DISCOVER HOW DPR® LIQUID NATURAL RUBBER CAN WORK FOR YOU...

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DIVISION OF PACER INDUSTRIES INC.

LIQUID NATURAL RUBBER

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MANUFACTURED IN THE USA
INDUSTRIES SERVED

RUBBER COMPOUNDING
DPR can be reacted over the entire cure spectrum of natural rubber, making it particularly useful as a general rubber compounding ingredient. When used as processing aids (plasticizers) and reactive vehicles for rubber chemicals that must be dustless, pre-disbursed and/or pre-measured, DPR provides unique benefits due to the liquid rubber being easy to process and becoming non-fugitive later.

TIRE & AUTOMOTIVE INDUSTRY
Tire manufacturers are able to take advantage of these inherent characteristics with the introduction of DPR in various components of tire construction:

- **Bead Insulation/Apex Area**
  By using a highly loaded carbon black compound with DPR as a reactive plasticizer, processability of very stiff compounds can be achieved without sacrificing the permanence of cured compound.

- **Skim-Coat Compounds**
  In order to become soft enough for application, several Banbury passes may be needed. The reactivity of DPR makes this critical compound adhesion achievable while avoiding the use of large amounts of plasticizer. Once cured, it will not migrate over time as typical oils do.

- **Other Benefits**
  DPR is reported to have greater adhesion & penetration with steel wire and steel belts. It has a wider molecular weight than synthetic does which may help with green strength and cured crosslinking with solid natural rubber. Since it wets carbon black and synthetic fibers very well, DPR may help with highly loaded off-road tires.
DPR-400
Highest viscosity. It accepts the maximum extension of plasticizer and filler. When used as a processing aid, it demonstrates higher retention of cured physical properties as compared to the lower viscosity grades of liquid natural rubber.

DPR-75
It offers an intermediate viscosity grade. Its viscosity provides an optimum balance between the lower viscosity needed for easy processing and the thickness required to bind aggregates and other highly loaded systems.

DPR-40
It is a low viscosity grade. When used as a processing aid, it demonstrates greater reduction in plasticity than the higher viscosity grades. This is the grade generally used for tire applications.

DPR-35
Lowest viscosity. It is easiest to pour and the most efficient plasticizer of liquid rubber products. It increases the polymer's capacity for fillers and improves the acceptance of non-compatible reinforcement.

Viscosity (cps) of all grades is relatively high at near room temperature of 77 deg F (25 C) but decreases significantly at higher temps. It drops about 60% at 100 deg and about 85% at 125 deg.

GRADES OF DPR
There are four grades, all the same chemical but with different viscosities. They range from the most viscous, DPR-400, to the least, DPR-35. Molecular weight of the most viscous grade is about double that of the least viscous.

The elastomer best able to provide the strength, heat resistance, adhesion to particles and proper elasticity has been DPR.

FRICTION PRODUCTS
Brake linings also have a high percentage of dry ingredients and are hard products. DPR® has an affinity to wet large amounts of dry ingredients and it has the ability to cure to a very hard matrix.

LUBRICANTS
DPR improves stability of heavy-duty lubricants by increasing resistance to flow on vertical surfaces and by holding dry ingredients in a more stable suspension. It performs as a rheology modifier.

ASPHALT MODIFIER
A minor addition of DPR to asphalt reduces flow at high temperatures and maintains flexibility at low temperatures.

OTHER CHARACTERISTICS
DPR reduces the viscosity of uncured rubber when added at levels of 5 to 20 parts. This reduces power requirements, improves blend consistency and reduces risk of scorching. It can be used with synthetic polymers such as polychloroprene, EPDM, polybutadiene, SBR and acrylonitrile-isoprene.

GRINDING WHEELS
For many decades DPR has been an important ingredient in special grinding wheels made by numerous companies. It is a strong binder designed to hold large quantities of abrasive grain and fillers. Because the wheels are run at high speeds, centrifugal force is high and the binder must be very strong.

The elastomer best able to provide the strength, heat resistance, adhesion to particles and proper elasticity has been DPR.

DPR liquid rubber offers processing flexibility and performance options for a wide range of applications.

DPR is beneficial when used as an asphalt modifier.

DPR is a strong binder for grinding & friction products.
TYPICAL PROPERTIES
DPR liquid rubber provides many performance properties into the finished polymer system. The attributes result from the inherent properties of natural rubber. The physical characteristics of the liquid polymers include the following:

<table>
<thead>
<tr>
<th>Attributes</th>
<th>DPR-400</th>
<th>DPR-75</th>
<th>DPR-40</th>
<th>DPR-35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Color</td>
<td>Dark Brown</td>
<td>Dark Brown</td>
<td>Dark Brown</td>
<td>Visual</td>
</tr>
<tr>
<td>Viscosity, cps @ 38 C (100 F)</td>
<td>400,000</td>
<td>75,000</td>
<td>40,000</td>
<td>35,000</td>
</tr>
<tr>
<td>Average Molecular Weight</td>
<td>80,000</td>
<td>45,000</td>
<td>40,000</td>
<td>38,000</td>
</tr>
<tr>
<td>Manufacturing Viscosity Tolerances</td>
<td>270,000 to 550,000</td>
<td>45,000 to 95,000</td>
<td>35,000 to 55,000</td>
<td>25,000 to 40,000</td>
</tr>
<tr>
<td>Density, lb/gal</td>
<td>77</td>
<td>77</td>
<td>77</td>
<td>77</td>
</tr>
<tr>
<td>Specific Gravity, g/cc</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
<td>0.92</td>
</tr>
<tr>
<td>Flash Point, deg C</td>
<td>271</td>
<td>255</td>
<td>246</td>
<td>240</td>
</tr>
</tbody>
</table>

OTHER APPLICATIONS
- Reactive vehicle for rubber additives
- Rheology modifier for lubricants
- Polymer base for molding and tooling systems
- Polymer base for electrical encapsulates
- Polymer base for automotive sealants
- Active ingredient in self-sealing tires
- Trans-ocean cable insulation

PACKAGING
DPR products normally are packaged in 350 lb. 55-gallon steel open-head drums. They also are available in 5-gallon pails and 4.4 lb (2 kg) or other low melt poly-bags. The poly-bags can be placed directly into a Banbury mixer when used for tire or other application. Alternatively, a pre-weighed amount can be poured into the mixer.

The liquid rubber products are stable over a wide temperature range. They are not damaged by freezing temperatures or occasional short term exposure to temperatures of 150 deg F. Shelf life is a minimum of two years in unopened container.

They are viscous polymers. Heating the drum reduces viscosity for easier handling. Vent drums before heating to avoid pressure build up.

Refer to Safety Data Sheet for detailed information.