

# TUFFTREK 4002

## Renewable Oil Technology

Renewable oil technology from Georgia-Pacific Chemicals can meet the needs for asphalt modification responsibly and economically.

TUFFTREK 4002 technology includes the ability to:

- Achieve multiple grades with single grade of asphalt.
- Adjust stored/aged asphalt to desired spec.
- Achieve PG improvement with less modifier.
- Achieve higher performance with lower-cost asphalt.
- Limit effects on mass loss.
- Add in-line for ease of incorporation.
- Attain low PG asphalts for some blend stocks.
- Improve compatibility of SBS polymer in PMAC.

### Advantage: TUFFTREK 4002

	TUFFTREK 4002	Aromatic Oil	Base Oil
PG Grade Reduction	<b>Low dosage required to reduce PG</b>	Nearly 3x additional modifier required to achieve same low PG reduction	Nearly 15% additional modifier required to achieve same low PG reduction
40 hr PAV $\Delta T_c$	<b>Greatest impact on <math>\Delta T_c</math>. Improvement maintained at high dosage level.</b>	Moderate impact on $\Delta T_c$	Low impact on $\Delta T_c$ at low dosage. Detrimental to $\Delta T_c$ at high dosage
HSE	<b>Biobased, renewable. Not hazardous to health or the environment.</b>	Non-renewable	Non-renewable

**866-4GP-CHEM**  
www.gp-chemicals.com

# TUFFTREK 4002 Renewable Oil Technology

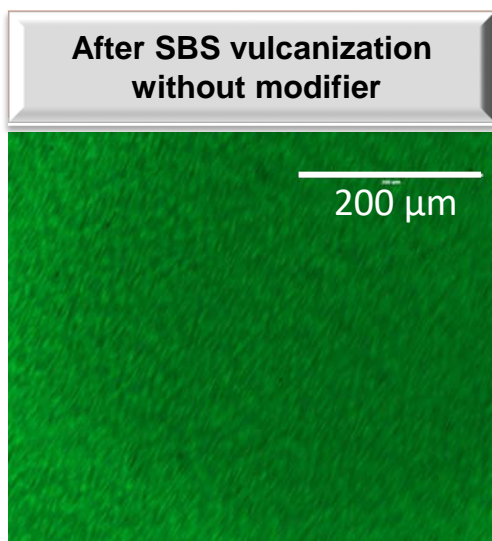
Comparing TUFFTREK 4002 Technology to petrochemical modifiers...

## Modification of Base Asphalt PG 64-22 Results

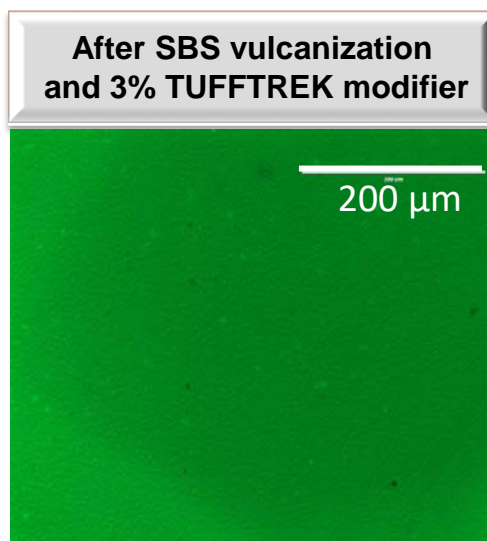
Modifier	Base Asphalt*	TUFFTREK 4002		Aromatic Oil		Base Oil	
		3	6	3	6	3	6
Dosage Rate, %	0	3	6	3	6	3	6
Mass Change, %	-0.347	-0.369	-0.444	-0.393	-0.468	-0.419	-0.560
Δ in high PG per 1% added modifier		-1.9	-1.9	-1.1	-1.0	-1.6	-1.5
Δ in intermediate PG Stiffness per 1% added modifier		-2.0	-1.8	-0.8	-0.7	-1.3	-1.3
Δ in low PG Stiffness per 1% added modifier		-1.6	-1.7	-0.5	-0.6	-1.3	-1.5
Δ in low PG m-value per 1% added modifier		-1.8	-1.9	-0.6	-0.7	-1.4	-1.2
20 hr PAV ΔTc (S-m)	1.3	2.2	3.1	1.6	2.3	1.4	-0.3
40 hr PAV ΔTc (S-m)	-1.6	0.0	0.0	-0.7	-0.5	-1.3	-2.7

\*High quality asphalt sourced from MN. TUFFTREK 4002 benefits may be magnified with lower quality base asphalt.

## More Complete SBS dispersion with TUFFTREK Technology



G\* Storage Stability @58°C  
3.92% Difference (Top & Bottom)



G\* Storage Stability @58°C  
0.90% Difference (Top & Bottom)

Viewed under Fluorescence Microscope

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