



Vanderbilt Worldwide Ltd
A Wholly Owned Subsidiary of R.T. Vanderbilt Holding Company, Inc.



LUBRICANT **ADDITIVES**

LUBRICANT ADDITIVES



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CONTACT



CUVAN®
Corrosion Inhibitor

MOLYVAN®
Antiwear Compound
Friction Reducer

NACAP®
Corrosion Inhibitor
Metal Deactivator

VANLUBE®
Lubricant Additive

VANCHEM®
Corrosion Inhibitor
Metal Deactivator

Committed to the European Market

Our team of highly trained professionals, dedicated strictly to the lubrication market, gives us the ability to be responsive to your needs from both a technical as well as a commercial perspective, and in doing so provide a level of service second to none.

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TABLE OF CONTENTS

| Page | Product | Category | | | | | | | | | | | |
|-------|------------------------------|-----------------|------------------|------------------|-------------------|-------|---------------------------------------|--------------------|-------------------|------------------------|-----------------|---------------------------------|-------|
| 1 & 2 | Quick-Scan Application Guide | | | | | | | | | | | | |
| | | Antioxidants | | | | | Antiwear & Extreme Pressure Additives | Metal Deactivators | Friction Reducers | Chemical Intermediates | Rust Inhibitors | Multi-Purpose Additive Packages | Other |
| | | Aromatic Amines | Hindered Phenols | Sulfur Compounds | Organo-molybdenum | Other | | | | | | | |
| 3 | CUVAN® 303 | | | | | | | ♦ | | | | | |
| 3 | CUVAN 313 | | | | | | | ♦ | | | | | |
| 3 | CUVAN 484 | | | | | | | ♦ | | | | | |
| 4 | CUVAN 826 | | | | | | | ♦ | | | | | |
| 4 | MOLYVAN® A | | | | ♦ | | ♦ | | ♦ | | | | |
| 4 | MOLYVAN L | | | | ♦ | | ♦ | | ♦ | | | | |
| 5 | MOLYVAN FEI Plus | | | | ♦ | | | | | | | ♦ | |
| 5 | MOLYVAN 807 NT | | | | ♦ | | ♦ | | ♦ | | | | |
| 5 | MOLYVAN 822 NT | | | | ♦ | | ♦ | | ♦ | | | | |
| 6 | MOLYVAN 855 | | | | ♦ | | | | ♦ | | | | |
| 6 | MOLYVAN 3000 | | | | ♦ | | ♦ | | ♦ | | | | |
| 6 | NACAP® | | | | | | | ♦ | | ♦ | | | |
| 7 | VANCHEM™ DMTD | | | | | | | ♦ | | ♦ | | | |
| 7 | VANCHEM NATD | | | | | | | ♦ | | ♦ | | | |
| 7 | VANLUBE® AZ | | | ♦ | | | | | | | | | |
| 8 | VANLUBE EZ | | | ♦ | | | ♦ | | | | | | |
| 8 | VANLUBE PA | | | | | ♦ | | | | | | | |
| 8 | VANLUBE RD | ♦ | | | | | | | | | | | |
| 9 | VANLUBE SB | | | | | | ♦ | | | | | | |
| 9 | VANLUBE SN | ♦ | ♦ | ♦ | ♦ | ♦ | | | | | | ♦ | |
| 9 | VANLUBE SS | ♦ | | | | | | | | | | | |
| 10 | VANLUBE BHC | | ♦ | | | | | | | | | | |
| 10 | VANLUBE DND | ♦ | | | | | | | | | | | |
| 10 | VANLUBE RI-A | | | | | | | | | | ♦ | | |
| 11 | VANLUBE RI-G | | | | | | | | | | ♦ | | |
| 11 | VANLUBE RI-BSN | | | | | | | | | | ♦ | | |
| 11 | VANLUBE RI-CSN | | | | | | | | | | ♦ | | |
| 12 | VANLUBE RI-ZSN | | | | | | | | | | ♦ | | |
| 12 | VANLUBE TK-100 | | | | | | | | | | | | ♦ |
| 12 | VANLUBE W-324 | | | | | | ♦ | | ♦ | | | | ♦ |
| 13 | VANLUBE 73 | | | | | | ♦ | | | | | | |
| 13 | VANLUBE 73 Super Plus | | | | | | ♦ | | | | | | |
| 13 | VANLUBE 81 | ♦ | | | | | | | | | | | |
| 14 | VANLUBE 289 | | | | | | ♦ | | | | | | |

| Page | Product | Category | | | | | | | | | | | |
|------|--------------------------|-----------------|------------------|------------------|-------------------|-------|---------------------------------------|--------------------|-------------------|------------------------|-----------------|---------------------------------|-------|
| | | Antioxidants | | | | | Antiwear & Extreme Pressure Additives | Metal Deactivators | Friction Reducers | Chemical Intermediates | Rust Inhibitors | Multi-Purpose Additive Packages | Other |
| | | Aromatic Amines | Hindered Phenols | Sulfur Compounds | Organo-molybdenum | Other | | | | | | | |
| 14 | VANLUBE [®] 407 | | | | | ♦ | | | | | | | |
| 14 | VANLUBE 601 | | | | | | | ♦ | | | | | |
| 15 | VANLUBE 601E | | | | | | | ♦ | | | | | |
| 15 | VANLUBE 622 | | | | | | ♦ | | ♦ | | | | |
| 15 | VANLUBE 672E | | | | | | ♦ | | | | | | |
| 16 | VANLUBE 692E | | | | | | ♦ | | | | | | |
| 16 | VANLUBE 704S | | | | | | | ♦ | | | ♦ | | |
| 16 | VANLUBE 719 | | | | | | ♦ | | | | | | |
| 17 | VANLUBE 727 | | | | | | ♦ | | | | | | |
| 17 | VANLUBE 739 | | | | | | | | | | ♦ | | |
| 17 | VANLUBE 829 | | | | | | ♦ | | | | | | |
| 18 | VANLUBE 871 | | | | | | ♦ | | | | | | |
| 18 | VANLUBE 887 | ♦ | | | | | | | | | | | |
| 18 | VANLUBE 887E | ♦ | | | | | | | | | | | |
| 19 | VANLUBE 887 FG | ♦ | | | | | | | | | | | |
| 19 | VANLUBE 961 | ♦ | | | | | | | | | | | |
| 19 | VANLUBE 972M | | | | | | ♦ | | | | | | |
| 20 | VANLUBE 972 NT | | | | | | ♦ | | | | | | |
| 20 | VANLUBE 981 | | | ♦ | | | | | | | | | |
| 20 | VANLUBE 996E | | | ♦ | | | | | | | | | |
| 21 | VANLUBE 0902 | | | | | | | | | | | ♦ | ♦ |
| 21 | VANLUBE 1061 | ♦ | | | | | | | | | | | |
| 21 | VANLUBE 1202 | ♦ | | | | | | | | | | | |
| 22 | VANLUBE 2305 | ♦ | ♦ | | | | | | | | | | |
| 22 | VANLUBE 7611M | | | | | | ♦ | | | | | | |
| 22 | VANLUBE 7723 | | | ♦ | | | | | | | | | |
| 23 | VANLUBE 8610 | | | ♦ | | | ♦ | | | | | | |
| 23 | VANLUBE 8912E | | | | | | | | | | ♦ | | |
| 23 | VANLUBE 9123 | | | | | | ♦ | | | | ♦ | | |
| 24 | VANLUBE 9317 | ♦ | | | | | | | | | | | |

This brochure contains brief descriptions of most of the products sold by Vanderbilt Chemicals, LLC to the lubricating oil and grease industry. The products not included in this brochure are either experimental, or those that are only available on a local basis. We also welcome inquiries with regard to custom-made lubricants or joint research projects. For more detailed information, please contact your Vanderbilt Worldwide Technical Sales Representative, or email us at info@vanderbiltworldwide.com.

Vanderbilt Chemicals, LLC will continuously improve all products and services to consistently meet customer expectations the first time and every time.

