

Explanation of Technical Measurements; Wipers

To whom it may concern,

Cleanroom wipers have specific technical attributes which are measured to define Intrinsic Purity & Extrinsic Performance. In this document I will attempt to explain the standard measurements used in analysis. These standards and test methodology are referenced from IEST-RP-CC004.3

Extrinsic Values

Physical Property Variables: Typically the following extrinsic parameters are measured

Basis Weight (the measurement of material weight). This is measured as g/m^2 , gram weight, per square meter of fabric. This is measured with a weight balance.

Thickness (the thickness of material). This is measured in millimeters, and tested via Caliper

Sorbency Capacity & Rate: This defines the amount of water which can be held, and speed of capture

Extrinsic Capacity (total amount of water held by volume). This is measured as ml/m^2 . Total milliliters of water held per square meter of fabric

Intrinsic Capacity (total amount of water held by weight). This is measured as ml/g . Total milliliters of water held per gram of fabric

Rate (speed of which water is absorbed). This is measured in Seconds of time.

Intrinsic Values

Particle Count Test: This defines the total amount of particles per size per wiper.

Measured in **LPC (Liquid Particle Count)**. Explanation of test: the wiper is placed in ultra-pure DI Water with known cleanliness. The wiper is agitated to release particles, either **Bi-Axial or Orbital shake**. The more agitation and time, the more particles will be released. Orbital is the most challenging test. The wiper is extracted, and the DI Water is tested for extracted particles.

An alternate method is via **APC (Air Particle Count)**. Explanation of test: the wiper is placed in a clean SS drum with known cleanliness. The drum is rotated at a defined speed (RPM) and duration time. A vacuum sampling is ongoing during the test, and particles are counted by size from the air extracted.

Particle counts are typically counted by size; ranging from 0.5 micron (μm) to 5.0 micron, and 5.0 micron up to 100 micron.

Unit of measure is defined as ($\# \times 10^6/\text{m}^2$). Explanation & example: $6 \times 10^6/\text{m}^2$ represents: $6 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$ (6,000,000) per square meter of fabric.

Fiber Count Test: Particles >100 micron are considered as fibers, and tested with the same method and unit of measurement.

Extractable Matter Test: This defines the total amount of NVR's (Non-Volatile Residues) left on the wiper after fluid has been evaporated. **This test is done with both DI Water, and Isopropyl Alcohol**, separately as values will vary. The unit of measurement is g/m^2 (grams of NVR per square meter of fabric).

Specific Extractable Ion Test: This defines the total amount of Ions by type per wiper. This is commonly measured as ($\mu\text{g/g}$; micro-gram of Ions per Gram of fabric), or ppm (parts per million). The values correlate for easy comparison. Ions are broken into 2 categories; Anions and Cations. Standard Ion's typically included (but not limited to) in measurement include: Sodium, Potassium, Calcium, Chloride, & Magnesium.

I am hopeful this information is beneficial, and I offer further assistance or clarification upon request.

Cordially,

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