Test Procedure for

SURFACE TREATMENT BOND TEST

TxDOT Designation: Tex-XXX
Effective Date: March 2011
Published: February 2012

1. SCOPE

1.1. This test procedure is used to determine the bond strength characteristics of the interfaces between the surface of a stabilized base layer, prime coat, and surface treatment.

1.2. The values given in parenthesis (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. Forced draft oven, capable of attaining a temperature of at least 325°F± 5°F (163 ± 3°C).

2.2. Pull-Off Tester with 50 mm dia × 25 mm aluminum caps, draw bolts (Refer to Figure 1).

2.3. Spacers (maximum diameter 1 inch, maximum thickness 1/8 inch), and base plate. (Refer to Figure 2)

2.4. Balance, readable to 0.1 g and accurate to 0.5 g.

3. MATERIALS

3.1. Plumber's putty

3.2. Plastic wrap

3.3. 2" painter's masking tape

3.4. 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.

3.5. 10 lb (4.5 kg) weight less than 6-inches in diameter or dimension.

3.6. Box cutter or razor blade

3.7. 12" wooden rolling pin

3.8. Air compressor

3.9. Paint marker

3.10. Foam brushes

3.11. Tongue depressors

3.12. Standard handheld brush

---

4. SPECIMEN

4.1. Prepare a minimum of 4, 2-in tall × 6-in diameter base specimens using one lift applying 50 blows of the hammer in accordance with the procedure and apparatus described in Tex-113-E.

Note 1 – If adding cement stabilizer, refer to Tex-120-E, Steps 5.1 to 5.2.3.
If adding lime stabilizer, refer to Tex -121-E, Steps 5.1. to 5.3.4.
If adding lime-fly ash stabilizer, refer to Tex-127-E, Steps 5.1. to 5.1.4.

Note 2 – Take care to properly label specimens according to their material characteristics so as to avoid confusion later (when testing especially).

---

5. PROCEDURE

5.1. Sample Preparation

5.1.1. Use four cylindrically molded specimens in accordance with section four.

5.1.2. Immediately after compacting each individual specimen, seal the sample with plastic wrap.

5.1.3. Using the painter's masking tape, apply to the circumference of the specimen leaving a minimum of a 1/8" lip above the surface that will be tested (to retain the prime/seal coat).

5.1.3. 60±5 minutes after compacting the specimens, use the box cutter or razor blade to remove the plastic covering from the top of the specimen (i.e., the surface to be tested).

5.1.4. If applying a prime coat, use the design-specified application rate and evenly distribute the prime coat over the exposed specimen surface using the foam brush. Refer to section 6.1 to determine the correct weight of prime to apply in grams.

Note 1 –Place specimen on scale, zero the balance, then add material until the desired weight of prime is reached. Take care to apply the appropriate weight as the foam brush tends to absorb some of the material.

5.1.5. After completing step 5.1.4, place the specimen in the oven to cure at 110°F ± 2°F for 72±4 hours

5.1.6. After the three-day cure, remove the specimen from the oven to ambient temperature.

5.1.7. Evenly distribute 30 g of the asphalt cement binder (40 g if using asphalt emulsion) required for the seal coat design to the primed specimen surface using the tongue depressor or foam brush. This is the amount of asphalt needed for a Grade 5 seal coat aggregate. Even if the proposed field surface treatment is not a Grade 5, it is recommended that a Grade 5 be used for the laboratory evaluation to allow for more aggregate surface area to glue to the test cap. A Grade 5 aggregate also enables the test cap to be glued in a more level position than if a coarser aggregate grade is used.

Note 1 – Foam brushes are used when applying non-heated materials, and tongue depressors are used when applying heated materials.

5. 1.9. Place the specified aggregate onto the binder immediately, in order to ensure proper seating of the aggregate (if using emulsion or cutback place aggregate on binder after the appropriate setting or curing time).

Note 1 – Washed grade 5 aggregate is recommended as the extra dust particles can produce erroneous test results.

5. 1.10. Gently roll the rolling pin over the aggregate to apply pressure in order to properly seat the aggregate into the asphalt binder, taking care not to force the binder out from underneath the aggregate.

Note 1 – Proper seating generally occurs after 10–20 passes with the rolling pin.
Note 2 – Be sure to roll in the perpendicular direction as well.

5. 1.11. Place the specimens back into the oven to cure at 110±2°F for an additional 24±1 hr.

5. 1.12. After the 24-hr cure, remove the specimens from the oven to ambient temperature.

5. 1.13. Brush the specimen gently to remove the loose aggregate. Using compressed air, remove all remaining loose particles from the surface of the specimens (with particular attention

to the remaining dust particles). This will help the bonding between the epoxy and the seal coat.

5. 1.14. Place a pull-off tester test disc on the center of the specimen and trace the circumference of the test disc onto the surface of the specimen using the paint marker.

5.1.15. Place the plumber's putty around the traced circle such that the inner circumference of the putty is touching the circle. Apply pressure to the putty to ensure that it fills any gaps in the surface of the seal coat to prevent epoxy from seeping outside the circle.

