



Designation: D4230 – 20

Standard Test Method for Measuring Humidity with Cooled-Surface Condensation (Dew-Point) Hygrometer¹

This standard is issued under the fixed designation D4230; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the determination of the thermodynamic dew- or frost-point temperature of ambient air by the condensation of water vapor on a cooled surface. For brevity, this is referred to in this test method as the condensation temperature.

1.2 This test method is applicable for the range of condensation temperatures from 60°C to –70°C.

1.3 This test method includes a general description of the instrumentation and operational procedures, including site selection, to be used for obtaining the measurements and a description of the procedures to be used for calculating the results.

1.4 This test method is applicable for the continuous measurement of ambient humidity in the natural atmosphere on a stationary platform.

1.5 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary statements, see Section 8.

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D1356 Terminology Relating to Sampling and Analysis of Atmospheres

D3631 Test Methods for Measuring Surface Atmospheric Pressure

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of other terms in this test method, refer to Terminology **D1356**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *nonhygroscopic material, n*—material that neither absorbs nor retains water vapor.

3.2.2 *mirror (front surface), n*—a polished surface, usually a metallic surface, on which condensates are deposited.

3.3 *Symbols:*

- e = vapor pressure of water vapor in moist air.
- e_i = saturation pressure of water vapor in equilibrium with the plane surface of ice.
- e_w = saturation pressure of water vapor in equilibrium with the plane surface of water.
- P = ambient pressure.
- r = mixing ratio.
- T = ambient air temperature.
- T_d = thermodynamic dew- or frost-point temperature.
- RH_i = relative humidity with respect to ice.
- RH_w = relative humidity with respect to water.

4. Summary of Test Method

4.1 The ambient humidity is measured with a dew- and frost-point hygrometer.

¹ This test method is under the jurisdiction of ASTM Committee **D22** on Air Quality and is the direct responsibility of Subcommittee **D22.11** on Meteorology.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.