
Test Procedure for

OVERLAY TEST

TxDOT Designation: Tex-248-F

Effective Date: January 2009



1. SCOPE

- 1.1 This test method determines 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.
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2. APPARATUS

- 2.1 *Overlay tester*, an electro-hydraulic system that applies repeated direct tension loads to specimens. The machine features two blocks: one is fixed, and the other slides horizontally. The device automatically measures and records load, displacement, and temperature every 0.1 sec.
- 2.1.1 The sliding block applies tension in a cyclic triangular waveform to a constant maximum displacement of 0.06 cm (0.025 in.) The sliding block reaches the maximum displacement and then returns to its initial position in 10 sec. (one cycle).
- 2.1.2 Additionally, the device includes:
- a temperature controlled chamber,
 - 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 or steel base plates to restrict shifting of the specimen during testing, and
 - a mounting jig to align the two base plates for specimen preparation.
- 2.1.3 Refer to manufacturer for equipment range and accuracy for LVDT and load cell.
- 2.2 *Cutting template*, as shown in Figure 1.
- 2.3 *Socket drive handle*, 3/8-in., with a 3-in. (7.6 cm) extension.
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3. MATERIALS

- 3.1 *Two-part epoxy*, with a minimum 24 hr. tensile strength of 4.1 MPa (600 psi) and 24 hr. shear strength of 13.8 MPa (2,000 psi) in accordance with Tex-614-J.
 - 3.2 Weight, 4.5 kg (10 lb.)
 - 3.3 Adhesive tape, 1/4-in. width.
 - 3.4 Paint or permanent marker.
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4. SPECIMENS

- 4.1 *Laboratory Molded Specimens*—Prepare specimens according to Tex-205-F and Tex-241-F. Specimen diameter must be 150 mm (6 in.), and specimen height must be 115 ± 5 mm (4.5 ± 0.2 in.).
 - Note 1**—Mixtures modified with warm-mix asphalt additives or processes must be oven cured at 275°F for 4 hours \pm 5 minutes before molding.
 - 4.1.1 Density of the trimmed test specimen must be $93 \pm 1\%$.
 - Note 2**—Experience has shown that molded laboratory specimens with $91 \pm 1\%$ density usually result in trimmed test specimens that meet the $93 \pm 1\%$ density requirement. This is a guide and depends on experience and knowledge of the specific materials.
 - Note 3**—Mixture weights for specimens prepared in the laboratory typically vary between 4500 and 4700 g to achieve density. 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 150 ± 2 mm (6 ± 0.1 in.), and specimen height must be a minimum of 38 mm (1.5 in.) There is not a specific density requirement for core specimens.
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5. PROCEDURE

- 5.1 *Sample Preparation:*
 - 5.1.1 Use three cylindrically molded specimens meeting the requirements of Section 4.
 - Note 4**—Test roadway cores for informational purposes only.
 - 5.2 *Trimming of Cylindrical Specimen:*
 - 5.2.1 Refer to the sawing device manufacturer's instructions for trimming specimens.
 - 5.2.1.1 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.
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- 5.2.1.2 Trim the specimen ends by cutting the specimen perpendicular to the top surface following the traced lines. Discard specimen ends.
- 5.2.1.3 Trim off the top and bottom of the specimen to produce a sample with a height of 38 ± 0.5 mm (1.5 ± 0.02 in.). Discard the top and bottom parts of the specimen.
Note 5—Refer to Figure 2.
- 5.2.2 Measure the relative density of the trimmed specimen in accordance with Tex-207-F. Density for trimmed laboratory molded specimen must be $93 \pm 1\%$. Discard and prepare a new specimen if it does not meet the density requirement. Density for trimmed core specimens is for informational purpose only.
- 5.2.3 Dry the trimmed specimen at a maximum temperature of $60 \pm 3^\circ\text{C}$ ($140 \pm 5^\circ\text{F}$) to constant weight.
Note 6—Constant weight is 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:*
- 5.3.1 Mount and secure the base plates to the mounting jig. Cut a piece of adhesive tape approximately 102 mm (4.0 in.) in length. Center and place piece of tape over the gap between the base plates.
- 5.3.2 Prepare epoxy following manufacturer's instructions.
- 5.3.3 Cover the majority of both base plates with the epoxy including the tape. Glue the trimmed specimen to the base plates.
- 5.3.4 Place a 4.5 kg (10 lb.) 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 manufacturer. Remove the weight from the specimen after the epoxy has cured.
- 5.4 Place the test sample assembly in the overlay tester's 25°C (77°F) temperature chamber for a minimum of 1 hour before testing.
- 5.5 *Starting Testing Device:*
- 5.5.1 Turn on the overlay tester. Turn on the computer and wait at least 1 minute to establish communication with the overlay tester. Start the overlay test software.
- 5.5.2 Turn on the hydraulic pump using the overlay test software. Turn the machine to load mode.

