

8000 SERIES AIR CART



**MINIMUM FAN SPEED CHART
MANUAL**

0253-20-40

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Effective S.N. 43963AS01- DATE
May 2025
0253-20-40

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1 Fan Speed Charts

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Important

The stationary method listed in [Section 1.2](#) was used to construct the charts listed in the following manual and were created using a Bourgault air cart and Bourgault seeding unit/distribution system that uses a 6" (152mm) diameter primary 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 cart 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 8000 series carts with 1/2" fan circuit hydraulic couplers. The high speed fan option comes with a set of 3/4" couplers for the cart and cross tillage hydraulic hoses. These should be used on the high speed fan hydraulic circuit for maximum fan efficiency and RPM.

The charts listed in [Figures 1.3 - 1.6](#) are for units **WITHOUT ASC** installed and they show the loaded fan speeds. The unloaded fan speed will be lower. The amount lower, will be a greater difference, the higher the fan speed and application rates are.

The charts listed in [Figure 1.7](#) are for units **WITH ASC** installed and they have 2 sets of lines to show the unloaded (dashed lines) and the loaded (solid lines) fan speeds.

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 [Section 1.2](#) for any change to seeding conditions.

Important

These charts provide minimum recommended fan speed settings only, intended to be a starting point for determining an optimum fan speed setting.

Ensure fan speed is adjusted appropriately when changing product type or metering rates.

Important

For the Standard Fan **DO NOT EXCEED 5000 RPM.**

For the High Speed Fan **DO NOT EXCEED 6000 RPM.**

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/elbows or hoses coming from the primary manifold. This is the manifold being fed by the 6" (152 mm) pipe from the air seeder tank, refer to *Figure 1.1*.

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.



Figure 1.1 - 8550 Trailing Unit with ASC - Primary Line, Manifold and Ports
(Double Shoot is shown)

4. Verify the type of fan on your air cart.
5. The motor on the fan is the easiest way to distinguish between the standard and the high speed fans. Refer to *Figure 1.2*.
 - a. The standard fan has a straight axis motor with the ports facing away from the fan and has an external check valve plumbed in.
 - b. The high speed fan has a bent axis motor with the ports facing up and has a check valve integrated into the motor.
6. Once you have recorded this information refer to *Figures 1.3, 1.4, 1.5, 1.6 & 1.7*, to find the charts specific to your seeding system and applied product.
 - a. *Figures 1.3 - 1.6* are for **units WITHOUT ASC** (Air Seeder Sectional Control) on them.
 - b. *Figure 1.7* is for **units WITH ASC** on them
7. Take care when picking your chart for your unit. Some charts are given hose size designations of 7/8" (22 mm) tertiary or 1" (25.4 mm) tertiary hose.

Important

For units with Double Row Spacing Caps:

Increase fan speed 100-300 RPM above recommended minimum fan speed when caps are installed.

For Single Run MRB/MRS (1-1/4" (32 mm) ID hose) on:

- 3320/3330/3335/5810 with MRB/MRS
- 3310 with MRS
- 3710/3720/3820 with MRB

Use 7/8" (22mm) ID hose chart when available.

If only 1" (25.4 mm) ID hose chart is available, increase fan speed by 100-200 RPM above recommended minimum fan speed.

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.

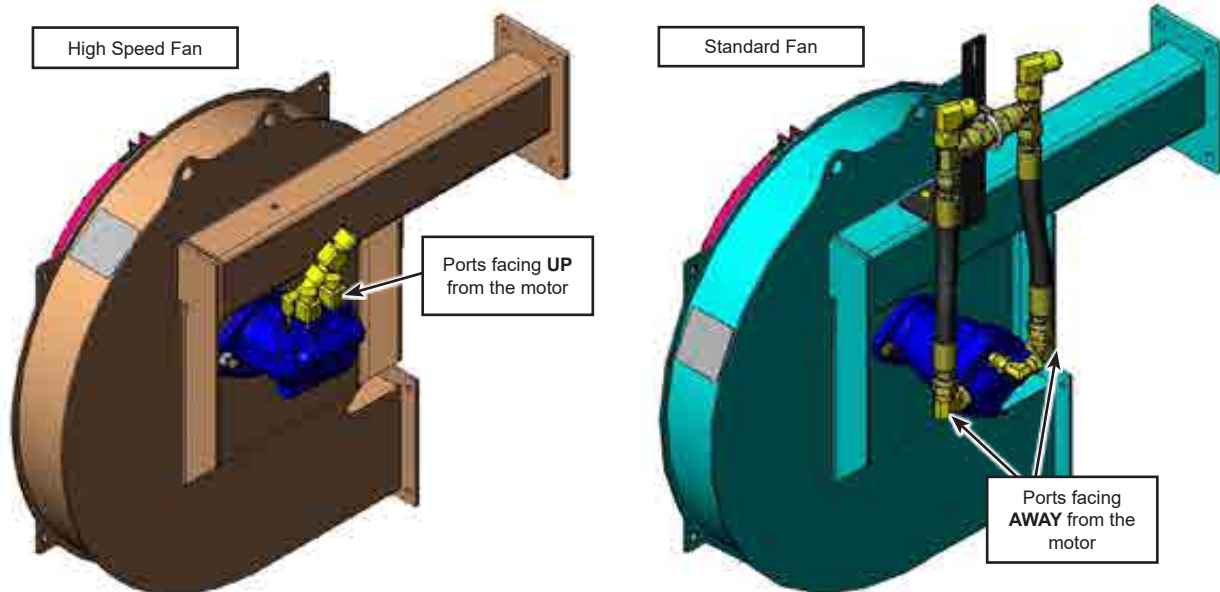


Figure 1.2 - Fan Identification

Figure 1.3 - Model 8810, 8825/8830, 8910 Charts - **WITHOUT ASC**

**** Match the frame size and spacing as close as possible to your unit**

**** Charts MAY only show a label of 8810, but are to be used for ALL models listed above**

24ft @ 8"	2.1
25ft @ 10"	2.1
28ft @ 8"	2.2
30ft @ 10"	2.1
32ft @ 8"	2.2
33ft 4in @ 10"	2.1
35ft @ 10"	2.3
36ft @ 8"	2.3
36ft @ 12"	2.4
40ft @ 8"	2.5
40ft @ 10"	2.5
40ft @ 12"	2.4
48ft @ 8"	2.6
50ft @ 10"	2.7
52ft @ 8"	2.8
55ft @ 10"	2.9
58ft - 8in @ 8"	2.10
60ft @ 10"	2.11

8830

56ft @ 12"	2.12
60ft @ 12"	2.13

Figure 1.4 - Model 5710, 5810/5811, 5720/5725, 5730, 5925/5926 Charts - **WITHOUT ASC**

**** Match the frame size and spacing as close as possible to your unit**

**** Charts MAY only show a label of 5710, but are to be used for ALL models listed above**

24ft - 6in @ 7"	2.14
24ft - 6in @ 9.8"	2.15
25ft - 2in @ 12.6"	2.15
29ft - 2in @ 7"	2.16
29ft - 5in @ 9.8"	2.16
29ft - 5in @ 12.6"	2.17
33ft - 7in @ 12.6"	2.17
34ft - 4in @ 9.8"	2.18
35ft @ 7"	2.18
40ft - 10in @ 9.8"	2.19
42ft @ 7"	2.20
42ft @ 12.6"	2.21
47ft @ 9.8"	2.22
47ft @ 12.6"	2.23
51ft - 4in @ 7"	2.24
52ft - 6in @ 12.6"	2.25
53ft - 11in @ 9.8"	2.25
59ft @ 7"	2.26
59ft @ 9.8"	2.27
59ft @ 12.6"	2.28
60ft - 8in @ 7"	2.29
63ft - 8in @ 9.8"	2.30
63ft - 8in @ 12.6"	2.31
70ft @ 9.8"	2.32
69ft - 4in @ 12.6"	2.33
74ft @ 9.8"	2.34
74ft @ 12.6"	2.35

5725

34ft - 4in @ 9.8"	2.18
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5730

17ft - 6in @ 7"	2.36
18' @ 9.8"	2.36

Figure 1.5 - Model 9400/9405, 9500, 9800/9820/9830 Charts - **WITHOUT ASC**

**** Match the frame size and spacing as close as possible to your unit**

**** Charts MAY only show a label of 9400, but are to be used for ALL models listed above**

28ft @ 12"	2.37
30ft @ 12"	2.37
32ft @ 12"	2.37
36ft @ 12"	2.37
40ft @ 12"	2.37
42ft @ 12"	2.37
48ft @ 12"	2.38
50ft @ 12"	2.38
54ft @ 12"	2.40
60ft @ 12"	2.39

Figure 1.6 - Model 3310/3320/3330/3335 PHD & 3710/3720/3820 PCD Charts - **WITHOUT ASC**

**** Match the frame size and spacing as close as possible to your unit**

**** Charts MAY only show a label of 3310, 3710 or 3320 but are to be used for models listed below**

40ft @ 10" (3310, 3710/3720/3820, 3320/3330/3335)	2.5
40ft @ 12" (3310 & 3320/3330/3335)	2.4
48ft @ 10" (3310 (48ft), 3710/3720/3820 (50ft) & 3320/3330/3335 (50ft))	2.22
48ft @ 12" (3310 (48ft), 3710/3720/3820 (50ft) & 3320/3330/3335 (50ft))	2.23
50ft @ 7.5" (3710/3720/3820)	2.8
55ft @ 10"	2.25
55ft @ 12"	2.40
60ft @ 7.5" (3710/3720/3820)	2.26
60ft @ 10" (3710/3720/3820 (60ft) & 3320/3330/3335 (60ft))	2.27
60ft @ 12" (3710/3720/3820 (60ft) & 3320/3330/3335 (60ft))	2.31
65ft @ 10" (3310 (65ft) & 3320/3330/3335 (60ft))	2.30
65ft @ 12" (3310 (65ft) & 3320/3330/3335 (60ft))	2.33
75ft @ 10" (3310 (75ft) & 3320/3330/3335 (76ft))	2.34
75ft @ 12" (3310 (74ft) & 3320/3330/3335 (76ft))	2.35

Figure 1.7 - Model 3xxx/4420 Charts - with ASC (Air Seeder Sectional Control)

Important

Take care when using these charts in **Section 3**. Ensure that you are finding the correct charts for your desired product. There is a box in the TOP LEFT corner of each chart explaining what the chart covers. There is also info in the BOTTOM RIGHT corner showing what each colored line represents.

Located at the Top Left Corner

Product: HR Wheat
Machine: 6 Port 6" ASC System
Fan: Standard (5000 rpm Max)
Fan: High Speed (6000 rpm Max)

Located at the Bottom Right Corner

Chart shows optimum Minimum Fan RPM required. Deviations from this may be required due to operating conditions. (Seed density, treatments, Humidity, etc.)

7 MPH (11.2 km/h)
6 MPH (9.7 km/h)
5 MPH (8.0 km/h)
-- Unloaded Fan RPM
4 MPH (6.4 km/h)

Drill Configuration			Chart Required		
			Trailing & Leading Units		
Model	Spacing	Number of Ports (Primary Manifold)	Standard Fan	High Speed Fan	OpManual Pg:
333x-40	10"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
333x-50	10"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
	12"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
333x-60	10"	6	18A ~ 18F	18A ~ 18F	3.4-3.6
	12"	6	18A ~ 18F	18A ~ 18F	3.4-3.6
333x-66	10"	8	21A ~ 21F	21A ~ 21F	3.13-3.15
	12"	6	18A ~ 18F	18A ~ 18F	3.4-3.6
333x-76	10"	8	22A ~ 22F	22A ~ 22F	3.16-3.18
	12"	8	22A ~ 22F	22A ~ 22F	3.16-3.18
333x-80	10"	8	22A ~ 22F	22A ~ 22F	3.16-3.18
	12"	8	22A ~ 22F	22A ~ 22F	3.16-3.18
3x20-40	7.5"	8	20A ~ 20F	20A ~ 20F	3.10-3.12
	10"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
3x20-50	7.5"	8	20A ~ 20F	20A ~ 20F	3.10-3.12
	10"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
	12"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
3x20-60	7.5"	8	21A ~ 21F	21A ~ 21F	3.13-3.15
	10"	6	18A ~ 18F	18A ~ 18F	3.4-3.6
	12"	6	18A ~ 18F	18A ~ 18F	3.4-3.6
3x20-70	10"	8	22A ~ 22F	22A ~ 22F	3.16-3.18
	12"	6	19A ~ 19F	19A ~ 19F	3.7-3.9

Note: The 6" ASC Primary is only to be use with Air kits with 7/8" & 1" hose only, (SSIDS Side), and with 1-1/4" hose only, (DS MRB)

4420 with 8000 A/S ASC Minimum Fan Speed Chart Legend

Drill Configuration			Chart Required		OpManual Pg:
			Trailing & Leading Units		
Model	Spacing	Number of Ports (Primary Manifold)	Standard Fan	High Speed Fan	
4420-12	250mm	6	17A ~ 17F	17A ~ 17F	3.1-3.3
	300mm	6	17A ~ 17F	17A ~ 17F	3.1-3.3
4420-18	250mm	6	18A ~ 18F	18A ~ 18F	3.4-3.6
	300mm	6	18A ~ 18F	18A ~ 18F	3.4-3.6

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 minimum fan speeds.

1. From the chart specific to your configuration locate the rate in lb/acre.
2. Find where the speed curve that is 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 #1 (Imperial) - Unit WITHOUT ASC (Air Seeder Sectional Control):

Minimum fan speed required to travel 5.7 mph with a 3320-76' unit, 10" spaced, with 1" hose that comes with the high speed fan applying wheat at 150 lb/ac. Refer to *Figure 1.6* to determine what page your unit is on.

1. It is determined, that you should use the chart at the *BOTTOM of the page on Page 2.34*.
2. On the chart locate the rate - 150 lb.
3. Determine fan speed:
4. Between 5 mph and 6 mph curves fan speed at 5 mph and 6 mph:
 - a. 5 mph 150 lb Min. fan speed = 4400 RPM
 - b. 6 mph 150 lb Min. fan speed = 4800 RPM

5. Calculate the difference between speeds:
 - a. $(5.7 \text{ mph} - 5 \text{ mph}) / (6 \text{ mph} - 5 \text{ mph}) = 0.7 \text{ mph}$
6. Change in fan RPM is required:
 - a. $(4800 - 4400) \times 0.7 = 280 \text{ RPM}$
7. Calculate your fan speed:
 - a. Estimated fan speed = 4400 RPM + 280 RPM = 4680 RPM minimum fan speed for a ground speed of 5.7 mph
 - b. Set fan to 4700 RPM (round RPM to nearest 50 RPM +/- 25 RPM).

Example (Metric) - Unit WITHOUT ASC (Air Seeder Sectional Control):

Minimum unloaded fan speed required to travel 9.2 km/h with a 3320-76' unit, 10" spaced, with 25.4 mm hose that comes with the high speed fan applying wheat at 168 kg. Refer to *Figure 1.6* to determine what page your unit is on.

1. It is determined, that you should use the chart at the *BOTTOM of the page on Page 2.34*.
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 unloaded minimum fan speed = 4400 RPM
 - b. 9.7 km/h 168 kg unloaded minimum fan speed = 4800 RPM
4. Calculate the difference between speeds:
 - a. $(9.2 \text{ km/h} - 8 \text{ km/h}) / (9.7 \text{ km/h} - 8 \text{ km/h}) = 0.7 \text{ km/h}$
5. Change in fan RPM required:
 - a. $(4800 - 4400) \times 0.7 = 280 \text{ RPM}$
6. Calculate your fan speed:
 - a. Estimated fan speed = 4400 RPM + 280 RPM = 4680 RPM minimum fan speed for a ground speed of 9.2 km/h
 - b. Set fan to 4700 RPM in the unloaded state (round RPM to nearest 50 RPM +/- 25 RPM).

Example #2 (Imperial) - Unit WITH ASC (Air Seeder Sectional Control):**Important**

For ASC units you are calculating the "Unloaded" fan speed.

Minimum unloaded fan speed required to travel 5.7 mph with a 3320-76' unit, 10" spaced, 8 port and tow behind tank that comes with the high capacity fan applying wheat at 150 lb/ac. Refer to *Figure 1.7* to determine what page your unit is on.

1. It is determined that *Chart 22A* is the chart specific for your seeding system configuration (Refer to *Figure 1.8* - highlighted in Green for the unit in the example).
 - a. Go to *Chart 22A* in this book.
 - b. On the chart locate Wheat @ the rate - 150 lb.
2. Determine unloaded fan speed.
 - a. Refer to the "dashed" lines on the chart.
3. Between 5 mph and 6 mph curves, find the Unloaded Fan speed (dashed lines) at 5 mph and 6 mph:
 - a. 5 mph 150 lb unloaded minimum fan speed = 4400 RPM
 - b. 6 mph 150 lb unloaded minimum fan speed = 4575 RPM
4. Calculate the difference between speeds:
 - a. $(5.7 \text{ mph} - 5 \text{ mph}) / (6 \text{ mph} - 5 \text{ mph}) = 0.7 \text{ mph}$
5. Change in fan RPM is required:
 - a. $(4575 - 4400) \times 0.7 = 123 \text{ RPM}$
6. Calculate your fan speed:
 - a. Estimated unloaded fan speed = 4400 RPM + 123 RPM = 4523 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).

Example #2 (Metric) - Unit WITH ASC (Air Seeder Sectional Control):**Important**

For ASC units you are calculating the "Unloaded" fan speed.

Minimum unloaded fan speed required to travel 9.2 km/h with a 3320-76' unit, 10" spaced, 8 port and tow behind tank that comes with the high capacity fan applying wheat at 168 kg/ha. Refer to *Figure 1.7* to determine what page your unit is on.

1. It is determined that *Chart 22A* is the chart specific for your seeding system configuration (Refer to *Figure 1.8* - highlighted in Green for the unit in the example).
 - a. Go to *Chart 22A* in this book.
 - b. On the chart locate Wheat @ the rate - 168 kg/ha.
2. Determine unloaded fan speed.
 - a. Refer to the "dashed" lines on the chart.
3. Between 8 km/h and 9.7 km/h curves, find the Unloaded Fan speed (dashed lines) at 8 km/h and 9.7 km/h:
 - a. 8 km/h 168 kg/ha unloaded minimum fan speed = 4400 RPM
 - b. 9.7 km/h 168 kg/ha unloaded minimum fan speed = 4575 RPM
4. Calculate the difference between speeds:
 - a. $(9.2 \text{ km/h} - 8 \text{ km/h}) / (9.7 \text{ km/h} - 8 \text{ km/h}) = 0.7 \text{ km/h}$
5. Change in fan RPM is required:
 - a. $(4575 - 4400) \times 0.7 = 123 \text{ RPM}$
6. Calculate your fan speed:
 - a. Estimated unloaded fan speed = 4400 RPM + 123 RPM = 4523 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).

Drill Configuration			Chart Required		
			Trailing & Leading Units		
Model	Spacing	Number of Ports (Primary Manifold)	Standard Fan	High Speed Fan	OpManual Pg:
333x-40	10"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
333x-50	10"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
	12"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
333x-60	10"	6	18A ~ 18F	18A ~ 18F	3.4-3.6
	12"	6	18A ~ 18F	18A ~ 18F	3.4-3.6
333x-66	10"	8	21A ~ 21F	21A ~ 21F	3.13-3.15
	12"	6	18A ~ 18F	18A ~ 18F	3.4-3.6
333x-76	10"	8	22A ~ 22F	22A ~ 22F	3.16-3.18
	12"	8	22A ~ 22F	22A ~ 22F	3.16-3.18
333x-80	10"	8	22A ~ 22F	22A ~ 22F	3.16-3.18
	12"	8	22A ~ 22F	22A ~ 22F	3.16-3.18
3x20-40	7.5"	8	20A ~ 20F	20A ~ 20F	3.10-3.12
	10"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
3x20-50	7.5"	8	20A ~ 20F	20A ~ 20F	3.10-3.12
	10"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
	12"	6	17A ~ 17F	17A ~ 17F	3.1-3.3
3x20-60	7.5"	8	21A ~ 21F	21A ~ 21F	3.13-3.15
	10"	6	18A ~ 18F	18A ~ 18F	3.4-3.6
	12"	6	18A ~ 18F	18A ~ 18F	3.4-3.6
3x20-70	10"	8	22A ~ 22F	22A ~ 22F	3.16-3.18
	12"	6	19A ~ 19F	19A ~ 19F	3.7-3.9

Figure 1.8 - Example - Finding The Chart Specific to Your Seeding System

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 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 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 EvenStream Primary Inspection

1.3.1 Inspection

Information in this section will assist you in the inspection of the EvenStream primary and inserts.

The instructions below are for both the single shoot and double shoot side primary's and for ASC and NON-ASC models as noted.

For terminology and location of components used in the content please refer to *Figure 1.9*.

Important

A trailing unit is shown in *Figure 1.9*.

Leading units are similar, but use a Urethane coupler instead of the bellows shown.

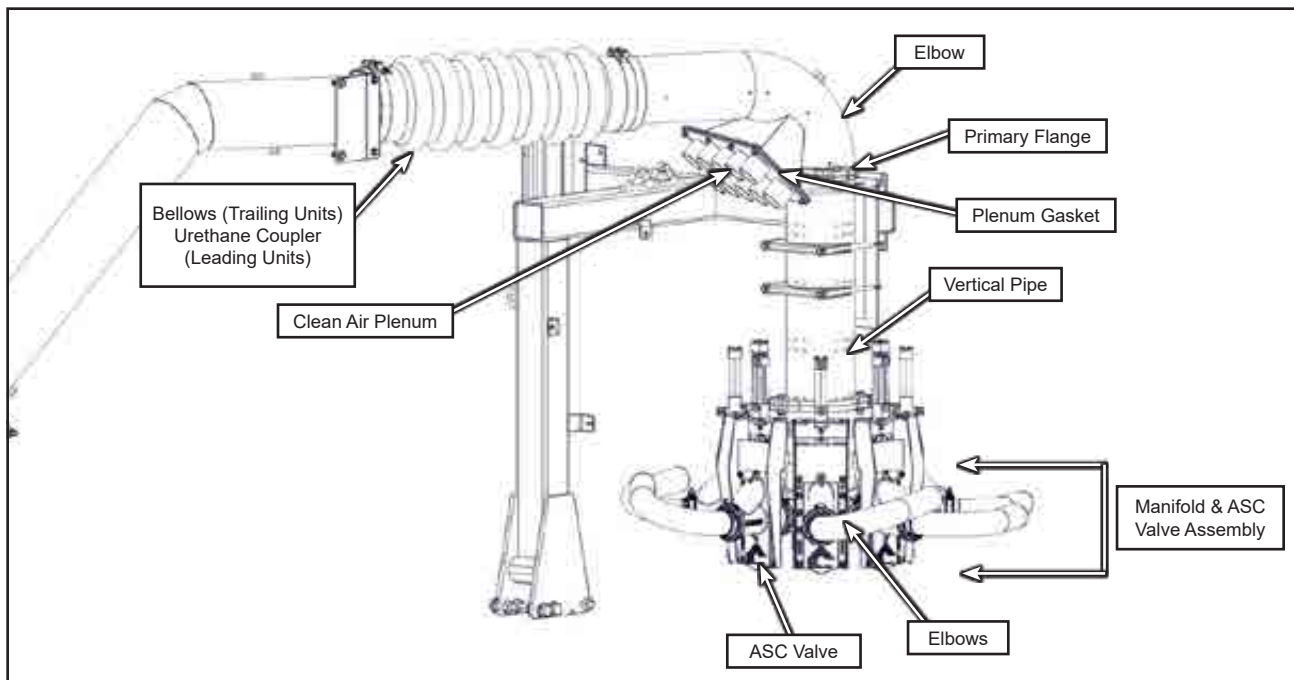


Figure 1.9 - EvenStream Primary Components

1.3.1.1 Check Primary Alignment - Trailing Units ONLY

There are 2 methods to get the unit prepared for primary alignment, either method will work to provide good results.

Method 1:

1. Verify that the front hitch is centered. Check that measurements labelled "X" in *Figure 1.10* are equal.
2. Check that the front axle is level (unit is parked on level ground).
3. This was how the unit was aligned at the factory and will allow for the primary to be aligned successfully.

Method 2:

1. Select units will "dog track" slightly when being pulled straight down the field.
 - a. In this case the hitch will not be square to the frame.
2. For optimal alignment of the primary in operation, it is recommended to pull the unit ~100 feet in a straight line and park on level ground prior to inspecting the primary.

1.3.1.2 Dis-Assembly

1. Remove clean air plenum bolts and plenum cover from the primary and rest the assembly off to the side.
 - a. Be careful not to tear the gasket while removing, (ASC units only).
 - b. Refer to *Figure 1.11*.

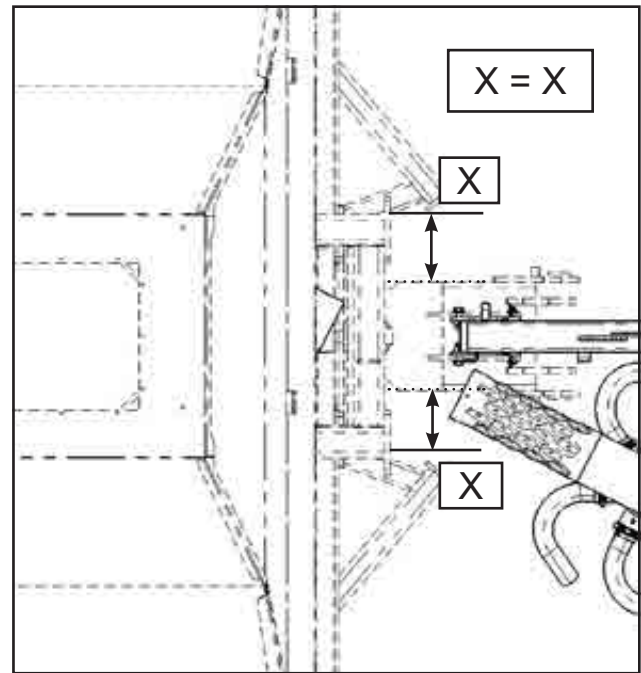


Figure 1.10 - Front Hitch - Centered

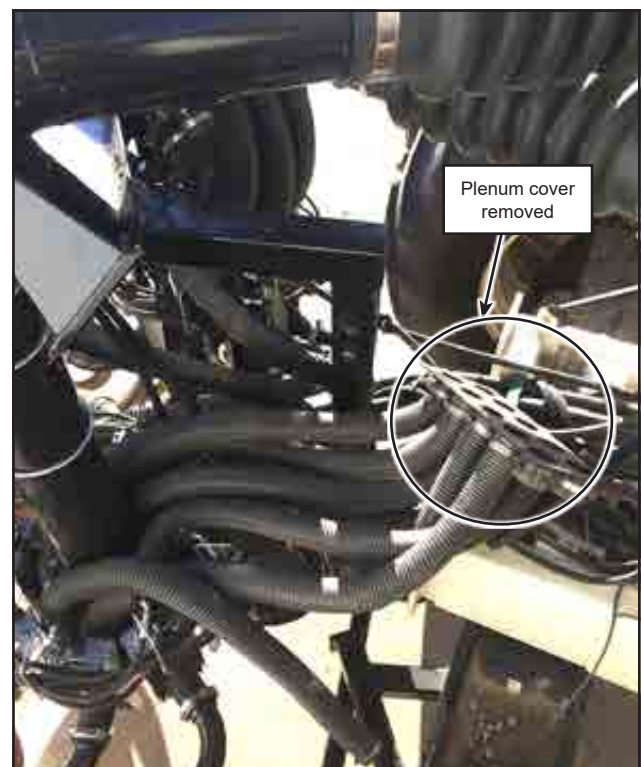


Figure 1.11 - Clean Air Plenum Removed

2. Mark the primary flange in two locations, 90° apart, one on the front of the primary flange and the other on the bolted side of the flange.
Refer to *Figure 1.12*.

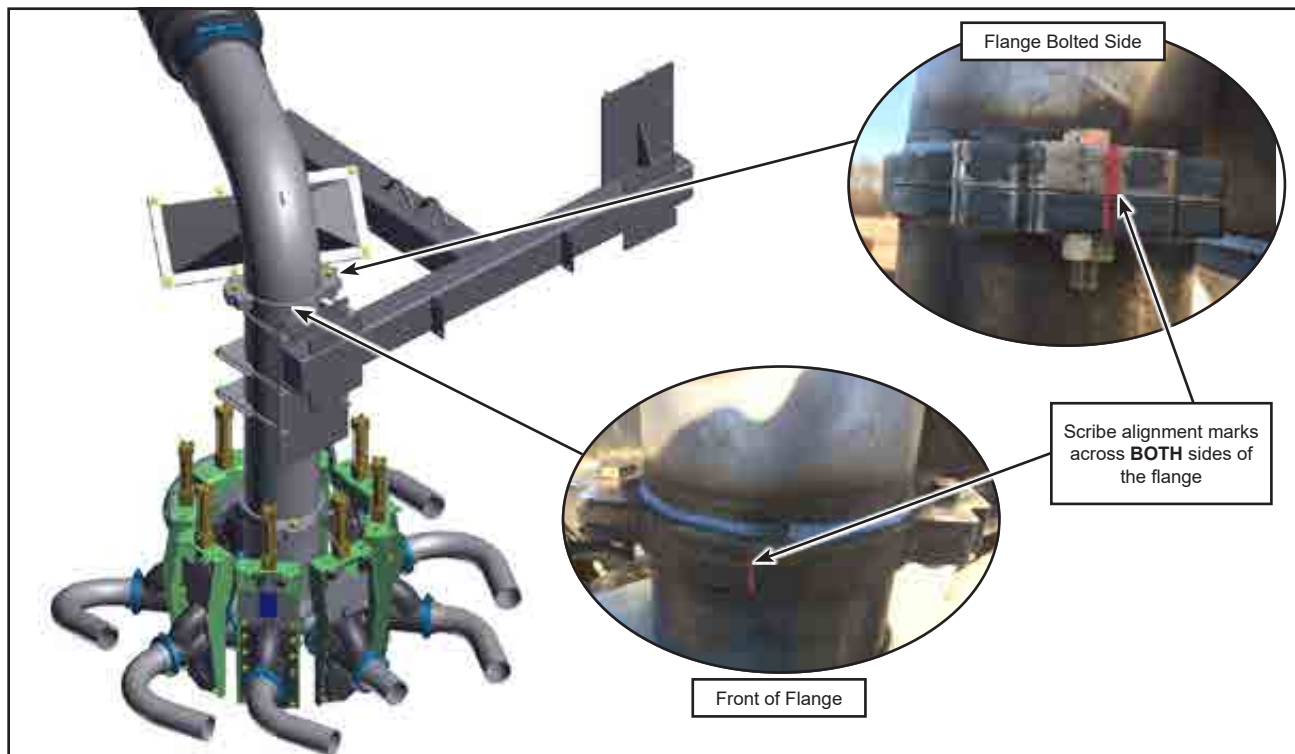


Figure 1.12 - Primary Flange - Marking

3. Loosen the two bolts securing the elbow to the vertical pipe. Leading primary air kits only:
 - a. Loosen the clamps holding the urethane coupler and slide the coupler back onto the s-pipe.
 - b. Loosen the 2 bolts securing the elbow to the vertical pipe.

Note

For trailing units only, use caution as the bellows has some preload and may pop off when the bolts are removed.

4. There is a spigot inside the pipe that will assist in holding the elbow in place. Refer to *Figure 1.13*. Not applicable for leading units.



Figure 1.13 - Spigot Location

5. Lift the elbow off of the vertical pipe and allow it to hang on the bellows. Refer to *Figure 1.14*.
 - a. Leading primary air kits only:
 - i. Lift the elbow off of the vertical pipe and set down, be careful not to damage the elbow.



Figure 1.14 - Elbow Removed from Vertical Pipe

1.3.1.3 Inspection

1. Inspect the inserts from the top of the pipe for any for buildup of product between the ribs and clean as required. Refer to *Figure 1.15*.
2. Inspect the inside of the insert and determine if the wear is normal or excessive. Refer to *Figure 1.17*.
3. To confirm that the insert needs to be replaced, measure the diameter of the ribs.
4. This ID should not exceed $\varnothing 5\text{-}31/32"$ (152 mm). Refer to *Figure 1.16*.
 - a. If it measures below $5\text{-}31/32"$ (152 mm) the inserts are acceptable for use.
 - b. If the measurement is larger than specification the inserts must be replaced for optimum performance of the distribution system.



Figure 1.15 - EvenStream Insert Inspection

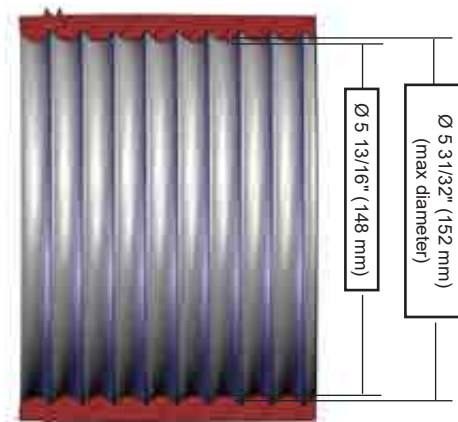


Figure 1.16 - Rib Diameter

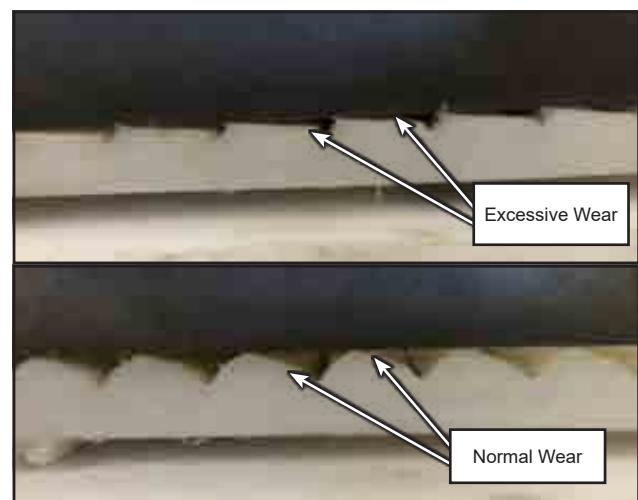


Figure 1.17 - Wear Patterns

5. To replace the inserts, the primary manifold will have to be unbolted from the bottom of the vertical pipe. Refer to *Figure 1.18*.
 - a. Place supports under the manifold.
 - b. Use sawhorses/or suitable blocking.
 - c. Loosen and remove the bolts shown in *Figure 1.18*.

Note

On ASC units the manifold/ASC valve assembly is heavy. Use proper care when removing.

6. If the ASC valves are removed be sure they are marked for correct reassembly.
 - a. On both ASC and NON ASC units, if removing the elbows, be sure they are properly marked for proper reassembly.
7. Once the manifold is removed, the inserts can be driven out of the vertical pipe, from the top down with a block and hammer.

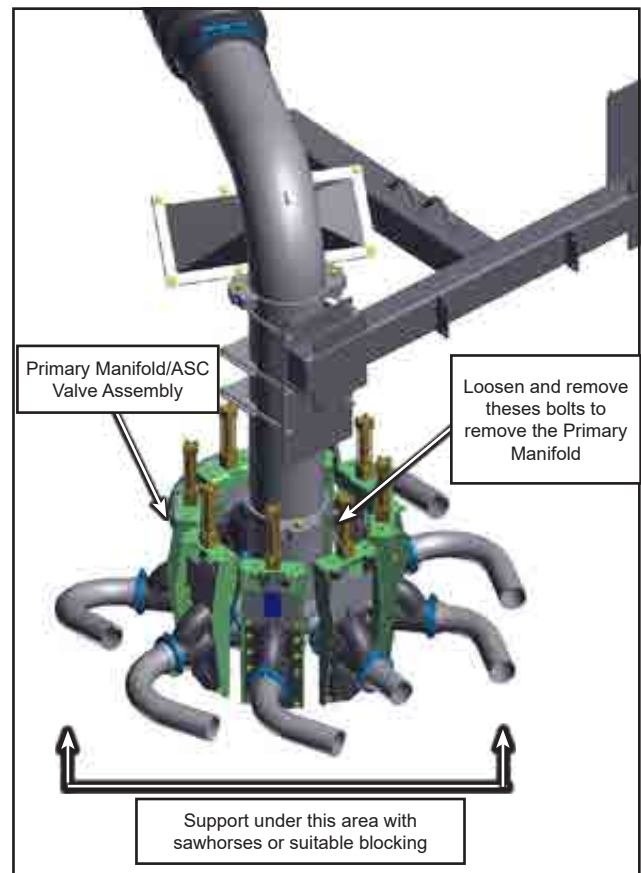


Figure 1.18 - Primary Manifold - Removal

1.3.1.4 Re-Installation of Components

1. Refer to [Section 1.3.1.1 to 1.3.1.3](#) for correct orientation of the manifold/elbows before starting re-assembly.
2. Re-connect the primary manifold/ASC Valve assembly that was removed.
 - a. Ensure the bolts are tightened and that the alignment is correct.
3. Install the elbow following the instructions below:
 - a. Lift the elbow/bellows assembly back onto the vertical pipe.
 - b. Trailing units only:
 - i. Apply force to the assembly, towards the bellows, to get the elbow back onto the vertical pipe.
 - c. Apply force to the assembly, towards the bellows, to get the elbow back onto the vertical pipe.
 - d. There is a 1/8" (3 mm) spigot on the vertical pipe that the elbow will lock over top of. Refer to [Figure 1.19](#).
 - e. Install the two mounting bolts and snug up so the elbow will still move by hand.
 - f. Check the alignment marks made in step 3 and adjust the elbow as needed to get the orientation correct. Refer to [Figures 1.20 & 1.21](#).

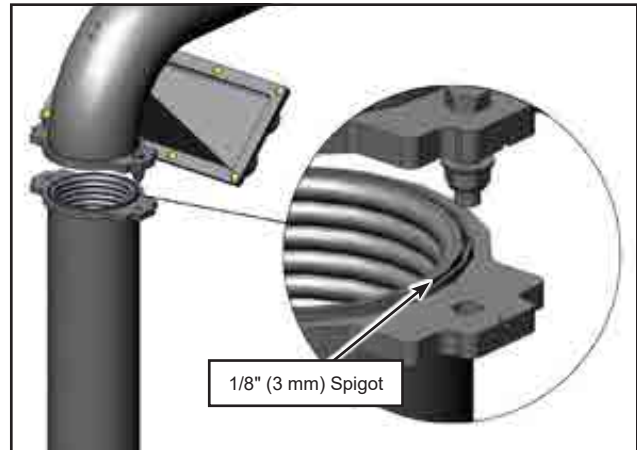


Figure 1.19 - Spigot Location

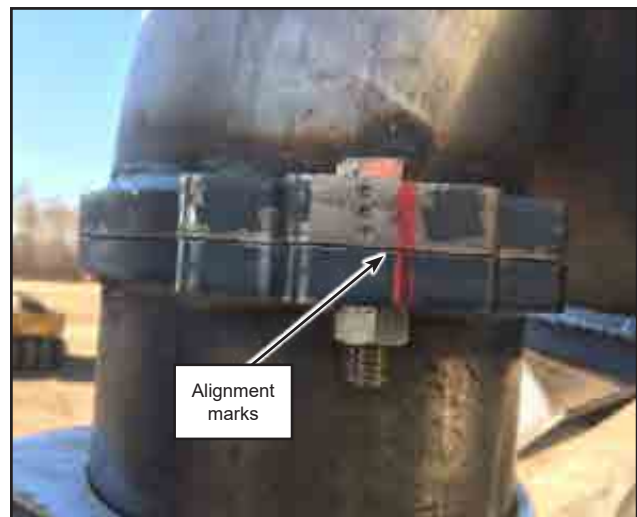


Figure 1.20 - Bolted Side Flange Scribe Marks

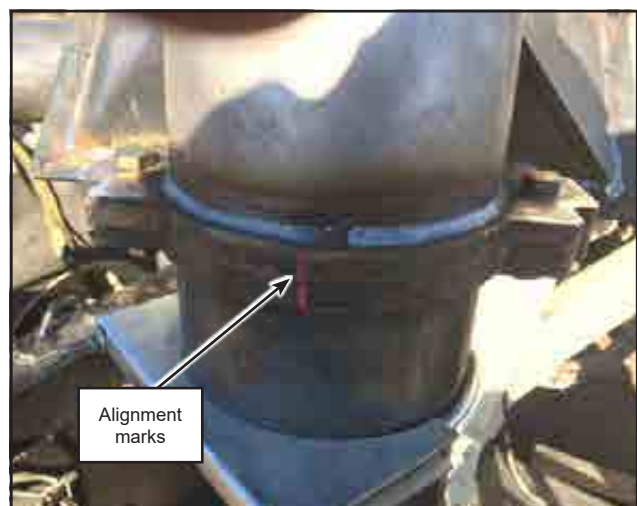


Figure 1.21 - Front of Flange Scribe Marks

4. Tighten all mount bolts to 50ft lbs (68 Nm).
5. Leading primary air kits only:
 - a. Slide urethane coupler back onto the elbow.
 - b. Be sure to center the coupler between the s-pipe and elbow.
 - c. Tighten the 2 clamps
6. For ASC units inspect the clean air plenum gasket to be sure it is still fit for use, (no rips or tears).
 - a. Reinstall gasket and plenum cover.
 - b. Tighten all hardware.

