



BUILDING BETTER PAVEMENT PERFORMANCE

Enhancing the performance of hot mix asphalt, sustainably.

Since 2014, Polyco has improved the longevity of pavements across the West.

Our innovative asphalt modifier, SigmaBond, sustainably enhances the performance of hot mix — from California and Arizona to Nevada and New Mexico and beyond. SigmaBond enables the use of more upcycled materials to create customized asphalt formulations that meet all state specifications. Incorporating end-of-life tires into asphalt pavements is not only beneficial for the environment, but also for the long-term performance of roads. SigmaBond is contributing to a sustainable infrastructure in the West today to ensure a brighter future for the region tomorrow.



Getting Green in the Greenbook

Designed to meet the latest in California Greenbook specifications (Standard Specifications for Public Works Construction), Polyco's SigmaBond enables reliable, sustainable rubberized asphalt performance for **Terminal Blend PG-TR** and **MAC 15/10**.



“We need to raise the bar as an industry — SigmaBond ensures that asphalt endures and performs.”

— HOTMIX PRODUCER

**STABLE PROCESS.
CONSISTENT RESULTS.**

RAPID DIGESTION PROCESS™

SigmaBond is powered by RDP — the only process in the market that completely digests recycled tire rubber and asphalt into a homogeneous, liquefied state.

Benefits



**PREDICTABLE
PERFORMANCE**



WEATHERABILITY



**RESISTANCE TO
THERMAL CRACKING**



**ELASTIC
RECOVERY**



**HIGHER PERCENTAGE
OF TIRE RUBBER IN MIX**



**STORAGE
STABLE**



**APPLICATION-SPECIFIC
VISCOSITY**



**FASTER PRODUCTION
PROCESS**

SigmaBond Makes Inroads in California

High-traffic performance in Southern California

A busy Santa Ana roadway was repaved in 2014 using a slurry seal incorporating SigmaBond in its TRMSS emulsion. Nearly a decade later, the SigmaBond slurry seal remains intact despite heavy traffic volumes. This project improved durability and consistency of the pavement without compromising performance. SigmaBond resulted in a more sustainable pavement solution by:

- » Preventing nozzle clogs during application due to the completely digested tire rubber in the mix
- » Enabling excellent durability and longevity, with no significant repairs required by maintenance teams
- » Retaining its dark black color, providing strong contrast on lane markings compared to adjacent pavement sections





ALIGNING WITH AB 661

California's Assembly Bill 661 expands the State Agency Buy Recycled Campaign (SABRC) by adding new covered products and upping reporting and enforcement. It strengthens California's commitment to sustainable procurement, boosting post-consumer material requirements across product categories like paper, plastics, and construction materials. SigmaBond allows contractors to meet these new standards by maximizing recycled content in infrastructure projects.

Sustainable success for neighborhoods in Northern California

Multiple private communities near Sacramento and Stockton — including Rancho Murieta, Los Lagos and Brookside — recently utilized SigmaBond PG-TR binders for repaving projects. Contractors noted that SigmaBond provided comparable workability and pneumatic roller compaction to conventional binders. The half-inch dense graded overlays show no deformation to date and retain their dark black color. SigmaBond allows communities like these to optimize recycled content without sacrificing quality by:

- » Incorporating up to 20% recycled tire rubber with consistent viscosity
- » Reducing pavement fatigue and maintenance costs
- » Adhering to local specifications that meet sustainability goals
- » Achieving 3% air voids and 93% density
- » Allowing for asphalt RAP > 15%

Did you know?

More than 51 million reusable and waste tires are generated each year in California.

(Source: CalRecycle)

SigmaBond Performs Across the Country

Optimizing road construction in Arizona's most populated county

Since 2014, Maricopa County has integrated SigmaBond into multiple paving projects to enhance performance and sustainability. SigmaBond PG-TR binders provide “plug and play” functionality, with contractors praising the product’s ease of use and performance. SigmaBond enables Maricopa County to repurpose recycled tires into quality, sustainable infrastructure by:

- » Improving resistance to thermal cracking and extending pavement longevity
- » Integrating seamlessly with existing paving operations
- » Delivering performance that is equivalent to, and often exceeds, standard binders





Proven resiliency at NCAT

SigmaBond continues to defy expectations on the National Center for Asphalt Technology (NCAT) test track at Auburn University. The pavement has already completed its first fatigue cycle with no signs of failure — outperforming other standard grades. We look forward to seeing the results of the next cycle.

