

Hydrocarbon Resins For Tire Tread Compounds

A Well-balanced Solution for Better Tire Performance



Introduction

Neville Chemical Company has been providing hydrocarbon resin in tire industry since 1950. Our resin technology can produce materials using thermal or catalytic polymerization with both technologies have advantages in tailoring products to customer requirements specifically suited to the performance needs of the tire industry. Structure/property relationships have shown that high Tg resins with low molecular weights and good compatibility provide optimum performance in tread compounds. Neville thermal resins are designed to have lower molecular weights than the corresponding pure monomer resins and their structure can be optimized for the performance. NEVEX 100 is a special catalytic aromatic resin, and LX-3100 is a thermal aromatic resin. The performance study below focuses on SSBR/BR system for passenger tire.

Resin Properties *

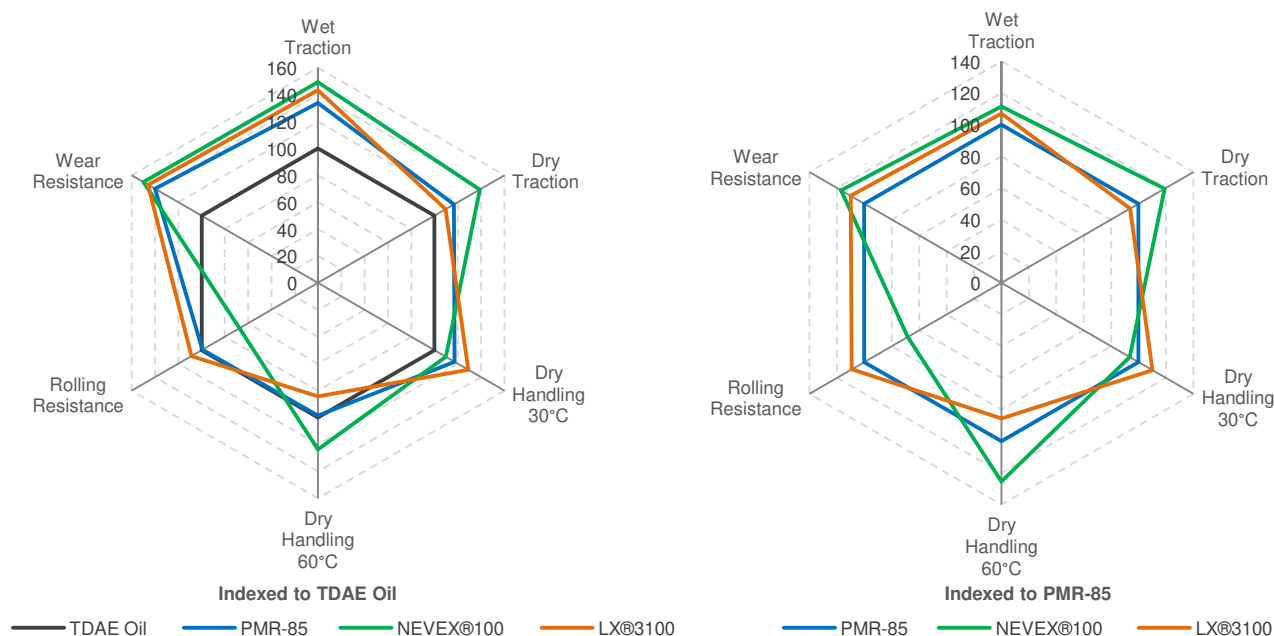
Resin	Type	Softening Point, °C	Tg, °C	Mn, g/mol	Mw, g/mol
NEVEX@100	Catalytic	98	45	550	1000
LX@3100	Thermal	108	54	370	900
TDAE Oil	N/A	N/A	-54	440	540
PMR-85 *	Catalytic	85	40	600	1100

* PMR-85: Resin manufactured from pure aromatic monomers.

* All the data here are the typical values of the resins.

