Smithers Scientific Services PneumaSeal™ Evaluation Summary

Smithers Scientific Services, Inc., is a leading independent consulting, research and testing firm, servicing a worldwide client base in tire, automotive, elastometric, chemical, medical device and marine industries. Smithers is an approved Federal Government testing laboratory. Since 1925, the company has been dedicated to excellence and accuracy in providing analytical testing, performance evaluations, product analysis, product certification and management consulting.

Smithers Scientific Services conducted extensive studies on PneumaSeal, and listed below are the published findings from their testing. The Smithers testing concluded that:

1. PneumaSeal seals puncture holes left by a ¼ inch puncturing object.
2. PneumaSeal does not degrade components.
3. PneumaSeal does not rust steel wire tire cords.
4. PneumaSeal may act as a hint sink and allow for cooler tread shoulder temperatures.
5. PneumaSeal has a variable viscosity. A study of viscosity as temperature was reduced to -55°F suggests its dynamic flow rate changes as temperature changes.
6. PneumaSeal does not impede the rolling resistance of low profile radial truck tires.

The reports lists the recommended quantities of PneumaSeal which should give adequate sealant coverage to seal holes left by a ¼ inch diameter puncturing object, while not creating any ride disturbances. The quantities specified in the report will provide adequate inner liner coverage beneath the tread surface maintaining sufficient (0.050”) sealant thickness in any one tread puncture location. Installing PneumaSeal in these quantities will not create an imbalance or ride disturbance. The report encompasses the majority of passenger tire size combinations available on the market today.

Using the recommended quantity of PneumaSeal in a tire will meet the two basic requirements for an effective tire seal:

1. The ability to coat an entering, puncturing object and provide an airtight seal. When the puncturing object is thrown out or otherwise removed, the sealant flows into and over the aperture and seals the hole.
2. The sealant stays in place across the full tread, withstanding the 160 Gs of centrifugal force in the shoulders of a tire traveling at 60 MPH. It does not puddle in the center of the tread but rather stays in the shoulder areas where it is also needed. It does not flow in a circumferential direction when the vehicle is parked thus eliminating potential balance problems.

Although certain test tires failed due to excessive speed creating severe tire temperatures and belt separations, the PneumaSeal did not fail. Internal air pressure was maintained. No air loss or leakage of sealant due to centrifugal force occurred.

PneumaSeal, when used in recommended quantities in steel belted radial tubeless passenger tires causes the inner liner surface temperatures to be reduced by approximately 4°F. Passenger tires operated with PneumaSeal contained higher air operating temperatures (approximately 13°F), suggesting that the sealant acts as a heat sink, pulling heat out of the tread area.

Tires tested at reduced inflation pressures, simulating underinflation, showed typical higher temperature characteristics due to increased tire flexing. Tires with PneumaSeal, however, gave indications of reduced tread shoulder temperatures.