



Standard Specification for ESD Controlled Garments Required in Cleanrooms and Controlled Environments for Spacecraft for Non-Hazardous and Hazardous Operations¹

This standard is issued under the fixed designation E 1549; 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.

^{ε1} NOTE—To bring Subcommittee E21.05's existing standards into compliance with Part H of ASTM's Form and Style Manual, the M designation has been editorially removed in July 2000.

1. Scope

1.1 This document specifies special items of clothing (cleanroom garments) designed to protect aerospace products from electrostatic discharge and from contaminants released by personnel and garments. Special clothing includes low linting coveralls, footwear, and head covers.

1.2 The function of cleanroom garments is to contain the contaminants generated by people and to minimize contaminants from the garments.

1.3 Two types of fabrics can be selected for the garments. Both types are inherently static-dissipative materials to prevent electrical discharges that can damage sensitive hardware or initiate explosions in the presence of flammable vapors. The material specified for "hazardous environments" is flame resistant and provides additional protection to the wearer. Selection of garment design and fabric should be based on the user's needs with respect to functional and environmental requirements.

1.4 Additional, background information can be found in SD-TR-91-26 and IES-RP-CC003.2.

1.5 *This standard is intended to be in compliance with the ASTM policy on Fire Standards.* ² *Flammability tests specified in this standard should be used to measure and describe the properties of fabrics in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fabrics under actual fire conditions. However, results of the tests may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of operations in controlled environment areas.*

1.6 *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.

1.7 The values stated in SI units are to be regarded as the standard. The values in parentheses are for information purposes only but are hard conversions.

2. Referenced Documents

2.1 ASTM Standards:

D 123 Terminology Relating to Textiles³

D 204 Test Methods for Sewing Threads³

D 1683 Test Method for Failure in Sewn Seams of Woven Fabrics⁴

D 1894 Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheeting⁵

E 96 Test Methods for Water Vapor Transmission of Materials⁶

E 176 Terminology of Fire Standards⁷

E 535 Practice for Preparation of Fire-Test-Response Standards⁷

E 1560 Test Method for Gravimetric Determination of Non-volatile Residue from Cleanroom Wipers⁸

F 51 Test Method for Sizing and Counting Particulate Contaminant In and On Clean Room Garments⁸

F 739 Test Method for Resistance of Protective Clothing Materials to Permeation By Liquids or Gases Under Condition of Continuous Contact⁹

2.2 U.S. Federal Standards:

FED-SPEC-191 Textile Test Method¹⁰

FED STD A-A 50195 Thread Aramid

FED-STD-209E Airborne Particulate Cleanliness Classes in Cleanrooms and Clean Zones¹⁰

¹ This specification 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.

Current edition approved Aug. 15, 1995. Published October 1995. Originally published as E 1549 – 93. Last previous edition E 1549 – 93.

² ASTM Fire Test Standards, 4th Edition, Dec. 1993, available on request from ASTM Headquarters, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA 19428-2959.

³ *Annual Book of ASTM Standards*, Vol 07.01.

⁴ Withdrawn. See 1998 *Annual Book of ASTM Standards*, Vol 07.01.

⁵ *Annual Book of ASTM Standards*, Vol 08.01.

⁶ *Annual Book of ASTM Standards*, Vol 04.06.

⁷ *Annual Book of ASTM Standards*, Vol 04.07.

⁸ *Annual Book of ASTM Standards*, Vol 15.03.

⁹ *Annual Book of ASTM Standards*, Vol 11.03.

¹⁰ Available from U.S. General Services Administration, Washington, DC.