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ANSI/ASHRAE Standard 41.6-2025
Standard Methods for Humidity 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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FOREWORD

Selecting an appropriate psychrometer or hygrometer can be daunting given the wide variety of operating principles, measurement precision, and costs. Whether humidity measurements are to be taken in a laboratory or in the field, selecting the appropriate hygrometer should be based on the required measurement accuracy.

Users need to (a) construct a psychrometer or hygrometer in accordance with the specifications defined in this in this standard, (b) select a psychrometer or hygrometer from commercial products, or (c) obtain a psychrometer or hygrometer from other sources. Next, the user may need to consult with the source of a psychrometer or hygrometer regarding installation specifics, operating range limits, calibration limits, and other similar specifics in order to obtain the expected measurement accuracy or uncertainty.

The 2025 edition of this standard makes it easier for the higher-tier ASHRAE standards to adopt this standard by reference and updates the steady-state criteria requirements. This edition of ASHRAE Standard 41.6 meets ASHRAE's mandatory language requirements.

1. PURPOSE

This standard prescribes methods for measuring the humidity of moist air with instruments.

2. SCOPE

2.1 This standard applies to the measurement of humidity of moist air from sea level to 3048 m (10,000 ft), within the dry-bulb temperature range of –50°C to 160°C (–58°F to 320°F), and within the dew-point temperature range of –50°C to 99°C (–58°F to 210°F).

2.2 This standard applies to methods for the measurement of wet-bulb temperature, dew-point temperature, and relative humidity.

3. DEFINITIONS

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

error: the difference between the test result and its corresponding true value.

frost point: the temperature where visible frost forms on a surface being chilled.

humidity: the moisture content of an air/water mixture.

> ***absolute humidity:*** in a mixture of water vapor and dry air, the ratio of the mass of water vapor to the total volume of the sample.
>
> ***relative humidity:***
>
> a. ratio of the partial pressure of water vapor to the saturation pressure in a given moist air sample at the same dry-bulb temperature.
> b. ratio of the density of water vapor to the air density at the same dry-bulb temperature and ambient air barometric pressure.
> c. ratio of the mole fraction of water vapor to the mole fraction of water vapor saturated at the same temperature and barometric pressure.

hygrometer: an instrument used to measure humidity in the atmosphere.

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 for a test result before conducting the test.

psychrometer: an instrument used to determine the humidity of air by simultaneously measuring the wet-bulb and dry-bulb temperatures.

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 humidity with time.

Preview