Designation: D5404 – 03

Standard Practice for Recovery of Asphalt from Solution Using the Rotary Evaporator[1]

This standard is issued under the fixed designation D5404; 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.

1. Scope

1.1 This practice is intended to recover asphalt from a solvent using the rotary evaporator to ensure that changes in the asphalt properties during the recovery process are minimized.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D92 Test Method for Flash and Fire Points by Cleveland Open Cup Tester

D1856 Test Method for Recovery of Asphalt From Solution by Abson Method

D2939 Test Methods for Emulsified Bitumens Used as Protective Coatings

D6368 Specification for Vapor-Degreasing Solvents Based on ***normal***-Propyl Bromide and Technical Grade ***normal***-Propyl Bromide

2.2 *Federal Specification:*

O-T-634 (latest) Trichloroethylene, Technical[3]

3. Summary of Practice

3.1 The solution of solvent and asphalt from a prior extraction is distilled by partially immersing the rotating distillation flask of the rotary evaporator in a heated oil bath while the solution is subjected to a partial vacuum and a flow of nitrogen gas or carbon dioxide gas. The recovered asphalt can then be subjected to testing as required.

4. Significance and Use

4.1 In order to determine the characteristics of the asphalt in an asphalt paving mixture, it is necessary to extract the asphalt from the aggregate by means of a suitable solvent and then to recover the asphalt from the solvent without significantly changing the asphalt's properties. The asphalt recovered from the solvent by this practice can be tested using the same methods as for the original asphalt cement, and comparisons between the properties of the original and recovered asphalt can be made.

5. Apparatus

5.1 *Rotary Evaporator* (*see* Fig. 1), equipped with a distillation flask, a variable speed motor capable of rotating the distillation flask at a rate of at least 50 rpm, condenser, solvent recovery flask, and heated oil bath. The angle of the distillation flask from the horizontal to the bath is set at approximately 15°. The distillation flask (Note 1), when fully immersed, should be at a depth of approximately 40 mm (1.5 in.).[4]

NOTE 1—A flask having a 2000 mL capacity is recommended.

5.2 *Manometer or Vacuum Gage*, suitable for measuring the specified vacuum.

5.3 *Gas Flowmeter*, capable of indicating a gas flow of up to 1000 mL/min.

5.4 *Sample Container*, having adequate volume to hold the sample and added solvent.

5.5 *Vacuum System*, capable of maintaining a vacuum to within ±0.7 kPa (±5 mm Hg) of the desired level up to and including 80 kPa (600 mm Hg).

6. Reagents and Materials

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

NOTE 2—Different flow rates may be required depending on whether

[1] This practice 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 Bituminous Mixtures.

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[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] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

[4] The Buchi Rotavapor RE-111A, or its equivalent, has been found satisfactory for this purpose. The Buchi Rotavapor is available from Fischer Scientific, Pittsburgh, PA.