



Standard Practice for Sampling for Particulate Contamination by Tape Lift¹

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1. Scope

1.1 This practice covers procedures for sampling surfaces to determine the presence of particulate contamination, 5 μm and larger. The practice consists of the application of a pressure-sensitive tape to the surface followed by the removal of particulate contamination with the removal of the tape. The tape with the adhering particles is then mounted on counting slides. Counting and measuring of particles is done by standard techniques.

1.2 This practice describes the materials and equipment required to perform sampling of surfaces for particle counting and sizing.

1.3 The criteria for acceptance or rejection of a part for conformance to surface cleanliness level requirements shall be determined by the user and are not included in this practice.

1.4 This practice is for use on surfaces that are not damaged by the application of adhesive tape. The use of this practice on any surface of any material not previously tested or for which the susceptibility to damage is unknown is not recommended. In general, metals, metal plating, and oxide coatings will not be damaged. Application to painted, vapor deposited, and optical coatings should be evaluated before implementing this test.

1.5 This practice provides three methods to evaluate tape lift tests, as follows:

	Sections
<i>Practice A</i> —This method uses light transmitted through the tape and tape adhesive to detect particles that adhere to it.	4 to 6
<i>Practice B</i> —This method uses light transmitted through the tape adhesive after bonding to a base microscope slide, dissolving the tape backing, and a cover slide. The particles are embedded in the adhesive, and air bubbles are eliminated with acrylic mounting media.	7 to 9
<i>Practice C</i> —This method uses light reflected off the tape adhesive to detect particles that adhere to it.	10 to 12

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

1.7 *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:

E 595 Test Method for Total Mass Loss and Collected Volatile Condensable Materials from Outgassing in a Vacuum Environment²

F 312 Methods for Microscopical Sizing and Counting Particles from Aerospace Fluids on Membrane Filters³

2.2 Federal Standard:

Federal Standard 595 Color⁴

3. Significance and Use

3.1 The tape lift provides a rapid and simple technique for removing particles from a surface and determining their number and size distribution.

3.2 By using statistically determined sample size and locations, an estimate of the surface cleanliness level of large areas can be made. The user shall define the sampling plan.

3.3 The sampling plan shall consider the importance of surface geometry and surface orientation to gas flow, gravity, obstructions, and previous history of hardware. These factors influence particle fallout and entrapment of particles on the surface. The geometry of joints, recessed areas, fasteners, and the correspondence of particle-count data to area can be maintained.

3.4 The selection of tape and the verification of its effect on the cleanliness of the hardware is very important. The tape adhesive should have sufficient cohesion to avoid transfer of the adhesive to the surface under test. The impact of adhesive transfer should be evaluated by laboratory testing before using the tape on the hardware. Since potential for adhesive transfer exists, cleaning to remove any adhesive might be required. In addition, the tape should have low outgassing characteristics, and as a minimum, it should meet the requirements of less than 1.0 % total mass loss (TML) and 0.1 % collected volatile condensable materials (CVCN), as measured by Test Method E 595.

3.5 Care should be exercised in deciding which surfaces

¹ This practice is under the jurisdiction of ASTM Committee E-21 on Space Simulation and Applications of Space Technology and is the direct responsibility of Subcommittee E21.05 on Contamination.

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² *Annual Book of ASTM Standards*, Vol 15.03.

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

⁴ Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.