

Draft

# TERMINAL BLEND ASPHALT RUBBER CHIP SEAL (PG70-22TR)



TECHNICAL REPORT

A COST EFFECTIVE ALTERNATIVE FOR HOT  
APPLIED CHIP SEAL SYSTEMS

Prepared by:



**PARAMOUNT  
ASPHALT**

a subsidiary of **ALON**USA

# Terminal Blend Asphalt Rubber Chip Seal (PG70-22TR)

## A COST EFFECTIVE ALTERNATIVE FOR HOT APPLIED CHIP SEAL SYSTEMS

### THE PROCESS

After the success of the PG70-22TR test section placed in October 2006, the City of Santa Cruz, CA placed one of the biggest chip seal project during the week of September 10<sup>th</sup> & 17<sup>th</sup>, 2007. Initial estimate was around 960 liquid Ton using other process but when it was changed to a terminal blend, only 580 liquid Tons of PG70-22TR was needed to cover the same area. The PG70-22TR is a terminal blend asphalt rubber binder that is fully PG graded and needs no special equipment such as an on site blending unit for the job. The TR binder is handled like any other hot asphalt binder, and the manufactured material shows no visual signs of the digested tire rubber residue.

On Sept 10 2007, the truck of PG70-22TR showed up on the job at a temperature of 310-330°F from Bakersfield terminal. The product is also available at many of Paramount locations. The asphalt distributor truck was used to heat up the binder to 325°F if needed. The PG70-22TR chip seal was placed on many of the Santa Cruz streets such as Bay St & Escalona. The aggregate used was 3/8 x #4 and pre-coated with 0.25-0.5% of PG64-10. The PG70-22TR application started at 8:00 am, the ambient air temperature was about 62°F and high humidity. The application rate of the asphalt binder was 0.32 – 0.35 gal/sy and the aggregate spread rate was 23 lb/sy – 24 lb/sy. The project went so smooth that local residents sent letters to Graham Construction complimenting on a job well done.

The sequence of the application was the usual hot asphalt chipping scenario, spraying the oil closely followed by the chip spreader and then immediately followed by the rubber tire rollers. The crew

waited 20 minutes before sweeping. The TR performed exceptionally with minimal rock loss and no reported vehicle claims.

The following week the whole project was sealed with Type II slurry seal, which is standard practice by the City of Santa Cruz. Time from application to release to traffic was roughly one day.

The PG70-22 TR was supplied by Paramount Petroleum; the pre-coated aggregate source was Granite Rock., The construction crew was from Graham Construction, Inc. Standard spreading equipment was used as the means to apply the Terminal Blend Asphalt Rubber and visible VOC's were minimal. The Slurry was done by Graham Construction, Inc.

**Equipment used:**

- Chip Spreader – 6ft wide
- Asphalt Distributors—BearCat 501/CRC Super Spreader (Standard Equipment)
- Three 9 wheel pneumatic rubber roller
- Sweepers

The benefits of PG70-22TR includes:

- improved driving comfort,
- protection from oxidation,
- prolonged pavement lifespan,
- fast application with quick return to traffic,
- Cost effectiveness and extended treatment service life.
- No need to raise manhole
- 80-90% retention after sweeping
- Applied in high moisture environment

The October 13, 2006 section was evaluated on September 12, 2007 that after a year of construction. The section showed no sign of distresses and still performing well.

This product can and is being used as a viable surface treatment for agencies in California, Arizona and Texas. As can be seen from the pictures and a site visit, the Hot Asphalt products filled voids and cracks exceptionally well to bring the road surface to a more uniform appearance while rejuvenating the structural and surface capabilities of the pavement.

The material could be used in a very creative ways and with other product as interlayer treatments. Two small sections on the same project were used successfully as interlayer over a Petromat section with crack filling and the other one with no crack filling.

In conclusion the PG70-22TR is a cost effective alternative to similar products and meets or exceeds the performance characteristics for other hot applied chip seals. The Terminal Blend Binder (TR) is a proven product that can and should be in the forefront of agency's minds as a viable way to improve their road system for taxpayers, doing so in a cost effective manner and offering the added benefit of grants in aid from the State Waste Resources Department.

