PHOENIX INDUSTRIES

Asphalt Rubber Blending Process

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- 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

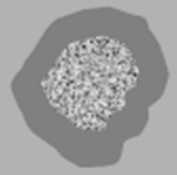
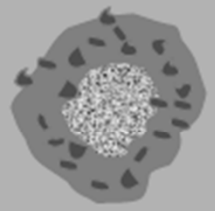
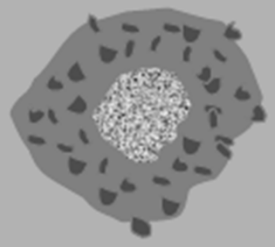
Asphalt Rubber Binder
18% Crumb Rubber Content

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

Dense Graded 4.6% **HMA** **9 Micron**	
Gap Graded 7.4% **Asphalt Rubber** **18 Micron**	
Open Graded 9.2% **Asphalt Rubber** **36 Micron**	

Asphalt Rubber Hot Mix

Why Use Asphalt Rubber

Good For The Environment!

Eliminates Waste Tires

Safe!!

Better Skid Resistance

Durable!!!

Longer Lasting

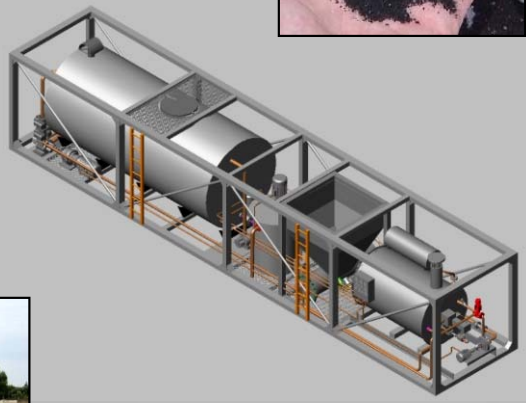
Asphalt Rubber Binder - Field Blending

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



Asphalt rubber is used in a typical paving procedure

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

Portable Asphalt Rubber Blending Unit

Reaction Tank

Rubber Hopper

Hot Oil Heater

Control Cabinet

Heat Exchanger

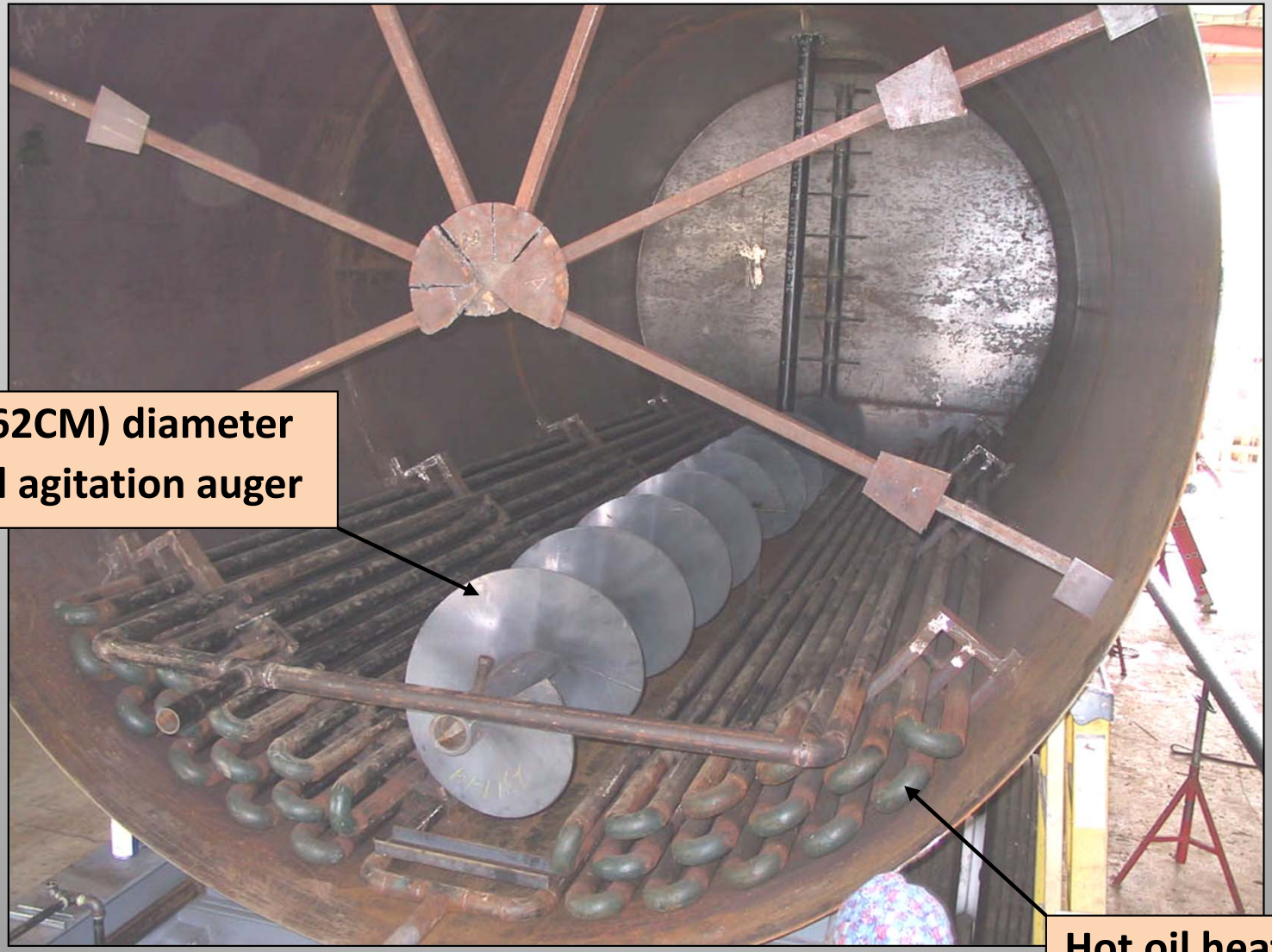
High Speed / High Shear Mixer

Drum Plant

Blending Unit Setup At Typical Hot Plant Site

Batch Plant

