

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.
- Utilize a high flash point and low toxicity modifier.
- Improve compatibility of SBS polymer in PMAC.

Advantage: TUFFTREK 4002

	TUFFTREK 4002	Aromatic Oil	Base Oil
PG Grade Reduction	Low dosage required to reduce PG	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 ΔT_c	Greatest impact on ΔT_c. Improvement maintained at high dosage level.	Moderate impact on ΔT_c	Low impact on ΔT_c at low dosage. Detrimental to ΔT_c at high dosage
HSE	Biobased, renewable. Not hazardous to health or the environment.	Non-renewable	Non-renewable

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

TUFFTREK 4002 Renewable Oil Technology

Comparing TUFFTREK 4002 Technology to petrochemical modifiers...

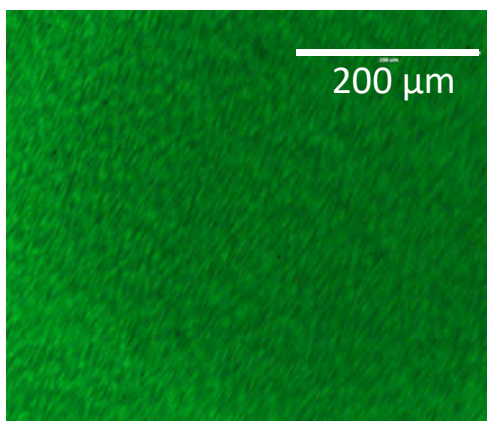
Modification of Base Asphalt PG 64-22 Results (2018 Study Results)

Modifier	Base Asphalt*	TUFFTREK 4002		Aromatic Oil		Base Oil	
		3	6	3	6	3	6
% Added	0	3	6	3	6	3	6
Mass Change, %	-0.35	-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 per 1% added modifier		2.0	1.8	0.8	0.7	1.3	1.3
Δ in low PG per 1% added modifier		1.6	1.7	0.5	0.5	1.3	1.4
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.

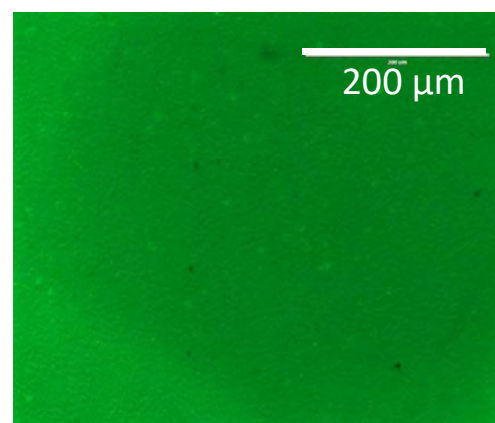
More Complete SBS dispersion with TUFFTREK Technology

After SBS vulcanization
without modifier



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

After SBS Vulcanization
and 3% TUFFTREK modifier



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

Viewed under Fluorescence Microscope

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