

*high*



*performance*



*industrial*



*lubricants*

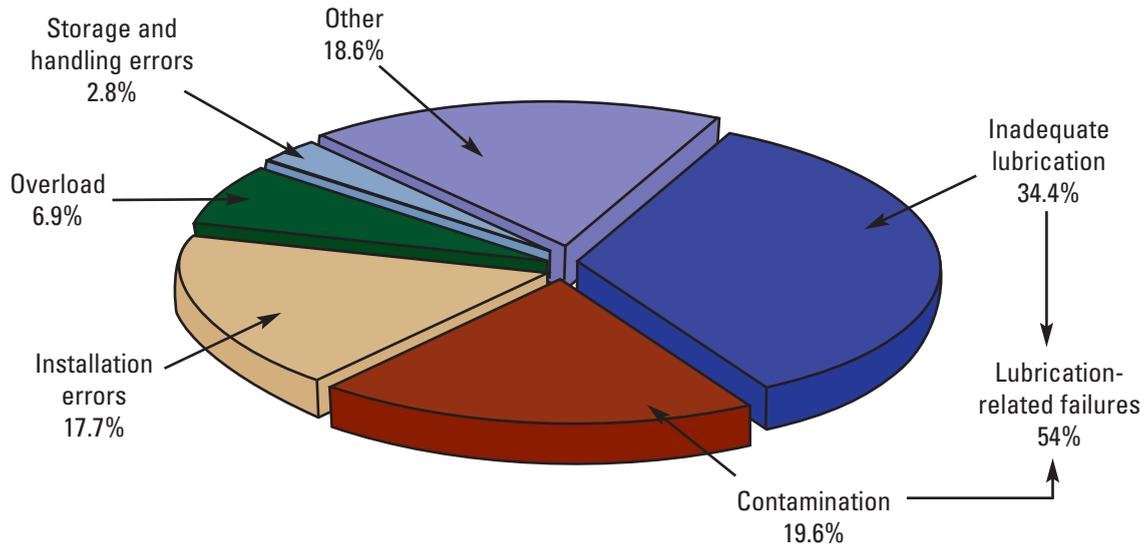


5th Edition

# The Only Way to Permanently Reduce the Cost of Maintenance is to Reduce the Need for Maintenance.

Failed bearings result in costly equipment maintenance.  
Most bearings fail because of improper lubrication.

## Causes of Bearing Failures



**Lubrication-related failures account for 54% of all bearing failures!**

Source: SKF USA Inc., also TAPPI 1995 Engineering Conference Proceedings

Any serious effort to permanently reduce  
the cost of maintenance must include upgrading  
the quality of the lubrication.



**Royal Purple is the solution!**



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## The Royal Purple Advantage

### Introduction

The industrial and racing markets associate outstanding quality and superior performance with Royal Purple. This reputation has been earned through Royal Purple's relentless pursuit of excellence in lubrication.

Royal Purple formulates the most advanced lubricants available on the market today. If you currently use Royal Purple's products, you already know this. If you do not, they offer the opportunity to greatly improve the reliability and efficiency of your equipment and to lower your operating costs.

### Superior Products, Superior Performance

Lubricants are typically viewed as a commodity, where low price and service issues dominate purchase decisions. Therefore, oil companies seeking large market share have a great incentive to keep manufacturing costs low and little incentive to upgrade lubricant quality.

Royal Purple recognizes that lubricants are not a commodity. Reliable operation of rotating equipment critically depends upon the quality of the lubricant used. Lubricant performance directly and significantly affects how long, how reliable, how efficient, and at what cost (i.e. parts, labor, downtime, number of oil changes, and energy costs) your equipment will operate. Therefore, Royal Purple will always provide you with the highest quality lubricants available anywhere.

### When Only The Best Will Do

Royal Purple combines the highest quality synthetic base oils with generous amounts of its unbeatable, synthetic, proprietary Synerlec® additive technology.

Lubricants must perform many functions. But the primary job of any lubricant is to separate and to reduce the friction between two moving surfaces. If this is not done effectively, its ability to perform other functions well is of little importance.

Royal Purple's lubricants perform this task better than virtually any other product on the market today. This is a result of their high film strength and superior synthetic additive technology.

### Synerlec® additive technology — Beyond Synthetic™

Synerlec® additive technology is Royal Purple's most versatile additive technology and the cornerstone of its product line. Royal Purple's oils for turbines, pumps, compressors, blowers, hydraulics, gears, refrigeration systems, motor oils, and more contain Synerlec® additive technology. It forms a tough, ionic, slippery, chemical film on all metal surfaces. This film helps to separate metal surfaces in three ways:

#### I. Synerlec® Provides a Thicker Oil Film

By forming a chemical film on metal surfaces, Synerlec® additive technology adds to the oil film thickness created by the oil viscosity alone.

