Designation: D3065 – 01 (Reapproved 2013)

Standard Test Methods for Flammability of Aerosol Products[1]

This standard is issued under the fixed designation D3065; 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 U.S. Department of Defense.

1. Scope

1.1 These test methods cover the determination of flammability hazards for aerosol products.

1.2 These test methods appear in the following order:

	Section
Flame Projection Test	4 to 7
Closed Drum Test	8 to 10

1.3 These test methods should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.

1.4 *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]

E1 Specification for ASTM Liquid-in-Glass Thermometers

3. Significance and Use

3.1 These test methods were developed so that the Open Drum Test could be abandoned as a meaningful guide in establishing flammability hazards.

FLAME PROJECTION TEST

4. Apparatus

4.1 *Base,* 8 in. (203 mm) wide and 2 ft (0.6 m) long, marked in 6-in. (152-mm) intervals.

4.2 *Rule,* 2 ft (0.6 m) long, marked in inches (or millimetres) to be supported horizontally on the side of the base and approximately 6 in. (152 mm) above it.

4.3 *Candle,* paraffin, approximately 1 in. (25 mm) in diameter and of such height that the top third of the flame is at the height of the horizontal rule, to be placed at the zero point in the base.

5. Conditioning

5.1 Condition the dispenser to 70 ± 1°F (21± 0.5°C).

6. Procedure

6.1 Conduct the test in a draft-free area that can be ventilated and cleared after each test.

6.2 Shake the dispenser, and hold it upright unless the label states otherwise.

6.3 Position the dispenser 6 in. (152 mm) from the flame source and spray for 4 s (one operator noting the extension of the flame and the other operating the dispenser) through the top third of the 2-in (51-mm) flame and essentially parallel to the rule.

6.3.1 **Warning**—Do not spray large quantities in a small, confined area.

6.4 Record the results.

6.5 Free the space of any previously discharged material, repeat 6.2 – 6.4 twice again, and average the three results.

7. Report

7.1 Report the following information:

7.1.1 Product being tested,

7.1.2 Results of the three readings, and

7.1.3 Average of the three results.

[1] These test methods are 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 2006 as D3065 – 2001(2006). DOI: 10.1520/D3065-01R13.

[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.

CLOSED DRUM TEST

8. Apparatus

8.1 *Drum,* open-head, 55 gal (208 dm^3), modified as follows:

8.1.1 Fit a closure over the open drum head. The closure may be either a hinged lid (Fig. 1), or a ½-mil (0.0127-mm) thickness of polyamide film. If the film is used, apply it as follows:

8.1.1.1 Stretch the film over the open end of the drum and hold it in place by a strong rubber band, that will stretch 1 in. (25 mm) when a 1-lb (0.45-kg) mass is hung from its lowest point when around the drum.

8.1.1.2 Cut a 1-in. (25-mm) vertical slit in the film, beginning at a point 2 in. (51 mm) from the top of the drum.

8.1.1.3 Draw the film taut over the opening.

8.1.2 Bore a circular opening 1 in. (25 mm) in diameter through the base, about 2 in. (51 mm) from the edge, in such a position that when the drum is on its side the hole will be at the top.

8.1.3 A metal base 9 in. (229 mm) long, 2 in. (51 mm) wide, and at least 1/16 in. (1.6 mm) thick shall be used to support a paraffin candle approximately 1 in. (25 mm) in diameter and at least 3 in. (76 mm) in height (see Fig. 2).

8.1.4 Optionally, a 6-in. (152-mm) square opening may be cut through the center of the drum base and securely covered with a piece of safety glass.

9. Conditioning

9.1 Condition the dispenser to 70 ± 1°F (21± 0.5°C).

10. Procedure

10.1 Lay the drum on its side (Fig. 1) where the temperature is between 60 and 80°F (15 and 27°C), but as close to 70°F (21°C) as possible.

