



STANDARD

ANSI/ASHRAE Standard 41.1-2020
(Supersedes ANSI/ASHRAE Standard 41.1-2013)

Standard Methods for Temperature Measurement

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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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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, selection of 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 2020 edition is a substantial revision of Standard 41.1 and meets ASHRAE's mandatory language requirements.

1. PURPOSE

This standard prescribes methods for measuring temperature under laboratory and field conditions. Temperature measurements are required for system performance tests and for testing heating, ventilating, air-conditioning, and refrigerating components.

2. SCOPE

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

3. DEFINITIONS

accuracy: the degree of conformity of an indicated value to the corresponding true value.

error: the difference between the test result 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.

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

sensitivity: the change of output for a unit change of input.

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 temperature or temperature difference is unknown and has an associated operating tolerance.

transducer: a device that changes one form of physical quantity into another.

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

uncertainty: a measure of the potential error in a measurement that reflects the lack of confidence in the result to a specified level.

unit under test (UUT): equipment that is subjected to temperature measurement.

4. CLASSIFICATIONS

4.1 Temperature Measurement Methods. Temperature measurement methods that are within the scope of this standard are listed in Table 4-1.

4.2 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 in Sections 4.2.1 or 4.2.2.