

COOLING TECHNOLOGY INSTITUTE

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STANDARD FOR PUBLICATION OF CUSTOM COOLING TOWER THERMAL PERFORMANCE TEST RESULTS



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This guideline document summarizes the best current state of knowledge regarding the specific subject. This document represents a consensus of those individual members who have reviewed this document, its scope and provisions. It is intended to aid all users or potential users of Cooling Towers.



This document has been reviewed and approved as part of CTI's Five-Year Review Cycle. This document is again subject to review in 2026.

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STANDARD FOR PUBLICATION OF CUSTOM COOLING TOWER THERMAL PERFORMANCE TEST RESULTS

1 BACKGROUND.

Every year the CTI Multi-Agency Testing Chair provides a review of the previous year's custom tower test results. Such reviews have shown that in some years more than half of the custom cooling tower acceptance tests are at less than 100% thermal capacity. CTI has developed this Standard to encourage custom tower capacity equal to or greater than 100%. It is CTI's intent to foster and promote the benefits of thermal performance acceptance testing of water cooling towers to the owner/operator of the equipment. It is not a certification program like that governed by CTI STD-201. The success of this program depends on a high percentage of custom cooling towers being field tested for thermal performance and the results published in accordance with this Standard. **CTI will take action under the provisions of this Standard against: 1) participating manufacturers who imply that participation in this program is certification of the performance of their products; and 2) against participating manufacturers who in any way discourage or prevent testing of their products by a CTI Licensed Test Agency.**

This standard was initially published and implemented in 2012. In 2015, the standard was significantly revised and data from prior years were reformatted to be consistent with the 2015 version of the standard.

2 PURPOSE

This Standard sets forth a voluntary program wherein CTI will publish measurements of the thermal performance test history of participating tower manufacturers (PM) by utilizing field-testing of custom cooling towers within its licensed thermal testing program.

3 DEFINITIONS

CTPA: The CTI Custom Tower Program Administrator for processing of test reports.

CTIA: The CTI Administrator.

CTPC: The Custom Tower Program Committee, composed of participating manufacturers, owner operators and licensed testing agencies.

LTA: A CTI-Licensed Thermal Testing Agency.

Custom Cooling Towers. Custom cooling towers include all cooling towers for which the rating is established on an individual basis per the plans and specification of the project. This program shall not be applied to models or lines that could be covered by STD-201, whether or not ratings are published for those models or lines, and whether or not such lines are certified per STD-201.

Lines. The term "Line," as used in this Standard, applies to a manufacturers grouping of cooling tower models, all of which are of consistent design in that they employ the same design configuration (induced draft crossflow, forced draft counterflow, etc.), and the same fan type (propeller or centrifugal), plus any other optional design or application considerations (such as range of capacities) as the manufacturer may employ, and for which the manufacturer issues a unique catalog or other sales literature providing a physical description and range of dimensions for all models.

New Cooling Towers. New custom cooling towers shall include all cooling towers erected on a new or existing basin, with a new fill system, a new water distribution system, a new drift eliminator system, new fans and mechanical equipment, within a new structure.

Cooling Tower Repacked/Rebuilt with Thermal Guarantee – A custom cooling tower rebuilt within an existing basin and structure, which includes a thermal performance guarantee, and is refurbished with a new fill system and may include; a new water distribution system, a new drift eliminator system, and new fans and mechanical equipment. The rebuilt tower may include reuse of some existing components from the original tower and structural repair or extension might also be included in the scope of work and guarantee.

Participating Manufacturer (PM). A cooling tower manufacturing company that has applied for participation and agrees to comply with all provisions of the Program as set forth in this Standard.

Ineligible Test. Test for which no report is submitted to the CTPA and PM.

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Candidate Test. A LTA test on a PM tower according to Section 5.2.4 which counts toward satisfaction of the minimum number of tests but for which there is no test capability shown on the report to the CTPA and PM.

Reportable Test. A LTA test on a PM tower which is reported with test capability shown to the CTI CTPA and PM according to Section 5.2.5.

Reporting Period. Data for each PM transmitted from LTAs to the CTI's designated Custom Tower Program Administrator (CTPA) shall be on an annual basis, for the year between January 1, and December 31.

4 SCOPE

4.1 This Standard applies to New, Custom Cooling Towers and Repacked/Rebuilt towers that have a Thermal Guarantee.

4.2 The Program shall be administered by the CTI Administrator and CTI's CTPA as prescribed in this Standard.

4.3 Compliance with this Standard requires that all custom cooling towers offered by the PM be included in the program. Models or lines that could be covered by CTI STD-201 are by definition not considered to be custom towers, and are to be **excluded** from reporting.

