

# Evaluation of Polymer Binder Technisoil G5® in Concrete Mixture

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## Introduction

Solid waste management and global warming have become the biggest challenge of the modern world. Waste plastic and greenhouse gases are significant factors contributing to the solid waste management problem and global warming. Reusing recycled waste plastics and using low energy consumption technology will help to control these problems. Technisoil G5® binder is a binder entirely made from recycled waste plastic and requires less energy for application as it can be mixed and compacted at room temperature. In order to use the G5 binder successfully, the G5 mix should show similar or superior performance to the conventional mix. In this study, the research team tested and compared the fatigue cracking resistance and rutting resistance of each mix.

## Study Methods

Researchers prepared a conventional PG 70-22 mix and G5 mix with virgin aggregates and 20% of

RAP. The team tested the mechanical properties: fatigue cracking resistance and rutting resistance and conducted the IDEAL Cracking Test according to ASTM D8225 to examine the fatigue resistance of the samples. Similarly, the team conducted the Hamburg Wheel Tracking Test, according to AASHTO T324 to determine the rutting resistance. They then compared results from the standard test methods between conventional and G5 samples to draw conclusions.

## Key Findings

- G5 binder rutting resistance is superior to conventional mix.
- G5 mix can take a higher load before failure.



- The failure behavior of the G5 sample is brittle.
- Significant decrease in the fatigue cracking resistance in the G5 mix compared to the conventional mix.
- Rutting resistance remains similar in conventional and G5 samples with or without 20% of RAP aggregates.

### Recommendations

The fatigue resistance of the G5 mix by using 5.3% of G5 binder by the weight of the total mix is inferior compared to the conventional mix. A higher percentage of mineral filler and G5 binder may improve the fatigue resistance of the mix.

The use of Technisoil G5® binder entirely made from recycled waste plastics can achieve high rutting resistance.

### About the Authors

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Pritam is currently working as a Civil Engineer in Bowman Consulting. He holds a Bachelor's Degree in Civil Engineering from Tribhuvan University, Nepal, and a Master's Degree in Civil Engineering from California State University Long Beach. His interests include pavement design, geometric design, transportation planning, and land development.



Figure 1. G5 sample during IDEAL Cracking Test.

### To Learn More

For more details about the study, download the full report at [transweb.sjsu.edu/research/2139](https://transweb.sjsu.edu/research/2139)



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