Quick-Scan

APPLICATION/ FUNCTION GUIDE

| APPLICATION | FUNCTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | Ashless | High Temp. | Antioxidant | Antiwear/ Antiscuff | Friction Reducer | Corrosion Inhibitor | Demulsifier | Chemical Intermediate | Extreme Pressure | Metal Deactivator | Rust Inhibitor | Water-Based Fluids | Auto Transmission Fluid | Compressor Oil | Engine Oil | Fuel | Gear Oil | Grease | Hydraulic Oil | Metalworking | Rust Preventive | Synthetic Lube | Turbine Oil | CUVAN® 303 | CUVAN 313 | CUVAN 484 | CUVAN 826 | MOLYVAN® A | MOLYVAN L | MOLYVAN FEI Plus | MOLYVAN 807 NT | MOLYVAN 822 NT | MOLYVAN 855 | MOLYVAN 3000 | NACAP® | VANCHEM™ DMTD | VANCHEM NATD | VANLUBE® AZ | VANLUBE EZ | VANLUBE PA | VANLUBE RD | VANLUBE BHC | VANLUBE DND | VANLUBE RI-A | VANLUBE RI-G | VANLUBE RI-BSN | VANLUBE RI-CSN | VANLUBE RI-ZSN | VANLUBE SB | VANLUBE SN | VANLUBE SS | VANLUBE TK-100* | VANLUBE W-324 | VANLUBE 73 | VANLUBE 73 Super Plus | VANLUBE 81 | VANLUBE 289 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Coolant | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

✓ = Application/Function 1 = Primary Function

2 = Secondary Function

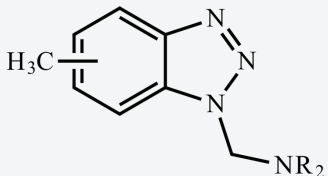
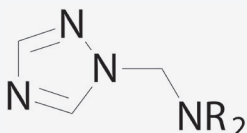
* = Tackifier

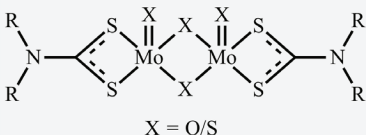
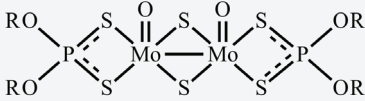
| APPLICATION | VANLUBE 407 | VANLUBE 601 | VANLUBE 601E | VANLUBE 622 | VANLUBE 672E | VANLUBE 692E | VANLUBE 704S | VANLUBE 719 | VANLUBE 727 | VANLUBE 739 | VANLUBE 829 | VANLUBE 871 | VANLUBE 887 | VANLUBE 887E | VANLUBE 887 FG | VANLUBE 961 | VANLUBE 972M | VANLUBE 972 NT | VANLUBE 981 | VANLUBE 996E | VANLUBE 0902 | VANLUBE 1061 | VANLUBE 1202 | VANLUBE 2305 | VANLUBE 7611M | VANLUBE 7723 | VANLUBE 8610 | VANLUBE 8912E | VANLUBE 9123 | VANLUBE 9317 |
|-------------------------|-------------|-------------|--------------|-------------|--------------|--------------|--------------|-------------|-------------|-------------|-------------|-------------|-------------|--------------|----------------|-------------|--------------|----------------|-------------|--------------|--------------|--------------|--------------|--------------|---------------|--------------|--------------|---------------|--------------|--------------|
| Coolant | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Water-Based Fluids | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Auto Transmission Fluid | | | | | | | | | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | | | | ✓ | | ✓ | | | ✓ | | | | | |
| Compressor Oil | ✓ | | | | | | | | | ✓ | | | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | | ✓ | ✓ | | | ✓ | | | | ✓ |
| Engine Oil | ✓ | | | ✓ | | | | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | ✓ | | ✓ | ✓ | ✓ | ✓ | | | | | |
| Fuel | | ✓ | ✓ | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gear Oil | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | | | | ✓ | ✓ | ✓ | ✓ | |
| Grease | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| Hydraulic Oil | ✓ | ✓ | ✓ | | | | ✓ | | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | | ✓ | | | ✓ | ✓ | | ✓ | | |
| Metalworking | | ✓ | ✓ | | ✓ | ✓ | ✓ | ✓ | ✓ | | | | | | | | | | | ✓ | | | | | ✓ | | | ✓ | | |
| Rust Preventive | | | | | | | | | | | | | | | | | | | | | | | | | | | | ✓ | ✓ | |
| Synthetic Lube | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | | | ✓ |
| Turbine Oil | ✓ | ✓ | ✓ | | | | ✓ | | | ✓ | | | ✓ | ✓ | ✓ | ✓ | | | ✓ | ✓ | | ✓ | ✓ | | | ✓ | | ✓ | | |
| FUNCTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ashless | ✓ | ✓ | ✓ | | ✓ | ✓ | | | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | | ✓ | ✓ | | | ✓ | ✓ |
| High Temp. | ✓ | | | | | | | | | | ✓ | | ✓ | ✓ | ✓ | | | | ✓ | ✓ | | ✓ | ✓ | | | ✓ | | | | ✓ |
| Antioxidant | 1 | 2 | 2 | 2 | 2 | 2 | | 2 | 2 | | 2 | 2 | 1 | 1 | 1 | 1 | | | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | | | 1 |
| Antiwear/Antiscuff | | | | 1 | 1 | 2 | | 2 | 1 | | 2 | 1 | | | | | 2 | 2 | 2 | | 1 | | | 1 | 1 | 2 | 2 | | 1 | |
| Friction Reducer | | | | 1 | | | | | | | 2 | | | | | | | | 2 | | | | | 1 | | 2 | | | | |
| Corrosion Inhibitor | | 1 | 1 | | | | 1 | | | 2 | 2 | | | | | | | | | 2 | 2 | | | | | | | 2 | | |
| Demulsifier | | | | | | | 2 | | | | | | | | | | | | | | | | | | | | | | | |
| Chemical Intermediate | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Extreme Pressure | | | | 1 | 1 | 1 | | 1 | | | 1 | | | | | | 1 | 1 | 2 | | 1 | | | | | 1 | 1 | | | |
| Metal Deactivator | | 1 | 1 | | | | 1 | | | 2 | | | | | | | 2 | 2 | | 2 | | | | | | | | | | |
| Rust Inhibitor | | | | | | | 1 | | 1 | | | | | | | | | | | | 2 | | | | | | | 1 | 1 | |

✓ = Application/Function

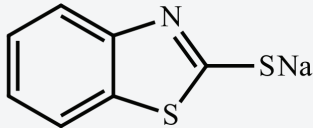

1 = Primary Function

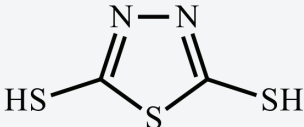
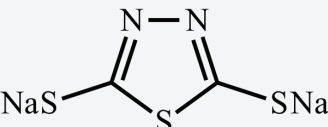
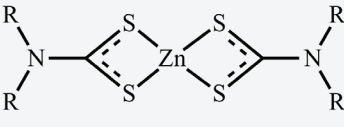
2 = Secondary Function

| | CUVAN® 303 Metal Deactivator | CUVAN 313 Metal Deactivator | CUVAN 484 Metal Deactivator |
|--|--|--|--|
| Formula |  |  | Proprietary |
| Application | Auto Transmission Fluid, Compressor Oil, Engine Oil, Fuel, Gear Oil, Grease, Hydraulic Oil, Metalworking, Synthetic Lube, Turbine Oil | Auto Transmission Fluid, Compressor Oil, Engine Oil, Fuel, Gear Oil, Grease, Hydraulic Oil, Synthetic Lube, Turbine Oil. | Compressor Oil, Engine Oil, Gear Oil, Grease, Hydraulic Oil, Metalworking, Turbine Oil |
| Function | Ashless, Corrosion Inhibitor, Metal Deactivator | Ashless, Antioxidant | Ashless, Antioxidant, Antiwear/Antiscuff, Corrosion Inhibitor, Metal Deactivator |
| Chemical Composition | N, N-bis(2-ethylhexyl)-4-methyl-1H-benzotriazole-1-methanamine | N,N-bis(2-ethylhexyl)-1,2,4-triazole-1-methanamine | 2,5 dimercapto-1,3,4-thiadiazole derivative |
| Physical State | Liquid | Liquid | Liquid |
| Color | Amber | Light Yellow | Amber |
| Density @ 15.6°C Mg/m³ (lb/gal) | 0.95 (7.9) @ 25°C | 0.92 (7.7) | 1.07 (8.9) |
| Viscosity @ 100°C mm²/s | 5.81 | 4 | 11 |
| Flash Point (PMCC), °C | 125 | 158 | 76 |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 0.05 - 0.20 | 0.05 – 0.20 | 0.10 - 0.50 |
| Typical Uses | <p>CUVAN 303 is an oil-soluble corrosion inhibitor and metal deactivator for lubricants, greases and metalworking fluids. As a corrosion inhibitor, it is effective in protecting copper, copper alloys, cadmium, cobalt, silver and zinc. As a metal deactivator, it is effective in precipitating ions of the same metals, thus preventing galvanic corrosion of other metal surfaces and inhibiting these ions from acting as oxidation catalysts.</p> <p>NSF® Certified HX-1, 138995</p> | <p>CUVAN 313 is an oil-soluble corrosion inhibitor and metal deactivator for automotive and industrial lubricants, greases, and metalworking fluids. As a corrosion inhibitor, it is effective in protecting copper, copper alloys, cadmium, cobalt, silver, and zinc. As a metal deactivator, it is effective in precipitating ions of the same metals, thus preventing galvanic corrosion of other metal surfaces and inhibiting these ions from acting as oxidation catalysts.</p> | <p>CUVAN 484 is an ashless oil-soluble corrosion inhibitor and metal deactivator for nonferrous metals, particularly for copper. Useful in industrial and automotive oils and greases, metalworking fluids, etc. CUVAN 484 may also enhance the antiwear and oxidation properties of lubricants.</p> |

