Alabama Dept of Transportation
Bureau of Materials and Tests
Testing Manual

ALDOT Procedures
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ALDOT-458

High Temperature Indirect Tensile Test for HMA

1. Scope

1.1. This method describes a procedure for testing laboratory prepared or plant mixed samples of Hot Mix Asphalt (HMA) for resistance to rutting via an indirect tensile method on a Marshall press.

2. Referenced Documents

2.1. AASHTO Standards

- AASHTO R 30   Mixture Conditioning of Hot Mix Asphalt
- AASHTO T 47   Reducing Sample of Asphalt Mixtures to Testing Size

- AASHTO T 97   Sampling Asphalt Mixtures
- AASHTO T 166   Title Bulk Specific Gravity (Gmb) of Compacted Asphalt Mixtures Using Saturated Surface-Dry Specimens
- AASHTO T 209   Theoretical Maximum Specific Gravity (Gmm) and Density of Asphalt Mixtures
- AASHTO T 312   Preparing and Determining the Density of Asphalt Mixture Specimens by Means of the Superpave Gyratory Compactor

2.2. ASTM Standards

- ASTM D6931   Standard Test Method for Indirect Tensile (IDT) Strength of Asphalt Mixtures

3. APPARATUS

3.1. A Gyratory compactor conforming to AASHTO T 312

3.2. Equipment for determining the theoretical maximum specific gravity (G_{mm}) conforming to AASHTO T 209

3.3. Balance and water bath conforming to AASHTO T 166

3.4. A load press such as a Marshall press that can maintain a displacement rate of 2in./min(50mm/min)

3.5. An indirect tensile strength loading fixture compliant with ASTM D6931

3.6. Calipers capable of measuring the height and diameter of the specimen to 0.01 in.

3.6.1. Height measurements may also be taken using the gyratory compactor's internal height measurement system.

4.   Sample Preparation

4.1. Aging of mix

4.1.1. Laboratory prepared samples should be aged prior to compaction according to AASHTO R 30 7.2 Short-Term Conditioning for Mixture Mechanical Property Testing.

4.1.1.1. Spread the mixture in a pan to an even thickness between 25 and 50 mm (1 and 2 in.). Place the mixture and pan in the conditioning oven for 2 hours ± 5 minutes at a temperature of 135 ± 3 °C (275 °F ± 5 °F).

4.1.1.2. Stir every 60 ± 5 min to maintain uniform conditioning

4.1.1.3. After 2 hours ± 5 min, remove the mix from the oven. The conditioned mixture is now ready for compaction.

4.1.2. Plant Mixed samples need no conditioning and should be compacted after being reheated to their compaction temperature.

4.2. Prepare 3 replicant specimens in accordance with AASHTO 312.

4.2.1. If the Maximum aggregate size is 1 ½ in. (37.5 mm) or larger prepare samples 150 mm in diameter, 95 mm ± 1 mm in height and at the laboratory designed air void content 7% ± 0.5% as determined by AASHTO T 312.

4.2.2. If the maximum aggregate size is smaller than 1 ½ in. (37.5mm) prepare samples 150 mm in diameter, 62 mm ± 1 mm in height and at the laboratory designed air void content of 7% ± 0.5% as determined by AASHTO T 312.

5. Procedure

5.1. Measure and record the specimen height in inches at 3 evenly spaced locations around the circumference. The specimen height reported by the gyratory compactor may also be used.

5.2. Measure and record specimen diameter for verification.

5.3. Condition the sample in a forced draft oven at the test temperature of 50 °C ± 1°C (122 °F ± 2 °F) for 2 hours ± 10 minutes prior to testing.

5.4. Remove each specimen from the oven one at a time for testing leaving the others in the oven to remain at test temperature. Place the specimen carefully onto the lower loading strip. Slowly lower the top loading strip to bring it into contact with the specimen. Ensure that the loading strips are parallel and centered vertically on the diameter of the specimen on both sides. The specimen shall be tested within 2 minutes of removal from the oven.

5.5. Apply a vertical load to the test fixture with a displacement of 2 in./min. record the maximum load

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6. Calculation

6.1. Calculate the HT-IDT strength as follows:

$$HTIDT\ Strenght = \frac{2\ \times\ Max\ load}{\pi \times D \times H}$$

Where:

HT-IDT Strength is in psi

Max Load is in pounds

D = average diameter in inches

H = average height in inches

From ASTM D 6931 section 8.1

6.2 Example calculation:

Given: The three measured diameters are 5.905 in. , 5.910 in. , and 5.900 in.
The measured height is 2.441 in.
The maximum load read from the graph is 650 lbs.

Find: the HT-IDT Strength

Solution: First calculate the average specimen diameter

$$average\ diameter = \frac{5.905+5.910+5.900}{3} = 5.905\ \text{in.}$$

Next calculate the HT-IDT strength

$$HTIDT\ Strength = \frac{2 \times 650}{3.141 \times 5.905 \times 2.441} = 28.7\ psi$$

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7. Report

7.1. Report the following:

7.1.1. JMF number

7.1.2. Each measured and average height and diameter of the specimens to the nearest 0.01 in or 0.1 mm

7.1.3. Test temperature to the nearest 1°C

7.1.4. Maximum load for each specimen as reported by the test apparatus

7.1.5. HT-IDT strength for each specimen and average HT-IDT strength of all samples to the nearest 0.1 psi