

Additives for **Food Grade Lubricants**



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QMS Certified to ISO 9001:2015 (With Design) **REACH and GHS Compliant**

FUNCTIONAL PRODUCTS INC.

Functional Products Inc. was founded in 1985. The Quality Management System is certified to ISO 9001:2015 (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.

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

Additives for Food Grade Lubricants

FUNCTIONAL PRODUCTS' 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.



Nonfoods Compounds
Program Listed

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.



Tackifiers

Tackifiers are additives that confer tack or stringiness to a lubricant or grease which provides adherence, prevents fling-off, and aids in the circulation of product through gears. Tackifiers are critical in NSF H1/H2 lubricants to prevent drippage and misting where food contact is possible.

Functional Product's NSF HX-1/HX-2 incidental food contact tackifiers are ideal for lubes/greases servicing oven chains, conveyors, textiles, spindles, refrigeration, open/closed gearing, sprayers, and more.

FUNCTIONAL V-422 is a colorless general-purpose polyisobutylene (PIB) tackifier formulated in H1 white oil

for excellent color stability and cleanliness. **FUNCTIONAL V-498** is a more concentrated version that is useful in adding tack to H1 greases. The PIB chemistry provides very low varnish buildup in high temperature oven chain formulas.

FUNCTIONAL V-475 uses ultra-high molecular weight PIB to impart very high levels of tack in low viscosity, high speed textile and machinery lubricants.

FUNCTIONAL V-584 adds tack to biobased vegetable oils and esters in high temperature chain oils. **FUNCTIONAL V-584** is LuSC listed for EU Ecolabel and Vessel General Permit (VGP) applications.

Typical Properties

	V-422	V-498	V-475	V-584
NSF Reg. No.	120906	133062	157875	120913
Category	HX-1, HX-2	HX-1, HX-2	HX-1, HX-2	HX-1,HX-2
Color	Clear, Colorless	Clear, Colorless	Clear, Colorless	Hazy Yellow
Active Ingredient	Polyisobutylene	Polyisobutylene	Polyisobutylene	PProprietary
Diluent	White Oil	White Oil	White Oil	Vegetable Oil
Specific Gravity	0.845	0.86	0.86	0.93
Flash Point (COC)	135°C(275°F)	135°C(275°F)	135°C(275°F)	150°C(300°F)
Kinematic Viscosity	3,100 cSt @ 100°C	4,000 cSt @ 100°C	1600 cSt @ 100°C	2,500 cSt @ 40°C

Typical Treat Rates by Application

Chain Oil	0.5%	0.5%	0.5%	2.0%
Grease	2.0%	1.0%	2.0%	4.0%
Anti-Mist	0.2%	0.2%	0.1%	0.5%
Spindle Oils	0.3%	0.3%	0.1%	1.5%

For details on handling and blending with tackifiers, see the Functional Products brochure on **Tackifier Products**.

Oil and Water Soluble Corrosion Inhibitors

FUNCTIONAL CI-426, and low color variant **CI-427**, are oil-soluble ferrous corrosion inhibitors used at 0.2 - 0.3wt% to protect against rust in methods like ASTM D665 turbine oil rust test. Both corrosion inhibitors are based on amine phosphate chemistry and are soluble in petroleum oils, PAO, vegetable oil, ester, and other suitable base oils.

FUNCTIONAL CI-498 is a water-soluble ferrous corrosion inhibitor based on phosphate salts used at 0.3 - 0.5wt% to

protect against rust in methods like the ASTM D4627 cast iron chip rust test.

FUNCTIONAL CI-426, CI-427, and CI-498 are NSF HX-1/HX-2 registered and permitted in NSF H1/H2 incidental food contact lubricants up to 0.5wt%.

Typical Properties			
	CI-426	CI-427	CI-498
NSF Registration Number	120910	154971	120912
Category	HX-1, HX-2	HX-1, HX-2	HX-1, HX-2
Max. NSF Treat	0.5wt%	0.5wt%	Any
Solubility in Oil/Water	Oil Soluble	Oil Soluble	Water Soluble
Diluent Oil	None	None	Water
Form	Liquid	Liquid	Liquid
Color	Yellow	Colorless	Colorless
Odor	Mild Amine	Mild Amine	None
Specific Gravity	0.92	0.94	1.02
Flash Point	105°C (220°F)	100°C (212°F)	N/A
Kinematic Viscosity	500 cSt @ 40°C	600 cSt @ 40°C	1 cSt @ 40°C
pH	8.5 - 9.5	8.0 - 9.5	8.5 - 9.5
Phosphorus	6.3%	6.3%	5.7%
Sulfur	0%	0%	0%
Corrosion Testing in:	Canola Oil	Canola Oil	Water
ASTM D665A Distilled Water	Pass, 0.1wt%	Pass, 0.1wt%	—
ASTM D665B Sea Water	Pass, 0.3wt%	Pass, 0.3wt%	—
ASTM D4627 Iron Chip Corrosion	—	—	Pass, 0.2wt%

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.

Anti-Wear Additives

FUNCTIONAL CI-426EP, CI-446EP, and CI-526EP are multi-functional packages used at up to 2wt% to deliver anti-wear and mild extreme pressure additives with corrosion inhibitor. These packages are ideal for protection in less severe applications: light-duty hydraulics and pneumatics, chain oils, spindles oils, and more.

FUNCTIONAL CI-426EP, CI-446EP, and CI-526EP are NSF HX-1/HX-2 registered and suitable to use at up to 2wt% in NSF H1/H2 incidental food contact lubricants and greases. **FUNCTIONAL CI-446EP and CI-526EP** are sulfur-free.