1.3.2 Primary Manifolds & Elbows, Clean Air Layout, Secondary Hose Connection

1.3.2.1 6 Port Configuration

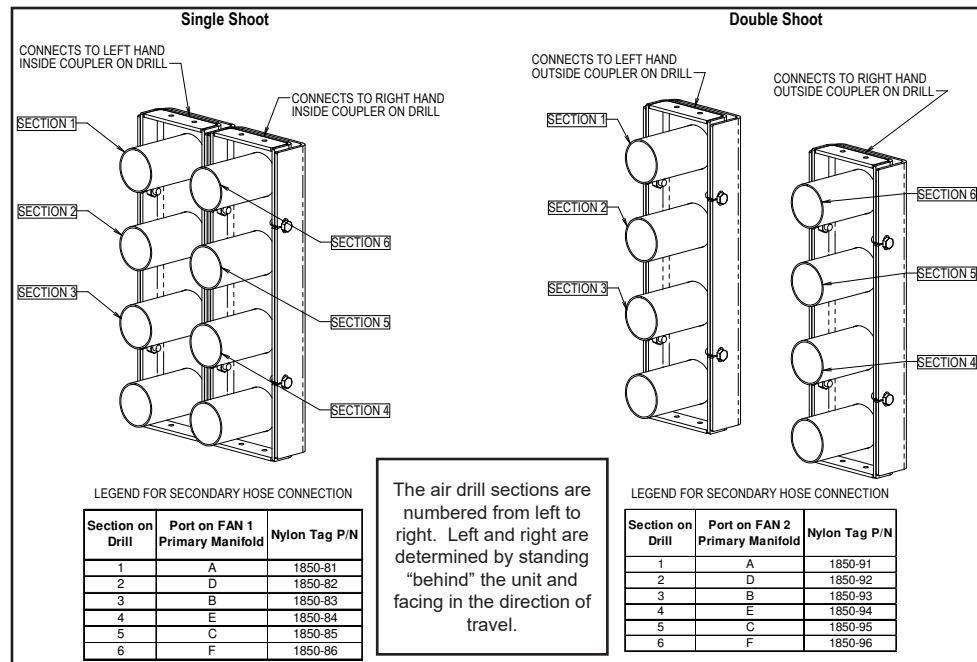


Figure 1.23 - Section Numbering - 6 Port

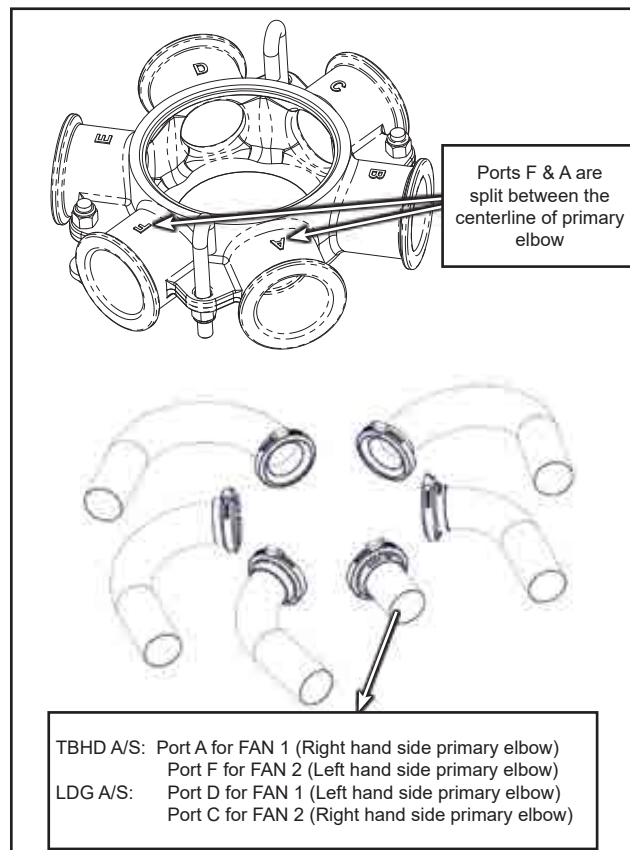


Figure 1.22 - Primary Manifold Head & Elbows - 6 Port

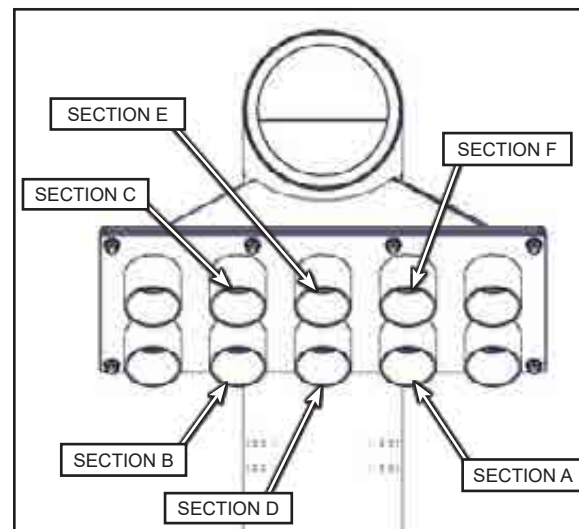


Figure 1.24 - Clean Air Connections - 6 Port

1.3.2.2 8 Port Configuration

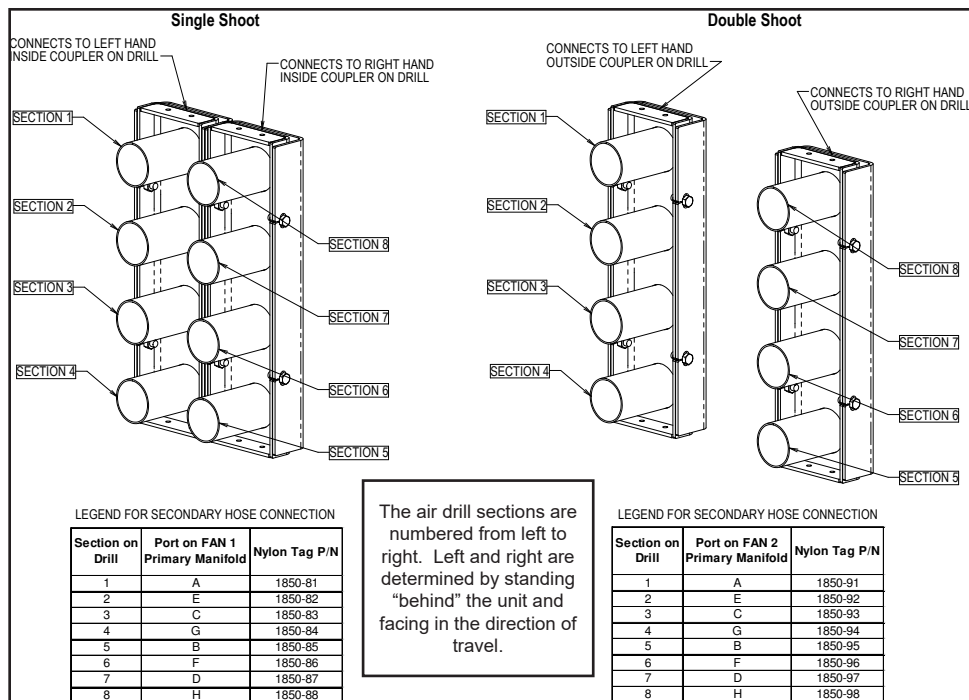


Figure 1.26 - Section Numbering - 8 Port

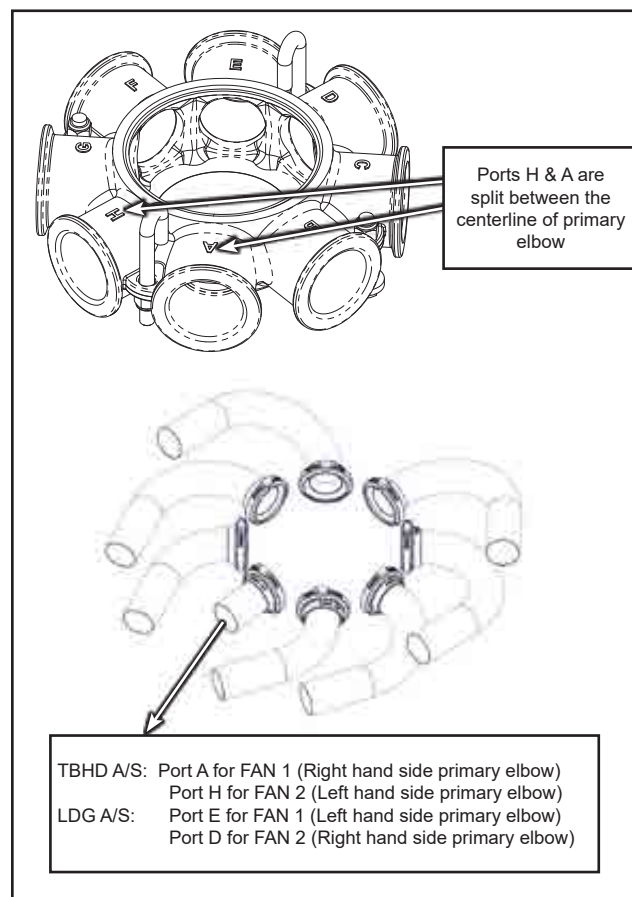


Figure 1.25 - Primary Manifold Head & Elbows - 8 Port

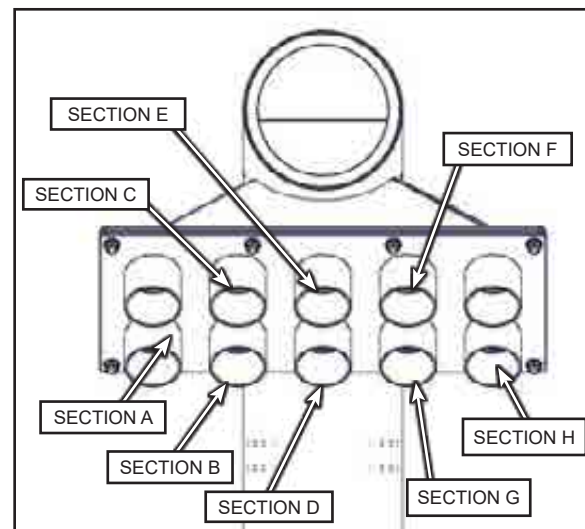


Figure 1.27 - Clean Air Connections - 8 Port

1.3.2.3 10 Port Configuration

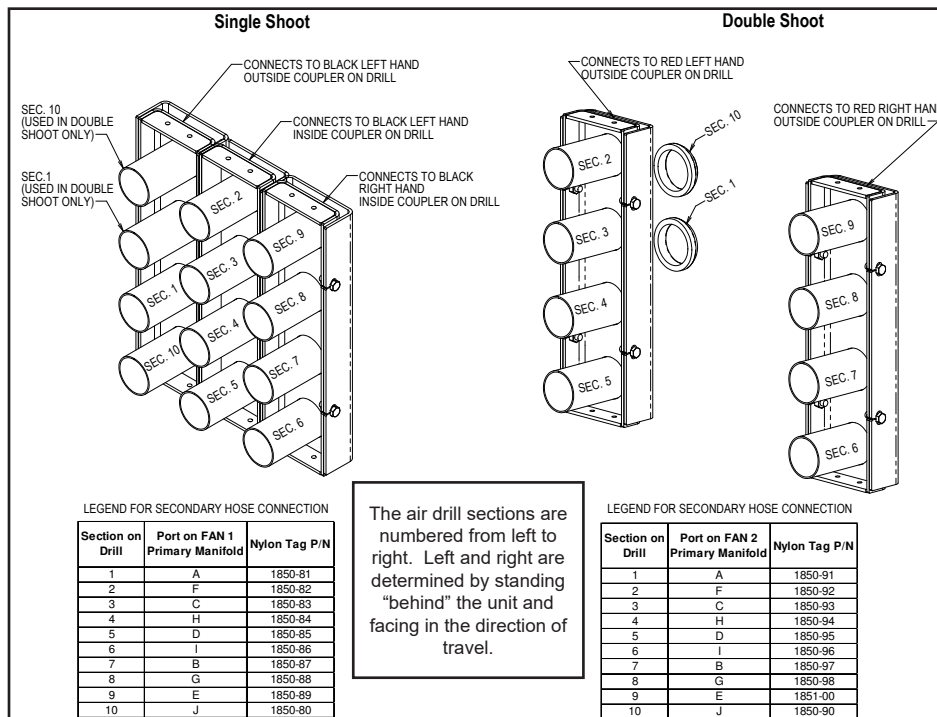


Figure 1.29 - Section Numbering - 10 Port

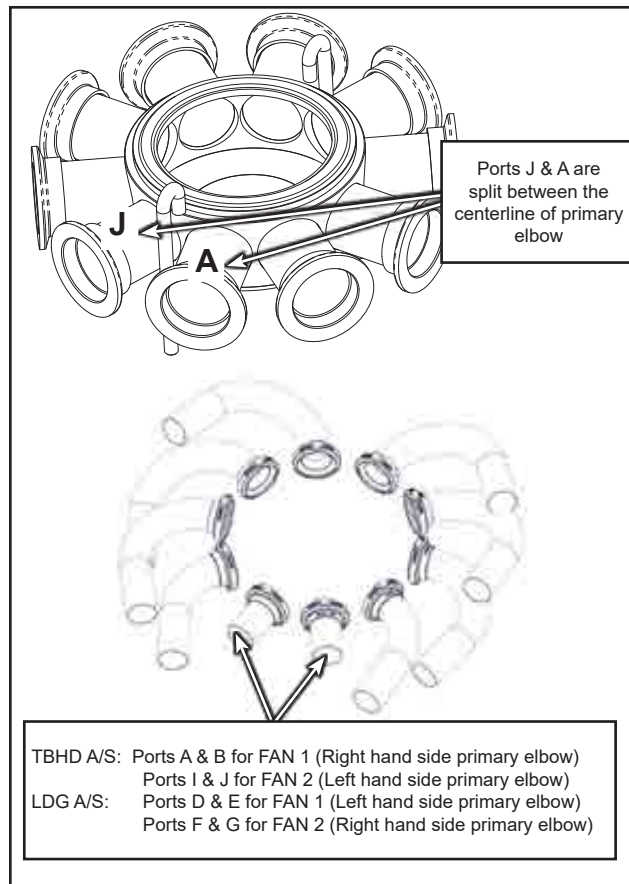


Figure 1.28 - Primary Manifold Head & Elbows - 10 Port

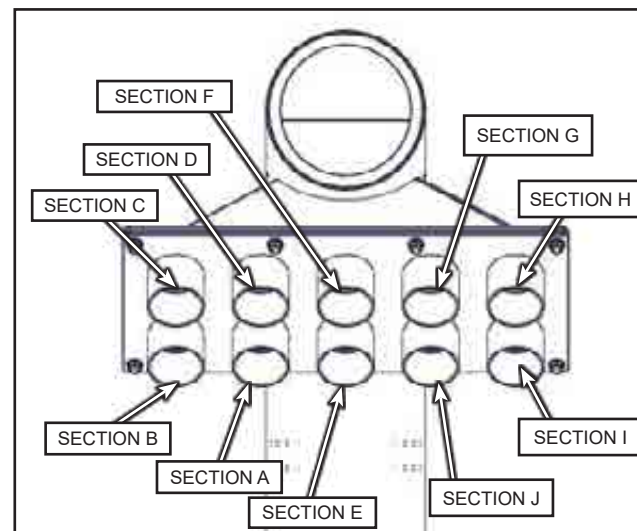
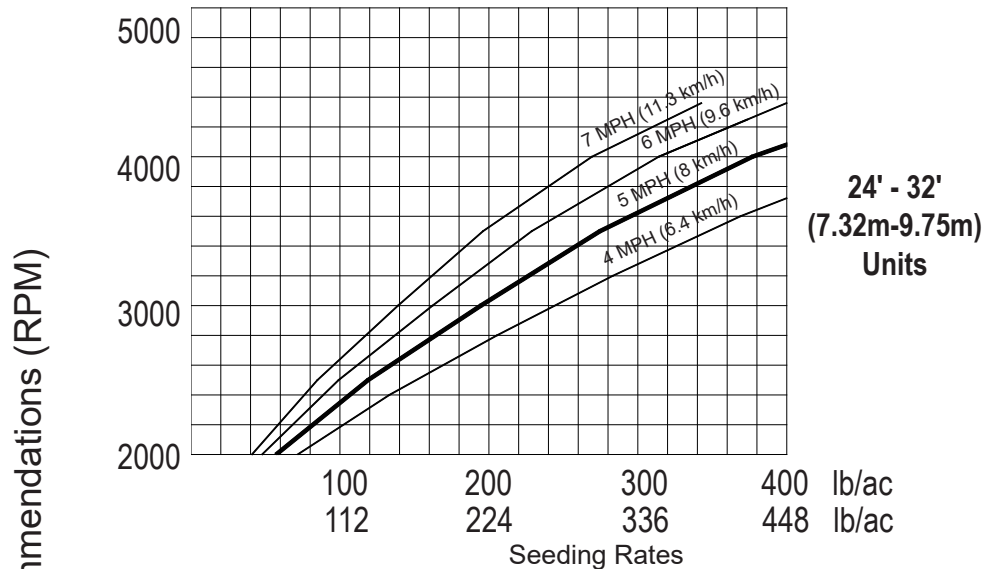


Figure 1.30 - Clean Air Connections - 10 Port

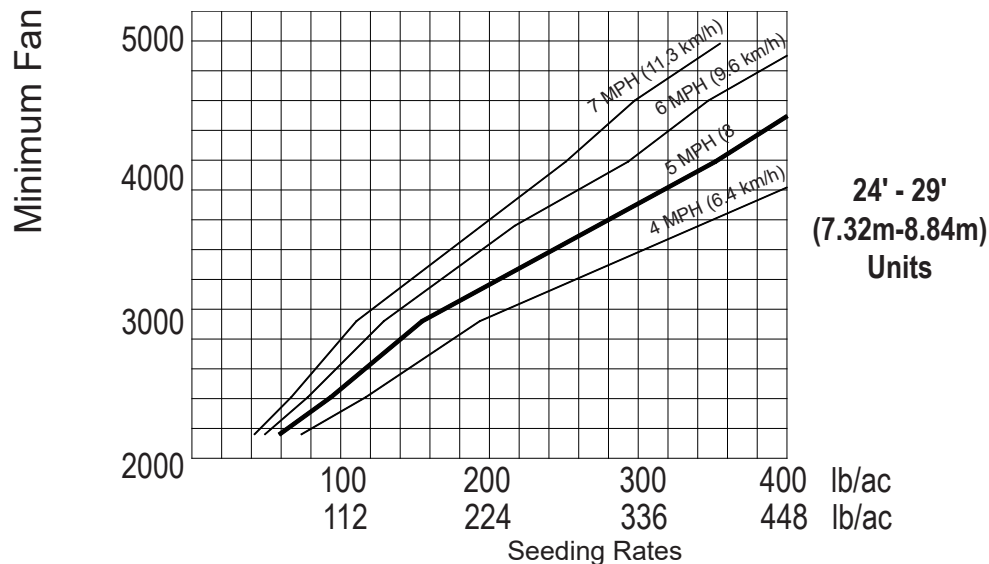
2 Model 8810, 8825/8830, 8910 Charts - Without ASC**Model 5710, 5810/5811, 5720/5725, 5730, 5925/5926 Charts - Without ASC****Model 9400/9405, 9500, 9800/9820/9830 Charts - Without ASC**

8810 24'@8" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components

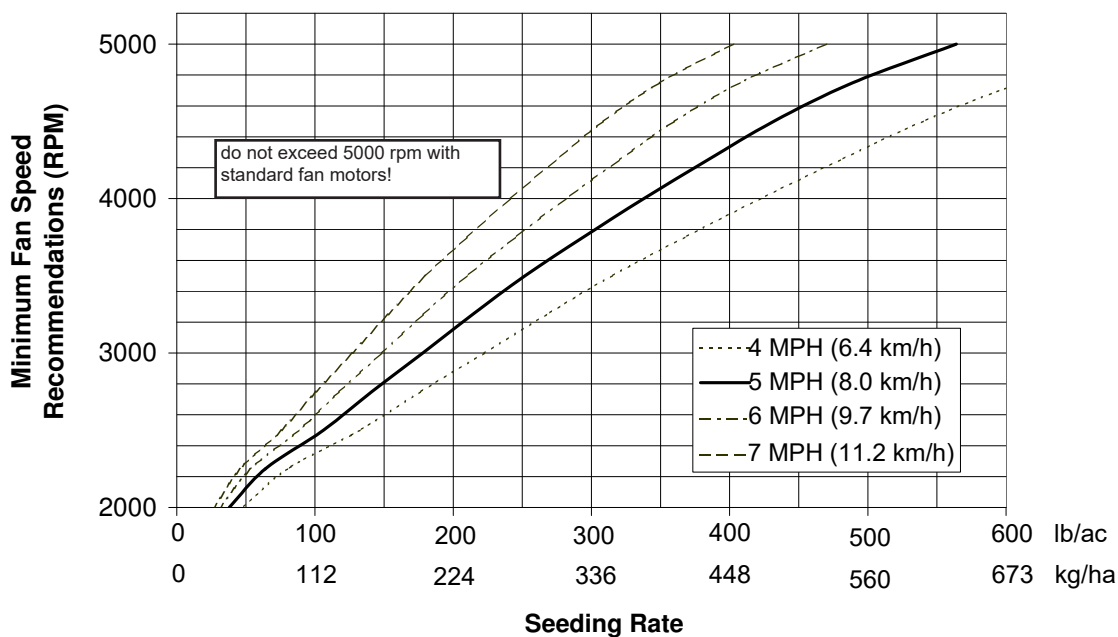
**Important**

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2000 RPM is recommended.

8810 25', 30' & 33'4"@10" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components



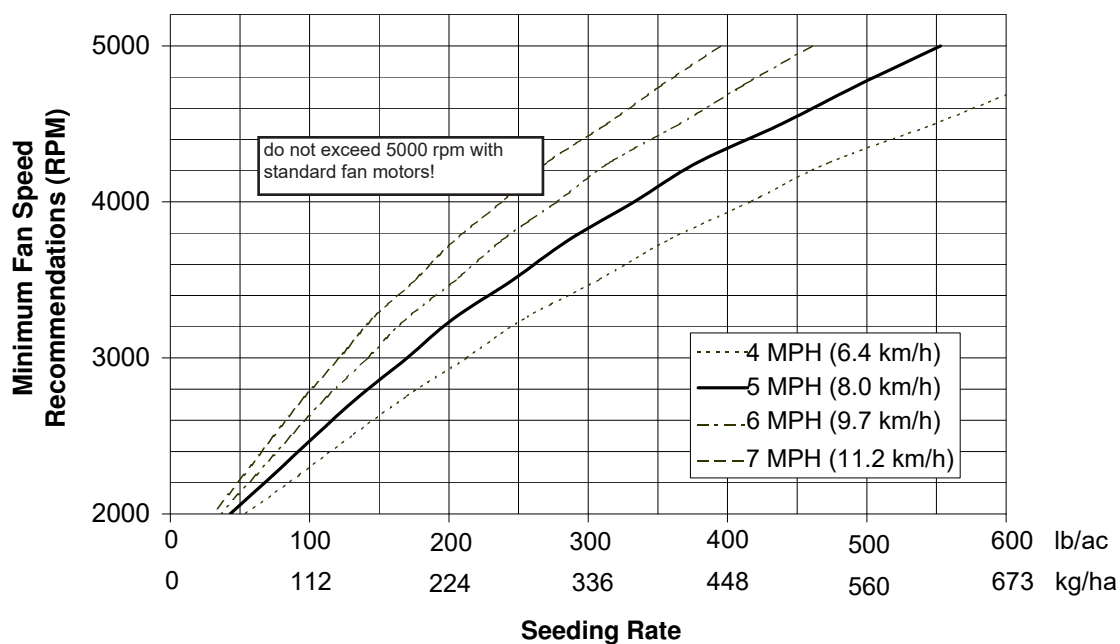
8810 28'@8" Minimum Fan speed
1" (25 mm)Tertiary Hose With Dimpled Components



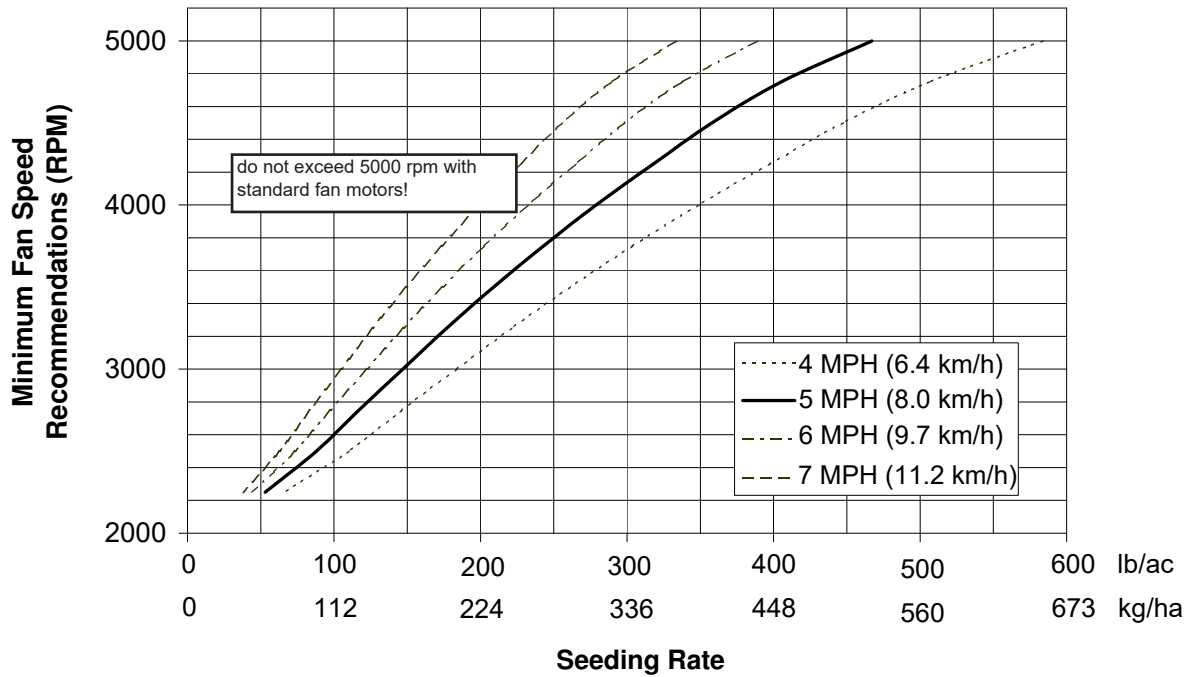
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2000 RPM is recommended.

8810 32'@8" Minimum Fan speed
1" (25 mm)Tertiary Hose With Dimpled Components



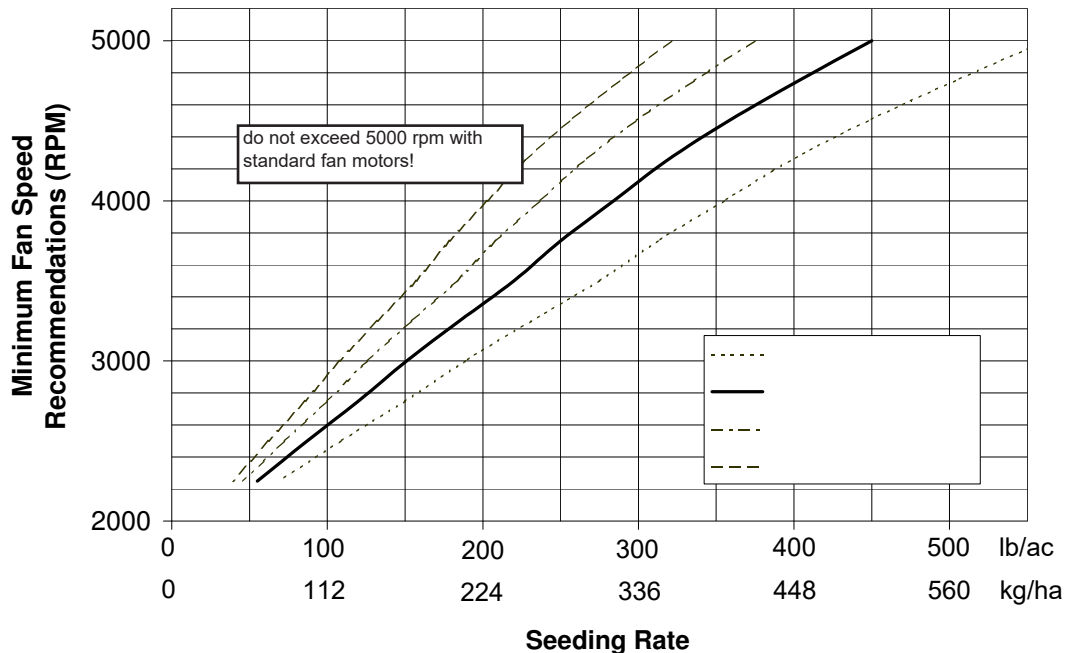
**8810 35'@10" Minimum Fan speed
1" (25 mm)Tertiary Hose With Dimpled Components**



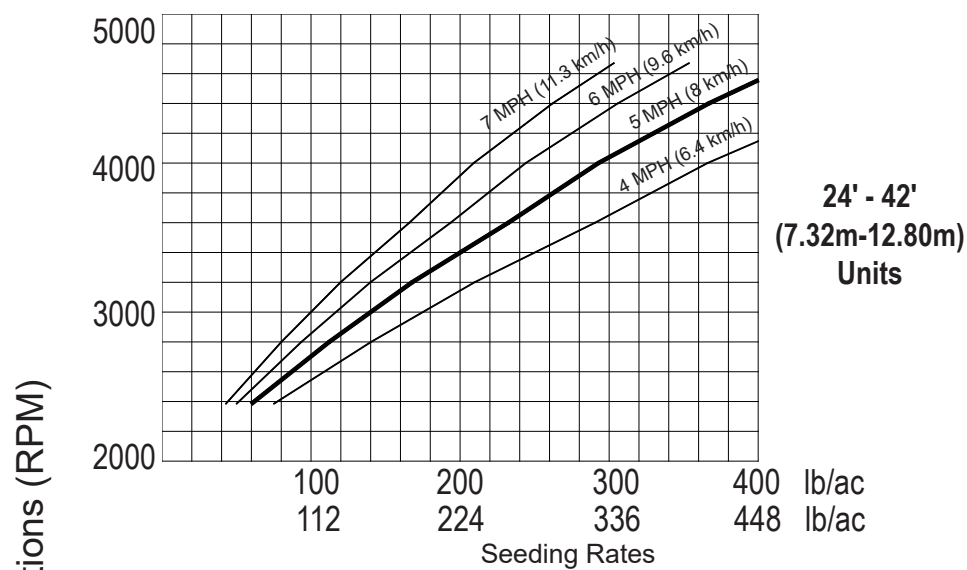
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2250 RPM is recommended.

**8810 36'@8" Minimum Fan speed
1" (25 mm)Tertiary Hose With Dimpled Components**



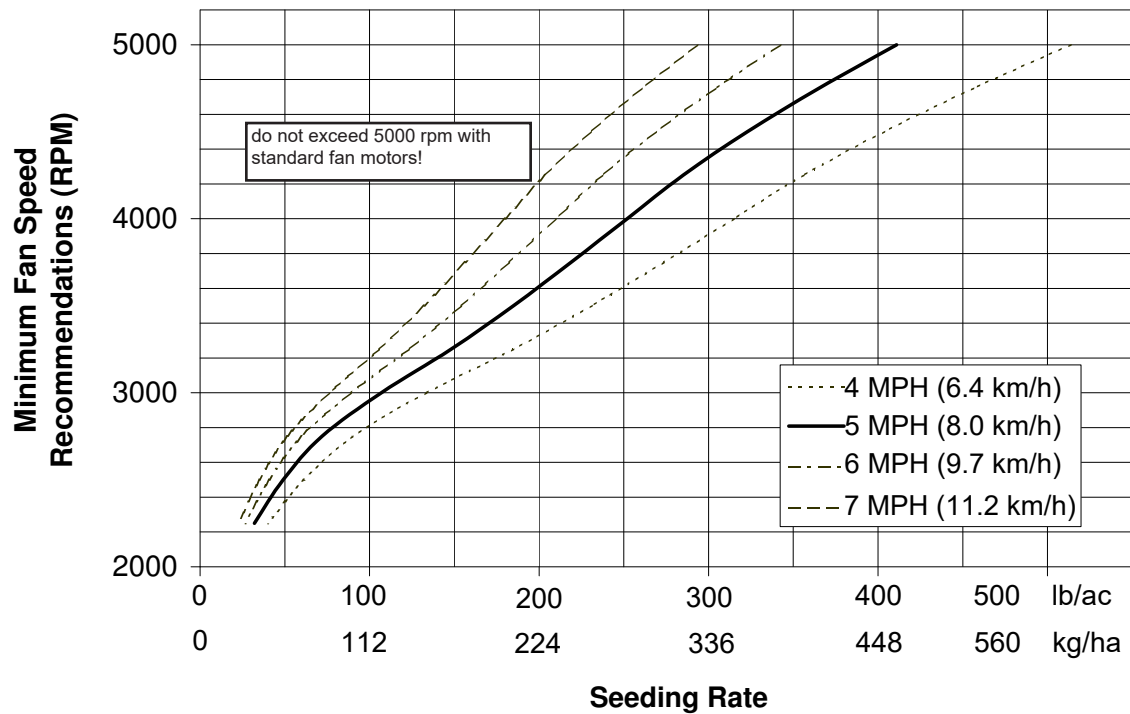
**3310, 3320 40' @ 12", 8810 36' & 40' @ 12" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components**



Important

For rates **below** 50 lbs/acre (56 kg/ha), a minimum fan speed of **2000 RPM** is recommended.

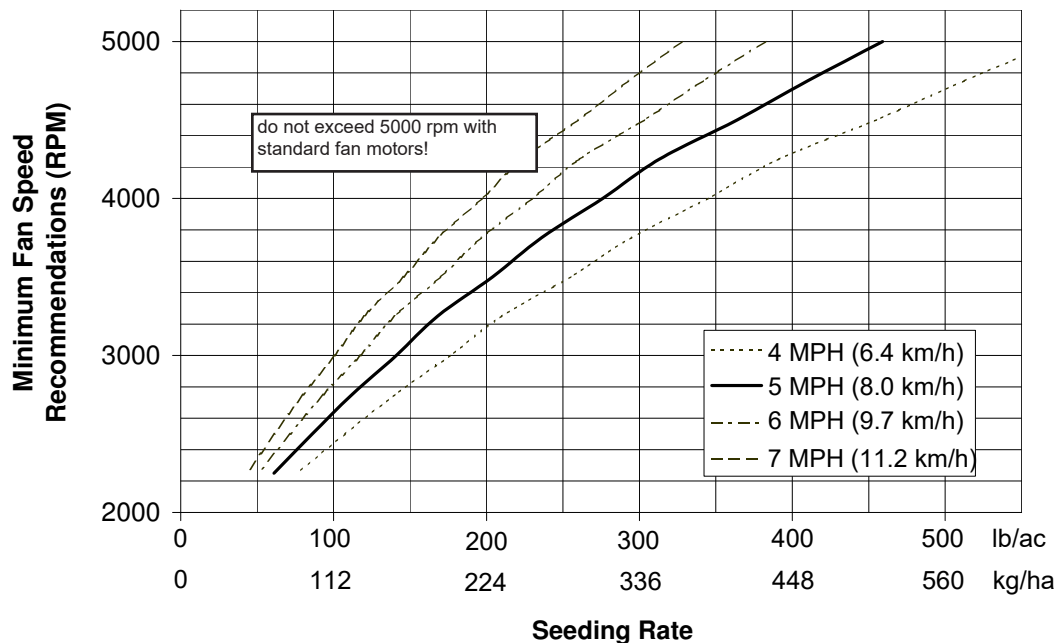
8810 40'@8" Minimum Fan speed 1" (25 mm)Tertiary Hose With Dimpled Components



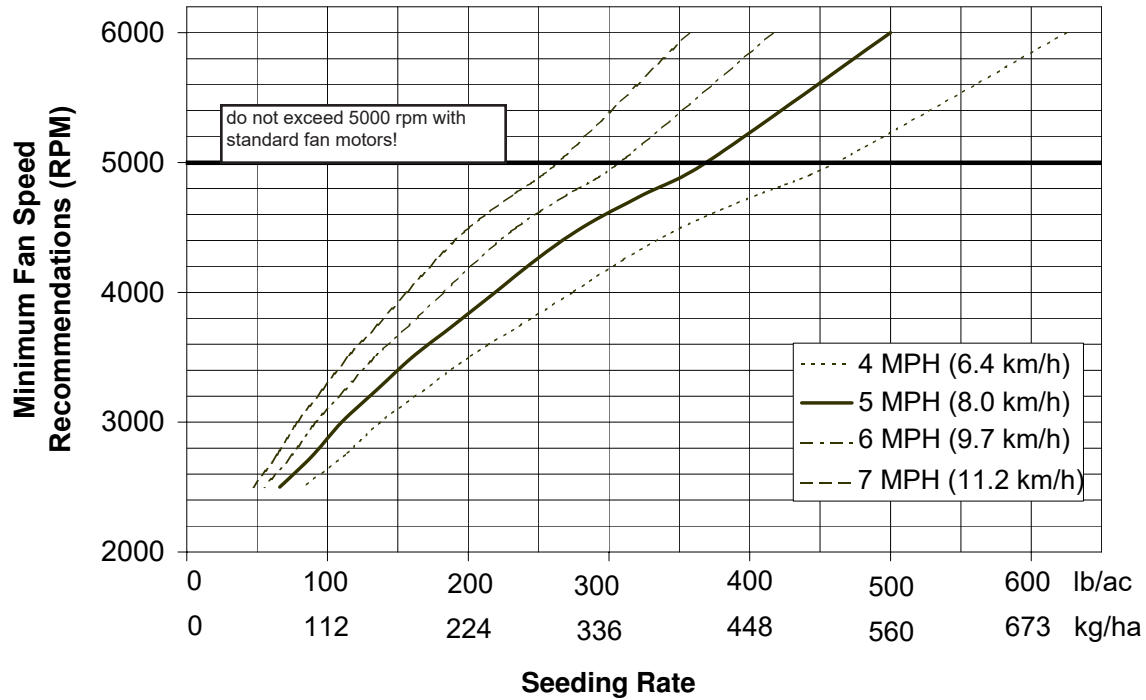
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2250 RPM is recommended.

