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ANSI/ASHRAE Standard 41.1-2024
Standard Methods for Temperature Measurement

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Preview

NOTE

Approved addenda, errata, or interpretations for this standard can be downloaded free of charge from the ASHRAE website at www.ashrae.org/technology.

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(This foreword is not part of this standard. It is merely informative and does not contain requirements necessary for conformance to the standard. It has not been processed according to the ANSI requirements for a standard and may contain material that has not been subject to public review or a consensus process. Unresolved objectors on informative material are not offered the right to appeal at ASHRAE or ANSI.)

FOREWORD

Selecting an appropriate temperature measurement system can be a daunting task given the wide variety of operating principles, measurement precision, and costs of commercial products. Whether temperature measurements are under laboratory or field conditions, selecting the temperature measurement system should be based on the required measurement accuracy and dynamic response. Once a temperature measurement system has been selected, the user may need to consult with the source regarding installation specifics, operating range limits, and calibration limits to obtain the expected measurement accuracy.

The 2024 edition of Standard 41.1 includes updated methods for determining when steady-state operation has been achieved for data recording, changes to make it easier for higher tier standards to adopt this standard by reference. This revision of ASHRAE Standard 41.1 meets ASHRAE's mandatory language requirements.

1. PURPOSE

This standard prescribes methods for measuring temperature under laboratory and field conditions.

2. SCOPE

2.1 This standard applies to temperature measurements under laboratory and field conditions for use in performance testing heating, ventilating, air-conditioning, and refrigeration systems and components.

2.2 This standard does not apply to wet-bulb and dew-point temperature measurement methods within the scope of ANSI/ASHRAE Standard 41.6.

3. DEFINITIONS

accuracy*:** the degree of conformity of an indicated value to the corresponding true value. (Informative Note:*** Accuracy is a term sometimes used by instrument manufacturers to represent instrument uncertainty.)

error: the difference between the observed value of the measurand and its corresponding true value.

measurement system: the instruments; signal conditioning systems, if any; and data acquisition system, if any.

operating tolerance limit: the upper or lower value of an operating tolerance that is associated with a test point or a targeted set point.

post-test uncertainty: an analysis to establish the uncertainty of a test result after conducting the test.

pretest uncertainty: an analysis to establish the expected uncertainty interval for a test result before conducting the test.

random error: the portion of the total error that varies randomly in repeated measurements of the true value throughout a test process.

steady-state criteria: the criteria that establish negligible change of temperature or temperature difference with time.

systematic error: the portion of the total error that remains constant in repeated measurements of the true value throughout a test process.

targeted set point: a specific set of test conditions where the required temperature or temperature difference is known and has an associated operating tolerance.

test point: a specific set of test operating conditions for recording data where the measured required temperature or temperature difference is unknown and has an associated operating tolerance.

true value: the unknown, error-free value of a test result.

uncertainty: the limits of error within which the true value lies for specified confidence level.

unit under test: equipment that is subjected to temperature or temperature difference measurement.

4. CLASSIFICATIONS

4.1 Temperature and Temperature Difference Measurement Conditions. Temperature and temperature difference measurement test conditions that are within the scope of this standard shall be classified as one of the types described in Sections 4.1.1 and 4.1.2.

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