



Designation: D1856 – 21

Standard Test Method for Recovery of Asphalt from Solution by Abson Method¹

This standard is issued under the fixed designation D1856; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This test method covers the recovery by the Abson method of asphalt from a solution from a previously conducted extraction. The asphalt is recovered with properties substantially the same as those it possessed in the bituminous mixture and in quantities sufficient for further testing.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are provided 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, 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
- [C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials](#)
 - [D2172/D2172M Test Methods for Quantitative Extraction of Asphalt Binder from Asphalt Mixtures](#)
 - [D2939 Test Methods for Emulsified Bitumens Used as Protective Coatings \(Withdrawn 2012\)](#)³
 - [D4080 Specification for Trichloroethylene, Technical and Vapor-Degreasing Grade](#)

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.25 on Analysis of Asphalt Mixtures.

Current edition approved May 1, 2021. Published June 2021. Originally approved in 1961. Last previous edition approved in 2015 as D1856 – 09 (2015). DOI: 10.1520/D1856-21.

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.

³ The last approved version of this historical standard is referenced on www.astm.org.

- [D6368 Specification for Vapor-Degreasing Solvents Based on normal-Propyl Bromide and Technical Grade normal-Propyl Bromide](#)
- [D8159 Test Method for Automated Extraction of Asphalt Binder from Asphalt Mixtures](#)
- [E1 Specification for ASTM Liquid-in-Glass Thermometers](#)

3. Summary of Test Method

3.1 The solution of solvent and asphalt from an asphalt mix extraction is distilled under prescribed conditions to a point where most of the solvent has been distilled, at which time carbon dioxide gas is introduced into the distillation process to remove all traces of the extraction solvent. The recovered asphalt (distillation residue) can then be subjected to further testing as required.

4. Significance and Use

4.1 The asphalt should be extracted from the aggregate-asphalt mixture in accordance with Method A of Test Methods [D2172/D2172M](#) (centrifuge method) or [D8159](#) as there is some experimental evidence that the recovered asphalt may have slightly lower penetration values when recovered from solutions obtained from hot extraction methods.

5. Apparatus

5.1 *Centrifuge*, batch unit capable of exerting a minimum centrifugal force of 770 times gravity or continuous unit capable of exerting a minimum force of 3000 times gravity.

5.2 *Centrifuge Tubes*—A supply of wide-mouth bottles or centrifuge tubes may be used for the batch unit. A tube as illustrated in [Fig. 1](#) has been found satisfactory for the continuous unit.

5.3 *Distillation Assembly*, as shown in [Fig. 2](#), and consisting of the following items:

5.3.1 *Extraction Flasks*—Two 250-mL, wide-mouth, heat-resistant flasks, one for distillation and the other for the receiver.

5.3.2 *Glass Tubing*—Heat-resistant glass tubing, having 10-mm inside diameter and gooseneck shaped (as shown in [Fig. 2](#)) for connecting the flask to the condenser.

