Designation: D7084 − 04 (Reapproved 2017)

Standard Test Method for Determination of Bulk Crush Strength of Catalysts and Catalyst Carriers[1]

This standard is issued under the fixed designation D7084; 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 bulk crush strength of a bed of formed catalyst particles 1⁄32 to 3⁄16 in. (0.8 to 4.8 mm) in diameter and is intended to provide information concerning the ability of the catalyst material to maintain physical integrity.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered 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
D4180 Test Method for Vibratory Packing Density of Formed Catalyst Particles and Catalyst Carriers
E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods
E456 Terminology Relating to Quality and Statistics
E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Terminology

3.1 *Definitions:*

3.1.1 See also Terminology D3766.

3.1.2 *bulk crush strength*—pressure that generates 1 % fines for a sample contained in a cylindrical sample holder and crushed with a piston.

3.1.3 *generated fines*—particle size after crushing that passes through a sieve one-half of the diameter of the catalyst pellet.

4. Summary of Test Method

4.1 A representative sample is placed in a cylindrical sample holder, which is fitted with a piston. The piston is allowed to compress the catalyst at a known pressure. The percent of generated fines is determined by sieving.

5. Significance and Use

5.1 This test method is a means of determining the crushing strength of a catalyst in a bed. Techniques to measure the crushing strength of formed catalyst particles is limited to crushing of individual particles, which may not be related to how the catalyst will crush in a reactor or bed. For some catalysts, such as granules, this technique may be the only viable method for obtaining crushing strength. The production of fines in a reactor is not desired because of the potential of bed compaction and the pressure buildup in the reactor.

6. Apparatus

6.1 *Hydraulic Press,* capable of 3200 lb (1450 kg) loading, including a force gage. Maximum load capacity of the press should match with the accuracy measuring the applied force.

NOTE 1—Lower maximum load may be acceptable for testing less strong materials.

6.2 *U.S. Standard Sieves,* set (Tyler Equivalent).

6.3 *Test Cell,* (Fig. 1).

NOTE 2—A top loading cell can be used, but reproducibility of this test is a function of the volume being crushed and therefore the constant volume cell, as shown in Fig. 1, is recommended. A smaller *l*/*d* ratio for

[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.