

**degussa.**

*High Performance Polymers*



**VESTENAMER<sup>®</sup>**  
Reactive Modifier

*For a superior rubber/asphalt road surface at a lower cost per mile...*

Something Exciting Happens When...

# you add a little VESTENAMER®

The use of crumb rubber, or ground tire rubber (GTR), to enhance the durability and performance of asphalt concrete pavements is well recognized. The GTR/asphalt mix makes roads more flexible under traffic loads and reduces ice formation, noise level, embrittlement and cracking. It can be applied in thinner coats, and it consumes scrap tires to the advantage of the environment.

When heated, however, the GTR/asphalt mix exhibits high tackiness, which causes problems in processing and application. When processed in terminal blending tanks, the GTR tends to separate from the asphalt and to increase the tackiness of the GTR/asphalt mix. When applied on the roadbed, GTR/asphalt concrete has to be cooled to prevent it from sticking to the steel cylinders of the rolling equipment. This all takes time – costly time.

## **VESTENAMER® Polyoctenamer Solves Mixing and Paving Problems**

A small addition of VESTENAMER® pellets dramatically overcomes these problems, leading to an easier-to-process mix and superior road surface! It will give your paving job a new look, a new feel, and new life – all at lower cost per mile. Here's why...

Crumb rubber alone as a modifier functions as a non-reactive additive to asphalt. VESTENAMER®

polyoctenamer reacts chemically with both the crumb rubber and the asphalt to produce a uniform, low-tack, rubber-like composite. This chemical bond is due to the double-bond structure of the VESTENAMER® product, which permits cross-linking of the sulfur associated with the asphaltenes and maltenes in the asphalt, as well as with the sulfur at the surface of the GTR to create a macropolymer network. VESTENAMER® polyoctenamer also chemically bonds to the aggregate surface, which reduces stripping.

## **Other advantages of adding Vestenamer® Polyoctenamer include:**

- **Easier, faster and more uniform mixing**
- **Faster paving**
- **A superior surface finish**
- **Application at low road-surface temperatures**
- **Reduced cracking and rutting**
- **Longer service life**
- **Elimination of terminal blending**
- **Lower cost per mile**
- **Thermally stable to 520°F**
- **Melting point 129°F**

## What is **VESTENAMER® Polyoctenamer?**

**VESTENAMER® trans-polyoctenamer rubber (TOR)** is a mixture of linear and macrocyclic polymers that exhibit four special structural features when added to rubberized asphalt concrete:

1. **Low initial viscosity during the initial mixing operation**
2. **Increased viscosity after polymerization to prevent drain down**
3. **Chemical bonding of the GTR to the asphalt**
4. **Chemical bonding of the final rubberized asphalt to the aggregate to reduce stripping**
5. **Conversion of the thermoplastic asphalt to a thermoset polymer, which reduces cracking and rutting**

# Reactive Modifier to Crumb Rubber/Asphalt!

## “Road Test” Proves Effectiveness of VESTENAMER® Mix

Gary Shaw, Director of Highway Engineering for Grey County, Ontario, Canada, put the VESTENAMER® product to the test in September 1998 on a 1,000 meter stretch of road near the Talisman Ski and Golf Resort.

The project consumed more than 590 tons of asphalt, but only 712 pounds of VESTENAMER® polyoctenamer or 0.06% of the total.

The benefits of VESTENAMER® rubber were obvious to the road crew immediately. No waiting to roll the mix after it was applied to the roadbed. No problem with the mix sticking to the cylinder of the rolling equipment. And no waiting before smoothing the surface with the rubber rollers.

The result: the crew completed the job three hours ahead of schedule, and traffic was moving on the new road in only one hour.

After five winters, the road has shown no cracks or rutting. Over the past several years, additional trials have run under a broad range of climatic conditions in Canada, Arizona, Nebraska, New Jersey, Ohio, and Pennsylvania. These trials have all produced similar positive results.



Rolling was begun immediately after laying the mix – with no adhesion to the rollers

## The Patented Mixing Process

The VESTENAMER® polymer and the crumb rubber are first added in a dry particulate form to the hot aggregate through the RAP door or collar in the pug mill or continuous drum mixer at about 340 Degrees F and then the hot (320°F) asphalt is added to the mixture.



Rt. 7 Owen Sound, Ontario, paved with TOR plus GTR, no cracks after 4 1/2 years.



