



Designation: F 312 – 97

Standard Test Methods for Microscopical Sizing and Counting Particles from Aerospace Fluids on Membrane Filters¹

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1. Scope

1.1 These test methods cover the determination of the size distribution and quantity of particulate matter contamination from aerospace fluids isolated on a membrane filter. The microscopical techniques described may also be applied to other properly prepared samples of small particles. Two test methods are described for sizing particles as follows:

1.1.1 *Test Method A*—Particle sizes are measured as the diameter of a circle whose area is equal to the projected area of the particle.

1.1.2 *Test Method B*—Particle sizes are measured by their longest dimension.

1.2 The test methods are intended for application to particle contamination determination of aerospace fluids, gases, surfaces, and environments.

1.3 These test methods do not provide for sizing particles smaller than 5 μm .

NOTE 1—Results of these methods are subject to variables inherent in any statistical method. The use of these methods as a standard for initially establishing limits should be avoided unless ample tolerances are permissible.

1.4 *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:

F 302 Practice for Field Sampling of Aerospace Fluids in Containers²

F 303 Practices for Sampling Aerospace Fluids from Components²

F 311 Practice for Processing Aerospace Liquid Samples for

Particulate Contamination Analysis Using Membrane Filters³

F 314 Test Method for Identification of Metallic and Fibrous Contaminants in Aerospace Fluids³

F 318 Practice for Sampling Airborne Particulate Contamination in Clean Rooms for Handling Aerospace Fluids²

3. Terminology

3.1 Definitions:

3.1.1 *unit area*—the area selected for counting particles. This may be the area of a reticle grid or some subdivision thereof, the area of one imprinted membrane grid, or any other accurately calibrated area.

3.1.2 *effective filter area*—the area of the membrane which entraps the particles to be counted.

3.1.3 *particle size*—the size of a particle as defined by area comparison or by its longest dimension.

4. Summary of Test Methods

4.1 The membrane is examined through a microscope and the particles counted according to size or size categories using a calibrated reticle. The total number of particles present is estimated by statistical methods from the actual number of particles counted. Either sizing Test Method A or B may be selected according to the preference and results expected.

5. Significance and Use

5.1 Reported particle size measurement is a function of both the actual particle dimension and shape factor as well as the particular physical or chemical properties of the particle being measured. Caution is required when comparing data from instruments operating on different physical or chemical parameters or with different particle size measurement ranges. Sample acquisition, handling and preparation can also affect the reported particle size results.

6. Apparatus

6.1 *Microscope*, capable of resolving the smallest particles to be counted and producing a flat field of view.

¹ These test methods are under the jurisdiction of ASTM Committee E-29 on Particle Size Measurement and are the direct responsibility of Subcommittee E29.02 on Subsieve Testing.

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² *Annual Book of ASTM Standards*, Vol 10.05.

³ *Annual Book of ASTM Standards*, Vol 14.02.