Designation: ~~E2316 – 03 (Reapproved 2014)~~ E2316 – 14

Standard Test Method for Determination of Particles Resulting from the Attrition of Granular Pesticides[1]

This standard is issued under the fixed designation E2316; 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 amount and particle size distribution curve of particles with diameter ~~10~~106 micrometers or smaller resulting from the attrition of granular pesticides.

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 practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statement, see Section 8.

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

2.2 *CIPAC Standard:*

CIPAC Test Method MT 187[3]

3. Terminology

3.1 *Definitions:*

3.1.1 *fines*—a synonym for particles with diameter of ~~10~~106 micrometers or smaller.

3.1.2 *micron and μm*— synonyms for micrometer.

4. Summary of Test Method

4.1 The initial weight of a test sample of granular pesticide is determined. The sample is then air jet sieved using ~~10~~106 ~~micron~~ openings to remove the inherent fines. The fines-free granules are then combined with glass beads in a glass jar, the lid is placed on the jar, and the jar is placed on a roller system with a drive bed capable of rotating the jar at a known rpm. After rolling for a specified time period, the jar is removed from the rollers and the contents of the jar are poured through a sieve sized to remove the glass beads. The sample minus the glass beads is again air jet sieved using ~~10~~106 micron openings to remove the fines attrited during the rolling of the jar. The total of particles smaller than ~~10~~106 microns for the test sample is the inherent fines plus the attrited fines. The particle size distribution curve of the combined inherent and attrited fines is determined by laser light diffraction using CIPAC Test Method MT 187.

5. Significance and Use

5.1 This test method is designed specifically for granular pesticide formulations.

5.2 This test method helps provide information on health hazards likely to arise from exposures by the inhalation route. It can be of use in selecting dose levels for chronic studies and for establishing safety criteria for human exposure.

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[1] This test method is under the jurisdiction of ASTM Committee E35 on Pesticides, Antimicrobials, and Alternative Control Agentsand 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.

[3] The size distribution of the particles with sieve diameter less than ~~10~~106 μm is determined by laser light diffraction using CIPAC Test Method MT 187.

5.3 The amount of fines determined by this method is a measure of potential inhalation and respiration toxicity because the hazards of inhaled solid substances are influenced by physical factors such as particle size.

6. Apparatus

6.1 *Roller System,* two or more rollers with a drive bed, capable of rotating the specified glass jar at 75 ± 15 rpm.

6.2 *Glass Jar,* with lid, capacity ~500 mL, outer diameter ~8 cm, height ~15 cm.

6.3 *Glass Beads,* diameter 4.0 ± 0.2 mm, bulk density ~1.5 g/cc.

6.4 *Micron Air Jet Sieve,* with GAZ 125 cyclone fines collector or *Alpine Air Jet Sieve*, with GAZ 125 cyclone fines collector,[4] or equivalent.

6.5 *Sieves,* U.S. standard series conforming to Specification E11, diameter 8 in. (203 mm), height 2 in. (51 mm): 10-mesh (2 mm openings), 140-mesh ~~(10~~(106~~)~~ µm openings).

NOTE 1—The amount of particles with sieve diameter ~~10~~106~~)~~ µm or smaller is determined by sieving.

6.6 *Balance,* sensitivity of 0.01 g.

6.7 *Hygrometer,* minimum range of 25 to 95 % relative humidity.

6.8 Apparatus specified in CIPAC Test Method MT 187.

7. Reagents and Materials

7.1 Granular pesticide to be tested.

7.2 Reagents and materials specified in CIPAC Test Method MT 187.

8. Hazards

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

8.2 Storage, handling, and disposal of test pesticides should be done with consideration for health and environmental safety, and in accordance with federal, state, and local regulations.

9. Sampling, Test Specimens, and Test Units

9.1 See Test Method E725 for proper sampling practices and procedures to reduce a gross sample to a representative, suitable size for this test method.

10. Preparation of Apparatus

10.1 For all apparatus, see manufacturers' instructions for proper calibration, operation, and maintenance.

11. Procedure

11.1 The test sample should be 15 g, nominal. The exact amount of each sample should be recorded for use in necessary calculations.

11.2 Weigh the test sample to the nearest 0.01 g (15 g nominal) and record as W (granules plus inherent inhalable particles).

11.3 Weigh the cyclone collection jar to the nearest 0.01 g and record as J1. Attach the jar to the apparatus.

11.4 Measure and record the relative humidity of the air that will come in contact with the granules. In the absence of humidity controlled air, the air of concern will be the air of the room in which the tests are performed.

11.5 Place the ~~10~~106~~)~~ µm sieve in the air jet manifold of the Micron Air Jet Sieve or Alpine Air Jet Sieve. Gently transfer the entire test sample to the sieve and put the sieve cover in place. Set the timer for 3 min. Start the vacuum and adjust the vacuum gauge to read 7 to 9 in. of water (1.7 to 2.4 kPa). During the sieving period, material adhering to the sieve cover or sieve sides may be loosened by use of tapping or by use of trace amounts of anti-static compound.

11.6 After sieving, determine to the nearest 0.01 g the weight of granules retained on the sieve and record the weight as R1 (granules minus inherent fines).

11.7 Determine to the nearest 0.01 g the weight of the cyclone collection jar plus inherent fines and record the weight as J2. Leave the fines in the jar. Reattach the jar to the apparatus.

[4] The Micron Air Jet Sieve and the Alpine Air Jet Sieve use the same principle of design and working components. Both are products of Hosokawa Micron International of New York. The GAZ 125 cyclone fines collector is an accessory.