Standard Method of Test for

Quantitative Extraction of Asphalt Binder from Hot Mix Asphalt (HMA)

AASHTO Designation: T 164-14 (2018)[1]

Technical Subcommittee: 2c, Asphalt–Aggregate Mixtures

Release: Group 3 (July)

ASTM Designation: D2172/D2172M-11

AASHTO

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1. SCOPE

1.1. These methods cover the quantitative determination of asphalt binder in hot mix asphalt (HMA) and HMA pavement samples. Aggregate obtained by these methods may be used for sieve analysis using T 30.

1.2. The values stated in SI units are to be regarded as the standard.

1.3. *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns 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.* Specific hazards are given in Section 8.

Note 1—The results obtained by these methods may be affected by the age of the material tested, with older samples tending to yield slightly lower asphalt binder contents. Best quantitative results are obtained when the test is made on HMA mixtures and pavements shortly after their preparation. It is difficult to remove all the asphalt binder when some aggregates are used; some solvent may remain within the mineral matter affecting the measured asphalt binder content.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- M 231, Weighing Devices Used in the Testing of Materials
- R 59, Recovery of Asphalt Binder from Solution by Abson Method
- T 30, Mechanical Analysis of Extracted Aggregate
- T 84, Specific Gravity and Absorption of Fine Aggregate
- T 110, Moisture or Volatile Distillates in Hot Mix Asphalt (HMA)
- T 168, Sampling Bituminous Paving Mixtures
- T 228, Specific Gravity of Semi-Solid Asphalt Materials
- T 329, Moisture Content of Asphalt Mixtures by Oven Method

2.2. *ASTM Standards*:

- C670, Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- D604, Standard Specification for Diatomaceous Silica Pigment (withdrawn 2003)
- D2111, Standard Test Methods for Specific Gravity and Density of Halogenated Organic Solvents and Their Admixtures
- D4080, Standard Specification for Trichloroethylene, Technical and Vapor-Degreasing Grade
- D6368, Standard Specification for Vapor-Degreasing Solvents Based on normal-Propyl Bromide and Technical Grade normal-Propyl Bromide

2.3. *Federal Standard*:

- Fed. Std. No. 29, CFR 1910.1200 OSHA Hazard Communication Standard; see also Permissible Exposure Limits—Annotated Tables, available at https://www.osha.gov/dsg/annotated-pels/

3. TERMINOLOGY

3.1. *nominal maximum size (of aggregate)*—one size larger than the first sieve that retains more than 10 percent aggregate.

3.2. *constant mass*—shall be defined as the mass at which further drying does not alter the mass by more than 0.05 percent when weighed at 2-h intervals.

4. SUMMARY OF TEST METHODS

4.1. The HMA is extracted with trichloroethylene, *n*-propyl bromide, or methylene chloride, using the extraction equipment applicable to the particular method. Terpene extractant may be used in Method A or E. The asphalt binder content is calculated by differences from the mass of the extracted aggregate, moisture content, and mineral matter in the extract. The asphalt binder content is expressed as a mass percent of moisture-free mixtures.

5. SIGNIFICANCE AND USE

5.1. All of the methods can be used for quantitative determinations of asphalt binder in HMA mixtures and pavement samples for specification acceptance, service evaluation, quality control, and research. Each method prescribes the solvents and any other reagents that can be used in the method. R 59 requires that Method A or E (Note 2) and reagent-grade trichloroethylene be used when asphalt binder is recovered from solution.

Note 2—The vacuum extractor, Section 22.1.1, can be modified by a vacuum trap attached to the top of the "end point" sight tube to collect the extract to allow its use for recoveries (Figure 4b).

6. APPARATUS

6.1. *Oven*—Capable of maintaining the temperature at 110 ± 5°C (230 ± 9°F), for warming the sample.

6.2. *Oven*—Capable of maintaining the temperature at 149 to 163°C (300 to 325°F), for drying the sample if the moisture content is not determined.

6.3. *Pan*—Flat, of appropriate size.