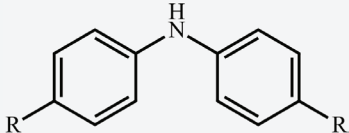
| | CUVAN® 826 Metal Deactivator | MOLYVAN® A Friction Reducer | MOLYVAN L Friction Reducer |
|--|--|---|---|
| Formula | Proprietary |  X = O/S |  |
| Application | Compressor Oil, Engine Oil, Fuel, Gear Oil, Grease, Hydraulic Oil, Metalworking, Turbine Oil | Grease, Synthetic Lube | Engine Oil, Gear Oil, Grease, Metalworking, Synthetic Lube |
| Function | Ashless, Antioxidant, Corrosion Inhibitor, Metal Deactivator | High Temperature, Antioxidant, Antiwear/Antiscuff, Friction Reducer, Extreme Pressure | Antioxidant, Antiwear/Antiscuff, Friction Reducer, Extreme Pressure |
| Chemical Composition | 2,5 dimercapto-1,3,4-thiadiazole derivative | Molybdenum di-n-butylthio-carbamate | Molybdenum di(2-ethylhexyl)phosphorodithioate |
| Physical State | Liquid | Powder | Liquid |
| Color | Amber | Yellow | Dark Green |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.04 (8.7) | 1.59 @ 25°C | 1.08 (9.0) |
| Viscosity @ 100°C mm²/s | 3.32 | — | 8.6 |
| Flash Point (PMCC), °C | 192 | — | 142 |
| Solubility | Soluble in petroleum lubricating bases. | Slightly soluble in aromatic hydrocarbons. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 0.10 - 0.50 | 0.5 - 3.0 | 0.25 - 1.0 |
| Typical Uses | <p>CUVAN 826 is a ashless oil-soluble corrosion inhibitor and metal deactivator for nonferrous metals, particularly for copper. It is useful in industrial and automotive oils and greases, metalworking fluids, etc. CUVAN 826 has a unique composition that enables it to suppress the corrosive action of hydrogen sulfide.</p> | <p>MOLYVAN A is used in long life chassis greases for ball joints, steering linkages and other lubricating greases requiring good antioxidant and antiwear at high temperatures for long periods of time. It is an organic molybdenum extreme pressure and antiwear additive for petroleum and synthetic lubricants. It has good high temperature stability. In lubricating greases it is superior to inorganic molybdenum additives for both antiwear and antioxidant properties. MOLYVAN A is slightly basic and does not promote rusting. It has a low specific gravity which makes it easy to disperse with simple equipment. It is used in non-petroleum base valve lubricants.</p> <p>Not recommended for diesel engine oils without proper corrosion testing and voluntary assumption of risk.</p> | <p>MOLYVAN L is an oil-soluble organic molybdenum additive containing sulfur and phosphorus. It functions as a friction reducer, antioxidant, antiwear, and extreme pressure agent. It is used in engine oils, metalworking compositions and in a variety of industrial and automotive lubricating oils, greases and specialties.</p> <p>MOLYVAN L is an outstanding antiwear agent. It is quite useful in automotive and industrial gear oils and greases which operate under heavy load conditions. Not recommended for diesel engine oils without proper corrosion testing and voluntary assumption of risk.</p> |

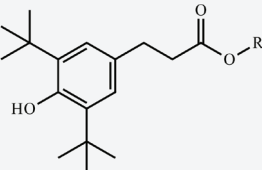
| | MOLYVAN® FEI PLUS Friction Reducer | MOLYVAN 807 NT Friction Reducer | MOLYVAN 822 NT Friction Reducer |
|--|---|--|--|
| Formula | Proprietary | Proprietary | Proprietary |
| Application | Engine Oil | Engine Oil, Gear Oil, Grease, Synthetic Lube | Engine Oil, Gear Oil, Grease, Synthetic Lube |
| Function | Friction Reducer, Antioxidant, Antiwear | Antioxidant, Antiwear/Antiscuff, Friction Reducer, Extreme Pressure | Antioxidant, Antiwear/Antiscuff, Friction Reducer, Extreme Pressure |
| Chemical Composition | Antioxidant, Antiwear, Friction Reducer Blend | Molybdenum dialkyldithiocarbamate in oil | Molybdenum dialkyldithiocarbamate in oil |
| Physical State | Liquid | Liquid | Liquid |
| Color | Dark Amber to Brown | Dark Green | Brown |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.01 (8.4) @ 25°C | 0.97 (8.1) | 0.97 (8.1) |
| Viscosity @ 100°C mm²/s | 10.8 | 13 | 13 |
| Flash Point (PMCC), °C | 178 | 135 | 135 |
| Solubility | Soluble in petroleum and synthetic lubricant base stocks. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 0.1 - 4.0 | 0.25 - 0.5 | 0.25 - 0.5 |
| Typical Uses | <p>MOLYVAN FEI Plus is a lubricant composition that when combined with a dispersant, detergent, VI improver and base oil constitutes a low phosphorus, high molybdenum containing engine oil with enhanced fuel economy and catalyst compatibility.</p> <p>Not recommended for diesel engine oils without proper corrosion testing and voluntary assumption of risk.</p> | <p>MOLYVAN 807 NT offers a unique molybdenum-sulfur combination in an oil-soluble form which is easy to blend into lubricants. It can be used to maintain the antifriction properties of an engine oil while reducing the phosphorus content. To obtain significant increases in extreme pressure properties and to impart improved antiwear performance.</p> <p>MOLYVAN 807 NT can be used in combination with VANLUBE® 7723 Antioxidant, a nonmetallic dithiocarbamate which functions as an antioxidant and extreme pressure agent.</p> <p>Not recommended for diesel engine oils without proper corrosion testing and voluntary assumption of risk.</p> | <p>MOLYVAN 822 NT may be used to maintain or improve the antifriction properties of an engine oil while reducing the phosphorus content.</p> <p>Not recommended for diesel engine oils without proper corrosion testing and voluntary assumption of risk.</p> |

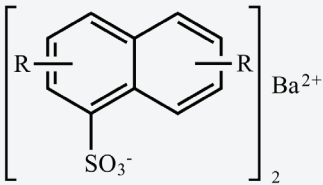
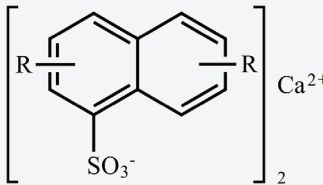
| | MOLYVAN® 855 Friction Reducer | MOLYVAN 3000 Friction Reducer | NACAP® Corrosion Inhibitor |
|--|---|--|---|
| Formula | Proprietary | Proprietary |  |
| Application | Engine Oil, Grease, Metalworking | Engine Oils, Gear Oils, Greases, Synthetic Lubes | Coolant, Water-Based Fluids |
| Function | Antioxidant, Antiwear/Antiscuff, Friction Reducer | Friction Reducer. Antiwear/Antiscuff, Extreme Pressure | Antioxidant, Corrosion Inhibitor, Chemical Intermediate, Metal Deactivator |
| Chemical Composition | Organomolybdenum complex | Molybdenum Dithiocarbamate in oil | Sodium 2-mercaptobenzothiazole, 50% aqueous solution |
| Physical State | Liquid | Liquid | Liquid |
| Color | Brown | Brown | Light Amber |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.08 (9.0) | 1.05 (8.8) | 1.27 (10.6) |
| Viscosity @ 100°C mm²/s | 55 | 50 - 100 | — |
| Flash Point (PMCC), °C | 193 | >145 | — |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic base oils. Insoluble in water. | Soluble in water, alcohols and glycols. Insoluble in petroleum hydrocarbons. |
| Use Concentration, % mass | 0.1 - 1.0 | 0.1 - 1.0 | 0.1 - 0.6 |
| Typical Uses | <p>MOLYVAN 855 is a liquid organomolybdenum friction reducer specifically designed for crankcase oils. MOLYVAN 855 provides engine oils with a substantial reduction in the coefficient of friction.</p> <p>Not recommended for diesel engine oils without proper corrosion testing and voluntary assumption of risk.</p>  | <p>MOLYVAN 3000 may be used to maintain or improve the antifriction properties of an engine oil while reducing the phosphorus content.</p> <p>Not recommended for diesel engine oils without proper corrosion testing and voluntary assumption of risk.</p> | <p>NACAP is a corrosion inhibitor for water, alcohol and glycol systems. It is particularly effective in preventing corrosion of copper and brass. Widely used in antifreeze, where it functions as a copper corrosion inhibitor and alkaline buffer. It is an excellent corrosion inhibitor for aluminum in systems where aluminum is used in the presence of copper and copper alloys. NACAP is one of the standard copper corrosion inhibitors for the antifreeze industry. Used as a chemical intermediate.</p> |

