ASME PTC 40-2017
(Revision of ASME PTC 40-1991)

Flue Gas Desulfurization Units

Performance Test Codes

AN AMERICAN NATIONAL STANDARD

The American Society of
Mechanical Engineers

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Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: March 23, 2018

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CONTENTS

Nonmandatory Appendices

Figures

Tables

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

When the twin issues of environmental protection and the need to assure a reliable supply of energy became important public concerns in the 1970s, The American Society of Mechanical Engineers (ASME) Board on Performance Test Codes began to explore the possibility of addressing these concerns within the test code framework. As a result of these discussions, the PTC 40 Committee on Flue Gas Desulfurization (FGD) units was organized in 1978; it held its first meeting in April 1979. The PTC 40 Code draft was approved by the Board on Performance Test Codes on May 11, 1990. The Code was adopted by the American National Standards Institute as an American National Standard on March 19, 1991.

In 2006, the ASME Performance Test Code Standards Committee restarted the PTC 40 Committee. This edition of ASME PTC 40 addresses advances in new technology. Specifically, this edition applies to different types of FGD systems: wet FGD, dry FGD, and regenerable FGD. It applies the various U.S. Environmental Protection Agency (EPA) methods that exist today.

This Code was approved by the PTC Standards Committee on March 13, 2017, and approved and adopted as an American National Standard on May 23, 2017.

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 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 or a case, and attending Committee meetings. Correspondence should be addressed to:

Secretary, PTC Standards Committee
The American Society of Mechanical Engineers
Two Park Avenue
New York, NY 10016-5990
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 to provide 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 and 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 Standards 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 Standards Committee.

Requests for interpretation should preferably be submitted through the online Interpretation Submittal Form. The form is accessible at http://go.asme.org/InterpretationRequest. Upon submittal of the form, the Inquirer will receive an automatic e-mail confirming receipt.

If the Inquirer is unable to use the online form, he/she may mail the request to the Secretary of the PTC Standards Committee at the above address. The request for an 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 in one or two words.
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. Please provide a condensed and precise question, composed in such a way that a "yes" or "no" reply is acceptable.
Proposed Reply(ies):	Provide a proposed reply(ies) in the form of "Yes" or "No," with explanation as needed. If entering replies to more than one question, please number the questions and replies.
Background Information:	Provide the Committee with any background information that will assist the Committee in understanding the inquiry. 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 the format described above may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

Moreover, 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 inquiry information submitted, it is the opinion of the Committee that the Inquirer should seek assistance, the inquiry will be returned with the recommendation that such assistance be obtained.

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 Standards Committee regularly holds meetings and/or telephone conferences that are open to the public. Persons wishing to attend any meeting and/or telephone conference should contact the Secretary of the PTC Standards Committee. Future Committee meeting dates and locations can be found on the Committee Page at http://go.asme.org/PTCcommittee.

Section 1
Object and Scope

1-1 OBJECT

The object of this Code is to establish standard procedures for conducting and reporting of performance tests of flue gas desulfurization (FGD) systems and reporting the results in terms of the following categories:

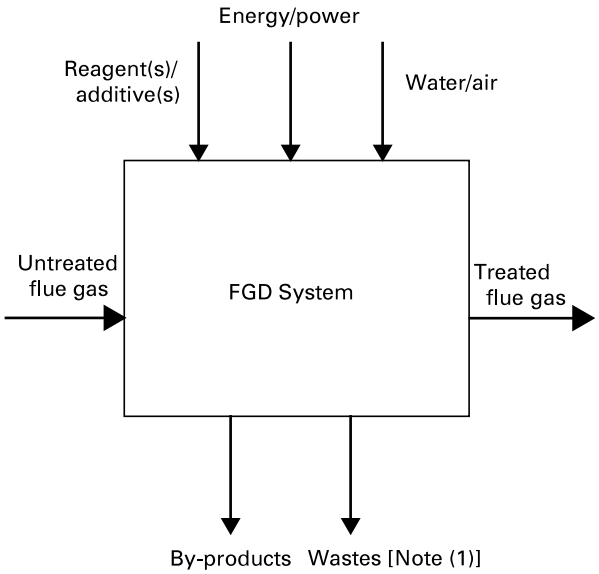
(a) emissions reduction
(b) consumables and utilities
(c) waste and by-product characterization and amount

1-2 SCOPE

The application of this Code is limited to the process and equipment employed to remove sulfur dioxides from flue gas or other sulfur-dioxide-laden gas streams. The methodology described in this Code may be adapted for assessment of removal of other emissions if agreed to by the parties to the test. The performance of an FGD system is defined to be the characterization of inputs and outputs (see Figure 1-2-1).

This Code does not apply to removal of sulfur oxides from gases during the combustion process, e.g., fluidized bed combustion (see ASME PTC 4).

Figure 1-2-1 FGD System Inputs and Outputs



NOTE: (1) Waste streams include purge streams used for process control.

This Code covers the following types of systems:

(a) Dry FGD System. An FGD system process in which a flue gas containing sulfur oxides passes through an alkaline material but is not saturated with moisture; the gas leaves the reactor at a temperature above the adiabatic saturation, thus producing a dry by-product or dry waste product.

(b) Wet FGD System. An FGD system process in which a flue gas containing sulfur oxides passes through an alkaline material and is saturated with moisture, thus producing a wet by-product or wet waste product.

(c) Regenerable FGD System. An FGD system process that regenerates and recycles the sorption medium.

This Code does not cover in detail other FGD system processes such as dry sorbent injections, seawater, and ammonia; however, the principles are still applicable.

1-3 UNCERTAINTY

The underlying philosophy of this Code is to achieve test results of the lowest uncertainty based on current technology and knowledge with respect to testing, taking into account test cost and value of the information obtained. To accomplish this and because of the various FGD systems covered by this Code, this Code establishes an upper limit of the uncertainty of each parameter. Exceeding the upper limit of any parameter's uncertainty requirement is allowable only if it is demonstrated that the selection of all instrumentation for a test will result in a test uncertainty equal to or less than what it would have been had all parameters' uncertainty requirements been followed.

A pretest uncertainty analysis is required. It serves to establish the expected level of uncertainty for a test. The pretest uncertainty shall be calculated in accordance with the procedures defined herein and by ASME PTC 19.1.

A post-test uncertainty analysis is also required. It is used to determine the uncertainty for the actual test. This analysis should confirm the pretest systematic and random uncertainty estimates, and validate the quality of the test results.

The maximum uncertainty for the tests permitted by this Code could be influenced by the physical configuration and FGD system process, as well as the sensitivity of the corrected results to the process variables. The sum of the applicable test uncertainty limits of each parameter shown in Table 1-3-1 shall result in the expected test uncertainty for that parameter.