Note 1 – Mold the putty to a height that will prevent overflow of epoxy to the outside of the putty.

5.1.16. Prepare epoxy following manufacturer's instructions.

5.1.17. Place enough epoxy inside the ring of putty to ensure that the tallest rock within the ring is completely submerged.

5.1.18. Gently place the pull-off tester test disc onto the epoxy. Rotate the test disc at least 90° clockwise and counterclockwise to ensure proper distribution of the epoxy onto the test disc.

5.1.19. Place the 10 lb weight directly on top of the pull-off tester test disc to ensure that the test disc adheres properly to the specimen.

5.1.20. Allow the epoxy to cure for the time recommended by the manufacturer. Remove the weight from the specimen after the epoxy has cured.

5.2. Testing Specimen (Refer to Figure 3)

5.2.1. Refer to the manufacturer's operating instruction manual to properly prepare the pull-off tester. This includes setting the machine to display the correct units and correct data collection rate.

5.2.2. Install the draw bolt into the test disc.

5.2.3. Place the base plate onto the sample such that the test disc is centered within the inner diameter of the base plate.

Note 1 – Position the base plate in such a way that the tensile force is applied perpendicular to the surface of the specimen. This can be accomplished by placing spacers between the specimen surface and the base plate such that the base plate becomes level or by adjusting the height of the legs of the pull-off tester.

5.2.3. With the machine disconnected from the specimen, turn the crank back to its initial position in a counterclockwise direction until slight resistance is encountered.

5.2.4. Turn the crank once in the clockwise direction to relieve the hydraulic system.

5.2.5. Connect the coupling of the draw spindle to the draw bolt of the test disc.

5.2.6. Zero the maximum load.

5.2.7. Turn the wheel clockwise until slight resistance is encountered.

5.2.8. Turn the crank steadily clockwise until specimen failure has occurred. Specimen failure is defined as a 50% reduction in the maximum observed load. Record the maximum load.

5.2.9. After specimen failure, turn the wheel in the clockwise direction until the test disc can be easily removed from the specimen by hand. Record the location of failure (i.e., which layer bond failed). If a single layer failure is not clear, record an estimated percentage of failure in each layer (e.g., failure occurred in 50% of the base layer and 50% of the prime coat).

6. CALCULATIONS

6.1. Calculate the weight of prime to be applied to each specimen given the application rate in gallons per square yard:

$$SG \times AR \times 82.51 = Wb$$

Where:
SG = specific gravity of the prime coat
AR = application rate of the prime coat, gal/sq. yd.
Wb = weight of binder to be applied to each specimen, g

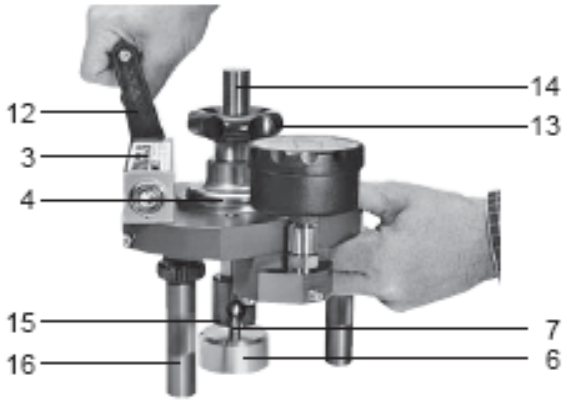
7. REPORT

7.1. Report the following for each specimen:

- Maximum Load
- Failure location

8. FIGURES

1 Pull-off tester
2 Digital manometer
3 Hydraulic pump
4 Piston
5 Device plate
6 Draw bolts
7 Test disc



3 Hydraulic pump
4 Piston
6 Test disc
7 Draw bolt
12 Crank
13 Wheel
14 Draw spindle
15 Coupling
16 Legs

Figure 1. DYNA Z Pull-Off Tester and Digital Manometer.

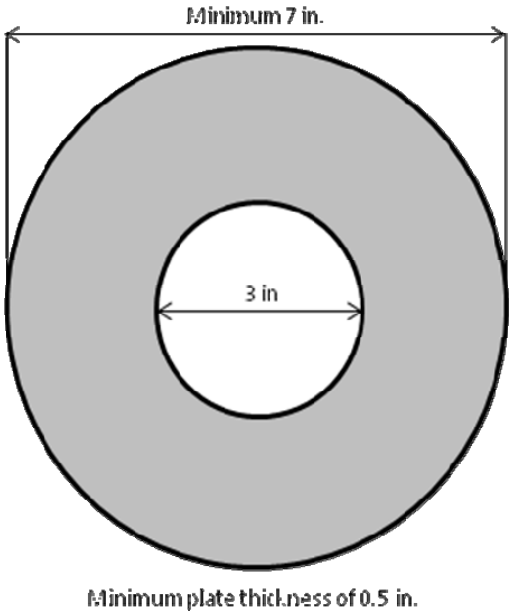


Figure 2. Base Plate.

Figure 3. Surface Treatment Bond Test Equipment Set-Up and Tested Lab Specimen.