Additives for **Food Grade Lubricants**

Coupling Agents .......................................................... 3
Anti-wear Additives and Corrosion Inhibitors ....................... 4
Water Soluble Corrosion Inhibitor .................................... 5
Ceramax ................................................................. 5
Tackifiers ................................................................. 6
Viscosity Modifiers ....................................................... 7

QMS Certified to ISO 9001:2015 (With Design) REACH and GHS Compliant
Additives for Food Grade Lubricants

**FUNCTIONAL PRODUCTS INC.** offers an extensive line of additives for various types of food grade lubricants. This catalog presents information about our coupling agents for white oils, anti-wear and corrosion inhibitors for mineral oil based lubricants, and tackifiers and thickeners for white oil and vegetable oil based lubricants.

**FUNCTIONAL PRODUCTS INC.** offers a wide range of additives to fit your needs. Custom products are our specialty. We will be happy to create an additive that meets your needs.

**Formulating a Food Grade Lubricant**

H1 or H2 food grade lubricant formulation is simplified by using HX-1 and HX-2 registered ingredients. **FUNCTIONAL PRODUCTS INC.** offers additives that perform as viscosity modifiers, tackifiers and corrosion inhibitors. We will be happy to assist in selecting HX-1 and HX-2 approved additives for use in your formulations.

**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.

**HX-1** — The NSF classification HX-1 applies to ingredients with incidental food contact.

**HX-2** — The NSF classification HX-2 applies to ingredients without food contact.

**21 CFR 178.3570** — This section of the Code of Federal Regulations applies to Lubricants with Incidental Food Contact.

**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
Coupling Agents

White mineral oil, widely used in food grade lubricants, is generally a poor solvent for polar lubricant additives such as antioxidants and anti-wear additives. These coupling agents are additives used to increase the polarity of the food grade lubricant to allow use of other additives. They are also used to impart rubber-swelling properties to minimize seal shrinkage and leakage. Considering the wide variety of possible applications for coupling agents, it is recommended that samples of each product be evaluated by the formulator to determine appropriate use.

The active ingredients in each of these coupling agents are unique blends of esters in food grade diluent oil suitable for use as lubricant components where incidental food contact may occur. Our coupling agents have been registered with the NSF and may be cited as a component when submitting a lubricant composition to NSF.

The treatment level is typically two parts coupling agent to one part additive to be dissolved. Rubber swell is imparted at levels over 4%. Exact levels need to be determined by the formulator.

<table>
<thead>
<tr>
<th>Typical Properties</th>
<th>CA-441</th>
<th>CA-447</th>
<th>CA-450</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF Registration Number</td>
<td>120908</td>
<td>120909</td>
<td>140748</td>
</tr>
<tr>
<td>Category</td>
<td>HX-1, HX-2</td>
<td>HX-1, HX-2</td>
<td>HX-1, HX-2</td>
</tr>
<tr>
<td>Appearance</td>
<td>Clear, Colorless Liquid</td>
<td>Clear, Colorless Liquid</td>
<td>Light Amber Liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>Mild or None</td>
<td>Mild or None</td>
<td>Mild or None</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>0.92</td>
<td>0.913</td>
<td>0.99</td>
</tr>
<tr>
<td>Flash Point</td>
<td>135°C (275°F)</td>
<td>135°C (275°F)</td>
<td>&gt; 185°C (365°F)</td>
</tr>
<tr>
<td>Kinematic Viscosity</td>
<td>12 cSt at 40°C</td>
<td>12 cSt at 40°C</td>
<td>12 cSt at 40°C</td>
</tr>
</tbody>
</table>

These coupling agents are easily handled and any convenient technique may be used for blending. Safe handling precautions are the same as those to be taken with the base oil. Please see the current Safety Data Sheet for detailed information.
FUNCTIONAL CI-426 and CI-426-EP are oil-soluble anti-wear additives and corrosion inhibitors that may be used in lubricants and hydraulic fluids with incidental food contact. FUNCTIONAL CI-426-EP is an extreme pressure version. Both are soluble in white oils, polyalphaolefins and other suitable base oils.

