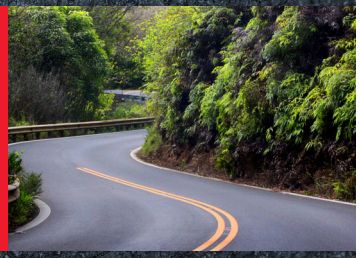

How can chemistry improve our roads?
DOW

Extreme heat. Frigid conditions. Constant abuse. Our roads take quite a pounding over the years. Traveling on vacation. Getting products to market. Or just cruising with the top down. They are a vital part of our infrastructure. What if we could add something to the asphalt to enhance road integrity, increase the life span, and improve the circular economy? ELVALOY™ RET is that "something."

ELVALOY™ enhanced PMA pavement combined with recycled plastic has diverted more than 100 metric tons of waste from landfills globally. Two roads at the Dow Innovation Center in Freeport, Texas, alone utilized 1,686 pounds of recycled polyethylene plastic, equivalent to 120,000 plastic grocery bags.



More than 20 years and too many miles to count

We've been making ELVALOY™ RET for road modification since 1991. That's a lot of roads. Chances are you've driven on one and didn't know it. So, what exactly is ELVALOY™ RET? It's a reactive elastomeric terpolymer. That's the scientific term for an impressive portfolio of resins used to help bring longevity and versatility to polymer-modified asphalt (PMA) binders. Most importantly, it helps minimize safety hazards caused by road deterioration. And let's not forget fewer coffee spills. But there's so much more than that:

Efficient processing

- Typically short mixing time for on-demand production
- Can be compacted and mixed in lower temperatures (30 degrees lower) than styrene butadiene styrene (SBS)-modified binders
- Can be easily blended into the hot binder – no high sheer mill required
- As a stable product, it can be stored for several months – eliminating any potential polymer waste
- Requires lower storage temperature and energy usage than SBS-modified binders

Sustainable

- Allows for recycled plastic to be used in paving projects
- Accommodates tire rubber or plastic for added flexibility

Meets or exceeds specifications

- Provides exceptional rutting resistance and hot/cold temperature performance
- Offers great fatigue cracking protection
- Has inherent stripping resistance
- Meets the requirements of fuel resistance to binder mixes
- Allows to cost-effectively meet empirical and performance specifications

Better value

- Lower system cost
- Requires lower capital investment than competitive alternatives
- Not susceptible to pricing swings from butadiene availability like SBS-modified binders

REACTIVITY
Permanent chemical bond with the binder

ROBUST
Innovation for a versatile & universally applicable binder

DURABILITY
Maximum life span against rutting, cracking, fatigue, & high traffic

SUSTAINABLE
Combined with recycled plastic, helps minimize plastic waste in the environment

EXTREME CLIMATES
Highly resilient to function under various temperatures

PERFORMANCE EFFICIENCY
Designed for longevity & value

Simply put: ours tests better

Low Temperature Performance Test

Thermal cracks in pavement occur when the binder can't keep up with the temperature expansion and contraction of the pavement. ELVALOY™ RET has a high resistance to changes in temperatures and has displayed the best performance in extreme temperatures among several modifiers. See figure 1.

Multiple Stress Creep Recovery Test (MSCR)

MSCR predicts the pavement's performance to rutting at different temperatures and stress levels. Binders modified with ELVALOY™ RET have displayed the greatest resistance to rut formation in even extreme temperatures. See figures 2 and 3.

Hamburg Rutting Test

Repeated heavy loads cause pavements to permanently deform over time. This creates unsafe ruts in the road. The Hamburg Rutting Test simulates the dynamic of heavy and repeating traffic loads to determine the pavement's performance after a specified number of passes. In the Hamburg Wheel-tracking Device (WTD) Test, the binder-modified with ELVALOY™ RET displayed the greatest resistance to rutting. See figures 4 and 5.

Driving collaboration

Even after more than 20 years of experience in the paving industry creating PMA, we're still finding new ways to collaborate across the value chain to create innovations that enhance paved surfaces, meet regulatory demands, and reduce costs. Our Texas Innovation Center offers customers an accelerated, hands-on way to evaluate PMA performance. We've also worked with some amazing asphalt trade groups and industry associations to stay on top of trends and move the industry forward.

What's your next road project? We'd be excited to be part of it.

Figure 1: Low Temperature Performance of Binder Modified with Different Modifiers BBR Tcr (RTFO/PAV)

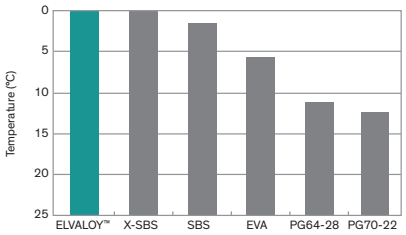


Figure 2: Multiple Stress Creep Recovery Test
Stress vs. Temperature at 3.2kPa

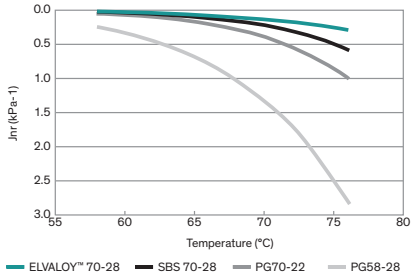


Figure 3: Multiple Stress Creep Recovery Test*
Recovery vs. Stress at 3.2kPa

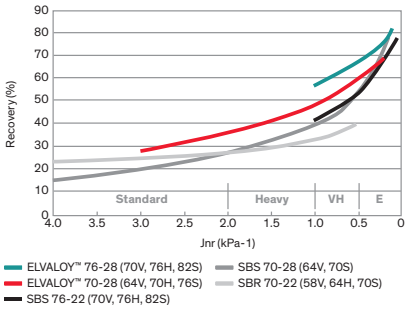


Figure 4: Hamburg Rutting Test
Hamburg WTD – (under water 58°C) diabase mix, 7% void

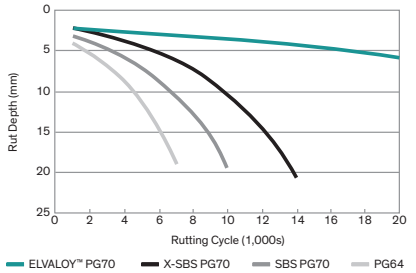


Figure 5: Hamburg Rutting Test Visual Results
Conventional Binder vs. Binder Modified with **ELVALOY™ RET**

Conventional Binder | Binder Modified with ELVALOY™ RET

Elvaloy™
copolymers for alloys by DOW

*VH: Very Heavy E: Extreme **Source: Fig. 1:** Federal Highway Administration – FHWA-RD-02/074 10/2010. **Fig. 2:** MSCR Test & Method Specification – Federal Highway Administration - John D'Angelo – 200. **Fig. 3:** MSCR Test & Method Specification – Federal Highway Administration - John D'Angelo – 2008. **Fig. 4:** Understanding the Performance of Modified Asphalt Binders in Mixtures; Evaluation of Moisture Sensitivity (NCHRP) Project 90-07.

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