PG76-28SR binder blended with SigmaBond at 20%+ TR and 20% RAP resulted in no cracking after ~2 million ESALs and < 5mm of rutting.

Resiliency leads to cost savings in Nevada

An independent study by the University of Nevada, Reno found that SigmaBond significantly improves fatigue resistance. Researchers evaluated the crack resistance of tire rubber-modified asphalt mixtures, including SigmaBond. The data shows both SigmaBond samples (PG70-16TR and PG70-28TR) with 10% tire rubber significantly increased cycles to fatigue when compared to the PG70-10 conventional asphalt pavement with no tire rubber.

This performance improvement resulted in a 10% to 25% reduction in construction cost per lane-kilometer when compared to conventional asphalt pavement.

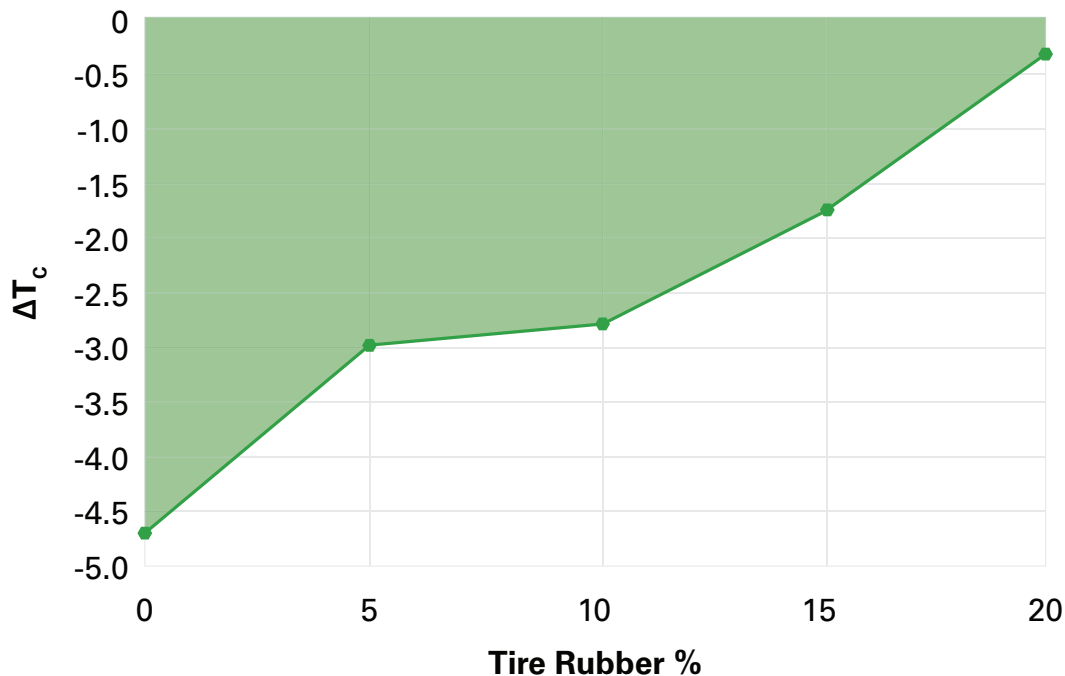
SigmaBond Stays Stronger, Longer

The proof is in the pavement.



