FUNCTIONAL PRODUCTS INC.
Innovative Chemistry for Lubricants

Biobased and EAL Additives

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Biobased Viscosity Modifiers

Functional Products Inc. has been developing cost effective additive technology for the biobased lubricant market for over 20 years. Each viscosity modifier has several variants available to offer lower viscosity for improved handling or higher viscosity for improved economics. Contact us to discuss your goals.

The top viscosity modifiers to start any new formulation project are:

FUNCTIONAL V-515
Economic and Tacky VM

- Bar & chain oils, saw guide oils
- Rock drill and pneumatic oil
- Total loss lubricants and greases

FUNCTIONAL V-515 is the most efficient viscosity modifier for adding viscosity to biobased lubricants with low treat and good economics. The high molecular weight also provides some tack and anti-misting.

FUNCTIONAL V-508M
Versatile, High Temperature VM

- NSF H1 incidental food contact
- Oven oils, smokeless oils, metalworking
- Synthetic ester and PAG oils

FUNCTIONAL V-508 is the most versatile viscosity modifier for synthetic esters and is compatible in a wide range of different polyol esters, complex esters, or even blown oils. **FUNCTIONAL V-508** has excellent thermal and oxidative stability for high temperature applications and meets NSF HX-1 and Ecolabel LuSC.

FUNCTIONAL V-521
Low Temperature VM

- Mobile equipment, municipal vehicles
- HETG and HEES hydraulic fluid
- Low pour point base oils (TMPTO)

FUNCTIONAL V-521 is an ideal option for general purpose biobased lubricants which will experience a wide range of environmental conditions. **FUNCTIONAL V-521** adds viscosity without greatly affecting low temperature properties like pour point and is idea in low pour point esters like TMPTO.

FUNCTIONAL PD-585
Shear Stable Polymethacrylate

- Full synthetic ester formulas
- Light duty gear oils
- Low temperature vegetable oil HF

FUNCTIONAL PD-585 is a multi-functional polymethacrylate (PMA) viscosity modifier for synthetic biobased lubricants at 2-10wt% and an effective pour point depressant for natural vegetable oils at 0.5-1wt%. **FUNCTIONAL PD-585** has the lowest shear stability index (best shear resistance) versus the other viscosity modifier options.

Biobased Viscosity Modifiers, Typical Properties

Product	Viscosity, at 100°C	PSSI, D6278	PSSI, KRL	Chemistry	Base Oil	Thickening Efficiency, 10wt%	Ecolabel LuSC?	NSF HX-1?
V-515	8000	50	N/A	Proprietary	Veg Oil	83.6 cSt	Yes	No
V-521	5000	30	N/A	Proprietary	Veg Oil	76.8 cSt	Yes	No
V-508M	2500	29	N/A	Proprietary	Veg Oil	71.9 cSt	Yes	Yes
PD-585	1200	4	56	PMA	Ester	80.3 cSt	Yes	No

Biobased Tackifiers

Tackifiers provide anti-fling and anti-mist performance to high speed lubricants like bar & chain oils or saws. See the **Tackifiers** brochure from Functional Products Inc. for more information on use and testing.

Product	Viscosity, @ 100°C, cSt	Compatibility	Chemistry	Base Oil	String Length, Ductless Siphon	Ecolabel LuSC?	NSF HX-1?
V-584	2500 @ 40°C	Veg Oil, Esters	Proprietary	Veg Oil	10	Yes	Yes
V-572	7500	Veg Oil, Esters	Proprietary	Veg Oil	5	No	No
V-188P2	9250	PAO, Petro. Oil	OCP	PAO	20	Yes	Yes

FUNCTIONAL V-584 is the primary tackifier for veg oil and synthetic esters.
FUNCTIONAL V-572 is a concentrated tackifier for building tack and viscosity in biobased greases.
FUNCTIONAL V-188P2 tackifies biodegradable polyalphaolefins and other biodegradable hydrocarbons for environmentally acceptable lubricants and eco-friendly products.