4.3.1 PM's shall submit to the CTI Administrator by October 31 of each year a list of tower lines and corresponding model numbers that are to be excluded from this program. This list of tower lines shall be limited to towers suitable for inclusion in STD-201 whether or not they are currently certified per STD-201 and whether or not the manufacturer is currently a PM in STD-201.

4.3.2 The LTAs will each receive a copy of the list of non-custom lines and models for each PM.

4.3.3 PM's shall provide updated lists to the CTI Administrator per Section 4.3.1 within 20 working days as changes are made to their product portfolio. These shall be transmitted as soon as practical to the LTAs.

4.4 The LTAs shall base the reporting of results for custom towers on any tower not on the current non-custom tower exclusion list in the possession of, or provided by, the CTI Administrator at the time of testing.

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5 OPERATION OF PROGRAM

5.1 A manufacturer requesting participation in this program shall submit an application to the CTI Administrator. The application shall include a listing of the non-custom lines and models (per STD-201) to be excluded from the custom tower program as of the date of application. The application shall include designation of a contact person at the PM for receipt of test summaries from the LTAs.

5.1.1 The submission of a written application to participate in this program is the manufacturer's consent to have its future results reported to the CTPA by the LTAs. Since no information that would reveal the owner for any individual test is reported by the test agency to the CTPA, or by the CTPA to CTI for publication, the confidentiality requirements in the CTI License Agreement with LTAs are satisfied.

5.1.2 The CTI Administrator shall transmit the list of non-custom lines and models to the LTAs and direct them to begin to report the custom tower test results for the Applicant per Section 5.3. The LTAs shall also be advised of the designated contact person for each PM. The CTI Administrator will inform the CTPA that reports are pending for the new PM.

5.1.3 The CTPA shall then begin to accumulate results per Section 5.4 for the new PM.

5.1.4 The CTI Administrator shall transmit a formal letter of acceptance in the format of Appendix A, to the applicant, the LTAs, to the other PM's, and to the CTPA. A copy of this letter shall be maintained on file by each of the above parties.

5.1.4.1 Upon notification of Acceptance in the Program, the PM's shall begin immediately to incorporate a statement in the form of Appendix C of this Standard as an integral part of all proposals for custom cooling towers. Failure to include the Appendix C statement in proposals subject to the scope of STD-202 shall be non-conformance with the standard and subject to the provisions of Section 8.

5.1.4.2 The PM shall also actively promote the specification and actual conducting of a thermal acceptance test by a LTA on all new Custom towers.

5.1.4.3 The PM shall not offer his own thermal testing as a substitute for a LTA test for

- the owner for any reason, nor shall he use any non-LTA for acceptance testing in the PM's scope or influence. All acceptance testing on towers in PM's scope shall be done by LTAs. Projects shall not be pre-screened or pre-tested in any way by the PM. Since the percentage of towers being tested is small, it is considered imperative that PMs not have any opportunity to manage which towers are tested by LTAs and for which results are reported. Failure to comply with the provisions of this paragraph shall be considered non-conformance with the standard and subject to the provisions of Section 8.
- 5.1.5 PM's may withdraw from the program at any time by submitting a letter to the CTI Administrator requesting that their participation be terminated. The CTI Administrator shall publish notification of withdrawal as specified in Sections 8.7.3 and 8.7.4. The annual program administrative fee is not refundable upon withdrawal.
- 5.1.5.1 If a PM withdraws, PM may not re-apply within 3 years of the withdrawal. The intent of this provision is to prevent withdrawal to avoid publication of a poor result.
- 5.1.5.2 If a PM withdraws and subsequently re-applies, then the provisions for a new application shall be followed.
- 5.2 Only new tower and tower repack/rebuild acceptance tests shall be reported.
- 5.2.1 All tests reported as prescribed by this Standard shall be conducted by LTAs.
- 5.2.2 A test will not be considered a CTI STD-202 Reportable Test unless the PM has been given a minimum of two weeks' notice to attend the testing.
- 5.2.3 The results of all completed acceptance tests with a test report and a calculated capability shall be reported by the LTAs for each PM as long as no PM controllable parameters (in the judgment of the LTA) are what kept the test out of the reportable limits in Section 6.2 per this Standard. Tests with PM controllable parameters outside of the limits shall not be reported as Candidate Tests that count toward the minimum required tests to remain in the program.
- 5.2.4 Tests with non-PM controllable parameters outside of the reportable limits per Section 6.2 shall be reported as completed without a test capability reported. Such Candidate Tests will count toward the minimum required tests for continued participation after year 2.
- 5.2.5 Reportable Test Results and Candidate Test information shall be transmitted to the CTPA and to the designated contact person for that PM in the format of Appendix B no later than 30 days after the completion of the test.
- 5.2.5.1 The CTPA shall acknowledge the receipt of each test result to the reporting LTA.
- 5.2.6 Reported Test Results shall be processed as one group for each PM.
- 5.2.7 Flow rate averages shall include all tests with a reported result.
- 5.2.8 The report form per Appendix B shall be transmitted by the LTAs to the CTPA in a sealed envelope marked "COOLING TECHNOLOGY INSTITUTE CUSTOM COOLING TOWER THERMAL PERFORMANCE RESULTS". A duplicate copy of each report shall also be transmitted to the designated contact person for that PM. The CTPA shall maintain confidentiality of individual test results.
- 5.3 Review of Test Results. Two review steps will take place before the appeal period begins each year.
- 5.3.1 The CTPA will tabulate and record a summary of all of the tests reported from each LTA in the format specified in Appendix D-1. A copy of the results for each LTA shall be provided to the LTA representative by December 15 of each year. Resolution with the LTAs must happen before the CTPA prepares the report for each PM by January 15 of each year.
- 5.3.2 After notification under Section 5.1.2, the CTPA will tabulate and record, (with no results from testing prior to becoming a PM included) a summary of the tower test capabilities, as reported by the LTAs for each PM over each Reporting Period, and summarize the results in the format specified in Appendix D-2. A copy of the results for each PM shall be provided to the designated contact person for that PM by January 15th of each year. This report shall be the basis for appeals by the PM per Section 7 before the date specified in Section 7.2. This report shall also be the basis by which a PM may note that a test has not been included which they believe should have been included. The resolution of inclusion of tests shall be conducted between the LTA involved and the PM. The inclusion of tests may also be appealed to the Custom Tower Program

