



How to Estimate the proper number of Evaporators

Step 1: Determine the volume of water you wish to evaporator

- You may have a inflow figure you wish to evaporate
- May need to calculate the size of the pond and determine and average depth.
- You will need to know objective, does the company wish to maintain the level of the pond or lower the level or eliminate the pond.
- See our description of Pond Volume Calculations on following page to figure out what you have. Just how big is your problem?

Take the volume determined from the above analysis and get that figure into US gallons.

- Depending upon the above results you will get a figure for an annual basis, or monthly or daily.
- You must chose what time period you wish to work with, a daily volume is easy because you can take the results and determine the length of your operating season by days.

Step 2: Determine which nozzle configuration is going to be used.

- The standard configuration is 30 nozzles using hollow cone pattern with D12 discs and DC45 cores. The output on this combination is varied depending upon the pressure used.
- If Spiral jet Teflon pigtail style configuration is chosen (they will pass more organic matter, a higher TDS) they also utilize 30 nozzles.

Step 3: Determine the pressure that will be available at the machine.

- This figure will be used with the nozzle configuration from step 2 to look up the output each nozzle will have based upon the manufacturers output chart. (Tee Jet output chart included for both hollow cone disc-core tips and Spiral jet spray nozzles)

Step 4: Use the configuration and pressure to determine the output per nozzle.

- Both configurations at 100 Psi will yield 2.2 gallons per minute per nozzle for a total of 66 US gallons per minute. This is 3,960 gallons per hour and 95,040 gallons per day. Remember, this is the amount pumped aloft, not evaporated. You must still determine the % of evaporation to find the amounts evaporated.
- See chart below to get the gallons per minute per nozzle

Spray Systems Hollow cone spray flow rates

Disc #	Orifice	Core No.	Gallons Per Minute at PSI		
			100 PSI	150 PSI	200 PSI
D5		45	0.71	0.86	0.99
D6		45	0.93	1.15	1.33
D7		45	1.11	1.35	1.57
D8		45	1.35	1.68	1.94
D10		45	1.77	2.18	2.5
D12		45	2.2	2.69	3.11
D14		45	2.45	3.00	3.49
D16		45	2.89	3.54	4.11

Spray system Spiral jet hollow cone flow rates

Pipe Size	Spray Angle	Capacity Size	Gallons Per Minute at PSI		
			100 PSI	150PSI	200PSI
1/4	90 degrees	7	2.2	2.69	3.11

Step 5: Multiple the result of step 4, the per nozzle output x 30 to obtain total output in US gallons per minute for one S30P evaporator. If the pressure is different than the 100 PSI example shown above, the results will vary.

- If you find you have a pressure below or above the chart please contact Bob McIntyre at Slimline Manufacturing Ltd for formula to determine actual output.
- Please note we recommend everyone use at least 100 PSI to obtain a water droplet size that is desirable. The higher the pressure the smaller the water droplet size, the smaller the water droplet size the higher the evaporation rate will be, but along with that increase in evaporation, will be an increase in the drift, which is what increases the evaporation efficiency.
- The spiral jet hollow cone Teflon nozzles (BSJ90) will give us an average size water droplet of 110 microns at 100 PSI.
- The standard disc-cone stainless steel nozzle system (DC45/D12) will give a water droplet size of 450 microns, but after air shear effective of the evaporator will be in range of 300 microns. (Using data from University of Ohio to establish this reduction, paper available upon request.)

Step 6: Determine the pan evaporation rate at the site, consult our estimate of evaporation rate obtainable at given pan evaporation levels. See this website for graph up to 19 inches net pan evaporation under Turbomist Evap rates on the main page.

- The pan evaporation rate is often available from weather information services at a site close to your location. Almost all airports have pan evaporation rates. You may have to estimate from closest available.
- Most clients will have engineering available to construct a simple pan evaporation test if they have the time line available to do so. It will take them one season to collect this data on a daily basis.

This chart is indicating inches per month:

If you have an annual pan evaporation rate in feet, convert to inches and divide by 12 months to determine the average pan evaporation rate per month to use below.

** Please note that these figures were based upon an average humidity at the site of between 50 and 60%. If you have a lower humidity level the evaporation rate will be considerably higher.

Net pan evaporation (inches/month)	Percentage of volume pumped by evaporator	Net pan evaporation (inches/month)	Percentage of volume pumped by evaporator
1.5	20	7.0	40
2.0	28	7.5	41
2.5	29	8.0	42
3.0	30	8.5	43
3.5	32	9.0	44
4.0	34	9.5	45
4.5	35	10	46
5.0	36	10.5	47
5.5	37	11	48
6.0	38	11.5	49
6.5	39	12	50
7.0	40	12+	up to 85

Step 7: The final step

Assume the following as an example and replace your actual figures to calculate the number of evaporators needed!

- Assumption 1: You wish to evaporate 25 million gallons in a season and you have 10 months in your season. March thru December.
- Assumption 2: You have a pan evaporation rate of 6.5 inches per month
- Assumption 3. You can achieve 100 psi the most economically.

a. First determine what one machine can do in this window, given these assumptions. At 100psi using the standard nozzles the chart shows you pump aloft 2.2 gallons per minute (gpm) x 30 nozzles = 66 gpm x 60 minutes = 3,960 gph x 24 hours = 95,040 gallons per day. 10 months at 30 days/month = 300 days. Therefore you know you can pump aloft 300 x 95,040 gallons for a total of 28,512,000 (28.512 million) gallons in a season per unit.

b. If the pan rate is 6.5 inches/month the chart estimates 39% of volume pumped aloft will be evaporated. In this example you then take the volume one unit pumps x the % that will evaporate, that is 28,512,000 x .39 and the result is 11,119,680 US gallons. (11.119 million gallons in a season.)

c. To determine the number of units needed, divide the desired amount which was 25 million gallons by 11.119 and you would need 2.25 units

d. In this case we would recommend the customer purchase 3 evaporators to ensure they reach their goal. In fact 2 evaporators should get rid of 22.2 million gallons, and the customer may be satisfied with this. Depending upon the year, he may get more or less evaporation and we wish to point out, this is not an exact science, we are predicting results based upon experience of other customers and would suggest that if the customer has a dire problem, he estimate low on the evaporation rate, in anticipation of a bad weather year. We will always prefer to be on the conservative side.

Turbomist Evaporators are Manufactured by [Slimline Manufacturing Ltd.](#)
in Penticton British Columbia

If you wish you can call 1 800 495 6145 and give our sales department your inflow or total volume to eliminate, plus the net pan evaporation information from your site, or somewhere close to your site, we will do the calculations on an excel spread sheet and will forward you the results for consideration.