

Remote Sump Tank Connection for a Cooling Tower

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 to accommodate the surge volume, defined as all of the water that will drain back to the tank during the cooling system shutdown, the surge volume includes:

- **Cooling Tower Volume:** The total volume of water contained within the cooling tower during operation, including water within the distribution system and falling through the fill section.
- **System Piping Volume:** The volume of water contained in all system piping located above the operating water level of the remote sump tank.
- **System Components Volume:** The volume of water contained within any heat exchanger or other equipment located above the operating water level of the remote sump that will drain to the tank when the cooling system is shut down.

This method is a conservative approach as it will not consider any volume reductions based on flow rates. Cold water basin volumes at the overflow level are given in **Tables 2 through 7**. **Table 8** provides pipe capacities (gallons per linear foot) for common Schedule 40 nominal pipe sizes, which can be used to determine system piping volume. For specific information for your application, contact your local BAC Representative.

Please note that 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.

Safety Factor

When selecting a remote sump tank, select a model with a net available volume that is 5% greater than the surge volume. Engineering data on BAC's RS Remote Sump Tanks is provided in **Table 1**, see **page G5** for dimensional information on Remote Sumps. Note that the minimum operating level must be maintained in the remote sump tank to prevent vortexing of air through the tank's suction connection

Model Number	Shipping Weights (lbs)	Maximum Weight (lbs) ^[1]	Maximum Storage Volume (gal)	"X" Minimum Operating Level ^[2]	Net Available Volume (gal)
RS 94	240	1,070	94	8 1/2"	72
RS 212	350	2,220	212	8 1/2"	163
RS 335	470	3,410	335	8 1/2"	257
RS 457	610	4,630	457	8 1/2"	351
RS 702	800	6,970	702	8 1/2"	539
RS 946	1,030	9,340	946	8 1/2"	727
RS 1390	1,260	13,470	1,390	8 1/2"	1,068

Table 1: RS Remote Sump Tank Engineering Data

NOTES:

1. Maximum weight is for tank filled with water to spillout.
2. Minimum operating level "X" is measured from inside bottom of tank.

Remote Tank Selection for a Cooling Tower

Model Number	Pulldown Volume (gal)
S3E/XES3E-8518-05x	503
S3E/XES3E-8518-06x	522
S3E/XES3E-8518-07x	542
S3E/XES3E-1020-06x	633
S3E/XES3E-1020-07x	655
S3E/XES3E-1222-06x	802
S3E/XES3E-1222-07x	828
S3E/XES3E-1222-10x	1,014
S3E/XES3E-1222-12x	1,068
S3E/XES3E-1222-13x	1,095
S3E/XES3E-1222-14x	1,121
S3E/XES3E-1424-07x	1,168
S3E/XES3E-1424-12x	1,326
S3E/XES3E-1424-13x	1,358
S3E/XES3E-1424-14x	1,390

Table 2. Series 3000 -
Cold Water Basin Volume at Overflow

Model Number	Pulldown Volume (gal)
S15E/XE15E-1285-06x	412
S15E/XE15E-1285-07x	452
S15E/XE15E-1285-09x	522
S15E/XE15E-1285-10x	570
S15E/XE15E-1212-07x	638
S15E/XE15E-1212-09x	744
S15E/XE15E-1212-10x	822
S15E/XE15E-1212-11x	875
S15E/XE15E-1212-12x	925
S15E/XE15E-1218-07x	1,224
S15E/XE15E-1218-09x	1,384
S15E/XE15E-1218-10x	1,502
S15E/XE15E-1218-11x	1,580
S15E/XE15E-1218-12x	1,657

Table 3. Series 1500 -
Cold Water Basin Volume at Overflow

Model Number	Pulldown Volume (gal)
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-227-0	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 VT0-176-0	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-M316-0 to VT1-M420-R	595
VT1-M431-N to VT1-M610-P	905
VT1-M632-0 to VT1-M840-R	1,190
VT1-M948-0 to VT1-M1260-R	1,785
VT1-275-P to VT1-415-R	900
VT1-416-0 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 4. Series V - Cold Water Basin Volume at Overflow

Model Number	Pulldown Volume (gal)
PT2-0412A	265
PT2-0709A	300
PT2-0809A	335
PT2-1009A	375
PT2-0812A	450
PT2-1012A	500
PT2-1212A	570
PT2-1218A	1,022

Table 5. PT2 -
Cold Water Basin Volume at Overflow

Model Number	Pulldown Volume (gal)
FXT-0506A-x	186
FXT-0706B-x	255
FXT-0709B-x	392
FXT-0712B-x	520
FXT-0712C-x	620

Table 7. FXT -
Cold Water Basin Volume at Overflow

Model Number	Pulldown Volume (gal)
S5E-8518-07x	542
S5E-1020-07x	655
S5E-1222-07x	828
S5E-1222-14x	1,121
S5E-1424-07x	1,168
S5E-1424-14x	1,390

Table 6. 5000 -
Cold Water Basin Volume at Overflow

Nominal Pipe Size (in)	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

Table 8. Schedule 40 Pipe Capacities -
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" 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 7**, 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 remote sump tank engineering data available on **page G5**, the correct RS Remote Sump Tank selection is an RS-335, which has a net available volume of 257 gallons.