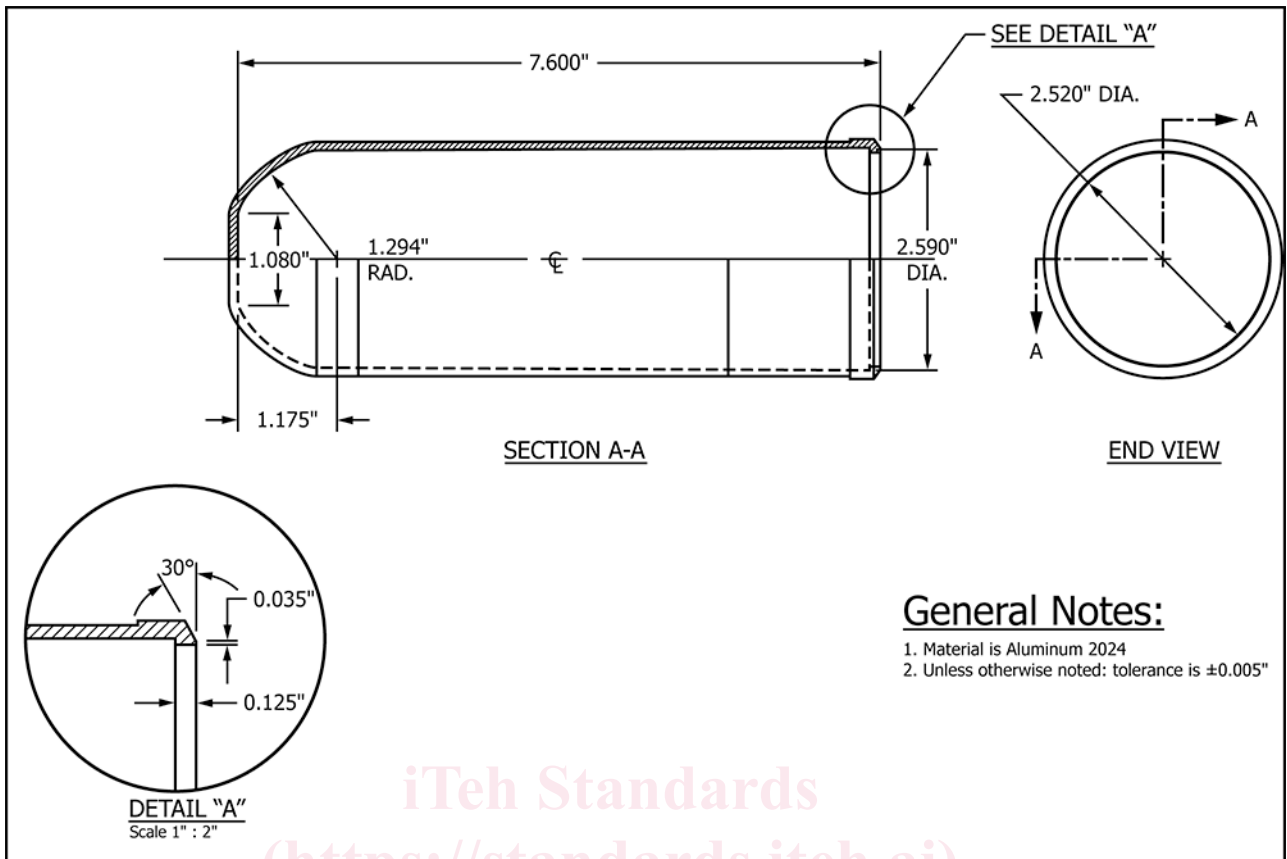


FIG. 1 Centrifuge Tube Example

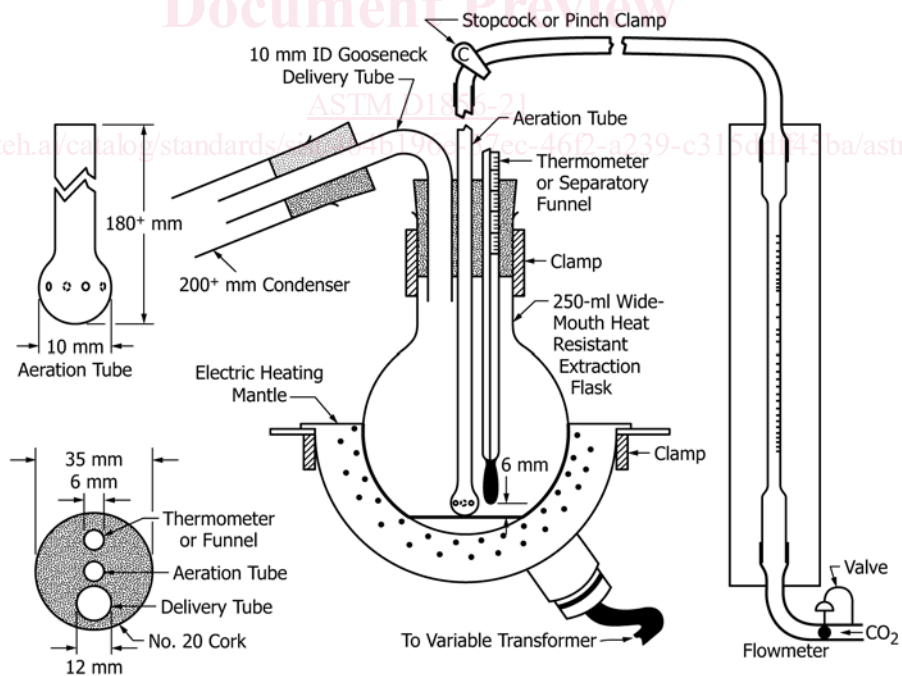


FIG. 2 Distillation Assembly for Bitumen Recovery

5.3.3 *Inlet Aeration Tube*,⁴ at least 180 mm in length, having a 6-mm outside diameter with a 10-mm bulb carrying six staggered side holes approximately 1.5 mm in diameter.

5.3.4 *Electric Heating Mantle*, with variable transformer, oil bath, or fluidized sand bath, to fit a 250-mL flask.

5.3.5 *Water-Jacketed Condenser*, Allihn type, with 200-mm minimum jacket length or equivalent.

5.3.6 *Thermometer*—An ASTM Low Distillation Thermometer 7E or 7F, as specified, having a range from –2 to 300 °C or 30 to 580 °F, respectively, and conforming to the requirements in Specification E1.