FUNCTIONAL CI-426 is composed of amine salts of an alkyl phosphate. FUNCTIONAL CI-426-EP is composed of phosphate compounds. Both additives meet the NSF certification requirements for HX-1 and HX-2 categories.

FUNCTIONAL CI-426 is permitted in food grade lubricants up to 0.5%, while FUNCTIONAL CI-426-EP can be used up to 2.0%. If only rust protection is needed, then 0.3-0.5% is usually sufficient. They may be used with antioxidants, viscosity modifiers or other additives customarily used in these applications.

### Typical Properties

<table>
<thead>
<tr>
<th></th>
<th>CI-426</th>
<th>CI-426-EP</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF Registration Number</td>
<td>120910</td>
<td>138503</td>
</tr>
<tr>
<td>Category</td>
<td>HX-1, HX-2</td>
<td>HX-1, HX-2</td>
</tr>
<tr>
<td>Appearance</td>
<td>Yellow Liquid</td>
<td>Yellow Liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>Mild Amine</td>
<td>Mild Amine</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>0.92</td>
<td>0.92</td>
</tr>
<tr>
<td>Flash Point</td>
<td>105°C (220°F)</td>
<td>105°C (220°F)</td>
</tr>
<tr>
<td>Kinematic Viscosity</td>
<td>800 cSt @ 40°C, 45 cSt @ 100°C</td>
<td>450 cSt @ 40°C</td>
</tr>
<tr>
<td>pH</td>
<td>8.5-9.5</td>
<td>7.0-8.0</td>
</tr>
<tr>
<td>Phosphorus</td>
<td>6.5%</td>
<td>3.6%</td>
</tr>
<tr>
<td>Sulphur</td>
<td>0</td>
<td>2.0%</td>
</tr>
<tr>
<td>Solubility in Oil/Water</td>
<td>Soluble/Insoluble</td>
<td>Soluble/Insoluble</td>
</tr>
<tr>
<td>Corrosion Inhibition</td>
<td>28%</td>
<td>28%</td>
</tr>
<tr>
<td>Rust Test ASTM D665B</td>
<td>Pass</td>
<td>Pass</td>
</tr>
<tr>
<td>4 Ball Test ASTM D783</td>
<td>(1.0 % IN 100 SEN)</td>
<td>(1.0 % IN 100 SEN)</td>
</tr>
<tr>
<td>Initial Seizure</td>
<td>80 kg</td>
<td>160 kg</td>
</tr>
<tr>
<td>Scar Diameter</td>
<td>2.9mm</td>
<td>3.6mm</td>
</tr>
<tr>
<td>Weld Load</td>
<td>126 kg</td>
<td>250 kg</td>
</tr>
</tbody>
</table>

In concentrated form, these additives may cause skin and eye irritation and should be handled with suitable personal protection. The concentrated form should not be heated unnecessarily, as heating could release fumes that may cause respiratory irritation. See the current Safety Data Sheet. The oils made with these additives are non-hazardous and may be handled with the usual precautions for similar oils.
FUNCTIONAL CI-498 is a water-soluble corrosion inhibitor for use in lubricants and hydraulic fluids that may have incidental food contact.

FUNCTIONAL CI-498 is an aqueous solution of a phosphate salt, NSF registered HX-1 and HX-2.

FUNCTIONAL CI-498 is permitted in food-grade lubricants up to the level needed to function as a corrosion inhibitor. The treatment level will depend on the formulation, but may be in the range of 0.3-0.5%. It is generally used with antioxidants, thickeners or other additives customarily used in these applications.

<table>
<thead>
<tr>
<th>Typical Properties</th>
<th>CI-498</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF Registration Number</td>
<td>120912</td>
</tr>
<tr>
<td>Category</td>
<td>HX-1, HX-2</td>
</tr>
<tr>
<td>Appearance</td>
<td>Clear, slightly yellow liquid</td>
</tr>
<tr>
<td>Odor</td>
<td>None</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>1.02</td>
</tr>
</tbody>
</table>

In its concentrated form, FUNCTIONAL CI-498 may cause skin and eye irritation and should be handled with suitable personal protection. FUNCTIONAL CI-498 should be protected from freezing. See the Safety Data Sheet.