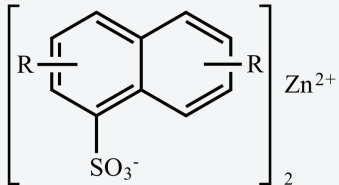
| | VANCHEM® DMTD Metal Deactivator | VANCHEM® NATD Metal Deactivator | VANLUBE® AZ Lubricant Additive |
|---|--|--|--|
| Formula |  |  |  |
| Application | Coolant, Water-Based Fluids, Metalworking | Coolant, Water-Based Fluids, Metalworking | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Metalworking, Rust Preventive, Synthetic Lube |
| Function | Ashless, Corrosion Inhibitor, Chemical Intermediate, Metal Deactivator | Corrosion Inhibitor, Chemical Intermediate, Metal Deactivator | Antioxidant, Antiwear/Antiscuff, Corrosion Inhibitor, Metal Deactivator |
| Chemical Composition | 2,5-dimercapto-1,3,4-thiadiazole | Disodium 2,5-dimercaptothiadiazole, 30% aqueous solution | Zinc diamyldithiocarbamate in oil |
| Physical State | Powder | Liquid | Liquid |
| Color | Cream to Light Yellow | Amber | Amber |
| Density @ 15.6°C Mg/m ³ (lb/gal) | 1.79 | 1.22 (10.2) | 1.02 (8.5) |
| Viscosity @ 100°C mm ² /s | — | — | 9.8 |
| Flash Point (PMCC), °C | — | — | 136 |
| Solubility | Soluble in water, ethanol, acetone and diesters. Slightly soluble in petroleum lubricant bases, hexane, petroleum ether, chloroform and toluene. | Soluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | Chemical Intermediate | 0.1 - 0.25 | 0.25 - 4.0 |
| Typical Uses | VANCHEM DMTD's common reactions are double decomposition reactions with soluble metal salts, salt formation with alkaline metal hydroxides, oxidation reactions involving mercaptans, addition reactions with organic compounds containing activated double bonds, reactions with epoxy groups, reactions with aldehydes and alcohols, salt formation with amines and ammonia and reactions with acyl chlorides. The two active sites on VANCHEM DMTD can generally be reacted successively. | VANCHEM NATD is a corrosion inhibitor and metal deactivator for nonferrous metals in aqueous systems. It is particularly indicated for the protection of solder, aluminum, copper and copper alloys. It is stable and active at lower pH values than many mercapto compounds. VANCHEM NATD is a stable reactive dimercaptide which is readily alkylated, oxidized to the disulfide, or converted to metal salts. | VANLUBE AZ is used in engine oils, in industrial oils, and in soap and clay-thickened greases. Used in both gasoline and diesel crankcase oils to inhibit oxidation, bearing corrosion and wear. Used in combination with detergents, it inhibits corrosion and wear by inhibiting oxidation of the oil and also by the formation of protective films on metal surfaces. Used as a partial replacement for zinc dithiophosphates. Because of its effectiveness at high temperatures, it is a good additive for crankcase oils in heavy duty service. In industrial oils and automatic transmission fluids it functions as a high temperature oxidation and corrosion inhibitor. Used in lubricating greases both as an oxidation inhibitor and metal deactivator. An excellent copper corrosion inhibitor of film-forming type. |

| | VANLUBE® EZ Antioxidant | VANLUBE PA Antioxidant | VANLUBE RD Antioxidant |
|---|--|--|---|
| Formula | Mixture of: | Proprietary | |
| Application | Gear Oil, Grease, Metalworking, Synthetic Lube | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Hydraulic Oil, Metalworking, Synthetic Lube, Turbine Oil | Grease, Synthetic Lube |
| Function | Antioxidant, Antiwear/Antiscuff, Extreme Pressure | Ashless, Antioxidant | Ashless, Antioxidant |
| Chemical Composition | Zinc diamyldithiocarbamate and diamyl ammonium diamyldithiocarbamate | Alkylated diphenylamines & sterically hindered phenol | Polymerized 1,2-dihydro-2,2,4-trimethylquinoline |
| Physical State | Liquid | Liquid | Small Pastilles |
| Color | Yellowish/Amber | Clear Yellow | Amber |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.10 (9.2) | 0.97 (8.1) | 1.06 |
| Viscosity @ 100°C mm²/s | 40 - 70 | 8 | — |
| Flash Point (PMCC), °C | 93 | 200 | — |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in diesters, polyalkylene glycol UCON™ fluids. Insoluble in water and petroleum oils. |
| Use Concentration, % mass | 0.1 - 2.0 | 0.1 - 2.0 | 0.1 - 1.0 |
| Typical Uses | VANLUBE EZ is a multifunctional additive that imparts excellent antiwear, extreme pressure, corrosion resistance and antioxidant properties to industrial lubricants and greases. It contains no diluent oil. | VANLUBE PA is a synergistic combination of alkylated diphenylamine (ADPA) and sterically hindered phenol. VANLUBE PA provides optimized antioxidant performance in many applications: Industrial Oils - turbine oil, hydraulic oils, compressor oils, heat transfer fluids, metalworking fluids and greases; Engine Oils - both passenger car and diesel engine oils; Automatic Transmission Fluids. | VANLUBE RD inhibits oxidation in polyglycols, Ucon® fluids and diester synthetic lubricants. Good high temperature inhibitor for both petroleum and synthetic lubricants. Widely used in Ucon and polyglycol brake fluids at concentrations of 0.1 to 0.25%. Prevents the depolymerization of polyoxyethylene and similar polymers. Used as a high temperature oxidation inhibitor in both petroleum and synthetic base lubricating greases. Effective in both static (ASTM grease pressure vessel) and dynamic (bearing life or spindle) oxidation tests. |

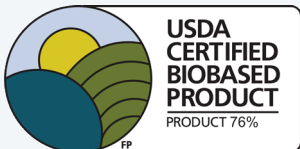
| | VANLUBE® SB Lubricant Additive | VANLUBE SN Antioxidant | VANLUBE SS Antioxidant |
|--|--|--|--|
| Formula | Proprietary | Proprietary |  |
| Application | Engine Oil, Gear Oil, Grease, Metalworking | Turbine Oils, Compressor Fluids, hydraulic fluids, automatic transmission fluids, engine oils, gear oils, industrial oils, greases | Auto Transmission Fluid, Compressor Oil, Engine Oil, Grease, Synthetic Lube, Turbine Oil |
| Function | Antiwear/Antiscuff, Extreme Pressure | Antioxidant | Ashless, High Temperature, Antioxidant |
| Chemical Composition | Sulfur-based additive | Alkylated diphenylamine/hindered phenol blend | Octylated diphenylamines |
| Physical State | Liquid | Liquid | Powder |
| Color | Amber | Light Brown | Light Tan |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.14 (9.5) | Density @ 25 °C Mg/m³ (lb/gal): 0.95 (7.90) | 1.02 |
| Viscosity @ 100°C mm²/s | 10 | 23 | — |
| Flash Point (PMCC), °C | 79 | Flash Point (CCC), °C: 211 | — |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in most mineral and synthetic oils. Not Soluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 1.0 - 2.0 | 0.1 - 2.0 | 0.5 - 2.0 |
| Typical Uses | <p>VANLUBE SB is a sulfur-based additive used in the formulation of industrial gear oils, automotive and industrial greases of various types, and other formulations where noncorrosive sulfur is desired. VANLUBE SB is an economical source of sulfur in a form that provides good load-carrying and antiwear properties combined with low copper corrosion.</p> | <p>VANLUBE SN is a synergistic liquid antioxidant blend composed of alkylated diphenylamines (ADPA) and a high molecular weight sterically hindered phenol (HP). It is a general-purpose antioxidant good for all types of lubricant applications such as turbine, compressor, hydraulic fluids, automatic transmission fluids (ATF), passenger car motor oils (PCMO), and heavy-duty diesel engine oils (HDDEO). VANLUBE SN can be used to boost the oxidation performance of older category engine oils.</p> | <p>VANLUBE SS is a general-purpose antioxidant. It is used as a high temperature antioxidant in petroleum and synthetic lubricants. Effective as an antioxidant and corrosion inhibitor in silane and siloxane synthetic lubricants - both in fluids and greases. Used in hydraulic fluids, various industrial oils, automatic transmission fluids and synthetic and petroleum-based engine oils.</p> <p>NSF® Certified HX-1, 155717</p> |