3310, 3710, 3320 & 8810 40'@ 10" Minimum Fan Speed 1" (25 mm)Tertiary Hose With Dimpled Components



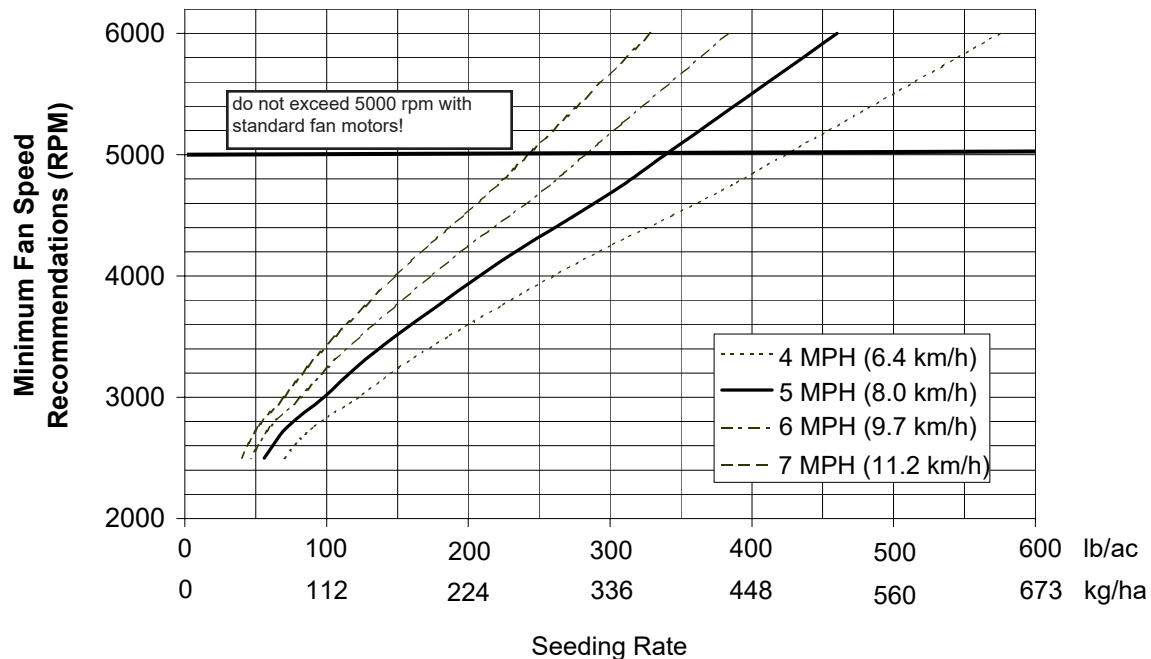
**8810 48'@8" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components**



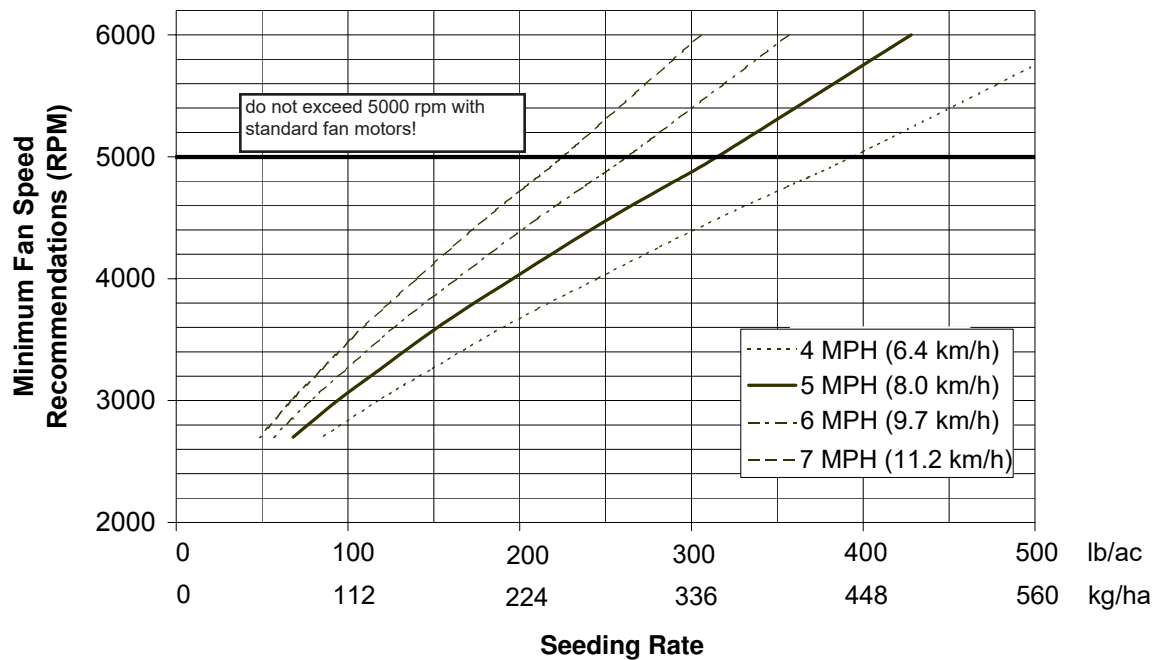
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

**8810 48'@8" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components**



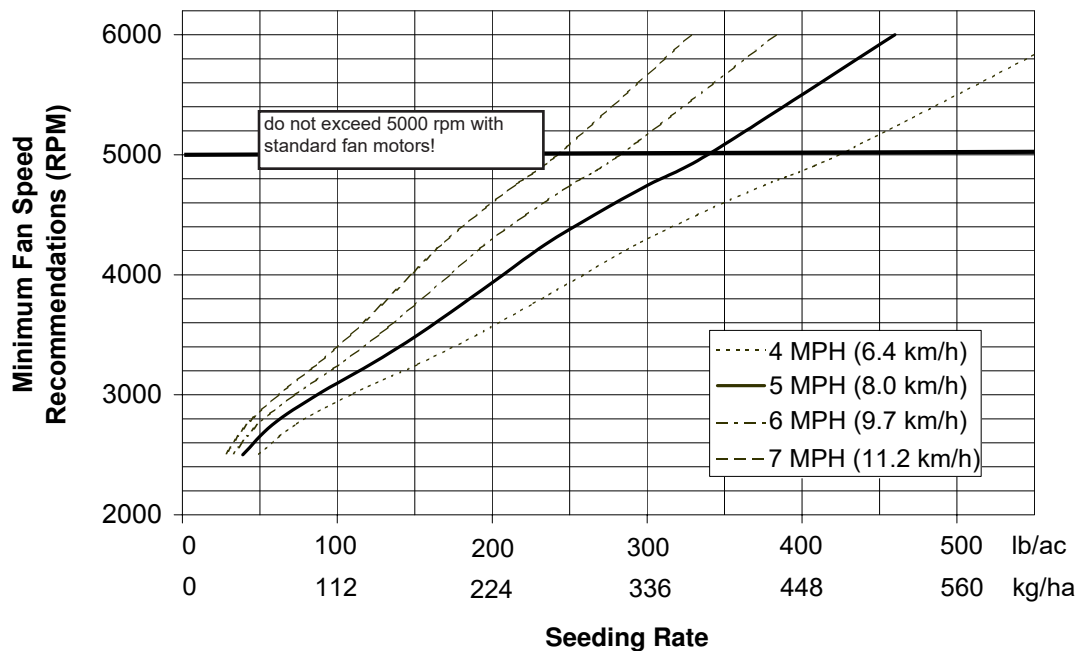
**8810 50'@10" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components**



Important

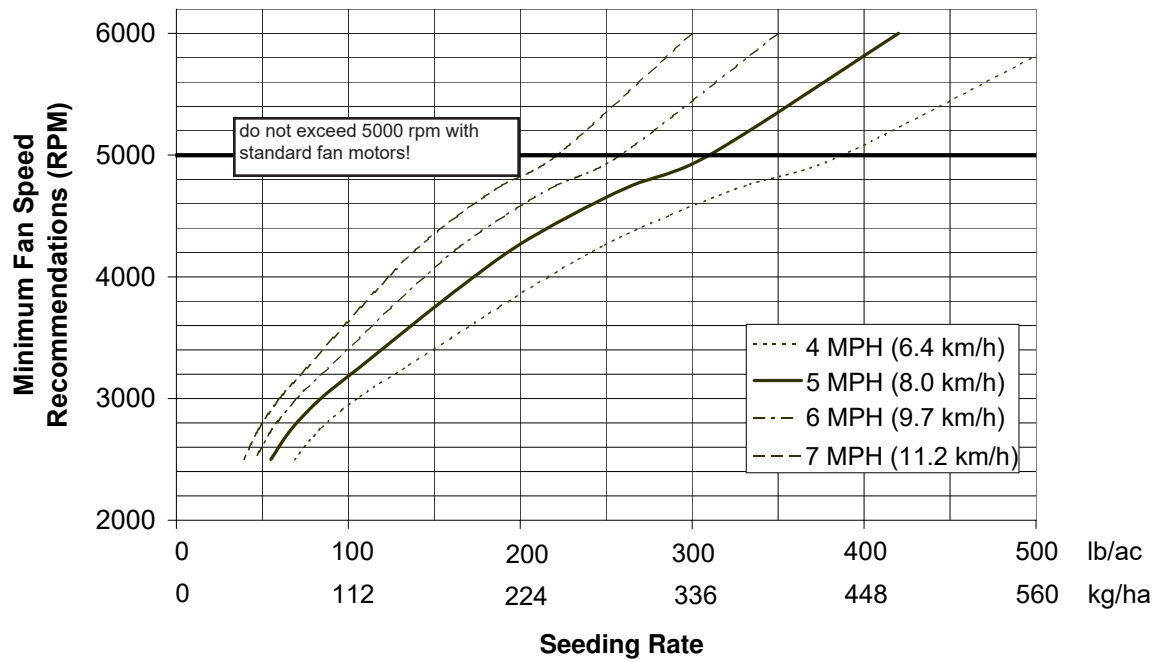
For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

**8810 50'@10" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components**



3710-50' @ 7.5" & 8810-52' @ 8"

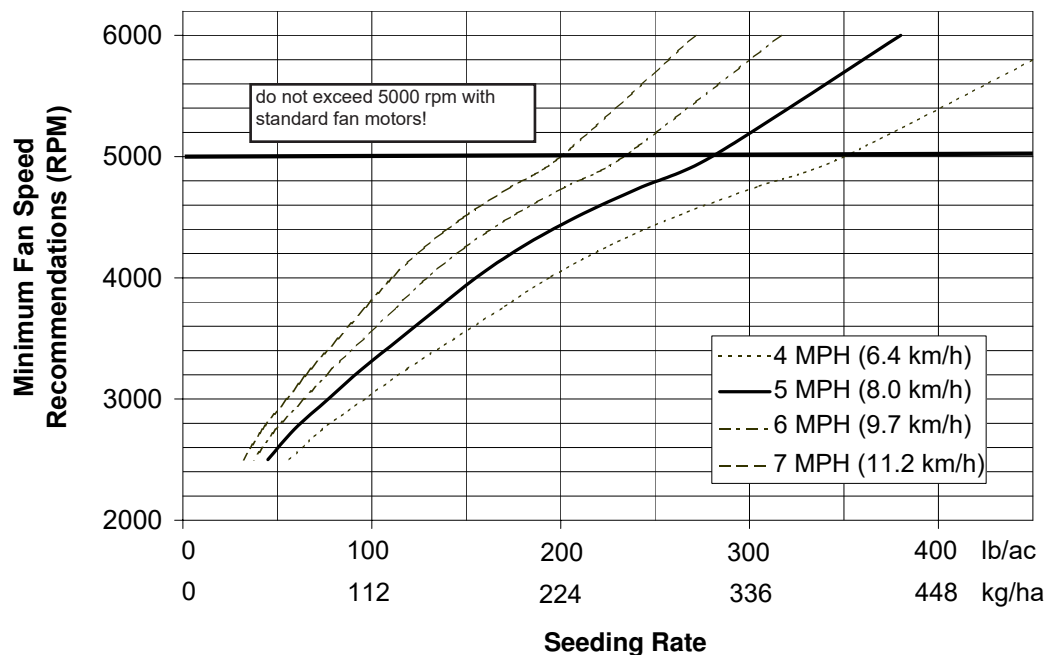
7/8" (22 mm) Tertiary Hose with Dimpled Components

**Important**

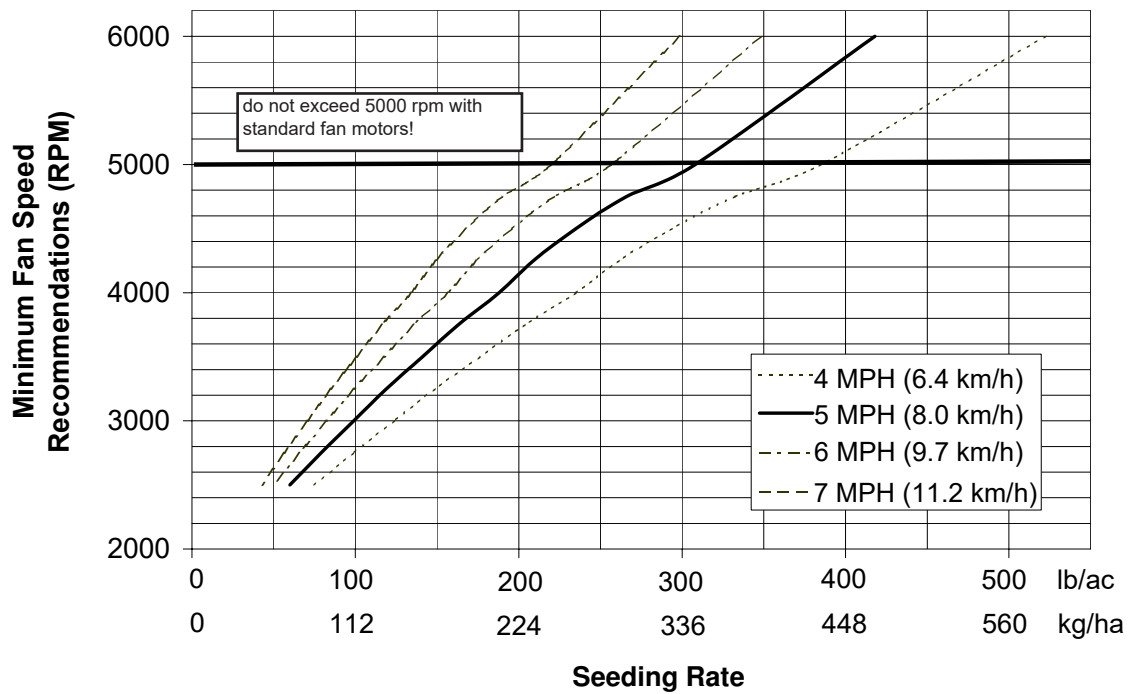
For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

3710-50' @ 7.5" & 8810-52' @ 8"

1" (25 mm) Tertiary Hose With Dimpled Components



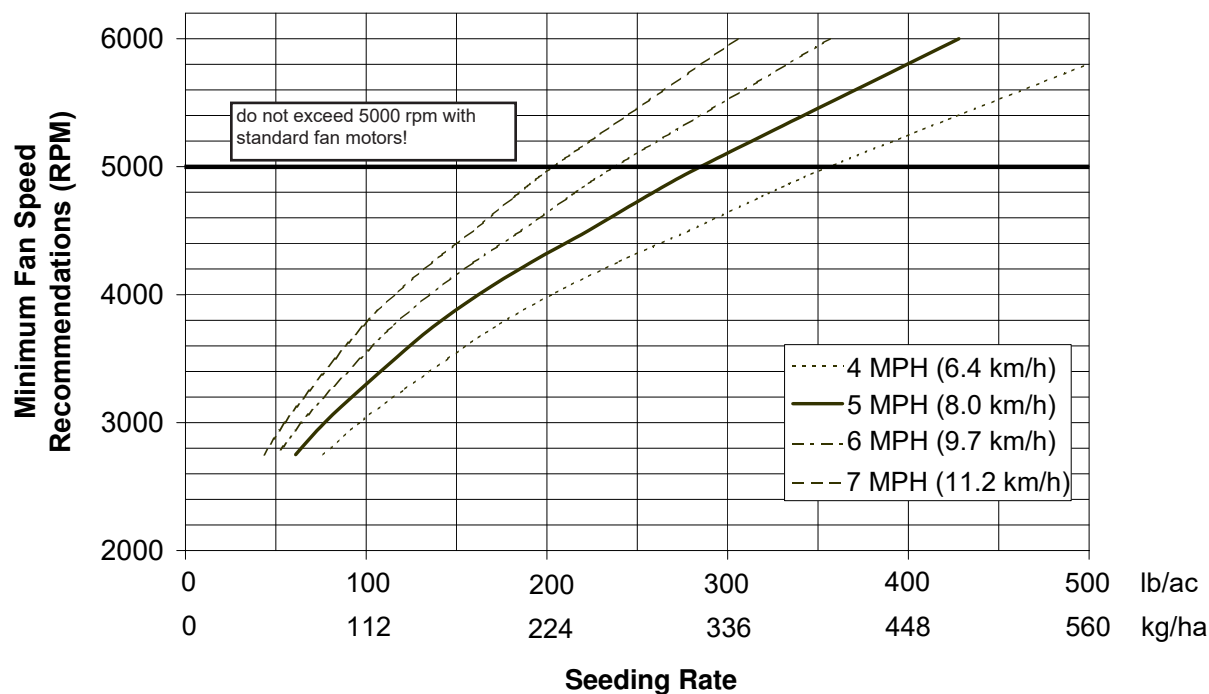
8810 55'@10" Minimum Fan Speed
1" (25 mm)/ 7/8" (22mm) Tertiary Hose With Dimpled Components



Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

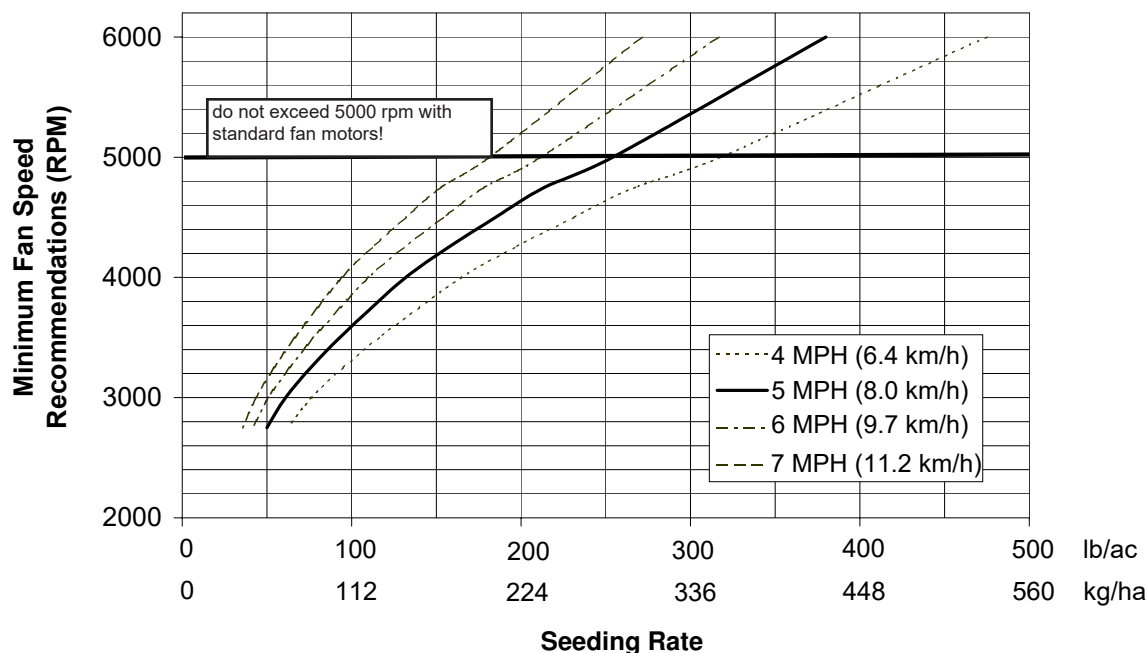
**8810 58'8"@8" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components**



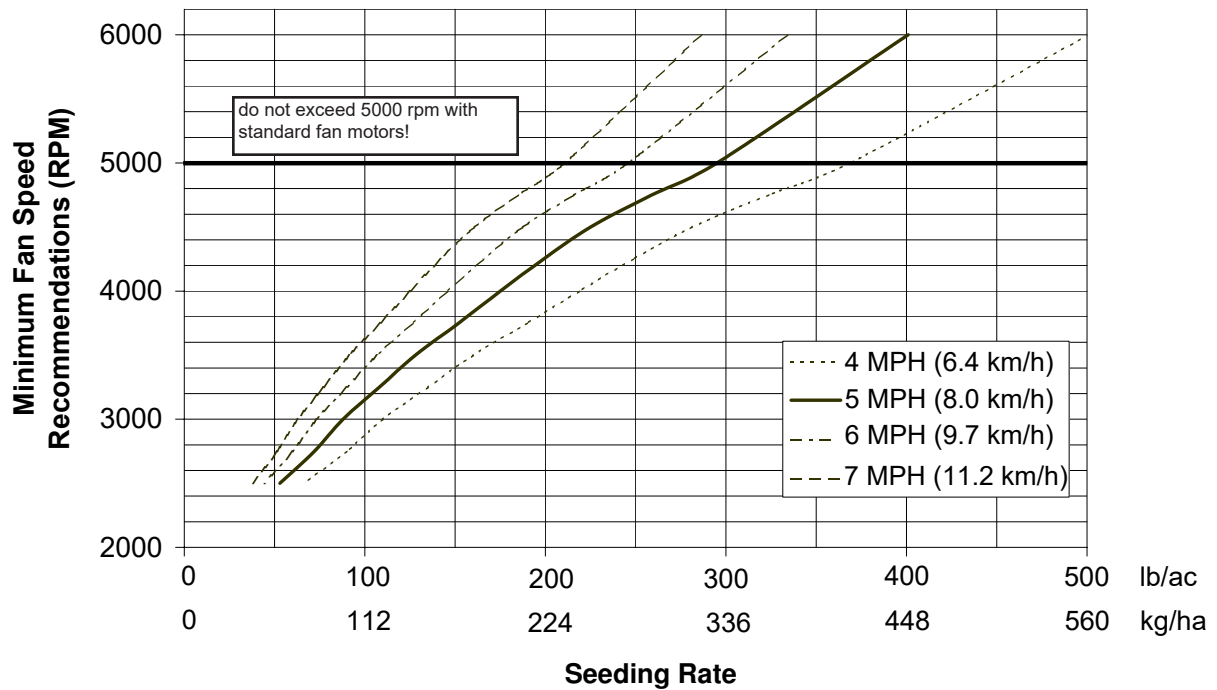
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

**8810 58' 8"@8" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components**



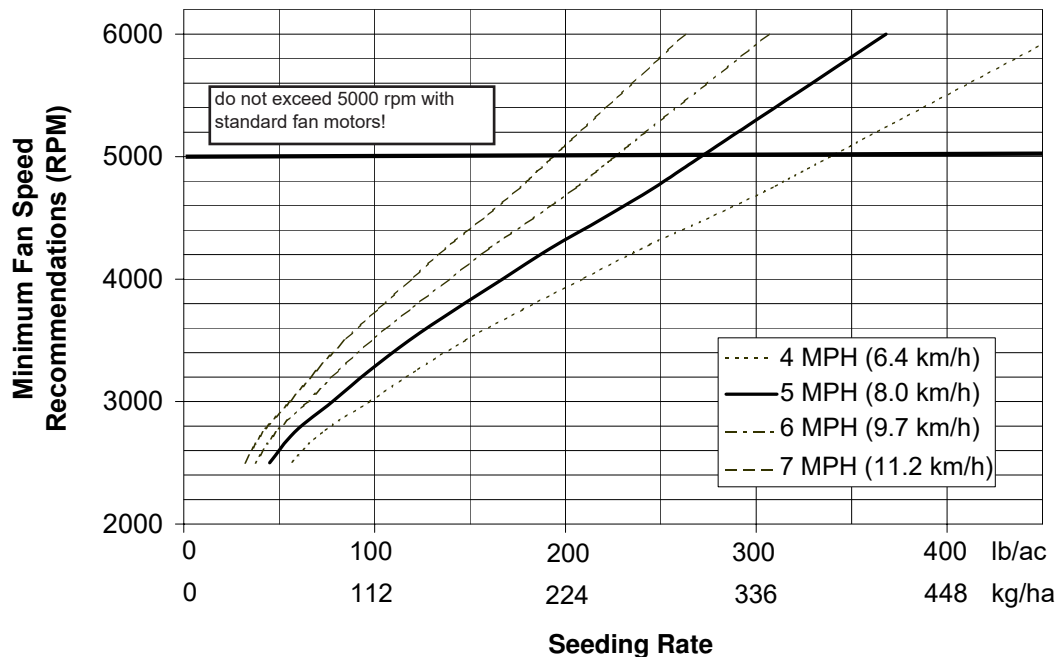
**8810 60'@10" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components**



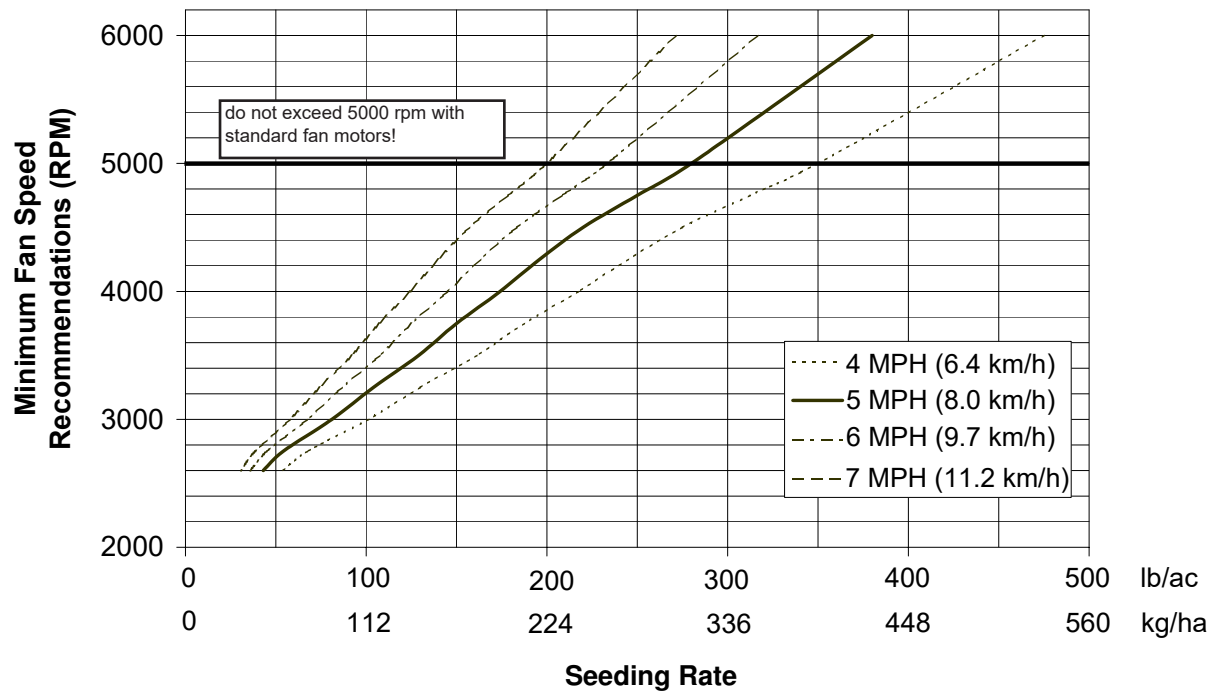
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

**8810 60'@10" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components**



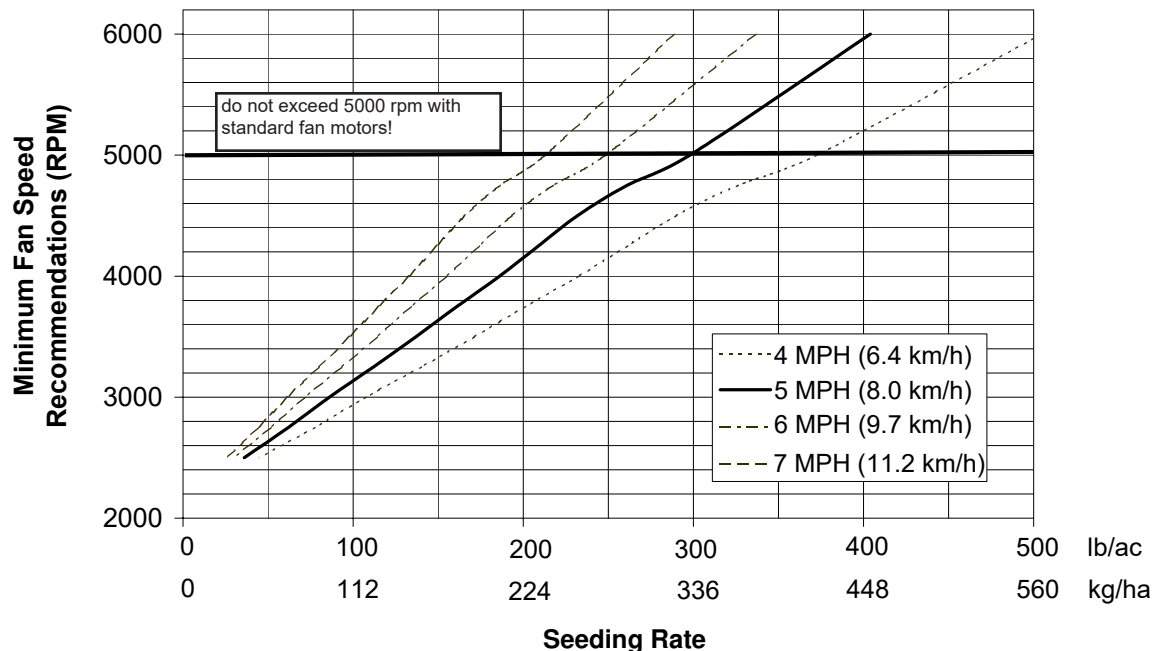
**8830 56'@12" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components**



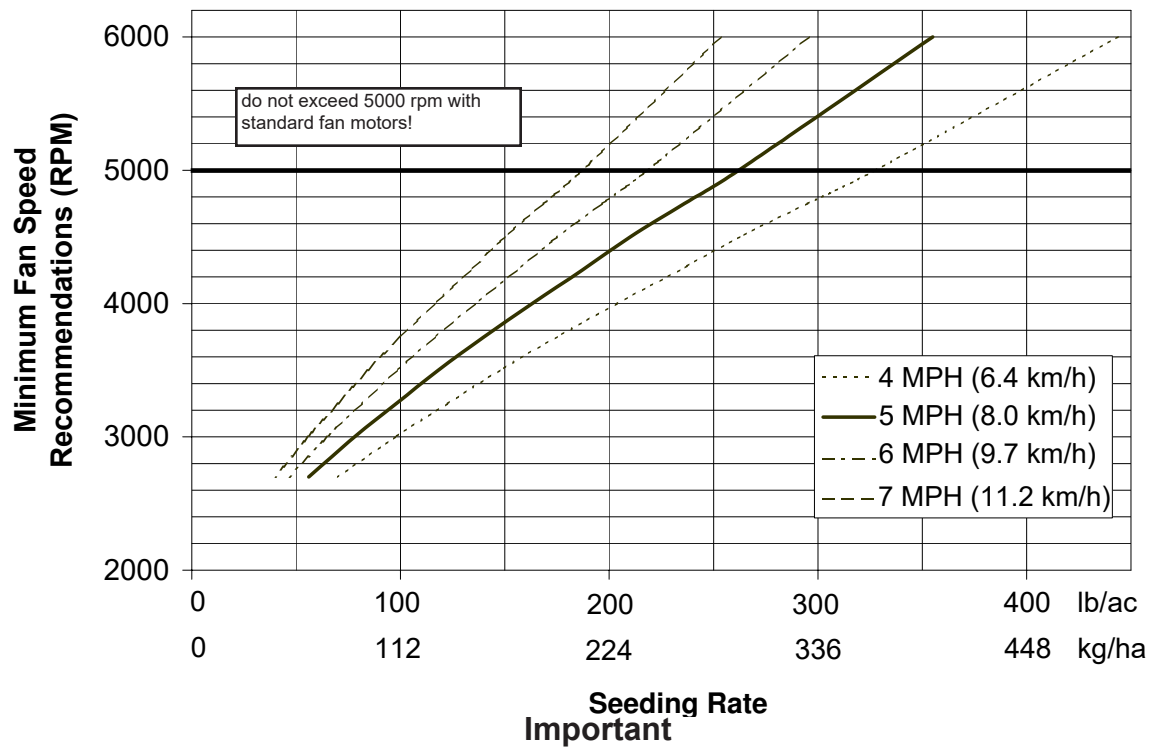
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

**8830 56'@12" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components**

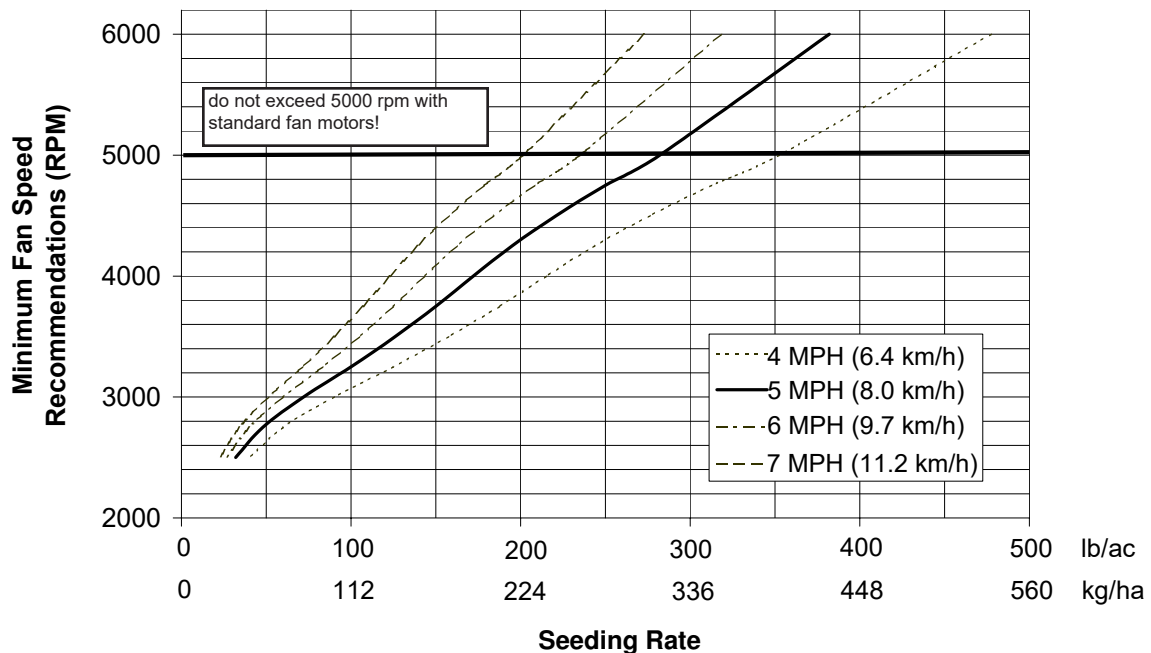


**8830 60'@12" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components**

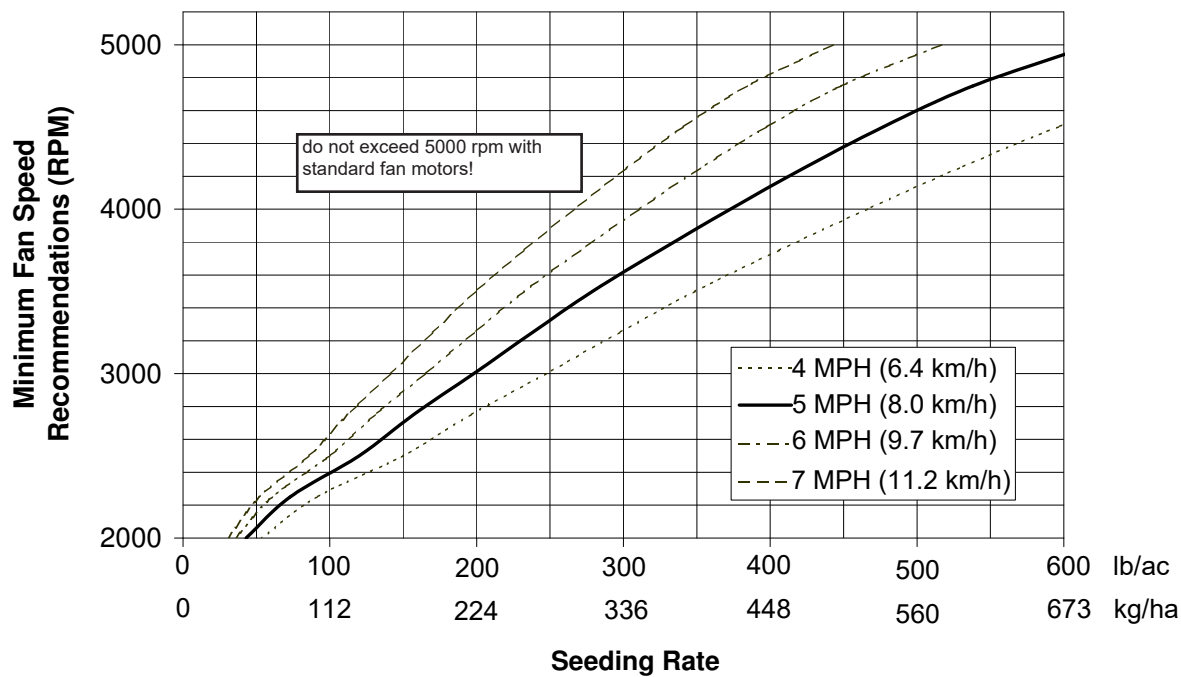


For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

**8830 60'@12" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components**



**5710 24'6" @ 7" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components**

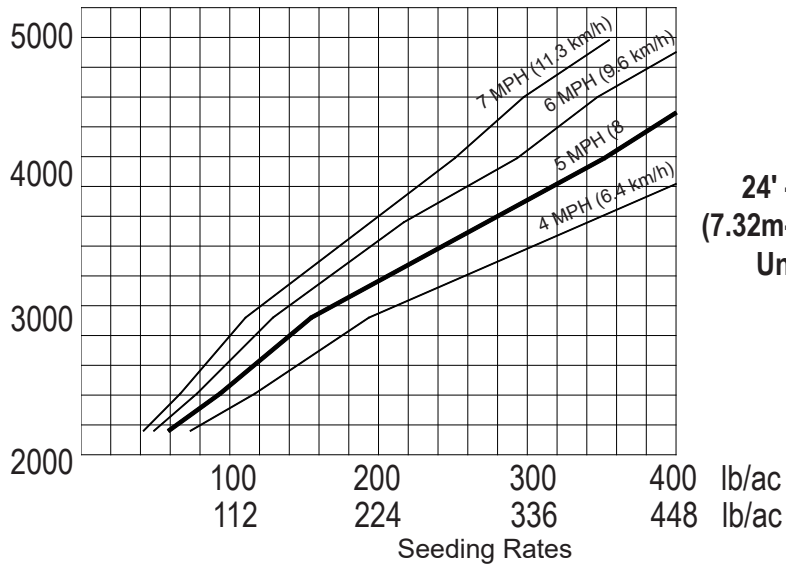


Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2000 RPM is recommended.

5710 24'6"@9.8" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components

Minimum Fan Speed Recommendations (RPM)

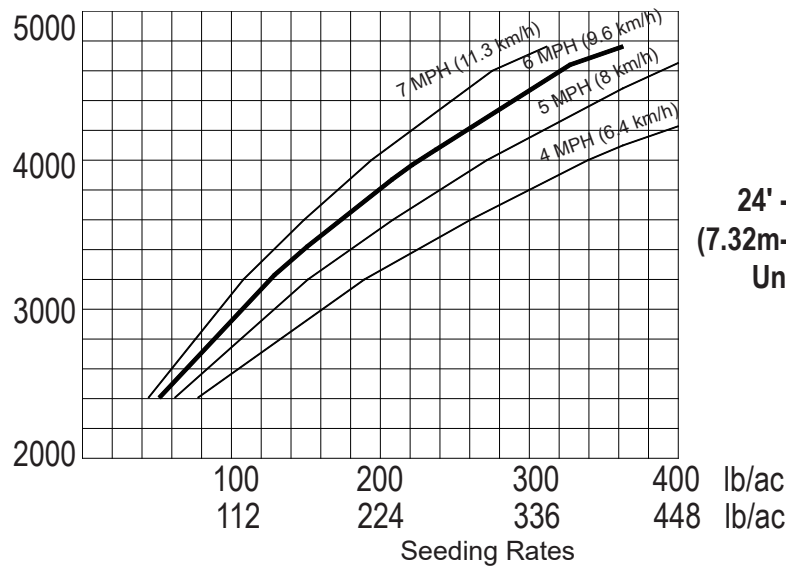


24' - 29'
(7.32m-8.84m)
Units

Important

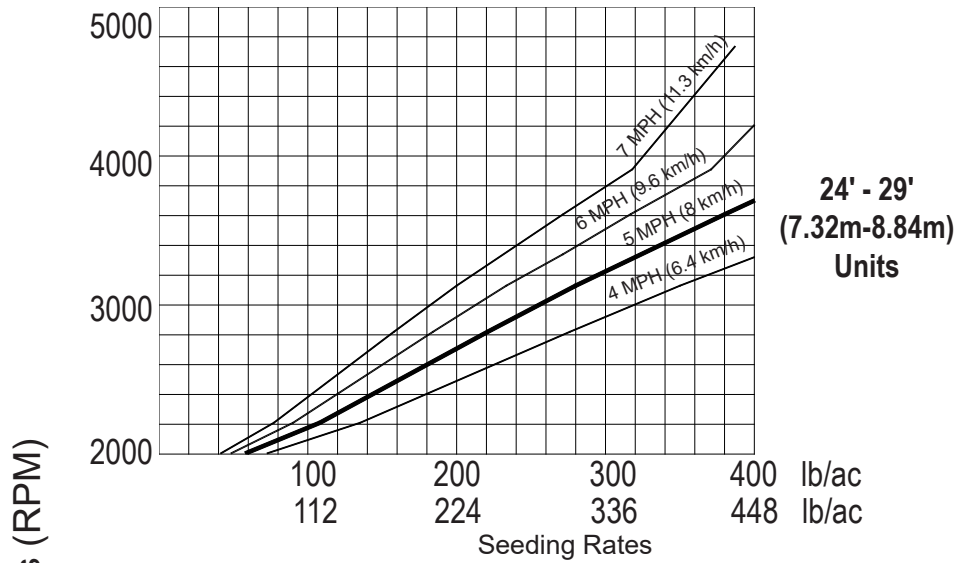
For rates **below** 50 lbs/acre (56 kg/ha), a minimum fan speed of **2000 RPM** is recommended.

