



Designation: D8414/D8414M – 21

Standard Test Method for Measurement of Jet Cup Attrition Index of Catalytic Materials¹

This standard is issued under the fixed designation D8414/D8414M; 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 The jet cup attrition test is applicable to fluid catalytic cracking (FCC) catalysts, catalyst additives, and catalytic materials.

1.2 Applications for other powdered catalysts have been reported in the literature. The round robin test samples included two FCC catalysts and one powdered alumina.

1.3 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.4 *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.*

1.5 *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

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

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.

Current edition approved Oct. 1, 2021. Published November 2021. DOI: 10.1520/D8414_D8414M-21.

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.

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *control factor, CF, n*—unitless value determined by the repetitive analysis of a standard material; it is equal to the (initial value of the control standard)/ (current value of the control standard) = CF.

3.1.1.1 *Discussion*—Refer to 12.1 for details on the standard.

3.1.1.2 *Discussion*—The values used in the calculations are monthly averages.

3.1.2 *jet cup index, JCI, n*—unitless value equal to the “weight percent of 0- to 20- μ m [0- to 787- μ in.] fines generated per hour” under test conditions.

4. Summary of Test Method

4.1 Of the sample to be tested, 5 g [0.175 oz] is placed into the jet cup of the test apparatus where humidified air is passed through an orifice in the jet cup at high velocity.

4.2 The air impinges on the catalyst and causes particles to collide with each other and the walls of the jet cup. These particle-to-particle and particle-to-wall interactions cause fines to form via attrition. In addition, weaker particles will fracture and form fines.

4.3 The jet cup is attached to a fines disengagement chamber that allows particles less than 20 μ m [787- μ in.] to pass into a fines collection assembly.

NOTE 1—The fines disengagement chamber is based on the AMINCO-Roller air elutriation particle size analyzer, historically used to measure the 0-20 micron fraction in catalyst.

4.4 The JCI is calculated from the mass of fines collected and is numerically equivalent to the “weight percent of fines generated per hour” under test conditions.

5. Significance and Use

5.1 The jet cup attrition test will provide an estimate of the relative attrition resistance of fluid catalytic cracking (FCC) catalyst, catalyst additives, and catalytic materials.

5.2 The test is designed to simulate the attrition a catalyst or additive undergoes in a fluid catalytic cracking unit but at an accelerated rate.