| | VANLUBE® BHC Antioxidant | VANLUBE DND Antioxidant | VANLUBE RI-A Lubricant Additive |
|---|--|--|--|
| Formula |  | Proprietary | Proprietary |
| Application | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Hydraulic Oil, Metalworking, Synthetic Lube, Turbine Oil | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Hydraulic Oil, R&O Circulating Oil, Synthetic Lube, Turbine Oil | Gear Oil, Grease, Hydraulic Oil, Rust Preventive, Turbine Oil |
| Function | Ashless, Antioxidant | Ashless, Antioxidant | Ashless, Corrosion Inhibitor, Rust Inhibitor |
| Chemical Composition | Butylated hydroxy-hydrocinnamate | Nonylated diphenylamine | Dodecenylsuccinic acid reaction product |
| Physical State | Liquid | Liquid | Liquid |
| Color | Yellowish | Amber to Brown | Amber |
| Density @ 15.6°C Mg/m³ (lb/gal) | 0.97 (8.1) | 0.95 (7.9) | 0.96 (8.0) @ 25°C |
| Viscosity @ 100°C mm²/s | 6.2 | 15 | 19 |
| Flash Point (PMCC), °C | 152 | > 200 °C | 165 |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum lubricant bases. |
| Use Concentration, % mass | 0.1 - 2.0 | 0.05 – 1.00 | 0.05 - 2.5 |
| Typical Uses | <p>VANLUBE BHC is an effective general purpose, nonstaining, ashless antioxidant that provides excellent oxidative stability to wide range of automotive and industrial lubricants. It has excellent solubility in mineral and non conventional base stocks, and contains no diluents. It is easy to handle and will not crystallize at low temperatures. It has low volatility and helps control oxidation and high temperature deposits especially when combined with alkylated diphenylamines, molybdenum compounds, sulfur-containing antioxidants and/or phosphites in many industrial oils and automotive lubricants.</p> | <p>VANLUBE DND is a liquid ashless antioxidant for use in oils and greases of various types. It may be used in industrial lubricants, including compressor, hydraulic, turbine, gas engine and R&O circulating oils. VANLUBE DND may be used as an ashless antioxidant in all types of crankcase oils.</p> | <p>VANLUBE RI-A is an oil-soluble rust inhibitor recommended for steam turbine oils, circulating oils and hydraulic oils. In industrial gear oils with extreme pressure additives, levels of approximately 0.25% are recommended. VANLUBE RI-A is most effective in greases when used with a sulfonate such as VANLUBE RI-BSN in a 50/50 ratio.</p> <p>NSF® Certified HX-2, 139738</p> |

| | VANLUBE® RI-G Lubricant Additive | VANLUBE RI-BSN Lubricant Additive | VANLUBE RI-CSN Lubricant Additive |
|---|--|--|---|
| Formula | Proprietary |  |  |
| Application | Gear Oil, Grease, Hydraulic Oil, Rust Preventive | Gear Oil, Grease, Hydraulic Oil, Metal Working Fluid, Rust Preventive, Turbine Oil | Gear Oil, Grease, Hydraulic oil, Metal Working Fluid, Rust Preventive, Turbine Oil |
| Function | Ashless, Corrosion Inhibitor, Rust Inhibitor | Corrosion Inhibitor, Rust Inhibitors, Demulsifier | Corrosion Inhibitor, Rust Inhibitor, Demulsifier |
| Chemical Composition | Fatty acid derivative of 4,5-dihydro-1H-imidazole | Neutral barium dinonylnaphthalene sulfonate in light mineral oil | Neutral calcium dinonylnaphthalene sulfonate in light mineral oil |
| Physical State | Liquid | Liquid | Liquid |
| Color | Amber | Dark Brown | Dark Brown |
| Density @ 15.6°C Mg/m³ (lb/gal) | 0.94 (7.8) | 1.01 (8.4) @ 20°C | 0.98 (8.2) |
| Viscosity @ 100°C mm²/s | 117 | 65.0 | 125 |
| Flash Point (PMCC), °C | 271 | >165 (COC) | >165 (COC) |
| Solubility | Soluble in petroleum lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 0.25 - 0.50 | 0.005 - 10.0 | 0.1 - 20.0 |
| Typical Uses | VANLUBE RI-G was specifically designed to provide excellent rust inhibition for greases. It is compatible with other VANLUBE extreme pressure, antioxidant and antiwear additives. | VANLUBE RI-BSN is an effective general purpose rust inhibitor recommended for use where excellent rust inhibition and water resistance are needed. It can be used in industrial lubricants operating in the presence of moisture such as paper machine oils, rock drill oils, turbine, hydraulic and circulating oils. It can also be used as rust inhibitor in lubricating greases and as rust preventive for metal parts from metalworking processes. | VANLUBE RI-CSN is an effective general purpose rust inhibitor recommended for use where excellent rust inhibition and water resistance are needed. It can be used in industrial lubricants operating in the presence of moisture such as paper machine oils, rock drill oils, turbine hydraulic and circulating oils. It can also be used as rust inhibitor in lubricating greases and as rust preventive for metal parts from metalworking processes. |

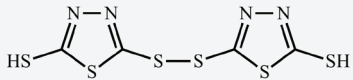
| | VANLUBE® RI-ZSN Lubricant Additive | VANLUBE TK-100 Lubricant Additive | VANLUBE W-324 Lubricant Additive |
|--|--|---|--|
| Formula |  | Proprietary | Proprietary |
| Application | Gear Oil, Grease, Hydraulic oil, Metal Working Fluid, Rust Preventive, Turbine Oil | Gear Oil, Grease, Metalworking, Rust Preventive | Engine Oils, Gear Oils, Grease, Synthetic Lubricants |
| Function | Corrosion Inhibitor, Rust Inhibitor, Demulsifier | Tackifier | Antiwear, Antioxidant and high temperature Friction Reducer |
| Chemical Composition | Neutral zinc dinonylnaphthalene sulfonate in light mineral oil | Solution of a copolymer of ethylene and propylene | Dialkylammonium Tungstate |
| Physical State | Liquid | Liquid | Liquid |
| Color | Dark Brown | Amber | Amber to Black |
| Density @ 15.6°C Mg/m³ (lb/gal) | 0.97 (8.1) | 0.89 (7.4) | — |
| Viscosity @ 100°C mm²/s | 32.0 | 4500 | 11.6 |
| Flash Point (PMCC), °C | >160 (COC) | 121 | >140 |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Only soluble in lubricants using dispersants. Insoluble in water. |
| Use Concentration, % mass | 0.1 - 20.0 | 0.5 - 5.0 | 0.01 - 0.5 |
| Typical Uses | <p>VANLUBE RI-ZSN is an effective general purpose rust inhibitor recommended for use where excellent rust inhibition and water resistance are needed. It can be used in industrial lubricants operating in the presence of moisture such as paper machine oils, rock drill oils, turbine hydraulic and circulating oils. It can also be used as rust inhibitor in lubricating greases and as rust preventive for metal parts from metalworking processes.</p> | <p>VANLUBE TK-100 is used to provide adherence in way oils, chain lubricants and greases. It provides excellent aerosol resistance in pneumatic system lubricants.</p> | <p>VANLUBE W 324 is a liquid additive that enhances the antioxidant, antiwear and friction properties of greases, engine oils and other lubricating oils.</p> |

| | VANLUBE® 73 Lubricant Additive | VANLUBE 73 Super Plus Lubricant Additive | VANLUBE 81 Antioxidant |
|--|--|--|--|
| Formula | | Proprietary | |
| Application | Compressor Oil, Engine Oil, Gear Oil, Grease, Synthetic Lube | Gear Oil, Grease | Auto Transmission Fluid, Compressor Oil, Engine Oil, Grease, Synthetic Lube, Turbine Oil |
| Function | Antioxidant, Antiwear/Antiscuff, Friction Reducer, Extreme Pressure | Antioxidant, Antiwear/Antiscuff, Extreme Pressure | Ashless, High Temperature, Antioxidant |
| Chemical Composition | Antimony tris(dialkyldithiocarbamate) in oil | Proprietary blend of dialkyldithiocarbamates | p,p'-dioctyldiphenylamine |
| Physical State | Clear to Hazy Liquid | Liquid | Powder |
| Color | Dark Amber | Amber | Off White |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.03 (8.6) | 1.10 (9.2) @ 25°C | 1.01 (8.4) |
| Viscosity @ 100°C mm²/s | 11 | 33.3 | — |
| Flash Point (PMCC), °C | 171 | >118 | — |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 0.1 - 1.0 as antioxidant, 2.0 - 5.0 as extreme pressure agent. | 2.0 - 4.0 | 0.5 - 2.0 |
| Typical Uses | <p>VANLUBE 73 is one of the most versatile of the dithiocarbamate additives. It has excellent antiwear, extreme pressure and antioxidant properties. It is used as an antiwear additive, a bearing corrosion inhibitor in motor oils, gas engine oil, compressor oils, etc. It is used in lubricating greases of all types as an antioxidant, antiwear and extreme pressure additive.</p> <p>NSF® Certified HX-2, 137553</p> | <p>VANLUBE 73 Super Plus is a proprietary mixture of dialkyldithiocarbamates. Based on equivalent antimony content, the load-carrying capability of VANLUBE 73 Super Plus is superior to that of antimony dialkyldithiocarbamate (SDDC), and comparable to that of combinations of SDDC and sulfurized olefin. As an antioxidant, VANLUBE 73 Super Plus outperforms both SDDC and SDDC/sulfurized olefin and, unlike sulfurized olefin, it does not lower the dropping point of lithium complex grease. VANLUBE 73 Super Plus does not have the pungent odor of sulfurized olefin.</p> | <p>VANLUBE 81 is similar chemically to VANLUBE SS but is a better high temperature oxidation inhibitor because of its high purity and high p,p'-dioctyldiphenylamine content. VANLUBE 81 can be used in a variety of petroleum and synthetic lubricants where an ashless oxidation inhibitor with good high temperature properties is needed. Effective in silane, siloxane, silicone and diester fluids at concentrations of 0.5 to 2.0% and temperature of 400 to 500°F. In lubricating greases, VANLUBE 81 is effective in both oxidation pressure vessel tests and in high speed spindle tests. Siloxane greases containing 2% VANLUBE 81 have given outstanding results in bearing performance tests at 350°F. Has a good color stability. Widely used as a high temperature antioxidant in jet engine oils.</p> <p>NSF® Certified HX-1, 143815</p> |