5710 25'2"@12.6" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components



24' - 29'
(7.32m-8.84m)
Units

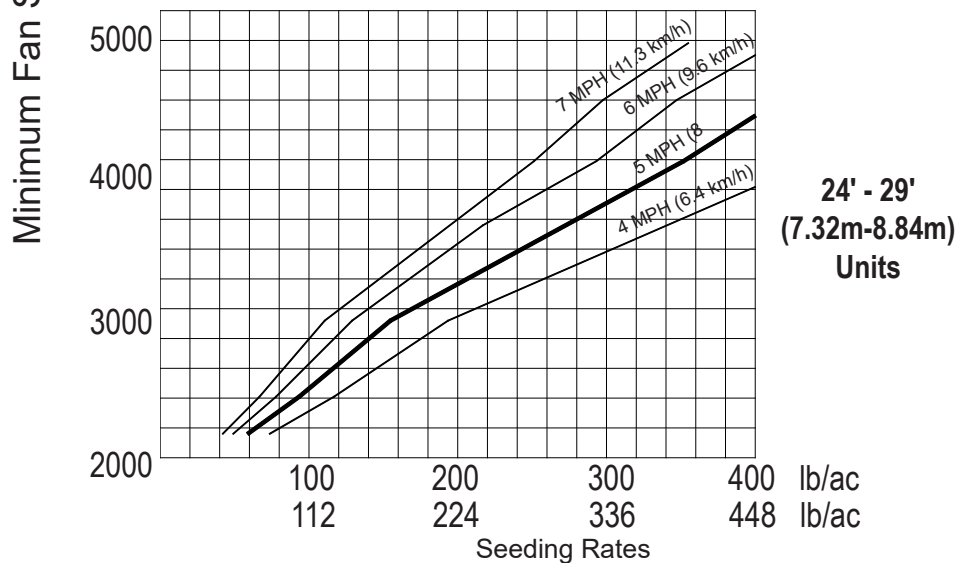
5710 29'2"@7" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components



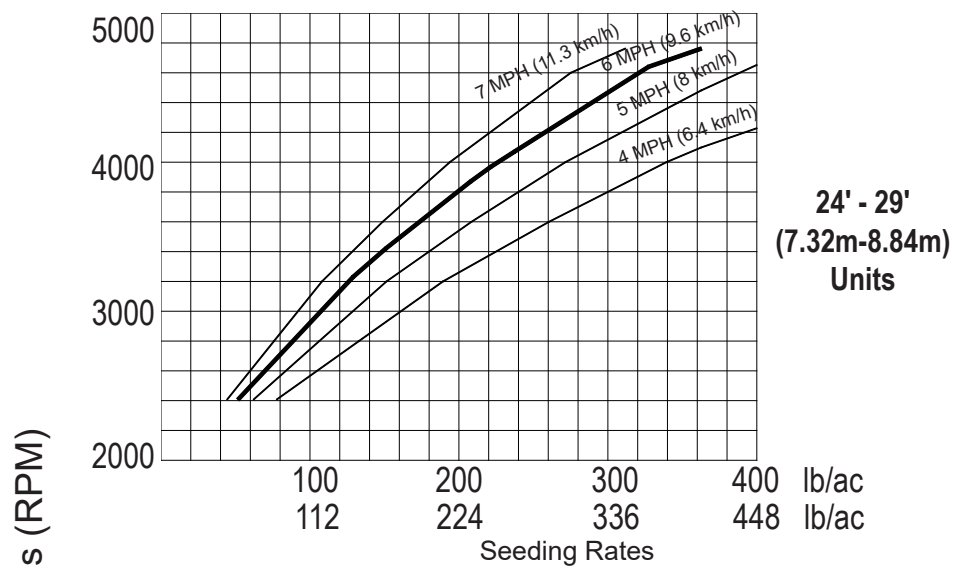
Important

For rates **below** 50 lbs/acre (56 kg/ha), a minimum fan speed of **2000 RPM** is recommended.

5710 29'5"@9.8" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components



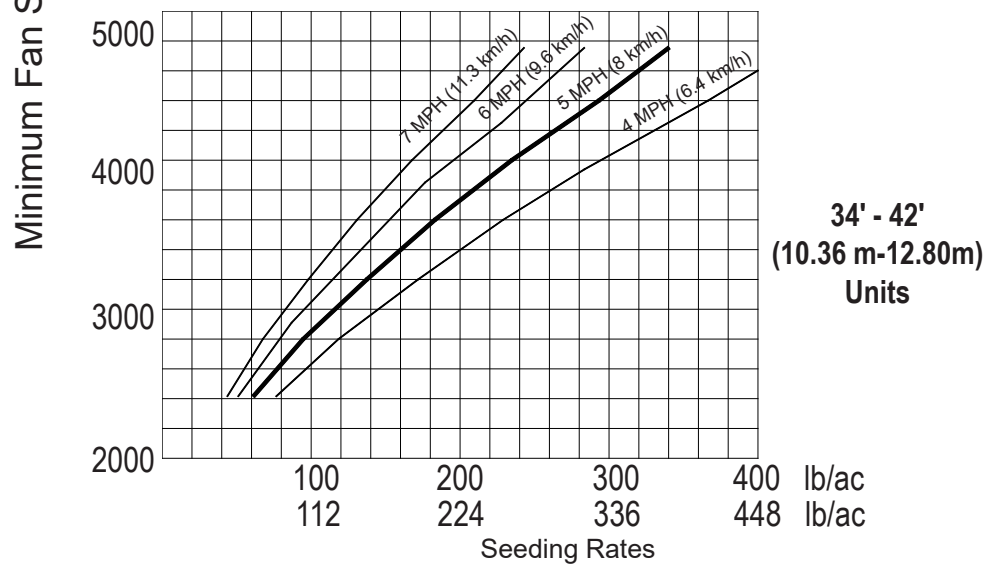
5710 29'5"@12.6" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components



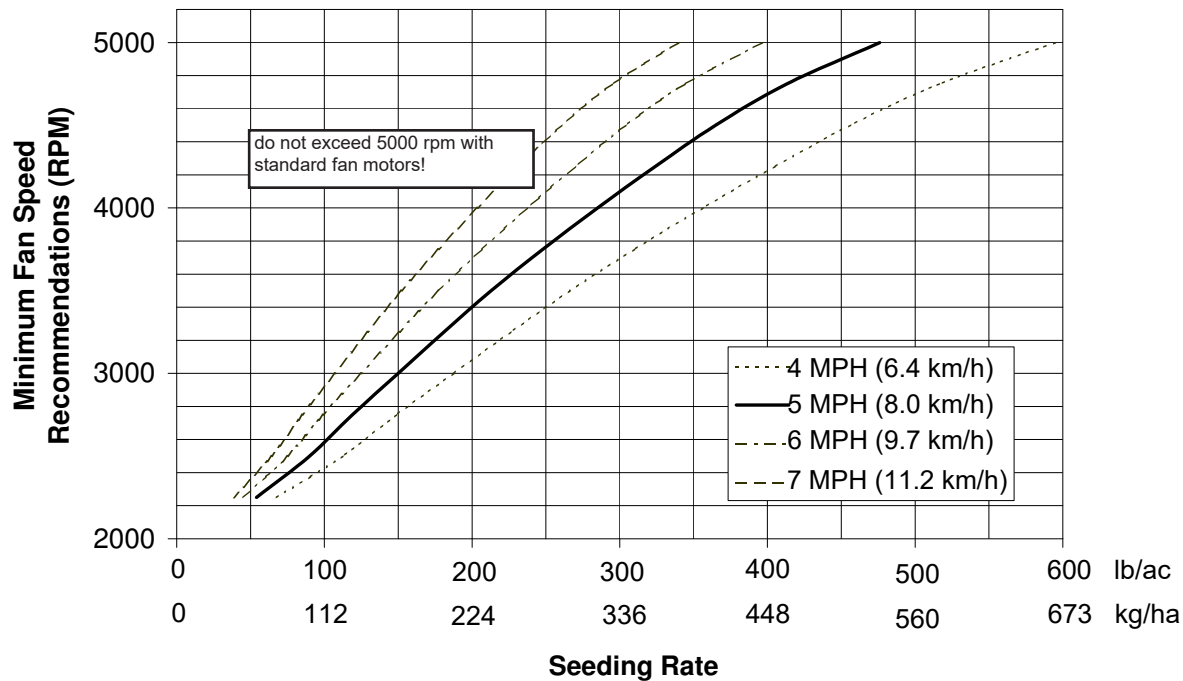
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2000 RPM is recommended.

5710 33'7"@12.6" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components



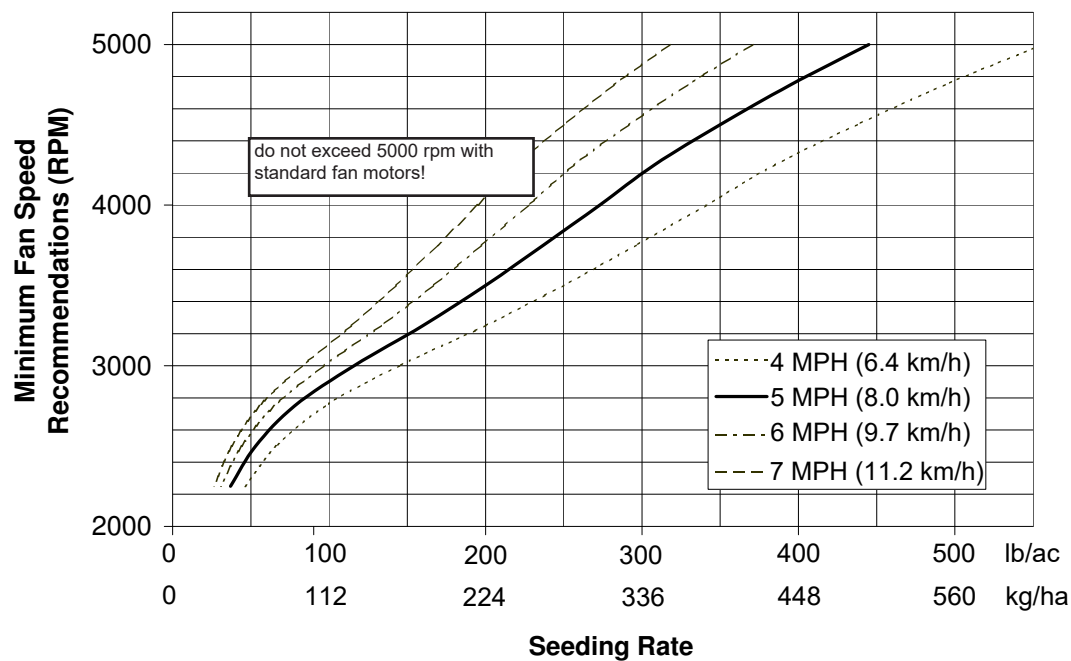
5710 / 5725 34'4" @9.8" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components



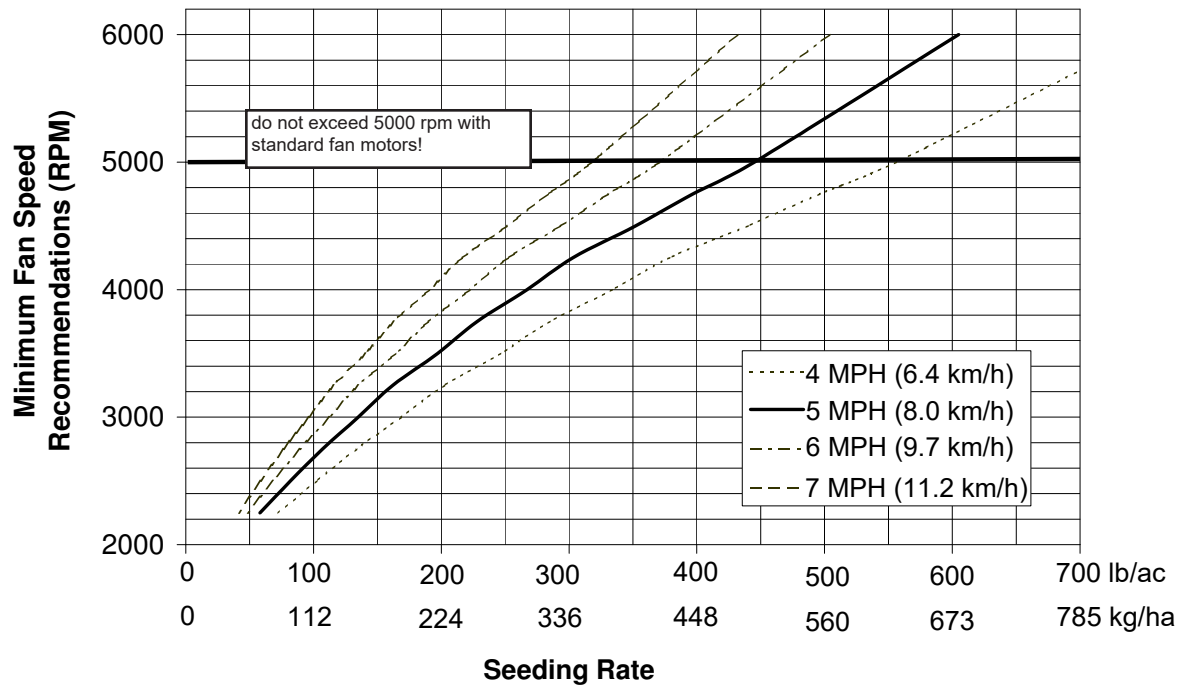
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2250 RPM is recommended.

5710 35' @7" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components



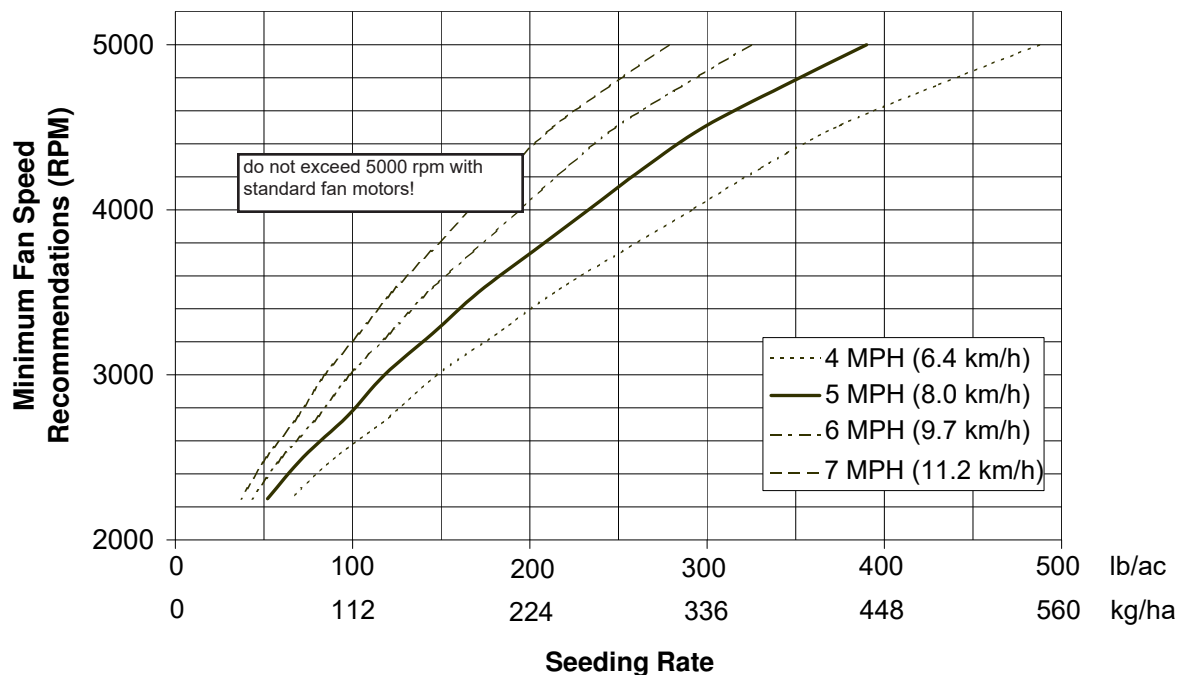
**5710 40'10"@9.8" Minimum Fan speed
1" (25 mm)Tertiary Hose With Dimpled Components**



Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2250 RPM is recommended.

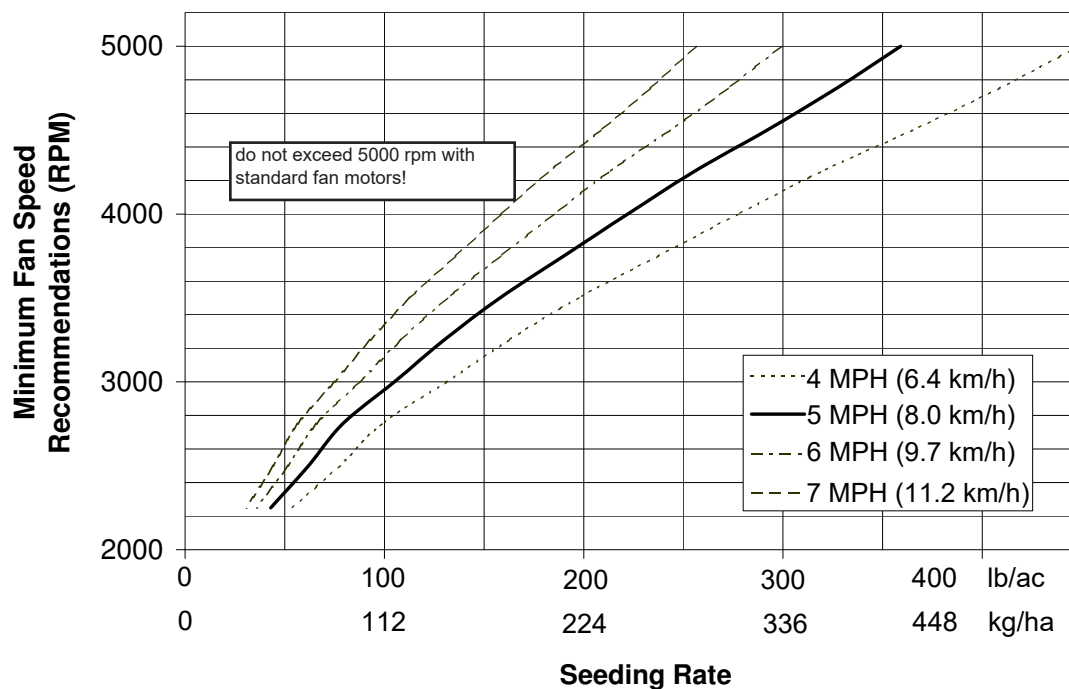
5710 42'@7" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components



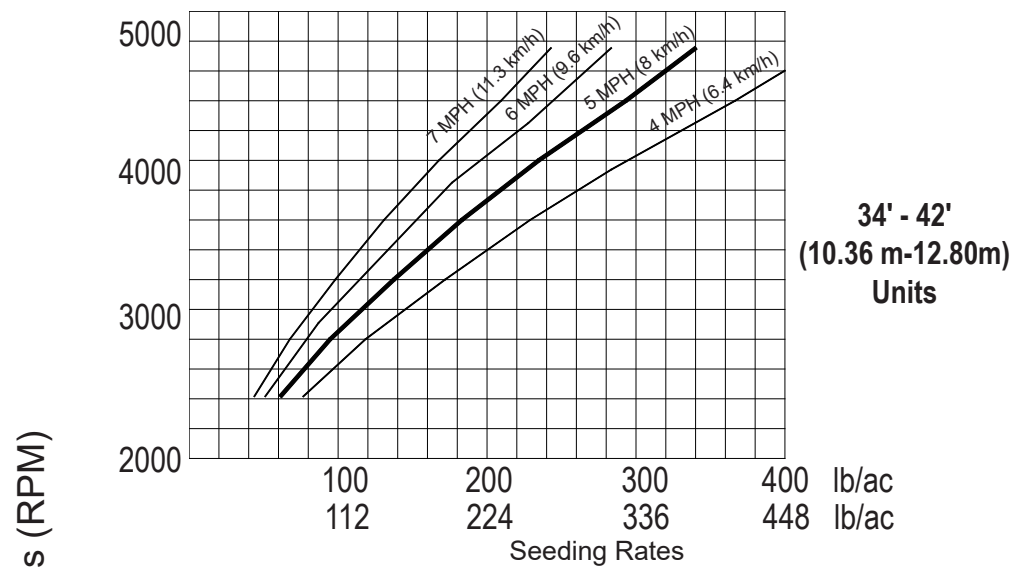
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2250 RPM is recommended.

5710 42'@7" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components



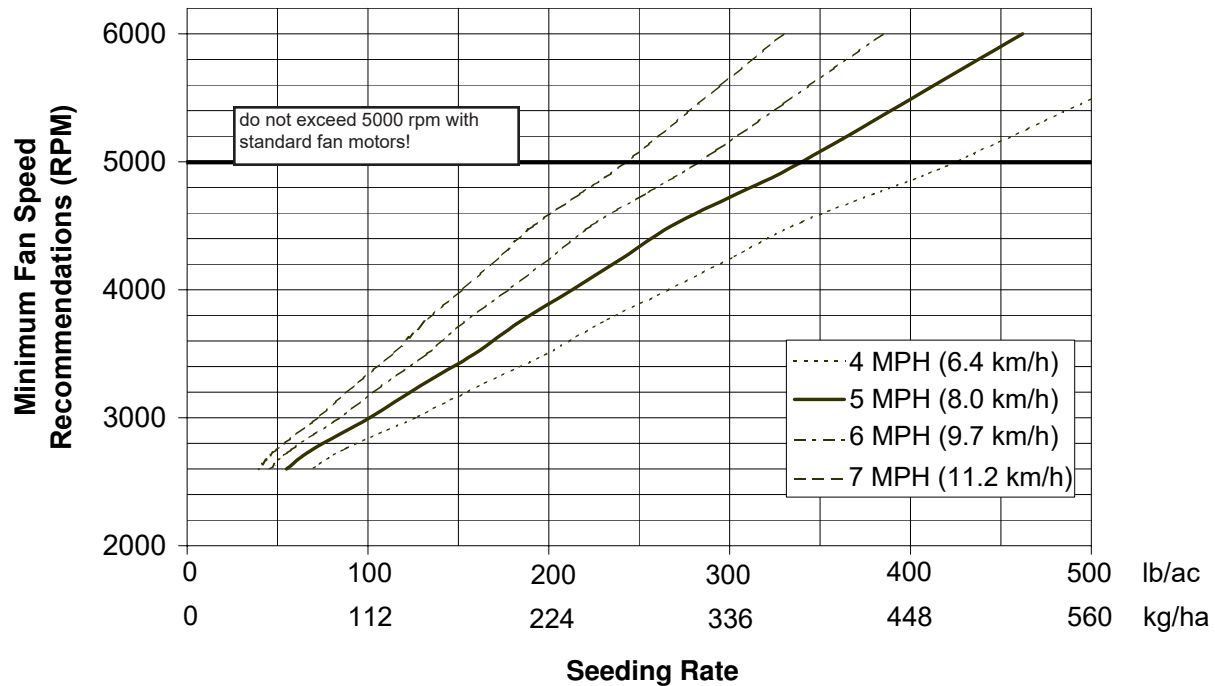
5710 42'@12.6" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components



Important

For rates **below** 50 lbs/acre (56 kg/ha), a minimum fan speed of **2000 RPM** is recommended.

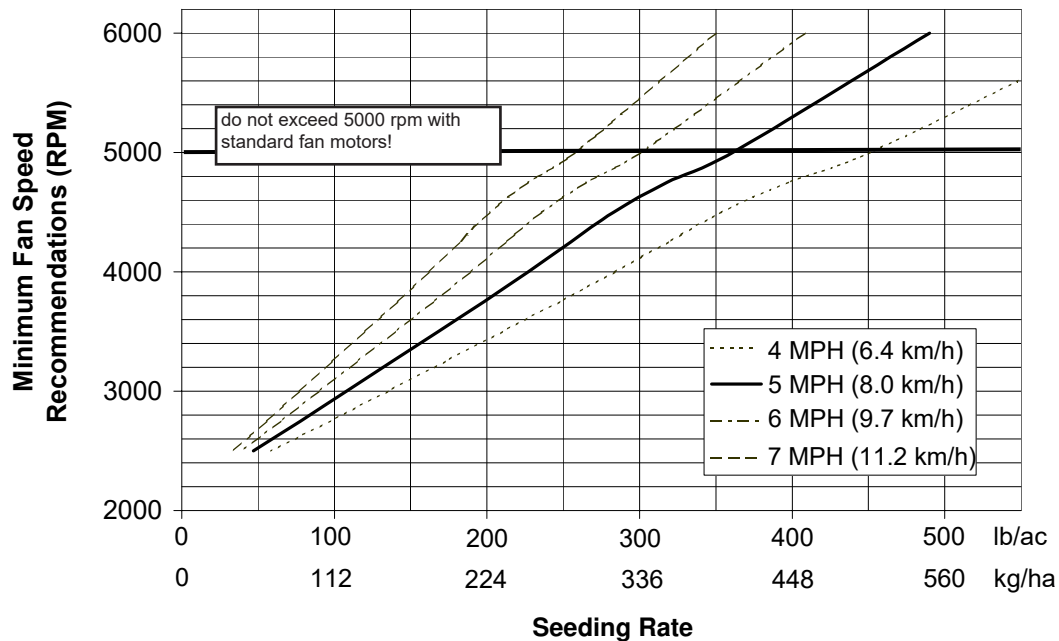
**5710 47'@9.8" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components**



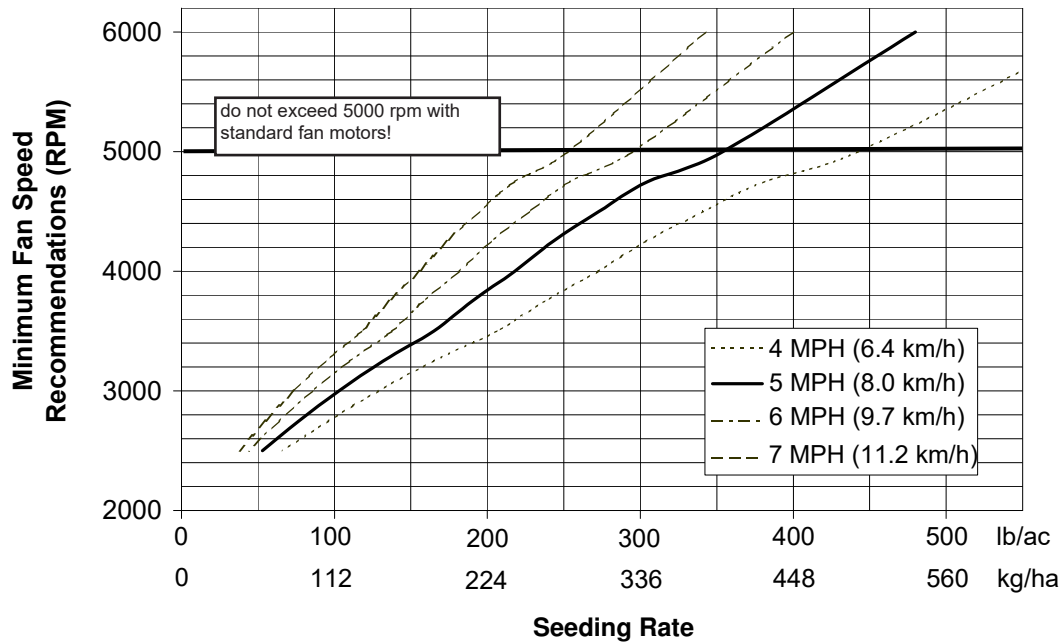
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

**3310-48', 3710-50', 3320-50' @ 10" & 5710-47' @ 9.8"
1" (25 mm) Tertiary Hose With Dimpled Components**



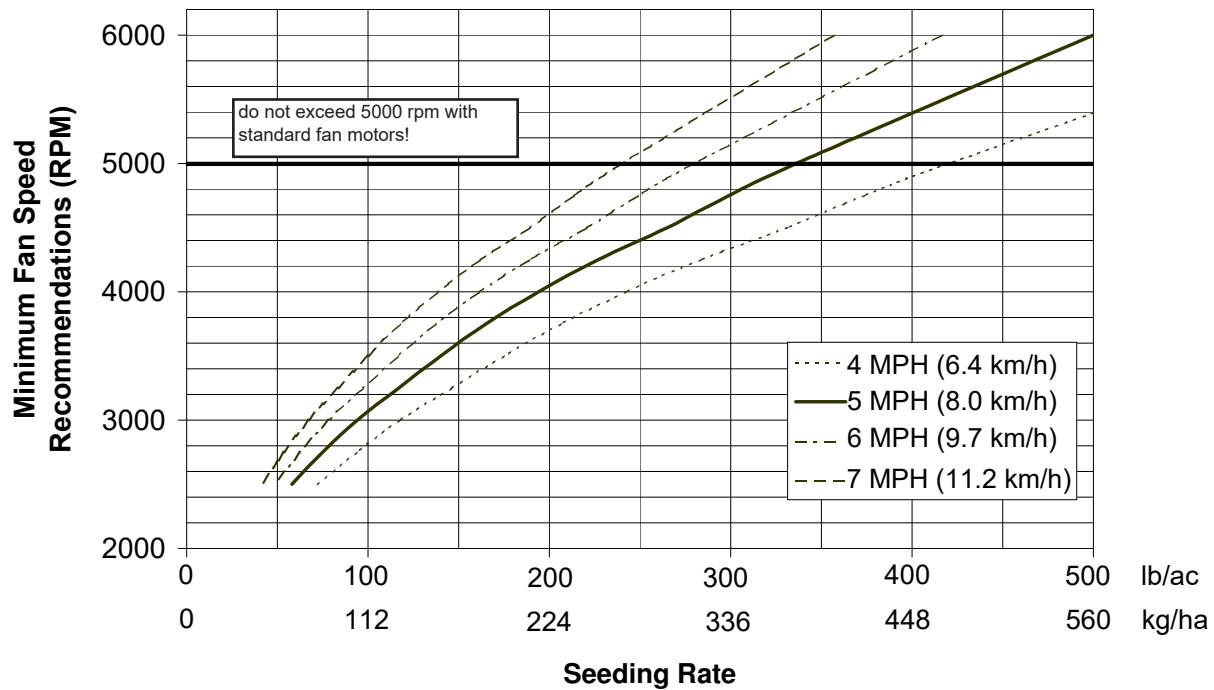
3310-48', 3710-50', 3320-50' @ 12" & 5710-47' @ 12.6"
 1" (25 mm) Tertiary Hose With Dimpled Components



Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

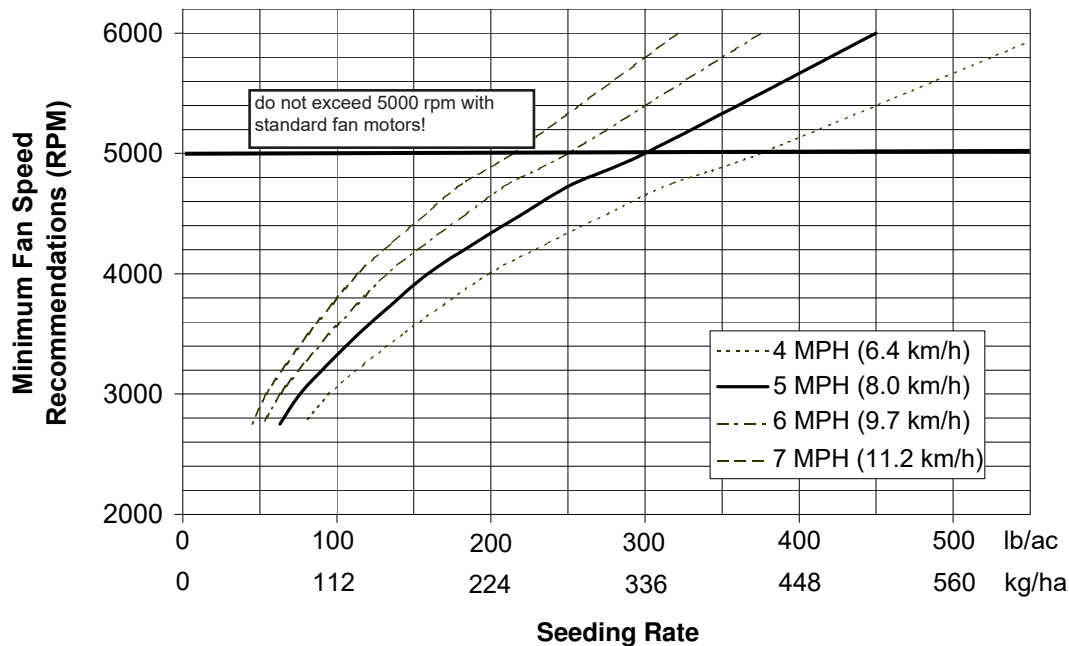
5710 51'4"@7" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components



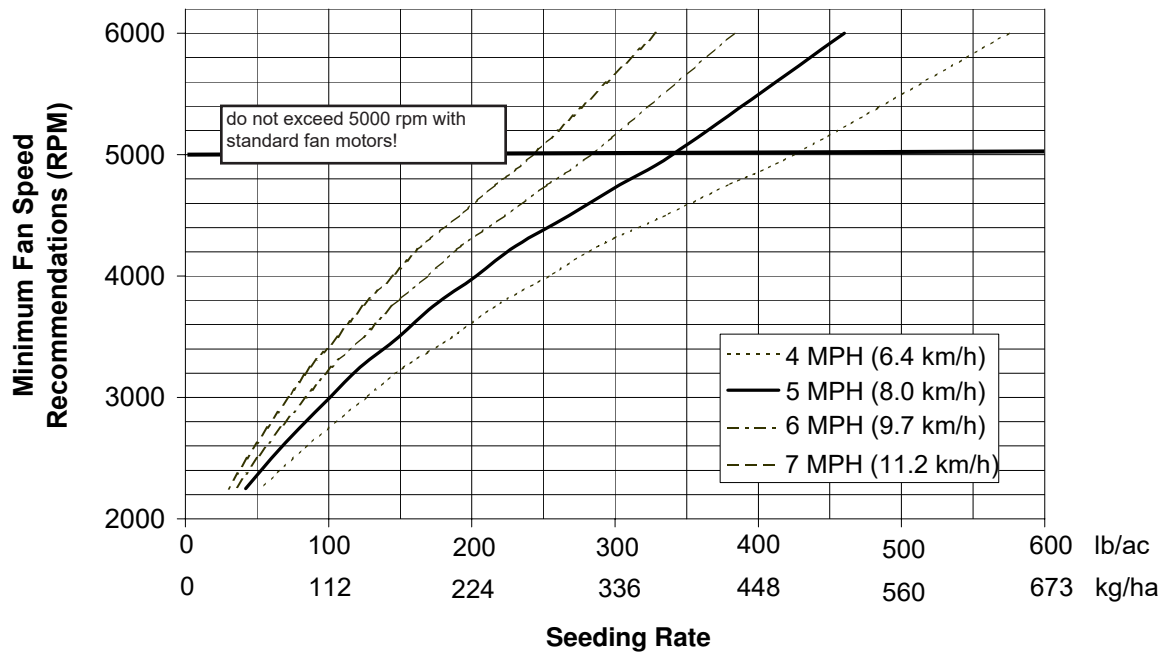
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

5710 51' 4"@7" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components



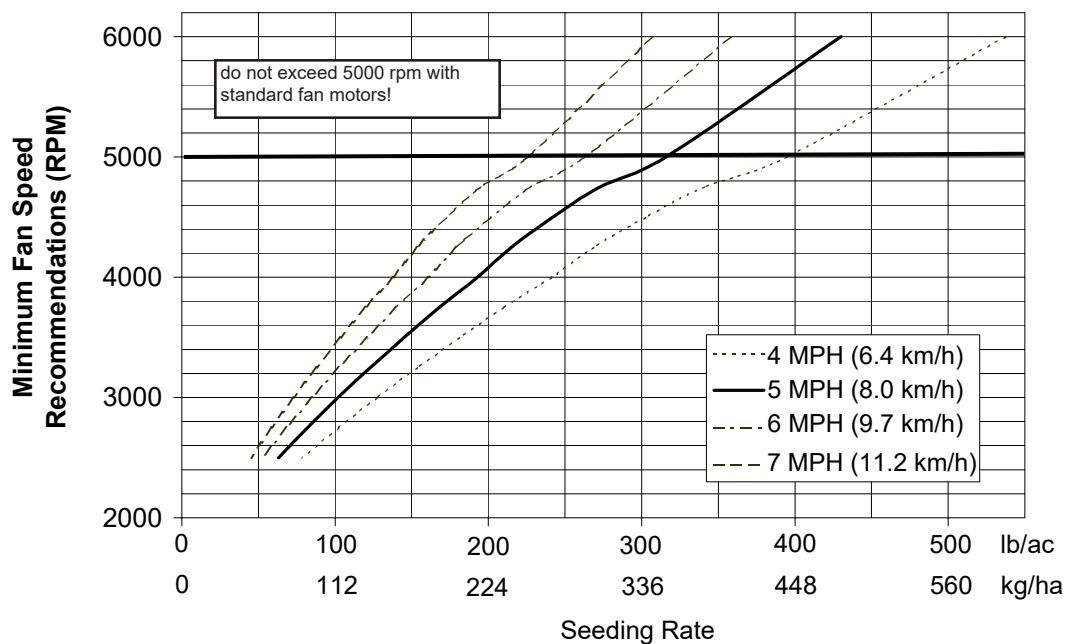
**5710 52'6"@12.6" Minimum Fan speed
1" (25 mm)Tertiary Hose With Dimpled Components**



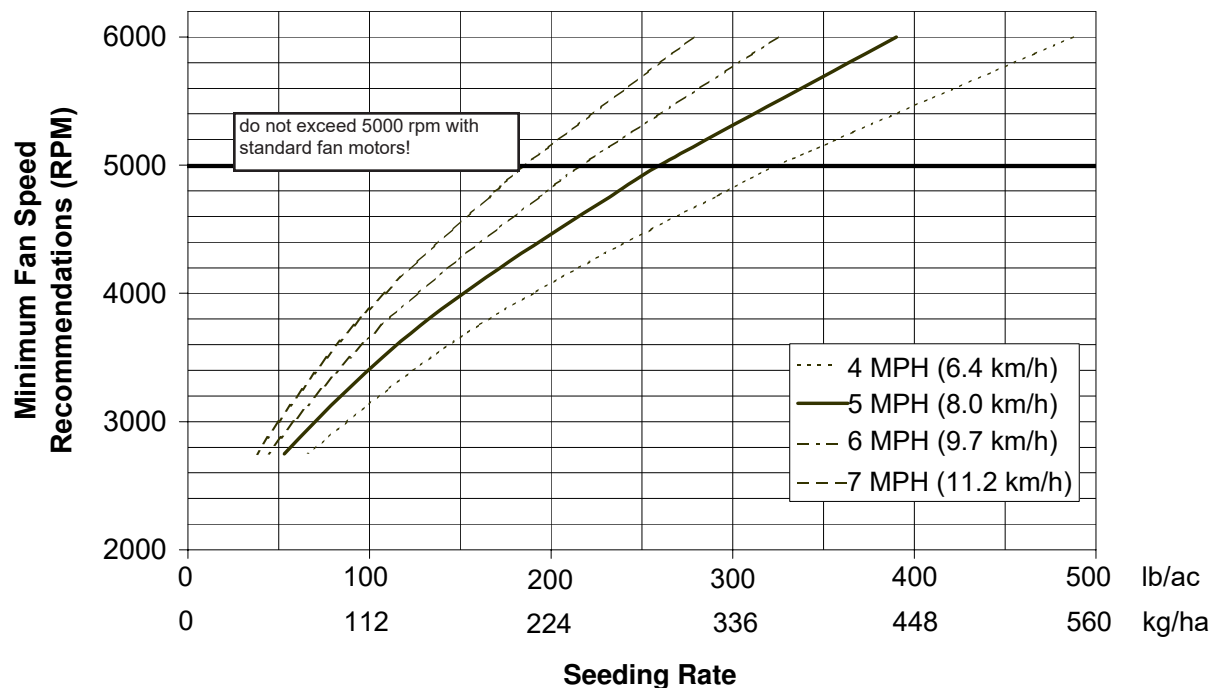
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

**3310 55'@10" & 5710 53'11"@9.8" Minimum Fan Speed
1" (25 mm)/ 7/8" (22mm) Tertiary Hose With Dimpled Components**



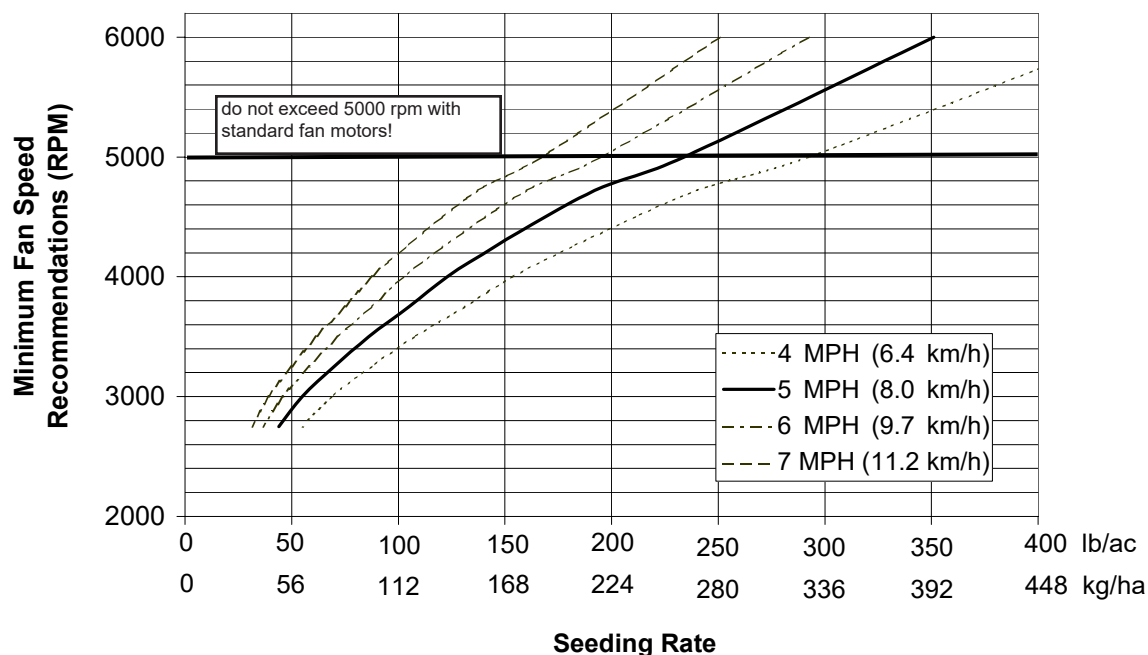
3710-60' @ 7.5" & 5710-59' @ 7"
7/8" (22 mm) Tertiary Hose with Dimpled Components



