



Standard Test Method for Air Cleaning Performance of a High-Efficiency Particulate Air Filter System¹

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1. Scope

1.1 This test method covers the procedure and equipment for measuring the penetration of test particles through high-efficiency particulate air (HEPA) filter systems using a laser aerosol spectrometer (LAS). This test method provides the capability of evaluating the overall effectiveness of HEPA filter systems consisting of one or two filter stages.

1.2 The aerosols used for testing have a heterodisperse size distribution in the submicrometer diameter range from 0.1 to 1.0 μm .

1.3 The purpose for conducting in-place filter testing by this test method is in the ability to determine penetration of multi-stage installations, without individual stage tests. Particle penetration as low as 10^{-8} can be measured by this test method. Also, the LAS provides a measure of penetration for discrete particle sizes.

1.4 Maximum penetration for an installed HEPA filter system is 5×10^{-4} for one filter stage, and 2.5×10^{-7} for two stages in series is recommended.

NOTE 1—Acceptance penetration criteria must be specified in the program, or owners specifications. The penetration criteria suggested in this test method is referenced in Ref (1).²

1.5 The values stated in SI units are to be regarded as the standard.

1.6 *This standard does not purport to address all of the safety problems, 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. Specific precautionary statements are given in 9.6.*

¹ This test method is under the jurisdiction of ASTM Committee D22 on Air Quality and is the direct responsibility of Subcommittee D22.05 on Indoor Air.

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

2. Referenced Documents

2.1 *ASTM Standards*:³

F328 Practice for Calibration of an Airborne Particle Counter Using Monodisperse Spherical Particles (Withdrawn 2007)⁴

2.2 *Military Standard*:

MIL-STD 282 Military Standard Filter Units, Protective Clothing, Gas Mask Components, and Related Products: Performance Test Method⁵

3. Terminology

3.1 *Definitions of Terms Specific to This Standard*:

3.1.1 *diluter*—a device used to reduce the aerosol particle concentration to eliminate coincidence counting is in the LAS.

3.1.2 *dilution ratio*—the ratio of the undiluted aerosol particle concentration entering the diluter to the diluted portion of the particle concentration. Because diluters have inherent particle losses that may vary according to the particle size, the dilution ratio may not be constant with respect to size.

3.1.3 *laser aerosol spectrometer (LAS)*—a precision particle detector that allows single particle counting and sizing by the amount of scattered light from individual particles, where the signals can be grouped into categories corresponding to particle size.

3.1.4 *penetration*—the number of particles passing through the filter stage, to the number of particles challenging the upstream side of the filter stage. The penetration, or the challenge aerosol, may be associated for each particle size of interest.

³ 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.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

⁵ Available from Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://www.dodssp.daps.mil>.