10.2 Stand the candle on the metal base in the drum, half-way from each end.

10.3 Light the candle and secure the closure. (If the film closure is used, ignite the candle by means of a taper through the 1-in. (25-mm) circular opening.)

10.4 Shake the dispenser and hold it upright or, if necessary, in such a position that the liquid contents can be sprayed directly into the drum.

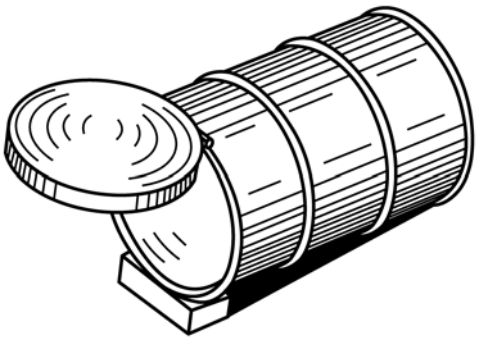
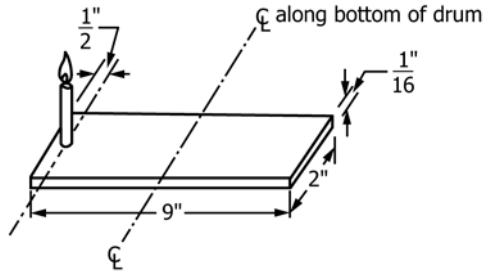


FIG. 1 Hinged Lid



in.	mm	in.	mm
1/8	1.6	2	51
½	13	9	229

FIG. 2 Candle Base

10.5 As quickly as possible, place the dispenser at the 1-in. (25-mm) opening and spray directly into the drum, directing the spray toward the center of the opposite end, until an explosion takes place, or for a period up to 60 s, whichever occurs first.

10.6 After each test, open the drum to clear the atmosphere, and clean the drum of any residues which might effect future tests.

10.7 Repeat 10.3 – 10.6 twice again, and average the three results, using the same dispenser if possible. If size limitations make it necessary to use more than one dispenser, then do not use more than one in the performance of any one test.

11. Report

11.1 Report the following information:

11.1.1 Product being tested,

11.1.2 Results of the three tests, and

11.1.3 Average of the three results.

12. Precision and Bias

12.1 *Precision*—The precision of Test Methods D3065 is highly dependent on the contents being tested. One laboratory that used the "Flame Projection Test" has investigated two products with three replicate tests, yielding the following results:

Product A	Flame Extension (in.)
Can No. 1	18
Can No. 2	16
Can No. 3	18
Mean value	17.3
Standard Deviation	1.15

Product B	Flame Extension (in.)
Can No. 1	7
Can No. 2	4
Can No. 3	5
Mean value	5.3
Standard Deviation	1.53

12.1.1 Another laboratory that used the "Closed Drum Test" has investigated two products with three replicate tests, yielding the following results:

Product A	Seconds
Can No. 1	48.9
Can No. 2	47.8

Can No. 3	55.2
Mean value	50.63
Standard Deviation	3.99
Product B	Seconds
Can No. 1	31.1
Can No. 2	27.5
Can No. 3	29.5
Mean value	29.37
Standard Deviation	1.8

12.1.2 Other products in aerosol packages may have values different than the values disclosed above. Variability is strong due to the tolerances in all of the components in the aerosol valve, which affect the delivery rate and pattern shape; both rate and pattern have a direct effect of flame extension. There is also variability due to the amount and flammability level of the contents—both product and propellent. Users of this test method are suggested to reference historical files of previous tests of similar aerosol packaging contents for an estimate of within–laboratory repeatability. The Committee believes that because of this strong product and component material dependency, further investigation of repeatability and reproducibility is not practicable.

12.2 *Bias*—Test Methods D3065 has no bias because an accepted reference or referee value is not available.

13. Keywords

13.1 aerosol packaging; aerosol safety; flammability of aerosol products