



Designation: D5741 – 96 (Reapproved 2023)

Standard Practice for Characterizing Surface Wind Using a Wind Vane and Rotating Anemometer¹

This standard is issued under the fixed designation D5741; 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 practice covers a method for characterizing surface wind speed, wind direction, peak one-minute speeds, peak three-second and peak one-minute speeds, and standard deviations of fluctuation about the means of speed and direction.

1.2 This practice may be used with other kinds of sensors if the response characteristics of the sensors, including their signal conditioners, are equivalent or faster and the measurement uncertainty of the system is equivalent or better than those specified below.

1.3 The characterization prescribed in this practice will provide information on wind acceptable for a wide variety of applications.

NOTE 1—This practice builds on a consensus reached by the attendees at a workshop sponsored by the Office of the Federal Coordinator for Meteorological Services and Supporting Research in Rockville, MD on Oct. 29–30, 1992.

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

1.5 *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.*

1.6 *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.*

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

Current edition approved Sept. 1, 2023. Published October 2023. Originally approved in 1996. Last previous edition approved in 2017 as D5741 – 96 (2017). DOI: 10.1520/D5741-96R23.

2. Referenced Documents

2.1 *ASTM Standards:*²

D1356 Terminology Relating to Sampling and Analysis of Atmospheres

D5096 Test Method for Determining the Performance of a Cup Anemometer or Propeller Anemometer

D5366 Test Method for Determining the Dynamic Performance of a Wind Vane

3. Terminology

3.1 *Discussion*—For terms that are not defined herein, refer to Terminology D1356.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *aerodynamic roughness length* (z_0 , m)—a characteristic length representing the height above the surface where extrapolation of wind speed measurements, below the limit of profile validity, would predict the wind speed would become zero (1).³ It can be estimated for direction sectors from a landscape description.

3.2.2 *damped natural wavelength* (λ_d , m)—a characteristic of a wind vane empirically related to the delay distance and the damping ratio. See Test Method D5366 for test methods to determine the delay distance and equations to estimate the damped natural wavelength.

3.2.3 *damping ratio* (η , dimensionless)—the ratio of the actual damping, related to the inertial-driven overshoot of wind vanes to direction changes, to the critical damping, the fastest response where no overshoot occurs. See Test Method D5366 for test methods and equations to determine the damping ratio of a wind vane.

3.2.4 *distance constant* (L , m)—the distance the air flows past a rotating anemometer during the time it takes the cup

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.

³ The boldface numbers in parentheses refers to the list of references at the end of this standard.