Designation: ~~E1520 – 99 (Reapproved 2015)~~ E1520 – 23

Standard Test Method for Particle Counts Per Pound of Granular Carriers and Dry-Applied Granular Formulations[1]

This standard is issued under the fixed designation E1520; 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 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 and health~~safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.* For specific precautionary 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
E726 Test Method for Particle Size Distribution of Granular Carriers and Granular Pesticides
E727/E727M Test Methods for Determining Bulk Density of Granular Carriers and Granular Pesticides

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.

[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.

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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.

4.2 This procedure is applicable to granules in the range from ~~8 to 60 mesh (2.36 to 0.256~~ to 80 mesh (3.36 to 0.17 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 E11.

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 E725.

7.4 Weigh the sample to ±0.01 g.

7.5 Transfer the whole weighed sample (100 ± 5 g) onto the top sieve, cover, and shake for 10 min ± 10 s using the mechanical sieve shaker in accordance with Test Method E726 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 %.

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

where:

F = weight retained on sieve or pan,
S = sum of retained weights, and
R = percent retained on sieve or pan.

~~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~~ Multiplication Factor (*M*) specified in Table 1. ~~Sum these products (P) for the particle count in the desired size range.~~

$$P = R \times M \tag{2}$$

Sum these products (*P*) for the particle count in the desired size range, Σ*P*.

8.3 Calculate the total particles per pound (kilogram) (*T*) in the desired range as follows (see Note 1):

$$T = \frac{31.5 \times P}{D} \tag{3}$$

$$T = \frac{31.5 \times \Sigma P}{D} \tag{3}$$

$$\left(T = \frac{31.5 \times P}{D} \times 2.2046\right) \tag{4}$$

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where:

T = total particles per pound in the desired range,
P = sum of particle counts in accordance with 8.2, and

TABLE 1 Sieve Range Particles per Pound of Each Fraction[A,B]

~~8/12~~ US Sieve Range	~~1 080~~ Multiplication Factor
4/9	1800
6/8	2200
8/12	3100
~~12/14~~	~~4 300~~
12/14	4300
~~14/16~~	~~5 700~~
14/16	5700
~~16/18~~	~~7 300~~
16/18	7300
~~16/20~~	~~8 300~~
16/20	8300
~~18/20~~	~~9 500~~
18/20	9500
~~20/25~~	~~14 500~~
20/25	14 500
~~20/30~~	~~20 000~~
20/30	20 000
20/40	35 000
~~25/30~~	~~26 500~~
25/30	26 500
~~30/35~~	~~46 000~~
30/35	46 000
~~30/40~~	~~60 000~~
30/40	60 000
~~35/40~~	~~76 000~~
35/40	76 000
~~30/50~~	~~97 000~~
30/50	97 000
40/45	120 000
40/50	146 000
45/50	175 000
50/60	285 000
60/80	570 000

[A] 8/12 and 12/14 multipliers were experimentally determined by Ciba Geigy Corp., Greensboro, NC, 1988, by the same procedure as in Footnote B.
[B] Gwyn, Jr., H. M., "Determining the Particle Count per Pound of Granular Pesticides," *Agricultural Chemicals*, June 1964.