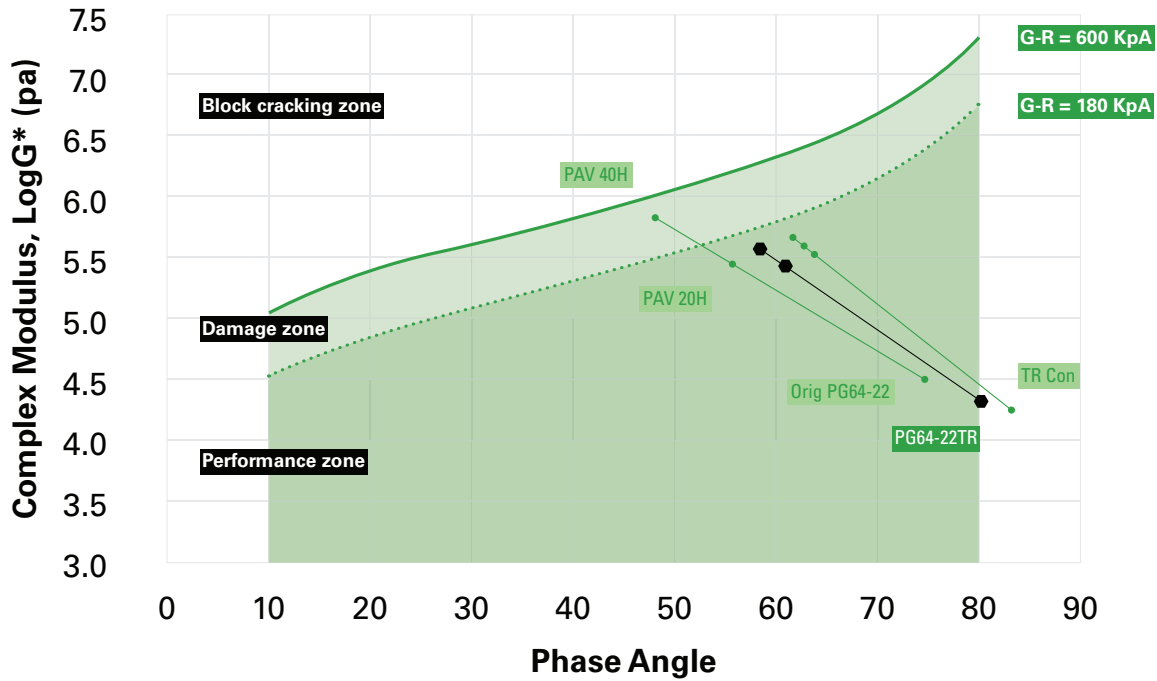
SigmaBond has been rigorously tested to ensure long-term performance. The following data are the results of binder tests run at Polyco's R&D lab. Our testing protocol used a raw, liquid SigmaBond asphalt mixture as a control, which was then blended with various asphalt streams — indicating performance improvement over time.

Resistant to Thermal Cracking



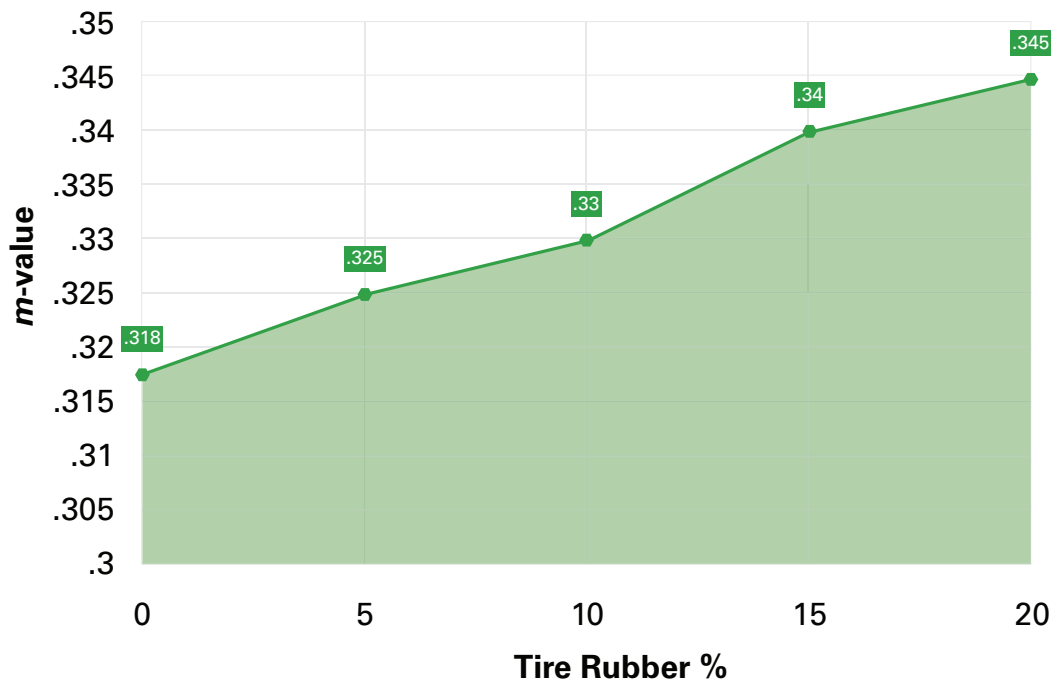
DeltaTC improves as the concentration of SigmaBond increases. Additions make no change to PG Binder grade.

