ASME PTC 39-2005

(Revision and Redesignation of ASME PTC 39.1-1980)

REAFFIRMED 2020

Steam Traps

Performance Test Codes

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

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Three Park Avenue • New York, NY 10016

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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 ASME PTC 39-2005.

ASME issues written replies to inquiries as code cases and interpretations of technical aspects of this document. Code cases and 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
Three Park Avenue, New York, NY 10016-5990

CONTENTS

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 Performance Test Codes Supervisory Committee, at its June 1974 Administrative meeting, authorized the formation of a Code Technical Committee to explore the possibility of writing a test code on condensate removal devices. This committee was organized January 15, 1975. At its organizational meeting, the committee proposed the writing of two codes, PTC 39.1 on Condensate Removal Devices for Steam Systems and PTC 39.2 on Condensate Removal Devices for Air Systems. This proposal was approved by the Performance Test Codes Supervisory Committee.

The Code for Condensate Removal Devices for Steam Systems was approved by the Performance Test Codes Supervisory Committee on April 1, 1980. It was further approved as an American National Standard by the ANSI Board of Standard Review on July 3, 1980.

This committee has been operating as PTC 39 Steam Traps.

The original document was a compromise which had three sets of existing test equipment to be utilized. We therefore satisfied the consensus standard.

The current document is generic and can fit other test platforms too.

The original publication was submitted without an uncertainty analysis. Mr. David Fisher of Armstrong Machine Works offered a magnificent theoretical treatise which is in our Appendix I.

It is a privilege to acknowledge the efforts of those who are currently not on the committee:

Thomas Alesson, Datron Systems — Nicholson Division
Warren Brand, Yarway
Thomas W. Carr, Jr., Spirax Sarco Inc.
Robert Collins, Watson Daniel Co.
Walter T. Deacon, Armstrong Machine Works
Keith Foley, Celanese Canada, Inc.
Robert W. Henry, Salt River Project — Power Generation Systems
Milton Hilmer, Sarco
David Kalix, Yarway Corp.
William Mashburn, Virginia Polytechnic Institute and State University — Mechanical Engineering Department
Elmer S. Monroe, DuPont
James W. Murdock, Mechanical Engineering of Drexel University
Richard G. Obst, Spence Engineering Co., Inc./Nicholson Steam Trap
William H. Schilling, Schilling Associates Inc.
William F. Sisson, Armstrong Machine Works
Horst R. Thieme, Watson McDaniel Co.

We are aware that the preferred SI unit for time is seconds. However, the overwhelming customary unit in our industry is the capacity dimension of lb mass/hour. We have chosen to not include the rigorous usage but continue that which is common usage.

ASME PTC 39-2005 was adopted by the American National Standards Institute as an American National Standard on May 5, 2005.

PERFORMANCE TEST CODE COMMITTEE PTC 39 ON STEAM TRAPS

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

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M. A. Brookes, *Secretary*

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J. G. Yost, Sargent & Lundy

CORRESPONDENCE WITH THE PTC 39 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 39 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 39 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 39 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 39 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the PTC 39 Standards Committee.

INTRODUCTION

This Code provides for the testing of steam traps in order to determine performance characteristics. It is based on the use of accurate instrumentation and the best analytical and measurement procedures currently available.

A study of the Code on General Instructions, PTC 1, is recommended as an introduction to essential procedures necessary for the proper use of this Code. The mandatory requirements contained therein are incorporated in this Code in Section 3.

The Code on Definitions and Values, PTC 2, defines certain technical terms and numerical constants, and their use is mandatory when applicable.

Reference is made to Performance Test Code Supplements on Instruments and Apparatus, PTC 19 series (abbreviated I&A), for general information and instructions on instrumentation. The specific directions of this Code, however, shall prevail for any instrument, procedure, or measurement which may differ from that given in another ASME publication.

This Code is recommended for use in conducting acceptance tests of steam traps. If so used, any deviations from Code procedure must be agreed upon in writing. In the absence of any written agreement, the code requirements shall be mandatory.

STEAM TRAPS

Section 1
Object and Scope

1-1 SCOPE

This Code covers steam traps which are devices used for removing condensate and noncondensibles from steam systems.

1-2 OBJECT

The purpose of this Code is to specify and define the practice of conducting tests of steam traps to determine:

(*a*) steam loss, under specified conditions. This test procedure does not account for convection and radiation losses. These can be determined separately.

(*b*) condensate discharge capacity, for specified conditions of saturated and subcooled condensate and back pressure.

(*c*) air and noncondensible gas removal capacity, under specified conditions.

1-3 UNCERTAINTY ANALYSIS

This Code includes the methods and examples to determine the uncertainty of the tests performed in accordance with it. This Committee prefers to define the test instrumentation and limit the allowable data fluctuations. This is equivalent to putting an upper limit on the allowable post-test uncertainty and ensures the validity of the test.

This Committee suggests that the post-test uncertainty should not exceed the following:

Quantity	Uncertainty
Condensate discharge rate less than 200 lbm/hr (91 kg/h)	10%
Condensate discharge rate 200 lbm/hr or greater (91 kg/h)	5%
Air discharge rate	10%
Steam loss rate greater than 20 lbm/hr (9.1 kg/h)	10%
Steam loss rate 20 lbm/hr (9.1 kg/h) down to 5 lbm/hr (2.3 kg/h)	15%
Steam loss rate 5 lbm/hr (2.3 kg/h) down to 1 lbm/hr (450 g/h)	25%

However, the steam loss calculations involve the differences of very large numbers and at low steam loss rates, the post-test uncertainty can become very large.

Section 2
Definitions and Descriptions of Terms

2-1 GENERAL

For terms and definitions not included in this Section, reference should be made to ASME PTC 2, Code on Definitions and Values.

2-2 STEAM TRAP

A device which permits the removal of condensate and air and other noncondensible gases, for steam systems at or below saturated steam temperature, and prevents or limits the discharge of live steam.

2-3 CAPACITY OF A STEAM TRAP

The amount of condensate per unit time which will be discharged continuously from the steam trap under specified conditions of pressure differential and inlet subcooling. Capacity is expressed in units of pounds mass per hour or kilograms per hour.

2-4 PRESSURE

Pressure is expressed in units of pounds force per square inch or pascals.

(*a*) Absolute pressure is the algebraic sum of the atmospheric pressure and gage pressure.

(*b*) Atmospheric pressure is the force per unit area exerted by the atmosphere. Standard atmospheric pressure is 760 mm of mercury at 0°C. This is equivalent to 101.325 kPa and 14.696 psia.

(*c*) Gage pressure is pressure measured with respect to the atmospheric pressure.

(*d*) Inlet pressure is the gage pressure measured at the steam trap inlet.

(*e*) Discharge pressure is the gage pressure measured at steam trap outlet.