



The University of Georgia

College of Agricultural & Environmental Sciences

How to Measure Static Pressure Under Grain

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Adequate air must reach all areas of stored grain to cool it before condensation begins. Satisfactory aeration depends upon air flow rate. Recommended air flow rates for intermittent operation in the Southeast is $\frac{1}{10}$ to $\frac{1}{20}$ CFM per bushel. Low rates should not be used unless moisture content is less than 12 percent (wet basis).

Horsepower requirements and static pressure in inches of water for aeration fan operation are shown in Table 1. The table is valid only for clean grain without excessive fines or chaff.

Static pressure is measured with a manometer. Commercial manometers are available for \$25.00 - 50.00. A simple homemade manometer can be made for the cost of some clear tubing and nails. Materials needed are 2 - 5 feet of $\frac{1}{4}$ inch clear flexible tubing, 15 feet of a flexible tubing to connect to clear, 6" x 12" board $\frac{1}{2}$ " thick, small staples and a ruler (graduated in 0.1 inch increments). Make an U-shape with the clear tubing and attach to the board with staples. Place the ruler as shown in figure 1.

Measure the static pressure as follows:

1. Find a hole the size of the tubing in the air chamber below the grain.
2. Place tubing into hole and seal. Make sure you have a good seal - no leaks.
3. Fill the manometer with enough water to give 2 inches of water height.
4. Attach the manometer to tubing.
5. Operate the fan the level of the water will change according to the static pressure develop.
6. Read the ruler at the level of water on both tubes. Subtract the smaller value from the larger. This is the static pressure developed by the fan.

Home made Manometer

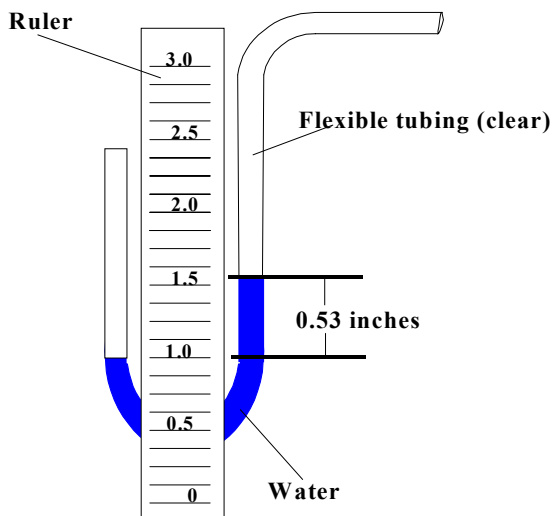


Table 1. Horsepower Requirements and Static Pressure for Aeration Fan Operation.

Depth of Grain (feet)	Horsepower per 100 bushels		Static Pressure (inches of water)	
	$1/_{10}$ CFM/bushel	$1/_{20}$ CFM/bushel	$1/_{10}$ CFM/bushel	$1/_{20}$ CFM/bushel
Shelled Corn				
10-15	0.2	0.1	0.55	0.51
20	0.2	0.1	0.65	0.57
25	0.3	0.1	0.77	0.63
Soybeans				
10-15	0.1	0.1	0.50	0.50
20	0.2	0.1	0.55	0.50
25	0.2	0.1	0.65	0.50
Wheat				
10	0.3	0.2	1.00	0.95
15	0.4	0.2	1.25	1.05
20	0.5	0.2	1.60	1.20
25	0.7	0.3	2.05	1.45
Oats				
10	0.3	0.1	0.80	0.70
15	0.3	0.2	0.95	0.80
20	0.4	0.2	1.20	0.92
25	0.5	0.2	1.50	1.07
Grain Sorghum				
10	0.3	0.2	1.00	0.95
15	0.4	0.2	1.25	1.05
20	0.5	0.2	1.60	1.20
25	0.7	0.3	2.05	1.45

Problems

1. The static pressure measured is less than what is stated in Table 1. The fan is too small, not enough CFM being delivered. Wrong design of the fan.
2. The static pressure measured is higher than what is stated in Table 1. The grain has excessive fines or chaff. The fan may be delivering the wrong amount of CFM based on the performance curve for the fan (see manufacturer's literature).

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