Typical Properties			
	CI-426EP	CI-446EP	CI-526EP
NSF Registration Number	138503	158355	158356
Category	HX-1, HX-2	HX-1, HX-2	HX-1, HX-2
Max. NSF Treat	2.0wt%	2.0wt%	2.0wt%
Solubility in Oil/Water	Oil Soluble	Oil Soluble	Oil Soluble
Diluent Oil	Ester	White Oil	Ester
Form	Liquid	Liquid	Liquid
Color	Yellow	Slight Yellow	Slight Yellow
Odor	Mild Amine	Mild Amine	Mild Amine
Specific Gravity	0.92	0.90	0.93
Flash Point	105°C (220°F)	105°C (220°F)	105°C (220°F)
Kinematic Viscosity	45 cSt @ 40°C	20 cSt @ 40°C	30 cSt @ 40°C
pH	7.0 - 8.0	7.0 - 8.0	7.0 - 8.0
Phosphorus	3.6%	3.75%	3.75%
Sulfur	2.0%	0%	0%
Performance Testing at 2wt% treat:	Canola Oil	ISO 32 White Oil	Water
Turbine Oil Rust, ASTM D665B	Pass	Pass	PASS
Wear Scar, ASTM D4172	0.31	0.38	0.38
EP Weld Load, ASTM D2783	160	126	200

Extreme Pressure Additive Ceramax

FUNCTIONAL CERAMAX products deliver micronized boron nitride particles to protect against extreme pressure and metal-to-metal contact in heavily loaded NSF H1/H2 greases. This chemistry offers NSF HX-1 status, exceptional temperature resistance, wear protection, and very low color versus graphite, MoS₂, and PTFE alternatives.

FUNCTIONAL CERAMAX (NSF #143817, HX-1/HX-2) is a white powder that allows maximum flexibility when formulating your grease. Typical use is 1wt%.

FUNCTIONAL CERAMAX PASTE (NSF #147508, HX-1/HX-2) is a pre-dispersed mixture for ease of processing and handling. Typical use is 5wt%.

Viscosity Modifiers

Viscosity modifiers are used to increase the viscosity of light base oils to a desired viscosity while maintaining excellent low temperature fluidity and additive solvency. A single viscosity modifier and base oil can prepare many viscosity grades. Viscosity modifiers typically increase viscosity index of oil and prevent oil from thinning out at high temperature.

FUNCTIONAL V-425 is an olefin copolymer (OCP) viscosity modifier and tackifier in H1 white oil used to modify

lubricants and greases based on white oil, PAO, or other hydrocarbons. **FUNCTIONAL V-460** is a more shear stable OCP viscosity modifier suitable for food grade lubricants with longer service life under greater mechanical stress.

FUNCTIONAL V-508F is compatible in vegetable oils, other triglycerides, and synthetic esters to prepare biobased lubricants like high temperature chain oils and ecofriendly hydraulic fluids. **FUNCTIONAL V-508F** is LuSC listed for EU Ecolabel and Vessel General Permit (VGP) applications.

Typical Properties			
	V-425	V-460	V-508F
NSF Reg. No.	120905	142396	146677
Category	HX-1, HX-2	HX-1, HX-2	HX-1, HX-2
Color	Clear, Colorless	Clear, Colorless	Hazy Yellow
Active Ingredient	Olefin Copolymer	Olefin Copolymer	Proprietary
Diluent	White Oil	White Oil	Natural Ester
Specific Gravity	0.845	0.86	0.91
Flash Point (COC)	135°C (275°F)	150°C (300°F)	168°C (335°F)
PSSI (ASTMD D6278)	>50%	22%	29%
Thickening Efficiency	13 cSt (10% in ISO 22 @100°C)	12 cSt (10% in ISO 22 @100°C)	22.9 cSt (10% in Canola Oil @40°C)
Kinematic Viscosity	3000 cSt at 100°C	3000 cSt at 100°C	7000 cSt at 100°C

Typical Treat Rates by Application			
Chain Oil	4%	15%	8%
Grease	2%	5%	5%
Anti-Mist	0.5%	—	—

For details on handling and blending with viscosity modifiers, see the Functional Products brochure on **Industrial Products**.

Grease Polymers

FUNCTIONAL V-211 is used at 0.5-1.0wt% to improve water resistance of grease per ASTM D4049 (water spray-off) and ASTM D1264 (water washout). **FUNCTIONAL V-4064** is used at 1-2wt% to reduce ASTM D6184 oil bleed and improve mechanical stability ASTM D1831.

For details on using grease polymers, see the Functional Products brochure on **Grease**.

Typical Properties		
	V-211	V-4064
NSF Registration Number	159030	158171
Category	HX-1, HX-2	HX-1, HX-2
Chemistry	Styrene OCP	OCP
Appearance	White Flake	White Flake
Typical Treat	1wt%	2wt%

Coupling Agents

Coupling agents are a blend of esters used to increase the polarity of H1 white oil or synthetic PAOs and their compatibility with additives like antioxidants and anti-wear/EP. Treat level of **FUNCTIONAL CA-447** is typically two parts agent to one part additive to be dissolved. 4wt% is sufficient to impart seal swelling.

Typical Properties	
	CA-447
NSF Reg Number	120909
Category	HX-1, HX-2
Appearance	Clear, Colorless Liquid
Odor	Mild or None
Specific Gravity	0.913
Flash Point	135°C (275°F)
Kinematic Viscosity	12 cSt at 40°C

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