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Cooling Tower Pumps and Piping – Part 8

Pump Suction Piping Rules

By Norman Hall

Traditional hydronic piping system designers use tools such as the *Xylem Bell & Gossett* **System Syzer** for pipe sizing. You may find this program at http://completewatersystems.com/brand/bell-gossett/selection-sizing-tools/system-syzer/. Tower manufacturers, the Hydraulic Institute (HI), and Bell and Gossett all suggest lower velocity for pipe selection in cooling tower pump suction piping. Bell and Gossett has several pipe sizing suggestions in their manual TEH-1209.

1. **The pipe velocity should not be greater than the pump suction velocity. In other words, the pipe entering the pump should not be smaller than the suction size of the pump.**

2. **Pipe velocities should be selected for 5 to 10 feet per second (FPS) and should have 5 to 10 pipe diameters of straight pipe before the suction side of the pump. A suction diffuser may be used in lieu of the 5 pipe diameters if the header is above and you are dropping down into the pump.**

3. **Pipe headers should be sized for 3 FPS at the total design flow rate.**

4. **The tower outlet pipe should be sized for 5 FPS maximum.**

5. **Minimize the number of pipe size changes. This makes economic sense when the suction pipe is short. On two or three cell towers, keep the tower and pump piping the same as the main, if physically possible. Avoid making multiple pipe reductions in one fitting.**

6. **Use lateral rather than bull head tees, if you have the space. This reduces turbulence entering the pump. You may detail tapered headers. (See the TEH manual)**

Many an engineer will point to many a project with the comment “I’ve never had an issue while following these suggestions”. The engineer is probably correct. It’s likely, if you do enough cooling tower projects, eventually, one will go bad. These suggestions are made to help avoid the problem job, which sometimes shows up.

EXAMPLE: Three towers at 2000 GPM each for a total of 6000 GPM in the pump suction header and three pumps at 2000 GPM at 60 feet each. Tower pan is 5 feet above grade.

SOLUTION: The pump is a B&G VSCS-6X8X10.5A at 40 HP with 10 foot NPSH. 2000 GPM leaving the tower should be 14” at 4.74 FPS. (Rule 4). 6000 GPM in the common pipe should be 30” at 2.97 FPS velocity. (Rule 3) We would select 24” at 4.79 FPS if the 30” pipe caused elevation issues with the pump on a housekeeping pad. Pump suctions would remain at 14” and we’ll use 2 reducers to the 8” suction. (Rule 1, 2, 6)

Click here to request a copy of the Xylem Bell and Gossett Cooling Tower Piping technical bulletin TEH-1209