



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

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1. Scope

1.1 This test method covers the determination of apparent specific gravity and bulk density in waste. For the purpose of this test method, materials to be measured will be classified into three groups:

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 preliminary 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 and health practices and determine the applicability of regulatory limitations prior to use.* For a specific hazard statement, see Section 9.

2. Referenced Documents

2.1 ASTM Standards:

D 1192 Specification for Equipment for Sampling Water and Steam²

D 1193 Specification for Reagent Water²

D 3370 Practices for Sampling Water²

D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products³

3. Terminology

3.1 Definition of Term Specific to This Standard:

3.1.1 *screening*—a preliminary qualitative or semi-quantitative test, developed from classical qualitative and

quantitative techniques, that is designed to efficiently give the user specific information about a waste that will aid in determining waste identification, process compatibility, and safety in handling.

4. Summary of Test Method

4.1 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. The weights are used in determining mass.

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. Interferences

6.1 Excessive temperatures causing loss of sample components due to vaporization could result in erroneous readings.

6.2 Large, obvious void spaces interfere in this test method and will give inaccurate results because of the false volume measured.

7. Apparatus

7.1 *Weighing Bottle*— Specific gravity bottle or equivalent container is needed.

7.2 *Spatulas*.

7.3 *Top Loader Balance*, with a sensitivity of 0.01 g is required.

8. Reagents and Materials

8.1 *Purity of Water*— Unless otherwise indicated, references to water shall be understood to mean reagent water as defined by Type IV of Specification D 1193.

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 *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 05.03.

9. Hazards

9.1 **Precaution**—Avoid inhalation of and skin and eye contact with all hazardous materials.

10. Sampling

10.1 Collect the sample in accordance with Specification D 1192 and Practices D 3370 and D 4057.

NOTE 1—Extreme temperature variations between the sample and reagent water should be avoided.

11. Procedure

11.1 Make all weight measurements to nearest 0.01 g.

11.2 Weigh the empty container (weighing bottle or specific gravity bottle) with lid on, and record weight as *W*.

11.3 Fill the container with water and place lid on container. Wipe off excess water and weigh. Record weight of water-filled container as *R*.

11.4 For free-flowing liquids (Group A):

11.4.1 Fill the empty container (see 7.1) with sample.

11.4.2 Place the lid on the container, pushing out excess sample through the hole.

11.4.3 Wipe off excess sample.

11.4.4 Weigh the sample-filled container with lid on, and record weight as *S*.

11.5 For granules, powders, and water reactive materials (Group B):

11.5.1 Add as much of the sample to the weighed container (see 7.1) as possible without exerting pressure, filling the container with sample but not allowing large void spaces (see 6.2). The container may be tapped or lightly tamped.

11.5.2 Place the lid on the container and weigh the sample and bottle and record weight as *S*.

11.6 For bulk solids such as gravel, paper or wood (Group C):

11.6.1 Add as much of the sample to the weighed container (see 7.1) as possible without exerting pressure. Place the lid on the container and weigh and record weight as *S*.

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

11.6.3 Weigh and record weight of sample and water, in container with the lid on. Record weight as *Q*.

NOTE 2—The quantity *Q-S* may be erroneously high due to the water absorbed by the solid sample.

12. Calculation

12.1 Calculate the apparent specific gravity (ASG) or bulk density 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

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

Q = weight of sample and water-filled container.

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. Quality Assurance

14.1 Instrument performance standards, quality control check samples of appropriate matrices, and duplicates should be performed at an action level specified by the laboratory and at an appropriate frequency.

15. Precision and Bias

15.1 The precision and bias of the procedure in this test method is being determined.

16. Keywords

16.1 density; specific gravity; waste screening

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