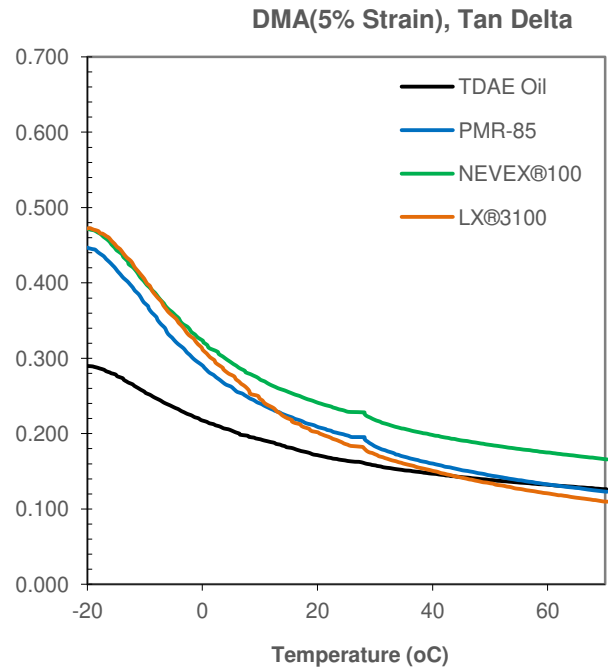
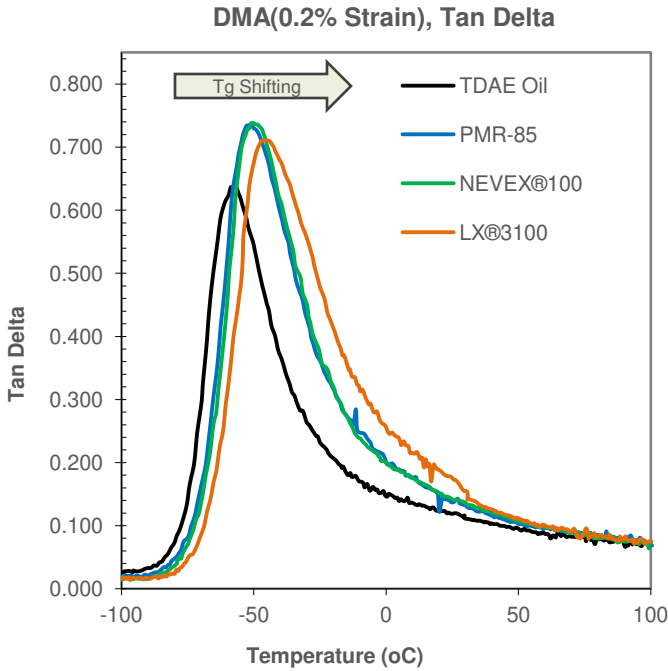
Summary- Passenger Tread Compound SSBR/BR

- ❖ A balance of high wet traction, low rolling resistance and good abrasion resistance can be achieved with NEVEX@100 and LX@3100 due to their improved compatibility with an SSBR/BR system.

