ASME PTC 30.1-2007

REAFFIRMED 2020

Air-Cooled Steam Condensers

Performance Test Codes

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

ASME SETTING THE STANDARD

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Date of Issuance: June 24, 2008

This Code will be revised when the Society approves the issuance of a new edition. There will be no addenda issued to ASME PTC 30.1-2007.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this document. Periodically certain actions of the ASME PTC Committee may be published as Code Cases. Code Cases and interpretations are published on the ASME Web site under the Committee Pages at http://cstools.asme.org as they are issued.

The American Society of Mechanical Engineers
Three Park Avenue, New York, NY 10016-5990

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Nonmandatory Appendices

NOTICE

All Performance Test Codes must adhere to the requirements of ASME PTC 1, General Instructions. The following information is based on that document and is included here for emphasis and for the convenience of the user of the Code. It is expected that the Code user is fully cognizant of Sections 1 and 3 of ASME PTC 1 and has read them prior to applying this Code.

ASME Performance Test Codes provide test procedures that yield results of the highest level of accuracy consistent with the best engineering knowledge and practice currently available. They were developed by balanced committees representing all concerned interests and specify procedures, instrumentation, equipment-operating requirements, calculation methods, and uncertainty analysis.

When tests are run in accordance with a Code, the test results themselves, without adjustment for uncertainty, yield the best available indication of the actual performance of the tested equipment. ASME Performance Test Codes do not specify means to compare those results to contractual guarantees. Therefore, it is recommended that the parties to a commercial test agree before starting the test and preferably before signing the contract on the method to be used for comparing the test results to the contractual guarantees. It is beyond the scope of any Code to determine or interpret how such comparisons shall be made.

FOREWORD

The history of this performance test code started in 1960 when the Board on Performance Test Codes organized PTC 30 on Atmospheric Cooling Equipment. It was the first attempt by ASME to provide procedures for testing air-cooled heat exchangers. Except for a preliminary draft, the Code was not completed at that time due to the death of the Chair and he was its only Committee Member. In 1977 the Board decided to resume the effort to produce a performance test for air-cooled heat exchangers. Subsequently a committee was formed and developed an appropriate Code after several years. The title of the new Code was revised to "Air-Cooled Heat Exchangers" and on February 15, 1991, the Code was approved as an American National Standard.

The 1991 issue of that Code was a credit to those on the Committee. It was very comprehensive, erudite, and a definite contribution to the art of engineering. But it was infrequently used due to the difficulty of measuring the airflow through the equipment and other aspects of its application to the great variety of exchangers that existed and the minimal acceptance testing that was traditionally specified in the general heat exchanger industry.

During 2002, the Board on Performance Test Codes had taken notice that air-cooled steam condensers (ACCs) were being largely installed on power plants at an increasing rate throughout the country and the world. At that point in time, there were over 600 ACCs worldwide with more than fifty large applications of the technology in the United States. These machines are essentially enormous radiators served by a multiplicity of fans that, compared to water-cooled condensers, are relatively expensive and generally exhibit a poorer performance. They were being applied however in order to conserve water resources; to allow a particular plant to be located in water scarce regions; to reduce the aquatic and airborne environmental effects often associated with once-through or wet cooling towers; and to bring projects to completion quickly without having to address restrictive regulations related to any future use of cooling waters. In addition, because their size could be as big as an acre or more, it appeared there was there was no directly fitting test code that would allow a cost-effective, practical engineering performance test of the equipment. Thus, in November 2002, the Board on Performance Test Codes directed a committee be formed to update and/or produce a test code applicable to these air-cooled condensers. A large national Committee was convened the following year that was comprised of experts from manufacturing, utility-owners, test agency, academia, and consultants in the field.

Before the work of revising or drafting up a Code began, a careful review of PTC 30 was undertaken and some field-test experience with that Code was reported to the Committee. As a result, the Committee decided not to update the existing Code but rather to create a new Code expressly for the performance testing of the ACCs utilized on power plants. Hence, the existing Code was retained and a new Code was designated as PTC 30.1, Air-Cooled Steam Condensers.

The general focus of PTC 30.1 is acceptance testing. Recognizing, however, the importance of minimal turbine exhaust pressure on plant generation, the Committee also featured two Appendices of the Code that address both methods of Performance Monitoring and Routine Performance Testing. These appendices contain pragmatic techniques that use lesser accuracy instrumentation and procedures that will allow plant personnel to maintain the lowest turbine backpressures without the higher costs or engineering efforts associated with acceptance testing.

