



Standard Practice for Evaluating the Performance of Respirable Aerosol Samplers¹

This standard is issued under the fixed designation D 6061; 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 the evaluation of the performance of personal samplers of non-fibrous respirable aerosol. The samplers are assessed relative to a specific respirable sampling convention. The convention is one of several that identify specific particle size fractions for assessing health effects of airborne particles. When a health effects assessment has been based on a specific convention it is appropriate to use that same convention for setting permissible exposure limits in the workplace and ambient environment and for monitoring compliance. The conventions, which define inhalable, thoracic, and respirable aerosol sampler ideals, have now been adopted by the International Standards Organization (Technical Report ISO TR 7708), the Comité Européen de Normalisation (CEN Standard EN 481), and the American Conference of Governmental Industrial Hygienists (ACGIH, Ref (1)),² developed (2) in part from health-effects studies reviewed in Ref (3) and in part as a compromise between definitions proposed in Refs (3,4).

1.2 This practice is complimentary to Test Method D 4532, which specifies a particular instrument, the 10-mm cyclone.³ The sampler evaluation procedures presented in this practice have been applied in the testing of the 10-mm cyclone as well as the Higgins-Dewell cyclone.^{3,4} Details on the evaluation have been recently published (5-7) and can be incorporated into revisions of Test Method D 4532.

1.3 A central aim of this practice is to provide information required for characterizing the uncertainty of concentration estimates from samples taken by candidate samplers. For this purpose, sampling accuracy data from the performance tests given here can be combined with information as to analytical and sampling pump uncertainty obtained externally. The prac-

tice applies principles of ISO GUM, expanded to cover situations common in occupational hygiene measurement, where the measurand varies markedly in both time and space. A general approach (8) for dealing with this situation relates to the theory of tolerance intervals and may be summarized as follows: Sampling/analytical methods undergo extensive evaluations and are subsequently applied without re-evaluation at each measurement, while taking precautions (for example, through a quality assurance program) that the method remains stable. Measurement uncertainty is then characterized by specifying the evaluation confidence (for example, 95 %) that confidence intervals determined by measurements bracket measurand values at better than a given rate (for example, 95 %). Moreover, the systematic difference between candidate and idealized aerosol samplers can be expressed as a relative bias, which has proven to be a useful concept and is included in the specification of accuracy (3.2.9-3.2.10).

1.4 Units of the International System of Units (SI) are used throughout this practice and should be regarded as 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

- D 1356 Terminology Relating to Atmospheric Sampling and Analysis⁵
- D 4532 Test Method for Respirable Dust in Workplace Atmospheres⁵
- D 6062M Performance Specifications for Samplers of Health-Related Aerosol Fractions⁵
- D 6552 Practice for Controlling and Characterizing Errors in Weighing Collected Aerosols⁵

2.2 International Standards:

- ISO TR 7708 Technical Report on Air Quality—Particle Size Fraction Definitions for Health-Related Sampling, Brussels, 1993⁶

¹ This practice is under the jurisdiction of ASTM Committee D22 on Sampling and Analysis of Atmospheres and is the direct responsibility of Subcommittee D22.04 on Workplace Atmospheres.

Current edition approved October 10, 2001. Published December 2001. Originally published as D 6061 – 96. Last previous edition D 6061 – 96.

² The boldface numbers in parentheses refer to a list of references at the end of this practice.

³ If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁴ The sole source of supply of the Higgins-Dewell cyclone known to the committee at this time is BGI Inc., 58 Guinan Street, Waltham, MA 02154.

⁵ *Annual Book of ASTM Standards*, Vol 11.03.

⁶ Available from International Organization for Standardization, Caisse Postale 56, CH-1211, Geneva 20, Switzerland.