Large Production Mobile Asphalt Rubber Blending Plant at Hot Plant Site

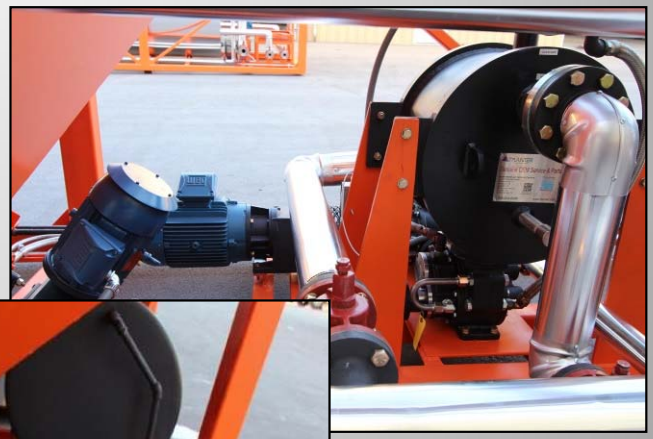


Inside View of Reaction Tank

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



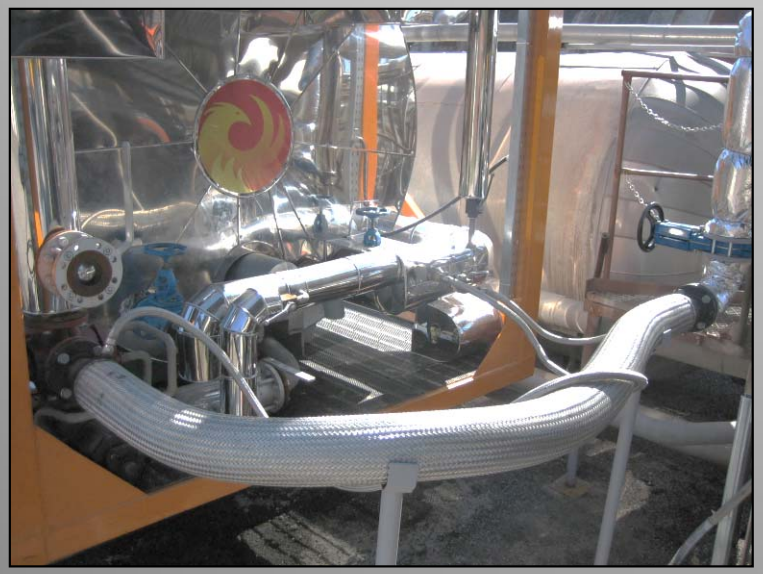
High speed / high shear mixer unit with watered cooled bearings

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

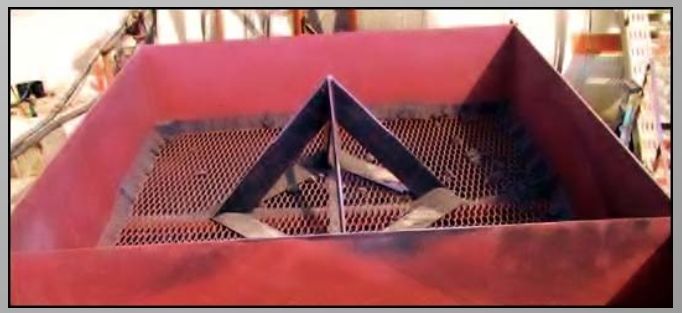
Crumb Rubber Handling

22 – 24 Bags Per Truck Load

Crumb Rubber Is Delivered To Site In One Ton *Super Sacks* (approx. 1,000 Kilos each)

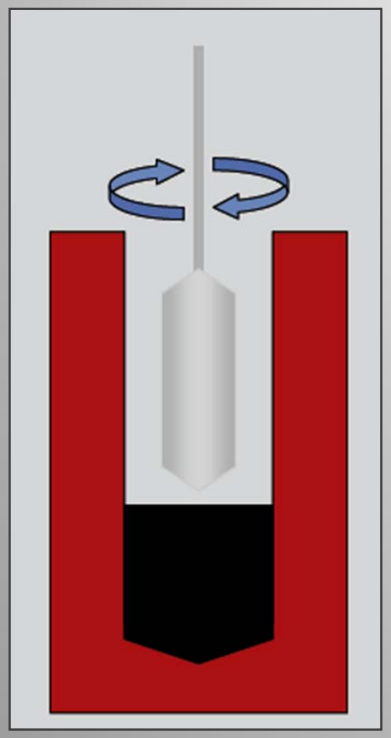
Typically 14 – 20 Mesh Gradation Depending On Binder Design

Bags Are Loaded Into Blending Unit With Forklift



Bag Buster / Cutter

Asphalt Rubber Binder - Field Testing



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

- 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

1,500 – 4,000 cP (Centipoise) @ 177° C

Asphalt Rubber - Binder Testing

Test Performed	Specified Limits
Viscosity, Haake at 177°C, Pa-s	1.5 – 4.0
Resilience at 25°C, % Rebound (ASTM D5329)	25 Minimum
Ring & Ball Softening Point, °C (ASTM D36)	55 Minimum
Needle Penetration at 4°C, 200 g, 60 sec., 1/10 mm (ASTM D5)	10 Minimum

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