Process uses simple augers.



Close-up of the paving product illustrates its uniformity and dark color.

## COST CALCULATION for 1 Mile, Dual Lanes, 22-foot Wide

### Case #1 A 3-inch standard PG 76-28 modified asphalt overlay

Material	Quantity	Cost
Aggregate	2,178 tons	\$12,306
76,-28 Asphalt	131tons	\$38,551
Total	2,309 tons	\$50,857

### Case #2 A 3-inch 10% GTR + VESTENAMER modified (PG76,-28) asphalt overlay

Material	Quantity	Cost
Aggregate	2,178 tons	\$12,306
64,-28 Asphalt	131tons	\$24,235
10% GTR (14-)	13 tons	\$4,680
VESTENAMER 8012	0.6 ton	\$2,400
Total	2,322.6 tons	\$43,621

## Other Successful Projects Using VESTENAMER® Polyoctenamer



5202 St, Lincoln, Nebraska. Left side, paved with standard mix depicts stripping of asphalt. Right side, with TOR plus GTR with no stripping after 1 1/2 years.



Rt. 12, Owen Sound, Ontario, paved with TOR plus GTR shows no cracks after 2 1/2 years.

# More Successful Projects



Degussa Headquarters parking lot, Parsippany, New Jersey. Left side, standard asphalt. Right side, TOR plus GTR after 2 years.



Phoenix, Arizona. On left paving with TOR plus GTR.



Lincoln, Nebraska parking lot paved with 100% RAP.



Flagstaff, Arizona, paved with TOR plus GTR after 2 years.



Maricopa County, Arizona. Left side, chip seal. Right side, TOR plus GTR.



Phoenix, Arizona. Left side, TOR plus GTR after 2 years. Right side, SBS plus GTR shows asphalt stripping off the stone.

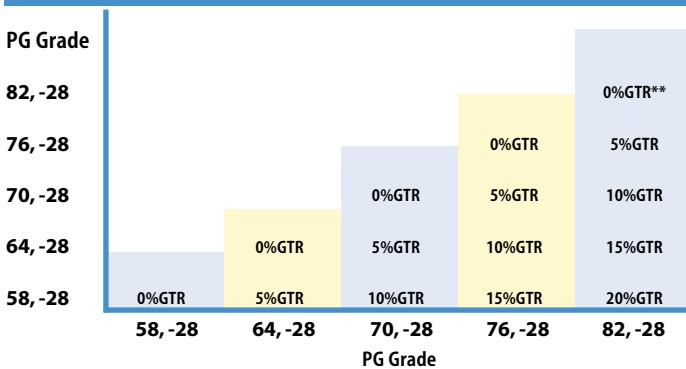


Rt 238, Maricopa County, black area shows TOR plus GTR dry process

## Test Methods for Determining the Effect of GTR + VESTENAMER® 8012 Product on a Base Asphalt

The following Test Grid is what we recommend to determine the PG ratings obtained by combinations of 14 mesh GTR plus VESTENAMER® 8012 product when mixed together with a base asphalt. This eliminates the need for multiple asphalt storage tanks.

### TEST GRID FOR EVALUATING 14 MESH GROUND TIRE RUBBER (GTR) + X \* % VESTENAMER 8012 PRODUCT †



\*based on the weight of the GTR

\*\*The % GTR is based, in each case, on the weight of the asphalt cement/binder/oil

† 30 mesh provides a two level increase in PG grade for every 5% TOR plus GTR

## An excerpt from the Evaluation of VESTENAMER® reactive modifier in crumb rubber asphalt from the Northeast Center of Excellence for Pavement Technology

### Pennsylvania Transportation Institute (NECEPT)

The VESTENAMER® significantly influenced the properties of the asphalt cement at the upper pavement temperatures. Two increases in binder grade were observed for some of the blends, a very desirable result. The VESTENAMER® did not adversely affect the low temperature properties, instead a slight improvement was observed in some of the blends/properties. Thus, it can be clearly concluded that the main role of the VESTENAMER® is to enhance pavement performance at the upper range of service temperatures where rutting is the more dominant distress mode. Surprisingly, the GTR + VESTENAMER® modified binder showed decreased aging when compared to the control (PAV residue) such that the ranking with respect to stiffness was actually reversed after PAV aging.

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### For more information on the paving and saving power of VESTENAMER® Polyoctenamer call, fax or e-mail:

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