ASME PTC 25-2023
(Revision of ASME PTC 25-2018)

Pressure Relief Devices

Performance Test Codes

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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The American Society of Mechanical Engineers
Two Park Avenue • New York, NY • 10016 USA

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This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The standards committee that approved the code or standard was balanced to ensure that individuals from competent and concerned interests had an opportunity to participate. The proposed code or standard was made available for public review and comment, which provided an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

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The endnotes and preamble in this document (if any) are part of this American National Standard.

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NOTICE

All ASME Performance Test Codes (PTCs) shall adhere to the requirements of ASME PTC 1, General Instructions. It is expected that the Code user is fully cognizant of the requirements of ASME PTC 1 and has read them before applying ASME PTCs.

ASME PTCs provide unbiased test methods for both the equipment supplier and the users of the equipment or systems. The Codes are developed by balanced committees representing all concerned interests and specify procedures, instrumentation, equipment-operating requirements, calculation methods, and uncertainty analysis. Parties to the test can reference an ASME PTC confident that it represents the highest level of accuracy consistent with the best engineering knowledge and standard practice available, taking into account test costs and the value of information obtained from testing. Precision and reliability of test results shall also underlie all considerations in the development of an ASME PTC, consistent with economic considerations as judged appropriate by each technical committee under the jurisdiction of the ASME Board on Standardization and Testing.

When tests are run in accordance with a Code, the test results, without adjustment for uncertainty, yield the best available indication of the actual performance of the tested equipment. Parties to the test shall ensure that the test is objective and transparent. All parties to the test shall be aware of the goals of the test, technical limitations, challenges, and compromises that shall be considered when designing, executing, and reporting a test under the ASME PTC guidelines.

ASME PTCs do not specify means to compare test results to contractual guarantees. Therefore, the parties to a commercial test should 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 ASME PTC to determine or interpret how such comparisons shall be made.

FOREWORD

In December 1948, the ASME Boiler and Pressure Vessel Committee recommended to the ASME Performance (then Power) Test Codes Committee that a code be prepared on the testing of safety and relief valves. This request resulted in the publication of the original test code for safety and relief valves (PTC 25-1958) and was applicable only to tests with atmospheric discharge. In June 1964, the ASME Performance (then Power) Test Code Committee authorized PTC Committee Number 25 on Safety and Relief Valves to prepare a single test code (PTC 25.2-1966) to cover testing of valves discharging to atmosphere, superimposed, or built-up back pressure. In March 1971, the ASME Performance Test Codes Committee authorized PTC Committee Number 25 on Safety and Relief Valves to prepare a general revision to the test code, the result of which was PTC 25.3-1976, approved as an American National Standard on August 19, 1976.

In 1978, the ASME Board on Performance Test Codes once again authorized the PTC Committee Number 25 to prepare a general revision of the test code. The revision, PTC 25.3-1988, approved by the ASME Board on Performance Test Codes on March 14, 1988, differed from its predecessors primarily by the omission of the section concerning theoretical relieving capacity and coefficient of discharge.

In 1991, the ASME Board on Performance Test Codes revised the name of PTC Committee Number 25 to "Pressure Relief Devices" and authorized the committee to prepare a revised test code of the same name with a scope that was extended to include a broader range of closing and non-reclosing pressure relief devices and to broaden the discussion of in-service and bench testing. The revised Code, ASME PTC 25-2001, was approved and adopted by the American National Standards Institute (ANSI) as meeting the criteria as an American National Standard on May 25, 2001.

The next edition, ASME PTC 25-2008, divided the Code into its current three-Part structure, as follows:

(a) Part I, "General," includes Sections 1 and 2.

(b) Part II, "Flow Capacity Testing," includes the preceding Sections 1 and 2, along with Sections 3 through 6 and appendices.

(c) Part III, "In-Service and Bench Testing," includes the preceding Sections 1 and 2, along with Sections 7 through 10 and appendices.

ASME PTC 25-2008 was approved by ANSI on September 16, 2008.

ASME PTC 25-2014 was approved by ANSI on May 5, 2014.

ASME PTC 25-2018 was approved by ANSI on October 24, 2018.

This Code is available for public review on a continuing basis. Public review provides an opportunity for additional input from industry, academia, regulatory agencies, and the public-at-large.

ASME PTC 25-2023 was approved by ANSI on October 16, 2023.

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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CORRESPONDENCE WITH THE PTC COMMITTEE

General. ASME codes and standards are developed and maintained by committees with the intent to represent the consensus of concerned interests. Users of ASME codes and standards may correspond with the committees to propose revisions or cases, report errata, or request interpretations. Correspondence for this Code should be sent to the staff secretary noted on the committee's web page, accessible at https://go.asme.org/PTCcommittee.

Revisions and Errata. The committee processes revisions to this Code on a continuous basis 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 in the next edition of the Code.

In addition, the committee may post errata on the committee web page. Errata become effective on the date posted. Users can register on the committee web page to receive e-mail notifications of posted errata.

This Code is always open for comment, and the committee welcomes proposals for revisions. Such proposals should be as specific as possible, citing the paragraph number, the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent background information and supporting documentation.