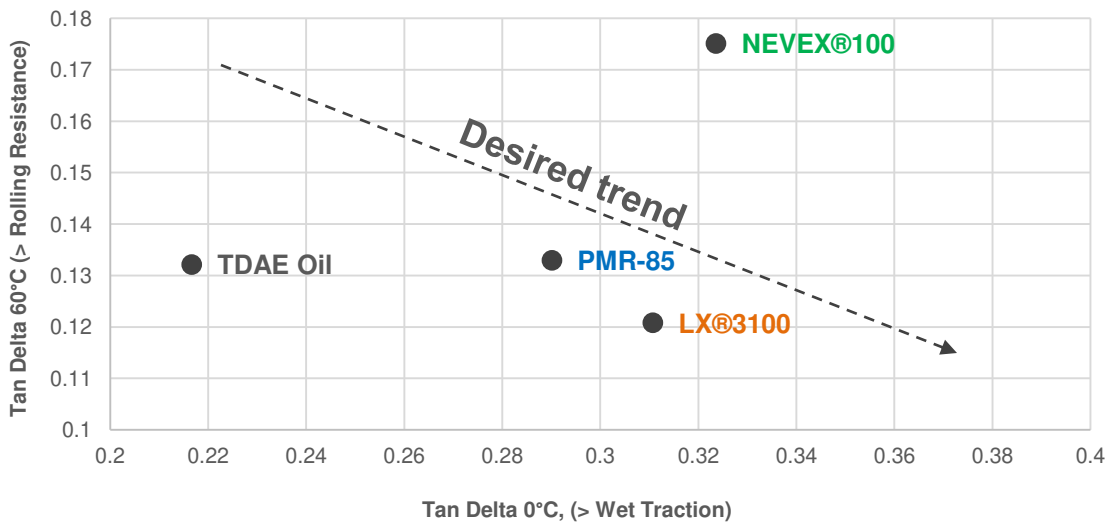


Tread Compound Evaluation

- ❖ It is common to associate a high value of tan delta at 0°C with improved wet traction, and a low value of tan delta at 60°C with lower rolling resistance.
- ❖ DMA demonstrates that a comparable performance between Neville resins and PMR.



**Tan Delta, 60°C versus 0°C
Rolling Resistance versus Wet Traction**

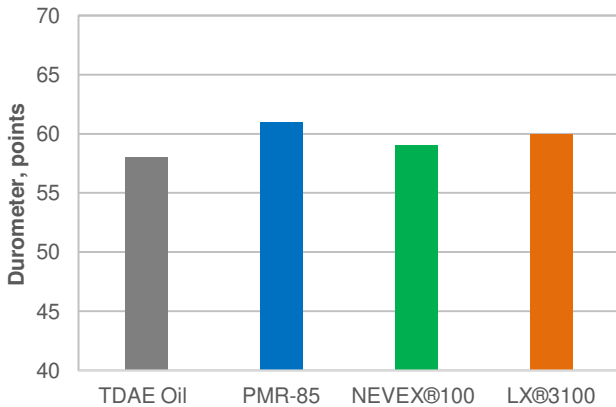


Physical Properties*

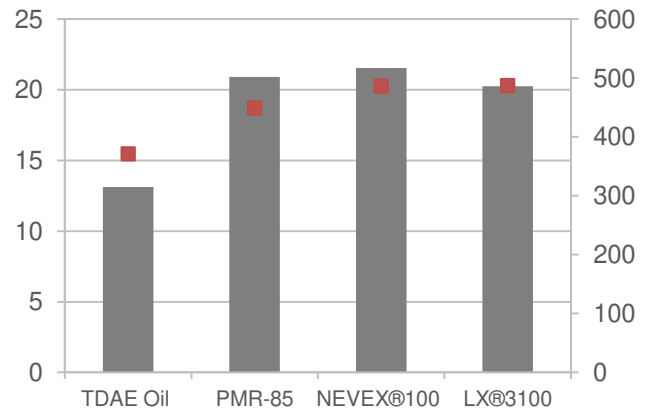
- ❖ The compounds were evaluated for hardness, tensile, tear, and abrasion. Compared with TDAE oil, all the resins improves the tensile and elongation, tear strength and abrasion.
- ❖ NEVEX®100 and LX®3100 showed similar physical properties as PMR's, but with better wear resistance.

*The sample used for the physical property test was the same compound but not the same mixed batch as the DMA test.