- Committee if not resolved between the LTA and the PM.
- 5.3.3 In the case of multiple design points each with separate test results calculated for the same tower, the LTA shall report only one test result. The lowest of the performance results shall be reported.
- 5.4 Test Reporting.** On an annual basis, the CTPA will calculate and transmit to the CTI Administrator, and the CTI Administrator will publish (in accordance with Section 5.5), as available by December 1 of each calendar year, a report for each PM of the rolling summary of the test capabilities in the format specified in Appendix E, Table E-1. The CTPA will transmit by May 1 Tables E-1 for the program and E-2 for each PM to the current Custom Tower Program Committee Chair for use in determining which PMs are qualified to remain in the program, and which are qualified for publication of results. Table E-1 will be reviewed for consistency with all requirements and transmitted to the CTI Administrator by May 31. The CTIA will begin preparation of the publication including Table E-1, and submit galleys to the Chair of the Custom Tower Program Committee by June 15. Results will first be published in the July Journal and on the CTI website at the same time.
- 5.4.1 As a PM enters the program, a minimum of 3 total tests with a reported result is required to publish the calculated values per Section 5.5.
- 5.4.2 Requirements to remain in the program as a PM:
- 5.4.2.1 First full year in the program, a minimum of 1 LTA Reported Test Result over the course of that year is required to remain in the program.
- 5.4.2.2 Second full year in the program, a minimum of 2 LTA Reported Test Results during that year is required to remain in the program.
- 5.4.2.3 Third full year in the program and thereafter, a minimum of 3 total LTA tests during each year is required to remain in the program. A minimum of 2 tests must have reported results, and one of the 3 tests may be a Candidate Test.
- 5.4.3 Over the course of time, a maximum of 10 tests will be included in the calculations, with the oldest tests rolling out of the calculations as new ones are added so that only the 10 most recent tests are included in the calculations.
- 5.4.4 In the first two years, if less than 3 total tests with a result are reported, the results shall not be published.
- 5.4.5 After the second full year in the program, a PM who fails to have sufficient tests (three) to publish results shall be considered non-compliant with this Standard.
- 5.4.6 Retest results on towers for which the retest was requested by the PM, and approved per Section 5.6.6.3, shall be included in the averages but shall not be used as one of the three (3) required tests to enter publication of reported results. Retests on towers that are not approved per Section 5.6.6.3 are considered status tests. Except under unusual circumstances that must be approved per Sections 5.6.6.2 and 5.6.6.3, 2 years after commercial operation shall be the limit for inclusion of results from retesting.
- 5.4.7 The required tests shall not include towers previously tested for this program unless covered under section 5.5.
- 5.4.8 After notification that a former PM has rejoined the program under Section 5.1.4.1 or 5.1.4.2, the CTPA will accumulate the test capabilities, compute the results and transmit to the CTI Administrator, and the CTI Administrator shall publish an annual test summary in the July Journal for the year after rejoining and at the same time on the CTI Website for the manufacturer.
- 5.5 Publication of Results.**
- 5.5.1 The publishable performance results for each PM shall be included in each issue of the CTI Journal, beginning in the July after the test year and on the public CTI web site using the format of Appendix E-1 and include the following data:
- 5.5.1.1 Name of Participating Manufacturer
- 5.5.1.2 The range of Reporting Periods during which the tests were performed
- 5.5.1.3 Measurements specified below, as described in Section 5.4 (if there are less than 3 tests, then N.A. (for Not Available) shall be shown in each of the below):
- 5.5.1.4 Percentage of test results that are greater than or equal to 100%. (Values from 0 to 100 are shown)
- 5.5.1.5 Percentage of test results that are greater than or equal to 95%. (Values from 0 to 100 are shown)
- 5.5.1.6 Average of test results that are less than 95%. (If none are below 95%, N.A. shall be shown)
- 5.5.1.7 Comparable values for All Acceptance Tests shall be obtained from the Multi-