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.
Tackifiers

Tackifiers are additives that confer tack or stringiness to a substance and are typically used to provide adherence in fluid lubricants and stringiness in greases. Tackifiers will also provide drip resistance and inhibit stray mist in pneumatic system lubricants. Our food grade tackifiers are NSF approved (category HX-1 and HX-2). Their specific compositions are identified in the table, below.

**FUNCTIONAL V-422** is a colorless general-purpose tackifier that is used in food grade greases and fluid lubricants.

**FUNCTIONAL V-498** is colorless, which makes it especially useful in spindle lubricants. It may also be used to provide adherence in way oils and chain lubricants, stringiness in greases and aerosol resistance in mist and pneumatic system lubricants.

**FUNCTIONAL V-584** confers tack or stringiness to lubricants made from vegetable- or animal-based fatty oils. It is principally used to provide adherence in chain oils in environmentally sensitive or food processing locations. **FUNCTIONAL V-584** is LuSC listed for EU Ecolabel formulations and suitable for use in Vessel General Permit (VGP) applications.

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**Typical Properties**

<table>
<thead>
<tr>
<th></th>
<th>V-422</th>
<th>V-498</th>
<th>V-584</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF Reg. No.</td>
<td>120906</td>
<td>133062</td>
<td>120913</td>
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<tr>
<td>Category</td>
<td>HX-1, HX-2</td>
<td>HX-1, HX-2</td>
<td>HX-1, HX-2</td>
</tr>
<tr>
<td>Color</td>
<td>Clear, Colorless</td>
<td>Clear, Colorless</td>
<td>Hazy Yellow</td>
</tr>
<tr>
<td>Active Ingredient</td>
<td>Polyisobutylene</td>
<td>Polyisobutylene</td>
<td>Proprietary</td>
</tr>
<tr>
<td>Diluent</td>
<td>White Oil</td>
<td>White Oil</td>
<td>Vegetable Oil</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>0.845</td>
<td>0.86</td>
<td>0.93</td>
</tr>
<tr>
<td>Flash Point (COC)</td>
<td>135ºC(275ºF)</td>
<td>135ºC(275ºF)</td>
<td>150ºC(300ºF)</td>
</tr>
<tr>
<td>Kinematic Viscosity</td>
<td>3,100 cSt @ 100ºC</td>
<td>4,000 cSt @ 100ºC</td>
<td>2,500 cSt @ 40ºC</td>
</tr>
</tbody>
</table>

**Typical Treat Rates by Application**

<table>
<thead>
<tr>
<th></th>
<th>V-422</th>
<th>V-498</th>
<th>V-584</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral Chain Oil</td>
<td>0.5 - 1.5%</td>
<td>0.5 - 1.5%</td>
<td>—</td>
</tr>
<tr>
<td>Grease</td>
<td>0.5 - 2.5%</td>
<td>0.5 - 2.5%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Anti-Mist</td>
<td>0.5%</td>
<td>0.3 - 0.6%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Spindle Oils</td>
<td>0.5%</td>
<td>0.1 - 0.5%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Vegetable Chain Oil</td>
<td>—</td>
<td>—</td>
<td>1.0 - 2.0%</td>
</tr>
</tbody>
</table>

Due to the high viscosity of tackifiers, elevated temperature (approximately 150ºF / 65ºC) can facilitate handling. Temperatures over 200ºF (95ºC) may lead to degradation of tackiness and viscosity. Safe handling precautions are the same as those to be taken with the base oil; see the current Safety Data Sheet for more information. As the performance of products made from any tackifier may be lessened by shear, mechanical shearing during blending and handling should be minimized. **FUNCTIONAL V-498** is especially sensitive to shear.

