



Designation: D 3097 – 94

Standard Test Method for Aerosol Products for Delivered Mass¹

This standard is issued under the fixed designation D 3097; 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 covers the determination of delivered mass 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.* For a specific cautionary statement, see the Note in Section 5.

2. Significance and Use

2.1 Aerosol packaged products are sold by mass, but unlike conventional standard-pack packages, aerosol packages cannot be conveniently opened, and puncturing the container must be avoided. An aerosol package should be considered a “system,” rather than simply a package, because the container includes a product dispensing system as well as the product. For this reason, test procedures require that the packaged product deliver the labeled mass less a specified test allowance. The allowance compensates for differences in delivery between normal consumer usage and test usage.

2.2 Since it is not practicable to have a single test allowance covering every product or brand, the products are broken down into four general classifications, each with similar properties and a developed set of test allowances, as follows: (1) non-food foam products, (2) food products, (3) low-viscosity products, and (4) high-viscosity products. Examples of products in each classification are given in Appendix X1.

2.3 Even within classification, there will always be some products that may deliver better than others. It is conceivable that an aerosol packaged product could deliver the stated quantity, within the limits of the test allowance, and still be short filled on a dry tare basis. It is emphasized that the test allowance should not be used as justification for packaging less than the stated quantity on a dry tare basis.

3. Apparatus

3.1 *Test Stand*, lightweight, portable, equipped with an adjustable valve-actuator depressor.

3.2 *Scale*, equal-arm.

3.3 *Receiving Vessel*.

4. Test Specimens

4.1 The specimens should not be punctured or subjected to temperatures in excess of 110°F (43°C).

4.2 With the exception of refrigerated products, all aerosol packaged products should be tested at product temperatures from 70 to 80°F (21 to 26°C).

4.3 All refrigerated products should be tested at product temperatures from 37 to 43°F (2.7 to 6°C).

5. Procedure

5.1 Select ten or more specimens identical in labeled mass, brand, and commodity. Remove any overcaps not required for dispensing the product.

5.2 Check the gross mass of each specimen to determine the lightest and heaviest specimens, and record the masses.

5.3 *Shaking Procedure*—Select the lightest specimen. Do not shake unless the label specifies that shaking is required. If shaking is specified, shake the container in accordance with the directions on the container. If no directions are specified, shake the container as follows:

5.3.1 *Non-Food Foam and Low-Viscosity Products*—Shake the container with a wrist-twisting motion for 15 s at the approximate rate of 1 complete cycle per second.

5.3.2 *Food Products*—Shake the container with a wrist-twisting motion for 15 s at the approximate rate of 2 complete cycles per second.

5.3.3 *High-Viscosity Products*—Shake the container with a brisk wrist-twisting motion for 1 min at the approximate rate of 2 complete cycles per second. If the specimen contains a ball agitator, continue the shaking procedure for 1 min after the ball has shaken loose.

5.4 *Exhausting Procedure*—The fumes and suspension of finely divided product in the air when emptying the containers (particularly those containing high- and low-viscosity products) may be toxic, irritating, and flammable. Therefore, conduct the exhausting procedure in a well-ventilated area or outdoors, as follows:

NOTE 1—**Caution:** No smoking should be permitted within at least 50 ft (15 m) of any source of open flame or spark in the test area.

5.4.1 *Food and Non-Food Foam Products*—Using the portable test stand valve depressor, position the lightest container

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as specified in the directions and hold the valve wide open for 30 min.

5.4.2 Low-Viscosity Products:

5.4.2.1 In accordance with 5.4.1, exhaust the lightest container until no product or gas is expelled. If any product remains, expel this as completely as possible by holding the container in the hand with the valve-actuator depressed and alternately invert the container and then restore it to the original test position at 10-s intervals until no further product is delivered. If the container becomes chilled during the initial exhausting period it is extremely important to allow the container to warm up to 70 to 80°F (21 to 26°C) before concluding the evacuation with the inverting procedure.

5.4.2.2 Metered-valve containers cannot be emptied by holding the valve depressed, since such a valve permits only a predetermined amount of product to be expelled each time the actuator is depressed. To empty this type of container, alternately depress and release the valve actuator by hand until no product or gas is expelled.

