Standard Method of Test for

Determining Rutting Susceptibility of Hot Mix Asphalt (HMA) Using the Asphalt Pavement Analyzer (APA)

AASHTO Designation: T 340-10 (2019)

Technical Subcommittee: 2d, Proportioning of Asphalt–Aggregate Mixtures

Release: Group 3 (July)

AASHTO

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1. SCOPE

1.1. This method describes a procedure for testing the rutting susceptibility of hot mix asphalt (HMA) using the Asphalt Pavement Analyzer (APA).

1.2. Annex A1 contains procedures for calibration checks for several APA components and related equipment.

1.3. Appendix X1 presents specifications for, and discussion concerning, several options for APA testing parameters often employed by APA users.

1.4. The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.5. *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*.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- R 97, Sampling Asphalt Mixtures
- T 166, Bulk Specific Gravity (G_{mb}) of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens
- T 209, Theoretical Maximum Specific Gravity (G_{mm}) and Density of Asphalt Mixtures
- T 269, Percent Air Voids in Compacted Dense and Open Asphalt Mixtures
- T 312, Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor

2.2. *ASTM Standard*:

- E1, Standard Specification for ASTM Liquid-in-Glass Thermometers

3. APPARATUS

3.1. *APA*—A thermostatically controlled device designed to test the rutting susceptibility of HMA by applying repetitive linear loads to compacted test specimens through pressurized hoses via wheels.

3.1.1. The APA shall be thermostatically controlled to maintain the test temperature and conditioning chamber at any set point between 4 and 72°C (40 and 160°F) within 1°C (2°F).

3.1.2. The APA shall be capable of independently applying loads up to 578 N (130 lbf) to the wheels. The loads shall be calibrated to the specified test load by an external-force transducer.

3.1.3. The APA shall be capable of adjusting the pressure in the test hoses and maintaining up to 862 kPa (125 psi) in the test hoses.

3.1.4. The APA shall be capable of testing six cylindrical specimens.

3.1.5. The test molds shall be rectangular in shape, be composed of ultra-high-molecular-weight (UHMW) polyethylene, fit snugly within the testing position in the APA testing chamber, and contain two holes in which to insert the specimens. The dimensions of each hole shall be 150 ± 2.0 mm (5.91 ± 0.08 in.) in diameter by 75.0 ± 2.0 mm (2.95 ± 0.08 in.) tall.

3.1.6. The APA shall have a programmable master cycle counter that can be preset to the desired number of cycles for a test. The APA shall be capable of automatically stopping the test at the completion of the programmed number of cycles.

3.1.7. The test hoses shall be composed of a nylon tube with high-tensile textile cord reinforcement and a synthetic rubber cover. The nominal inside diameter of the hoses shall be 19.0 mm (0.75 in.); the nominal outside diameter of the hoses shall be 29.5 mm (1.16 in.). The maximum working pressure (WP) of the hoses shall be 5.17 MPa (750 psi). The hoses should be replaced when any of the outer rubber casing exhibits significant wear. Follow the APA manufacturer's instructions for the technique on replacing hoses.

Note 1—A Gates 77B Paint Spray and Chemical hose has been found to be satisfactory. This hose is available from the Gates Corporation (Product No. 3207-0296).

3.1.8. When electing to manually measure rut depths, a rut depth measurement template is required. This template shall be machined aluminum plate [approximately 31.7 to 38.1 mm (1.25 to 1.50 in.) thick] and have the following dimensions: 400.0 mm (15.75 in.) long by 152.4 mm (6 in.) wide. The rut depth measurement template shall contain five openings, spaced along the length of the template, in which the ruts are measured. The locations of the openings on the template will coincide with the locations utilized by the automatic measurement system. Each of the five openings shall be approximately 11 mm (0.43 in.) wide.

Note 2—Manual rut depth measurements on specimens that are rutted significantly may result in erroneous data. The rut depth measurement template may rest on the displaced material rather than on the test mold. In these cases, the rut depth measurement template should be modified with a channel removed from the bottom side of the template in order to span the displaced material and ensure that the template rests on the test mold.

3.1.9. The APA shall be calibrated in accordance with Annex A1.

3.2. Ovens for maintaining temperature of plant-produced HMA and preheating specimens.

3.3. *Compaction device and molds*:

3.3.1. Superpave gyratory compactor (SGC) and compaction molds conforming to T 312, or