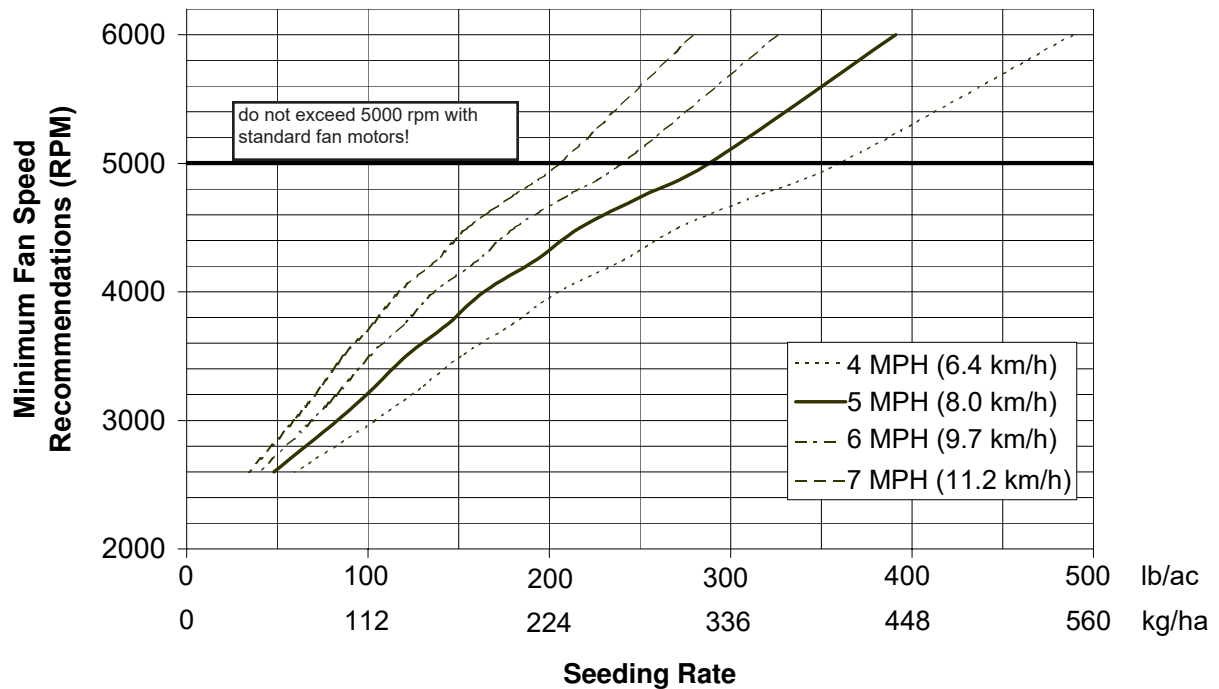
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

3710-60' @ 7.5" & 5710-59' @ 7"
1" (25 mm) Tertiary Hose With Dimpled Components



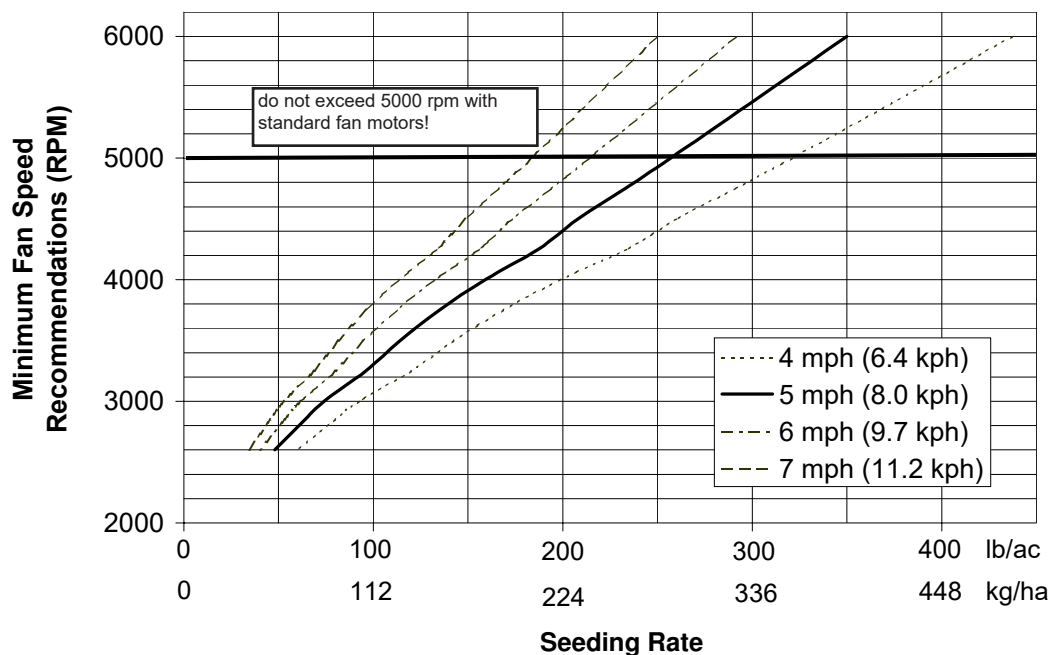
3710-60', 3320-60' @ 10" & 5710-59' @ 9.8"
7/8" (22 mm) Tertiary Hose with Dimpled Components



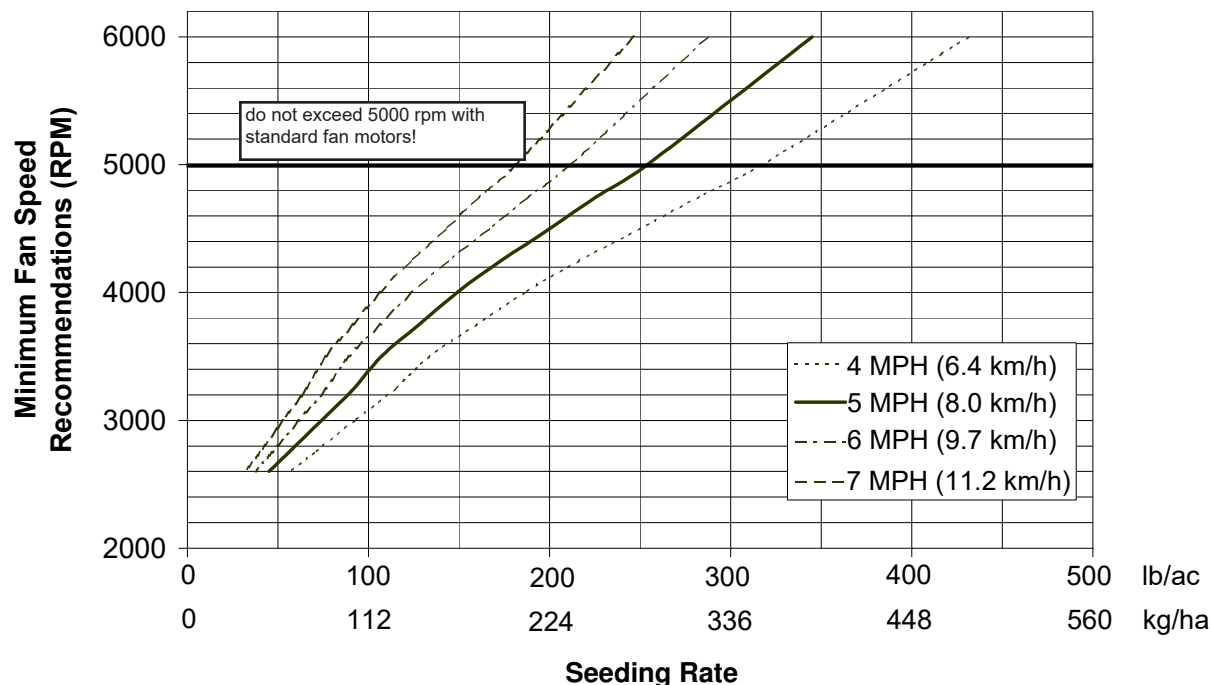
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

3710-60', 3320-60' @ 10" & 5710-59' @ 9.8"
1" (25 mm) Tertiary Hose With Dimpled Components



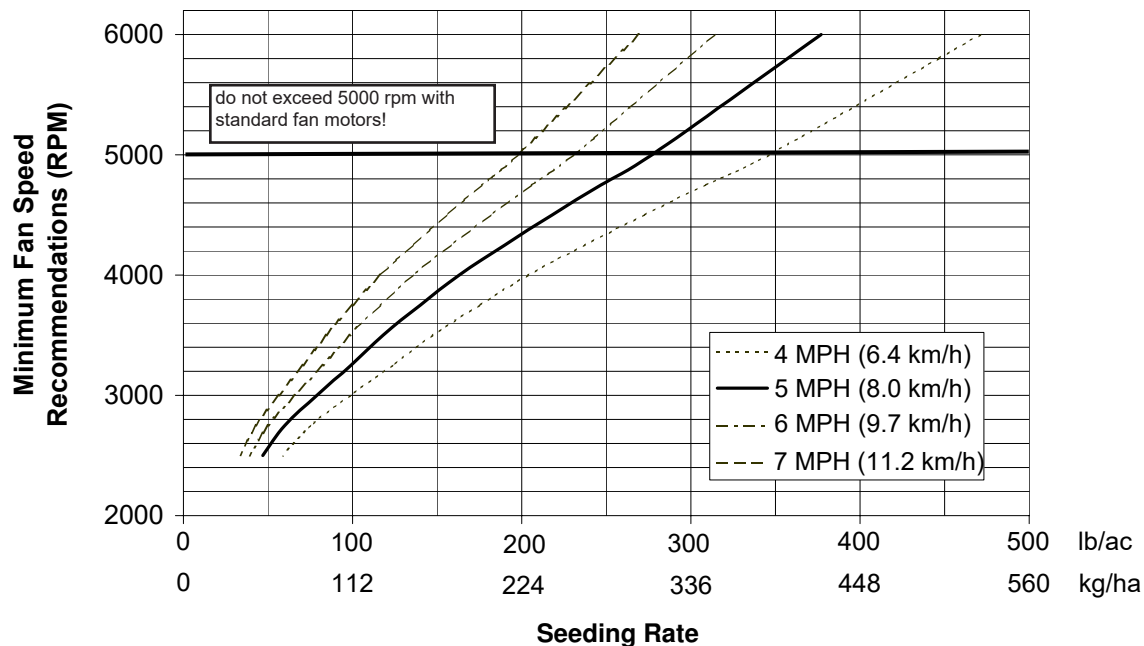
5710 59'@12.6" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components



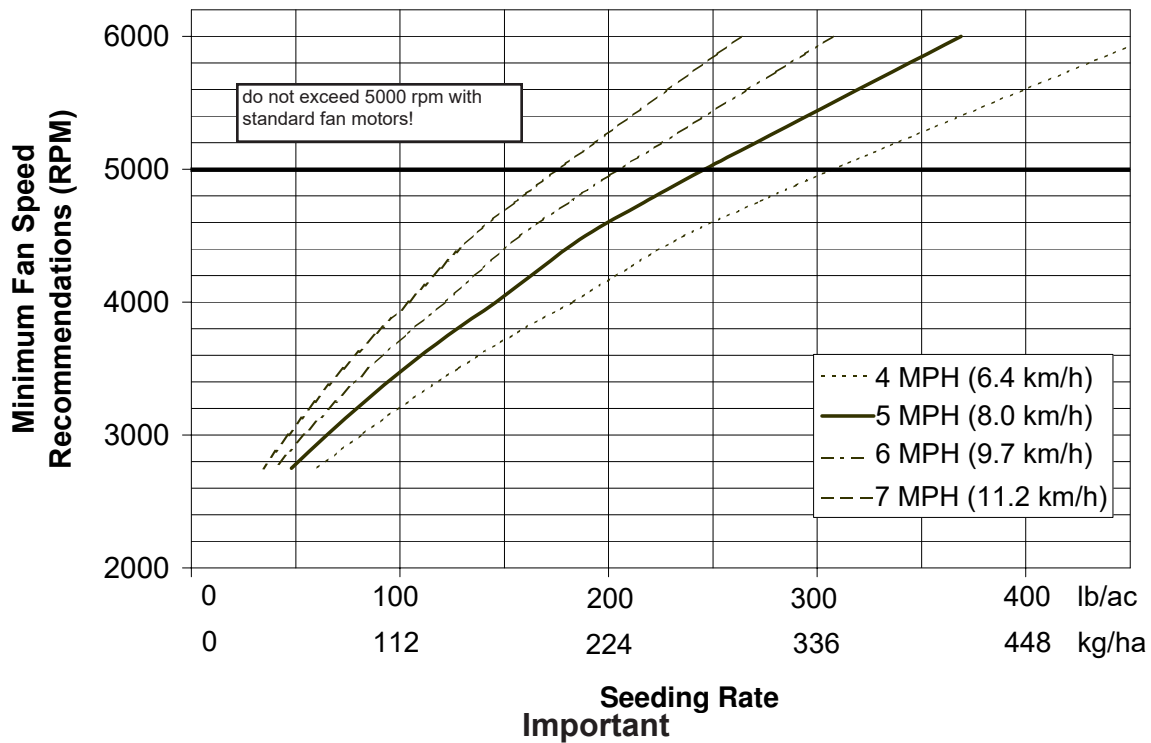
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

5710 59'@12.6" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components

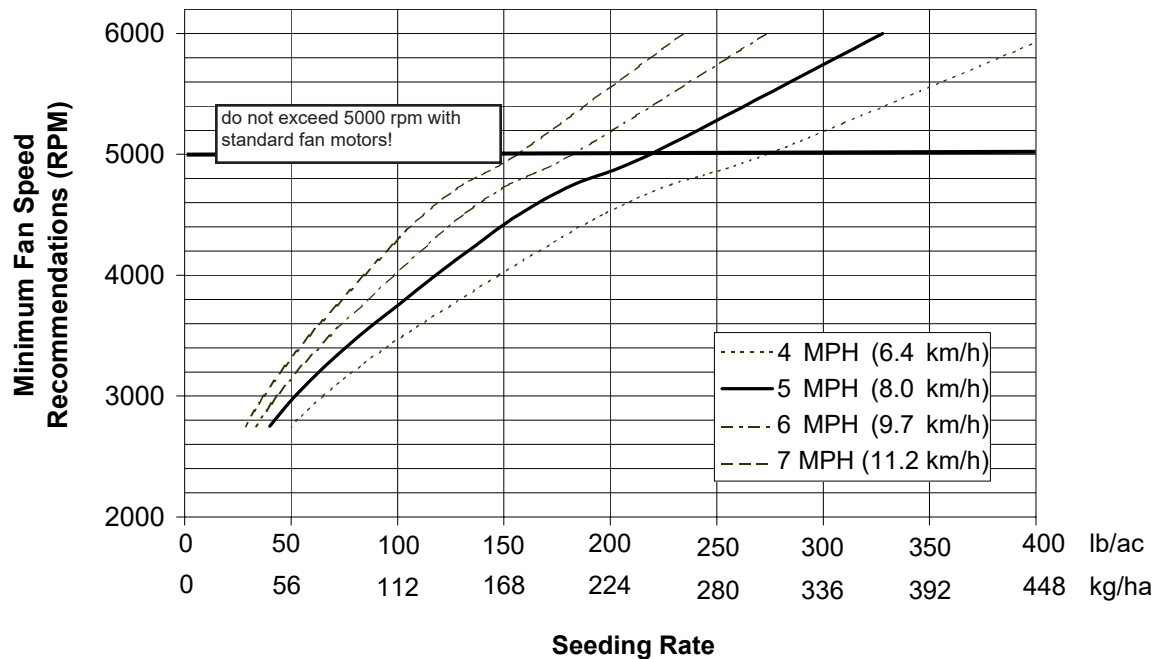


**5710 60'8"@7" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components**

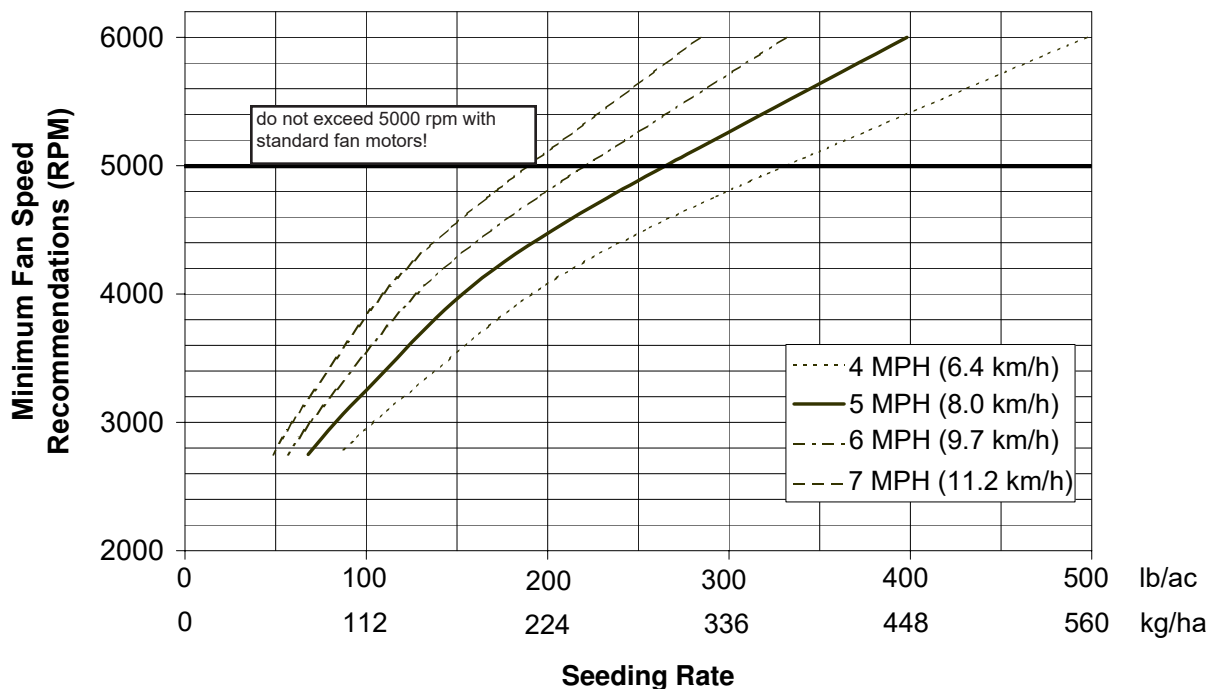


For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

**5710 60' 8"@7" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components**



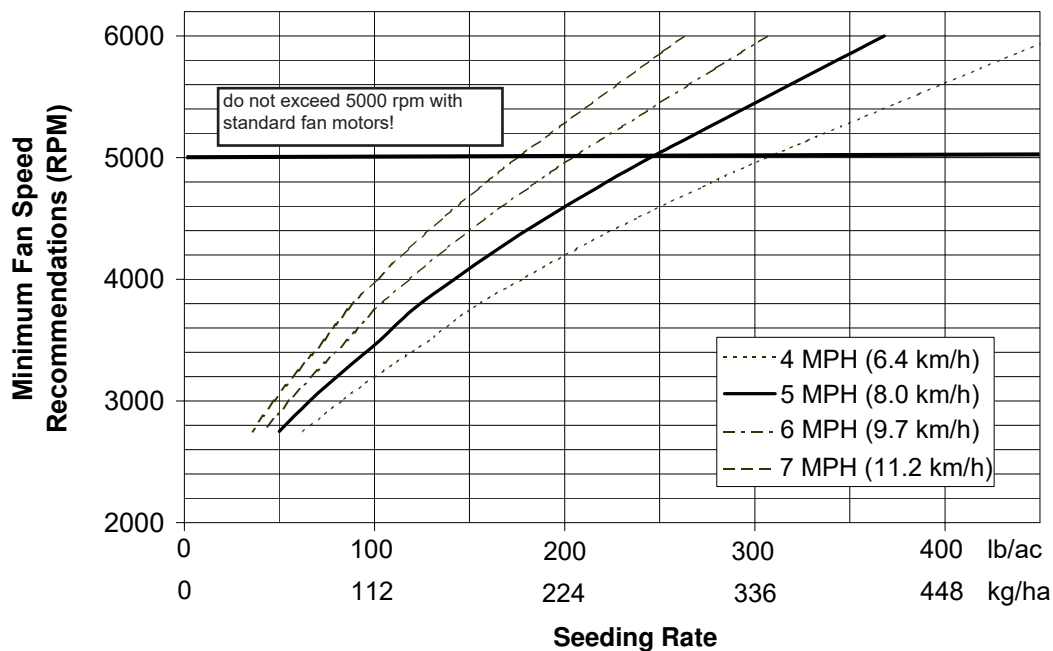
3310-65', 3320-66' @ 10" & 5710-63'8" @ 9.8"
7/8" (22 mm) Tertiary Hose with Dimpled Components



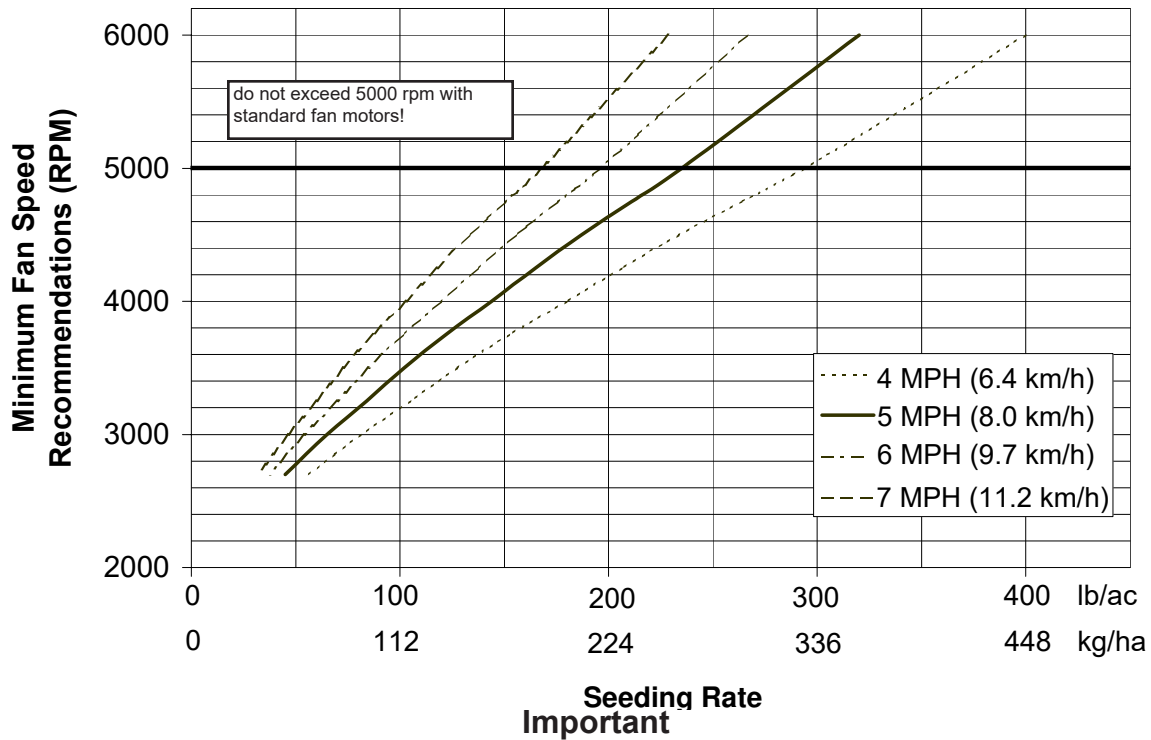
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

3310-65', 3320-66' @ 10" & 5710-63'8" @ 9.8"
1" (25 mm) Tertiary Hose With Dimpled Components

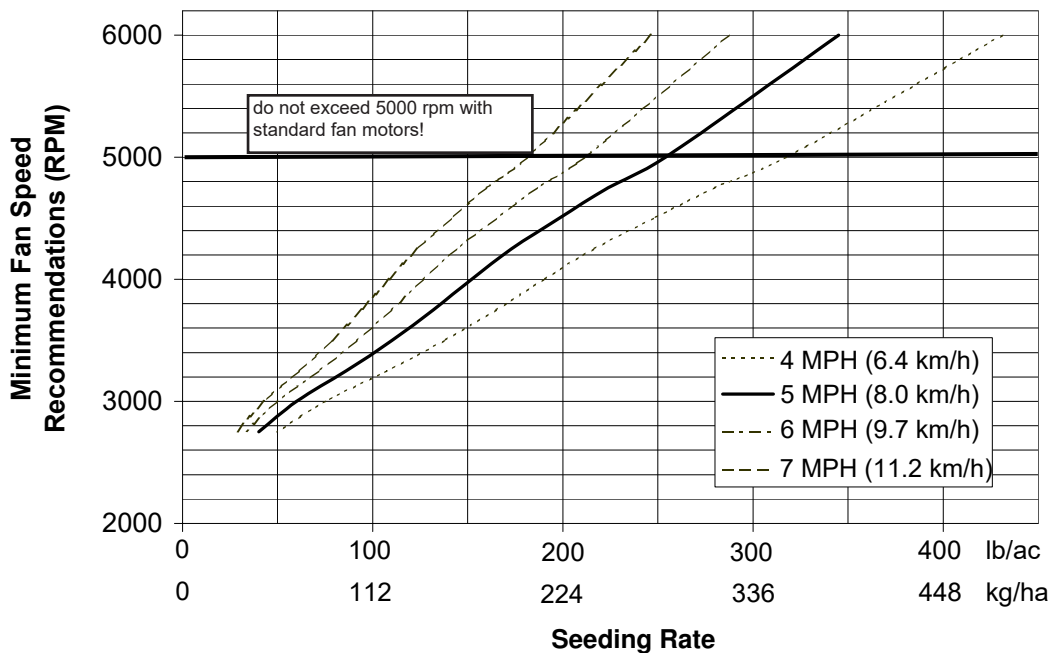


3710-60', 3320-60' @ 12" & 5710-63'8" @ 12.6"
7/8" (22 mm) Tertiary Hose with Dimpled Components

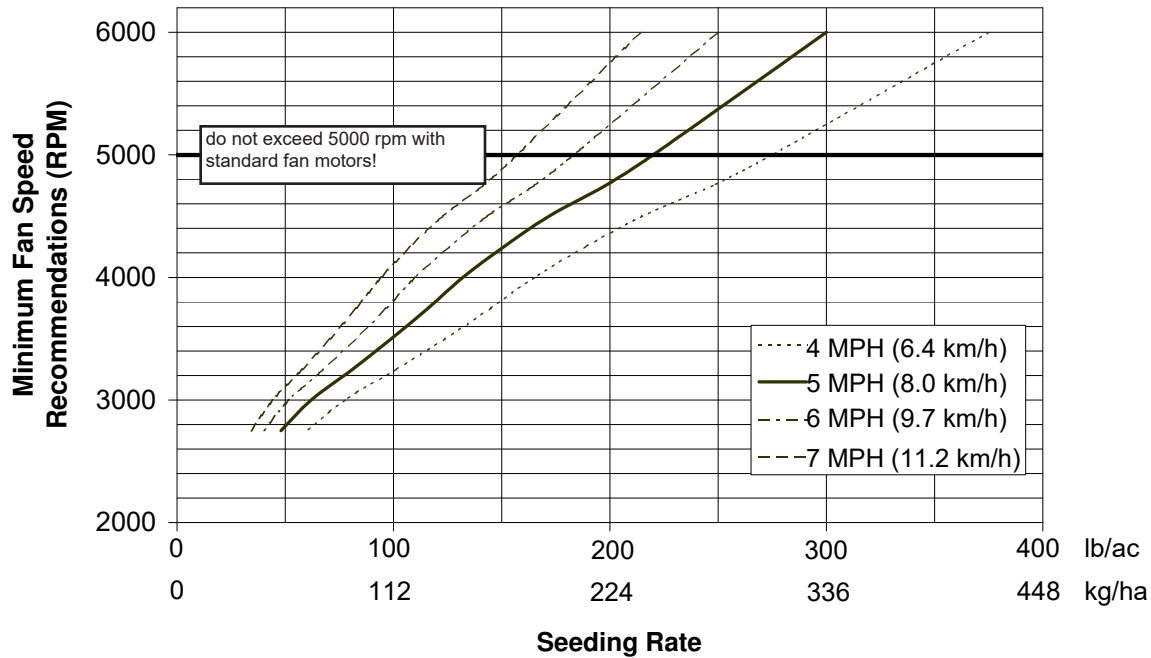


For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

3710-60', 3320-60' @ 12" & 5710-63'8" @ 12.6"
1" (25 mm) Tertiary Hose With Dimpled Components



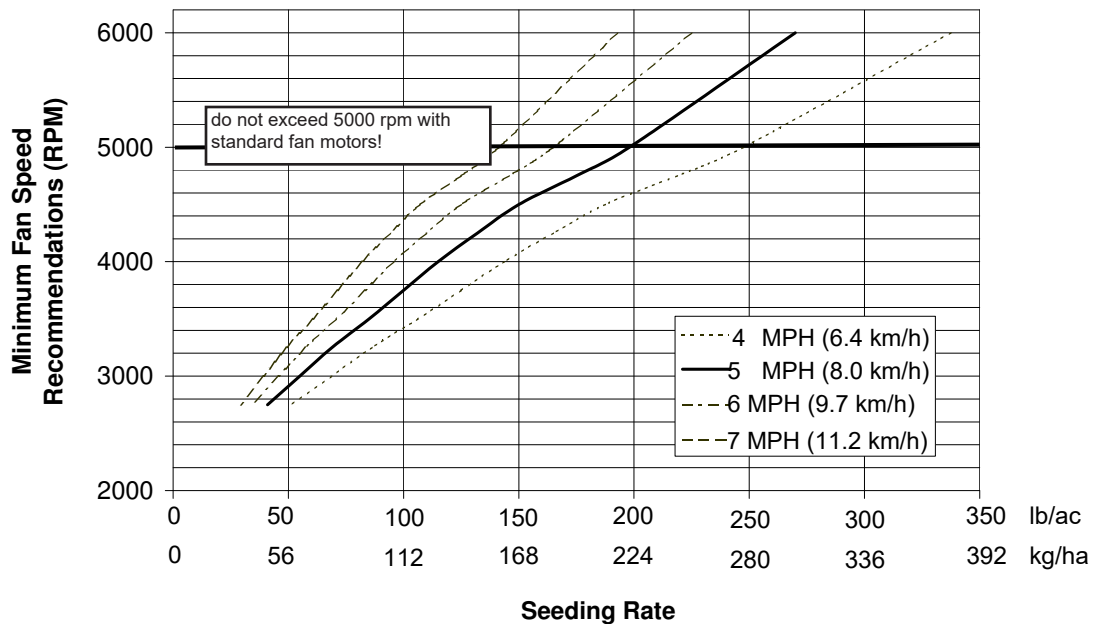
5710 70'@9.8" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components



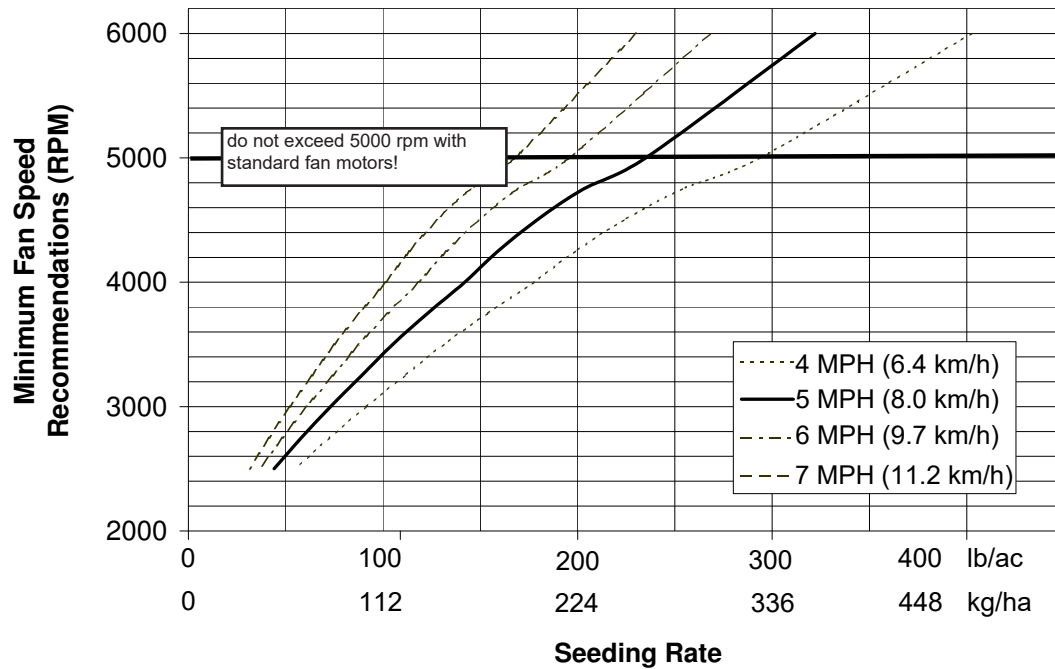
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

5710 70'@9.8" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components



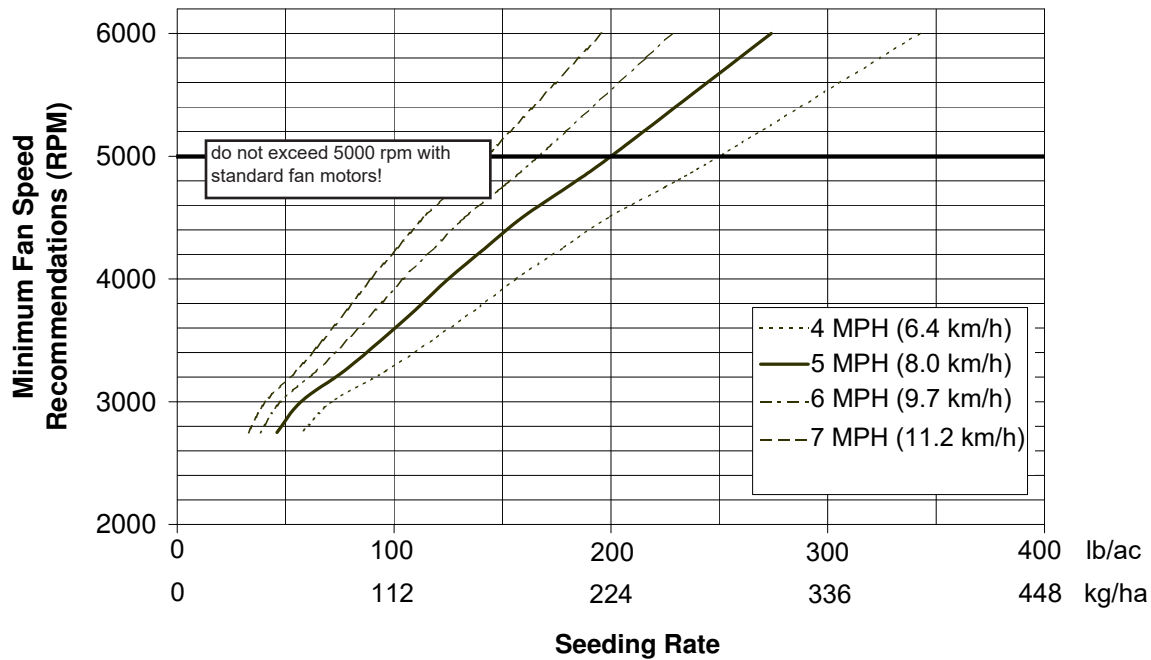
3310-65', 3320-66' @ 12" & 5710-69'4" @ 12.6"
 1" (25 mm)/ 7/8" (22mm) Tertiary Hose With Dimpled Components



Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

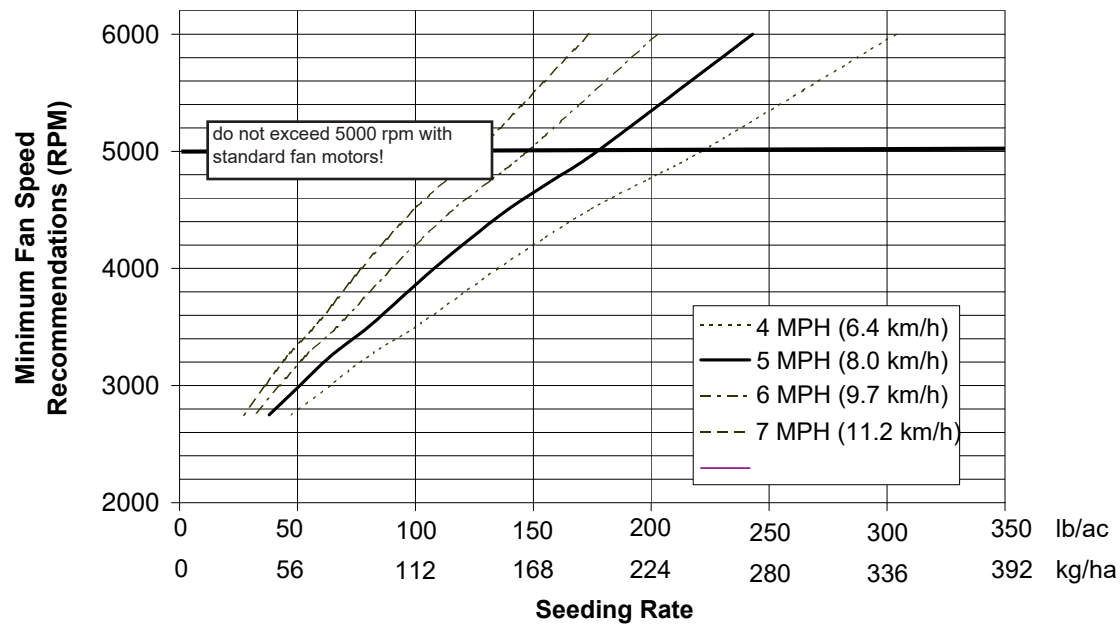
3310-75', 3320-76' @ 10" & 5710-74' @ 9.8"
7/8" (22 mm) Tertiary Hose with Dimpled Components



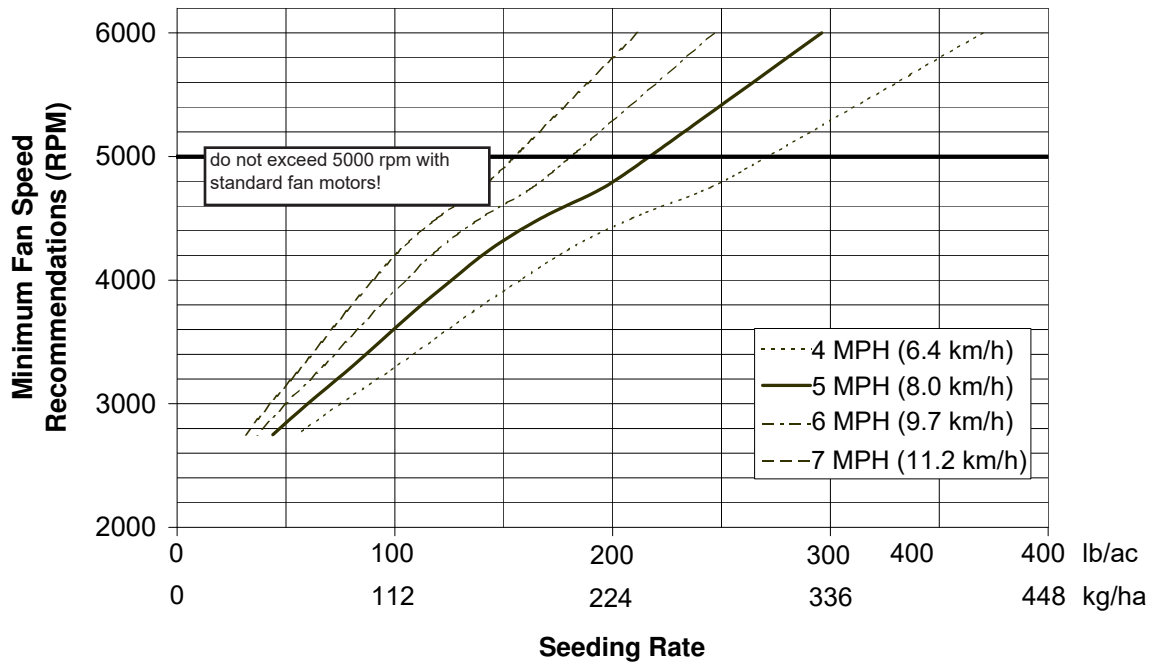
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

3310-75', 3320-76' @ 10" & 5710-74' @ 9.8"
1" (25 mm) Tertiary Hose With Dimpled Components



