Standard Method of Test for

Quantitative Extraction and Recovery of Asphalt Binder from Asphalt Mixtures

AASHTO Designation: T 319-15 (2019)

Technical Subcommittee: 2c, Asphalt–Aggregate Mixtures

Release: Group 3 (July)

AASHTO

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1. SCOPE

1.1. This standard describes a procedure for the extraction and recovery of asphalt binder from asphalt mixtures [both hot mix asphalt (HMA) and reclaimed asphalt pavement (RAP)] that have a minimal effect on the physical and chemical properties of the asphalt binder recovered. This standard is intended for use when the physical or chemical properties, or both, of the recovered asphalt binder are to be determined. It can also be used to determine the quantity of asphalt binder in the HMA or RAP. Recovered aggregate may be used for sieve analysis or other aggregate testing.

1.2. This method is applicable to HMA sampled from the pavement, RAP sampled from the pavement or stockpile, HMA plant production, or laboratory fabricated HMA.

1.3. *This procedure may involve hazardous materials, operations, and equipment. This procedure 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 procedure to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- M 231, Weighing Devices Used in the Testing of Materials
- R 90, Sampling Aggregate Products
- T 110, Moisture or Volatile Distillates in Hot Mix Asphalt (HMA)
- T 168, Sampling Bituminous Paving Mixtures
- T 329, Moisture Content of Asphalt Mixtures by Oven Method

2.2. *ASTM Standard*:

- D5361/D5361M, Standard Practice for Sampling Compacted Asphalt Mixtures for Laboratory Testing

3. TERMINOLOGY

3.1. *Definition*:

3.1.1. *asphalt binder*—an asphalt-based cement that is produced from petroleum residue either with or without the addition of nonparticulate organic modifiers.

4. SUMMARY OF METHOD

4.1. The asphalt mixture is repeatedly washed and filtered with solvent in an extraction/filtration apparatus. Each filtrate is distilled under vacuum in a rotary evaporator with the asphalt remaining in the flask. After recovery of the final filtrate, the solution is concentrated to about 300 mL and centrifuged to remove the aggregate fines. The decanted solution is distilled under vacuum to remove the extraction solvents. Nitrogen gas is introduced during the final phase of distillation to drive off any remaining traces of solvents. The quantity of asphalt binder in the asphalt mixture is calculated (optional) and the recovered asphalt (distillation residue) sample is subjected to further physical and chemical testing as required. The recovered aggregate can then be used for sieve analysis or other aggregate testing, if desired.

5. SIGNIFICANCE AND USE

5.1. This method is used for obtaining recovered asphalt binder residue samples from asphalt mixture samples for further physical and chemical analyses, and for the optional calculation of asphalt binder content.

6. APPARATUS

6.1. *Extraction Vessel*[1,2]—The extraction vessel shall be a device as shown in Figure 1, and shall have a 130-mm-long piece of 150-mm I.D. Schedule 80 aluminum pipe or Schedule 80, Grade 304 stainless steel pipe (Figure 2) with removable top and bottom 13-mm-thick aluminum or stainless steel plates. The top plate (Figure 3) shall have a mixing motor mount and 19-mm port for adding solvent. The bottom plate (Figure 4) shall be equipped with a quick-connect fitting. Four 100-by-25-mm baffles (Figure 5) shall be mounted in the extraction vessel, followed by a 3-mm aluminum ring, 2-mm (No. 10) mesh screen, spacer (Figure 6), 0.3-mm (No. 50) mesh screen, another spacer, 0.075-mm (No. 200) mesh screen, then another 2-mm (No. 10) mesh screen, as shown in Figure 1.

6.2. *In-Line Filter*[3]—The in-line fine filter apparatus shall be a cartridge type with 20-µm retention and at least 820 cm^3 of effective filter area. The filter apparatus shall be able to be removed from the system to accommodate weighing before and after the procedure. The filter shall be capable of withstanding heat up to 135°C without degradation in order to accommodate oven drying of the filter apparatus.

6.3. *Filtrate Flasks with Tubulation*—1000 mL (two required).

6.4. *Round-Bottom Flask*—1000 mL, with cork stands.

6.5. *Gas Flowmeter*—Capable of indicating a gas flow up to 1000 mL/min.

6.6. *Rotary Evaporator Device*[4]—with transfer and purge tubes, capable of holding a recovery flask in oil at a 15° angle and rotating at 40 r/min.

6.7. *Hot Oil Bath*—Capable of heating oil to 180°C.