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Standard Test Method for Distillation of ~~Cut-Back~~Cutback Asphaltic (Bituminous) Products¹

This standard is issued under the fixed designation D 402; 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.

This standard has been approved for use by agencies of the Department of Defense. This method was adopted as a joint ASTM-IP standard in 1961.

1. Scope

- 1.1 This test method covers a distillation test for ~~cut-back~~cutback asphaltic (bituminous) products.
- 1.2 The values given in SI units are to be regarded as the standard. The inch-pound units 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:²

- D 86 Test Method for Distillation of Petroleum Products at Atmospheric Pressure
- D 370 ~~Test Method~~ Practice for Dehydration of Oil-Type Preservatives
- E 1 Specification for ASTM Liquid-in-Glass Thermometers
- E 133 Specification for Distillation Equipment
- E 220 Test Method for Calibration of Thermocouples ~~by~~By Comparison Techniques

2.2 IP Standards:

- IP 123/ASTM D 86, Distillation of Petroleum Products Thermometers as specified in IP Standards
- Crow Receiver as specified in British Standards 658:1989
- C.O.3—Standard Methods for Testing Tar and its Products (Published by the U.K. Standardization of Tar Products Tests Committee)

3. Summary of Method

3.1 Two hundred millilitres of the sample are distilled in a 500-mL flask, at a controlled rate, to a temperature in the liquid of 360°C (680°F), and the volumes of distillate obtained at specified temperatures are measured. The residue from the distillation, and also the distillate, may be tested as required.

4. Significance and Use

4.1 This procedure measures the amount of the more volatile constituents in ~~cut-back~~cutback asphaltic products. The properties of the residue after distillation are not necessarily characteristic of the bitumen used in the original mixture, nor of the residue which may be left at any particular time after field application of the ~~cut-back~~cutback asphaltic product. The presence of silicone

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.46 on Durability and Distillation Tests.

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In the IP, this method is under the jurisdiction of the Standardization Committee.

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* Vol 05.01, volume information, refer to the standard's Document Summary page on the ASTM website.

in the cut-back may affect the distillation residue by retarding the loss of volatile material after the residue has been poured into the residue container.

5. Apparatus

5.1 *Distillation Flask*, 500-mL side-arm, having the dimensions shown in Fig. 1.

5.2 *Condenser*, standard glass-jacketed, of nominal jacket length from 200 to 300 mm and overall tube length of 450 ± 10 mm (see Fig. 3).

5.3 *Adapter*, heavy-wall (1-mm) glass, with reinforced top, having an angle of approximately 105° . The inside diameter at the large end shall be approximately 18 mm, and at the small end, not less than 5 mm. The lower surface of the adapter shall be on a smooth descending curve from the larger end to the smaller. The inside line of the outlet end shall be vertical, and the outlet shall be cut or ground (not fire-polished) at an angle of $45 \pm 5^\circ$ to the inside line.

5.4 *Shield*, steel, lined with 3-mm fire proof insulation and fitted with transparent mica windows, of the form and dimensions shown in Fig. 2, used to protect the flask from air currents and to reduce radiation. The cover (top) shall be made in two parts of 6.4-mm fire proof insulation.

5.5 *Shield and Flask Support*—Two 15-cm² sheets of 16-mesh Chromel wire gauze on a tripod or ring.

5.6 *Heat Source*—

5.6.1 Adjustable Tirrill-type gas burner or equivalent.

5.6.2 An electric heater equipped with a transformer capable of controlling from 0 to 750 W. The shield and support shall be a refractory with an opening of 79 mm, with the upper surface beveled to 86 mm to accommodate the specified 500-mL flask. When the flask is placed on the refractory, there should be a distance of approximately 3 mm between the bottom of the flask and the heating elements.

5.7 *Receiver*—A standard 100-mL graduated cylinder conforming to dimensions of Specification E 133, or a 100-mL Crow receiver as shown in Fig. 4 of this test method.

NOTE 1—Receivers of smaller capacity having 0.1-mL divisions may be used when low volumes of total distillate are expected and the added accuracy required.

5.8 *Residue Container*—A seamless metal container with slip on cover of 75 ± 5 mm in diameter, and 55 ± 5 mm in height.

5.9 *Thermometer/Thermometric Device*—ASTM High Distillation Thermometers having a range from -6 to 400°C (20 to 760°F) and conforming to the requirements for Thermometers 8C (8F) as prescribed in Specification E 1, or IP Thermometer 6C conforming to IP Specifications for Standard Thermometers, or an equivalent thermometric device that has been calibrated in accordance with Test Method E 220. ASTM 8C Thermometers shall be used for referee testing.

6. Hazards

6.1 **Warning**—Mercury has been designated by the United States Environmental Protection Agency (EPA) and many state agencies as a hazardous material that can cause central nervous system, kidney and liver damage. Mercury, or its vapor, may be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury containing products. See the applicable product Material Safety Data Sheet (MSDS) for details and EPA's website—<http://www.epa.gov/mercury/faq.htm>—for additional information. Users should be aware that selling mercury, mercury-containing products, or both, into your state may be prohibited by state law.

