FLORIDA DEPARTMENT OF TRANSPORTATION
State Materials Office
5007 NE 39th Avenue
Gainesville, Florida 32609
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Florida Method of Test
for
DETERMINING THE INTERLAYER BOND STRENGTH BETWEEN ASPHALT PAVEMENT LAYERS

Designation: FM 5-599

1. SCOPE

This method of test describes a procedure for determining the interlayer bond strength between two layers of asphalt pavement. A load is applied to a cored field sample to determine the interlayer bond strength in a shearing mode.

2. APPARATUS

2.1 Air chamber or water bath capable of maintaining a set temperature of 77.0 ± 1.8°F.

2.2 Measuring device capable of measuring the diameter of the sample to the nearest 0.01 in.

2.3 Loading Machine – The loading machine shall be a universal mechanical or hydraulic testing machine that can provide a vertical movement of 2.0 in./min.

2.4 Interlayer Bond Strength Tester – The device for testing the bond strength shall be designed so that it can be used with the corresponding loading machine in 2.4. The device shall have two platens- one fixed platen that will move upward with the device, and one movable platen that will move downward by the interaction surface of the loading machine. The device shall accommodate 6.0 in. diameter samples and shall have a 3/8 in. diameter locking pin for alignment of the two platens. The gap between the platens shall be set at 1/4 in. This device is illustrated in Figure 1. Cross-sectional, profile, and plan views, with dimensions, are shown in Figures 2, 3, and 4, respectively. A device manufactured by Associated Technologies and Manufacturing, Inc. has been found to meet these requirements.

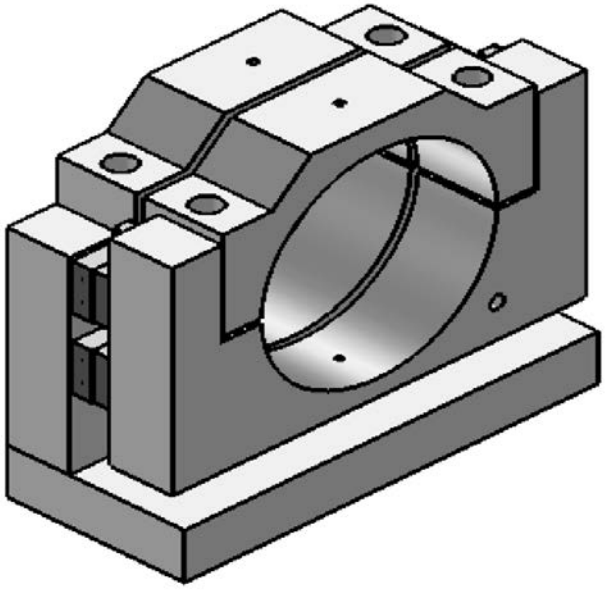

Figure 1. 3-D Illustration of the Interlayer Bond Strength Tester

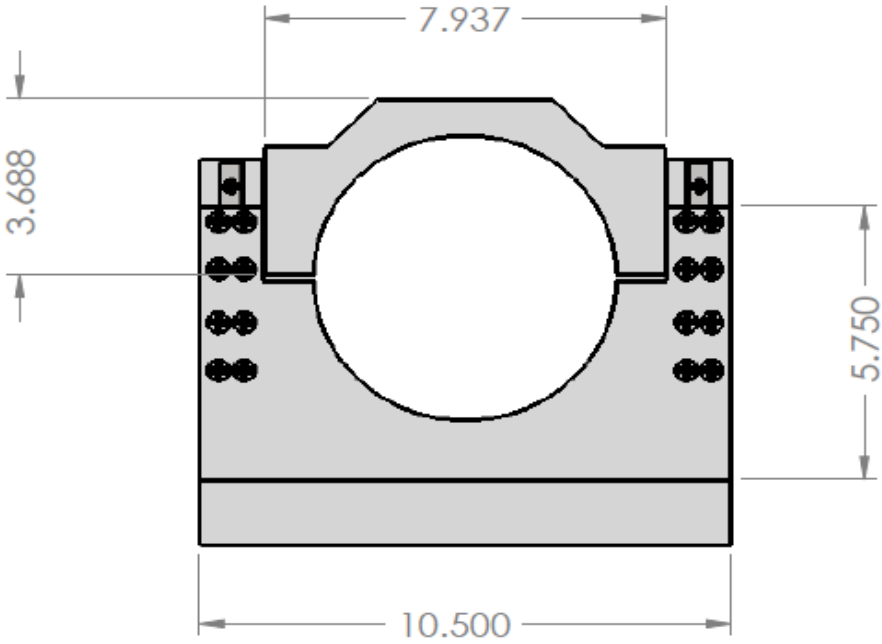

Figure 2. Cross-Sectional View of Interlayer Bond Strength Tester with Dimensions (in.)

