



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 E1549/E1549M; 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 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 IEST-RP-CC003.3.

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 The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

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:³

- D123 Terminology Relating to Textiles
- D204 Test Methods for Sewing Threads
- D1683 Test Method for Failure in Sewn Seams of Woven Apparel Fabrics
- D1894 Test Method for Static and Kinetic Coefficients of Friction of Plastic Film and Sheet
- D2257 Test Method for Extractable Matter in Textiles
- D5034 Test Method for Breaking Strength and Elongation of Textile Fabrics (Grab Test)
- D6193 Practice for Stitches and Seams
- D737 Test Method for Air Permeability of Textile Fabrics
- E96/E96M Test Methods for Water Vapor Transmission of Materials
- E176 Terminology of Fire Standards
- E535 Practice for Preparation of Fire-Test-Response Standards
- E1560 Test Method for Gravimetric Determination of Non-volatile Residue From Cleanroom Wipers
- F51 Test Method for Sizing and Counting Particulate Contaminant In and On Clean Room Garments
- F739 Test Method for Permeation of Liquids and Gases through Protective Clothing Materials under Conditions of Continuous Contact

¹ This specification 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.

Current edition approved Oct. 1, 2016. Published October 2016. Originally approved in 1993. Last previous edition approved in 2013 as E1549 – 13. DOI: 10.1520/E1549_E1549M-13R16.

² ASTM Fire Standards and Related Technical Material; 7th Edition, June 2007, ISBN13: 978-0-8031-5684-5, available on request from ASTM Headquarters, 100 Barr Harbor Dr., PO Box C700, West Conshohocken, PA 19428-2959.

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.