



# Standard Practice for Handling, Transporting, and Installing Nonvolatile Residue (NVR) Sample Plates Used in Environmentally Controlled Areas for Spacecraft<sup>1</sup>

This standard is issued under the fixed designation E 1234; 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 practice covers the handling, transporting, and installing of sample plates used for the gravimetric determination of nonvolatile residue (NVR) within and between facilities.

1.2 The values stated in SI units are to be regarded as the standard.

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.*

## 2. Referenced Documents

### 2.1 ASTM Standards:

E 1235 Test Method for Gravimetric Determination of Nonvolatile Residue (NVR) in Environmentally Controlled Areas for Spacecraft<sup>2</sup>

F 50 Practice for Continuous Sizing and Counting of Airborne Particles in Dust-Controlled Areas and Cleanrooms Using Instruments Capable of Detecting Single Sub-Micrometre and Larger Particles<sup>2</sup>

### 2.2 ISO Standards:

14644-1, Cleanrooms and Associated Controlled Environments—Part 1: Classification of Air Cleanliness<sup>3</sup>

14644-2, Cleanrooms and Associated Controlled Environments—Part 2: Specifications for Testing and Monitoring to Prove Continued Compliance with ISO 14644-1<sup>3</sup>

14644-5, Cleanrooms and Associated Controlled Environments—Part 5: Operations<sup>3</sup>

14951-3, Space Systems—Fluid Characteristics—Part 3: Nitrogen<sup>4</sup>

14952-3, Space Systems—Surface Cleanliness of Fluid Systems—Part 3: Analytical Procedures for the Determination of Nonvolatile Residue and Particulate Contamination<sup>4</sup>

### 2.3 U.S. Federal Standard:

FED-STD-209E Airborne Particulate Cleanliness Classes in Cleanrooms and Clean Zones<sup>5</sup>

### 2.4 Institute of Environmental Sciences and Technology:

IENT-RP-CC001.3, HEPA and ULPA Filters<sup>3</sup>

IENT-RP-CC006.2, Testing Cleanrooms<sup>3</sup>

IENT-RP-CC007.1, Testing ULPA Filters<sup>3</sup>

IENT-RP-CC016, The Rate of Deposition of Nonvolatile Residue in Cleanrooms<sup>3</sup>

IENT-RP-CC034.1, HEPA and ULPA Filter Leak Tests<sup>3</sup>

IENT-STD-CC1246, Product Cleanliness Levels and Contamination Control Program<sup>3</sup>

### 2.5 American National Standards Institute:

ANSI/ASME B46.1-1985, Surface Texture (Surface Roughness, Waviness, and Lay)<sup>6</sup>

## 3. Terminology

### 3.1 Definitions:

3.1.1 *ISO Class N (airborne particulate cleanliness class)*, *n*—level of airborne particulate concentrations as defined in ISO 14644-1 and 14644-2, where  $10^N$  is the maximum allowable concentrations (particles per cubic metre).

3.1.1.1 *Discussion*—The considered particle sizes (lower threshold values) applicable for classification with ISO 14644-1 are limited to the range from 0.1 through 5 µm. Particles larger than 5 µm (macroparticles) may be expressed in accordance with Annex E of ISO 14644-1.

3.1.2 *FS209, n*—the level of cleanliness specified by the maximum allowable number of particles per cubic foot of air as

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 15.03.

<sup>3</sup> Available from Institute of Environmental Sciences and Technology, 940 E. Northwest Highway, Mount Prospect, IL 60056.

<sup>4</sup> Available from the American Institute of Aeronautics & Astronautics, 1801 Alexander Bell Drive, Suite 500, Reston, VA 20191-4344.

<sup>5</sup> Available from Institute of Environmental Sciences and Technology, 940 E. Northwest Highway, Mount Prospect, IL 60056, and U.S. government sources.

<sup>6</sup> Available from American Society of Mechanical Engineers, United Engineering Center, 345 E. 47th St., New York, NY 10017.