**FLORIDA DEPARTMENT OF TRANSPORTATION**
State Materials Office
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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 displacement rate of 2.00 ± 0.15 in./min. and can measure load up to 10,000 lb. with an accuracy of 1.00%.

2.4 Interlayer Bond Strength Tester – The device for testing the interlayer bond strength shall be designed so that it can be used with the corresponding loading machine in **2.3.** The device shall have two platens: one fixed platen that will move with the device and one movable platen that will move in the opposite direction. The device shall accommodate samples with a 6.00 in. maximum diameter. The gap between the platens shall be set at 0.25 ± 0.02 in. A device manufactured by Associated Testing and Manufacturing has been found to meet these requirements. This device is illustrated in ***Figure 1***.

2.5 Shims - needed if core diameter is less than 6.00 in. but ≥ 5.75 in. ***See Figure 2.***

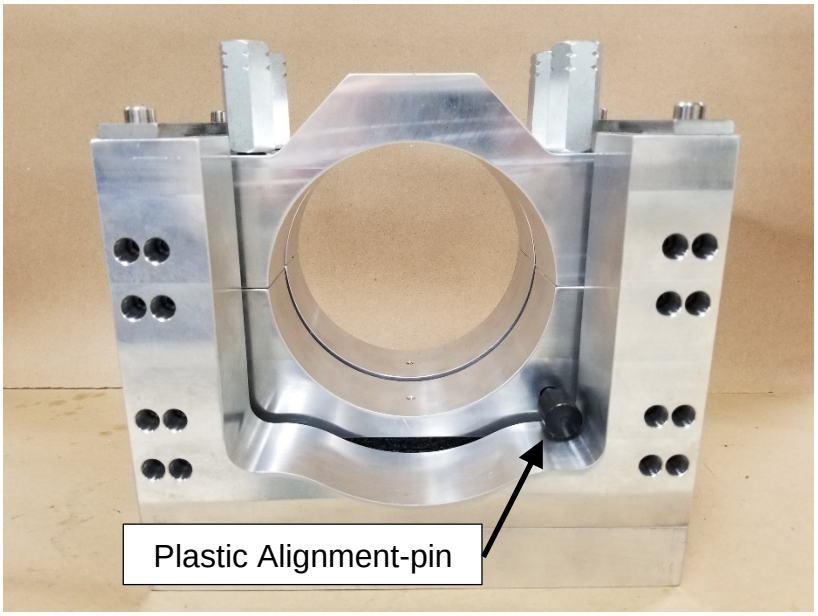


**Figure 1. Interlayer Bond Strength Tester**

**Figure 2. Shims of Varying Thicknesses to Accommodate a Core Sample with a Diameter < 6.00 in. and ≥ 5.75 in.**

## 3. MATERIALS

Cored field sample no larger than 6.00 in. diameter. Samples larger than 6.00 in. will not fit into the bond strength tester. The minimum diameter of cored field sample should be ≥ 5.75 in.

## 4. PROCEDURE

4.1 Sample preparation

4.1.1 Obtain a cored field sample preferably with a 6.00 in. diameter. Smaller diameter samples (minimum 5.75 in.) can be accommodated with the use of shims. The core should be sheared in the direction of traffic. Prior to coring the specimen, use a lumber crayon or similar permanent type marker to indicate the direction of traffic with an arrow on the surface of the core. When removing the core from the pavement, care should be taken to not stress or damage the layer interface. Label the core with appropriate identification.

4.1.2 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.

4.1.3 The sample shall be stored in an air chamber or water bath at 77.0 ± 1.8°F for a minimum of 3.0 hours. If a water bath is used, the sample should be placed in a sealed bag to prevent contact with water.

4.2 Machine and sample setup

4.2.1 Place the sample into the bond strength tester, aligning the layer interface of interest with the center of the gap between the platens. Insert the core so the direction of traffic faces down.

When shearing non-milled interfaces, if the core was obtained with its vertical alignment slightly skewed to the surface of the pavement, the core should be rotated in the shear apparatus so the skew will not affect the test results, i.e., the plane of the layer interface should be vertical. Rotate the core to obtain the vertical layer interface plane even if the rotation of the core means the direction of shear will not be in the same alignment as the direction of traffic. Ensure that after rotating the sample the entire layer interface should still be visible in the gap between the platens. If the skew is great enough (more than 1/4”), such that not all the layer interface is visible in the gap between the platens, then the sample is not suitable for testing.

4.2.2 Insert the shims, if needed.

4.2.3 Remove the plastic alignment-pin shown in **Fig. 1.** Use a torque wrench and tighten the bolts used to secure the platens to a value of 80 lbf-in. Tighten each of the bolts a small amount and make several iterations until the tightening torque of 80 lb-in is obtained for each bolt.

4.3 Test procedure

4.3.1 If the loading rate is adjustable, set it to 2.00 in./min.

4.3.2 If the loading machine has load range settings, 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, especially when using a mechanical pen plotter output.

4.3.3 Start the test. Continue to load the sample until a maximum load is reached. Record the maximum load.

## 5. CALCULATIONS

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

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

where:

IBS = interlayer bond strength (psi)
$P_{max}$ = maximum load applied to the specimen (lbs.)
D = diameter of test specimen (in.)

## 6. REPORT

For each sample tested, report the following:

6.1 Report the sample identification.

6.2 Report the sample diameter to the nearest 0.01 in.

6.3 Report the maximum load, $P_{max}$, to the nearest 1 lb.

6.4 Report the interlayer bond strength to the nearest 1 psi.