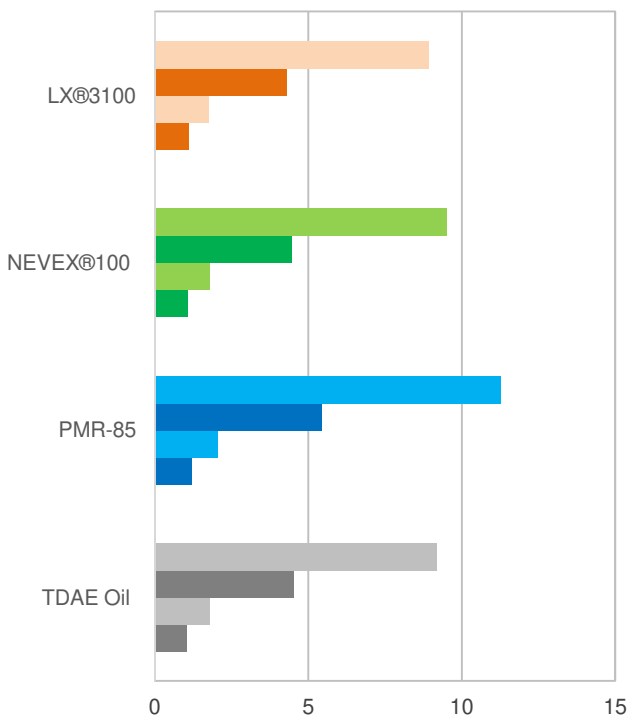
Shore A Hardness



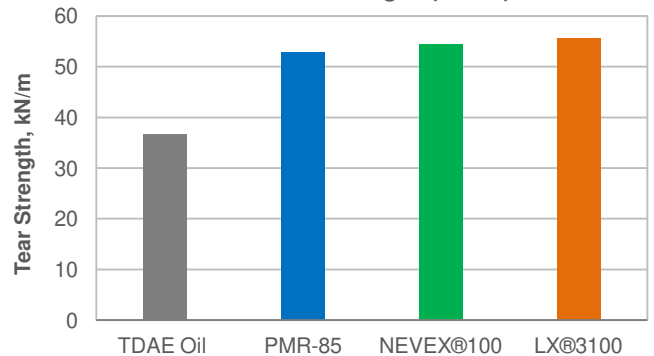
■ Tensile, MPa ■ Elongation, %



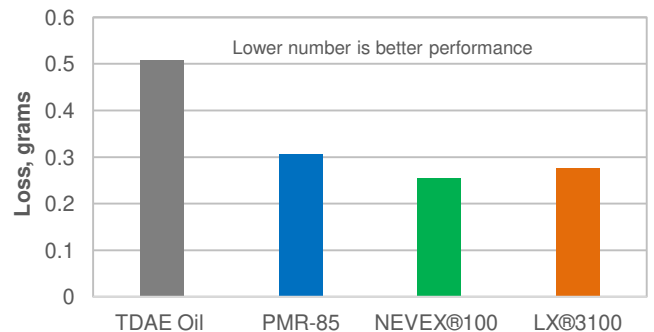
50%, 100%, 200% , 300% Modulus, MPa



Tear Strength (Die B)



Angle Abrasion. Grams Loss



Appendix: Compound Formula*

Ingredients	F-TDAE	F-PMR-85	F-NEVEX® 100	F-LX® 3100
1st Pass				
Buna ® 4525 (SSBR)	70	70	70	70
Buna ® CB24 (High cis BR)	30	30	30	30
1165MP (Silica)	75	75	75	75
N234 (Carbon Black)	5	5	5	5
Si-69 (Coupling agent)	7.5	7.5	7.5	7.5
TDAE Oil	32.0	2.0	2.0	2.0
PMR-85	0.0	20.0	0.0	0.0
NEVEX®100	0.0	0.0	20.0	0.0
LX®3100	0.0	0.0	0.0	20.0
First Pass phr	219.5	209.5	209.5	209.5
Second Pass				
First Pass	219.5	209.5	209.5	209.5
PMR-85	0.0	10.0	0.0	0.0
NEVEX®100	0.0	0.0	10.0	0.0
LX®3100	0.0	0.0	0.0	10.0
Stearic acid	1.0	1.0	1.0	1.0
ZnO	2.5	2.5	2.5	2.5
6PPD (Stabilizer)	2.0	2.0	2.0	2.0
Microcrystalline wax	1.5	1.5	1.5	1.5
Second Pass phr	226.5	226.5	226.5	226.5
Final Pass				
Second Pass	226.5	226.5	226.5	226.5
Sulfur	1.40	1.40	1.65	1.80
DPG (Accelerator)	2.00	2.00	2.00	2.00
CBS (Accelerator)	1.70	1.70		
TBBS (Accelerator)			2.00	1.85
TBZTD (Accelerator)				0.30
Final Pass phr	231.6	231.60	232.15	232.45

* Compound formula were adjusted basing on curing, viscosity and scorch.

About Neville Chemical Company

Neville Chemical Company is a well-known manufacturer and supplier of hydrocarbon resins in the US and globally, and has been in business for over 90 years. The company produces a variety of hydrocarbon resins as well as specialty resins for adhesives, coatings, inks, rubbers, and other applications.

For more information, please visit www.nevchem.com

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