Selection of a Remote Sump Tank for an Open Circuit Cooling Tower

Note: *This section provides a simplified method for the selection of a remote sump tank for an open circuit cooling tower only. For information on sizing a remote sump tank for a closed circuit cooling tower or evaporative condenser, see page M30.*

Remote sump tanks are used on evaporative cooling systems to provide a means of cold water basin freeze protection during cold weather operation. The remote sump tank is usually located in a heated, indoor space, and may preclude the need to winterize the cooling tower. A remote sump tank must provide sufficient storage volume to accommodate all the water that will drain back to it during cooling system shutdown, including:

- The total volume of water contained within the cooling tower during operation (cooling tower volume).
- The volume of water contained in all system piping located above the operating water level of the remote sump tank (system piping volume).
- The volume of water contained within any heat exchanger, or other equipment located above the operating water level of the remote sump tank that will drain to the tank when the cooling system is shut down (system components volume).

The maximum volume of water contained within the cooling tower is the volume of water to the overflow level. Besides the water in the cold water basin during operation, this volume will take into consideration water in the distribution system, water in suspension in the fill, plus an allowance for the external pulldown from piping and other equipment. This simplified method is a conservative approach as it will not consider any volume reductions based on flow rates. For specific information for your application, contact your local BAC Representative.

On remote sump applications, the standard float valve(s) and strainer(s) are omitted from the cold water basin and a properly sized outlet connection is added.

Cold water basin volumes at the overflow level are given in Tables 1 through 5. Table 6 provides pipe capacities (gallons per linear foot) for common Schedule 40 nominal pipe sizes, useful when determining system piping volume.

Safety Factor

When selecting a remote sump tank, select a model with a net available volume that is 5% greater than the total volume required. The net available volume is the volume between the operating level and the overflow level in the remote sump tank. See page L5 for engineering data (including net available volume) on BAC's RS Remote Sump Tanks. The minimum operating level must be maintained in the remote sump tank to prevent vortexing of air through the tank's suction connection.

Table 1. Series 3000 - Cold Water Basin Volume at Overflow

Model Number	Overflow Volume (gallons)
3420C to 3299C	911
3333C to 3379C	976
3412C to 3436C	1,153
3455C to 3527C	1,208
3473C to 3501C	1,420
3552C to 3672C	1,637
3728C to 3828C	1,949
3872C to 3970C	2,200
3985C to 31056C	2,418
3583C to 3725C	2,070
31132C	2,671
31213C to 31301C	2,909

Table 2. Series 1500 - Cold Water Basin Volume at Overflow

Model Number	Overflow Volume (gallons)
15146	475
15160	475
15176	475
15162	530
15177	530
15201	530
15219	530
15200	725
15227	725
15250	725
15214	815
15245	815

Model Number	Overflow Volume (gallons)
15270	815
15282	815
15296	1,050
15325	1,050
15350	1,050
15368	1,050
15310	1,200
15340	1,200
15365	1,200
15385	1,200
15425	1,200

Table 3. FXT - Cold Water Basin Volume at Overflow

Model Number	Overflow Volume (gallons)
FXT-6 to 7.5	63
FXT-11	98
FXT-16 to 20	73
FXT-26 to 33	113
FXT-38 to 47	146
FXT-58 to 68	197
FXT-74 to 95	273
FXT-115 to 136	420
FXT-160 to 192	558
FXT-216 to 257	666

Table 4. Series V - Cold Water Basin Volume at Overflow

Model Number	Overflow Volume (gallons)
VTL-016-E to VTL-039-H	72
VTL-045-H to VTL-079-K	146
VTL-082-K to VTL-095-K	215
VTL-103-K to VTL-137-M	287
VTL-152-M to VTL-227-O	432
VTL-245-P to VTL-272-P	574
VT0-12-E to VT0-28-H	26
VT0-32-H to VT0-57-K	55
VT0-65-J to VT0-88-L	85
VT0-102-L to VT0-116-M	114
VT0-132-L to VT0-176-O	153
VT1-N209-P to VT1-N255-P	488
VT1-N301-Q to VT1-N395-R	742
VT1-N418-P to VT1-N510-P	994
VT1-275-P to VT1-415-R	900
VT1-416-O to VT1-600-P	1,367
VT1-550-P to VT1-830-R	1,832
VT1-825-P to VT1-1335-S	2,764

Table 5. PT2 - Cold Water Basin Volume at Overflow

Model Number	Overflow Volume (gallons)
PT2-0412A	265
PT2-0709A	300
PT2-0809A	335
PT2-1009A	375
PT2-0812A	450
PT2-1012A	500
PT2-1212A	570

Table 6. Schedule 40 Pipe Capacities*

Nominal Pipe Size	Gallons Per Linear Foot
2	0.174
3	0.384
4	0.662
6	1.503
8	2.603
10	4.101
12	5.822
14	7.04
16	9.193
18	11.636
20	14.461
24	20.916

* Not applicable for other types of piping.

Example

A VTL-059-H will be installed on a cooling tower/heat exchanger system that will also utilize an RS Remote Sump Tank. The tower side volume contained in the heat exchanger is 25 gallons. The system has been designed with 35 feet of 4 inch pipe that will be above the operating level of the remote sump tank. What is the correct RS Remote Sump Tank selection?

Solution:

From Table 4, the cold water basin volume at overflow for the VTL-059-H is 146 gallons.

From Table 6, the 4" pipe will contain 0.662 gallons of water per linear foot. The total volume contained in the 4" pipe is 23 gallons.

The tower side volume of the heat exchanger is 25 gallons.

The total volume required is:

Cooling Tower Volume at Overflow	(146 gallons)
+ System Piping Volume	(23 gallons)
+ System Components Volume	(25 gallons)
= Total Volume	194 gallons

194 gallons x 1.05 (safety factor) = 204 gallons required.

From the engineering data on page L5, the correct RS Remote Sump Tank selection is an RS-335, which has a net available volume of 257 gallons.