Cases

(a) The most common applications for cases are

(1) to permit early implementation of a revision based on an urgent need

(2) to provide alternative requirements

(3) to allow users to gain experience with alternative or potential additional requirements prior to incorporation directly into the Code

(4) to permit the use of a new material or process

(b) Users are cautioned that not all jurisdictions or owners automatically accept cases. Cases are not to be considered as approving, recommending, certifying, or endorsing any proprietary or specific design, or as limiting in any way the freedom of manufacturers, constructors, or owners to choose any method of design or any form of construction that conforms to the Code.

(c) A proposed case shall be written as a question and reply in the same format as existing cases. The proposal shall also include the following information:

(1) a statement of need and background information

(2) the urgency of the case (e.g., the case concerns a project that is underway or imminent)

(3) the Code and the paragraph, figure, or table number

(4) the editions of the Code to which the proposed case applies

(d) A case is effective for use when the public review process has been completed and it is approved by the cognizant supervisory board. Approved cases are posted on the committee web page.

Interpretations. Upon request, the committee will issue an interpretation of any requirement of this Code. An interpretation can be issued only in response to a request submitted through the online Interpretation Submittal Form at https://go.asme.org/InterpretationRequest. Upon submitting the form, the inquirer will receive an automatic e-mail confirming receipt.

ASME does not act as a consultant for specific engineering problems or for the general application or understanding of the Code requirements. If, based on the information submitted, it is the opinion of the committee that the inquirer should seek assistance, the request will be returned with the recommendation that such assistance be obtained. Inquirers can track the status of their requests at https://go.asme.org/Interpretations.

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.

Interpretations are published in the ASME Interpretations Database at https://go.asme.org/Interpretations as they are issued.

Committee Meetings. The PTC Standards Committee regularly holds meetings that are open to the public. Persons wishing to attend any meeting should contact the secretary of the committee. Information on future committee meetings can be found on the committee web page at https://go.asme.org/PTCcommittee.

INTRODUCTION

This Code provides standards for conducting and reporting tests on reclosing and non-reclosing pressure relief devices normally used to terminate an abnormal internal or external rise in pressure above a predetermined design value in boilers, pressure vessels, and related piping equipment. This Code covers the methods and procedures to determine relieving capacity and additional operating characteristics that may be required for certification or other purposes by other codes. This is accomplished by dividing the Code into three parts: Part I, "General"; Part II, "Flow Capacity Testing"; and Part III, "In-Service and Bench Testing."

This Code does not necessarily cover the methods and procedures to satisfy operating and other conditions as may be required by other codes. Establishment of pressure relief device ratings and rules of safe construction do not fall within the province of this Code.

PART I
GENERAL

Section 1
Object and Scope

1-1 OBJECT

The object of the test is to determine the performance of pressure relief devices. These tests determine one or more of the following:

(a) dimensional, operational, and mechanical characteristics

(b) relieving pressure

(c) relieving flow capacity at test pressure

(d) individual flow resistance

Procedures for conducting the tests, calculating the results, and making corrections are defined.

1-2 SCOPE

(a) This Code provides instructions in Part II for flow capacity testing and in Part III for in-service and bench testing. Testing of reclosing and non-reclosing pressure relief devices is conducted under various inlet and outlet conditions using steam, gases, and liquids for which valid physical properties are known.

(b) The validity of tests shall be determined in accordance to the requirements of subsection 1-3.

1-3 MEASUREMENT UNCERTAINTY

In order to qualify as a valid code test, the total uncertainties of the test, as calculated by the procedures of ASME PTC 19.1, must be equal to or less than the values of maximum acceptable uncertainty. The maximum acceptable uncertainty of the final flow measurement shall not exceed ±2.0% of the measured value. For results other than flow measurements, the maximum acceptable uncertainty shall not exceed ±0.5% of the measured value as determined in accordance with Part II or ±1.0% of the measured value as determined in accordance with Part III.

1-4 GENERAL

(a) It is assumed that the testing facility has adequate capacity and sufficient pressure to conduct the tests. However, the users of this Code are cautioned that the capacity and pressure limitations of the testing facility may restrict the determination of satisfactory operating conditions and other operational features of the pressure relief device.

(b) In addition, field installation and/or abnormal operating conditions may adversely affect the function of the pressure relief device. It is not the intent of this Code to attempt to assess the suitability or reliability of the pressure relief device under such conditions. It should also be noted that if the temperature of the medium used to test the pressure relief device differs substantially from the temperature to which the pressure relief device is subjected while in service, the functional characteristics will be different from the test pressures, i.e., opening, closing, blowdown, and bursting pressure. In this case, it is necessary to develop appropriate corrections for the pressure relief device under test to account for these differences, which is outside the scope of this Code.

(c) This Code provides recommended test procedures and instrumentation for testing devices. Other test procedures or instrumentation may be used provided they can be demonstrated as having accuracy and reliability at least equal to the requirements of this Code. If another procedure or instrumentation will be used, it is subject to written agreement by the parties to the test prior to the test.

(d) The test results shall be reported as measured and calculated. Only tests that comply fully with the mandatory requirements of this Code may be designated as tests conducted in accordance with ASME PTC 25. References to other codes, unless otherwise indicated, refer to ASME Performance Test Codes. Should any specific direction in this Code, or any particular measurement, differ from those given in other ASME Performance Test Codes for similar measurements, the instructions of this Code shall prevail.

(e) The requirements of ASME PTC 1 shall be met.

(f) In some cases, the testing of pressure relief devices may involve the use of high-pressure and high-temperature fluid. Hazards to personnel will exist unless adequate precautionary measures are taken. Special consideration