Tackifier Products

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Tackifier Products

Tackifiers are additives that confer tack, or stringiness, to a substance and are typically used to provide adherence in fluid lubricants and stringiness in grease. Thickeners give additional body to greases and fluid lubricants. Both tackifiers and thickeners also provide drip resistance and serve to inhibit stray mist in pneumatic system lubricants.

**FUNCTIONAL PRODUCTS INC.** offers an extensive line of tackifiers for various systems and applications. This catalog presents information regarding our mineral oil, vegetable oil, and latex based products. The catalog also lists the appropriate application for each tackifier.

**FUNCTIONAL PRODUCTS INC.** offers a wide range of tackifiers to fit your requirements. Custom products are our specialty. If you require something not in our standard catalog, please let us know. We will be happy to create a tackifier that meets your need.

**Definitions**

- **NSF** — The NSF, a non-governmental non-profit corporation, assumed responsibility from the FDA. Registry numbers are assigned to approved products, lubricants and lubricant additives.
- **OCP** — Olefin copolymer
- **PAO** — Polyalphaolefin
- **PIB** — Polyisobutylene
- **String Length** — A measure of tackifier performance as determined by the Ductless Siphon Test (see page 7).

**Noteworthy**


**FUNCTIONAL PRODUCTS** was given the “Best Paper Award” at the ELGI Annual Meeting in Paris for their paper on polymer compatibility in mineral and vegetable oils.

**FUNCTIONAL PRODUCTS** provides instruction on polymers in the Advanced Grease Course at the NLGI conferences.

**FUNCTIONAL PRODUCTS** received an award for its paper at the National Lubricating Grease Symposium in Wuyishan, China.

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**Mission Statement:**

Functional Products Inc. is committed to providing our customers with quality products and services that meet or exceed their expectations through the use of continuous improvement.

**Health and Safety:**

The product descriptions here, in Technical Data Sheets (TDSs) and on product labels are not intended to take the place of a Safety Data Sheet (SDS).

An SDS is provided with each order or sample shipment and can be downloaded from our website:

www.functionalproducts.com

Phone: 1-330-963-3060
## Industrial Lubricant Tackifiers

### Applications and Treat Levels*
- Way Lubricants: 0.5-1.0%
- Greases: 0.5-1.5%
- Chain Oils: 0.3-1.5%
- Aerosol Resistance: 0.5-2.0%

*Treat levels are typical ranges. Since there are no standardized tests for these properties, the actual treat level is best determined by the formulator.

<table>
<thead>
<tr>
<th>Typical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
</tr>
<tr>
<td>V-172</td>
</tr>
<tr>
<td>V-172E</td>
</tr>
<tr>
<td>V-174</td>
</tr>
<tr>
<td>V-175</td>
</tr>
<tr>
<td>V-175F</td>
</tr>
<tr>
<td>V-176</td>
</tr>
<tr>
<td>V-177</td>
</tr>
<tr>
<td>V-177L</td>
</tr>
<tr>
<td>V-178</td>
</tr>
<tr>
<td>V-178E</td>
</tr>
<tr>
<td>V-179</td>
</tr>
<tr>
<td>V-184</td>
</tr>
<tr>
<td>V-188</td>
</tr>
<tr>
<td>V-189A</td>
</tr>
<tr>
<td>V-198A</td>
</tr>
<tr>
<td>V-298</td>
</tr>
<tr>
<td>V-298F</td>
</tr>
<tr>
<td>V-298L</td>
</tr>
<tr>
<td>V-378</td>
</tr>
<tr>
<td>V-388</td>
</tr>
</tbody>
</table>

* OCP tackifiers confer lower string lengths than those of PIB tackifiers. However, the shear stability of OCP tackifiers is much higher, resulting in smaller decreases in string length in applications where shear is present.

### PARATAC® and PARATAC XT® Tackifiers

<table>
<thead>
<tr>
<th>Typical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
</tr>
<tr>
<td>PARATAC®</td>
</tr>
<tr>
<td>PARATAC XT®</td>
</tr>
</tbody>
</table>
Food Grade Tackifiers
For Incidental Food Contact

