

**FUNCTIONAL PRODUCTS INC.**  
**Innovative Chemistry for Lubricants**

# Metalworking Additives



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8282 Bavaria Road, Macedonia, Ohio, USA 44056 • 1-330-963-3060 • January 2026

## Sulfur Carriers

Sulfur is a key component of heavy duty metal forming operations.

Product	% Total Sulfur	% Active / % Inactive	Feedstock Chemistry	Copper Corrosion	Color	Core Chemistry	Note
EP-203	38%	34% / <5%	Olefin	1B	Red/Brown	Olefin Sulfide	Passivated

## Phosphorus Carriers

Phosphorus helps in cutting operations, provides low friction, and can act as a rust inhibitor.

Product	wt% P	Form	Core Chemistry	Note
AW-116	9.0%	Liquid	Amine Phosphate; Acidic	-
CI-427	6.4%	Liquid	Amine Phosphate; Neutral	CAS# 80939-62-4
CI-426	5.5%	Liquid	Amine Phosphate; Neutral	-
AW-354	5.3%	Liquid	Fatty Phosphate; Neutral	-
CI-426EP	3.6%	Liquid	Amine Phosphate; Neutral	2.0% Sulfur

## Solid Lubricants

Solid lubricants are critical for boundary lubrication conditions to prevent metal-metal contact and galling.

**FUNCTIONAL CERAMAX** boron nitride technology offers exceedingly high operating temperatures and performance in a wide range of conditions versus graphite or other solid lubricants.

Product	Suggested wt%	Form	Core Chemistry	Note
CERAMAX	1wt%	Powder	Boron Nitride	Micronized powder; NSF HX-1
CERAMAX Paste	5wt%	Paste	Boron Nitride	20wt% <b>CERAMAX</b> ; extra lubricity; NSF HX-1
CERAMAX Paste AF	5wt%	Paste	Boron Nitride	Animal-free version of <b>CERAMAX Paste</b>

## Viscosity Modifiers

Viscosity modifiers provide a convenient means of increasing the viscosity of an oil to provide greater film thickness and load carrying capability. See the **Viscosity Modifiers** brochure.

Product	Form or Viscosity, 100°C, cSt	Chemistry	Soluble In	Note
V-158FN	Liquid, 1400 cSt	OCP	Hydrocarbon	Economical 50 SSI OCP
V-166	Liquid, 1200 cSt	OCP	Hydrocarbon	Workhorse 35 SSI OCP
V-731	Liquid, 1100 cSt	EPO	Hydrocarbon	Very high flashpoint and shear stability
V-739	Liquid, 60000 cSt	EPO	Hydrocarbon	Very high flashpoint and shear stability
V-508M	Liquid, 2500 cSt	Biobased	Esters	Soluble in biobased and synthetic esters
V-840	Liquid, 1900 cSt	Proprietary	Water/Glycol	Soluble in water/glycol formulas

## Tackifiers

Tackifiers are used to improve the cling and prevent fling-off of lubricants on high speed workpieces. These additives also produce higher surface film thickness even in low viscosity oils.

Product	Suggested wt%	Viscosity, cSt	Soluble In	Note
V-178	0.1wt%	4000 cSt @ 100°C	Hydrocarbon	PIB based tackifier for machining oils
V-584	0.1wt%	2500 @ 40°C	Ester	Biobased tackifier for esters and vegetable oils
V-802	0.1wt%	60000 cSt @ 40°C	Water	Aqueous tackifier/antimist for water-based lubricants

## Antimisting Additives

Low viscosity products like cutting and grinding oils can provide high levels of fine mist which pose a risk of inhalation or combustion. Antimisting additives are highly effective at reducing the occurrence of mist and create larger oil droplet sizes for safer operation.

Product	Suggested wt%	Viscosity, cSt	Soluble In	Note
V-162	0.1wt%	750 cSt @ 40C	Petroleum	Petroleum based antimisting additive
MW-612	0.1wt%	Liquid Emulsion	Emulsions	Emulsion based antimisting additive
V-802	0.5wt%	60000 cSt @ 40C	Water	Aqueous tackifier/antimist for water-based lubricants

## Quench Oil Packages

Quench oils are used to rapidly cool high temperature parts to induce the desired level of hardness to the metal. Use 2wt% **FUNCTIONAL V-731** viscosity modifier as a quench accelerator for faster quench speed.

Product	Suggested wt%	Chemistry	Application Note
Q-145	2-3%	Sulfonate	Economic quench oil package for oil-based quench oil
Q-249	2-3%	Sulfonate	Premium quench oil package for oil-based quench oil
V-731	2%	EPO	Quench oil accelerator (1100 cSt @ 100°C)

## Slideway and Spindle Oil Packages

Slideway lubricants, way oils, and spindle oil formulations are versatile lubricants for machining equipment. **FUNCTIONAL WA-64** and **WA-60SF** are time-tested packages for formulating a wide range of products.

Product	Suggested wt%	Chemistry	Application Note
WA-64	1.75%	Ashless	GM LS-2, low color/odor
WA-60SF	1.50%	Ashless	Sulfur-free for low color and use on yellow metals

## Emulsifying Additive Packages

These packages are antiwear and EP packages designed to form emulsions between the lubricant and water.

Product	Suggested wt%	Chemistry	Application Note
RD-350	1.8%	Ashless	Emulsifying EP package for petroleum rock drill and air tool
RD-540	2.2%	Ashless	Industrial rock drill package for biobased
SGP-563	1.5%	Biobased	Low friction forestry and saw guide oil package (Ecolabel)

## Rust Preventive Packages

RO packages focus on oxidation and rust protection and carry less antiwear or EP than heavy duty lubricants. These products are used to keep freshly machined parts from oxidizing.

Product	Suggested wt%	Chemistry	Application Note
RO-100	1%	Proprietary	Rust and oxidation package for R&O oils/lubricants
RO-135	50%	Proprietary	Rust preventive spray concentrate

Amine phosphates **FUNCTIONAL CI-426** and **CI-427** from the **Phosphorus Carriers** section on page 3 are also versatile and high effective ferrous corrosion inhibitors at 0.2-0.3wt%.

## Defoamers and Demulsifiers

Defoamers are used to eliminate surface foam and entrained air. Demulsifiers are used to prevent or break emulsion between water or coolant and the lubricant. Functional Products supplies multiple chemistries for both categories due to the highly selective nature of surface active additives like defoamers and demulsifiers. Test at multiple wt% (0.05%, 0.10%, 0.20%) to find the ideal treat rate.

Product	Suggested wt%	Chemistry	Application Note
DF-110	0.1%	Silicone	Industrial silicone defoamer.
DF-130	0.1%	Silicone	Defoamer for high temperature Seq II or IV foam in ASTM 892.
DF-400	0.1%	Silicone	EAL/HX-1 silicone-based defoamer, very versatile
DF-500	0.1%	Acrylate	EAL acrylate-based defoamer for fatty esters, veg oil
DM-240	0.1%	Proprietary	Highly effective demulsifier
DM-400	0.1%	Proprietary	EAL/HX-1 demulsifier

Not finding exactly what you need?  
We can help you navigate your options –  
[sales@functionalproducts.com](mailto:sales@functionalproducts.com)