| | VANLUBE® 289 Lubricant Additive | VANLUBE 407 Antioxidant | VANLUBE 601 Lubricant Additive |
|--|---|---|---|
| Formula | Proprietary | Proprietary | Proprietary |
| Application | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Metalworking | Industrial Oil, Turbine Oil, Compressor Oil, Greases, Food Grade HX-1 Lubricants | Fuel, Gear Oil, Grease, Hydraulic Oil, Metalworking, Synthetic Lube, Turbine Oil |
| Function | Ashless, Antiwear/Antiscuff, Friction Reducer | High Temperature, Antioxidant | Ashless, Antioxidant, Corrosion Inhibitor, Metal Deactivator |
| Chemical Composition | Borate ester | Blend of octylated phenyl-alpha-naphthylamine with proprietary antioxidants | Heterocyclic sulfur-nitrogen compound |
| Physical State | Liquid | Liquid | Liquid |
| Color | Yellowish | Clear Light Amber | Dark Amber |
| Density @ 15.6°C Mg/m³ (lb/gal) | 0.99 (8.3) | 1.02 (8.5) | 0.98 (8.2) |
| Viscosity @ 100°C mm²/s | 22.3 | 23.7 | 10.5 |
| Flash Point (PMCC), °C | 191 | 212 | 122 |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in mineral oils, polyalkylene glycols, synthetics esters and most non-polar synthetic base oils. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 0.5 - 1.0 | — | 0.02 - 1.0 |
| Typical Uses | <p>VANLUBE 289 is an oil-soluble borate ester that is an effective antiwear additive, by itself or in synergistic combinations with other antiwear/ extreme pressure additives such as dithiophosphates, dithiocarbamates and alkyl thiadiazoles. It contains no phosphorous, sulfur or metals. It is therefore useful in eliminating and/or reducing levels of these elements in lubricants and greases while maintaining cost-effective performance.</p>  | <p>VANLUBE 407 is a liquid blend of octylated phenyl-alpha-naphthylamine with other proprietary antioxidants. This unique combination provides exceptional antioxidant performance in PDSC (ASTM D6186) and RPVOT (ASTM D2272) at very low treat rates. VANLUBE 407 is approved by NSF for use in USDA HX-1 food grade lubricants with incidental food contact.</p> <p>NSF® Certified HX-1, 152988</p> | <p>VANLUBE 601 is a copper passivator, corrosion and rust inhibitor of the film-forming type. It exhibits synergistic properties with various metal organic extreme pressure additives such as the dithiocarbamates. Used in petroleum fuels and solvents at concentration of 1 to 10 pounds per 1,000 barrels to prevent copper stain and corrosion. Used in petroleum base oils and greases and in synthetic base greases at concentrations of 0.02 to 0.5% to protect copper. VANLUBE 601 has color stabilizing properties in oils and greases stored at elevated temperatures. It is useful EP/synergist with a variety of extreme pressure and antiwear additives.</p> |

| | VANLUBE® 601E Lubricant Additive | VANLUBE 622 Lubricant Additive | VANLUBE 672E Lubricant Additive |
|---|---|--|---|
| Formula | Proprietary | | Proprietary |
| Application | Fuel, Gear Oil, Grease, Hydraulic Oil, Metalworking, Synthetic Lube, Turbine Oil | Engine Oil, Gear Oil, Grease, Synthetic Lube | Gear Oil, Grease, Metalworking, Synthetic Lube |
| Function | Antioxidant, Corrosion Inhibitor | Antioxidant, Antiwear/Antiscuff, Friction Reducer, Extreme Pressure | Ashless, Antioxidant, Antiwear/Antiscuff, Extreme Pressure |
| Chemical Composition | Heterocyclic sulfur-nitrogen compound | Antimony o,o-dialkylphosphorodithioate in oil | Amine phosphate |
| Physical State | Liquid | Clear to Slightly Hazy Liquid | Viscous Liquid |
| Color | Dark Amber | Amber | Light Amber |
| Density @ 15.6°C Mg/m³ (lb/gal) | 0.98 (8.2) | 1.20 (10.0) | 1.02 (8.5) |
| Viscosity @ 100°C mm²/s | 7 | 5 | 250 |
| Flash Point (PMCC), °C | 157 | 150 | 113 |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in water, petroleum and synthetic lubricant bases. |
| Use Concentration, % mass | 0.02 - 1.0 | 0.5 - 3.0 | 1.0 - 3.0 |
| Typical Uses | <p>VANLUBE 601E is a copper passivator, corrosion and rust inhibitor of the film-forming type. It exhibits synergistic properties with various metal organic extreme pressure additives such as the dithiocarbamates. Used in petroleum fuels and solvents at concentrations to 1 to 10 pounds per 1,000 barrels to prevent copper stain and corrosion. Used in petroleum base oils and greases and in synthetic base greases at concentrations of 0.02 to 0.5% to protect copper.</p> <p>VANLUBE 601E has shown color stabilizing properties in oils and greases stored at elevated temperatures. It is a useful extreme pressure/synergist with a variety of extreme pressure and antiwear additives.</p> | <p>VANLUBE 622 is an antiwear and extreme pressure additive for steel mill and other industrial gear oils. VANLUBE 622 has outstanding extreme pressure and antiwear properties in a variety of base lubricants. It will give unusually high Timken, Falex and 4-Ball extreme pressure values at economical concentrations of 1 to 3%. It can also be used as an extreme pressure and antiwear additive in automotive gear oils.</p> | <p>VANLUBE 672E is an extreme pressure and antiwear additive for industrial lubricants, including lubricating oils, greases and synthetic fluids. Used as an extreme pressure and antiwear additive in various metalworking lubricants such as drawing, stamping and forming compounds. Improves extreme pressure performance of conventional extreme pressure materials such as sulfurized olefins, fatty oils, chlorinated paraffins, metal dithiocarbamates and phosphorodithioates. Effective in low concentrations as an antiwear additive in synthetic lubricants.</p> |

| | VANLUBE® 692E Lubricant Additive | VANLUBE 704S Lubricant Additive | VANLUBE 719 Lubricant Additive |
|---|---|---|--|
| Formula | Proprietary | Proprietary | Proprietary |
| Application | Gear Oil, Grease, Metalworking, Synthetic Lube | Gear Oil, Grease, Hydraulic Oil, Metalworking, Synthetic Lube, Turbine Oil | Gear Oil, Metalworking, Synthetic Lube |
| Function | Ashless, Antioxidant, Antiwear/Antiscuff, Extreme Pressure | Corrosion Inhibitor, Demulsifier, Metal Deactivator, Rust Inhibitor | Antioxidant, Antiwear/Antiscuff, Extreme pressure |
| Chemical Composition | Aromatic amine phosphate | Barium sulfonate blend | Amine phosphate package |
| Physical State | Viscous Liquid | Viscous Liquid | Liquid |
| Color | Dark Amber | Dark Amber | Amber |
| Density @ 15.6°C Mg/m³ (lb/gal) | 0.99 (8.3) | 1.03 (8.6) | 0.99 (8.3) |
| Viscosity @ 100°C mm²/s | 53 | 72 | 48 |
| Flash Point (PMCC), °C | ≥65 | 188 | 85 |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 1.0 - 3.0 | 0.05 - 0.25 | 1.0 - 4.0 |
| Typical Uses | VANLUBE 692E is used in nonmetallic industrial gear oils to give high load carrying properties. Extreme pressure and antiwear additive for lubricants based on petroleum oils and synthetics. VANLUBE 692E enhances the extreme pressure properties of sulfurized olefins, chlorinated paraffins, dithiocarbamates and phosphorodithioates. | VANLUBE 704S is used in petroleum and synthetic lubricants as a multifunctional rust and corrosion inhibitor. VANLUBE 704S is a synergistic blend of polar additives capable of forming films or complexes on metal surfaces, particularly copper and copper alloys that might be exposed to free sulfur of active sulfur compounds. It is used in a variety of lubricants based on petroleum oils or synthetics. Economical concentrations enhance antioxidants by passivating catalytic metal surfaces in the lubricant system. | VANLUBE 719 was developed primarily for steel mill and similar industrial gear oils. It gives good extreme pressure and antiwear properties, good high temperature stability, and good demulsibility. VANLUBE 719 at a concentration range of 2 to 3% will meet the requirements of most steel mill gear oil specifications. It is also used in 2-cycle engine oils. |