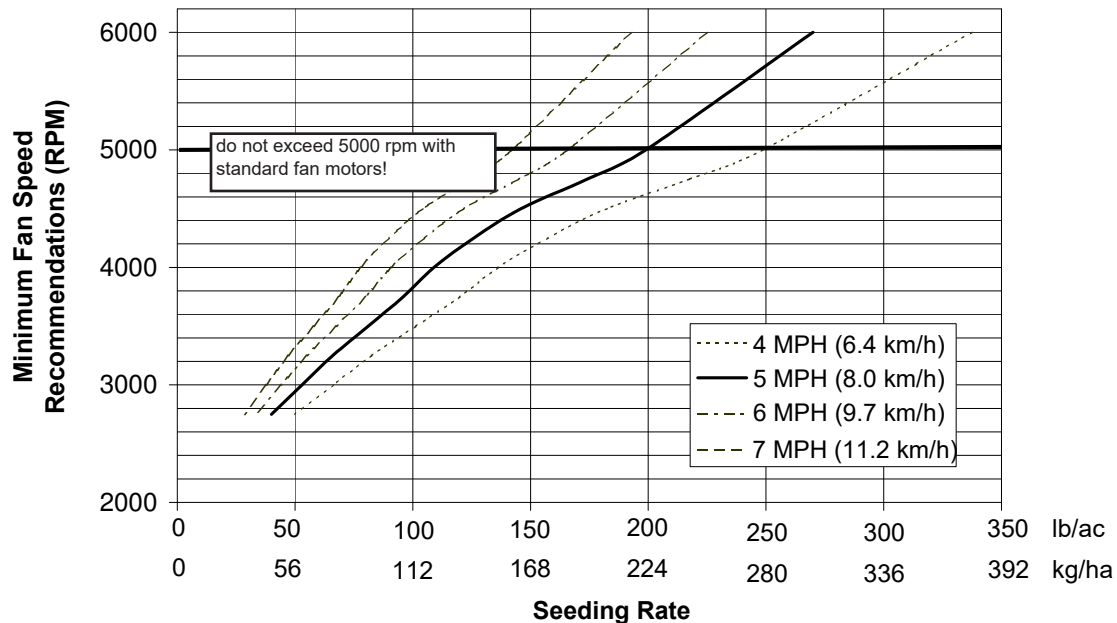
3310-75', 3320-76' @ 12" & 5710-74' @ 12.6"
7/8" (22 mm) Tertiary Hose with Dimpled Components



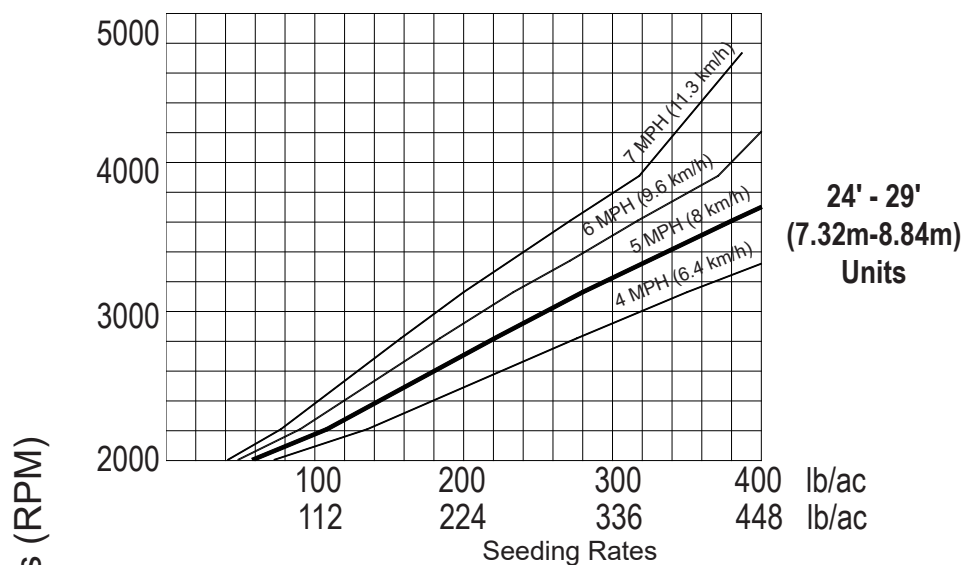
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

3310-75', 3320-76' @ 12" & 5710-74' @ 12.6"
1" (25 mm) Tertiary Hose With Dimpled Components



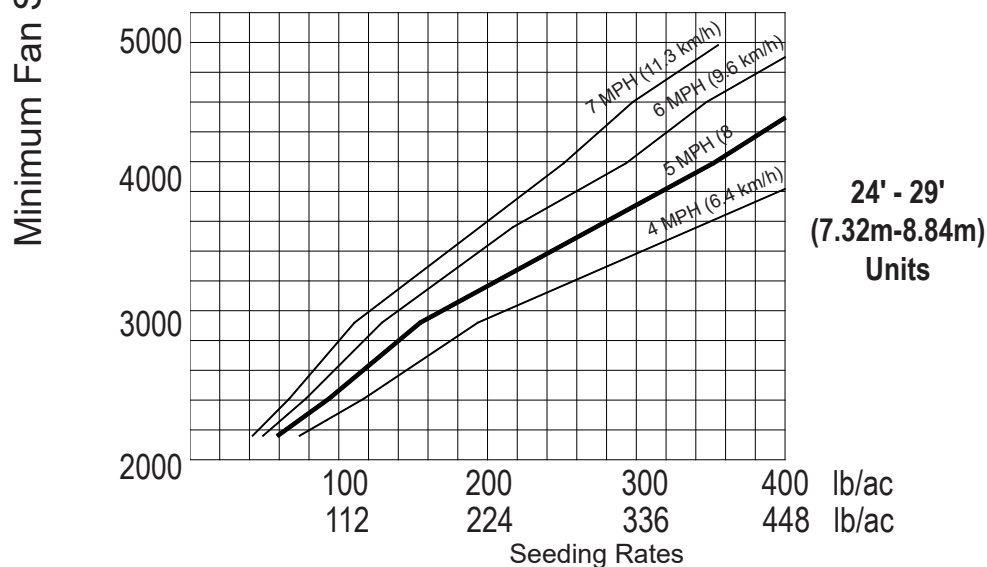
5730 17'6"@7" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components



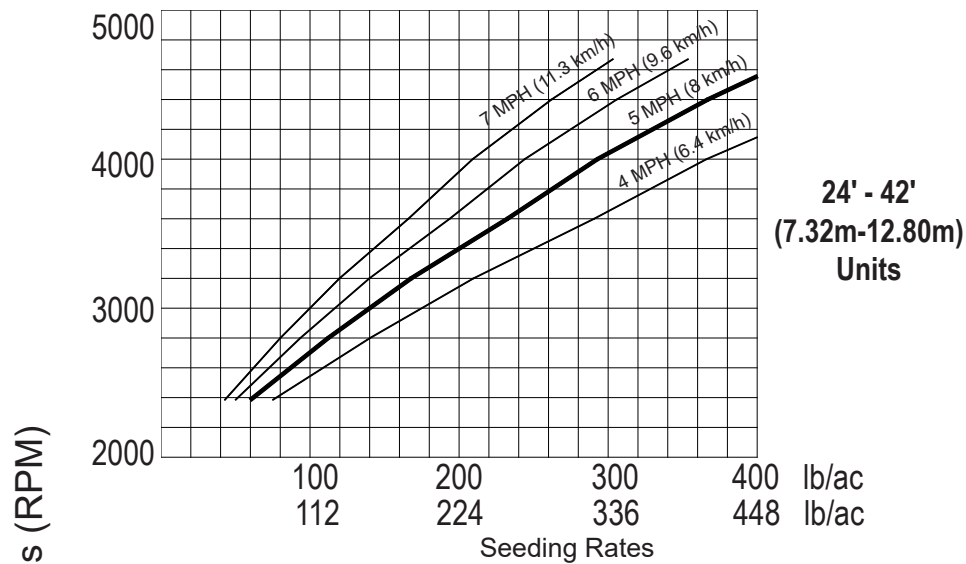
Important

For rates **below** 50 lbs/acre (56 kg/ha), a minimum fan speed of 2000 RPM is recommended.

5730 18'@9.8" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components



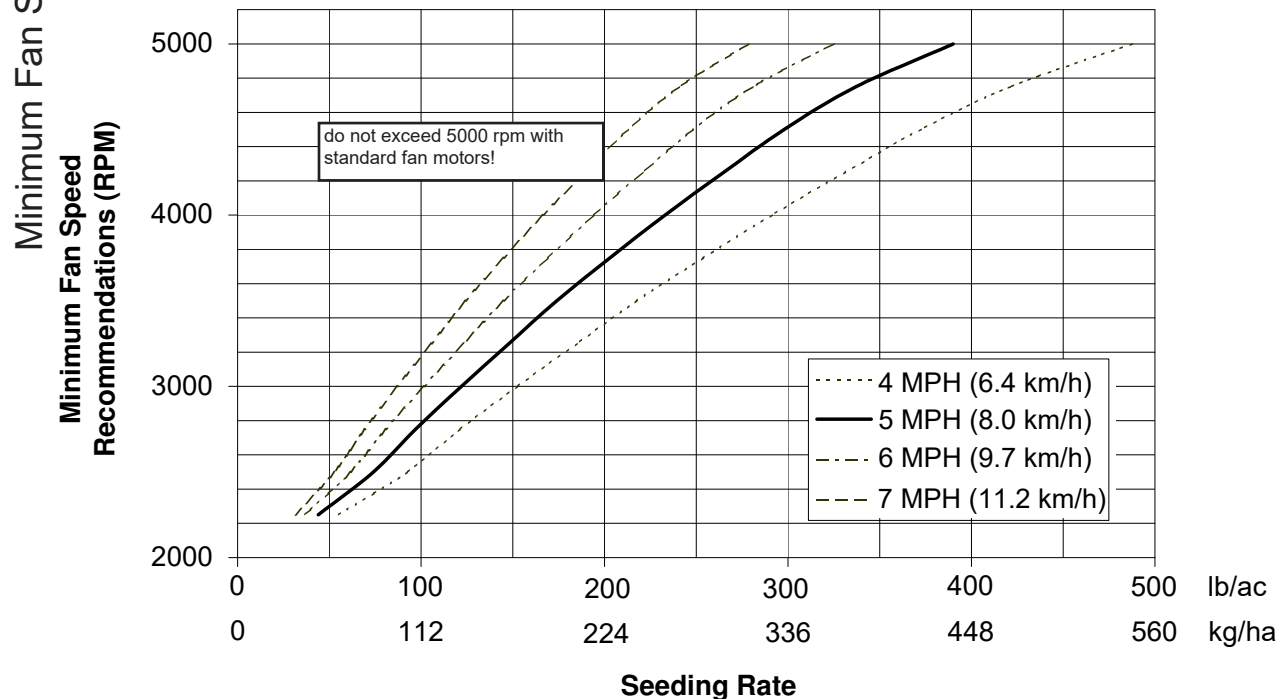
9400 28', 30', 32', 36' & 40'@12" Minimum Fan Speed
1" (25 mm) Tertiary Hose with Dimpled Components



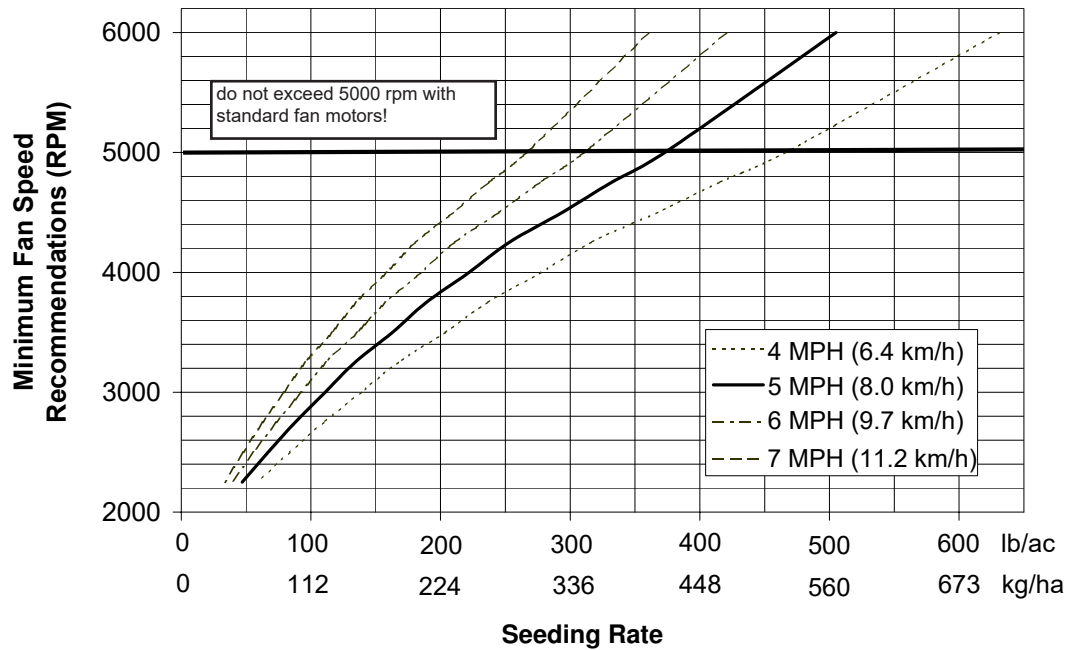
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2000 RPM is recommended.

9400 42'@12" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components



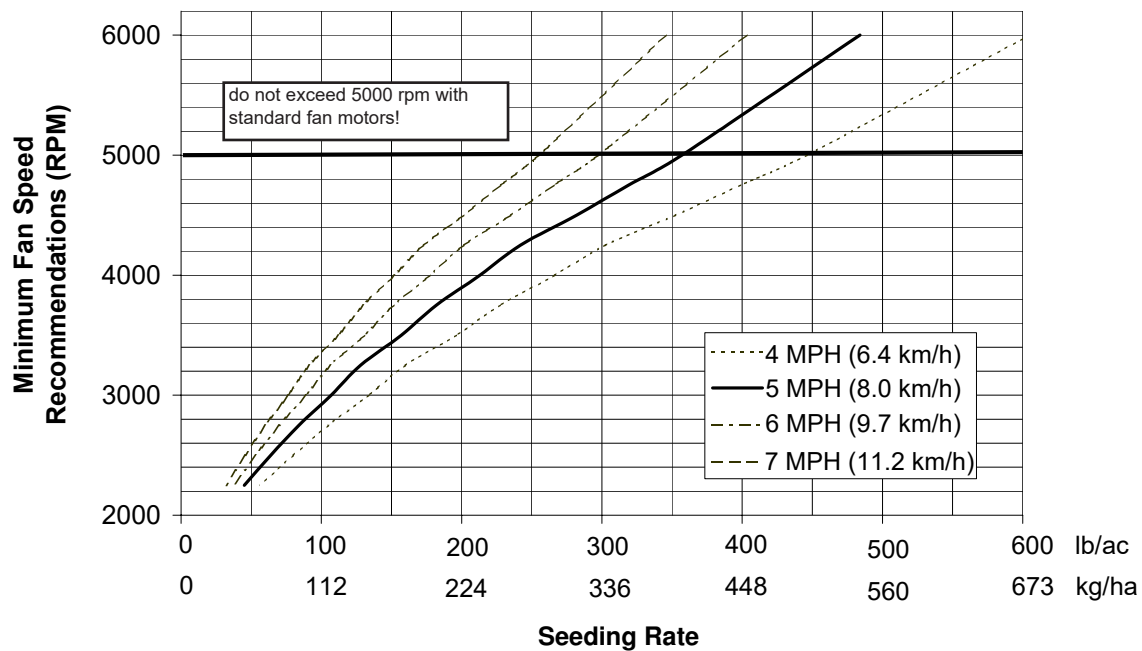
9400 48'@12" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components



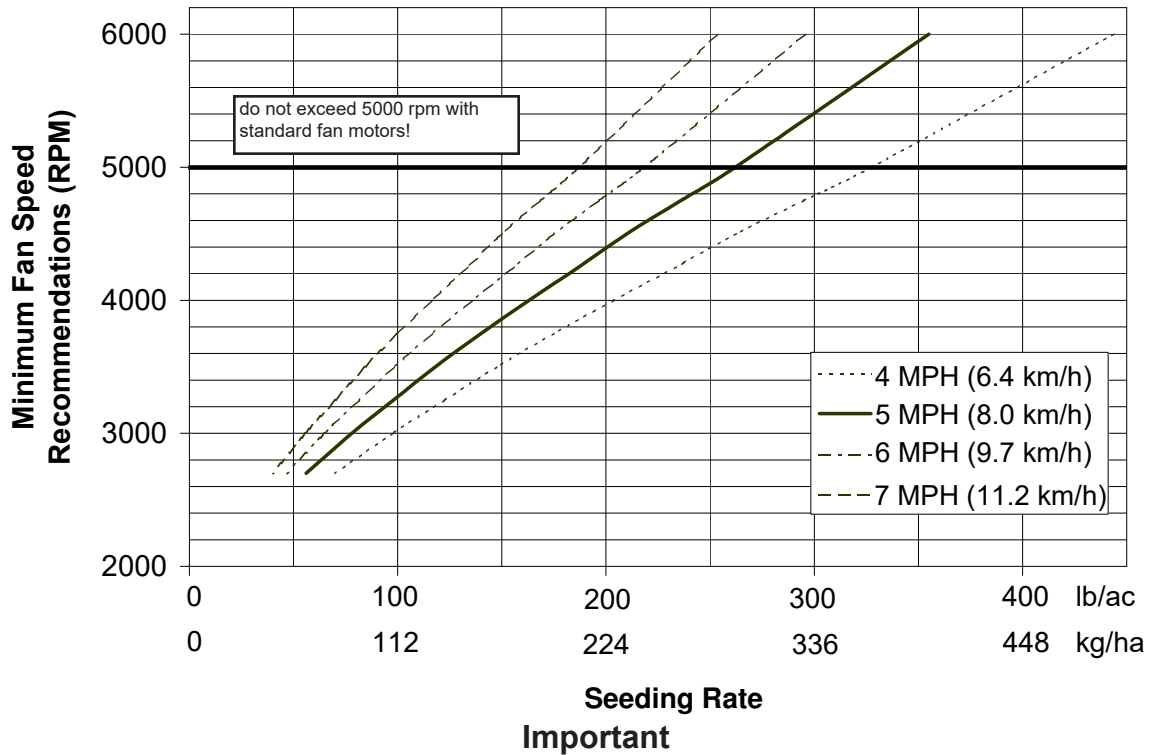
Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

9400 50'@12" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components

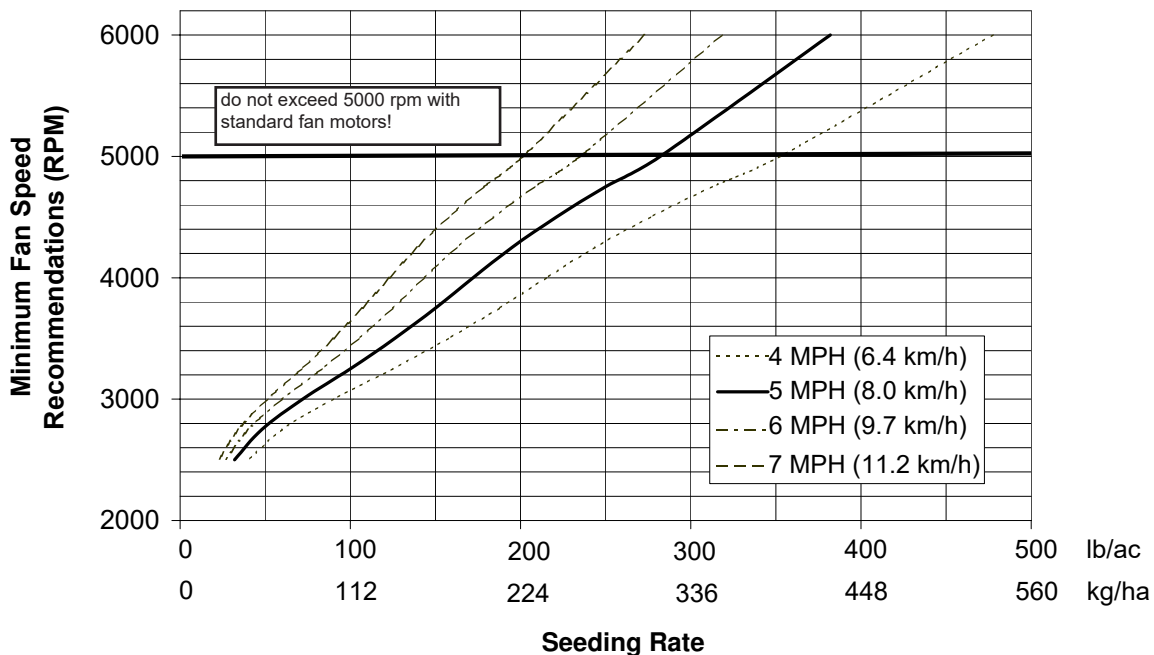


**9400 60'@12" Minimum Fan speed
7/8" (22 mm) Tertiary Hose with Dimpled Components**

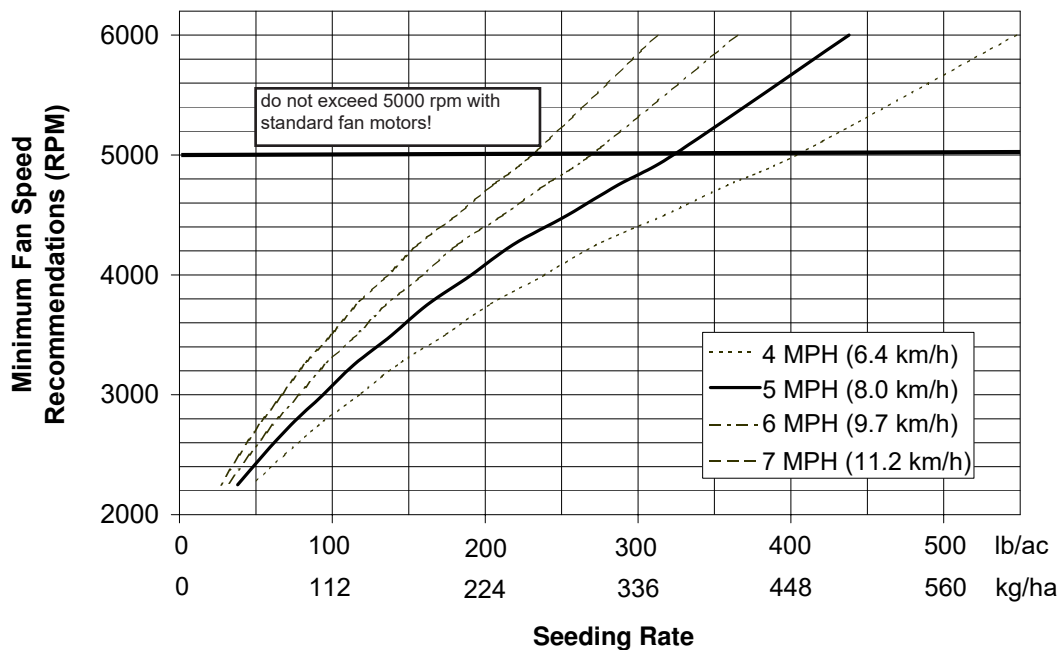


For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

**9400 60'@12" Minimum Fan speed
1" (25 mm) Tertiary Hose With Dimpled Components**



3310 55'@12" & 9400 54'@12" Minimum Fan Speed
1" (25 mm) Tertiary Hose With Dimpled Components

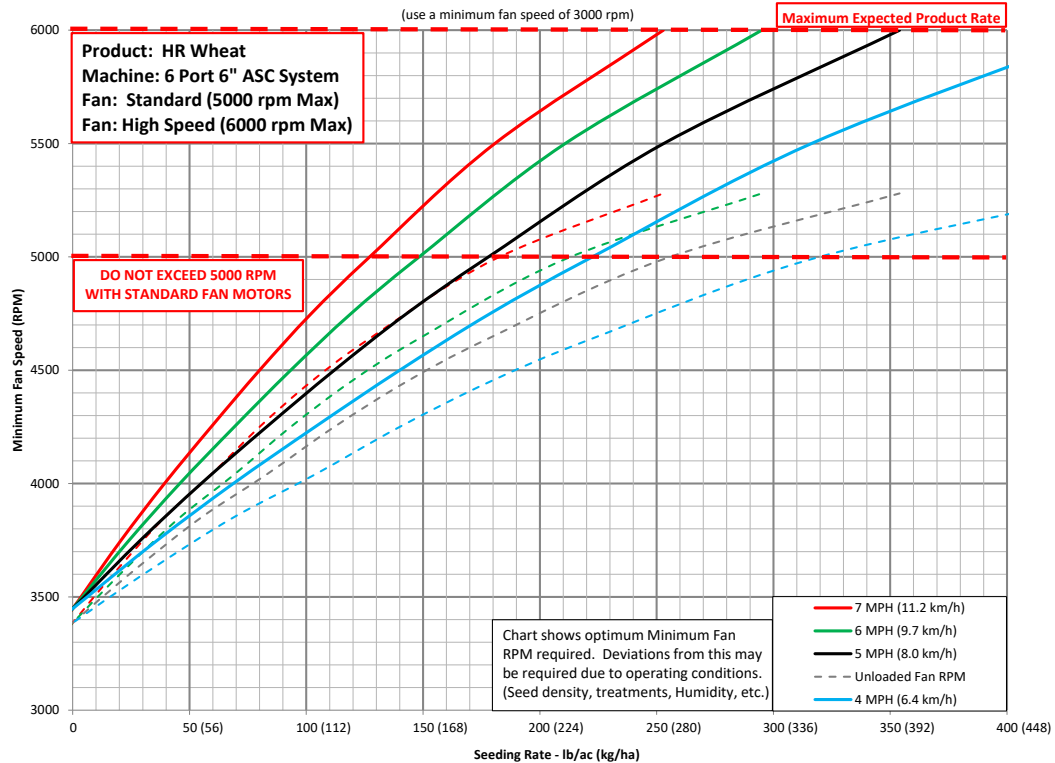


Important

For rates below 50 lbs/acre (56 kg/ha), a minimum fan speed of 2500 RPM is recommended.

3 Model 3xxx Charts - With ASC (Air Seeder Sectional Control)

Chart 17A



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.

Chart 17B

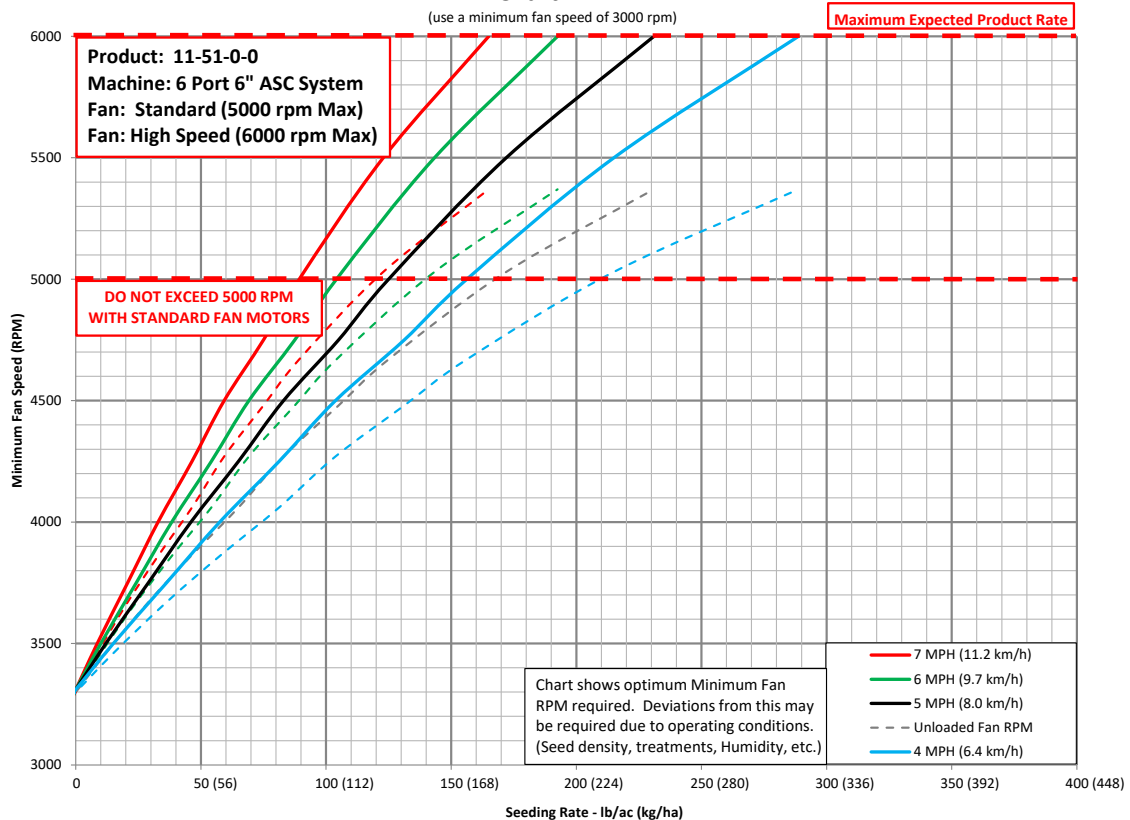
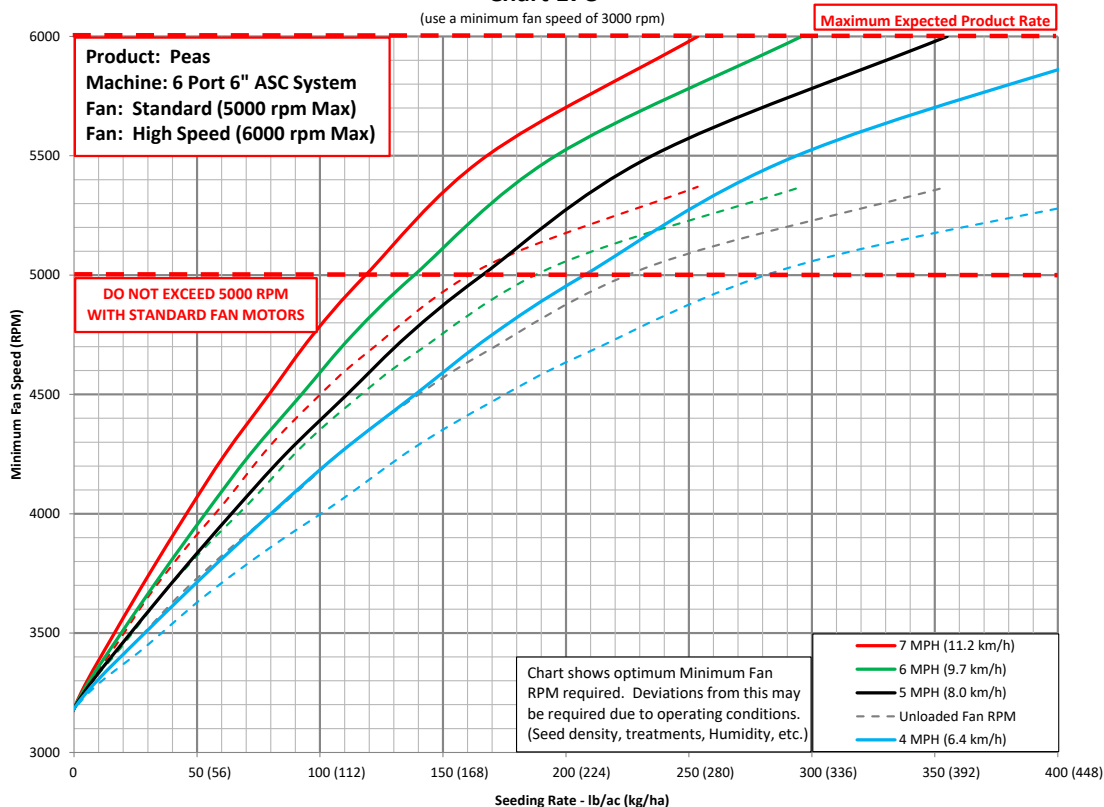
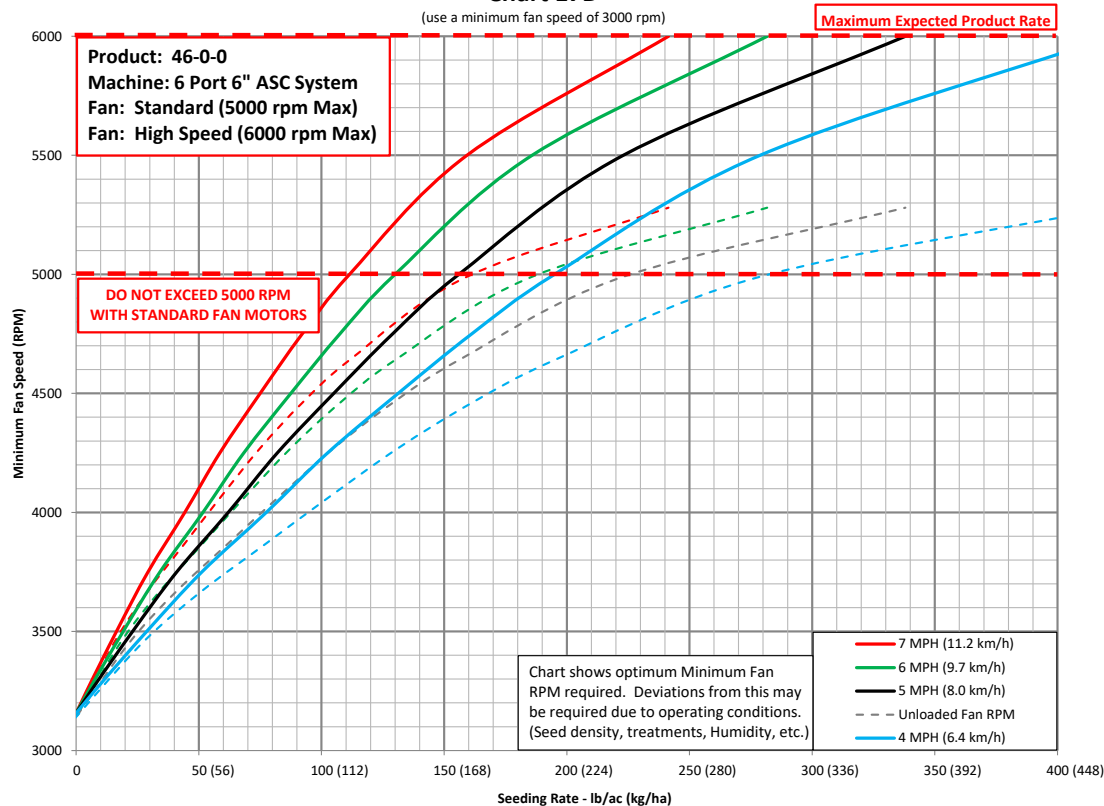


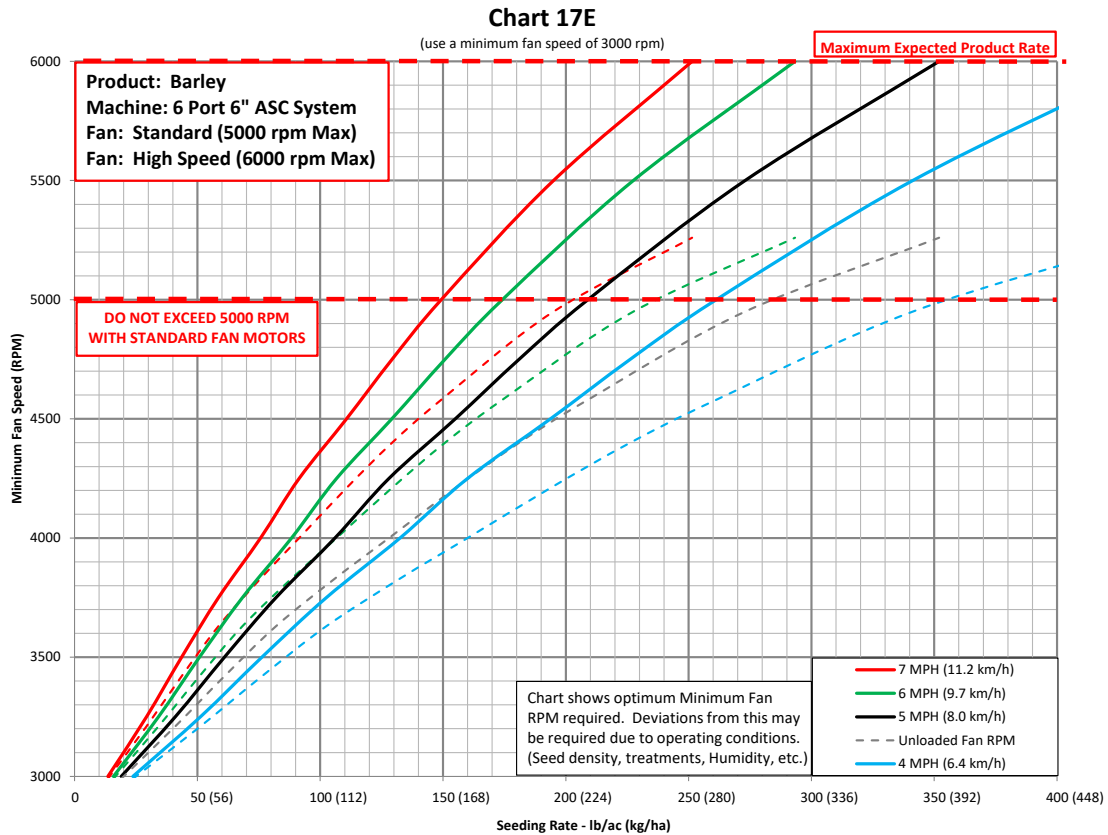
Chart 17C



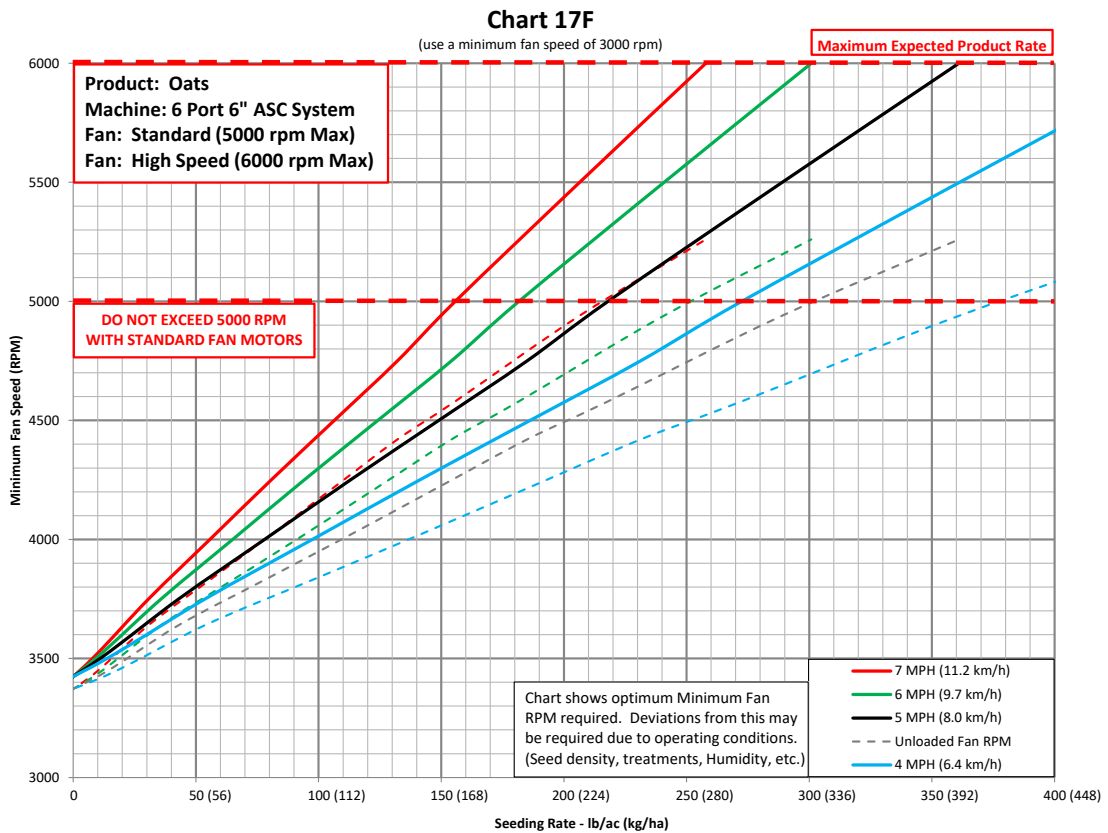
Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.

