Designation: F1326 – 02(Reapproved 2011)

An American National Standard

Standard Test Method for Measuring Maximum Dry Volume of Utility Vacuum Cleaners[1]

This standard is issued under the fixed designation F1326; 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 applicable to any vacuum cleaner that is classified as a utility vac.

1.2 The values stated in inch-pound units are to be regarded as standard. The values in parentheses are for information only.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

3. Significance and Use

3.1 This test method describes a procedure to determine the maximum functional dry volume that the utility vac is capable of collecting.

4. Apparatus

4.1 *Temperature and humidity indicators,* to provide temperature measurements accurate to within ±1°F (±½ °C) and humidity measurements accurate to within ±2 % relative humidity.

4.2 *Weighing Scale,* the scale shall be accurate to 4 oz (114 g) and have a weighing capacity of at least 120 lbs (54.4 kg).

5. Materials

5.1 Water.

6. Sampling

6.1 A minimum of three units of the same model vacuum cleaner selected at random in accordance with good statistical practice shall constitute the population sample.

6.1.1 To determine the best estimate of maximum dry volume for the population of the vacuum cleaner model being tested, the arithmetic mean of the maximum dry volume of the sample from the population shall be established by testing it to a 90 % confidence level within ±5 % of the mean value of the maximum dry volume.

6.1.2 Annex A1 provides a procedural example for determining the 90 % confidence level and when the sample size shall be increased.

NOTE 1—See Annex A1 for a method for determining 90 % confidence level.

7. Conditioning

7.1 *Test Room*—The test room should be maintained at 70°F ± 5°F (21°C ± 3°C) and 45 to 55 % relative humidity.

7.2 Condition the water in accordance with 7.1.

8. Procedure

8.1 *Dry Pick Up Capacity:*

8.1.1 Calculate the volume in gallons of the dust drum using the appropriate formulas, neglecting all projections into the drum.

8.1.2 Calculate all projections into the drum using the appropriate formulas in gallons.

8.1.3 Subtract the total projection volumes from the dirt drum volume to arrive at the maximum dry volume. Round down to the nearest ¼ gal (0.936 L).

8.1.4 Record the maximum functional volume in gallons (litres) within ¼ gal (0.936 L).

9. Procedure

9.1 *Dry Pick Up Capacity (Alternative Method):*

9.1.1 An alternative method is allowed when the shape of the vacuum cleaner is irregular, and the calculations of Section 8 become complex.

9.1.1.1 Block the inlet of the dust drum and fill it with water.

9.1.1.2 Line the projections into the drum with an appropriate water-proof material and submerse into the dust drum.

[1] This test method is under the jurisdiction of ASTM Committee F11 on Vacuum Cleaners and is the direct responsibility of Subcommittee F11.23 on Filtration.

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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.

TABLE 1 Repeatability and Reproducibility

Max. Functional Volume (gallons)	Standard Deviation of Repeatability, S_r	Repeatability Limit, r	Standard Deviation of Reproducibility, S_R	Reproducibility Limit, R
5 gal. and less	0.068	0.190	0.380	1.063
Over 5 gal.	0.118	0.3297	0.468	1.3116

9.1.1.3 Allow the excess water to flow out of the dust drum and then measure the volume of the water remaining in the dust drum. Round down to the nearest ¼ gal.

9.1.1.4 Record the maximum functional volume in gallons (litres) within ¼ gal (0.936 L).

9.1.1.5 Repeat steps 9.1.1 – 9.1.1.4 two more times. The average of the three tests represents the maximum dry functional volume that the utility vacuum is capable of collecting.

10. Precision and Bias[3]

10.1 *Precision*—These precision statements are based on an interlaboratory test involving six (6) laboratories and four (4) units. The range of maximum functional volume of the units was from 4.8 to 14.6 gal.

10.2 The statistics have been calculated as recommended in Practice E691.

10.3 The following statements regarding repeatability limit and reproducibility limit are used as directed in Practice E177.

10.4 *Repeatability (Single-Operator-and Laboratory; Multi-Day Testing)*—The ability of a single analyst to repeat the test within a single laboratory.

10.4.1 The expected standard deviation of repeatability of the measured results within a laboratory s_r has been found to be the respective values listed in Table 1.

10.4.2 The 95 % repeatability limit within a laboratory, r, has been found to be the respective values listed on Table 1, where $r = 2.8\ (S_r)$.

10.4.3 With 95 % confidence, it can be stated that within a laboratory a set of measured results derived from testing a unit should be considered suspect if the difference between any two of the three values is greater than the respective value of the repeatability limit r, listed in Table 1.

10.4.4 If the absolute value of the difference of any pair of measured results from three test runs performed within a single laboratory is not equal to or less than the respective repeatability limit listed in Table 1, that set of test results shall be considered suspect.

10.5 *Reproducibility (Multi-day Testing and Single Operator within Multiple Laboratories)*—The ability to repeat the test within laboratories.

10.5.1 The expected standard deviation of reproducibility of the average of a set of measured results between multiple laboratories, S_R has been found to be the respective values listed in Table 1.

10.5.2 The 95 % reproducibility limit within a laboratory, R, has been found to be the respective values listed in Table 1, where $R = 2.8(S_R)$.

10.5.3 With 95 % confidence, it can be stated that the average of the measured results from a set of three test runs performed in one laboratory, as compared to a second laboratory, should be considered suspect if the difference between those two values is greater than the respective values of the reproducibility limit, R, listed in Table 1.

10.5.4 If the absolute value of the difference between the average of the measured results from the two laboratories is not equal to or less than the respective reproducibility limit listed in Table 1, the set of results from both laboratories shall be considered suspect.

10.6 *Bias*—No justifiable statement can be made on the bias of the method to evaluate maximum dry volume of utility vacuum cleaners. Since the true value of the property cannot be established by an acceptable referee method.

11. Keywords

11.1 dry volume; filtration; utility vacuum cleaner

[3] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:F11-1009.