



Standard Test Method for Sizing and Counting Airborne Particulate Contamination in Clean Rooms and Other Dust-Controlled Areas Designed for Electronic and Similar Applications¹

This standard is issued under the fixed designation F 25; 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 counting and sizing airborne particulate matter 5 μm and larger. The sampling areas are specifically those with contamination levels typical of clean rooms (white and gray rooms) and dust-controlled areas designed for electronic work. It is not a test method for dust counting in which isokinetic sampling is a factor (Appendix X1).

1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

1.3 *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.*

NOTE 1—Information is included relative to modifications to the referee techniques which will make the test method more suitable for specific routine monitoring, such as described in Appendix X4.

2. Terminology

2.1 Definitions of Terms Specific to This Standard:

2.1.1 *Major Projected Dimension* of a particle is designated as the particle size.

2.1.2 *Standard Unit of Length* for sizing purposes is the micrometer, μm, which is 0.001 mm or 0.000 04 in. Only particles with a measurable length greater than 5 μm are to be counted.

2.1.3 *Fiber* is considered a particle, no distinction being made with respect to length to width ratios.

3. Summary of Test Method

3.1 The test method is based on the microscopical examination of particles impinged upon a membrane filter with the aid of a vacuum. The number of sampling points is propor-

tional to the floor area of the enclosure to be checked. The apparatus and facilities required are typical of a laboratory for the study of microparticle contamination. The operator must have adequate basic training in microscopy and the techniques of particle sizing and counting.

4. Apparatus

4.1 *Filter Holder*,² aerosol open type having an effective filtering area of 960 ± 25 mm².

4.2 *Vacuum Pump*, capable of producing a vacuum of 500 torr (500 mm Hg) while pumping at a rate of 10 L/min.

4.3 *Flowmeter*, calibrated and having a capacity in excess of 10 L/min, or a limiting orifice,² calibrated with the pump, filter holder, and filter used for this method at a flow rate of 10 ± 0.5 L/min. Ensure visually that the orifice is free of restricting matter before each test.

4.4 *Membrane Filters*,² black, 0.80-μm mean pore size, 47-mm diameter with imprinted grid squares having sides 3.10 ± 0.08 mm. Pressure drop across the filter used shall be no greater than 50 torr for an air flow rate of 1 L/min·cm².

4.5 *Glass Microscope Slides*, 50 by 75 mm, or 47-mm plastic disposable petri dishes.

4.6 *Forceps*,² with unserrated tips.

4.7 *Binocular Microscope*,³ (Fig. 1) with ocular-objective combinations to obtain 40 to 45× and 90 to 150× magnifications. Latter objective shall have numerical aperture of 0.15 min.

² The following apparatus, or equivalent, is satisfactory for this test method; except where mentioned otherwise, the part numbers refer to equipment available from Millipore Filter Corporation, Bedford, MA.

(1) Filter holder, Millipore XX50 047 10; or Gelman 1200 A with 1207 Adapter available from Gelman Instrument Co., Chelsea, MI.

(2) Limiting Orifice, XX50 000 00.

(3) Filter, AA Black Grid, 0.80 μm.

(4) Forceps, XX62 000 06,

(5) Check Slide Photographic, XX50 000 50 or equivalent,

(6) Aerosol Monitors, Type MABG037A0, and

(7) Adapter, XX62 000 04.

³ Microscopes such as Bausch & Lomb No. TBV-5, Series C; American Optical Co. X2BUHBW, Leitz SM 0.44S 25/81; and Zeiss: Model KF 124-212 (with accessories): or equivalent, have been found satisfactory for this purpose.

¹ This test method is under the jurisdiction of ASTM Committee E21 on Space Simulation and Applications of Space Technology and is the direct responsibility of Subcommittee E21.05 on Contamination.

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