Designation: D3069 – 94 (Reapproved 2013)

Standard Test Method for Delivery Rate of Aerosol Products[1]

This standard is issued under the fixed designation D3069; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the determination of delivery rate of aerosol products.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D996 Terminology of Packaging and Distribution Environments

3. Terminology

3.1 General definitions for packaging and distribution environments are found in Terminology D996.

4. Summary of Test Method

4.1 The delivery rate of an aerosol dispenser is determined by measuring the quantity of material expelled through the valve in a given time. The exact duration of discharge and the temperature of the dispenser must be carefully controlled for good reproducibility.

4.2 Biological and clinical tests are often made with one or two dispensers selected from a group that is similar in all respects, with the exception of delivery rate. When it is desirable to select dispensers with equal delivery rates, three tests should be performed on each dispenser.

4.3 In the case of storage tests, a single delivery rate test is normally performed at each examination period to conserve the contents and extend the life of the dispenser.

5. Significance and Use

5.1 Delivery rate tests assist in evaluating one aspect of valve performance, and are considered as a prerequisite to both biological and storage testing.

6. Apparatus

6.1 *Water Bath,* maintained at 70 ± 0.5°F (21 ± 0.25°C) (80 ± 0.5°F (26 ± 0.25°C) for insecticides), to match Peet-Grady test requirements, with a screen or perforated metal shelf 1 in. (25 mm) above the bottom of the bath.

6.2 *Stirrer,* air or electric.

6.3 *Balance,* 0.1-g scale.

6.4 *Stop Watch or Electric Timer* .

7. Sampling

7.1 Normal production or laboratory samples shall be used for this test.

8. Test Specimen

8.1 Remove the protective cover, paper label, and all other detachable materials from the dispenser, with the exception of the button or actuator.

8.2 If a foam spout is used, remove the spout, cut away all nonessential plastic, and then replace the spout.

9. Procedure

9.1 Activate the valve for a few seconds, then remove any valve cup impingements, and weigh the dispenser to the nearest 0.05 g.

9.2 Place the dispenser on the shelf in the water bath, which is maintained at the test temperature of 70 ± 0.1°F (21 ± 0.05°C). Keep the dispenser in an upright position, spaced 1 in. (25 mm) apart, and covered with 1 in. of water.

NOTE 1—Approximately 0.03 % sodium nitrite ($NaNO_2$) may be added to the water bath to prevent the minor rusting of some tinplate dispensers.

9.3 Circulate the water with the mechanical stirrer. Hold for 15 min in the case of essentially anhydrous products, and for 25 to 30 min for viscous or water-base products.

NOTE 2—In the case of thixotropic, rheopectic, and certain other

[1] This test method is under the jurisdiction of ASTM Committee D10 on Packaging and is the direct responsibility of Subcommittee D10.33 on Mechanical Dispensers. Originally developed by the Chemical Specialties Manufacturers Assn.

Current edition approved April 1, 2013. Published April 2013. Originally approved in 1972. Last previous edition approved in 2005 as D3069 – 94 (2005). DOI: 10.1520/D3069-94R13.

[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.

Copyright © ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. United States

emulsion types, the degree of agitation will have a considerable effect upon delivery rates.

9.4 Remove the dispenser, and actuate the valve for a given time (preferably 10 s), preferably into an exhaust hood.

NOTE 3—Generally, the product should be shaken before any actuation, and reference should be made to any label instruction.

9.5 Dry the dispenser with a clean cloth, and use a blast of compressed air to remove moisture from the mounting cup and dispenser seams, in the case of metal containers.

9.6 Reweigh the dispenser, and compute the mass difference.

9.7 If duplicate tests are made, repeat 9.1-9.6.

10. Calculation

10.1 Calculate the delivery rate in grams per second as follows:

$$D = M/10 \quad (1)$$

where:

D = delivery rate, g/s, and
M = mass loss, g.

11. Report

11.1 The report shall include the following:

11.1.1 Product being tested, and

11.1.2 Results of each test reported as delivery rate in grams per second.

12. Precision and Bias

12.1 *Precision*—This test method is being reviewed for development of a precision statement based upon intralaboratory test data. Volunteers from various CSMA Aerosol Division, Test and Standard Methods subcommittee membership will provide the precision statement based upon their within-laboratory data.

12.2 The reproducibility of results of this method is approximately ±1 %. The precision is approximately ±2 %.

12.3 Any air trapped in the product and outage space may be expected to have an elevating effect upon delivery rates. The effect decreases as the can is emptied. The rate of decrease is much more rapid for dispensers with vapor-tap valves. Even without air, minor distillation effects will occur within the dispenser as it is used up, and these will have a small depressing effect upon delivery rates.

12.4 The variation in valve orifice diameters may be as high as ±10 %. Because of this, delivery rates may vary as much as ±15 % from dispenser to dispenser.

12.5 The delivery rate of freshly prepared aerosols will not usually be the same as that after aging. This is due to gasket swelling, changes in elastomer hardness, and other factors.

13. Keywords

13.1 aerosol; delivery rate; package

ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.

This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org). Permission rights to photocopy the standard may also be secured from the ASTM website (www.astm.org/COPYRIGHT/).