

GREENHOUSE - Q AND A TIPS AND ADVICE

Agroponic Industries Ltd.
Calgary, Alberta, Canada
ph 403 241 8234
email: agropon@agroponic.com

Ask the Experts



Question : Is the general rule of thumb for selecting and sizing a high pressure fog cooling system.

The actual amount of fog (water evaporation) for greenhouse cooling takes into many considerations. Considerations include : project elevation, project location, project environmental information (web bulb/dry bulb and elevational conditions), greenhouse structure, ventilation/cooling systems, type of crop and cultural practices etc. We like to take into account all of these when sizing up a system for a client, but for those that like to use the "good old rule of thumb practices", the following.

But for those that wish to get an idea of how much fog generation is required, here is a very "**general rule of thumb table**." The first table is for naturally ventilated greenhouses houses and second table is for mechanically ventilated greenhouses.

NATURALLY VENTILATED GREENHOUSES:

If outdoor design temperature range is 75 to 85 deg. F. use 0.00016 USGPM/sq. ft.

If outdoor design temperature range is 85 to 95 deg. F use 0.0002 USGPM/sq. ft..

If outdoor design temperature range is 95 to 105 deg. F use 0.0003 USGPM/sq. ft.

If outdoor design temperature range is 105 to 115 deg. F use 0.0004 USGPM/sq. ft.

TABLE TWO - MECHANICALLY VENTILATED HOUSES:

If outdoor design temperature range is 75 to 85 deg. F. use 0.000018 USGPM/CFM

If outdoor design temperature range is 85 to 95 deg. F use 0.000025 USGPM/CFM.

If outdoor design temperature range is 95 to 105 deg. F use 0.000034 USGPM/CFM.

If outdoor design temperature range is 105 to 115 deg. F use 0.0000435 USGPM/CFM.

USGPM = united states gallon per min.

sq. ft.. = greenhouse area in sq. feet.

CFM = cubic feet of air flow of exhaust fans.

Rule of thumb Sizing.

A grower has a block of gutter connected greenhouse structures. There are 10 bays of 21' wide X 144 foot long houses. Each bay is provided with a 20,000 CFM exhaust fan. The outdoor air temperature seldom gets above 95 deg. F.

In table two for mechanically ventilated greenhouses the range for moisture addition is 0.000025 USGPM/CFM.

Therefore, the total fog system size would need to be:

$$10 \text{ bays} \times 20,000 \text{ CFM} \times 0.000025 \text{ USGPM/CFM} = 5 \text{ USGPM (18.92 liters/min)}$$

This provides the minimum pump capacity size.

And

to calculate the number of nozzles at 1000 PSI

$$5 \text{ gallons} / 0.0225 = 222 \text{ nozzles (total)}$$

Each nozzle is rated for 0.0225 GPM at 1000 PSI

And

if there is a desire to uniformly fog the house with one grid running down the length of each bay

$$=144 \text{ feet per each bay} / (222 / 10 \text{ Bays}) = 6.48 \text{ feet on center nozzle spacing.}$$

Use 6.5 foot nozzle spacing.

So there you have it. Basically you need a minimum pump capacity of 5 gallons and 10 fog grids each 144 feet long with nozzles spaced at 6.5 feet on center.

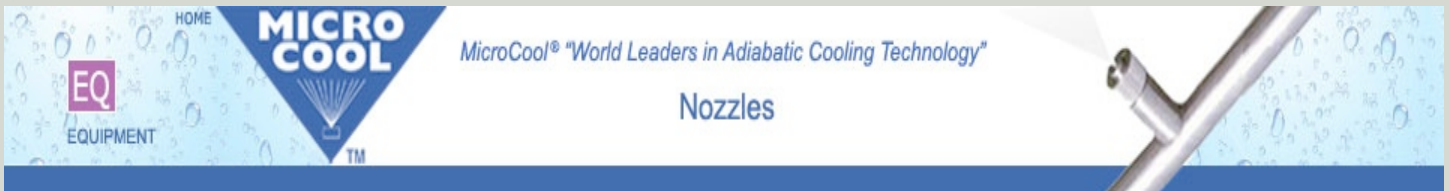
Now bear in mind this has been sized with the rule of thumb method (ie: one air change per minute based on 8 foot height.) For those with 12, 14 and 16 feet under the gutter heights well you can certainly do a lot more fogging to reduce the temperatures and vapor deficit even more.

For those installing or considering fog systems in greenhouses requiring flower pollination please don't cheap out and use slow response or ribbon type hair humidistats. Always consider using fast acting electronic sensors. Or better yet ... greenhouse microprocessor or computer based controllers which provide features as pulse cooling or humidification. Resist the urge to simply control fog (if you are planning to use it as a cooling stage) by temperature only. It is best to still be able to set a high humidity set point as well.) Refrain the urge to use cooling as stage one cooling. If you do so with out air flow movement in the structure and staging on the fog you will run into running the house to wet. Just remember this simple fact. If you are a tomato grower, it is difficult to achieve high fertilization when the pollen exposed to high humidity conditions. No pollination no tomato crop... It's as simple as that. So please take the control of the system with serious consideration. There are a lot of great greenhouse controllers that can do the job for you.



Other selection considerations should include : structural placement/alignment considerations, crop requirements, zoning etc.

If you require further selection advise, assistance and information specific to your application please feel free to contact us. We have years of experience to provide to you.



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email : agropon@agroponic.com

web : www.agroponic.com

Consultants, Suppliers and Installer to the Commercial Greenhouse Industry