Applications
- Greases
- Chain Oils
- Anti-mist
- Way oils

Typical Properties

<table>
<thead>
<tr>
<th>Product</th>
<th>Diluent Oil</th>
<th>Polymer</th>
<th>Viscosity (cSt at 100°C)</th>
<th>Color (ASTM D1500)</th>
<th>Shear Stability</th>
<th>String Length (0.5 wt% in ISO 68)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-422</td>
<td>White Mineral Oil</td>
<td>PIB</td>
<td>3000</td>
<td>&lt;1</td>
<td>Good</td>
<td>53</td>
</tr>
<tr>
<td>V-425</td>
<td>White Mineral Oil</td>
<td>OCP</td>
<td>3000</td>
<td>&lt;2</td>
<td>Excellent</td>
<td>15*</td>
</tr>
<tr>
<td>V-475</td>
<td>White Mineral Oil</td>
<td>PIB</td>
<td>1650</td>
<td>&lt;1</td>
<td>Poor</td>
<td>82</td>
</tr>
<tr>
<td>V-498</td>
<td>White Mineral Oil</td>
<td>PIB</td>
<td>4000</td>
<td>&lt;1</td>
<td>Good</td>
<td>53</td>
</tr>
<tr>
<td>V-584</td>
<td>Vegetable Oil</td>
<td>Proprietary</td>
<td>2500</td>
<td>&lt;4</td>
<td>Fair</td>
<td>10**</td>
</tr>
</tbody>
</table>

* OCP tackifiers confer lower string lengths than those of PIB tackifiers. However, the shear stability of OCP tackifiers is much higher, resulting in smaller decreases in string length in applications where shear is present.
** 0.5% by weight in Canola oil

For more information, please refer to our Additives for Food Grade Lubricants catalog.

Biobased Tackifiers

Biobased tackifiers are primarily used to provide adherence in saw-chain and saw-guide oils in environmentally sensitive locations.

Typical treatment level for a chain lube is 3-10%. This level will bring a vegetable oil to ISO 46 or ISO 68 grade. Low temperature properties can be improved with the addition of FUNCTIONAL PD-585 at 0.2-1.0%.

Typical Properties

<table>
<thead>
<tr>
<th>Product</th>
<th>Diluent Oil</th>
<th>Viscosity (cSt at 100°C)</th>
<th>Color (ASTM D1500)</th>
<th>Shear Stability</th>
<th>String Length (0.5 wt% in ISO 68)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-515</td>
<td>Vegetable Oil</td>
<td>8000 cSt at 100°C</td>
<td>&lt;4</td>
<td>Good</td>
<td>5</td>
</tr>
<tr>
<td>V-584</td>
<td>Vegetable Oil</td>
<td>2500 cSt at 40°C</td>
<td>&lt;4</td>
<td>Fair</td>
<td>10</td>
</tr>
</tbody>
</table>

The polymers themselves are not readily biodegradable, but allow the formulation of tacky lubricants in biobased oil systems. FUNCTIONAL V-584 and FUNCTIONAL V-584 are LuSC listed for EU Ecolabel formulations and suitable for use in Vessel General Permit (VGP) applications.

For more information, please refer to our Additives for Biobased Products catalog.
Emulsion Based Grease Tackifiers

As an emulsion, the high active polymer level results in modest viscosity compared to oil based tackifiers. These additives are for use in greases that are either made with water, or where water is formed as a by product of soap formation. **FUNCTIONAL V-191M** is more resistant to ‘clotting’ during blending. The typical treat level is 0.5-2.0%.

### Functional V-191M

**FUNCTIONAL V-191M** is more resistant to ‘clotting’ during blending. The typical treat level is 0.5-2.0%.

<table>
<thead>
<tr>
<th>Product</th>
<th>Diluent</th>
<th>Polymer</th>
<th>Appearance</th>
<th>pH</th>
<th>Odor</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-191</td>
<td>Water</td>
<td>Hydrocarbon</td>
<td>White Liquid</td>
<td>10</td>
<td>Slight ammonia</td>
</tr>
<tr>
<td>V-191M</td>
<td>Water/Petroleum</td>
<td>Hydrocarbon</td>
<td>White Liquid</td>
<td>10</td>
<td>Slight ammonia</td>
</tr>
</tbody>
</table>

**HANDLING:**

These products are subject to freezing at temperatures below 32°F. Freezing must be prevented to avoid irreversibly breaking the emulsion. Recommended storage temperature is 40-100°F.

### High Temperature Tackifiers

**FUNCTIONAL V-378** and **V-388** are additives that provide stringiness and water resistance to thermally stable lubricants and greases based on PAO and Group III base oils. Lubricants using Group III oils or PAOs with these tackifiers are more thermally and oxidatively stable than other products made with the same base oils and conventional tackifiers.