| | VANLUBE® 727 Lubricant Additive | VANLUBE 739 Lubricant Additive | VANLUBE 829 Lubricant Additive |
|--|---|---|---|
| Formula | Proprietary | Proprietary |  |
| Application | Auto Transmission Fluid, Engine Oil, Grease, Hydraulic Oil, Metalworking, Synthetic Lube | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Hydraulic Oil, Turbine Oil | Grease, Synthetic Lube |
| Function | Ashless, Antioxidant, Antiwear/Antiscuff | Ashless, Corrosion Inhibitor, Rust Inhibitor | Ashless, High Temperature, Antioxidant, Antiwear/Antiscuff, Friction Reducer, Corrosion Inhibitor, Extreme Pressure, Metal Deactivator |
| Chemical Composition | Organosulfur-phosphorus compound | Ashless rust inhibitor in oil | 5,5'-dithiobis(1,3,4-thiadiazole-2(3H)-thione) |
| Physical State | Liquid | Liquid | Powder |
| Color | Light Amber | Light Amber | Yellow |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.01 (8.4) | 0.92 (7.7) | 2.09 |
| Viscosity @ 100°C mm²/s | 2.6 | 5 | — |
| Flash Point (PMCC), °C | 100 | 130 | — |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Dispersible in grease. |
| Use Concentration, % mass | 1.0 - 2.0 | 0.05 - 0.5 | 1.0 - 3.0 |
| Typical Uses | <p>VANLUBE 727 is a versatile additive for various types of automotive and industrial lubricating oils. VANLUBE 727 functions as an antiwear agent and antioxidant. Its nonmetallic nature makes it of interest for ashless or low ash applications. Some suggested applications are: automotive engine oils, railroad diesel oils, compressor oils, gas engine oils, antiwear hydraulic and turbine oils, and various types of industrial oils. Bench tests indicate that the performance of VANLUBE 727 is competitive with that of commonly used zinc dithiophosphates. One percent in SAE 90 gear oil gives a 12-stage pass in the FZG test.</p> | <p>VANLUBE 739 was designed to improve rust protection in lube oils and greases.</p> | <p>VANLUBE 829 possesses excellent extreme pressure properties when dispersed in various greases. It also functions as an antiwear agent and an antioxidant. VANLUBE 829 should be used in greases in applications where extreme pressures prevail, such as steel mills and heavy equipment lubrication.</p> <p>NSF® Certified HX-2,138302</p> |

| | VANLUBE® 871 Antioxidant | VANLUBE 887 Antioxidant | VANLUBE 887E Antioxidant |
|--|--|---|---|
| Formula | Proprietary | Proprietary | Proprietary |
| Application | Engine Oil, Grease | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Hydraulic Oil, Turbine Oil | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Hydraulic Oil, Synthetic Lube, Turbine Oil |
| Function | Ashless, Antioxidant, Antiwear/Antiscuff | Ashless, High Temperature, Antioxidant | Ashless, High Temperature, Antioxidant |
| Chemical Composition | 2,5-dimercapto-1,3,4-thiadiazole alkyl polycarboxylate | Tolutriazole compound in oil | Tolutriazole compound in ester |
| Physical State | Liquid | Liquid | Liquid |
| Color | Amber | Amber | Light Amber |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.10 (9.2) | 1.00 (8.3) | 1.01 (8.4) |
| Viscosity @ 100°C mm²/s | 19.6 | 17 | 20 |
| Flash Point (PMCC), °C | 178 | 146 | 180 |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 0.5 - 2.0 | 0.5 - 1.0 | 0.5 - 2.0 |
| Typical Uses | VANLUBE 871 is a liquid ashless antioxidant/antiwear agent. Possible uses include both gasoline and diesel engine oil formulations to improve existing additive packages. | VANLUBE 887 is a liquid ashless antioxidant. It is most effective as an antioxidant synergist with mixtures of hindered phenols and/or ashless dithiocarbamates such as VANLUBE 7723 . VANLUBE 887 possesses excellent high temperature stability. Combined with VANLUBE 7723 and a suitable base stock, it will pass the MAG Cincinnati Machine Thermal Stability Test, Procedure A. | VANLUBE 887E is a liquid ashless antioxidant. It is most effective as an antioxidant synergist with mixtures of hindered phenols and/or ashless dithiocarbamates such as VANLUBE 7723 . VANLUBE 887E possesses excellent high temperature stability. |

| | VANLUBE® 887 FG Antioxidant | VANLUBE 961 Lubricant Additive | VANLUBE 972M Lubricant Additive |
|--|--|--|---|
| Formula | Proprietary | Proprietary | Proprietary |
| Application | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Hydraulic Oil, Synthetic Lube, Turbine Oil | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Hydraulic Oil, Synthetic Lube, Turbine Oil | Grease, Synthetic Lube |
| Function | Ashless, High Temperature, Antioxidant | Ashless, Antioxidant | Ashless, Antiwear/Antiscuff, Extreme Pressure |
| Chemical Composition | Tolutriazole compound in ester | Mixed octylated and butylated diphenylamines | Thiadiazole derivative in polyalkylene glycols |
| Physical State | Liquid | Liquid | Liquid |
| Color | Light Amber | Light Amber | Amber |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.01 (8.4) | 0.98 (8.2) | 1.24 (10.3) |
| Viscosity @ 100°C mm²/s | 20 | 9.9 | 6.0 |
| Flash Point (PMCC), °C | 180 | 190 | 110 |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in PAG fluids. Insoluble in petroleum lubricant bases and water. |
| Use Concentration, % mass | 0.5 - 2.0 | 0.5 - 1.0 | 0.5 - 3.0 |
| Typical Uses | <p>VANLUBE 887 FG is a liquid ashless antioxidant. It is most effective as an antioxidant synergist with mixtures of hindered phenols and /or ashless dithiocarbamates such as VANLUBE 7723. VANLUBE 887 FG possesses excellent high temperature stability.</p> <p>NSF® Certified HX-1, 150690</p> | <p>VANLUBE 961 is a liquid ashless antioxidant for use in oils and greases of various types. It may be used in industrial lubricants, including compressor, hydraulic, turbine, gas engine and circulating oils. VANLUBE 961 may be used as an ashless antioxidant in all types of crankcase oils.</p> <p>NSF® Certified HX-1, HX-2, 135573</p> | <p>VANLUBE 972M, a thiadiazole derivative in polyalkylene glycol, is an ashless extreme pressure additive recommended for use in grease and some polyalkylene glycols (PAG) and some synthetic esters. The advantages this product offers are that it contains no metals, is easily handled, is readily biodegradable, is a cost effective alternative to other metal-containing EP additives and does not have the strong sulfur odor that is typical of the other sulfur EP additives.</p> |

| | VANLUBE® 972 NT Lubricant Additive | VANLUBE 981 Antioxidant | VANLUBE 996E Antioxidant |
|---|---|--|--|
| Formula | Proprietary | Proprietary | Proprietary |
| Application | Grease, Synthetic Lube | Compressor Oil, Gear Oil, Grease, Hydraulic Oil, Synthetic Lube, Turbine Oil | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Hydraulic Oil, Metalworking, Synthetic Lube, Turbine Oil |
| Function | Ashless, Extreme Pressure, Antiwear / Antiscuff | Ashless, Antioxidant | Ashless, High Temperature, Antioxidant, Corrosion Inhibitor |
| Chemical Composition | Thiadiazole derivative in polyalkylene glycols | Dithiocarbamate derivative | Methylene bis (dibutylthiocarbamate) and tolutriazole derivative |
| Physical State | Liquid | Liquid | Liquid |
| Color | Dark Amber | Golden Yellow to Amber | Amber |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.30 (10.8) | 1.03 (8.6) | 1.06 (8.8) |
| Viscosity @ 100°C mm²/s | 20 | 6 | 16.4 |
| Flash Point (PMCC), °C | 188 | 120 | 191 |
| Solubility | Soluble in PAG fluids. Insoluble in petroleum lubricant bases and water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 0.5 - 3.0 | 0.1 - 1.0 as an antioxidant | 0.1 - 1.0 as antioxidant; 1-4 as extreme pressure agent |
| Typical Uses | VANLUBE 972 NT is a thiadiazole in a polyalkylene glycol. It is an ashless extreme pressure additive recommended for use in grease, some polyalkylene glycols, and some synthetic esters. Advantages of VANLUBE 972 NT are that it contains no metals, is easily handled, and is a cost effective alternative to other metal-containing EP additives. It does not have the strong sulfur odor that is typical of other sulfur EP additives. This product is HAPs (Hazardous Air Pollutants) free. | VANLUBE 981 is a general purpose, multifunctional ashless antioxidant and antiwear additive which can be used in a variety of lubrication applications. | VANLUBE 996E is a liquid ashless antioxidant that finds application in petroleum lubricants of all types. It possesses excellent high temperature stability and is noncorrosive despite having high sulfur content. VANLUBE 996E also exhibits extreme pressure performance alone and in combination with other additives. |

