ASME PTC 23-2003

[Revision of ANSI/ASME PTC 23-1986 (R1997)]

ATMOSPHERIC WATER COOLING EQUIPMENT

PERFORMANCE TEST CODES

REAFFIRMED 2014

FOR CURRENT COMMITTEE PERSONNEL
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AN AMERICAN NATIONAL STANDARD

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Date of Issuance: November 10, 2003

This Standard will be revised when the Society approves the issuance of a new edition. There will be no addenda issued to this edition.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the ASME Web site under the Committee Pages at http://www.asme.org/codes/ as they are issued.

The American Society of Mechanical Engineers
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FOREWORD

In 1918, revision began on the original ten Codes that formed the 1915 edition of the ASME Power Test Codes and it was decided to include water cooling in the list of revised Codes. Following the appearance of the Test Code for Atmospheric Water Cooling Equipment in tentative form in the August 1928 issue of *Mechanical Engineering*, the Society presented this Code for discussion at a public hearing held in December 1928 during its annual meeting in New York. The Code was approved at the June 2, 1930 meeting of the Standing Committee, and was adopted by the Council as a standard practice of the Society on August 4, 1930.

A new Technical Committee for Atmospheric Water Cooling Equipment was formed in 1948 to update the Code. Agreement on the location for the wet-bulb temperature measurement was the major issue. While there was general recognition that tower performance was governed by the entering wet-bulb temperature, at that time there was concern about responsibility for plume re-circulation and interference. The difficulty of obtaining adequate air temperature coverage of both sides of large towers was considered insurmountable. For this reason, some believed it would be better to relate performance to an ambient temperature measured some distance upwind and to have performance stated and substantiated on that basis.

In 1954, a seven-person Subcommittee with representation from the American Society of Refrigeration Engineers and the Cooling Tower Institute (now known as Cooling Technology Institute) was appointed to abbreviate and bring to an early conclusion the work of the 1948 Technical Committee. The Subcommittee's work was completed and a Code based on ambient wet-bulb temperature measurement was adopted by the Society on January 29, 1958. The growing number and size of towers, the evolution of the natural draft tower, and continuing disagreement on ambient versus entering wet-bulb temperature led to the formation of a new Committee in December 1968. Modern instrumentation and the availability of data acquisition systems had advanced measurement methods since the 1958 Code. Model test results and error analysis made available to the Committee supported the position that tower performance should be related to entering wet-bulb temperature in the revised Code. This issue of the Code was approved by ANSI and published by the Society in November 1986.

Continued advances in instrumentation, experiences with the testing itself and test uncertainty, installation of a variety of other types of evaporative cooling equipment, and more stringent environmental regulations led to the convening of a new Committee in 1995. Its objective was to extend the Code to include plume abatement compliance of wet–dry towers and the performance test procedures for cooling towers, closed circuit evaporative coolers and wet surface air-cooled condensers. In the interim, the impact on plant economics of the cooling system's operating performance became better understood. Hence, Appendix A in the new Code addresses practical techniques of monitoring the performance of cooling towers.

As in past editions of PTC 23, the most accurate test methods were established as Code. However, the Committee was aware that for some towers, an elaborate test was not practical or economically viable. Therefore, nonmandatory Appendix K provides simpler test methods. These test methods, being less accurate, have a higher uncertainty.

To expedite the completion of this version of the Code, sections of CTI Code ATC-105 were used with the permission of the Cooling Technology Institute (CTI). That contribution is acknowledged and appreciated.

The Committee voted to approve the document on November 13, 2002. It was then approved and adopted by the Council as a Standard practice of the Society by action of the Board on Performance Test Codes on February 28, 2003. The Code was also approved as an American National Standard by the ANSI Board of Standards Review on March 13, 2003.

PERFORMANCE TEST CODE COMMITTEE 23 ON ATMOSPHERIC WATER COOLING EQUIPMENT

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

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The Committee acknowledges with thanks the contributions made by Marcel R. Lefevre to the initial development of this revision and for his initiative in helping to reconstitute the Committee.

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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 23 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.

Interpretations. Upon request, the PTC 23 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 23 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, which 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 23 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the PTC 23 Standards Committee.

INTRODUCTION

This Code describes instruments, test procedures, and analysis of test data to be used to determine the performance of all designs of cooling towers and evaporative cooling equipment. It defines procedures that determine the plume abatement compliance of wet-dry cooling towers. The Code outlines practical methods of monitoring the performance of cooling towers in an appendix. It provides explicit test procedures that will yield results of the highest level of accuracy, consistent with the best current engineering practices and knowledge in this field. The Code is not intended to be used for spray-cooling devices, cooling canals or ponds, or cooling lakes.

To aid in an overall study of the Code, the following review sequences are suggested.

A quick survey of the Code can be obtained by reading the introductions to each section followed by the Test Procedures.

At the plant design, contractual agreement, or specification stage, it is advisable to review in order:

(a) achievable test uncertainty stated in Object and Scope section

(b) test procedures or alternatively the particular special test from the appendix

(c) Guiding Principles section

(d) Instruments and Methods of Measurement section for the recommended requirements, particularly the water flow measurement

Performance monitoring projects should review Appendix A before reviewing the details of Code Sections.

When this Code is to be used as a means to determine fulfillment of contract obligations, the contracting parties shall agree in advance on the test procedures, uncertainty estimates and implications, methods of presentation of data, and presentation of results.

Considerable efforts were made to write this cooling tower Code so that all the related technology was contained within the document itself; however, in all instances this was not possible. In these cases and unless otherwise specified, all references to other codes refer primarily to ASME Performance Test Codes or to Cooling Technology Institute Standards. Any terms not defined herein are listed in the Code in Definitions and Values, ASME PTC 2. Descriptions of instruments and apparatus may be found in the PTC 19 series of supplemental codes. The general basis of the uncertainty analysis beyond that specified in this Code may be found in the supplement ASME PTC 19.1, Test Uncertainty. A careful study should be made of all the referenced codes, but in the event of discrepancies between specific directions contained herein and those codes incorporated by reference, ASME PTC 23 shall govern.