<table>
<thead>
<tr>
<th>Product</th>
<th>Diluent Oil</th>
<th>Polymer</th>
<th>Viscosity (cSt at 100°C)</th>
<th>Color (ASTM D1500)</th>
<th>Shear Stability</th>
<th>String Length (0.5 wt% in ISO 68)</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-378</td>
<td>Group III Oil</td>
<td>PIB</td>
<td>6250</td>
<td>&lt;2</td>
<td>Good</td>
<td>75</td>
</tr>
<tr>
<td>V-388</td>
<td>Group III Oil</td>
<td>OCP</td>
<td>4000</td>
<td>&lt;2</td>
<td>Excellent</td>
<td>22*</td>
</tr>
</tbody>
</table>

*OCP tackifiers confer lower string lengths than those of PIB tackifiers. However, the shear stability of OCP tackifiers is much higher, resulting in smaller decreases in string length in applications where shear is present.
Tackifier and Thickener for Aqueous Systems

**FUNCTIONAL V-802P** is an environmentally friendly, non-hazardous liquid additive that thickens and confers tack/stringiness to fluids made from water or emulsions of water and soluble oils. It may be blended to increase adherence and drip resistance to liquids or colloidal suspensions used in aqueous bar and chain oils or wire rope lubricants. **V-802P** can also be used in flocculating agents, home care/cleaning, and ceramic applications, including as a binder for powders and an anti-sag agent in paints.

The active ingredient in **FUNCTIONAL V-802P** is a high molecular weight proprietary polymer that provides tackiness and thickening. The product also contains a cold flow improver for enhanced product stability and performance at freezing temperature. The polymer is not considered biodegradable, but is considered oxidatively degradeable.

### Typical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Tacky, viscous liquid</td>
</tr>
<tr>
<td>Color</td>
<td>Clear, Water-White</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.01</td>
</tr>
<tr>
<td>Lbs per Gallon</td>
<td>8.42</td>
</tr>
<tr>
<td>Kinematic Viscosity</td>
<td>60,000 cSt @ 40°C</td>
</tr>
</tbody>
</table>

Typical treatment level is 0.3 - 10%. Due to the range of applications, treatment level is best determined by the end-user. The user must thoroughly test **FUNCTIONAL V-802P** for compatibility and desired performance under the conditions and temperature in the intended application.

**HANDLING:**

**FUNCTIONAL V-802P** flows readily at ambient temperature and may be pumped into transfer systems. The product should be stored at temperatures above 5°C and below 45°C. Replace container lid tightly after use to maintain product consistency and quality. Exposure to air for more than a few hours may cause the formation of surface film. The film may be easily removed prior to use.

**FUNCTIONAL V-802P** has a shelf life of 6 months. Avoid mechanical shearing during handling and blending to minimize possible loss of tackiness.

Safe handling precautions are the same as those to be taken with other tackifiers. See the current Safety Data Sheet.
Testing, Handling and Blending Information

String Length Testing using the Ductless Siphon Method:

A comprehensive discussion of this test method is available. The ductless siphon test is based upon a paper, Evaluating Tackiness of Polymer Containing Lubricants by the Open Siphon Method: Experiments, Theory, and Observation, which was authored by scientists from FUNCTIONAL PRODUCTS INC. and the University of Akron Department of Polymer Engineering.

Incompatibilities:

Like other polymers, tackifier polymers can drop out of solution if the polarity of the diluent is changed. Usually, this problem arises when a polymer is blended with another (more-polar) additive such as a motor oil detergent package, way oil package or a sulfonate emulsifier. In such cases the polymer may drop out of solution. Incompatibility can be avoided by attention to the blending sequence; when blending a polymeric additive and a polar additive, always completely dissolve one additive in the diluent oil before starting the addition of the other.

Blending:

Viscous additives like tackifiers can be difficult to mix into low-viscosity diluents. Poor mixing may cause incompatibility when other additives are added (as stated above). If the agitation is not sufficient for good blending, the easiest solution is to heat the tackifier before blending.

Thermal Breakdown:

Except for FUNCTIONAL V-378, polyisobutylene-based tackifiers start to break down above 100°C (212°F). Fortunately, most tackifier applications are at modest temperatures. Some greases, however, are made at higher temperatures and breakdown can occur.

Be especially wary of the long cooling time of grease that is drummed hot.

Shear Breakdown:

The high molecular weight of polymers provides tack in solution. While some tackifiers are more shear-stable than others, shear will eventually break down any tackifier. The shear that occurs in agitation with air or with ordinary open propellers is typically not a serious problem. Shear in pumping, however, frequently leads to loss of tackiness. Best practice is to use a diaphragm pump or centrifugal pump, without pump recirculation during blending. The number of transfer operations should be minimized. Be especially careful about devices that re-circulate through a by-pass to limit pressure. One solution is to replace the pump with an air-driven diaphragm pump, which will stop pumping when the discharge pressure reaches the limit.
Purchasing Information

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