



Designation: D5057 – 17

Standard Test Method for Screening Apparent Specific Gravity and Bulk Density of Waste¹

This standard is issued under the fixed designation D5057; 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 apparent specific gravity and bulk density in a waste sample. For the purpose of this test method, the property to be measured is classified into three groups based on material type:

1.1.1 *Group A*—Free-flowing liquids; apparent specific gravity (ASG),

1.1.2 *Group B*—Granules, powders, and water-reactive liquids, solids, or sludges; bulk density (BD), and

1.1.3 *Group C*—Bulk solids (such as gravel, paper, or wood, etc.); apparent specific gravity (ASG).

1.2 This test method is designed and intended as a screening test to complement the more sophisticated quantitative analytical techniques that may be used to determine specific gravity. This test method offers to the user the option and the ability to screen waste for apparent specific gravity or bulk density when the more sophisticated techniques are not available and the total waste composition is unknown.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 ASTM Standards:²

D1193 Specification for Reagent Water

¹ This test method is under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.01.05 on Screening Methods.

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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.

D5681 Terminology for Waste and Waste Management

3. Terminology

3.1 *Definitions*—For definitions of terms used in this test method, refer to Terminology **D5681**.

4. Summary of Test Method

4.1 This method describes gravimetric procedures to estimate the specific gravity or bulk density of a waste sample. The specific gravity of a material is the ratio of the masses of equal volumes of a waste and reagent water. The apparent specific gravity of materials in Groups A and C is determined by comparing the mass of a sample to the mass of the same volume of reagent water. The bulk density of wastes in Group B is determined as a direct mass/volume ratio of the sample alone and should be used for determinations on water-reactive materials.

5. Significance and Use

5.1 This test method is intended for use by those in the waste management industries for the determination of apparent specific gravity and bulk density of waste.

5.2 The apparent specific gravity and bulk density determined by this test method can be used for the conversion of measured volumes to weights.

5.3 The apparent specific gravity and bulk density, when correlated with other properties, can be used to indicate the character of the waste.

6. Apparatus

6.1 *Weighing Container*—Specific gravity bottle or equivalent container.

6.2 *Spatulas*.

6.3 *Top Loader Balance*, with a sensitivity of 0.01 g.

7. Reagents and Materials

7.1 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean reagent water as defined by Type IV of Specification **D1193**.

8. Weighing Container Calibration

8.1 Weigh the empty container (weighing bottle or specific gravity bottle) with lid on, and record weight to the nearest 0.01 g as *W*.

8.2 Fill the container with reagent water and place lid on container.

8.3 Wipe off excess water and weigh the container and lid to the nearest 0.01 g. Record weight of water-filled container as *R*.

8.4 Empty the container and dry before filling with sample.

9. Group A – Free-Flowing Liquids

9.1 Fill the calibrated weighing container (see 6.1) with sample.

NOTE 1—Significant temperature variations (for example, 10 °C) between the waste sample and ambient conditions may alter the density of the waste sample and lead to lower measured result for apparent specific gravity.

9.2 Place the lid on the container, pushing out excess sample through the hole. Wipe off excess sample.

9.3 Weigh the sample-filled container with lid on to the nearest 0.01 g, and record weight as *S*.

10. Group B – Granules, Powders, and Water-Reactive Wastes

10.1 Fill the calibrated weighing container (see 6.1) with as much sample as possible without exerting pressure on the container or allowing large void spaces. The container may be tapped or lightly tamped to facilitate filling.

NOTE 2—Large, obvious void spaces reduce the weight of the sample and decrease the measured bulk density of the sample.

10.2 Place the lid on the container and weigh the sample and bottle to the nearest 0.01 g. Record the weight as *S*.

11. Group C – Bulk Solids

11.1 Fill the calibrated weighing container (see 6.1) with as much sample as possible without exerting pressure on the container.

11.2 Place the lid on the container and weigh the container, waste, and lid to the nearest 0.01 g. Record the weight as *S*.

11.3 Fill remaining space in the container with water, taking care that air bubbles are not trapped in the material or the container. Place the lid on the container.

11.4 Weigh the container, waste, water, and lid to the nearest 0.01 g and record the weight as *Q*.

12. Calculation

12.1 Calculate the apparent specific gravity (ASG) or bulk density (BD) from the following equations, matching the appropriate equation with the procedure of choice for each group.

12.1.1 For Group A materials:

$$ASG = \frac{(S - W)}{(R - W)} \quad (1)$$

where:

W = weight of empty container (with lid),

R = weight of water-filled container (with lid), and

S = weight of sample-filled container (with lid).

12.1.2 For Group B materials:

$$\text{Bulk Density (g/mL)} = (Y) \frac{(S - W)}{(R - W)} \quad (2)$$

where

W = weight of empty container (with lid),

R = weight of water-filled container (with lid),

S = weight of sample-filled container (with lid), and

Y = 1 g/mL, the conversion of mass/volume at 4 °C.

12.1.3 For Group C materials:

$$ASG = \frac{(S - W)}{(R - W) - (Q - S)} \quad (3)$$

where

W = weight of empty container (with lid),

R = weight of water-filled container (with lid),

S = weight of sample-filled container (with lid), and

Q = weight of sample and water-filled container.

NOTE 3—The quantity *Q*–*S* may be erroneously high due to the water absorbed by the solid sample.

13. Report

13.1 Report at a minimum the following information:

13.1.1 Sample identification and group (A, B, or C),

13.1.2 Date of test,

13.1.3 Procedure applied, and

13.1.4 Test results.

14. Precision and Bias

14.1 The precision and bias have not been determined due to the variability of the sample matrix.

15. Keywords

15.1 density; specific gravity; waste screening