7. Sampling

7.1 Stir the sample thoroughly, warming if necessary, to ensure homogeneity before removal of a portion for analysis.

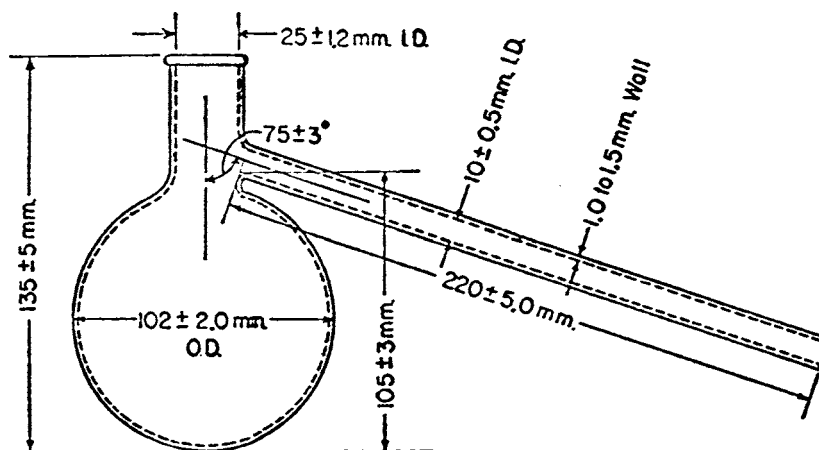
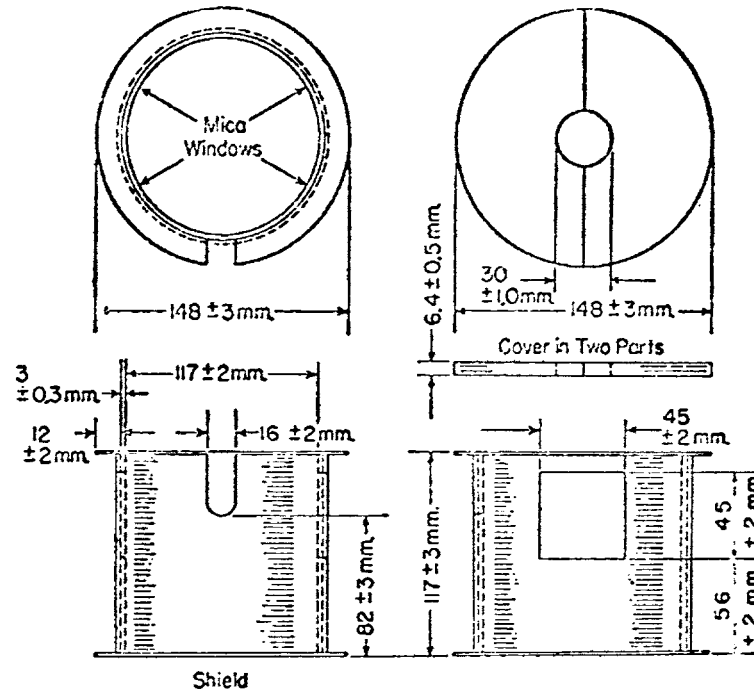


FIG. 1 Distillation Flask



Flanged Open-End Cylinder
Made of 22-Gage Galvanized
Iron with 3 mm Fire-Proof Lining
Riveted to Metal

Two Mica Windows are
Provided at Right Angles
to the End Slot.

FIG. 2 Shield

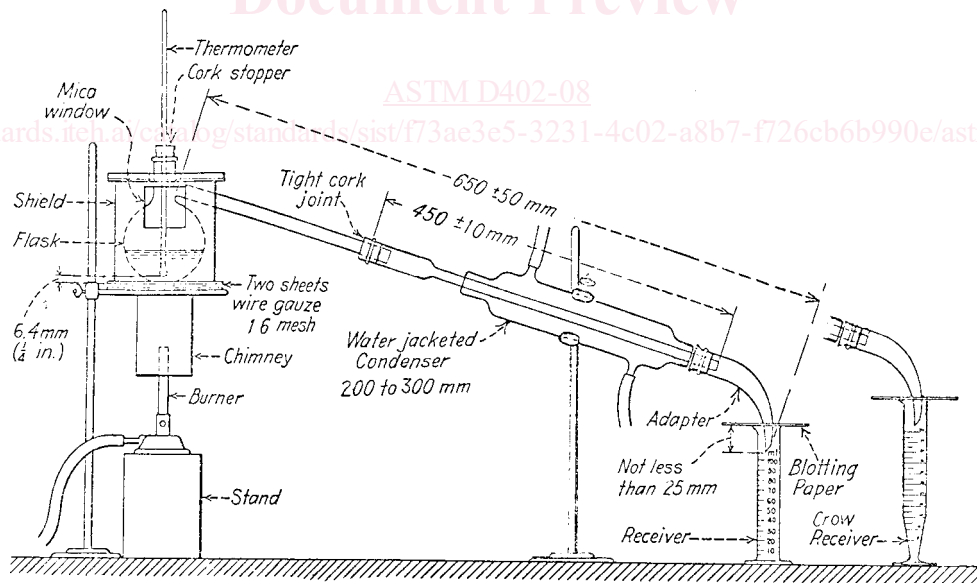


FIG. 3 Distillation Apparatus

6.2H7.2 If sufficient water is present to cause foaming or bumping, dehydrate a sample of not less than 250 mL by heating in a distillation flask sufficiently large to prevent foaming over into the side arm. When foaming has ceased, stop the distillation. If any light oil has distilled over, separate and pour this back into the flask when the contents have cooled just sufficiently to prevent loss of volatile oil. Mix the contents of the flask thoroughly before removal for analysis. An alternative procedure is described in Test Method D 370.