Test Procedure for

OVERLAY TEST

Texas Department of Transportation

TxDOT Designation: Tex–248–F

Effective Dates: March 2007–December 2008.

1. SCOPE

1.1 Use this test method to determine the susceptibility of bituminous mixtures to fatigue or reflective cracking. This test method measures the number of cycles to failure.

1.2 The values given in parentheses (if provided) are not standard and may not be exact mathematical conversions. Use each system of units separately. Combining values from the two systems may result in nonconformance with the standard.

2. APPARATUS

2.1 *Overlay Tester*—The device is an electro-hydraulic system that applies repeated direct tension loads to specimens. The machine features two hard-anodized aluminum blocks. One is fixed and the other slides horizontally. The device automatically measures and records load, displacement, and temperature every 0.1 sec.

The sliding block applies tension in a cyclic triangular waveform to a constant maximum displacement of 0.025 in. (0.06 cm). The sliding block reaches the maximum displacement and then returns to its initial position in 10 sec. (one cycle).

Additionally, the device includes:

- an air bath chamber that controls the test temperature,
- a linear variable differential transducer to measure the displacement of the block,
- an electronic load cell to measure the load resulting from the displacement,
- aluminum base plates to restrict shifting of the specimen during testing, and
- a mounting jig to align the two aluminum base plates for specimen preparation.

Refer to manufacturer for equipment range and accuracy for LVDT and load cell.

2.2 *Cutting Template*—Refer to Figure 1.

2.3 *3/8-in. Socket Drive Handle with a 3-in. (7.6 cm) extension.*

2.4 *Hacksaw with carbide grit blade.*

3. MATERIALS

3.1 Two-part epoxy with a minimum 24 hr. tensile strength of 600 psi (4.1 MPa) and 24 hr. shear strength of 2,000 psi (13.8 MPa) according to Tex-614-J

3.2 One 10 lb. (4.5 kg) weight

3.3 1/4-in. width adhesive tape

3.4 Paint or permanent marker.

4. SPECIMENS

4.1 *Laboratory Molded Specimens*—Prepare specimens according to Tex-205-F and Tex-241-F. Specimen diameter must be 6 in. (150 mm) and specimen height should be 2.4 ±0.1 in. (62 ±0.2 mm). Density of molded specimens must be 93 ±1%.

Note 1—Mixture weights for specimens prepared in the laboratory typically vary between 2400 to 2600 g to achieve density.

Note 2—Mixture weights for specimens prepared in the laboratory vary with different aggregate sources and with different mix types.

4.2 *Core Specimens*—Specimen diameter must be 6 ±0.1 in. (150 ±0.3 mm) and specimen height should be a minimum of 1.5 in. (38 mm). There is not a specific density requirement for core specimens.

5. PROCEDURE

5.1 *Sample Preparation*—Use three cylindrically molded specimens or collect three roadway cores according to Section 5.

5.2 *Trimming of Cylindrical Specimen*—Place the cutting template on the top surface of the laboratory molded specimen or roadway core. Trace the location of the first two cuts by drawing lines using paint or a permanent marker along both sides of the cutting template.

Trim the specimen ends by cutting the specimen perpendicular to the top surface following the traced lines. Discard specimen ends.

Trim off the top and bottom of the specimen to produce a sample with a height of 1.5 ±0.125 in. (38 ±3 mm). Discard the top and bottom parts of the specimen.

Note 3—Refer to Figure 2.

Measure the relative density of the trimmed specimen according to Tex-207-F.

Density for trimmed laboratory molded specimen must be 93 ±1%. Discard and prepare a new specimen if it does not meet the density requirement.

Density for trimmed core specimens is for informational purpose only.

Dry the trimmed specimen at a maximum temperature of 140 ±5°F (60 ±3°C) to constant weight.

Note 4—Constant weight is defined as the weight at which further oven drying does not alter the weight by more than 0.05% in a 2-hr. interval.