5.3.7 *Gas Flowmeter*,⁵ as shown in Fig. 2, or any flowmeter capable of indicating a gas flow of up to 1000 mL/min.

5.3.8 *Corks*, No. 20, drilled as shown in Fig. 2.

5.3.9 *Flexible Elastomeric Tubing*, resistant to chlorinated solvents having sufficient length and size to connect the aeration tube to flowmeter, and equipped with a pinch clamp or stopcock to close aeration tube prior to introducing carbon dioxide.

5.3.10 *Separatory Funnel*,⁶ (alternative procedure; see 9.3.1) 125-mL capacity.

6. Reagents and Materials

6.1 *Carbon Dioxide Gas*—A pressurized tank, with pressure-reducing valve or other convenient source.

6.2 *Solvents*:

6.2.1 The solvent for extracting the asphalt from mixtures may be trichloroethylene, conforming with Specification D4080.⁷

6.2.2 The solvent for extracting the asphalt from mixtures may be normal propyl bromides (nPB). This solvent should conform to Specification D6368.⁸

6.2.3 The solvent for extracting the asphalt from mixtures may be reagent grade methylene chloride.⁸

7. Precautions

7.1 **Warning**—The solvent listed in 6.2 should be used only under a hood or with an effective surface exhaust system in a

⁴ The sole source of supply of the apparatus known to the committee at this time is Inlet Aeration Tube, Part No. 226, available from Wm. A. Sales, Ltd., 419 Harvester Court, Wheeling, Ill. 60090; request Part No. 226. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁵ The sole source of supply of the apparatus known to the committee at this time is The Monostat Corp. “Flowmeter” No. 9144. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁶ The sole source of supply of the apparatus known to the committee at this time is Kimball separatory funnel No. 29028. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁷ The sole source of supply of the apparatus known to the committee at this time is American Conference of Governmental Industrial Hygienists, Inc. (ACGIH), 1330 Kemper Meadow Dr., Cincinnati, OH 45240, (<http://www.acgih.org>). If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁸ It is recommended that for each new supply of the solvent a blank should be run on an asphalt of known properties.

well-ventilated area, since they are toxic to various degrees. Consult the current Threshold Limit Concentration Committee of the American Conference of Governmental Industrial Hygienists for the current threshold limit values.

7.2 These solvents in the presence of heat and moisture may be hydrolyzed to form acids that are extremely corrosive to certain metals, particularly when subjected to contact over lengthy periods of time. Proper precautions should be taken to not allow these solvents to remain in small quantities in the effluent tanks of aluminum vacuum extractors.

7.3 Exposure of these solvents or their vapors to high temperatures such as contact with flames, hot glowing surfaces, or electric arcs can produce decomposition products such as hydrogen chloride. Steel drums containing these solvents should be stored in a cool, dry location, kept tightly sealed, and opened as infrequently as possible. The hydrogen chloride in decomposed solvent may harden an asphalt during the extraction and recovery test.

8. Sample

8.1 The sample shall consist of the solution from a previous extraction by Method A of Test Methods D2172/D2172M or D8159 of asphalt-aggregate mixture of sufficient quantity to result in 75 to 100 g of recovered bitumen. More or less quantities of bitumen may be recovered; however, the properties of the recovered bitumen may not be in agreement with those recovered of the aforementioned quantities, and in case of a disagreement, 75 to 100 g should be recovered.

8.2 During the extraction process, it is important that all of the asphalt in the mixture be extracted as there could be some selective solvency of the asphalt and the harder, more viscous components of the asphalt might be left in the mixture if extraction is not carried to completion.

8.3 Since heavy petroleum distillates such as mineral spirits or kerosine will affect the properties of the recovered asphalt, it is important to avoid the use of such solvents in cleaning the extraction and recovery apparatus and use only trichloroethylene for cleaning. Residues of heavy petroleum solvents on the equipment may contaminate the recovered asphalt and affect its test properties. It is also necessary to use new filter rings, clean felt pads, or other uncontaminated filtering media in the extraction process to avoid contamination from a previous extraction.

8.4 Generally, the bitumen in mixtures will progressively harden when exposed to air, particularly if the mixtures are in a loose condition. Therefore, it is important to protect bituminous mixtures from exposure to air and preferably to store them in airtight containers at a temperature below 0 °C (32 °F) until they can be tested. When samples of bituminous mixture are warmed for preparing representative proportions for extraction tests in accordance with Method A of Test Methods D2172/D2172M or D8159, they should be placed in an oven in covered containers and heated to a maximum temperature of 110 °C (230 °F) for the minimum time to obtain workability, but no longer than 30 min. If the samples have been stored at a low temperature, they should be allowed to reach room temperature before placing them in the oven.