



Designation: D5757 – 22

Standard Test Method for Determination of Attrition of FCC Catalysts by Air Jets¹

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1. Scope

1.1 This test method covers the determination of the relative attrition characteristics of FCC catalysts by means of air jet attrition. Other fine powder catalysts can be analyzed by this test method, but the precision of this test method has been determined only for FCC catalysts. It is applicable to spherically or irregularly shaped particles which range in size between 10 and 180 μm , have skeletal densities between 2.4 and 3.0 g/cm^3 (2400 and 3000 kg/m^3) (see [IEEE/ASTM SI-10](#)) and are insoluble in water. Particles less than 20 μm are considered fines. (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.

1.3 *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](#)

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

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

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

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.

[E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method](#)

[IEEE/ASTM SI-10 Standard for Use of the International System of Units \(SI\): The Modern Metric System](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *Air Jet Index (AJI), n* —a unitless value numerically equal to the percent attrition loss at 5 h.

4. Summary of Test Method

4.1 A sample of dried powder is humidified and attrited by means of three high velocity jets of humidified air. The fines are continuously removed from the attrition zone by elutriation into a fines collection assembly.

4.2 The AJI is calculated from the elutriated fines to give a relative estimate of the attrition resistance of the powdered catalyst as may be observed in commercial use.

5. Significance and Use

5.1 This test method is intended to provide information concerning the ability of a powdered catalyst to resist particle size reduction during use in a fluidized environment.

5.2 This test method is suitable for specification acceptance, manufacturing control, and research and development purposes.

6. Apparatus

6.1 The air jet attrition system consists of the following:

6.1.1 *Attrition Tube*, a stainless steel tube 710 mm long with a 35 mm inside diameter.

NOTE 1—NPS 1¼ in. pipe, Schedule 40 has the appropriate inside diameter.

6.1.2 *Three 2 mm Long Drilled Sapphire Square Edged Nozzles*, precision drilled 0.381 ± 0.005 mm in diameter. They are mounted equidistant from each other, 10 mm from center and flush with the top surface in a circular orifice plate 6.4 mm thick. The plate is designed to be attached to the bottom of the vertical attrition tube within an air delivery manifold.

6.1.3 *Settling Chamber*, a 300 mm long cylinder with a 110 mm inside diameter and with conical ends reducing to 30 mm inside diameter. The upper cone is approximately