Designation: D 4359 – 90 (Reapproved 2000)$^{\epsilon 1}$

Standard Test Method for Determining Whether a Material Is a Liquid or a Solid[1]

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ϵ^1 NOTE—5.1 changed editorially in June 2000.

1. Scope

1.1 This test method covers the determination of whether a viscous material is a liquid or a solid for regulatory purposes.

1.2 The values stated in SI units are to be regarded as the standard. The values given 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:*

D 3925 Practice for Sampling Liquid Paints and Related Pigmented Coatings[2]

E 300 Practice for Sampling Industrial Chemicals[3]

3. Summary of Test Method

3.1 The material under test is held at 38°C (100°F) in a tightly closed can. The lid is removed and the can inverted. The flow of the material from the can is observed to determine whether it is a solid or a liquid.

4. Significance and Use

4.1 Compliance with regulations often requires the determination of whether a material is a liquid or a solid. A similar test is used by the U.S. Department of Transportation for this purpose.

5. Apparatus

5.1 *Paint Can*, 1 L (1 quart), with lid, diameter approximately 108 mm (4¼ in.), height 120 mm (4¾ in.).

5.2 *Oven*, maintained at a temperature of 38°C (100°F).

5.3 *Tripod or Ring Stand.*

5.4 *Watchglass*, tared.

5.5 *Stopwatch.*

5.6 *Ruler.*

6. Sampling

6.1 Using standard sampling techniques, secure a representative sample from the lot or batch being tested, in accordance with Practices D 3925 or E 300.

7. Test Specimen

7.1 If the sample is supplied in a friction top quart can that is at least 85 % full, use the can and material as supplied.

7.2 If not, place the material to be tested into the quart can, filling it to at least 85 % and allowing enough ullage for expansion of the material without displacement of the cover. Tightly close the can so that no vapor escapes.

NOTE 1—The can is considered 85 % filled when the material level is no more than 20 mm (¾ in.) below the lip of the can.

8. Procedure

8.1 Place the can with the material in an oven maintained at 38 ± 3°C (100 ± 5°F). Allow the contents of the can to come to temperature equilibrium (18 to 24 h).

8.2 Place the tripod or ring stand on a level surface.

8.3 After the material has come to temperature equilibrium take the can from the oven and immediately remove the lid. With the ruler, measure the distance from the surface of the material to the top of the lip of the can and record.

8.4 Invert the can onto the tripod or ring stand in a vertical position over the tared watchglass. If a skin has formed on the surface of the material, break the skin prior to inverting the can. Determine the flow of the specimen out of the can at the end of 3 min, by measuring the vertical distance the material has flowed from the lip of the can to the tip of the specimen.

8.5 Add the distance from the surface of the material to the top of the lip of the can (8.3) to the distance the material has flowed below the lip of the can (8.4).

8.6 If there is an appreciable flow from the can before the 3 min are up, that is, more than 50 mm (2 in.), immediately stop the test and place the can in an upright position.

8.7 Collect any free-flowing material onto the tared watch glass and weigh.

[1] This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.22 on Health and Safety.

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[2] *Annual Book of ASTM Standards*, Vol 06.01.

[3] *Annual Book of ASTM Standards*, Vol 15.05.

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9. Interpretation of Results

9.1 A material that flows a total of 50 mm (2 in.) or less within 3 min is considered a solid. Otherwise, it is considered a liquid.

9.2 If 1 g or more of liquid is collected on the watchglass, the viscous specimen is considered a liquid regardless of its flow characteristics.

10. Precision and Bias

10.1 *Precision*—It is not practical to specify the precision of this procedure as the results of the test are reported only as the state of the material under test.

10.2 *Bias*—Since there is no accepted reference material suitable for determining the bias, no statement is made.

11. Keywords

11.1 regulations; sample definition; viscous material characterization

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