

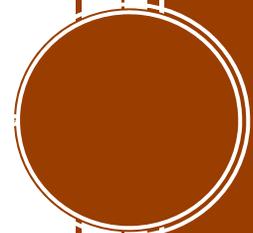


Chicago Testing  
Laboratory, Inc.

# PROPERTIES OF RECOVERED REJUVENATED MATERIAL INDOT RAP

Chicago Testing Laboratory, Inc.

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## Hot In Place Recycling INDOT RAP Analysis

### Project Summary:

Samples of Reclaimed Asphalt Pavement (RAP) were taken from an INDOT approved supplier located in Indianapolis, Indiana and brought to Chicago Testing Laboratory for analysis. The RAP asphalt was recovered and tested for various material properties as described within. RAP material was treated with Bitutech RAP rejuvenator in the laboratory and the asphalt was recovered to determine the effect the rejuvenation treatment had on the recovered asphalt material. The recovered asphalt was tested for material properties and compared to the properties of the untreated RAP recovered asphalt material.

This study included testing untreated and rejuvenated INDOT RAP and included the following test methods:

- Percent Bituminous by Centrifuge Extraction [ASTM D2172]
- Absorption Recovery of Bituminous Material [ASTM D1856]
- Viscosity [ASTM D2171]
- Penetration [ASTM D5]
- Dynamic Shear [T315]
- Bending Beam [T313]

Tests were conducted to determine the effectiveness of the Bitutech RAP product on INDOT RAP and are summarized in Table 1 below:

INDOT RAP Test Results				
Table 1				
	Grade*	Viscosity	Penetration	AC %
RAP	<b>82-10</b>	<b>100,341</b>	<b>4</b>	<b>4.5</b>
BituTech + RAP	<b>64-28</b>	<b>9,504</b>	<b>27</b>	<b>5.3</b>
*PG Testing by ATL				
BituTech RAP Study	82-28	PG Analysis on Recovered Product		

Observations:

1. INDOT Reclaimed Asphalt Pavement treated with the laboratory equivalent of 0.1 gallons per square yard application rate, improved the PG Grade of the RAP recovered asphalt material from a PG 82-10 to a PG 64-28.
2. Asphalt penetration and viscosity of the BituTech treated RAP showed significant softening, from a 4 to 27 and from 100,341 to 9,504 Pas respectively.
3. Total Bitumen content went from 4.5 percent to 5.3 percent after the addition of the rejuvenator laboratory treatment.
4. Previous studies using actual road material subjected to Hot in Place preheating with laboratory addition of BituTech RAP rejuvenator at 0.1 gallons per square yard laboratory equivalent resulted in a PG grade of PG 82-28.
5. A laboratory application rate of 0.05 gallons per square yard showed less improvement in stiffness as compared to the 0.1 gallons per square yard application rate as expected. Results showed an improvement from PG of (-10) to a PG of (-16) at the 0.05 application rate, and an increase in penetration of 75% and a decrease in viscosity of 25%.

Conclusions:

This study was completed to determine the effects of BitTech RAP on actual roadway reclaimed RAP material from the State of Indiana. Samples were taken from approved INDOT sources, and tested before and after application of the BituTech RAP rejuvenator. The properties tested (Viscosity, Penetration, and PG Grade) showed a considerable softening after the addition of the BituTech RAP as compared to the original RAP material. PG Grades were improved to a grade of PG 64-28, at an 0.1 application rate, consistent with most local specification requirements. Recommended application rates to meet the PG 64-22 specification are beyond the scope of this study, but would fall somewhere between 0.05 and 0.1 gallons per square yard.

Based on the laboratory data produced within this study, it is possible to achieve the PG Grades typically required in INDOT specifications through the addition of BituTech RAP rejuvenator to Indiana asphalt pavements. A mixture design utilizing existing field materials, at various application rates, is recommended during all production to ensure application rates meet prevailing specification requirements.

Respectfully Submitted  
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