



Standard Test Method for Determining the Initial Efficiency of Materials Used in Medical Face Masks to Penetration by Particulates Using Latex Spheres¹

This standard is issued under the fixed designation F 2299; 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 establishes procedures for measuring the initial particle filtration efficiency of materials used in medical facemasks using monodispersed aerosols.

1.1.1 This test method utilizes light scattering particle counting in the size range of 0.1 to 5.0 μm and airflow test velocities of 0.5 to 25 cm/s.

1.2 The test procedure measures filtration efficiency by comparing the particle count in the feed stream (upstream) to that in the filtrate (downstream).

1.3 The values stated in SI units or in other units shall be regarded separately as standard. The values stated in each system must be used independently of the other, without combining values in any way.

1.4 The following precautionary caveat pertains only to the test methods portion, Section 10, of this specification. *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 Analysis²

D 1777 Method for Measuring Thickness of Textiles³

D 2905 Practice for Statements on Number of Specimens for Textiles³

D 3776 Test Methods for Mass per Unit Area (Weight) of Woven Fabric³

E 691 Practice for Conducting an Interlaboratory Test to Determine the Precision of Test Methods⁴

F 50 Practice for Continuous Sizing and Counting of Air-

borne Particles in Dust-Controlled Areas Using Instruments Based Upon Light-Scattering Principles⁵

F 328 Practice for Determining Counting and Sizing Accuracy of an Airborne Particle Counter Using Near-Monodispersed Spherical Particulate Materials⁴

F 778 Methods for Gas Flow Resistance Testing of Filtration Media²

F 1471 Test Method for Air Cleaning Performance of a High-Efficiency Particulate Air-Filter System²

F 1494 Terminology Relating to Protective Clothing²

F 2053 Guide for Documenting the Results of Airborne Particle Penetration Testing of Protective Clothing Materials²

3. Terminology

3.1 Definitions:

3.1.1 *aerosol, n*—a suspension of a liquid or solid particles in a gas with the particles being in the colloidal size range.

3.1.1.1 *Discussion*—In this test method, aerosols include solid particles having a diameter of 0.1 to 5 μm suspended or dispersed in an airflow at concentrations of less than 102 particles/cm³.

3.1.2 *isokinetic sampling, n*—a condition where the velocity of the airflow entering the sampling nozzle is the same as the velocity of the airflow passing around the sampling nozzle.

3.1.3 *monodispersion, n*—scattering of discrete particles in an airflow where the size is centralized about a specific particle size.

3.1.3.1 *Discussion*—In this test method, the monodispersed particle distribution has a mean diameter size of the aerosol in the 0.1 to 5 μm range, with a coefficient of variation of the mean diameter of ±10 % or less, as certified by the manufacturer.

3.2 For definitions of other protective clothing-related terms used in this test method, refer to Terminology F 1494.

4. Summary of Test Method

4.1 Filtered and dried air is passed through an atomizer to produce an aerosol containing suspended latex spheres.

¹ This test method is under the jurisdiction of ASTM Committee F23 on Protective Clothing and is the direct responsibility of Subcommittee F23.40 on Biological Hazards.

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² Annual Book of ASTM Standards, Vol 11.03.

³ Annual Book of ASTM Standards, Vol 07.01.

⁴ Annual Book of ASTM Standards, Vol 14.02.

⁵ Annual Book of ASTM Standards, Vol 15.03.

