ASME PTC 19.22-2007
[Revision of ANSI/ASME PTC 19.22-1986 (R1998)]
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Data Acquisition Systems

Performance Test Codes

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

ASME
SETTING THE STANDARD

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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 Supplement. 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 Supplement.

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 scope of the Instruments and Apparatus Supplements (PTC 19 Series) is to describe the various types of instruments and methods of measurement likely to be prescribed in the ASME Performance Test Codes. Such details as the limits and sources of error, methods of calibration, precautions, etc., as will determine their range of application are usually given.

PTC 19.22, Data Acquisition Systems, represents an extension of the purpose of the Supplements into the realm of digital systems. These are increasingly becoming an integral part of modern testing practice. In order that the ASME Performance Test Codes continue to provide test procedures characterized by the highest level of accuracy consistent with the best current engineering practice, it became necessary to develop and maintain a PTC document on this topic.

Accordingly, on November 18, 1969, the Performance Test Codes Standing Committee (now the Performance Test Codes Standards Committee) authorized the organization of a Technical Committee to develop a Supplement on instrumentation for computer information. However, at that time it was difficult to obtain the services of qualified Committee personnel due to the relative novelty of applying digital systems to testing procedures. Nevertheless, a chairman was appointed by November 1972 and a report on the object and scope was issued on November 20, 1974. Regular Committee meetings began in 1976 and are held periodically.

The previous edition, PTC 19.22-1986, Digital Systems Techniques, was adopted by the American National Standards Institute as an American National Standard on January 3, 1986.

This revision, PTC 19.22-2007, Data Acquisition Systems, was approved by ASME Committee PTC 19.22 on April 20, 2007. It was then approved by the American National Standards Institute (ANSI) as an American National Standard on September 12, 2007.

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Performance Test Codes

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

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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 Supplement may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

Secretary, PTC 19.22 Standards Committee
The American Society of Mechanical Engineers
Three Park Avenue
New York, NY 10016-5990

Proposing Revisions. Revisions are made periodically to the Supplement to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Supplement. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Supplement. 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.

Requests for Cases shall provide a Statement of Need and Background Information. The request should identify the Code, 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 19.22 Committee will render an interpretation of any requirement of the Supplement. Interpretations can only be rendered in response to a written request sent to the Secretary of the PTC 19.22 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 Supplement 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 19.22 Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the PTC 19.22 Standards Committee.

INTRODUCTION

The purpose of this Code is to define the scope and application of data acquisition systems for use with ASME Performance Test Codes. The code is based on the use of data acquisition systems covering a wide range of capability from simple data gathering equipment to multipurpose online or offline data acquisition systems.

Use of this Code with any of the applications of ASME Performance Test Codes should include a review of the following documents:

(a) PTC 1

(b) PTC 19.1

(c) Appropriate ASME Performance Test Codes

(d) Appropriate ASME Performance Test Code Reports and Guides

(e) Appropriate Instruments and Apparatus Supplements

The appropriate sections of the Instruments and Apparatus Supplements of the PTC 19 series and specifically PTC 19.1, Measurement Uncertainty are essential when selecting or developing data acquisition systems.

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DATA ACQUISITION SYSTEMS

Section 1
Object and Scope

1-1 OBJECT

The object of this Code is to provide guidance for design, selection, and application of the data acquisition systems used in ASME Code Performance Tests. This Code provides descriptions of the various data acquisition system architectures and information on determining system uncertainties and to assist in selecting and applying these data acquisition systems. The Code is intended to address data acquisition systems used for ASME Code Performance Testing but may also be used for guidance in selecting systems for any test application. These systems include systems specifically installed for a test and plant Distributed Control Systems (DCS) which also provide the ability to monitor sensors during a test. The Code is not intended to address long term Performance Monitoring but may provide guidance for such applications.

1-2 SCOPE

The scope of this Code includes signal conditioning, signal multiplexing, analog-to-digital signal conversion, and data processing. This Code addresses stand-alone data acquisition systems, typified by a sensor with an integral digital display, data acquisition systems that link multiple sensors to a common digital processor tied to a computer or printer, and systems that link multiple digital processors to one or more stand-alone or networked computers.

This Code incorporates instrumentation practices covered by other Instruments and Apparatus Supplements (PTC 19 Series) as well as by the equipment Performance Test Codes. It also provides a means to determine the uncertainty associated with the data acquisition system, and its impact on the overall uncertainty of the performance test. The Code does not directly address specific sensors or instruments used for ASME Performance Testing. These are addressed in other ASME Performance Test Codes.