



Designation: E728 – 91 (Reapproved 2020)

Standard Test Method for Resistance to Attrition of Granular Carriers and Granular Pesticides¹

This standard is issued under the fixed designation E728; 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 is used to determine the resistance to attrition of granular carriers and granular pesticides.

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.* For specific hazard statements see Section 6.

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

E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

E725 Test Method for Sampling Granular Carriers and Granular Pesticides

3. Summary of Test Method

3.1 A known weight of pre-sized granular carrier or granular pesticide is combined with steel balls in a sieve-bottom receiver pan. After a specified period of mechanical agitation, the steel balls are removed and the weight of the granular

¹ This test method is under the jurisdiction of ASTM Committee E35 on Pesticides, Antimicrobials, and Alternative Control Agents and is the direct responsibility of Subcommittee E35.22 on Pesticide Formulations and Delivery Systems.

Current edition approved Nov. 1, 2020. Published November 2020. Originally approved in 1980. Last previous edition approved in 2015 as E728 – 91(2015). DOI: 10.1520/E0728-91R20.

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.

material passing through the specified limiting sieve is measured and the resistance to attrition calculated.

4. Significance and Use

4.1 This procedure was designed principally with granular clay, corncob, nut shell, or sand carriers and granular pesticide products, but need not be limited to these materials. There may be more appropriate test methods for other types of granular carriers and pesticide products.

5. Apparatus

5.1 *Brushes*, Tyler Model 1778-SB soft brass wire brush, or equivalent, for 100 mesh and coarser sieves. Tyler nylon bristle brush, or equivalent, for screens finer than 100 mesh.

5.2 *Mechanical Sieve Shaker*, a Tyler Ro-Tap sieveshaker, or equivalent, or other agreed upon device.

5.3 *Sieves*, U.S. standard sieves, or equivalent conforming to Specification E11. The sieves shall be 2 in. (51 mm) in height and 8 in. (203 mm) in diameter.

5.4 *Bottom Receiver Pan and Top Sieve Cover*.

5.5 *Steel Balls*, ten $\frac{5}{8}$ in. (16 mm) in diameter.

5.6 *Interval Timer*, adjustable, with an accuracy of ± 10 s.

5.7 *Balance*, sensitivity of 0.1 g.

5.8 *Beaker*, glass, metal, or plastic with 250-mL capacity.

6. Hazards

6.1 Before testing, read the precautionary statements on the product label, the material safety data sheet, or both. Take proper precautions to prevent skin contact and inhalation of the fines and vapors. Take care to prevent contamination of the surrounding area. Always wear the appropriate safety equipment and, where indicated, wear respiratory devices passed by NIOSH for the product being tested.

7. Procedure

7.1 For reproducible results on a comparative basis, it is necessary to use a narrow mesh fraction or cut for this test. Approximately 75 ± 5 g of a representative sample as defined in Test Method E725 is required for each test and duplication is recommended.

7.2 Select the limiting screen for the mesh of material to be tested. (For 20 to 40 mesh the limiting screen would be 40, for 18 to 50 mesh, the limiting screen would be 50, and so forth.) Preclean sieves with brush, then wash and dry the sieves.

7.3 Screen out about 75 g of material to be tested using the limiting screen in the sieve shaker for 10 min or according to product specifications (mechanical sieve shaker; use the hammer).

7.4 Transfer 50 ± 1 g of material to the pan of the sieve assembly. Put the ten $\frac{5}{8}$ -in. (16-mm) steel balls in the pan with the sample to be tested and place a clean limiting screen in position above the bottom receiver pan.

7.5 Insert the sieve assembly in the shaker.

7.6 Run the shaker for 10 min or according to product specifications (mechanical sieve shaker; without the hammer).

7.7 Remove the assembly from the shaker. Remove the steel balls from the pan. Transfer the material taken from the pan to the limiting screen. Reassemble the limiting screen and pan.

7.8 Place the sieve assembly in the shaker and run for 10 min or according to product specifications (mechanical sieve shaker; use the hammer).

7.9 Remove the screen assembly from the sieve shaker. Transfer the fraction retained on the screen to a tared beaker and weigh the fraction to the nearest 0.1 g.

7.10 Determine the attrition on duplicate samples.

8. Calculation

8.1 Calculate the percent resistance to attrition to the nearest 1.0 % as follows:

$$\text{Percent resistance to attrition} = \frac{a \times 100}{b}$$

where:

a = weight of fraction retained on limiting screen and
 b = total weight of sample as charged.

9. Precision and Bias

9.1 This test method does not yield pass or fail data and should be used as comparative data only. The pass/fail aspect of the test method should be determined by the supplier or user, or both.

10. Disposal of Samples

10.1 After testing, store all materials in a safe manner and dispose of used sample material in accordance with product label directions, the material safety data sheets, or both.

11. Keywords

11.1 attrition; carrier; granule; handling; hardness; pesticide

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