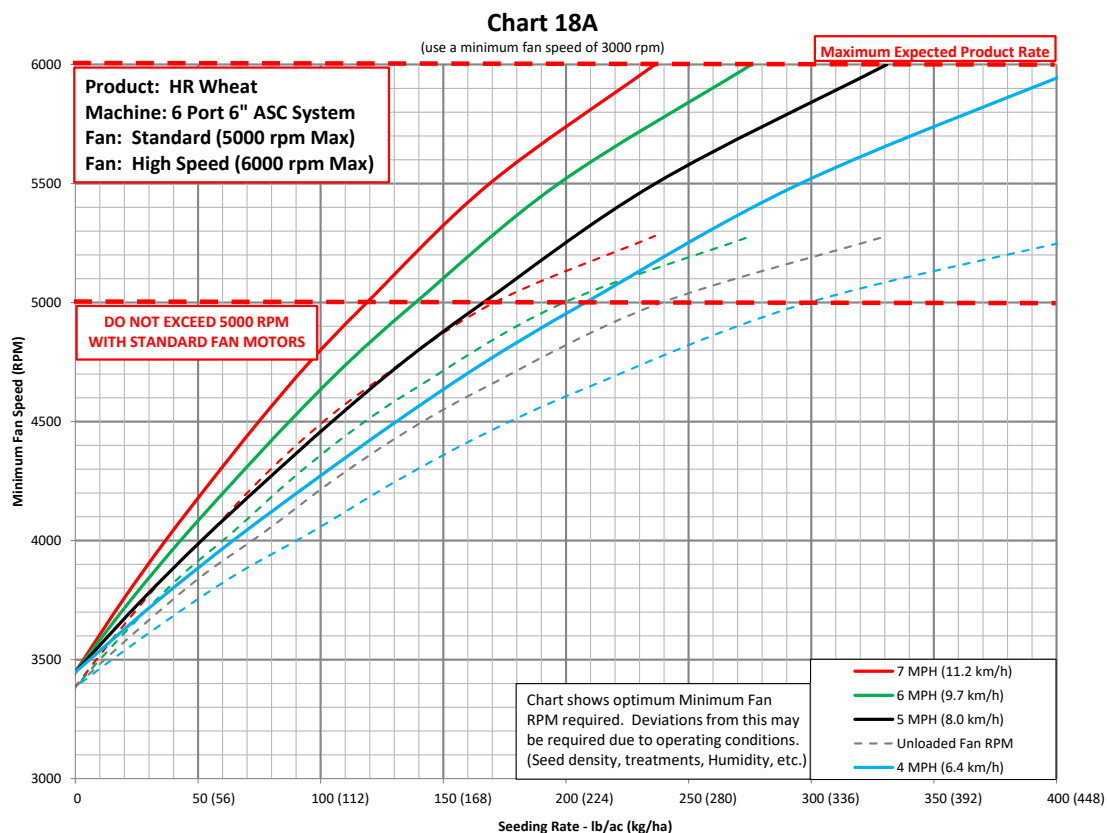
Chart 17D



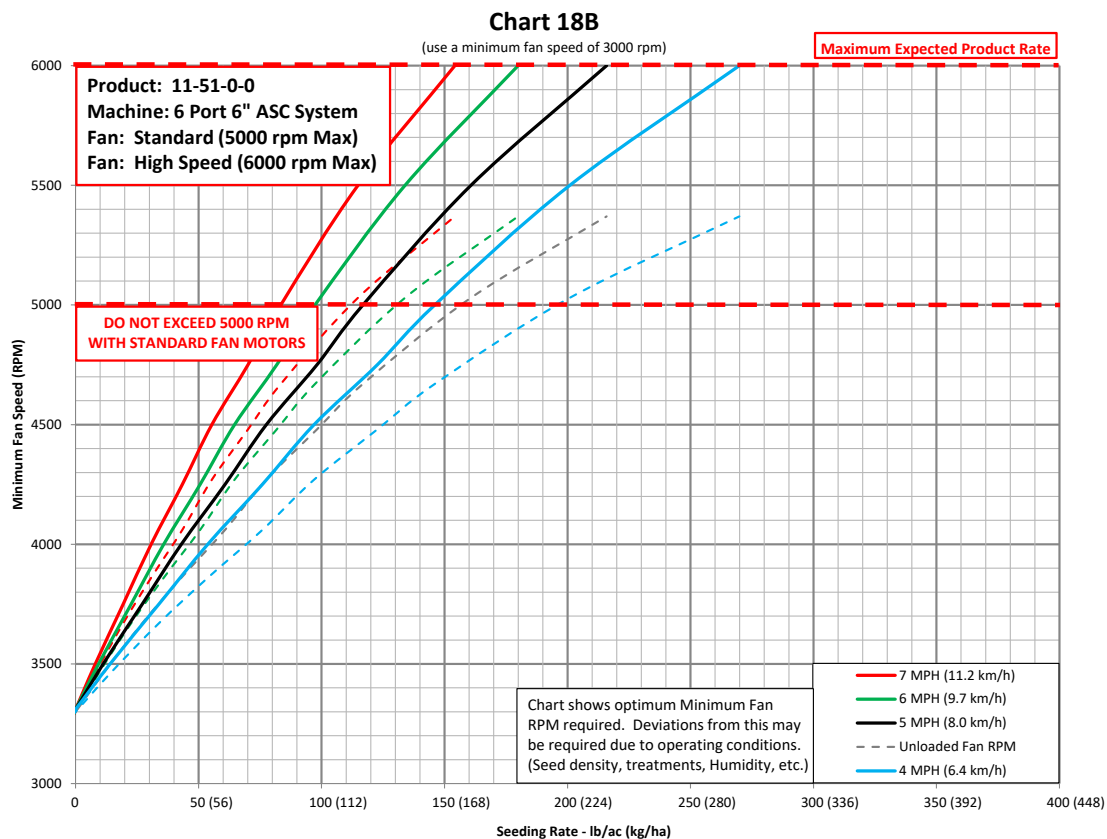


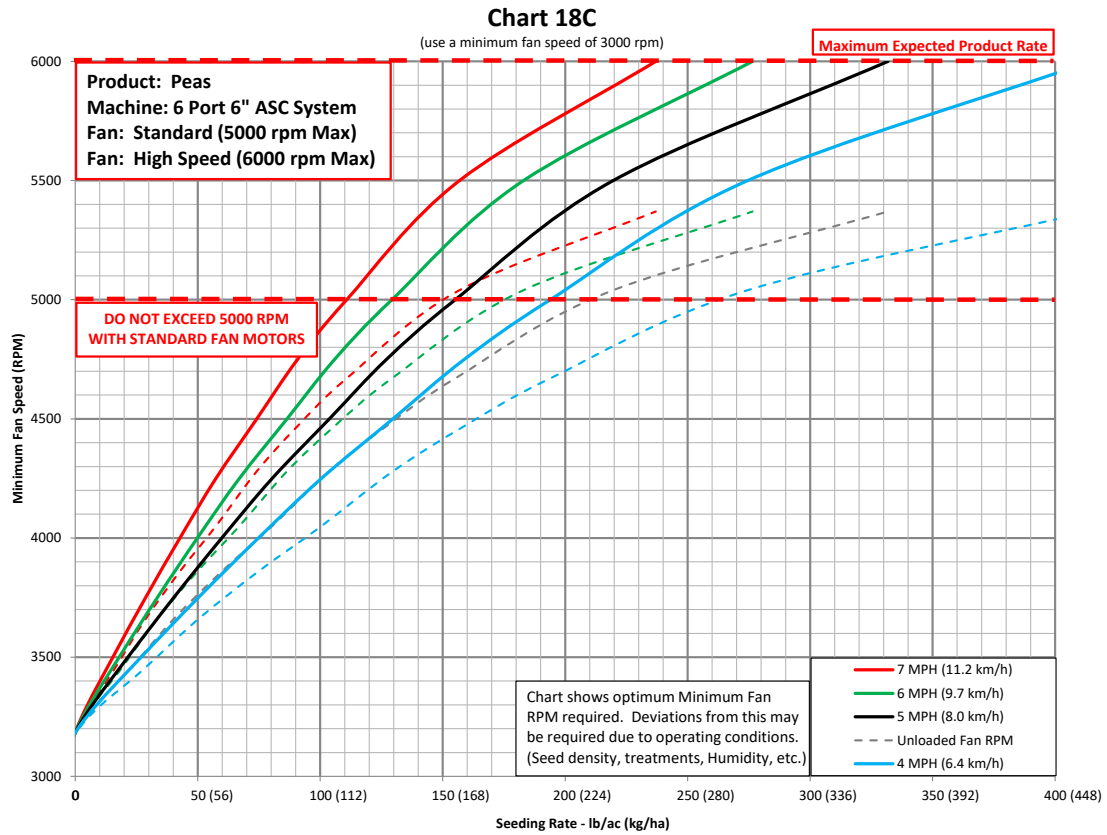
Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.





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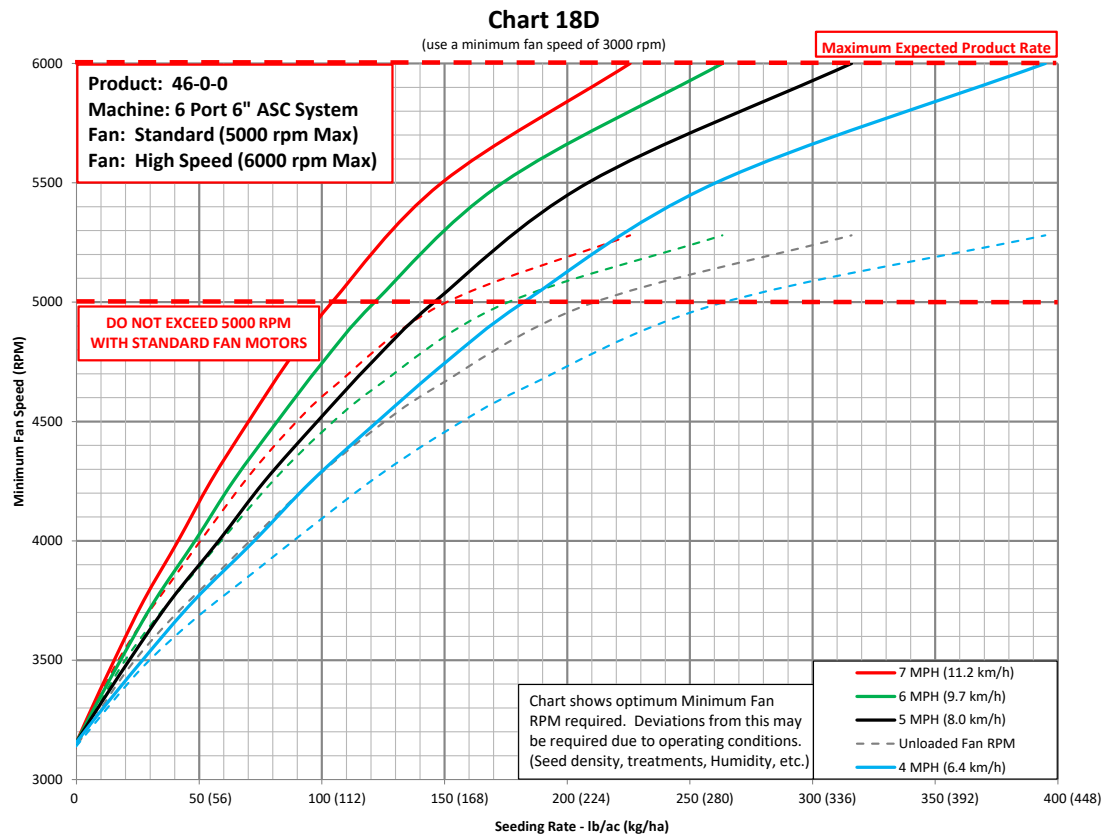
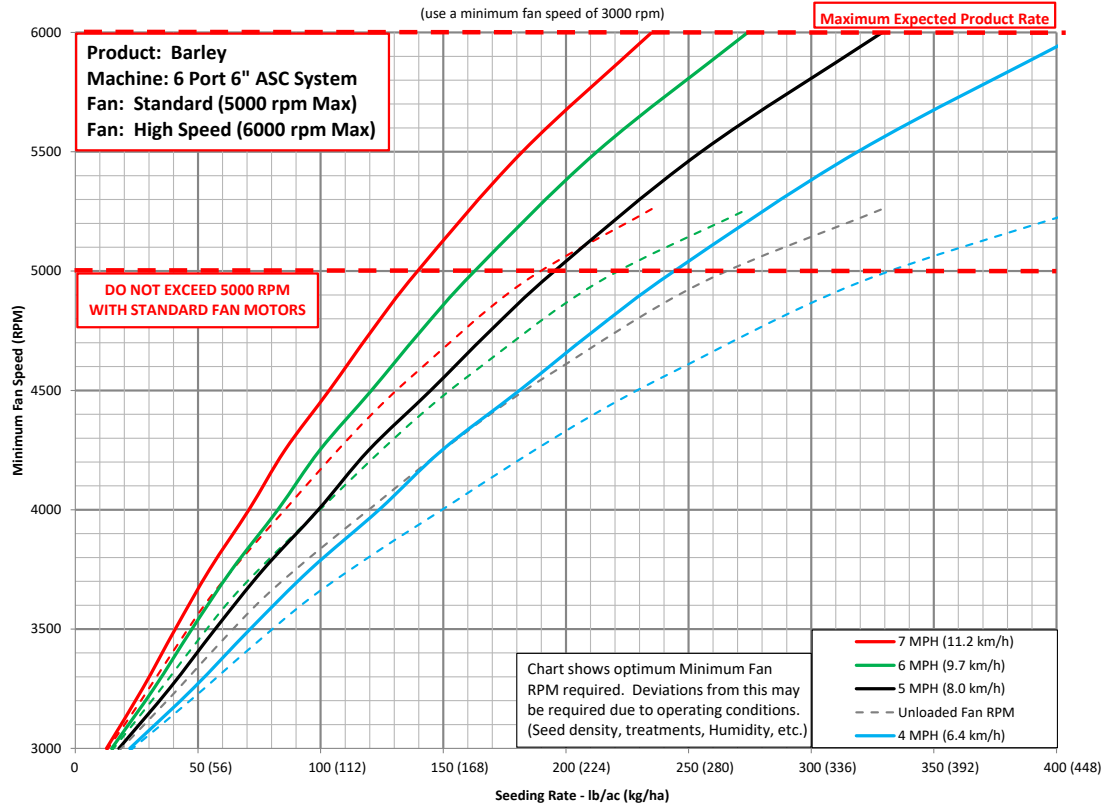
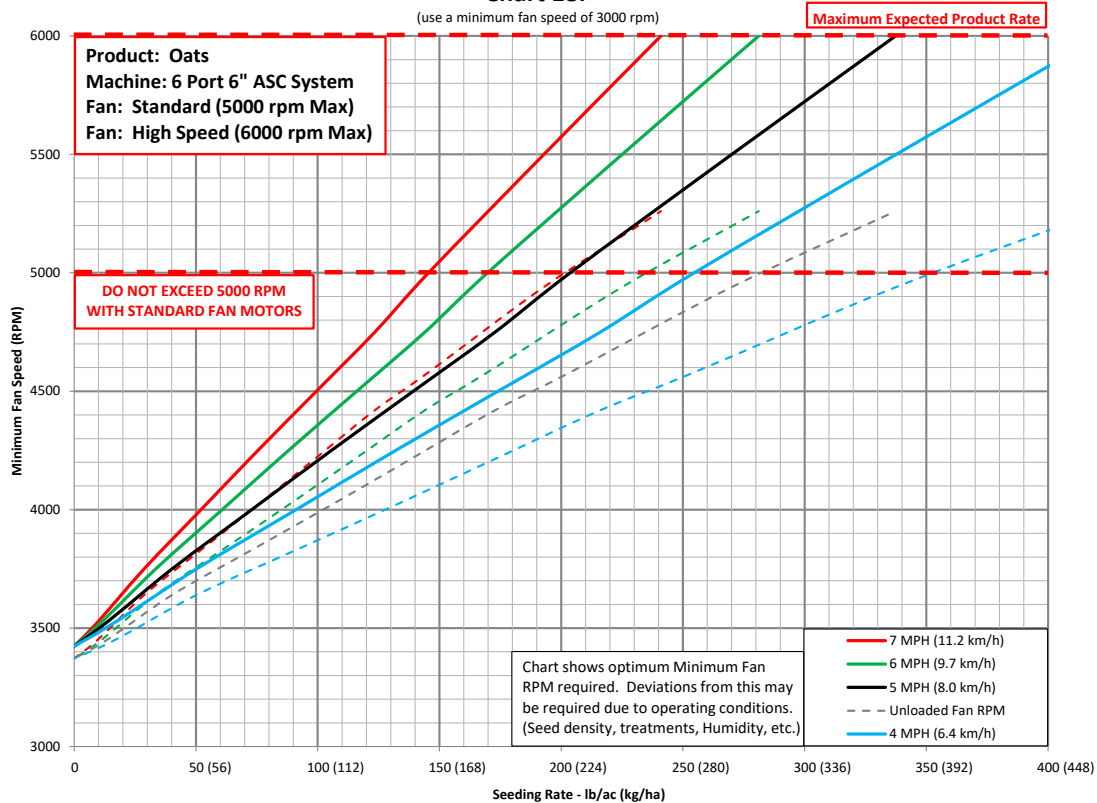


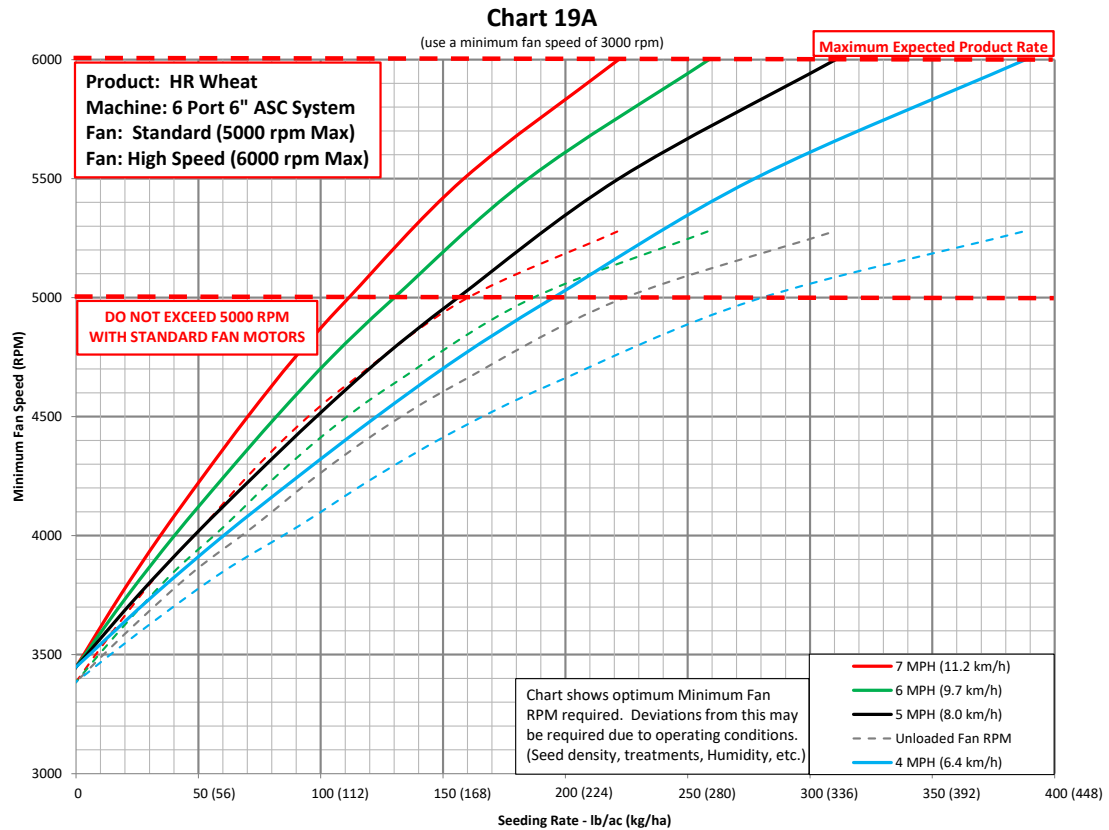
Chart 18E



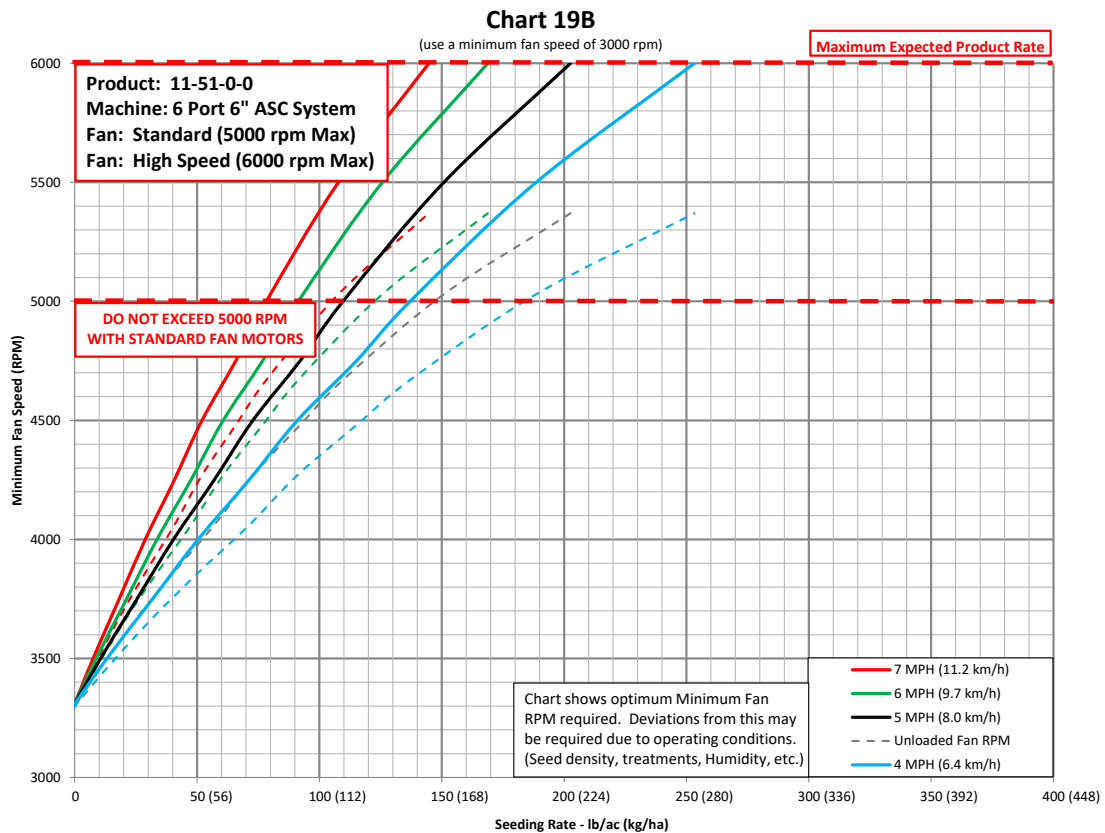
Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.

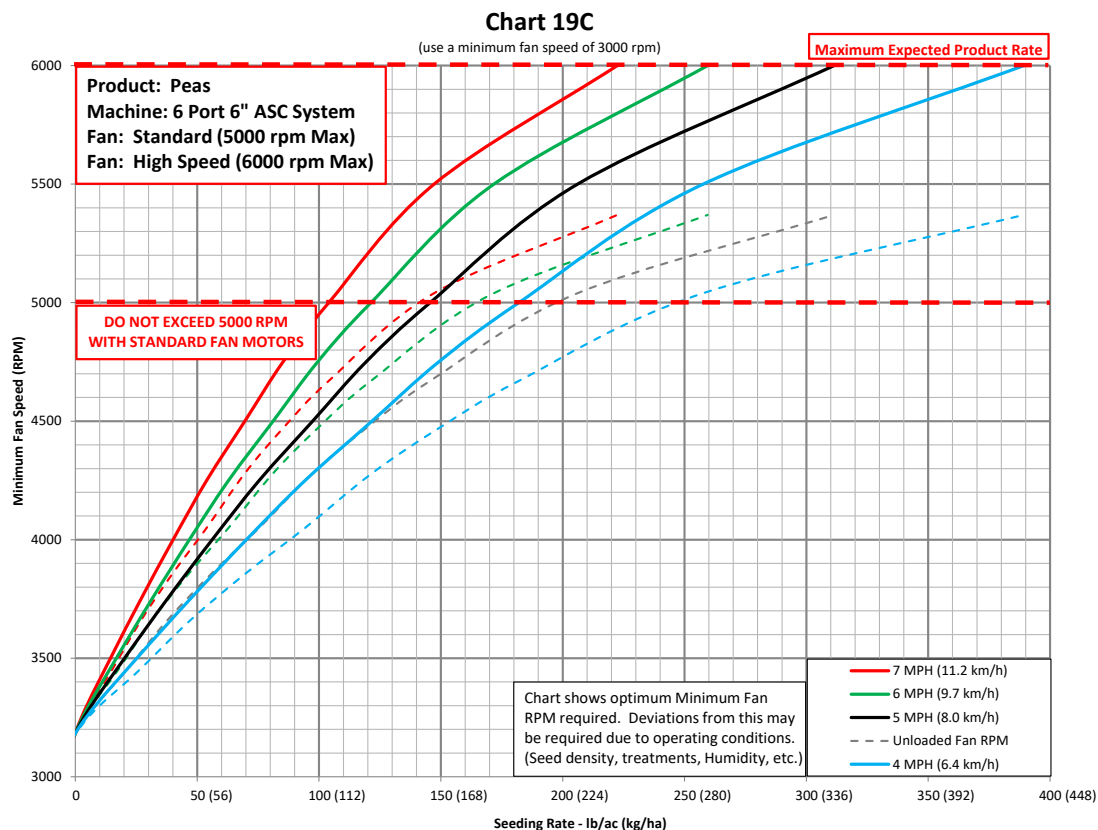
Chart 18F



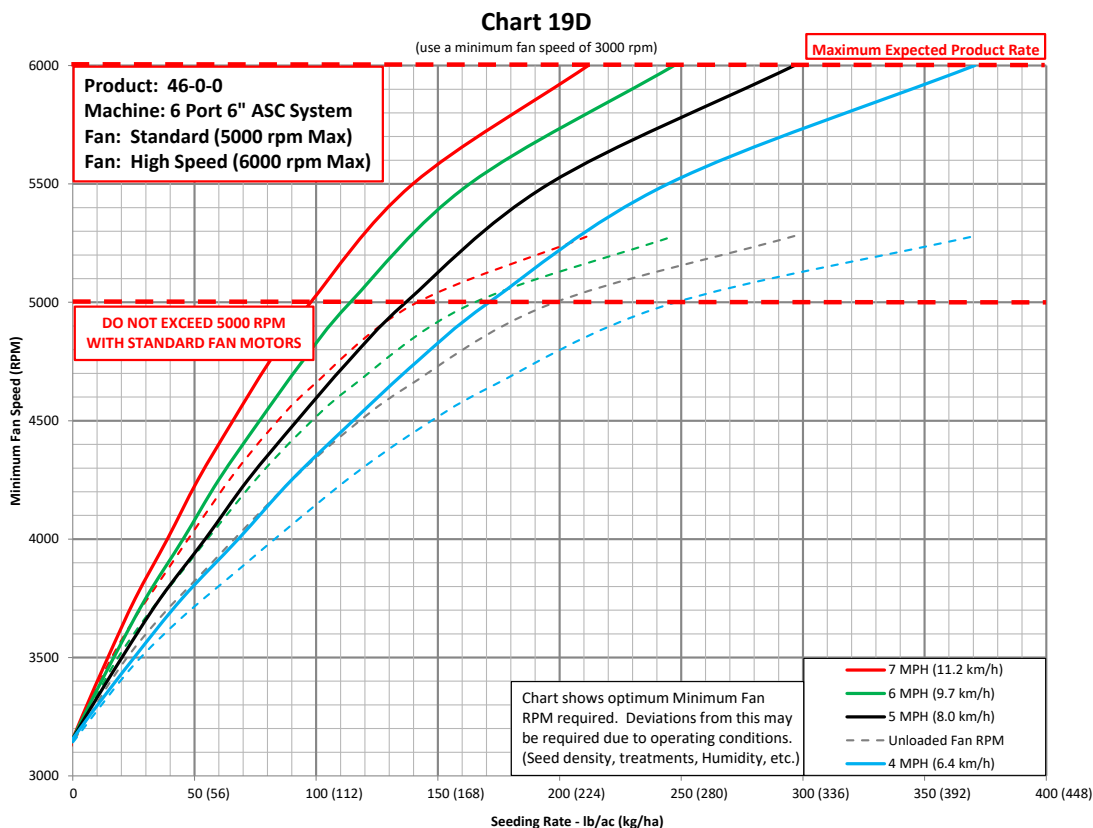


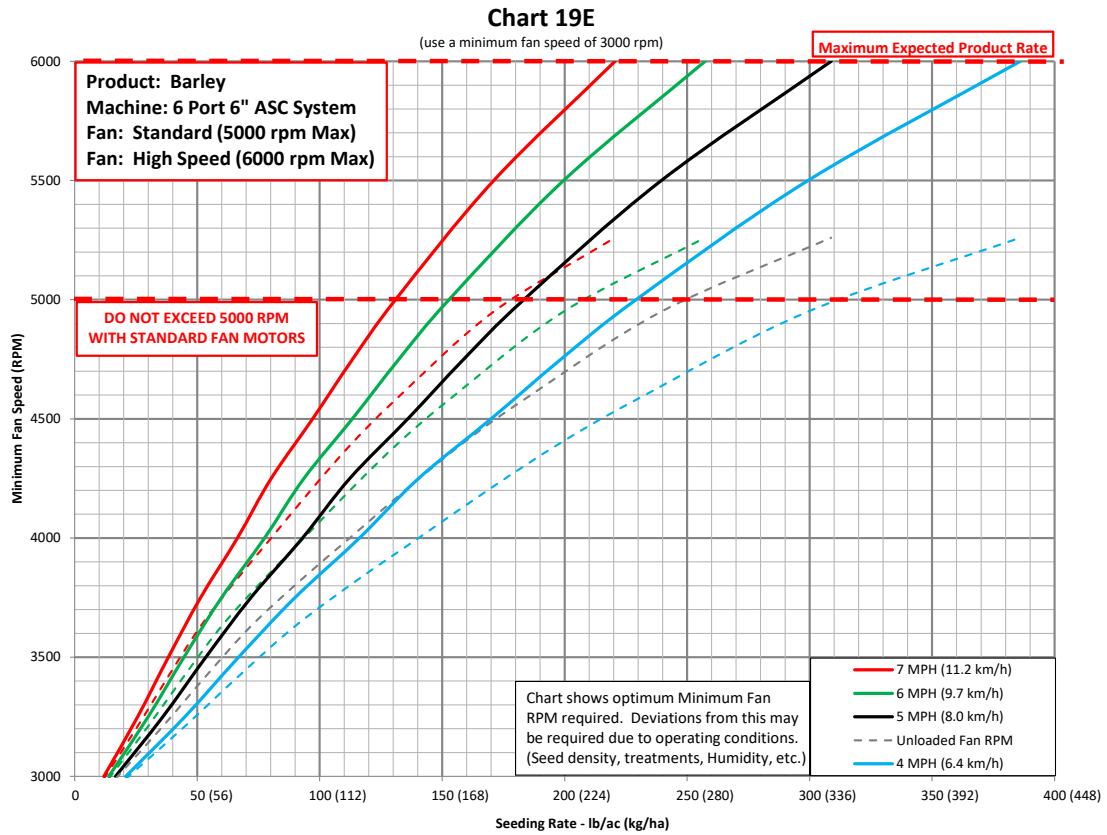
Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.



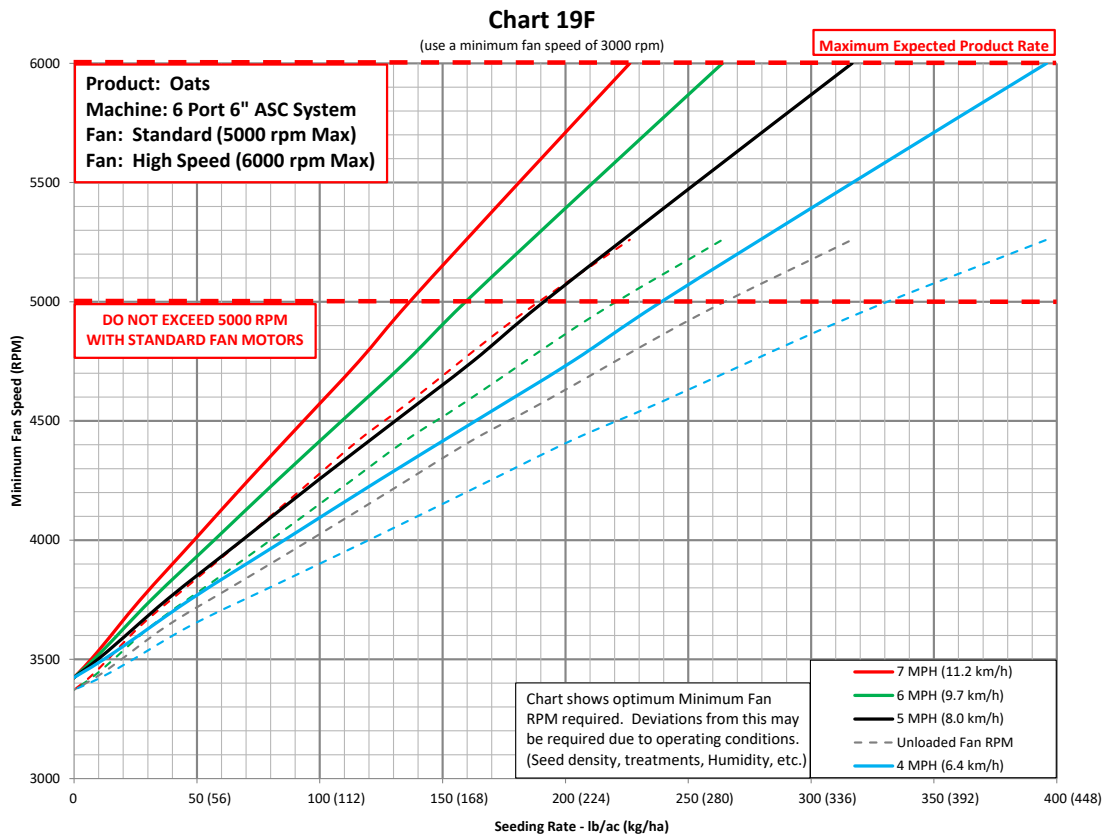


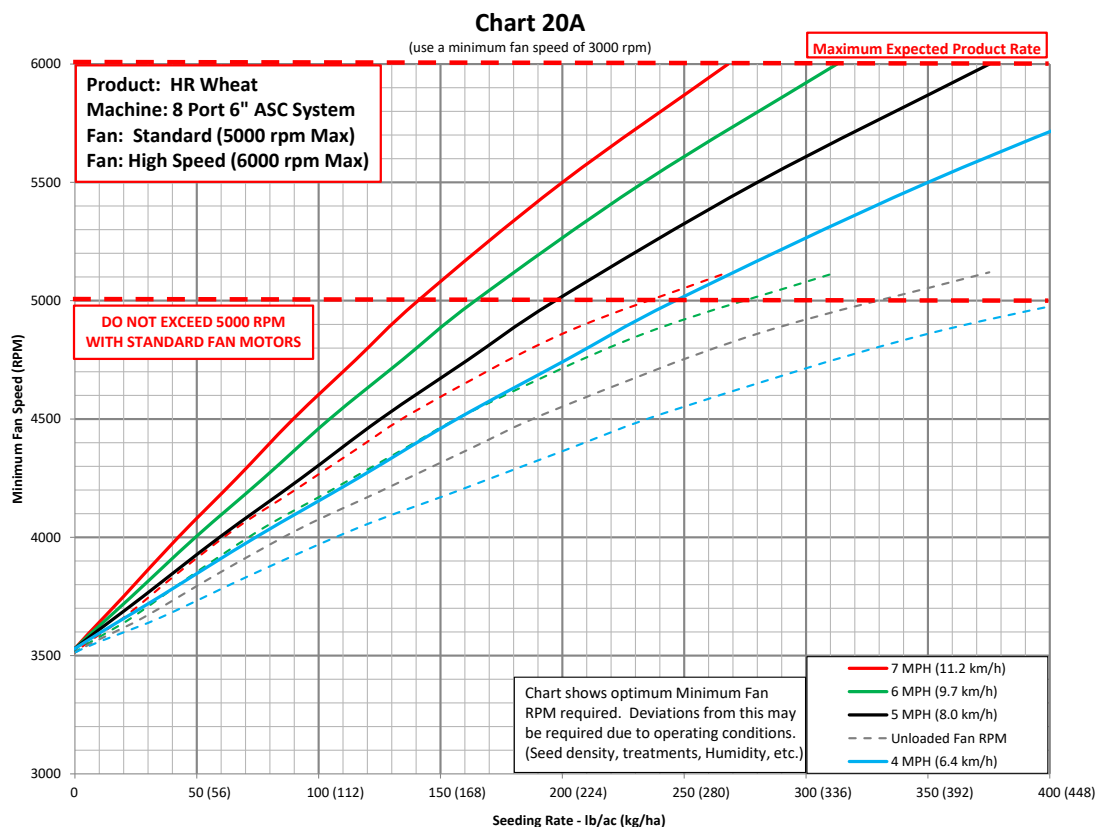
Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.



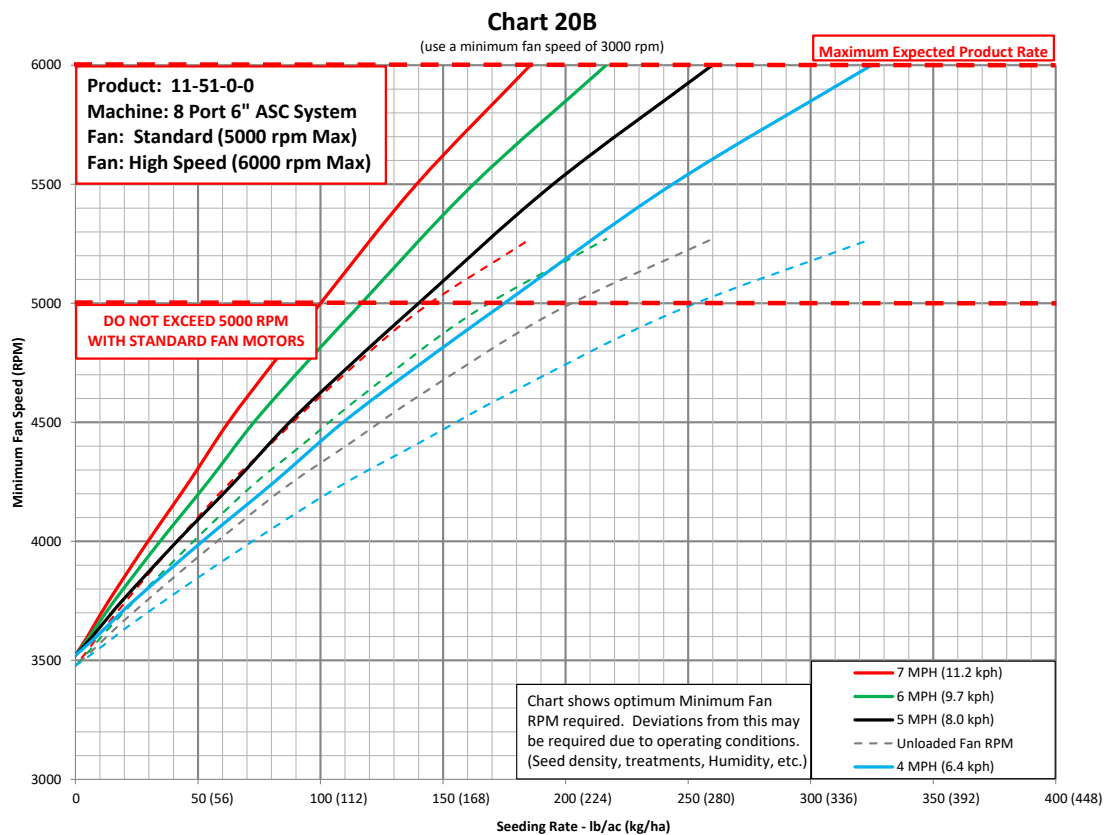


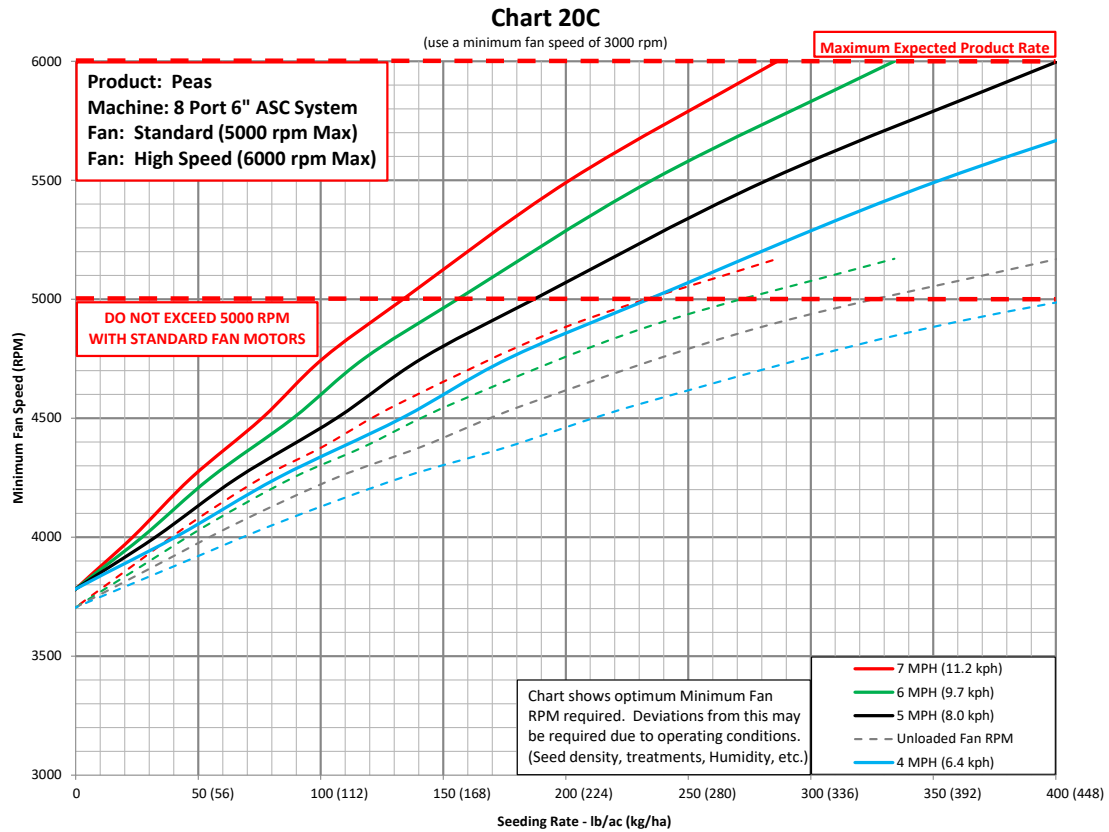
Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.





