Additives for Grease

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Additives for Grease

FUNCTIONAL PRODUCTS INC.

Additives for Grease

Improve your Greases with our Polymer Additives

FUNCTIONAL PRODUCTS INC. offers a variety of polymer additives. Our specialty polymer additives form an interpenetrating physical network with the grease soap to greatly improve the performance of the grease: increased shear stability, enhanced water spray-off and thicker grease.

How do Polymers Improve Grease?

The polymer forms an interpenetrating network with the grease soap matrix by chemical bonding, entanglement or an amorphous crystalline reinforcement. The result is improved functional properties and a robust appearance.

Polymer Additives and Low Temperature Properties

Many of Functional’s polymer additives, including V-207, V-4040P, V-4060, V-4270 and V-191, do not adversely impact low temperature flow properties of lithium complex base greases as determined by Lincoln Ventmeter results. Data available upon request.

Improved Shear Stability

FUNCTIONAL V-4004A, V-207, and V-176 greatly improve Cone Penetration (ASTM D217) and Roll Stability (ASTM D1831) performance test results for grease.

Enhanced Water Resistance


Increased Yield

FUNCTIONAL V-4004A, V-4040P, V-207, and V-176 stiffen greases and decrease the NLGI grade. To bring the grease back in grade, approximately 10% more oil is added.

What Types of Grease Soap may be Treated with Polymers?

Our specialty polymers are compatible with the following mineral and vegetable oil-based grease soaps: aluminum, lithium, lithium complex and calcium sulfonate systems.

Compatibility with Vegetable and Mineral Oils

Differences between vegetable and mineral oils require the use of compatible polymers when forming greases (see the illustration below). Although both oils are characterized by long hydrocarbon chains, vegetable oils have polar ester groups (A) and unsaturated double bonds (B).

Definitions

Triglyceride — An ester derived from glycerol and fatty acids.

Structural Differences Between Vegetable and Mineral Oils

Mineral Oil (Linear Paraffinic)

Vegetable Oil (Triglyceride)

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

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.

Functional Products Inc. was founded in 1985. The Quality Management System is certified to ISO 9001:2008 (with design). Functional Products is committed to compliance with current REACH and CLP regulations, including the Globally Harmonized System (GHS) for classification and labeling standard.

Functional Products is an active member or participant in the following professional technical associations: NLGI, ELGI, NLGI India, STLE, KSTLE, AOCS, NSF, UEIL and ILMA.

Functional Products formulates and blends over 200 active products and also provides custom formulary capability for short and long-run needs.

Headquarters, general offices and manufacturing plant are located in Macedonia, Ohio. Sales offices and stocking points are located throughout the United States and Canada, as well as Latin America, Europe, Australia, India and Asia.

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Polymer Additives
For Water Spray-off, Water Washout and Shear Stability

Functional's polymer additives can be used in aluminum, aluminum complex, lithium, lithium complex and calcium sulfonate base greases to improve water resistance and grease yields. These additives are composed of polymers selected for molecular weights that provide optimum benefits in greases. Liquid grease additives are preferred in continuous grease operations.

FUNCTIONAL V-207 and FUNCTIONAL V-4040P are powdered polymers without diluent oil for formulating flexibility that enhance water spray-off and grease yield.

FUNCTIONAL V-4004A is a multifunctional polymer diluted with oil and is designed to improve water resistance and mechanical stability. FUNCTIONAL V-4004A also increases the tackiness of the grease and stiffens the soap matrix, resulting in higher yields.

FUNCTIONAL V-4270 is a mixture of multifunctional polymers specifically designed for use in greases to improve water resistance and mechanical stability. FUNCTIONAL V-4270 also increases the tackiness of the grease and stiffens the soap matrix, resulting in higher yields.

<table>
<thead>
<tr>
<th>Composition</th>
<th>Form</th>
<th>Water Spray-off**</th>
<th>Water Washout**</th>
<th>Roll Stability*</th>
<th>Treat Rate†</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-207</td>
<td>White rubber powder</td>
<td>24%</td>
<td>14.25%</td>
<td>4.4%</td>
<td>1%</td>
</tr>
<tr>
<td>V-4004A</td>
<td>Yellow-orange liquid</td>
<td>23%</td>
<td>11.75%</td>
<td>3.0%</td>
<td>4%</td>
</tr>
<tr>
<td>V-4033</td>
<td>Yellow liquid</td>
<td>21%</td>
<td>9.75%</td>
<td>2.1%</td>
<td>1.5%</td>
</tr>
<tr>
<td>V-4040P</td>
<td>White Powder</td>
<td>25%</td>
<td>—</td>
<td>—</td>
<td>0.25%</td>
</tr>
<tr>
<td>V-4060</td>
<td>White Pellet</td>
<td>15%</td>
<td>—</td>
<td>—</td>
<td>1%</td>
</tr>
<tr>
<td>V-4270</td>
<td>Brown liquid</td>
<td>7%</td>
<td>12.50%</td>
<td>—</td>
<td>4%</td>
</tr>
</tbody>
</table>

*Reference is a lithium complex grease with ASTM D4049 water spray-off of 52% and ASTM D1831 roll stability of 11.0%
**Reference is a lithium complex grease with ASTM D1264 water washout of 23% at 79°C (175°F)
† Treat rates may be optimized for a specific grease, usually within ± 0.5% by weight.