This edition of PTC 30.1, Air-Cooled Steam Condensers was approved by the Performance Test Code Committee 30.1 on April 30, 2007 and by the Performance Test Codes Standards Committee on April 30, 2007, and approved and adopted as a Standard practice of the Society by action of the Board on Standardization and Testing on June 7, 2007. This edition was approved by the American National Standards Institute on August 17, 2007.

ASME PTC COMMITTEE
Performance Test Codes

(The following is the roster of the Committee at the time of approval of this Standard.)

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CORRESPONDENCE WITH THE PTC 30.1 COMMITTEE

General. ASME Codes are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Code may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to

Secretary, PTC 30.1 Standards Committee
The American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990

Proposing Revisions. Revisions are made periodically to the Code to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Code. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Code. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Proposing a Case. Cases may be issued for the purpose of providing alternative rules when justified, to permit early implementation of an approved revision when the need is urgent, or to provide rules not covered by existing provisions. Cases are effective immediately upon ASME approval and shall be posted on the ASME Committee Web page.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Code, the paragraph, figure or table number(s), and be written as a Question and Reply in the same format as existing Cases. Requests for Cases should also indicate the applicable edition(s) of the Code to which the proposed Case applies.

Interpretations. Upon request, the PTC 30.1 Committee will render an interpretation of any requirement of the Code. Interpretations can only be rendered in response to a written request sent to the Secretary of the PTC 30.1 Standards Committee.

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Code for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format will be rewritten in this format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The PTC 30.1 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the PTC 30.1 Standards Committee.

AIR-COOLED STEAM CONDENSERS

Section 1
Object and Scope

1-1 OBJECT

This Code provides uniform test methods for conducting and reporting thermal performance characteristics of mechanical draft air-cooled steam condensers (ACC) operating under vacuum conditions.

This Code provides explicit test procedures to yield results of the highest levels of accuracy consistent with the best engineering knowledge taking into account test costs and the value of the information obtained from testing and practice currently available. This Code provides rules for conducting acceptance tests. It also provides guidelines for monitoring thermal performance and conducting routine tests.

The tests can be used to determine compliance with contractual obligations and the Code can be incorporated into commercial agreements. A test shall be considered an ASME Code Test only if the test procedures comply with those stipulated in this Code and the post-test uncertainty analysis results are in accordance with subsection 1-3.

1-2 SCOPE

This Code provides rules for determining the thermal performance of the referenced equipment with regard to the steam flow capability while meeting any applicable fan power guarantees. This steam flow capability may be alternatively expressed as a deviation from design flow capability, a deviation from design turbine backpressure, or as the absolute value of the steam turbine backpressure. This Code also provides procedures for assessing compliance to specified dissolved oxygen and specified condensate temperature. This Code does not address procedures for assessing noise.

The Code is not intended for tests of

(a) devices for which the process fluid is above atmospheric pressure

(b) devices for process fluids other than steam

(c) devices for single-phase process fluids

(d) wet surface air cooled condensers

(e) natural draft or fan-assisted air cooled condensers

(f) air-cooled condensers with inlet air conditioning in-service

The determination of special data or verification of guarantees that are outside the scope of this Code shall be made only with the written agreement of the parties to the test. The agreed methods of measurement and computation shall be defined in writing and fully described in the test report.

1-3 UNCERTAINTY

The explicit measurement methods and procedures have been developed to provide a test of the highest level of accuracy consistent with practical limitations for acceptance testing. Any departure from Code requirements could introduce additional uncertainty beyond that considered acceptable to meet the objectives of the Code.

The application of uncertainties to adjust test results is not part of this Code; the test results themselves provide the best indication of actual performance. The uncertainty is used to determine the quality of the test and reflects the accuracy of the test instrumentation and stability of the test conditions. Test tolerance, margin, and allowance are commercial matters that are not addressed by this Code.

The maximum uncertainties shown below are limits — not targets. A Code precept is to design a test for the highest practical level of accuracy based on current engineering knowledge. For a commercial test, this philosophy is in the best interest of all parties to the test. Deviations from the methods stated in this Code are acceptable only if it can be demonstrated to the test parties that the deviations provide equal or lower uncertainty in the calculated test result.

A pretest uncertainty analysis shall be performed to establish the expected level of uncertainties for the test, including an estimate of the random (precision) uncertainty based on experience.

A post-test uncertainty analysis is similarly required. The results of a thermal performance test, conducted in full compliance with the procedures and instrumentation specified in this Code, shall be considered valid if