5.3 *Mounting Trimmed Specimen to Base Plates*—Mount and secure the base plates to the mounting jig. Cut a piece of adhesive tape approximately 4.0 in. (102 mm) in length. Center and place piece of tape over the gap between the base plates.

Prepare epoxy following manufacturer's instructions.

Glue the trimmed specimen to the base plates using the prepared epoxy. Cover the majority of both base plates with the epoxy including the tape.

Place a 10-lb. (4.5 kg) weight on top of the glued specimen to ensure full contact of the trimmed specimen to the base plates. Allow the epoxy to cure for the time recommended by the manufacture. Remove the weight off the specimen after the epoxy has cured.

Use a hacksaw to cut through the tape and dry epoxy located at the gap opening between the base plates. Slightly score the test specimen to propagate a crack at the gap opening.

5.4 *Starting Testing Device*—Turn on the 'Master' switch located on the main control panel of the overlay tester. Turn on the computer and wait at least 1 min. Start the overlay test software.

Turn on the hydraulic pump using the software after it is completely loaded on the computer. Turn the machine to load mode.

5.5 *Mounting Trimmed Test Specimen to Testing Device*—Enter the required test information into the overlay test software for the specimen mounted. Mount the specimen assembly onto the machine according to the manufacturer's instructions.

Note 5—Clean the bottom of the base plates and the top of the testing machine blocks before placing the specimen assembly into the blocks. If all four surfaces are not clean, damage may occur to the machine, the specimen, or the base plates when tightening the base plates.

5.6 *Testing Specimen*—Turn the machine to stroke mode. Perform testing at a constant temperature of 77 ±3°F (25 ±2°C).

Note 6—Ensure temperature of trimmed test specimen is 77 ±3°F (25 ±2°C).

Start the test by enabling the start button in the program. Perform testing until a 93% reduction or more of the maximum load measured from the first opening cycle occurs. If 93% is not reach, run the test to 1,200 cycles.

Turn the machine to load mode. Remove specimen assembly.

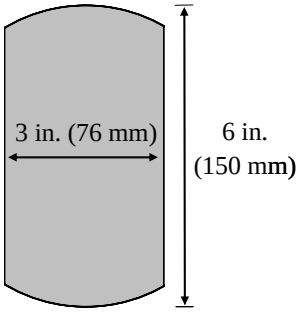
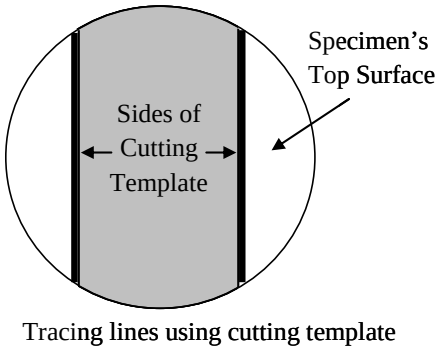
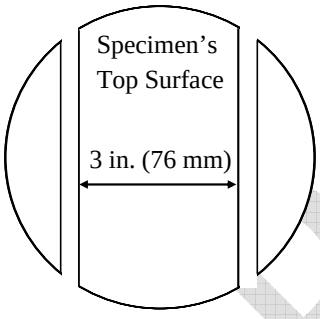


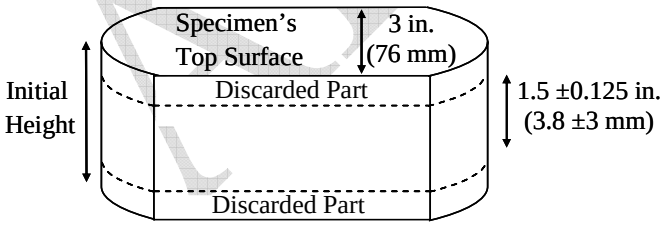
Figure 1—Cutting Template



Tracing lines using cutting template



Trimming specimen's ends



Trimming specimen to required height

Figure 2—Trimming of Cylindrical Specimen

6. REPORT

6.1 Report the following for each specimen:

- trimmed specimen density,
- starting load,
- final load,
- percent decline in load,
- number of cycles to failure, and
- test temperature.