



How do I size my Fan and Shutter System?

1. The first thing that you need to determine is the amount of air required.
This is stated in CFM (Cubic Ft. of Air per Minute).
2. The total CFM required is based on several factors:
 - A) Light Intensity -
determined by your geographic location and whether you use shade cloth
 - B) Temperature Difference - from air inlet to air outlet
3. Use the following formula to determine the CFM required for your greenhouse:
CFM = Length x Width x 12
Example: Greenhouse that is 12' wide and 24' long requires 3456 CFM (12 x 24 x 12)
4. Increase or decrease the CFM amount calculated by using the following factors:

Shade Cloth Percentage Factor

40%	50%	60%
.6	.5	.4

EXAMPLE: 12' x 36' Greenhouse with 50% Shade Cloth.

Determine basic CFM required using standard formula: $12 \times 36 \times 12 = 5184$ CFM.
We must now adjust this based on the Shade Factor.

$$5184 \times .5 \text{ (Shade Factor)} = 2592 \text{ CFM}$$

This is the CFM required to properly cool this greenhouse.

Remember, you must provide an adequate intake for the total CFM being exhausted by the fan(s). You can use an open door, roof vents or motorized intake shutters properly sized for the total CFM. The most efficient system utilizes motorized inlet shutters situated on the wall opposite from the exhaust fans.

How many fans do I need?

1. In a large commercial greenhouse the standard practice is to place fans no more than 16' to 20' apart. This provides a uniform airflow pattern with very little dead air spots when dealing with large open spaces of 1500 square foot or greater.
2. For smaller greenhouses utilizing smaller size fans it is recommended to space the fans closer together. For greenhouses up to 12' wide a single fan should be sufficient especially when coupled with two inlet shutters on the opposite end wall. However, over 12' width two smaller fans will give greater uniformity and produce fewer dead air spots.

How many inlet shutters do I need?

1. In a larger commercial greenhouse the number of shutters can be equal to the number of fans. It is important to size the shutters for the total amount of CFM being exhausted by the fans.
2. For smaller greenhouses it is recommended to keep the shutters smaller and use more of them to produce a uniform air flow through the space. The maximum spacing between shutters should be no more than 6' to 9' apart. It is important to size the shutters for the total amount of CFM being exhausted by the fan(s).

Two speed or one speed fans?

- Whether to use a one speed fan or two speed fan depends on the amount of control you require for your greenhouse. If you use a two speed fan you need to provide at least two stages of cooling control. Normally a single speed fan is sufficient for summertime cooling. If you are using the fans for wintertime cooling/dehumidification a two speed fan might be beneficial.

Where do I place the fans & shutters?

- The exhaust fans should be placed on one of the shorter walls with the bottom of the fan located approximately 3 ft. from floor level. The shutters should be placed on the opposite wall at approximately the same height. This allows the cool air flow to pass directly over crops placed at bench height. Under winter time cooling conditions (high sunlight, low outdoor temperature), it is recommended to have a small inlet shutter placed high on the gable endwall opposite the exhaust fan. This allows the cold incoming air to mix with the warmer greenhouse air before being drawing across plants or crops. This shutter would replace the normal inlet shutters used during summertime cooling.