## Process of applying Chip Seal using Terminal blend Product



Fig. 1: spraying the asphalt binder



Fig. 2: followed by the chipper



Fig. 3: laying the chip



Fig. 4: followed immediately by the rollers



Fig. 5: 20 minute delay before sweeping



Fig. 6: product after sweeping

## Distresses of the Pavement before Chip Seal



# After Chip Seal

*(Before applying the Slurry)*



## QS1h for Slurry – Section 93 (Caltrans)

Properties	Min.	Max.
<b>Test on Emulsions:</b>		
Viscosity, SSF @50°C, sec	15	90
Sieve Test, %	-	0.30
Storage Stability, 1 day, %	-	1
Residue by Distillation, %	57	-
<b>Tests on Residue from Distillation Test:</b>		
Penetration, 25°C	40	90
Ductility, 25°C, mm	400	-
Solubility in Trichloroethylene, %	97	-

## Type II Slurry Specification – Section 37 (Caltrans)

### Screening Grading Requirements

Sieve Size	Percentage Passing
3/8"	100
No. 4	94-100
No. 8	65-90
No. 16	40-70
No. 30	25-50
No. 200	5-15

### Screening Quality Requirements

Test Parameters	California Test	Requirements
Sand Equivalent	217	55 Min.
Durability Index	229	55 Min.

# **CERTIFICATE OF ANALYSIS for PG70-22TR**

**Product:** PG70-22TR  
**Code No.:** 13717  
**Date:** Sepetember 14-2007  
**Tank:** PMA-4  
**ID No** PG70-22TR-001

**Purchaser:** -  
**Destination:** -  
**Transporter:** -  
**Truck No.:** -  
**Bill of Lading:** -  
**Contract No.:** -  
**Purchase Order No.:** -

TESTS	ASTM No	AASHTO No	SPECIFICATION	RESULTS
Recycled Tire Rubber, Wt.%			5.0 min	5.5
Viscosity, 60°C(140°F), Poise	D2171	T202	1500 min	15916
Viscosity, 135°C(275°F), cSt	D2170	T201	2000 max	950
Penetration, 25°C(77°F), 100g, 5s	D5	T49	55-90	65
Softening Point, °F	D36	T53	140 min	143
Elastic Recovery, 25°C, %	D6084	T301	55 min	65
Dynamic Shear, G*/Sinδ, 70°C, kPa	D7175	T315	1.00 min	1.11
Flash Point, C.O.C., °C	D92	T48	230 min	302
Solubility in Trichloroethylene, %	D2042	T44	98 min	98.9
API Gravity, 60 F	D70	T228	--	7.0
Specific Gravity, 60/60 F	D70	T228	--	1.022
<b>Residue from R.T.F.O. Test:</b>	D2872	T240		
Dynamic Shear, G*/Sinδ, 70°C, kPa	D7175	T315	2.20 min	2.40
Loss on Heating, %	D2872	T240	1.00 max	-0.517
<b>Residue from PAV Conditioning @ 110°C:</b>	D6521	R28		
Dynamic Shear, G*·Sinδ, 28°C, kPa	D7175	T315	5000 max	3667
BBR Creep Stiffness, -12°C, Mpa	D6648	T313	300 max	209
BBR m-value, -12°C	D6648	T313	0.300 min	0.302

**Released By:**

**Data Compiled By:** \_\_\_\_\_  
*Asphalt Chemist*

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*Refinery Shift Supervisor*

**Oct 13, 2006 section**  
**Evaluation on Sept 12, 2007**



# Aggregates Specification

## Screening Grading Requirements

<b>3/8" Maximum</b>	
Sieve Size	Percentage Passing
1/2"	100
3/8"	70-85
No. 4	0-15
No. 8	0-5
No. 200	0-1

## Screening Quality Requirements

Test Parameters	California Test	Requirements
Los Angeles Rattler (100 Revolutions)	211	10 Max.
Los Angeles Rattler (500 Revolutions)	211	40 Max.
Film Stripping	302	25 Max.
Cleanness Value	227	80 Min.
Durability	229	52 Min.