Warming **FUNCTIONAL V-584** to approximately 120ºF (50ºC) may facilitate pumping and handling, however extended storage of this product at elevated temperatures is not recommended. To ensure product integrity, do not warm above 150ºF (65ºC). Safe handling precautions are the same as those to be taken with vegetable oils; see the current Safety Data Sheet for more detailed information.
Viscosity Modifiers

Viscosity modifiers give additional body to greases and fluid lubricants, provide drip resistance and inhibit stray mist in pneumatic system lubricants.

FUNCTIONAL V-425 is a dual function viscosity modifier and tackifier used in greases and fluid mineral oils intended for use in food processing equipment. V-425 also controls misting of lubricants. This clear and colorless additive is more stable at high temperatures than those derived from polyisobutylene.

FUNCTIONAL V-460 has excellent shear stability that makes it ideal for use in preparing industrial fluids and lubricants.

FUNCTIONAL V-508F is used in vegetable- or animal-based fatty oils and esters to blend lubricants of ISO 46 or ISO 68 viscosity grade. FUNCTIONAL V-508F is LuSc listed for EU Ecolabel formulations and suitable for use in Vessel General Permit (VGP) applications.

<table>
<thead>
<tr>
<th>Typical Properties</th>
<th>V-425</th>
<th>V-460</th>
<th>V-508</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSF Reg. No.</td>
<td>120905</td>
<td>142396</td>
<td>146676</td>
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<tr>
<td>Category</td>
<td>HX-1, HX-2</td>
<td>HX-1, HX-2</td>
<td>HX-1, HX-2</td>
</tr>
<tr>
<td>Color</td>
<td>Clear, Colorless</td>
<td>Clear, Colorless</td>
<td>Hazy Yellow</td>
</tr>
<tr>
<td>Active Ingredient</td>
<td>Olefin Copolymer</td>
<td>Olefin Copolymer</td>
<td>Proprietary</td>
</tr>
<tr>
<td>Diluent</td>
<td>White Oil</td>
<td>White Oil</td>
<td>Natural Ester</td>
</tr>
<tr>
<td>Specific Gravity</td>
<td>0.845</td>
<td>0.86</td>
<td>0.93</td>
</tr>
<tr>
<td>Flash Point (COC)</td>
<td>135ºC (275ºF)</td>
<td>150ºC (300ºF)</td>
<td>150ºC (300ºF)</td>
</tr>
<tr>
<td>PSSI (ASTMD D6278)</td>
<td>&gt;50%</td>
<td>22%</td>
<td>28%</td>
</tr>
<tr>
<td>Thickening Efficiency</td>
<td>13 cSt (10% in ISO 22 @100ºC)</td>
<td>12 cSt (10% in ISO 22 @100ºC)</td>
<td>12 cSt (10% in Canola Oil @40ºC)</td>
</tr>
<tr>
<td>Kinematic Viscosity</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Typical Treat Rates by Application**

<table>
<thead>
<tr>
<th></th>
<th>V-425</th>
<th>V-460</th>
<th>V-508</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mineral Chain Oil</td>
<td>8-12%</td>
<td>8-12%</td>
<td>8-12%</td>
</tr>
<tr>
<td>Grease</td>
<td>0.5-2.5%</td>
<td>3-5%</td>
<td>3-5%</td>
</tr>
<tr>
<td>Anti-Mist</td>
<td>0.3-0.6%</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>Vegetable Oil or Ester VM</td>
<td>—</td>
<td>—</td>
<td>4-8.5%</td>
</tr>
</tbody>
</table>

Due to the high viscosity of these products, elevated temperature (approximately 150ºF / 65ºC) can facilitate handling. Temperatures over 200ºF(95ºC) may lead to degradation of viscosity. Safe handling precautions are the same as those to be taken with the base oil; see the current Safety Data Sheet for more information.

Warming FUNCTIONAL V-508F to approximately 120ºF (50ºC) may facilitate pumping and handling, however extended storage of this product at elevated temperatures is not recommended. It is advised to keep below 150ºF (65ºC). Safe handling precautions are the same as those to be taken with vegetable oils; see the current Safety Data Sheet for more detailed information.
Purchasing Information

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