



**American Society of
Agricultural and Biological Engineers**

**S
T
A
N
D
A
R
D**

ASABE is a professional and technical organization, of members worldwide, who are dedicated to advancement of engineering applicable to agricultural, food, and biological systems. ASABE Standards are consensus documents developed and adopted by the American Society of Agricultural and Biological Engineers to meet standardization needs within the scope of the Society; principally agricultural field equipment, farmstead equipment, structures, soil and water resource management, turf and landscape equipment, forest engineering, food and process engineering, electric power applications, plant and animal environment, and waste management.

NOTE: ASABE Standards, Engineering Practices, and Data are informational and advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. The ASABE assumes no responsibility for results attributable to the application of ASABE Standards, Engineering Practices, and Data. Conformity does not ensure compliance with applicable ordinances, laws and regulations. Prospective users are responsible for protecting themselves against liability for infringement of patents.

ASABE Standards, Engineering Practices, and Data initially approved prior to the society name change in July of 2005 are designated as "ASAE", regardless of the revision approval date. Newly developed Standards, Engineering Practices and Data approved after July of 2005 are designated as "ASABE".

Standards designated as "ANSI" are American National Standards as are all ISO adoptions published by ASABE. Adoption as an American National Standard requires verification by ANSI that the requirements for due process, consensus, and other criteria for approval have been met by ASABE.

Consensus is established when, in the judgment of the ANSI Board of Standards Review, substantial agreement has been reached by directly and materially affected interests. Substantial agreement means much more than a simple majority, but not necessarily unanimity. Consensus requires that all views and objections be considered, and that a concerted effort be made toward their resolution.

CAUTION NOTICE: ASABE and ANSI standards may be revised or withdrawn at any time. Additionally, procedures of ASABE require that action be taken periodically to reaffirm, revise, or withdraw each standard.

Copyright American Society of Agricultural and Biological Engineers. All rights reserved.

ASABE, 2950 Niles Road, St. Joseph, MI 49085-9659, USA, phone 269-429-0300, fax 269-429-3852, hq@asabe.org

Procedure for Measuring Distribution Uniformity and Calibrating Granular Broadcast Spreaders

Developed by the Fertilizer Application Subcommittee of ASAE Agricultural Chemical Application Committee; approved by Power and Machinery Division Standards Committee; adopted by ASAE as a Tentative Standard December 1971; reclassified as a full Standard December 1972; revised March 1978; reconfirmed December 1982; revised March 1988; reaffirmed December 1992, December 1997, December 1998; revised February 1999; revised editorially April 2000; reaffirmed February 2004; reaffirmation extended for two years February 2009; revised December 2009, revised May 2018.

Keywords: Distribution, Granular, Spreaders, Test

1 Purpose and Scope

1.1 Purpose. The purpose of this Standard is to establish a uniform method of determining and reporting performance data on broadcast spreaders designed to surface apply granular materials. Tests performed according to this Standard make it possible to predict distribution uniformity of a broadcast spreader and to compare spreader distribution patterns.

1.2 Scope. This Standard pertains to centrifugal, pendulum, and other types of broadcast spreaders designed for dry granular application while operating on the soil surface. Portions of the test procedures outlined herein are suitable for determining the delivery rate of gravity or drop spreaders; however, additional tests not covered in this Standard are needed to completely evaluate the performance of gravity spreaders. This Standard does not cover dry pneumatic granular applicators.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies unless noted. For undated references, the latest approved edition of the referenced document (including any amendments) applies.

ASTM E11, *Standard specification for woven wire test sieve cloth and test sieves*

ASAE S281, *Capacity Designation for Fertilizer Pesticide Hoppers and Containers*

ASAE S327, *Terminology and Definitions for Application of Crop or Forestry Production and Protection Agents*

3 Definitions

3.1 application, one-direction: An application method in which successive adjacent swaths are made in the same direction of travel (racetrack or circuitous application). This method produces a right-on-left overlapping of adjacent patterns.

3.2 application, progressive: An application method in which the spreader applies adjacent swaths in alternate directions (back and forth application). This method produces a right-on-right pattern overlap alternately with a left-on-left pattern overlap.

3.3 application rate: Application rate are as defined in ASAE S327.

3.4 application, single-pass: An application method in which the spreader applies one swath over the collection trays.

3.5 collector efficiency: The percentage of true application rate caught in a collection device; i.e., the weight of material caught in the collection device divided by the area of the collection device and expressed as a percentage of the true application rate at that location in the pattern.

3.6 swath spacing: The lateral distance between spreader centerlines for adjacent swaths.

3.7 swath width, effective: The swath spacing that will produce acceptable field deposition uniformity for the intended application.

4 Test Conditions

4.1 The spreader to be tested shall be in good mechanical condition and shall be properly adjusted.

4.2 Tests may be conducted on a spreader to evaluate an experimental model, to qualify a new production model, or to verify the distribution uniformity of an existing production model. Tests may also be conducted to evaluate the distribution uniformity of a spreader and to verify the adjustment of a spreader for a specific granular material being spread under conditions similar to actual field conditions.

4.3 The geometric specifications shall be checked with the machine standing on an impenetrable, horizontal surface in normal operating position. Dimensions of length and width shall be measured along horizontal lines and dimensions of height along vertical lines.

4.4 It is recommended that the manufacturer be notified well in advance of any test in which the manufacturer's current production model will be compared with those of other manufacturers. The manufacturer shall be entitled to have his representative present during the test.

4.5 The test may be conducted with a standardized test material such as uniform size spherical prills, a specific granular product, or an inert product simulant. A description of the material including sieve size, moisture content, bulk density, and product name shall be specified in the test report (see ASAE S281).

4.5.1 Results of a sieve analysis shall be reported. The percent of material retained on each screen shall be stated. The sieves used shall conform to ASTM E11.

4.5.2 A description of the test material's particle shape and surface texture shall be included in the test report.

5 Test Procedure

5.1 Guidelines for test setup

5.1.1 The accuracy of the test can be influenced by wind, granule or particle size, critical relative humidity of the product, rate of application, ground slope, travel speed, ground roughness, temperature, relative humidity, and method of collecting samples. Conducting tests on a hard surface can also affect the observed patterns. This effect is more pronounced as particle size increases. The following recommendations should be followed to maintain test accuracy:

5.1.1.1 All spreading shall be done when the wind velocity is less than 8 km/h (5 mile/h) at a height of 1.5 m (5 ft) above the ground. If a wind exists, the direction of travel shall be parallel (within ± 15 deg) to the direction of the wind.