5.4.3 High-Viscosity Products:

5.4.3.1 Using the portable test stand in conjunction with the receiving vessel, position the lightest container as specified and exhaust until the visible spray is interrupted. As soon as the spray is interrupted, release the actuator and allow the container to warm up to 70 to 80°F (21 to 26°C) before concluding the evacuation.

5.4.3.2 Agitate the container with a swirling motion for 30 s. Hold the container at a 45° angle, with the valve actuator depressed, and rotate the container to maintain a visible spray as long as possible. (The rotating will ensure the contact of the dip tube with any remaining liquid in the container.) Continue this until no additional liquid or gas is expelled.

5.5 Rinse the container with a suitable solvent and dry the exterior. If the valve actuator is removable, remove it for cleaning and drying and then replace it to its original position.

5.6 Weigh the empty container to obtain the wet tare, which is the mass of the exhausted container plus any product that may not have been expelled during the exhausting procedure.

5.7 Determine the test allowance by referring to either Table 1, Table 2, or Table 3, whichever is appropriate.

5.8 Subtract the test allowance from the wet tare to obtain the corrected wet tare.

5.9 Subtract the corrected wet tare from the gross mass to obtain the adjusted net mass of the lightest container.

5.10 If the adjusted net mass of the lightest container at least equals the declared net mass, it may be reasonable to assume that the lot is satisfactory.

5.11 If the adjusted net mass of the lightest container is less than the declared mass, treat the ten specimens as a sample of the lot and proceed to weigh them individually to determine the individual errors. To do this, arrive at the average corrected wet

TABLE 1 Food and Non-Food Foam Products

Labeled Mass of Package	Test Allowance	
	oz (g)	lb (kg)
0 to less than 1½ oz (42 g)	0	0
1½ oz to less than 5 oz (42 to 140 g)	⅓ (1.7)	0.004 (0.002)
5 oz to less than 8 oz (140 to 224 g)	⅔ (3.5)	0.008 (0.003)
8 oz to less than 11 oz (224 to 308 g)	⅔ (5)	0.012 (0.005)
11 oz to less than 14 oz (308 to 392 g)	¾ (7)	0.016 (0.007)
14 oz to less than 1 lb 1 oz (392 g to 0.48 kg)	⅝ (8.5)	0.020 (0.009)
1 lb. 1 oz or higher (0.48 kg)	⅞ (10.5)	0.023 (0.010)

TABLE 2 Low Viscosity Products

Labeled Mass of Package, oz (g)	Test Allowance	
	oz (g)	lb (kg)
0 to less than 1½ (42)	0	0
1½ to less than 3 (42 to 84)	⅓ (1.7)	0.004 (0.002)
3 or higher (84)	⅔ (3.5)	0.008 (0.003)

TABLE 3 High Viscosity Products

Labeled Mass of Package, oz (g)	Test Allowance	
	oz (g)	lb (kg)
0 to less than 1½ (42)	0	0
1½ to less than 5 (42 to 140)	⅓ (1.7)	0.004 (0.002)
5 to less than 8 (140 to 224)	⅔ (3.5)	0.008 (0.003)
8 to less than 12 (224 to 336)	⅔ (5)	0.012 (0.005)
12 or higher (336)	¾ (7)	0.016 (0.007)

tare mass by repeating 5.3 through 5.8 with the heaviest specimen to obtain its corrected wet tare mass. (The tare of a single specimen is not considered acceptable as an average corrected wet tare mass, and no permanent or reference record of tares is acceptably reliable.) The average of the two corrected wet tare masses may then be accepted as the tare mass for the weighing of individual specimens.

5.12 Add the average corrected wet tare mass to the labeled net mass of the specimen to determine a standard gross mass with which the specimens can be compared.

5.13 With the standard masses in an amount equal to the standard gross mass for the specimens on one side of the scale, weigh the remaining specimens and record the error of all specimens. Exclude, by circling, any errors (plus or minus) (see Appendix X2) that are unreasonably large and determine an average error for the lot (see Appendix X3).

6. Precision and Bias

6.1 *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.