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## Standard Test Method for Distillation of Cutback Asphaltic (Bituminous) Products Asphalt<sup>1</sup>

This standard is issued under the fixed designation ~~D402;D402/D402M~~; 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 approval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method covers a distillation test for cutback asphaltic (bituminous) ~~products:asphalts~~.

1.2 The values ~~given stated in either SI units or inch-pound units~~ are to be regarded separately as the standard. The ~~inch-pound units given in parentheses are for information only~~. values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

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:*<sup>2</sup>

[D86 Test Method for Distillation of Petroleum Products at Atmospheric Pressure](#)

[D370 Practice for Dehydration of Oil-Type Preservatives](#)

[E1 Specification for ASTM Liquid-in-Glass Thermometers](#)

[E77 Test Method for Inspection and Verification of Thermometers](#)

[E133 Specification for Distillation Equipment](#)

[E220 Test Method for Calibration of Thermocouples By Comparison Techniques](#)

[E644 Test Methods for Testing Industrial Resistance Thermometers](#)

[E1137 Specification for Industrial Platinum Resistance Thermometers](#)

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);[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.

<sup>1</sup> 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. This method was adopted as a joint ASTM-IP standard in 1961.

<sup>2</sup> 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.

#### 4. Significance and Use

4.1 This procedure measures the amount of the more volatile constituents in cutback asphaltic products—~~asphalt~~. 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 cutback asphaltic product—~~asphalt~~. The presence of silicone in the cutback ~~asphalt~~ 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  $450 \pm 10$  mm (see Fig. 3).

5.3 *Adapter*, heavy-wall (1-mm) glass, with reinforced top, having an angle of approximately  $105^\circ$ . 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-cm<sup>2</sup> sheets of 16-mesh Chromel wire gauze on a tripod or ring.

5.6 *Heat Source*—*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 E133, 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  $75 \pm 5$  mm in diameter, and  $55 \pm 5$  mm in height.

5.9 *Thermometric Device*—*Thermometer*—ASTM High Distillation Thermometers having a range from  $-6$  to  $400^\circ\text{C}$  ( $20$  to  $760^\circ\text{F}$ ) and conforming to the requirements for Thermometers 8C (8F) as prescribed in Specification E1, 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 E220. ~~ASTM 8C Thermometers shall be used for referee testing.~~ shall be one of the following:

5.9.1 An 8C (8F) thermometer which conforms to the requirements of Specification E1. Calibrate the thermometer in accordance with one of the methods in Test Method E77.

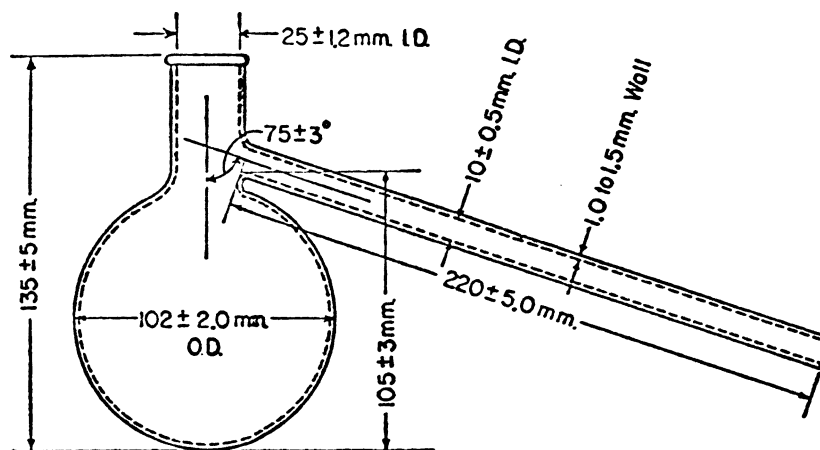
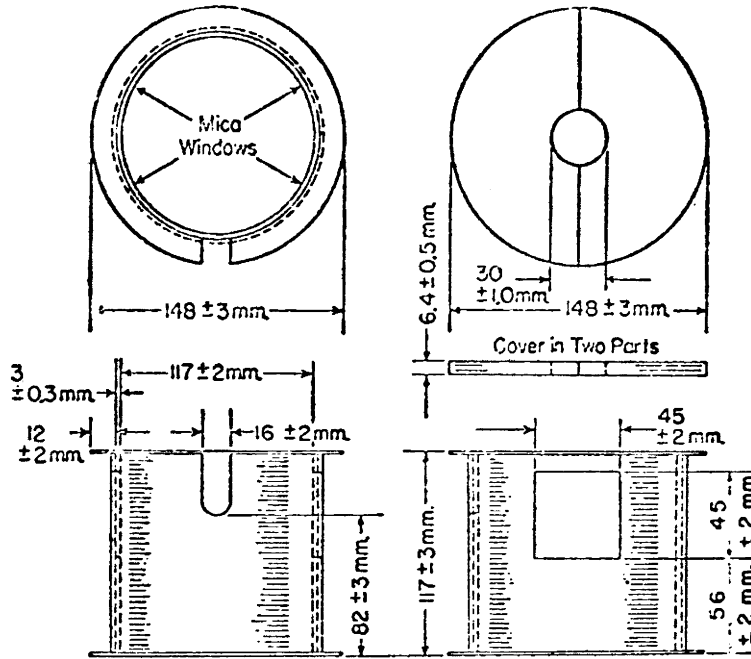