5.6 *Mounting Specimen Assembly to Testing Device:*

5.6.1 Enter the required test information into the overlay test software for the specimen to be tested. Mount the specimen assembly onto the machine according to the manufacturer's instructions and the following procedural steps.

- 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.
- Apply 15 lb.-in. of torque for each screw when fastening the base plates to the machine.

5.7 *Testing Specimen:*

5.7.1 Perform testing at a constant temperature of $25 \pm 0.5^{\circ}\text{C}$ ($77 \pm 1^{\circ}\text{F}$).

Note 7—Ensure temperature of trimmed test specimen is $25 \pm 0.5^{\circ}\text{C}$ ($77 \pm 1^{\circ}\text{F}$).

5.7.2 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.

5.7.3 Remove specimen assembly.

Note 8—Ensure machine is in load mode before removing specimen assembly.

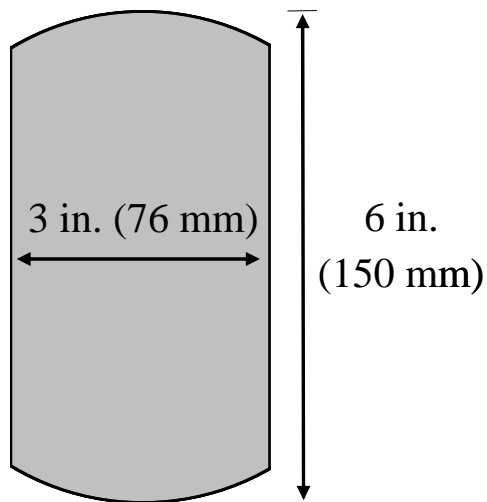
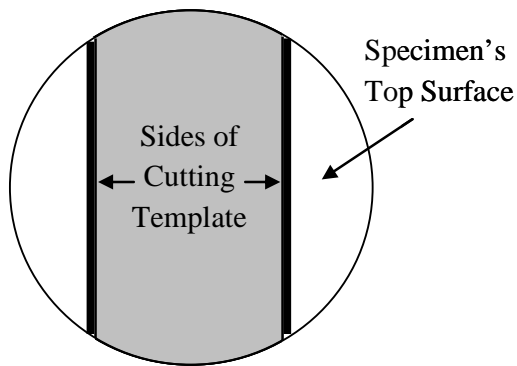
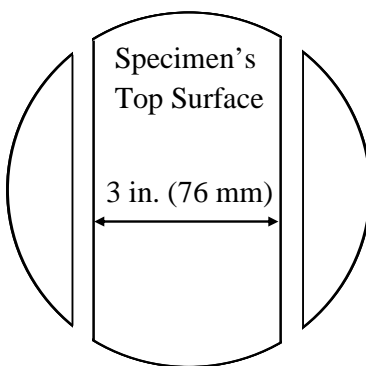


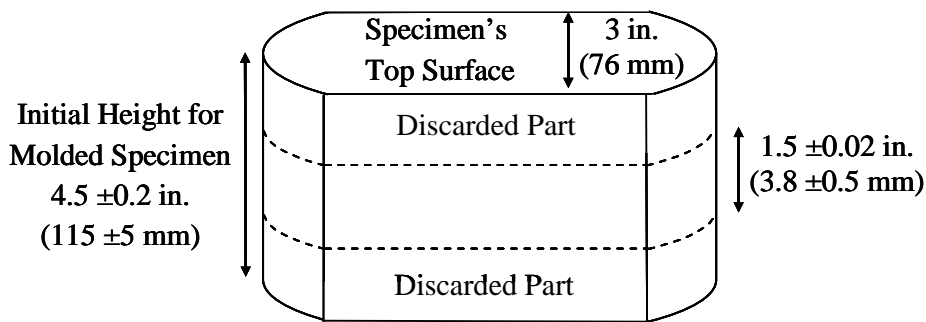
Figure 1—Cutting Template



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
- temperature.

7. ARCHIVED VERIONS

7.1.1 Archived versions are available.