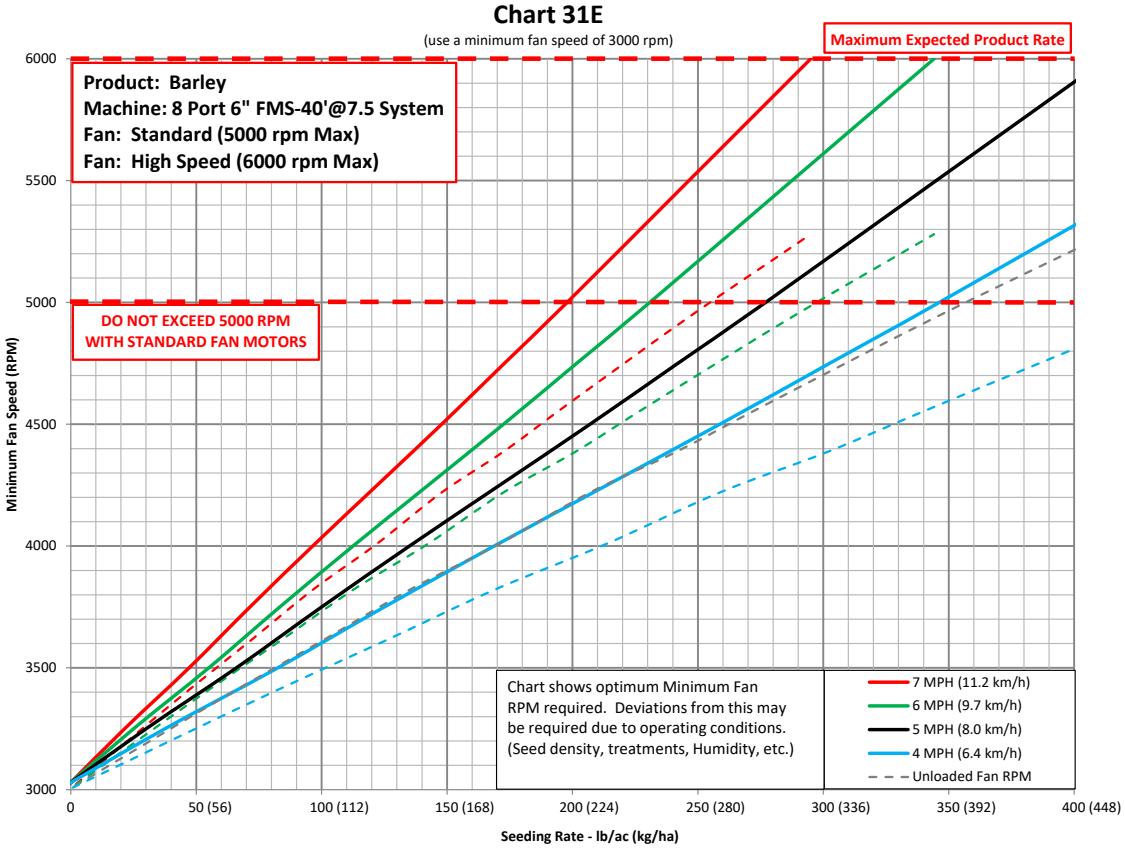


Chart 31E

(use a minimum fan speed of 3000 rpm)



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 3000 RPM.

Chart 31F

(use a minimum fan speed of 3000 rpm)