FUNCTIONAL V-4004A and V-207 are added while cool, at temperatures below 100°C. FUNCTIONAL V-4270 may be added before saponification or while cool, but temperatures above 100°C (212°F) should be avoided. FUNCTIONAL V-4040P is added during the initial reaction stage. FUNCTIONAL V-4033 may be added before saponification or with the cooling oil.

TRiiSO
Request Quote or Samples
Tackifiers

FUNCTIONAL’S tackifiers are based on unique blends of polymers which may be used in a range of greases from aluminum complex to clay. Due to the high molecular weight of the polymer, the tackifier network interpenetrates the grease soap matrix. Tackifiers improve adhesive properties and enhance water spray-off performance.

FUNCTIONAL V-176 confers tack or stringiness to a lubricant, and may be used to provide adherence.

FUNCTIONAL V-191M is a white liquid for use in greases made with water or where water is a by-product of soap formation. As an emulsion, FUNCTIONAL V-191M has a lower viscosity compared to solutions of tackifier polymers in oil.

FUNCTIONAL V-380 tackifier is recommended for high temperature applications 200ºC, where it remains tacky and stable when exposed to high temperature.

FUNCTIONAL V-515 and V-572 are yellow-orange tackifiers for fatty oil-based greases. FUNCTIONAL V-572 is approximately 90% readily biodegradable.

FUNCTIONAL V-584 (NSF registration #120913, category HX-1, HX-2), may be used where incidental food contact may occur.

<table>
<thead>
<tr>
<th>Composition</th>
<th>Kinematic Viscosity @ 100ºC</th>
<th>Color (ASTM D1500)</th>
<th>Flash Point</th>
<th>Treatment Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>V-173 Polyisobutylene</td>
<td>2,500-3,000cSt</td>
<td>&lt;3</td>
<td>175ºC</td>
<td>0.5 - 1.5%</td>
</tr>
<tr>
<td>V-191M High MW Hydrocarbon</td>
<td>—</td>
<td>Opaque</td>
<td>—</td>
<td>0.5 - 2%</td>
</tr>
<tr>
<td>V-380 Polyisobutylene</td>
<td>3,000-5,000 cSt</td>
<td>&lt;2</td>
<td>&gt;150ºC</td>
<td>1 - 4%</td>
</tr>
<tr>
<td>V-515 Polymer</td>
<td>7,000-9,000cSt</td>
<td>&lt;4</td>
<td>150ºC</td>
<td>3 - 7%</td>
</tr>
<tr>
<td>V-527 Polymer</td>
<td>6,000-9,000cSt</td>
<td>&lt;4</td>
<td>150ºC</td>
<td>0.2 - 10%</td>
</tr>
<tr>
<td>V-584 Polymer</td>
<td>2,000-3,000cSt</td>
<td>&lt;3</td>
<td>150ºC</td>
<td>5%</td>
</tr>
</tbody>
</table>

Food Grade and Biobased Extreme Pressure Additives

FUNCTIONAL CERAMAX and CERAMAX PASTE use size-optimized particles to provide efficient and economical products for use in heavy industrial and food processing grease. Both provide lubrication and metal-to-metal protection under extreme loads and temperatures, making them ideal replacements for graphite, MoS2 or PTFE.

Effective performance with either powder or paste can be provided with a treat rate as low as 5%. The end-user should determine the appropriate treat rate for their application.

FUNCTIONAL CERAMAX (NSF registration #143817, category HX-1, HX-2) is a white powder that allows maximum flexibility when formulating your grease.

FUNCTIONAL CERAMAX PASTE (NSF registration #147508, category HX-1, HX-2) is a pre-dispersed mixture for ease of processing and handling.

FUNCTIONAL RD-535 is a liquid additive for biobased grease. At a 5.0% treat rate, RD-535 has a Timken Weld Load of greater than 70 pounds (32kg).

Four Ball Extreme Pressure Test Results

<table>
<thead>
<tr>
<th></th>
<th>Wear Scar 40kg (mm)</th>
<th>Extreme Pressure Weld (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithium Complex Base Grease</td>
<td>1.060</td>
<td>126</td>
</tr>
<tr>
<td>Lithium Complex/1% PFTE</td>
<td>0.890</td>
<td>200</td>
</tr>
<tr>
<td>Lithium Complex 1% MoS2</td>
<td>0.805</td>
<td>250</td>
</tr>
<tr>
<td>Lithium Complex/5% RD-535</td>
<td>0.820</td>
<td>500</td>
</tr>
<tr>
<td>Lithium Complex/1% Ceramax</td>
<td>0.760</td>
<td>250</td>
</tr>
</tbody>
</table>