

## CTI Recommended Thermal Test Conditions

### Test Parameter Averages

Cooling Technology Institute's Test Code ATC-105 specifies that, during the test window, the averages for the test parameters fall within the following limits:

Description	Permissible Value Relative to Design Specification
Wet-Bulb Temperature	± 15 °F
Cooling Range	± 20%
Circulating Water Flow	± 10%
Fan Power Output	± 10%
Wind Speed	10 mph; 15 m/h for 1 min gust

### Low Heat Load Testing

Of all of these parameters, the only one that the OEM has direct influence over is the fan motor power - which is primarily a function of the fan blade pitch. Unfortunately, fan motor power is the parameter that is most commonly outside of recommended CTI limits. It is also important to note that code permits the test parties to agree to deviate from these limits and for the test to still be considered acceptable for contractual acceptance purposes.

The range and water flow limits can be evaluated on a per cell basis as opposed to a per tower basis. This means that a code test can be performed with one or more cells isolated out of service if there is a reduced heat load available at the time of the tests.

For example, (for a 5 cell tower), if the plant had 60% heat load available, 2 cells would be shut off, and the flow would be adjusted so that the flow to the remaining three cells was within ± 10% of the design flow on a per cell basis.

This approach is clearly outlined in the test code and is routinely performed to evaluate towers with excess capacity at the time of the tests.

### Stability Requirements

The stability requirements from CTI-ATC-105 Section 2.4 Constancy of Test Conditions are shown in following table:

Parameter	Maximum Variation Value
Circulating Water Flow	±2%
Heat Load	±5%
Range	±5%
Wet-Bulb Temperature	±2°F /hr

On an annual basis, about 30% of all contractual acceptance tests are conducted completely within the envelope of conditions presented in the tables above.