VESTENAMER®

INNOVATION FOR ELASTOMER-MODIFIED ASPHALTS









Inland waterways
Rail shipping
Truck shipping

VESTENAMER[®] – New options for modifying asphalt

Modified asphalt: opportunities and challenges

Road transportation is increasing all over the world, with the number of vehicles per 1000 residents having more than doubled in the EU since 1975. Long-distance trucking has experienced significant growth as well. More and more trucks are on our roads with increasingly large axle loads, posing new challenges for pavement.

Road quality and stability are becoming increasingly important concerns for public policy makers. The clearly emerging need for high-performance road construction materials to prevent ruts and cracks—and thus reduce maintenance costs—is looming larger in the public consciousness. Accompanying this trend is the growing importance of using existing resources efficiently.

Evonik has patented a process that could help resolve these issues while improving road conditions: the method involves blending VESTENAMER®, a polyoctenamer, with ground tire rubber (GTR) from recycled tires and adding this mixture to the bitumen and asphalts used in pavement.

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Evonik, the creative industrial group from Germany, is one of the world leaders in specialty chemicals. Active in over 100 countries around the world, the Evonik Group focuses its activities on key megatrends: health and nutrition, resource <u>efficiency</u>, and globalization. The High Performance Polymers Business Line manufactures customized products, systems, and semifinished products based on high-performance polymers. For over 50 years, our polymers have stood the test of time in a variety of applications

Evonik. Power to Create.

VESTENAMER[®] 8012

Adding just a small amount produces surprising changes



VESTENAMER[®] granulate in ground tire rubber

Processability and process safety for rubber powders with VESTENAMER®

Rubber powder is non-reactive when added to asphalt by itself. VESTENAMER[®] polyoctenamer, however, allows rubber powder and bitumen to interact, resulting in a uniform composite material.

This means that VESTENAMER[®] makes the material significantly easier to handle and process—and that improves process safety.



50/70 + rubber

50/70 + rubber + VESTENAMER®

The benefit to you

- Reduced stickiness of Hot Mix Asphalt
- Improved pumpability of modified bitumen
- · Easier compactability of asphalt blend
- Improved processability of Hot Mix Asphalt at lower temperatures simplifies manual installation and increases the time frame for processing
- Improved hot storage behavior of modified bitumen
- No limitations on the use of binders from a variety of sources

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The addition of VESTENAMER[®] and rubber powder improves bitumen and asphalt properties

A VESTENAMER[®]/rubber powder blend in asphalt makes roads more resistant to stress from heavy truck traffic and the elements.

The benefit to you

- An asphalt blend offering excellent rutting resistance without sacrificing highly favorable low-temperature properties
- A resulting binder mixture that is both highly rigid yet elastic within the operating range
- A low rigidity of the resulting binder mixture at low temperatures





Crushed aggregate base course plus a frost protection layer depending on local frost conditions

More benefits

Replacing bitumen with VESTENAMER®/rubber powder is also cost competitive. Compared to established modifiers, such as those based on highly volatile butadiene, VESTENAMER®/GTR can be expected to reduce the cost of construction materials.

The combination of VESTENAMER*/GTR can be applied using either the wet or dry process. This means that, even in relatively small construction projects, builders can produce outstanding asphalt blends that can be modified with available road bitumen by adding VESTENAMER*/GTR in an asphalt mixing plants.

General

The creation of the E GmBA* provides a set of guidelines that customers can turn to when using VESTENAMER*/GTR.

VESTENAMER[®]/GTR can be used in all common types of asphalt construction, and is particularly recommended for projects involving relatively large amounts of binders such as SMA or OPA, or for structures subjected to exceptional stress (requiring greater adhesive strength or fairly high deformation resistance).

Protecting the environment and resources by recycling rubber powder

Using VESTENAMER[®] allows builders to stay at or below the maximum mixing temperature recommended for the wet process in the E GmBA* (170°C). Thanks to its very low melting point of 54°C, the reactive components of VESTENAMER[®] are quickly available in soluble form, and highly volatile components tend to remain in the bitumen. It follows that VESTENAMER[®] has a positive impact on emission levels resulting from bitumen and asphalt production.

The German Environment Agency has confirmed that recycling and reuse of old tires is superior to using them as an energy source. The rubber powder used in bitumen and asphalt in conjunction with VESTENAMER[®] undergoes a complex treatment process to become a fully functional construction material. At the same time, processing this rubber powder is in line with legislation governing closed-loop recycling management and with the Circular Economy concept put forward by the European Commission.

Field and laboratory tests have shown that recycling asphalt modified with VESTENAMER[®] and rubber powder poses no technical nor ecological concerns.

When modifying asphalt, replacing some of the bitumen with VESTENAMER*/rubber powder conserves natural resources.

* Recommendations for rubber-modified bitumen and asphalts (E GmBA), Road and Transportation Research Association (Forschungsgesellschaft für Straßen- und Verkehrswesen), 2012 issue EVONIK RESOURCE EFFICIENCY GMBH High Performance Polymers 45764 Marl, Germany

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