ASME PTC 19.3 TW-2010

Thermowells

Performance Test Codes

AN AMERICAN NATIONAL STANDARD

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Three Park Avenue • New York, NY • 10016 USA

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This Code will be revised when the Society approves the issuance of a new edition. There will be no addenda issued to PTC 19.3 TW-2010.

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.

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FOREWORD

In 1957, the ASME Performance Test Codes Committee 19.3 determined that the 1930 edition of the *Supplement on Temperature Measurement* dealing with thermowells was unsatisfactory. Since the design of thermowells requires both thermal and stress considerations, the ASME Boiler and Pressure Vessel Committee was approached for assistance. However, the special needs for the design of intrusive pipe fittings were deemed beyond the scope of what could be properly included in the vessel codes.

The PTC 19.3 Committee is charged with temperature measurement and thermowell design. The purpose of the thermowell is to facilitate temperature measurement while resisting fluid forces of the process. This committee undertook the task of providing guidance in this area, on the basis of a paper authored by J. W. Murdock [1], ultimately leading to the publication of PTC 19.3-1974, *Supplement on Instruments and Apparatus, Part 3, Temperature Measurement*. Prior to the acceptance of PTC 19.3-1974, the incidence of thermowell failures during the start-up testing of high-pressure steam turbines was unacceptable; its subsequent use in steam services has been highly successful at preventing catastrophic thermowell failure.

Since its publication, PTC 19.3 has received widespread acceptance and use in both steam and nonsteam applications outside the scope of the performance test codes. In 1971 an ASME ad hoc committee, PB51, under the jurisdiction of the PTC Board, was formed to assess the thermowell standard. This committee, designated PTC 19.3.1, produced a draft thermowell standard. In 1999, PTC 19.3 undertook the task of completing this draft. In the course of this effort, it was discovered that a number of thermowells designed to PTC 19.3-1974 but placed in nonsteam services suffered catastrophic failure. Review of the literature revealed that the PTC 19.3.1 draft did not incorporate recent, significant advances in our knowledge of thermowell behavior, and the committee decided to thoroughly rewrite the standard. The goals of the new Standard are to provide a thermowell rating method that can be used in a myriad array of services, including processes involving corrosive fluids; offer advice where fatigue endurance is critical; and establish criteria for insuring sensor reliability. These factors result in a more reliable basis for thermowell design than the PTC 19.3-1974 Supplement. It is intended that this edition of this Standard not be retroactive.

PTC 19.3 TW on thermowells was approved by the PTC Standards Committee on January 15, 2010, and approved and adopted as a Standard practice of the Society by action of the Board on Standardization and Testing on February 18, 2010. It was also approved as an American National Standard by the ANSI Board of Standards Review on April 22, 2010.

ACKNOWLEDGMENTS

The Committee gratefully acknowledges the special contributions of R. D. Blevins, D. R. Frikken, W. J. Koves, and A. Löbig.

ASME PTC COMMITTEE
Performance Test Codes

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

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Secretary, PTC Standards Committee
The American Society of Mechanical Engineers
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http://go.asme.org/inquiry

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.

Request for cases shall provide a Statement of Need and background information. The request should identify the Code, 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 of the Code to which the proposed Case applies.

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

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

Subject:	Cite the applicable paragraph number(s) and a concise description.
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 the appropriate 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. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The PTC Standards Committee and its subcommittees, such as PTC 19.3, hold meetings or telephone conferences, which are open to the public. Persons wishing to attend any meeting or telephone conference should contact the Secretary of the PTC Standards Committee.

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THERMOWELLS

Section 1
Object and Scope

1-1 OBJECT

The object of this Standard is to establish a mechanical design standard for reliable service of tapered, straight, and stepped-shank thermowells in a broad range of applications. This includes an evaluation of the forces caused by external pressure, and the combination of static and dynamic forces resulting from fluid impingement.

1-2 SCOPE

This Standard applies to thermowells machined from bar stock and includes those welded to or threaded into a flange as well as those welded into a process vessel or pipe with or without a weld adaptor. Thermowells manufactured from pipe are outside the scope of this Standard.

Thermowells with specially designed surface structures (e.g., a knurled surface or a surface with spiral ridges) are beyond the scope of this Standard, due to the difficulty of providing design rules with broad applicability for these types of thermowells.

Thermowell attachment methods, standard dimensions, parasitic vibration of a sensor mounted inside the thermowell, and thermal equilibrium of the sensor relative to the process stream are beyond the scope of this Standard. In addition, thermowells fabricated by welding, including flame spray or weld overlays, at any place along the length of the shank or at the tip are outside the scope of this Standard.