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Customer Site Preparation for a Thermal Performance Test

For a thermal performance test, especially an acceptance test, there are certain site requirements that need to be met by the customer or his representative. The following list includes the common considerations for a standard tower installation operating on a closed loop system. Some tower installations due to their unique installation and/or application may modify this list. If there is any question, please contact SPX Cooling Technologies's Field and Certification Testing Services Department.

1. Pitot tube taps in the pipe(s) delivering water to the cooling tower. These taps should conform to the pitot tap instructions furnished. While SPX's instructions show the break point for larger taps at pipes over 48 inches, one could use the larger taps in pipes down to 30 inches in diameter. The larger taps accommodate reinforced pitot rods designed to minimize vibration effects on the measurement of flow. It is less expensive to include the taps in the original pipe installation. If a new project is to include an acceptance test, we suggest the piping contractor include the taps during the original installation.

2. Taps should be installed for measurement of water temperatures if required. Hot water temperature can normally be measured in the distribution basin of crossflow towers. Often the pitot taps can also be a measurement point for hot water temperature. If site specific circumstances make neither of these options acceptable, special taps will be required. The cold water temperature is normally accomplished at the discharge of the circulating water pumps. The most common location is at the pressure gauge tap present on most systems. If this is not available or applicable on a system, special taps or another solution must be identified. Measurement in a tower basin is not acceptable. Measurement of cold water temperature in a flume or channel can sometimes be accomplished with acceptable accuracy, but specifics should be reviewed.

3. At the time of the test, safe access to any elevated points of measurement must be provided. Examples would be pitot tube taps, hot water measurement taps, etc. All access must conform to safe work practices, OSHA requirements, and any local plant requirements. Especially in the case of pitot tube taps, the access must be scaffolding or a multi-person manlift. This work cannot be accomplished from ladders.

4. Power for test instruments available adjacent to the tower. This should be single phase, 110 volt, 50 or 60 cycle. On very large towers multiple sources around the tower are preferable to reduce the amount of extension cord and resulting line loss.

5. The tower should be ready for testing before the test engineers arrive. The following considerations are important to evaluate the full capability of any tower:

a. Towers with PVC film-fill should be operated at design water flow and heat load for 1000 hours prior to doing a performance test. The reason for this is to wash lubricants from the surface of the fill used in the production of the PVC. These lubricants inhibit the wettability, and heat transfer capability of the fill. For additional information refer to the *Cooling Technology Institute paper TP00-01 - "Design Features of Cross-Fluted Film Fill and Their Effect on Thermal Performance"* by Rich Aull and Tim Krell on fill aging (sometimes referred to as seasoning). Their work shows that film fill requires about 2 to 3 weeks of seasoning in their "aging tank"—they indicate that one week in the aging tank was equal to about four weeks of tower operation, which means about 8 weeks (1344 hours) of seasoning time in the tower to get the full capacity of the fill's performance.



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b. The tower should be clean. The distribution system should not have any damaged, missing, or plugged nozzles or orifices. The distribution system should be balanced as well as the design allows. The air inlet should be cleared of any blockage. If the tower has louvers, they should be in the normal design position, if adjustable. The eliminators should be free of foreign matter. Fan discharge should be clear and unobstructed.

c. Water flow and heat load to the tower, or representative cells, should be as close to design as the system will permit. If the code recommended limitations cannot be met, all parties should review the situation to agree on the deviation or delay/cancel the test.

d. Any water by-passes should be closed and inspected to ensure there is no leakage.

e. Any source of air leakage should be closed/blocked. Examples: access doors, mechanical equipment supports, or holes in the casing or fan cylinders.

f. A mechanical draft tower must be operated with all fans operating on full speed forward. They must not cycle during the test period. In the case of tower fans operating on VFDs, they should be placed in by-pass mode if the systems allows this.

g. The owner or his representative should designate a coordinator qualified to integrate the testing activity and the normal process operation being served by the cooling tower. Operators of the system should be notified in advance of the testing activity.

h. The owner or his representative should have an electrician or qualified operator available to assist in the measurement of fan power on mechanical draft towers. A wattmeter is normally used to measure fan motor power at the starters or other suitable location. If the power supply is over 600 volts or drive is not electrical, another method acceptable to all parties should be identified to measure this parameter.

i. All parties to the test should be advised in advance of any special safety issues required at the site. This includes training, equipment, testing, or restrictions. SPX is committed to safety in the workplace and will ensure its employees and subcontractors comply with all rules and regulations.