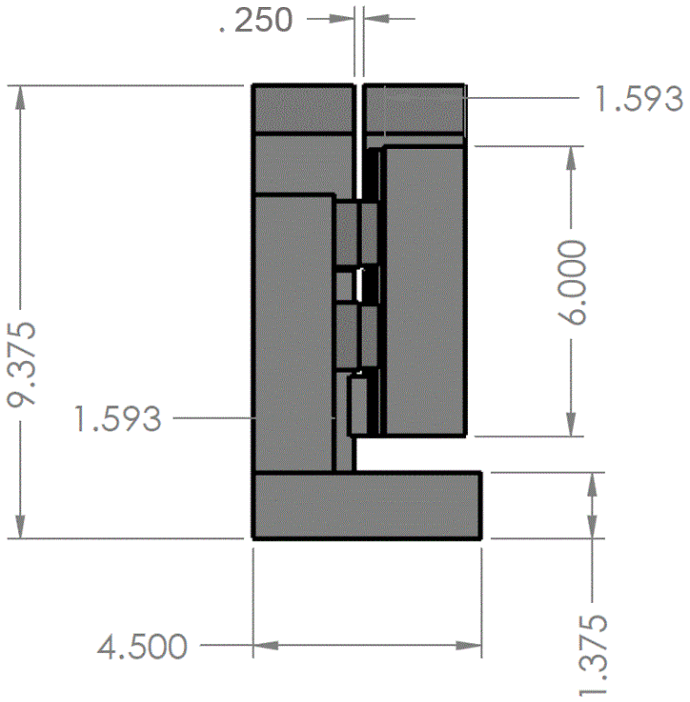

Figure 3. Profile View of the Interlayer Bond Strength Tester with Dimensions (in.)

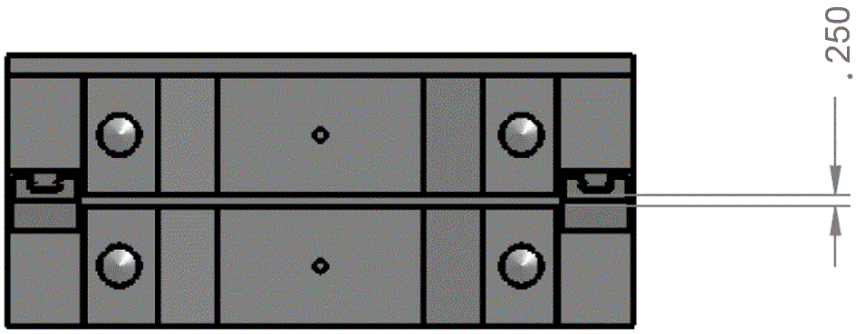

Figure 4. Plan View of the Interlayer Bond Strength Tester with Dimensions (in.)

3. MATERIALS

3.1 Cored field sample no larger than 6.0 in. diameter. Samples larger than 6.0 in. will not fit into the bond strength tester. The minimum diameter of cored field sample should be greater than or equal to 5.8 in.

3.2 Shims (needed if core diameter is less than 6.0 in). A picture example of shims is displayed in Figure 5.

Figure 5. Picture of Shims that Can Be Used to Accommodate a Core Sample with a Diameter Less than 6.0 in.

4. SAMPLE PREPARATION

4.1 Obtain a cored field sample of 6.0" diameter. The core should be sheared in the direction of traffic. Prior to coring the specimen, use a lumber crayon to mark the direction of traffic on the surface of the core. When removing the core from the pavement care should be taken to not stress or damage the bond. Label the core with appropriate identification.

4.2 Measure the diameter of the core at three equally spaced locations around the circumference of the core. Record these readings and calculate the average of these values.

4.3 The cores do not need to be trimmed with a saw. The machine can accommodate any length core.

4.4 The sample shall be stored in an air chamber or water bath at 77.0 ± 1.8°F for a minimum of 3 hours. If a water bath is used, the sample should be placed in a sealed bag to prevent contact with water.

5. MACHINE AND SAMPLE SET UP

5.1 The gap width between the shearing platens should be set at 0.25 in.

5.2 Unclamp the upper halves of each shearing platen.

5.3 Insert the shims at this time, if needed.

5.4 Place the sample into the shearing platens, aligning the layer interface with the center of the gap between the platens. Insert the core so the direction of traffic faces up.

5.5 If the core was obtained at a slight skew, then the core should be rotated so that the skew will not affect the test results, i.e. the failure plane is vertical.

6. TESTING THE SAMPLE

6.1 Set the loading rate to 2.0 in./min. (This may not be variable. Make sure that the loading machine loads at this rate).

6.2 Set the load range to 10,000 lbs. as an initial starting point. If the cores are shearing at loads lower than 5,000 lbs, the load range should be changed to 5,000 lbs for better resolution.

6.3 Start the test. The loading machine will automatically plot the load versus displacement curve. From the plot, obtain the maximum load.

7. CALCULATION

7.1 Divide the load by the cross-sectional area to obtain the interlayer bond strength, as shown in the following equation:

$$IBS = \frac{P_{ult}}{\frac{\pi D^2}{4}}$$

where:

IBS = interlayer bond strength (psi)
P_{ult} = ultimate load applied to specimen (lbs.)
D = diameter of test specimen (in.)

8. REPORT

8.1 For each sample tested, report the following:

Report the sample identification.

Report the sample diameter to the nearest 0.01 in.

Report the ultimate load, P_{ult}, to the nearest 25 lbs.

Report the interlayer bond strength to the nearest 1 psi.