Agency Testing Report for that test year, and reported in Table E-1.

- 5.5.2 It is known that repeated testing on a given tower will show variability due to factors that may be noted in an uncertainty analysis or due to differences in test equipment, test set-up, and weather conditions as well as to the correctness of performance curves submitted. An exact value for this variability is not known, but in extreme cases may be up to 5%.

- 5.5.3 The results of testing by PMs in this program are published voluntarily by the PMs, thereby demonstrating their intent to sell cooling towers that have acceptable test results. In order to encourage continued participation and PM efforts to consistently produce cooling towers with acceptable results, any references to other PMs' results in advertising by PMs will not be accepted by CTI. Failure to conform with this provision is considered non-conformance subject to the provisions of Section 8. PMs are permitted only to refer to the CTI publication of the program results in the CTI Journal or on the CTI website via a link.

5.6 Custom Tower Program Committee.

- 5.6.3 The Custom Tower Program Committee shall be comprised of the CTI Administrator (CTIA) (non-voting), LTAs, PMs in this program, and three to five owner/operators of cooling towers who are CTI Members in good standing.

- 5.6.3.1 A chair and vice chair shall be elected by the committee for a two-year term aligned with the 2 year change in CTI President. After two consecutive 2 year terms, a different chair and vice-chair shall be elected. An owner-operator or general interest member should be the chair, if possible. The Chair and potentially the Vice-Chair may in the course of duties need to deal with confidential issues or information, so having the Chair be an owner-operator (or general interest) person could be critical. Where the Chair must abstain, the President can appoint a temporary Chair who is free of conflict of interest for that situation.

- 5.6.3.2 Owner/operator CTI member representatives are appointed by the CTI President for 2 year terms beginning the following CTI year (i.e., the transition is during the Annual Conference as with

other CTI positions.) If an owner/operator position is vacated during a term, the CTI President may appoint a replacement to fulfill the remainder of the term.

- 5.6.3.3 A Chair and Vice-Chair shall be elected during the Annual Conference. Members whose voting representative is located outside North America shall be considered as International Members.

- 5.6.3.4 International Members shall count for, but not against the requirements for quorum at the Annual Conference and the Committee Workshop. Otherwise, rules for voting shall be according to CTI Policies and Procedures and Bylaws.

- 5.6.3.5 An odd number of committee members is preferred to reduce the chance of tie votes.

- 5.6.4 A test participant (also known as a party to the test) requesting a test be excluded, the LTA involved, and the affected owner/operator, if a member of the committee, shall abstain from voting on such exclusion. In the event sufficient members disqualify themselves on a particular vote, the Chair or Vice-Chairs (in order of tenure) on the Multi-Agency Testing Committee shall provide a tie-breaking vote if needed, provided that they themselves are not involved in the issue at hand.

- 5.6.5 A test participant requesting that an omitted test be included, the LTA involved, and the affected owner/operator, if a member of the committee, shall abstain from voting on such an inclusion. In the event sufficient members disqualify themselves on a particular vote, the Chair or Vice-Chairs (in order of tenure) on the Multi-Agency Testing Committee shall provide a tie-breaking vote if needed, provided they themselves are not involved in the issue at hand.

- 5.6.6 The Custom Tower Program Committee shall be responsible to:

- 5.6.6.1 Develop the promotional portion of the administrative fee, and review and approve the fee per Sections 9.2 and 9.3.

- 5.6.6.2 Hear and respond to requests from test participants to exclude or include test results within the time period between January 15, and notifying the CTPA of appeal results by April 15 of each year, so that final results can be calculated and published in the July Journal and on the CTI Website at the same time.