Block or Fatigue Cracking | Black Space Diagram



This black space diagram highlights physical properties related to cracking as they change over aging in a pressure aging vessel. SigmaBond was aged 60 hours without approaching the damage zone — proving that, when added to a neat binder, it resists aging.

Low Temperature Improvement



As SigmaBond concentration increases tire rubber percentage, there is drastic improvement in low temperature performance. This is due to the increase in process oils released from the tire rubber.



SigmaBond Busts Asphalt Rubber Binder Myths

Who says Asphalt Rubber Hot Mix requires:

- » Problems scheduling materials
- » Poor hand workability
- » A small temperature window for compaction attainment
- » Special trucks to mix rubber with binder and potential mixed product waste
- » A finished mat that is not always waterproof
- » Mat tears under immediate traffic without sanding

With SigmaBond, YOU CAN:

- » Get dense graded ARHM
- » Reduce binder content by up to 2%
- » Get 3% air voids and 92% MTD with all PG grades
- » Achieve additional density down to 225F
- » Assist compaction with pneumatic tire rollers
- » Eliminate sanding at intersections
- » Get all PG binder grades with 10-20% tire rubber
- » Return or reuse leftover asphalt rubber binder to refinery or terminal suppliers
- » Caltrans and Greenbook specified
- » Add RAP

Benefits of SigmaBond

For the paving industry, SigmaBond translates into safety and cost savings. SigmaBond can be applied like any other binder — arriving at the plant ready to be added to any hot mix without the need for special equipment. SigmaBond's liquefied state eliminates spray nozzle clogs and mix separation associated with crumb rubber. There's no need for tank clean-out at the end of a project. By optimizing recycled content without compromising quality, SigmaBond powers faster, more sustainable paving practices.

For Contractors



- » Manages viscosity when adding RAP due to NO tire rubber settlement
- » No additional equipment needed
- » Easy workability for hot mix lay down and density attainment
- » Improves dense graded compaction
- » Only PG-TR that can be compacted with pneumatic roller
- » Eliminates binder variability in results compared to field blend method
- » Enhances the performance of trackless tack and slurry seals

For Terminal Operators



- » Reduces tank maintenance due to NO tire rubber settlement
- » Lowers required temperatures with terminal blend tire rubber
- » Stabilized low viscosity when storing and mixing
- » Can be blended with any asphalt stream to the required tire rubber concentration
- » Indefinite storage stability with no physical changes
- » Concentrated tire rubber solubility is > 97.5%

For DOTs



- » Meets all binder specifications at any tire rubber concentration
- » Successful performance in cationic and anionic emulsions or hot-applied seal coats
- » Enhances striping contrast and reduces discoloration due to carbon black from tire rubber
- » Only terminal blend PG-TR and ARHM that routinely uses more than 15% RAP
- » Only rubberized asphalt binder that improves low temperature performance with increased TR percentages



Bringing the Best to the West
Meet your state's sustainability goals
without sacrificing performance.

 **SigmaBond**



Contact us to learn more about our advanced
asphalt solutions, including SigmaBond.

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