FIG. 1 Distillation Flask



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

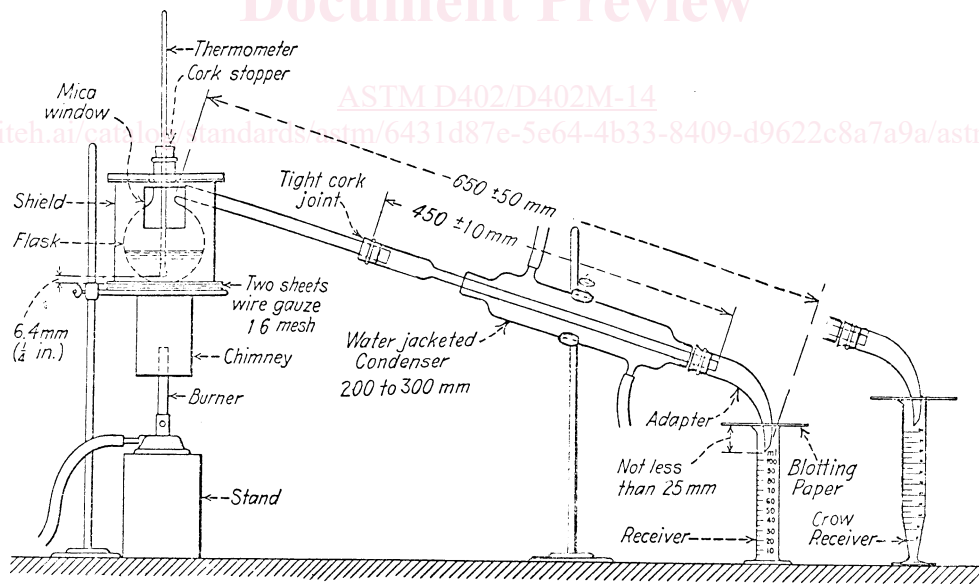


FIG. 3 Distillation Apparatus

5.9.2 A platinum resistance thermometer (PRT) with a probe which conforms to the requirements of Specification E1137. The PRT shall have a 3- or 4-wire connection configuration and the overall sheath length shall be at least 50 mm [2 in.] greater than the immersion depth. Calibrate the PRT system (probe and readout) in accordance with Test Methods E644. Corrections shall be applied to ensure accurate measurements within 1°C [2°F].

5.9.3 A metal-sheathed Type T thermocouple with a sensor substantially-similar in construction to the PRT probe described in 5.9.2. Calibrate the thermocouple system (sensor and readout) in accordance with Test Method E220. Corrections shall be applied to ensure accurate measurements within 1°C [2°F].