Recycled RUBBER Products
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Asphalt Rubber Blending Process

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Director of Operations
• What is Asphalt Rubber
• Types of blending equipment
• Ancillary equipment needed
• Transportation and set-up of equipment
• Hot Plant plumbing and electrical/electronic connections
• Special requirements related to pumping, metering and storage of high viscous binders
• Sampling and field testing of asphalt rubber binders
What is Asphalt Rubber?

It is a high performance modified asphalt binder that contains ground tire rubber produced from waste car & truck tires.

American Society for Testing Materials - ASTM

Asphalt Rubber — a blend of asphalt cement, reclaimed tire rubber and certain additives in which the rubber component is at least 15% by weight of the total blend and has reacted in the hot asphalt cement sufficiently to cause swelling of the rubber particles.

Typically, most asphalt rubber binders will contain 17% - 20% crumb rubber

The Wet Process.........
Asphalt Rubber

Minimum 15% Crumb Rubber

Asphalt Rubber Binder
18% Crumb Rubber Content

Neat, Virgin Bitumen,
Polymer Modified,
Terminal Blend
Advantages of High Viscous Asphalt Rubber Binder

Significantly higher binder content without drain down

- Thicker film thickness on aggregate:
- Reduced oxidation
- Increased durability
- Increased resistance to reflective cracking

<table>
<thead>
<tr>
<th>Dense Graded 4.6%</th>
<th>HMA</th>
<th>9 Micron</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gap Graded 7.4%</td>
<td>Asphalt Rubber</td>
<td>18 Micron</td>
</tr>
<tr>
<td>Open Graded 9.2%</td>
<td>Asphalt Rubber</td>
<td>36 Micron</td>
</tr>
</tbody>
</table>
Asphalt Rubber Hot Mix
Why Use Asphalt Rubber

Good For The Environment! 
*Eliminates Waste Tires*

Safe!! 
*Better Skid Resistance*

Durable!!! 
*Longer Lasting*
Asphalt Rubber Binder - Field Blending

Wet Process Overview

Whole car & truck tires are recycled

Tires processed into a metal and fiber free crumb rubber

Crumb rubber is blended with bitumen and used to produce asphalt rubber hot mix

2,000 waste tires used per lane mile in a 2 inch overlay

Asphalt rubber is used in a typical paving procedure
Portable Asphalt Rubber Blending Unit

- Reaction Tank
- Rubber Hopper
- Hot Oil Heater
- Control Cabinet
- Heat Exchanger
- High Speed / High Shear Mixer
- Blending Unit Setup At Typical Hot Plant Site
- Drum Plant
- Batch Plant
Large Production Mobile Asphalt Rubber Blending Plant at Hot Plant Site
As the blending process proceeds, A/R binder is transferred to the reaction tank where it is heated and maintained at the specified temperature (325 - 375°F), agitated & circulated for the specified reaction time.
Handling High Viscous Asphalt Rubber Binder

- Specialized heat jacketed pumps
- High speed / high shear mixer unit with watered cooled bearings
- Heat exchanger to raise the temperature of the incoming bitumen before adding the crumb rubber
Hot Plant Connections

Binder Supply Line Connects Directly To Hot Mix Plant, Completely Bypassing Their Tank and Pump

Mass Flow (Coriolis) Meter

Single Hose Connection For Drum Plant
Two Hose Connection For Batch Plant
Crumb Rubber Handling

Crumb Rubber is delivered to the site in one ton Super Sacks (approx. 1,000 Kilos each).

Typically 14 – 20 Mesh Gradation Depending on Binder Design

22 – 24 Bags Per Truck Load

Bags are loaded into the blending unit with forklift.

Bag Buster / Cutter
Asphalt Rubber Binder - Field Testing

- Rion viscometer or equivalent
- Viscometer must be calibrated
- Viscosity range 1500 - 4000 cP @ 177° C
- Target viscosity for hot mix binder is about 2000 - 3000 cP
- Viscosity is a very good indicator of other binder properties

After Reaction Time Is Complete (15, 30, 45, 60 Minutes), A Sample Is Taken And Checked For Viscosity

1,500 – 4,000 cP (Centipoise) @ 177° C
## Asphalt Rubber - Binder Testing

<table>
<thead>
<tr>
<th>Test Performed</th>
<th>Specified Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity, Haake at 177°C, Pa-s</td>
<td>1.5 – 4.0</td>
</tr>
<tr>
<td>Resilience at 25°C, % Rebound (ASTM D5329)</td>
<td>25 Minimum</td>
</tr>
<tr>
<td>Ring &amp; Ball Softening Point, °C (ASTM D36)</td>
<td>55 Minimum</td>
</tr>
<tr>
<td>Needle Penetration at 4°C, 200 g, 60 sec., 1/10 mm (ASTM D5)</td>
<td>10 Minimum</td>
</tr>
</tbody>
</table>
Phoenix Industries

Sweden

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Brazil

Poland

Next!!!

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Vietnam...

Mexico

Puerto Rico

Russia
Questions?

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