| | VANLUBE® 0902 Lubricant Additive | VANLUBE 1061 Antioxidant | VANLUBE 1202 Lubricant Additive |
|--|--|---|---|
| Formula | Proprietary | Proprietary | Proprietary |
| Application | Grease and Industrial Gear Oils | Auto Transmission Fluid, Compressor Oil, Engine Oil, Gear Oil, Grease, Hydraulic Oil, R&O Circulating Oil, Synthetic Lube, Turbine Oil | Engine Oils, Gear oil, Grease, Metal Working Fluids and Synthetic Lubricants |
| Function | Multifunctional additive package for both greases and industrial gear oil | Ashless, Antioxidant | Antioxidant |
| Chemical Composition | Metal-free multifunctional additive package, phosphorus containing sulfurized hydrocarbon | Mixture of alkylated aromatic amines | Alkylated PANA |
| Physical State | Liquid | Liquid | Solid, Powder |
| Color | Light Amber | Amber to Brown | Yellow to Brown |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.06 (8.8) | 0.95 (7.9) | — |
| Viscosity @ 100°C mm²/s | 10 - 30 | 16 | — |
| Flash Point (PMCC), °C | >90 | >200 °C | 186 |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant base stocks. Insoluble in water. |
| Use Concentration, % mass | 1.5 - 4.0 | 0.05 – 1.0 | 0.1 - 1.0 |
| Typical Uses | VANLUBE 0902 is a multifunctional additive package recommended for use at 1.5 to 2.25 % in suitable base stocks to formulate industrial gear oils. It is also recommended for use at 3.0 to 4.0% to formulate high performance greases. | VANLUBE 1061 is a liquid ashless antioxidant for use in oils and greases of various types. It may be used in industrial lubricants, including compressor, hydraulic, turbine, gas engine and R&O circulating oils. VANLUBE 1061 may be used as an ashless antioxidant in all types of crankcase oils. | VANLUBE 1202 is a solid ashless antioxidant for use in lubricating oils and greases of various types and is especially effective in engine oils and other high temperature applications. NSF® Certified HX-1, 150962 |

| | VANLUBE® 2305 Antioxidant | VANLUBE 7611M Lubricant Additive | VANLUBE 7723 Lubricant Additive |
|--|---|---|--|
| Formula | Proprietary | Proprietary | $\text{R}_2\text{N}-\text{C}(=\text{S})-\text{S}-\text{CH}_2-\text{S}-\text{C}(=\text{S})-\text{NR}_2$ |
| Application | Engine Oil | Auto Transmission Fluid, Engine Oil, Grease, Hydraulic Oil, Metalworking, Synthetic Lube | Compressor Oil, Gear Oil, Grease, Hydraulic Oil, Synthetic Lube, Turbine Oil |
| Function | Antioxidant, Antiwear, Friction Reducer | Ashless, Antioxidant, Antiwear/Antiscuff | Ashless, High Temperature, Antioxidant, Antiwear/Antiscuff, Friction Reducer, Extreme Pressure |
| Chemical Composition | Mixture | Ashless phosphorodithioate | Methylene bis (dibutyldithiocarbamate) |
| Physical State | Liquid | Liquid | Liquid |
| Color | Brown | Light Amber | Amber to Amber Green |
| Density @ 15.6°C Mg/m³ (lb/gal) | Density @ 25 °C Mg/m³ (lb/gal): 0.99 (8.2)4 | 1.08 (9.0) | 1.06 (8.8) |
| Viscosity @ 100°C mm²/s | 13 | 2.54 | 15 |
| Flash Point (PMCC), °C | Flash Point (CCC), °C: 193 | 142 | 177 |
| Solubility | Soluble in most mineral and synthetic engine oils. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 1.0 - 3.5 | 1.0 - 2.0 | 0.1 - 1.0 as antioxidant; 2.0 - 4.0 as extreme pressure agent |
| Typical Uses | <p>VANLUBE 2305 is a proprietary, low ash and phosphorus free engine oil booster that provides enhanced friction reduction, improved oxidation and deposit control, and supplemental anti-wear protection to existing passenger car engine oil formulations.</p> | <p>VANLUBE 7611M is an organic liquid additive containing sulfur and phosphorus. 4-Ball Wear tests show that VANLUBE 7611M, at a 20 kg load, performs equivalently to typical zinc dialkyldithiophosphates. At a 40 kg load it is superior to these products. VANLUBE 7611M will improve the antiwear properties of sulfurized extreme pressure additives. It is a useful component for extreme pressure/antiwear lubricant formulations and additive packages. VANLUBE 7611M does not contain metallic elements. Thus, it is applicable to ashless and low ash formulations.</p> <p>NSF® Certified HX-2, 136048</p> | <p>VANLUBE 7723 is a general purpose, ashless antioxidant which should find application in petroleum lubricants of all types. It is effective at economical concentrations, readily soluble, and easy to blend. VANLUBE 7723 has been tested in a variety of base stocks commonly used in compounding turbine, hydraulic and circulating oils. In addition to being an effective antioxidant, VANLUBE 7723 also exhibits good extreme pressure performance alone and in combination with other additives. Useful as a component of additive packages.</p> <p>NSF® Certified HX-1, HX-2, 136049</p> |

| | VANLUBE® 8610 Lubricant Additive | VANLUBE 8912E Lubricant Additive | VANLUBE 9123 Lubricant Additive |
|--|---|--|---|
| Formula | Proprietary | Proprietary | Proprietary |
| Application | Gear Oil, Grease | Gear Oil, Grease, Hydraulic Oil, Metalworking, Rust Preventive, Turbine Oil | Gear Oil, Grease, Rust Preventive |
| Function | Antioxidant, Antiwear/Antiscuff, Extreme Pressure | Corrosion Inhibitor, Rust Inhibitor | Ashless, Antiwear/Antiscuff, Rust Inhibitor |
| Chemical Composition | Antimony dithiocarbamate/sulfurized olefin blend | Calcium sulfonate | Amine phosphate |
| Physical State | Liquid | Liquid | Liquid |
| Color | Amber | Dark Brown | Amber |
| Density @ 15.6°C Mg/m³ (lb/gal) | 1.16 (9.7) | 0.97 (8.1) | 0.94 (7.8) |
| Viscosity @ 100°C mm²/s | 28.5 | 19 | 24 |
| Flash Point (PMCC), °C | 100 | 150 (COC) | 96 |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. |
| Use Concentration, % mass | 1.25 - 2.0 | 0.05 - 0.10 | 0.10 - 1.0 |
| Typical Uses | <p>VANLUBE 8610 is an extreme pressure/antioxidant useful for various lubricating oils and greases. Impressive Timken loads of 90 to 100 lbs. are achieved with 2% treatment levels.</p> <p>VANLUBE 8610 is compatible with other VANLUBE rust inhibitors/antioxidants and metal deactivators.</p> | <p>VANLUBE 8912E is an oil-soluble calcium sulfonate with excellent rust-inhibiting and water-resistant properties.</p> | <p>VANLUBE 9123 is an excellent antiwear additive and rust inhibitor in a wide range of industrial oils and lubricating greases.</p> <p>NSF® Certified HX-1, HX-2, 135575</p> |

| | | | |
|--|--|--|--|
| | VANLUBE® 9317 Antioxidant | | |
| Formula | Proprietary | | |
| Application | Synthetic Lube | | |
| Function | High Temperature, Antioxidant | | |
| Chemical Composition | Organic amine compounds in a synthetic ester | | |
| Physical State | Liquid | | |
| Color | Dark Brown | | |
| Density @ 15.6°C Mg/m³ (lb/gal) | 0.98 (8.2) | | |
| Viscosity @ 100°C mm²/s | 128 | | |
| Flash Point (PMCC), °C | 254 | | |
| Solubility | Soluble in petroleum and synthetic lubricant bases. Insoluble in water. | | |
| Use Concentration, % mass | 0.5 - 4.0 | | |
| Typical Uses | VANLUBE 9317 is an amine antioxidant designed to give excellent high temperature performance in synthetic polyolester based lubricants. At high temperatures, it significantly reduces the sludge and varnish typically seen with more conventional amine antioxidants. | | |

NOTES

REACHING **NEW** HEIGHTS

VANLUBE® 407 Antioxidant provides
outstanding Performance in Both
Thin-Film and Bulk Oxidation Protection.

VANLUBE is a registered trademark of Vanderbilt Chemicals, LLC.



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Branching Makes It Better With
MOLYVAN® 3000
F R I C T I O N R E D U C E R

MOLYVAN® 3000 Friction Reducer is an exceptional oil soluble MoDTC friction modifier containing 10% molybdenum with antiwear and antioxidant properties.

Its unique molecular branching provides superior fluid compatibility/stability at low temperature and enhanced robustness for improved retention of friction reduction in aged oil.

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