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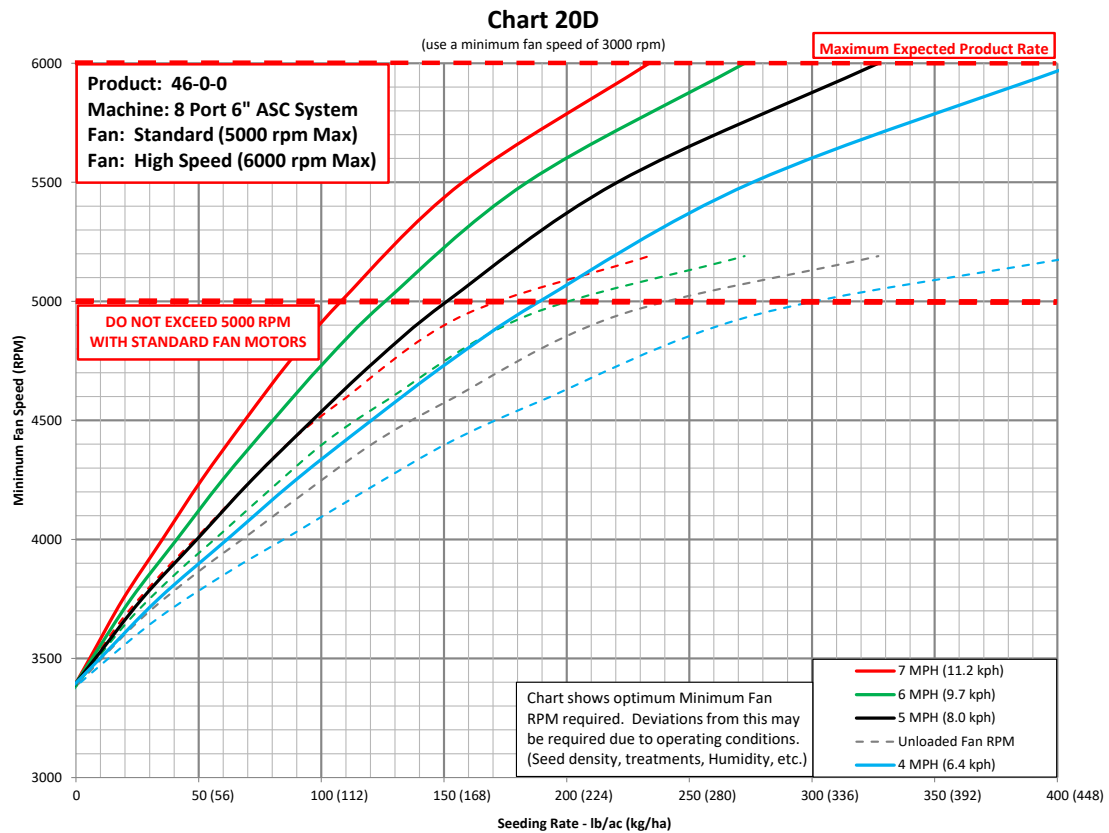
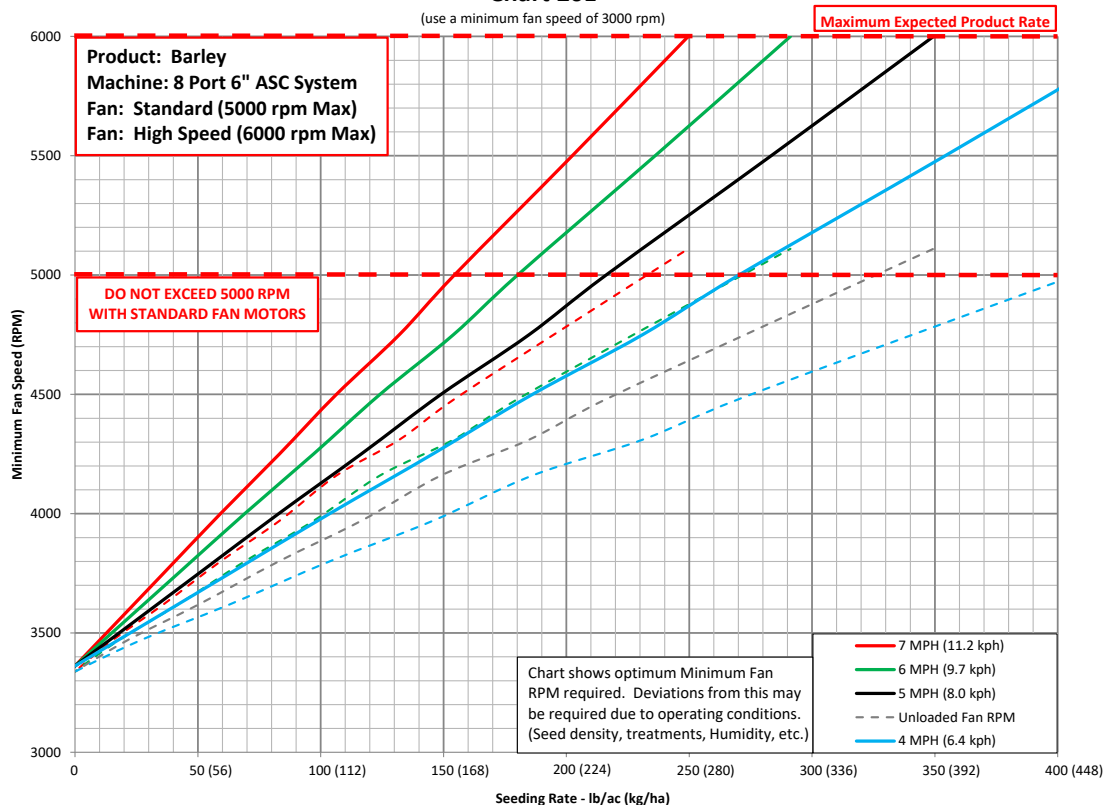


Chart 20E



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.

Chart 20F

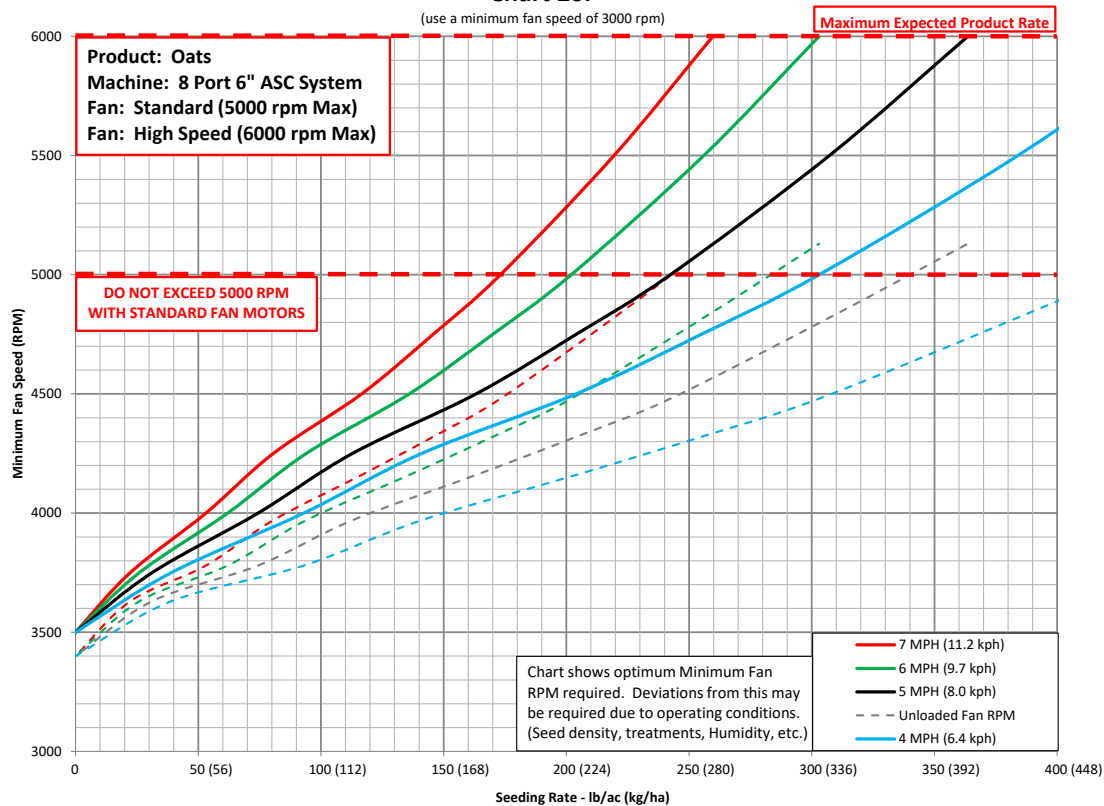
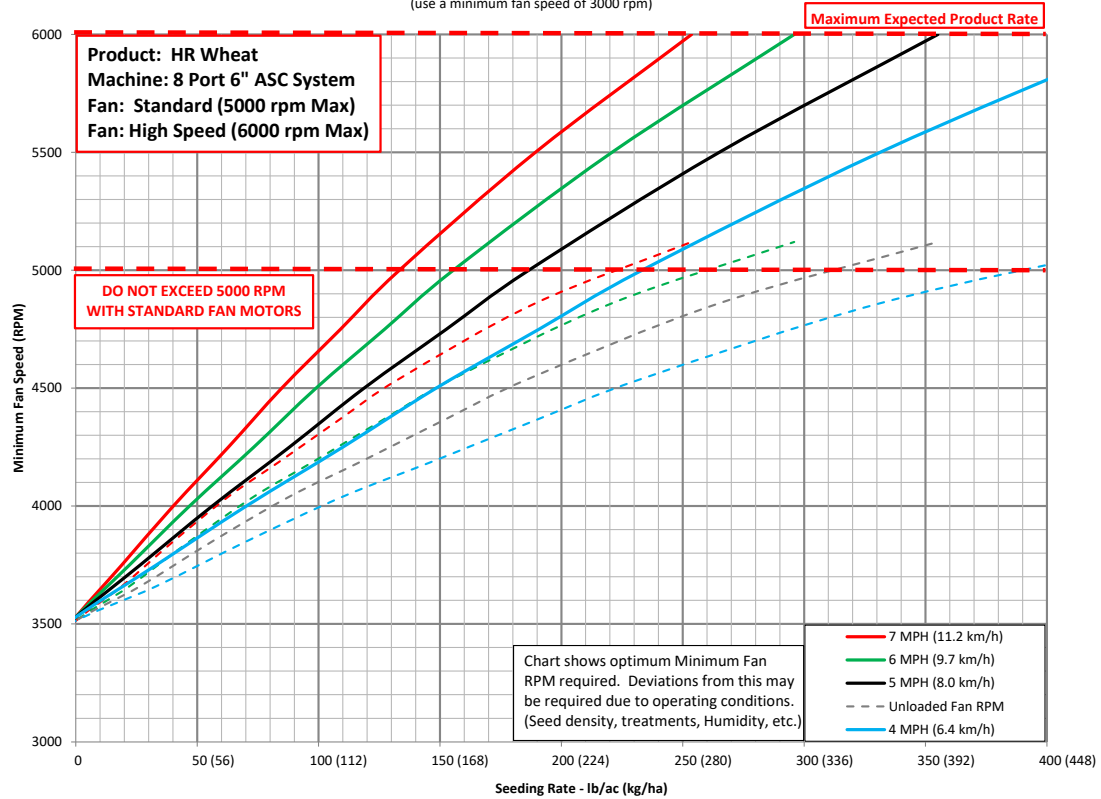


Chart 21A

(use a minimum fan speed of 3000 rpm)



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.

Chart 21B

(use a minimum fan speed of 3000 rpm)

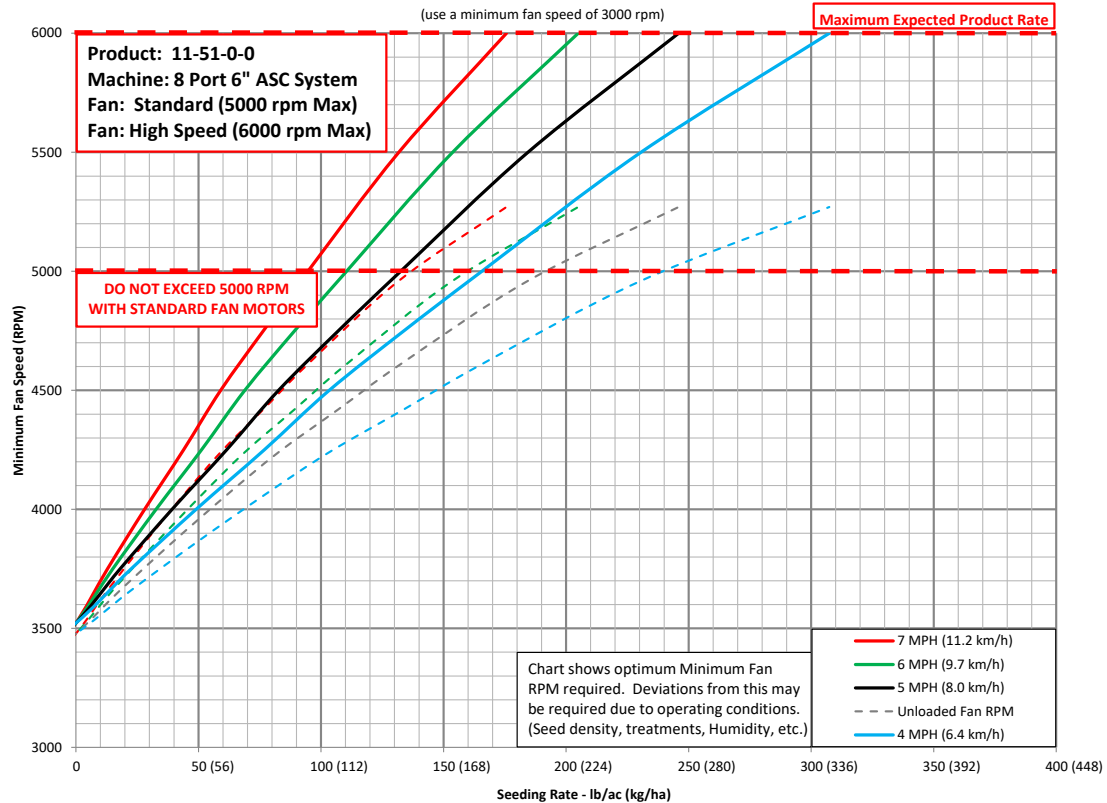
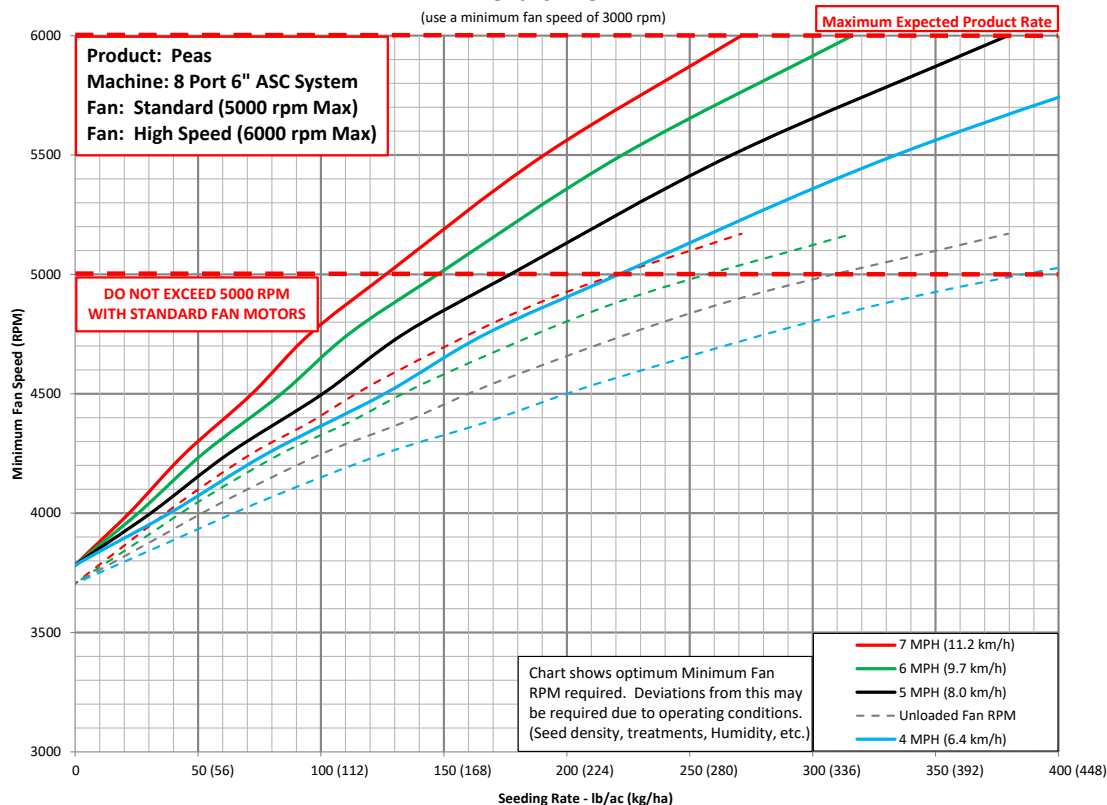
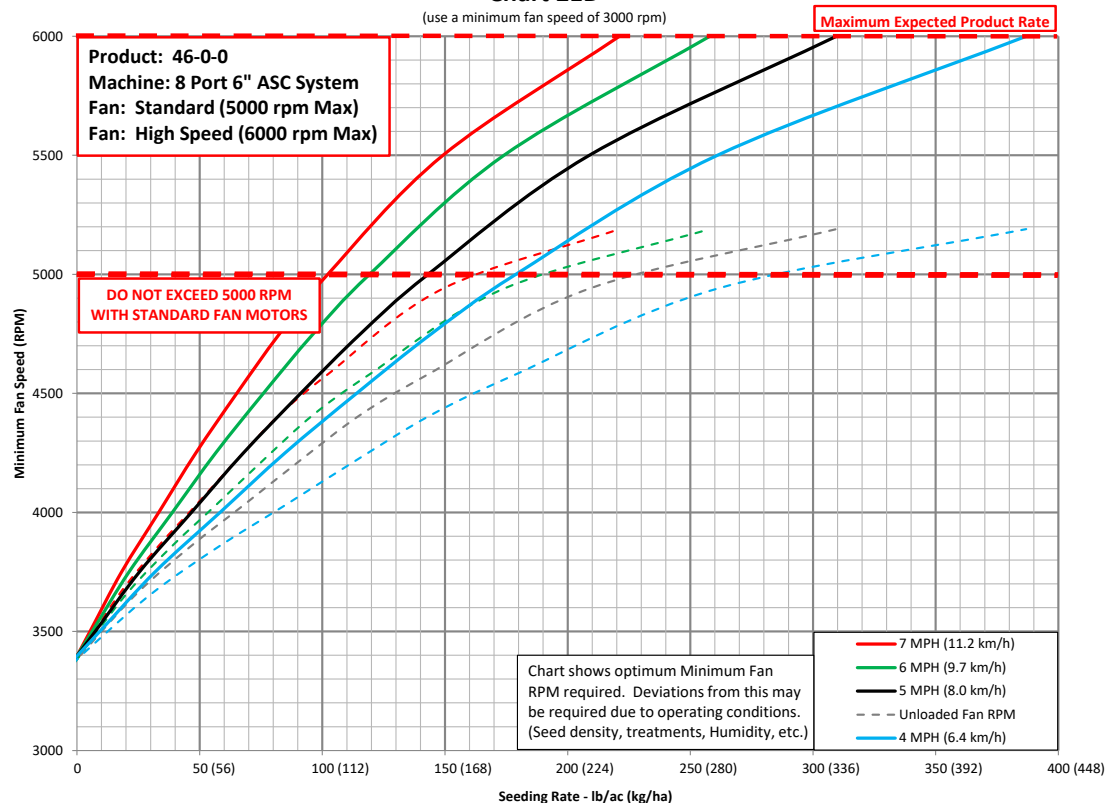


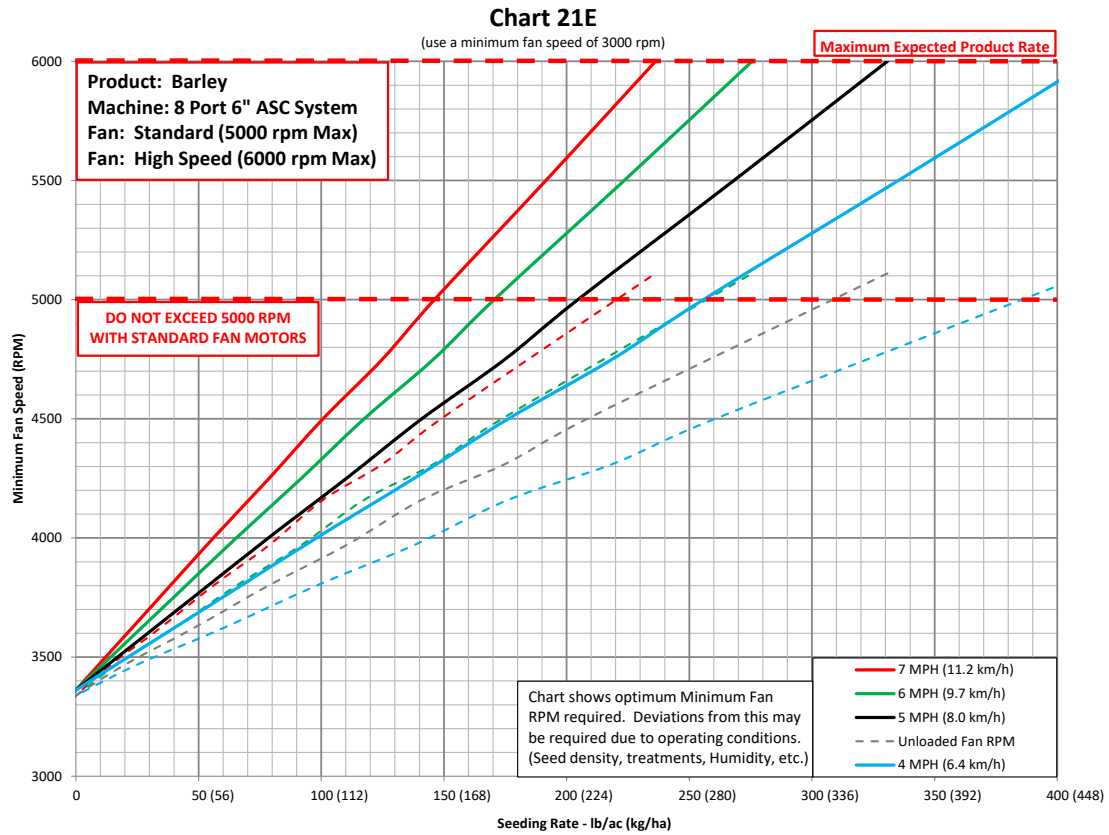
Chart 21C



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.

Chart 21D





Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.

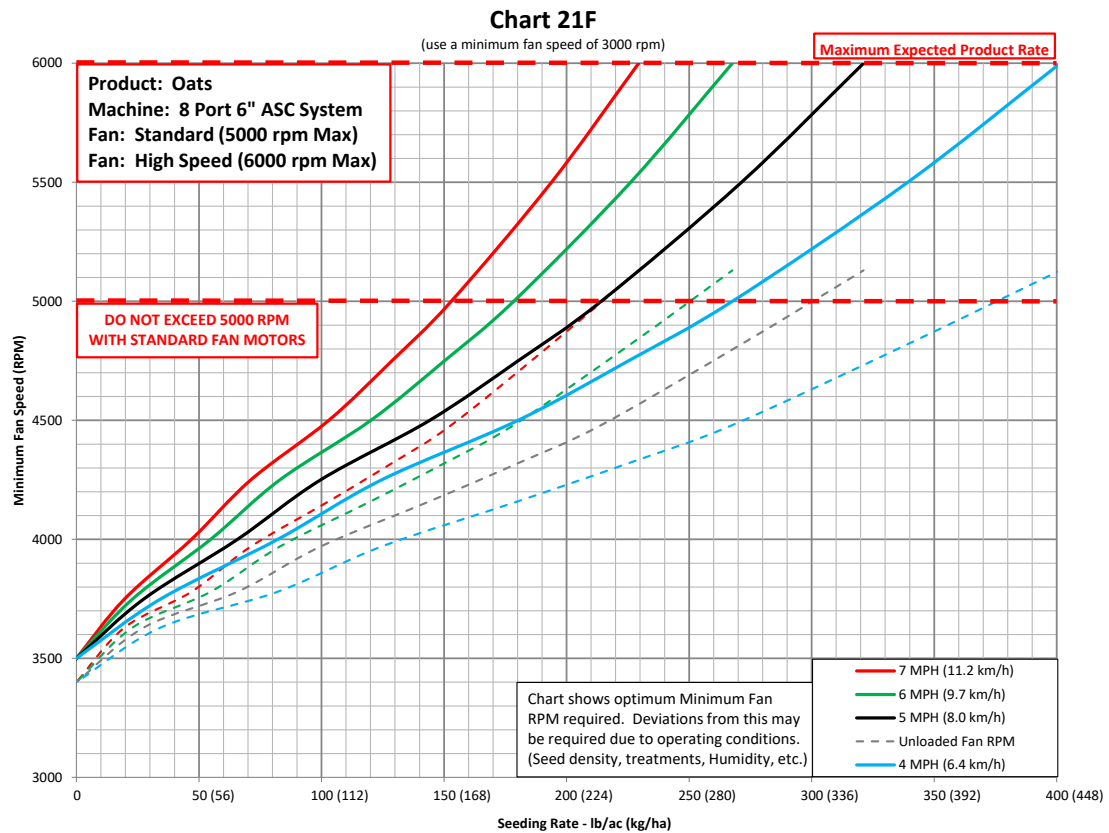
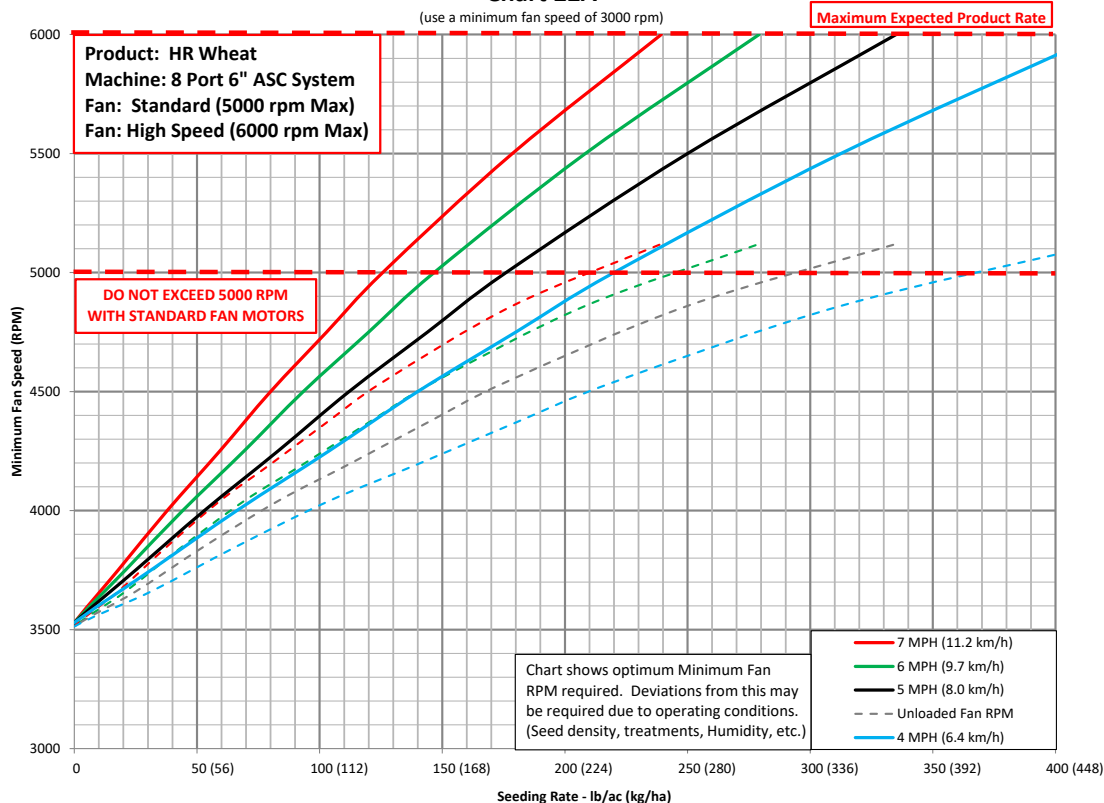
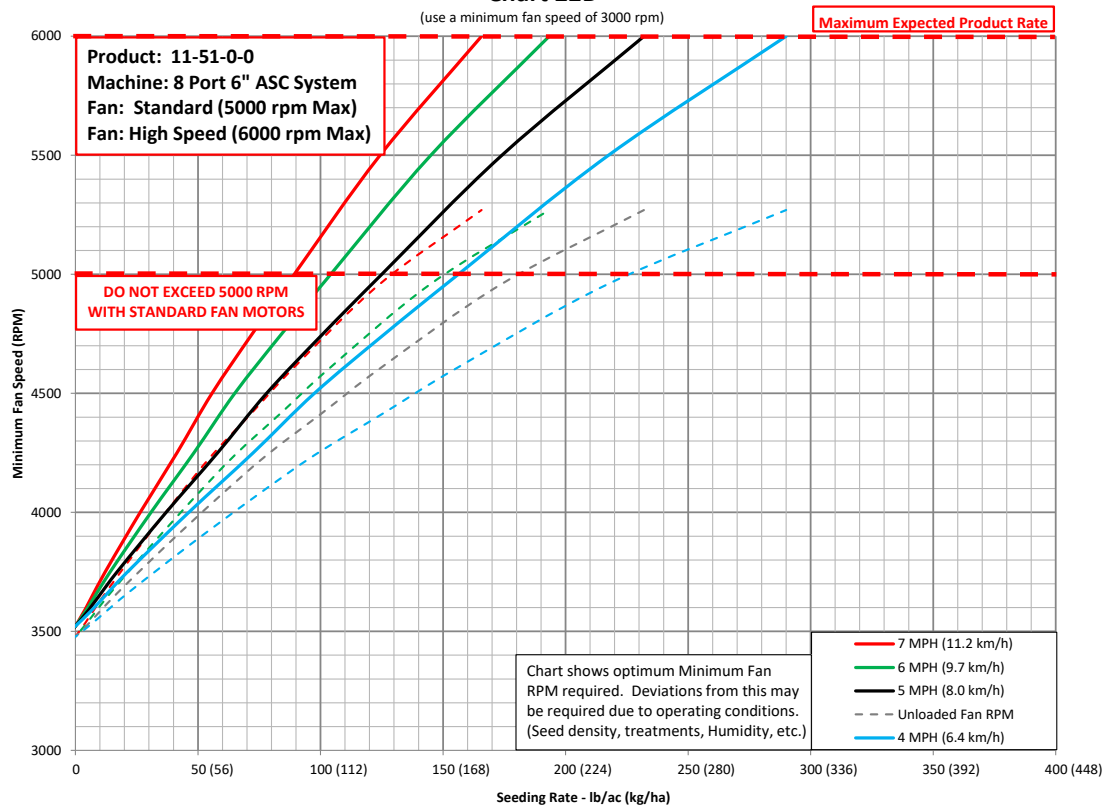


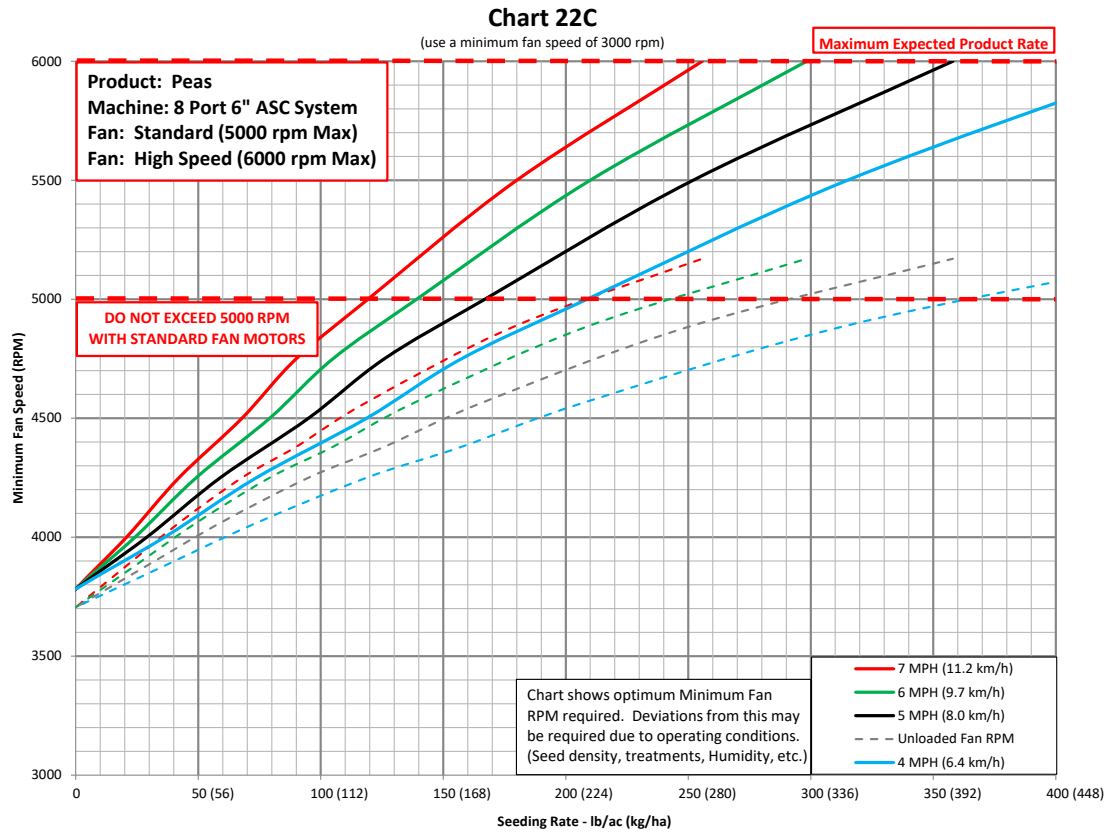
Chart 22A



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.

Chart 22B





Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.

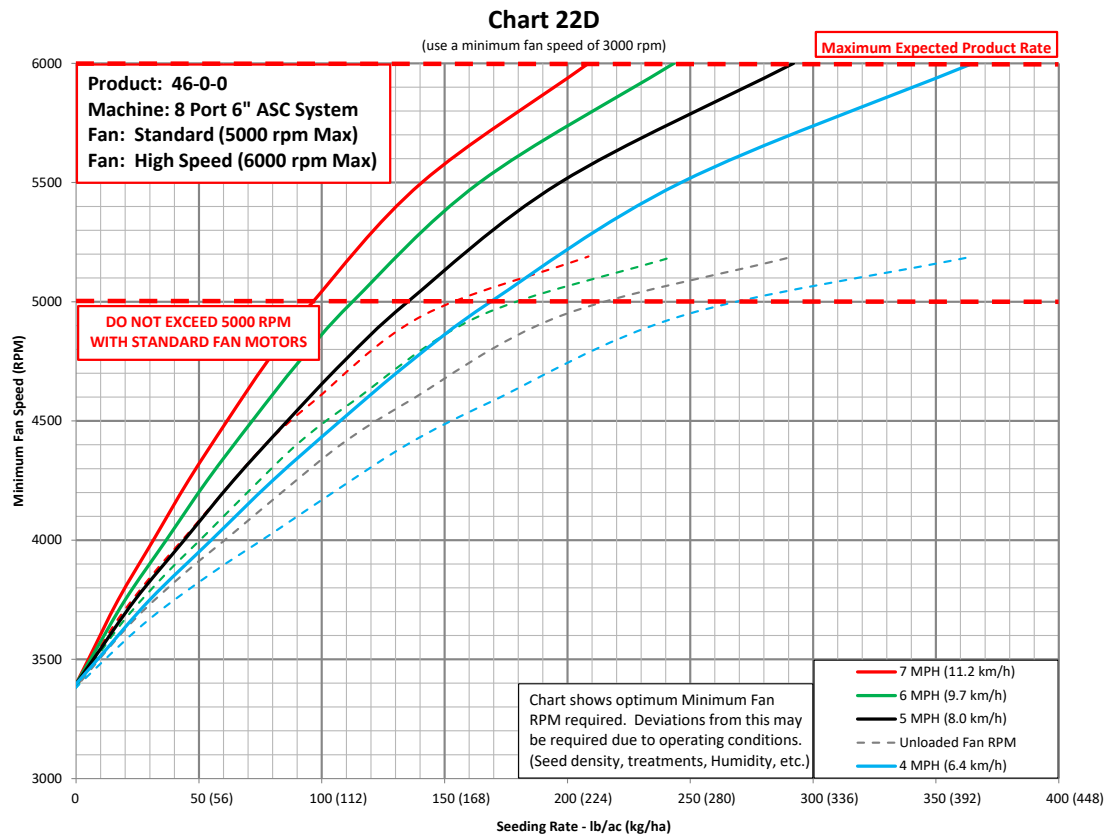
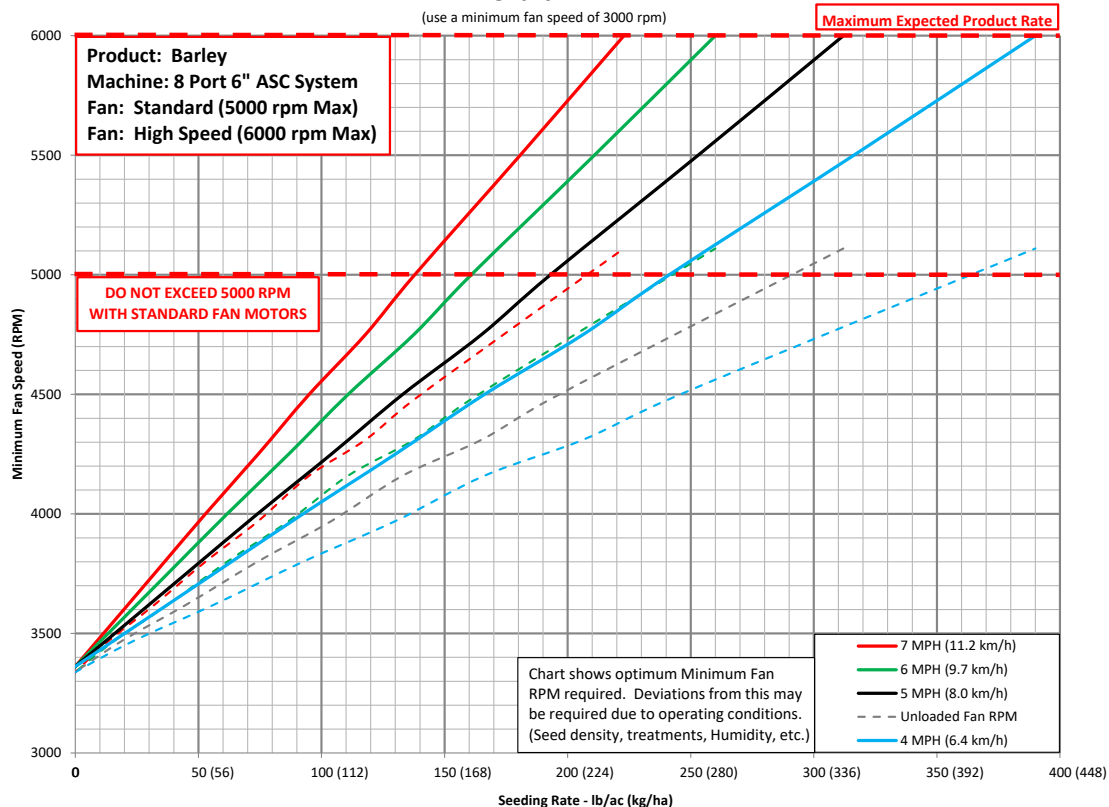


Chart 22E



Note: FOR RATES BELOW 50 LB/AC USE A MINIMUM FAN SPEED OF 2500 RPM.

Chart 22F

