



Designation: D4513 – 22

Standard Test Method for Particle Size Distribution of Catalytic Materials by Sieving¹

This standard is issued under the fixed designation D4513; 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 test method covers the determination of particle size distribution of catalytic powder material using a sieving instrument and is one of several found valuable for the measurement of particle size. This test method is particularly suitable for particles in the 20 to 420 μm range. (See Terminology [D3766](#).)

1.2 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.2.1 *Exception*—In [5.2](#), mesh size is the standard unit of measure.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards*:²

[D3766](#) Terminology Relating to Catalysts and Catalysis

[E11](#) Specification for Woven Wire Test Sieve Cloth and Test Sieves

[E105](#) Guide for Probability Sampling of Materials

[E161](#) Specification for Electroformed Material and Test Sieves

[E177](#) Practice for Use of the Terms Precision and Bias in

¹ This test method is under the jurisdiction of ASTM Committee [D32](#) on Catalysts and is the direct responsibility of Subcommittee [D32.02](#) on Physical-Mechanical Properties.

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² 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.

[ASTM Test Methods](#)

[E456](#) Terminology Relating to Quality and Statistics

3. Summary of Test Method

3.1 A 50 % relative humidity-equilibrated sample of known weight is allowed to fractionate on a series of various size sieves to allow the various particle sizes to be collected on successively smaller sieve openings.

3.2 The sample fraction collected on each sieve of the series is weighed and its fractional part of the original sample is determined.

4. Significance and Use

4.1 This test method can be used to determine particle size distributions of catalysts and supports for materials specifications, manufacturing control, and research and development work.

5. Apparatus

5.1 *Laboratory Sieving Instrument*, automatic with timer preferred.

5.2 *U.S. Standard Sieves*, or equivalent, to include micrometres (mesh) 425(40), 250(60), 177(80), 149(100), 105(140), 74(200), 44(325) and electroformed 30 and 20 micrometres. Because of their superior uniformity and resistance to distortion or damage during use, electroformed sieves, preferably with square holes, are recommended. Sieves with diameters between 6 and 10 cm are suggested.

5.3 *Ultrasonic Cleaning Tank*, 100 W.

5.4 *Transmitted Light Microscope*, 300 magnification, with calibrated scale eyepiece.

5.5 *Heat Gun Dryer*, (hair dryer or equivalent).

5.6 *Analytical Balance*, capable of weighing to 0.001 g.

5.7 *Sample Splitter, Chute Type, or Spinning Riffler*, with spinning riffler preferred.

6. Reagents

6.1 *Antistatic Coating*, (record cleaning spray or equivalent).

6.2 *Alcohol-Water Solution*—One part ethanol to nine parts deionized or distilled water.