



Standard Test Method for Particle Counts Per Pound of Granular Carriers and Dry-Applied Granular Formulations¹

This standard is issued under the fixed designation E 1520; 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 number of particles per pound of granular carriers and granular pesticide formulations.

1.2 *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 and health practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary statements, see Section 6.

2. Referenced Documents

2.1 ASTM Standards:

E 11 Specification for Wire-Cloth Sieves for Testing Purposes²

E 725 Test Method for Sampling Granular Carriers and Granular Pesticides³

E 726 Test Method for Particle Size Distribution of Granular Carriers and Granular Pesticides³

E 727 Test Methods for Determining Bulk Density of Granular Carriers and Granular Pesticides³

3. Summary of Test Method

3.1 A known weight of the granular carrier or granular pesticide formulation is placed on the top sieve of a stacked set of U.S. standard stainless steel screens. The sieves are shaken for a specified period of time. The weight percent of the granules retained on each sieve is determined. The number of particles per pound of granular material is then calculated.

4. Significance and Use

4.1 This test method was designed principally for clay granular carriers and clay-based granular formulations, but need not be limited to these materials.

4.2 This procedure is applicable to granules in the range from 8 to 60 mesh (2.36 to 0.25 mm).

4.3 The sieve sizes used to calculate total particle count will

be called the desired range and should be specified as part of the test results.

5. Apparatus

5.1 *Mechanical Sieve Shaker*, a Tyler RoTap sieve shaker or equivalent.

5.2 *Sieves*, U.S. standard stainless steel 8-in. diameter sieves conforming to Specification E 11.

5.3 *Bottom Receiver Pan and Top Sieve Cover*.

5.4 *Interval Timer*, adjustable, with an accuracy of +10 s.

5.5 *Balance*, sensitivity of 0.01 g.

6. Safety Precautions

6.1 Before testing read the precautionary statements on the product label or the Material Safety Data Sheet (MSDS), or both. Take proper precautions to prevent skin contact and inhalation of the fines or vapors, or both. Take care to prevent contamination of the surrounding area. Always wear the appropriate safety equipment and, where indicated, wear respiratory devices approved by (NIOSH) for the product being tested.

7. Procedure

7.1 Record tare weights of each sieve and bottom pan to ± 0.01 g.

7.2 Order stack of screens by size with the finest sieve next to the pan.

7.3 Use a representative sample of 100 ± 5 g obtained in accordance with Test Method E 725.

7.4 Weigh the sample to ± 0.01 g.

7.5 Transfer the whole weighed sample onto the top sieve, cover, and shake for $10 \text{ min} \pm 10 \text{ s}$ using the mechanical sieve shaker in accordance with Test Method E 726 with the hammer down.

7.6 Remove the sieve assembly from the sieve shaker. Weigh each sieve and bottom pan separately. Calculate and record the weight of the retained material to the nearest 0.01 g by subtracting the tare weight from the measured sieve weight for each sieve and bottom pan.

8. Calculation

8.1 Calculate the percentage distributions in all sieve fractions including the bottom pan to give 100 %.

$$R = (F/S) \times 100 \quad (1)$$

¹ This test method is under the jurisdiction of ASTM Committee E-35 on Pesticides and is the direct responsibility of Subcommittee E35.22 on Pesticide Formulation and Application Systems.

Current edition approved October 10, 1999. Published December 1999. Originally published as E 1520 - 93. Last previous edition E 1520 - 93 (1998).

² *Annual Book of ASTM Standards*, Vol 14.02.

³ *Annual Book of ASTM Standards*, Vol 11.05.

where:

F = weight retained on sieve or pan,

S = sum of retained weights, and

R = percent retained on sieve or pan.

8.2 Multiply the percentage of granules retained on each sieve by the numbers specified in Table 1. Sum these products (P) for the particle count in the desired size range.

8.3 Calculate the total particles per pound (kilogram) in the desired range as follows:⁴

$$T = \frac{31.5 \times P}{D} \quad (2)$$

$$\left(T = \frac{31.5 \times P}{D} \times 2.2046 \right) \quad (3)$$

where:

T = total particles per pound in the desired range,

P = sum of particle counts in accordance with 8.2, and

D = bulk density in pounds per cubic foot in accordance with Test Methods E 727.

⁴ Refers to a density of 31.5 lb/ft³ for clay used in Footnote B of Table 1.

TABLE 1 Sieve Range Particles per Pound of Each Fraction^{A, B}

8/12	1 080
12/14	4 300
14/16	5 700
16/18	7 300
16/20	8 300
18/20	9 500
20/25	14 500
20/30	20 000
25/30	26 500
30/35	46 000
30/40	60 000
35/40	76 000
30/50	97 000
40/45	120 000
40/50	146 000
45/50	175 000
50/60	285 000

^A8/12 and 12/14 multipliers were experimentally determined by Ciba Geigy Corp., Greensboro, NC, 1988, by the same procedure as in Footnote B.

^BGwyn, Jr., H. M., "Determining the Particle Count per Pound of Granular Pesticides," *Agricultural Chemicals*, June 1964.

9. Disposal of Sample

9.1 After testing, store all materials in a safe manner and dispose of used material in accordance with product label directions or MSDS, or both.

10. Precision and Bias

10.1 This test method yields comparative data. The pass/fail aspect of this test method should be determined by applicable specifications. When used for specification purposes, the mechanical shaker and test conditions must be agreed upon.

10.2 This test method was developed for spherical or near-spherical particles. Use with non-spherical particles may produce erroneous results.

11. Keywords

11.1 clay; granular carriers; particle count; particle size analysis; particles per pound; particles per weight; pesticide formulations; sieve analysis

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