

Colorado Procedure – Laboratory 5110-15

Standard Method of Test for

Resilient Modulus Test (M_R)

1. SCOPE

- 1.1 This method covers procedures for preparing and testing laboratory fabricated or field recovered cores of bituminous mixtures to determine resilient modulus (M_R) values using the repeated load indirect tension test. The M_R can be used in determining the structural contribution of the mix to the pavement performance.

2. APPARATUS

- 2.1 *Mark III Resilient Modulus Device* - manufactured by Retsina Co., or equivalent.

3. TEST SPECIMENS

- 3.1 Test specimens are compacted using a Superpave Gyratory compactor and test method CP-L 5115. Specimens are stored for a minimum of 2 hours in a 77°F cabinet. These specimens generally are the same specimens that will be used for Hveem stability, and this test is performed before heating.

4. PROCEDURE

- 4.1 Place yoke assembly of the Resilient Modulus Device on the holder.
- 4.2 Back out the screw so that the transducer sensors will clear the sample. Back out the four clamping screws and gently insert the sample into the center of the yoke. Place sample squarely on the centering strip. Gently tighten the clamping screws, keeping the sample centered and square in the yoke. Tighten only until snug.
- 4.3 Place the assembly in the loading device, align on the center strip. DO NOT LIFT BY THE YOKE!
- 4.4 Lift the loading shaft and place the top loading block on the specimen, 180 degrees from the bottom centering strip. Allow the shaft to seat against the ball on top of the loading block.
- 4.5 Zero the recording meter. Set the multiplier knob to 200 and turn on the meter. Adjust the zero control until the meter reads just above zero.
- 4.6 Tighten the right transducer advancement- screw until an increased meter reading of about 2.0 is obtained. Tighten the left transducer until an additional 2.0 is obtained.
- 4.7 Reset the zero-knob to just above zero until both the "High" and "Low" pilot lights are out.
- 4.8 Set Mode switch to "Operate".

- 4.9 Record the deflection in micro-inches from the meter. If the reading is out of range, change the multiplier to a higher or lower setting. Reset the zero-knob if one of the indicator lights comes on, and then take another reading.
- 4.10 Rotate the sample 90 degrees and repeat measurements. Deflection readings should be within 10 percent. Sometimes a specimen is non-isotropic and a larger difference will exist.

5. CALCULATIONS FOR M_R

- 5.1 Calculate the M_R as follows:

$$M_R = \frac{P (\text{gamma} + .0234)}{t * \text{delta}}$$

Where:

- P = dynamic load in lbs.,
gamma = 0.35 (assumed for Poisson's Ratio),
t = specimen thickness, inches to 0.1,
delta = deflection in inches (micro-inches X 10^{-6}) obtained by multiplying the meter reading by the multiplier.

6. NOTES ON TEST PROCEDURES

- 6.1 Usually a 75 psi load is used on sound, dry samples. In some cases lower pressure may be required to minimize damage to the sample; therefore, if in doubt, start with a lower pressure.

7. REPORT

- 7.1 There is no designated CDOT Form used for recording / reporting information for this CP-L.