Biobased Pour Point Depressants

Pour point depressants (or “cold flow improvers”) are critical for improving the low temperature fluidity of esters, especially natural triglycerides like vegetable oil which contain high amounts of waxy long-chain fatty acids. This directly affects ASTM D97 pour point but it also helps prevent gelation during slow cooling during storage in cold weather. Different vegetable oils or fats respond differently so it advised to try several PPDs.

FUNCTIONAL PD-500 Series pour point depressants target waxy long chain fatty acids that inhibit the low temperature fluidity of biobased esters. Specialty PPDs like **FUNCTIONAL PD-564** inhibit the crystallization of synthetic base oil molecules in some synthetic EAL base stocks to extend the low temperature performance.

Product	Viscosity, at 100°C	Chemistry	Use With	Ecolabel LuSC?	NSF HX-1?
PD-585	1200	PMA	Vegetable oils	Yes	No
PD-555C	300	PMA	Vegetable oils	No	No
PD-562	N/A	Proprietary	Low viscosity estolides	No	No
PD-564	950	Proprietary	Med-high visc. estolides; biobased PAO	Yes	No
PD-571	N/A	Proprietary	Methyl esters / FAME / biodiesel	No	No
PD-574	N/A	Proprietary	Biobased H1 lubricants	No	Yes

FUNCTIONAL PD-585 is a highly concentrated PMA pour point depressant which can also perform as a shear stable viscosity modifier. Listed on both European Ecolabel LuSC list and US EPA Cleangredients.
FUNCTIONAL PD-555C is an easy to handle, low treat PPD for biobased lubricants. This product performs well with blends of vegetable oil with white oil or Group III to improve oxidative stability while retaining biodegradability.
FUNCTIONAL PD-574 is suitable for NSF H1 vegetable-based lubricants.

Components and Packages for Biobased Lubricants

Functional Products Inc. specializes in developing additive packages to allow non-conventional lubricant formulations using unique base stocks to perform as well or better than standard petroleum products. See the **Industrial Additives** brochure for more information on basic packages and components for lubricants.

Eco-Friendly Packages and Components

For Lower Impact on the Environment

"Eco-friendly" packages are available as a better, lower impact alternative to standard zinc or hazard labeled industrial packages for petroleum oil. These additives, as concentrates, may carry some hazard labeling.

Product	Treat Rate, wt%	Application	Ecolabel LuSC?	NSF HX-1?
BC-15	1.5%	Bar & chain oil package	No	No
CI-426	0.2 – 0.5%	Corrosion inhibitor, AW/EP	No	Yes
CI-426EP	1 – 2%	Corrosion inhibitor package with enhanced AW/EP	No	Yes
GA-533	4%	Rock drill, gear, industrial EP lubricants	Yes	No
HF-580	1.5 – 2.5%	Antiwear HF package (variable treat)	No	No
RD-540	2.2%	Rock drill and air tool package (emulsifying)	No	No
RD-540CP	2.4%	Rock drill and air tool package (demulsifying); gear oil	No	No
SGP-567	1.5%	Saw guide oil (emulsifying), forestry package	No	No
WA-60SF	1.5%	Saw guide oil (demulsifying)	No	No

Environmentally Acceptable Lubricant (EAL) Packages and Components

For EAL Programs and Marine Lubricant (US VGP) Use

"Environmentally acceptable" packages are registered on the European Ecolabel Lubricant Substance Classification (LuSC) list. These products meet all hazard labeling, biodegradability, and bio-accumulative requirements.

Product	Treat Rate, wt%	Application	Ecolabel LuSC?	NSF HX-1?
DF-400	0.1 – 1%	Defoamer for PAO, petroleum	Yes	Yes
DF-500	0.1 – 1%	Defoamer for veg oil, fatty ester	Yes	No
DM-400	0.1 – 1%	Demulsifier	Yes	Yes
HF-595	2.2%	R&O, AW HF, HVI HF	Yes	No
SGP-563	1.5%	Bar & chain, saw guide oil	Yes	No

Not finding exactly what you need?
We can help you navigate your options –
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