An increase in oil film thickness is proven to increase bearing life in direct proportion to the percentage increased. (See page 56 in technical appendix.)

#### II. Synerlec® Creates a Tougher Oil Film

The tough oil film on metal surfaces makes a breach of the oil film much more difficult and unlikely. By preventing metal-to-metal contact,

"Since our initial oil fill in November 1991 we have never had to change or drain your lubricating oil . . . which we monitor with an oil analysis program. Furthermore, we have not experienced a single bearing failure since plant start-up over 35,000 hours ago."

— Gas Plant Supervisor,  
Feb. 16, 1996

## The Royal Purple Advantage

Synerlec® additive technology enables equipment to operate normally under severe operating conditions where it would otherwise quickly fail.

Synerlec® additive technology's ability to carry up to 700 percent greater loads than other mineral and synthetic oils provides extra protection for bearings subjected to mechanical stresses caused by misalignment, shaft flex, imbalance, water contamination or elevated temperatures, which thin the oil.

### III. Synerlec® Micro-Polishes Contacting Metal Surfaces

When opposing asperities (microscopic projections on metal surfaces) breach the oil film of competitors' oils, surface initiated fatigue occurs, which causes bearing surfaces to quickly wear and become rougher.

Vibrations steadily increase because these rough surfaces can no longer be fully separated by the thin film of the oil, causing increased metal-to-metal contact to occur.

Synerlec® additive technology's tough film strength not only makes it more difficult for asperities to breach the oil film, but it actually smoothes bearing surfaces that do. Instead of becoming rougher, Royal Purple's Synerlec® additive technology gently micro-polishes these asperities, creating smoother surfaces, which then are easily separated by Royal Purple's tough oil film.

Damaged bearings experiencing high vibrations can run normally for greatly extended periods of time simply by changing to Royal Purple's oils with Synerlec® additive technology. (See pages 48-49 in technical appendix.)

### Other Important Advantages

In addition to their superior ability to fully separate and lubricate metal surfaces, Royal Purple's lubricants offer these additional advantages:

#### I. Longer Oil Life

Royal Purple's oils formulated with Synerlec® additive technology last considerably longer than other mineral and synthetic oils. Synerlec® additive technology protects against oil oxidation, which causes oils to break down, to thicken and to form corrosive acids, sludge, varnish or lacquer deposits in equipment. This greatly increases oil life, reducing the amount of oil purchased and disposed of. Equipment will remain cleaner and will have longer life.

#### II. Excellent Corrosion Protection

Synerlec® additive technology provides superior protection against rust and corrosion in both salt and freshwater environments. Royal Purple's Synerlec® additive technology ionically bonds with all metal surfaces displacing moisture. Synerlec® additive technology's tough film strength protects during operation,

acts as a preservative oil during shutdown and provides instant lubrication upon startup until a full fluid oil film is established.

#### III. Rapidly Separates from Water

Water in oil means death to bearings. Many oils form milky oil-water emulsions, which greatly shorten the life of both the oil and the equipment it lubricates.

"Our plant has more than 100 spindle bearings that exceed 7,200 rpm. Prior to using Royal Purple, the average bearing life was approximately four months. Since changing to the RP grease, there has been one bearing failure in over two years, and it was not lubrication related."

— Plant Maintenance Superintendent,  
Roofing Materials Manufacturer

## The Royal Purple Advantage

Royal Purple's synthetic lubricants rapidly and completely separate from water, allowing water to easily be drained from the bottom of the oil reservoir.

### IV. Additional Additive Technologies

In addition to Synerlec® additive technology, Royal Purple formulates oils using the following three additional additive technologies:

#### A. Synslide® additive technology

This exclusive additive technology offers all of the performance advantages of Synerlec® additive technology plus superior protection against boundary lubrication (lubrication between two rubbing surfaces without development of a full-fluid lubricating film) conditions typically caused by heavy loads, shock loads and slow operating speeds. Royal Purple's noncorrosive, extreme pressure (EP) gear oils and greases contain Synslide® additive technology.

#### B. DynaGlyde® additive technology

Royal Purple's high film strength, noncorrosive DynaGlyde® additive technology contains special anti-wear additives, oiliness properties and cushioning molecules to provide the lubricity necessary to excel in worm gear lubrication.

#### C. Purolec® additive technology

Royal Purple's NSF Certified oils for H1 service for use in pharmaceutical and food service plants contain Purolec® additive technology.

This proprietary, stable, anti-wear additive technology reduces wear yet still meets the FDA's CFR Title 21 Section 178.3620(b) purity regulation.

### V. Oil Cleanliness

Royal Purple's lubricants are packaged in new, clean polydrums and pails to ensure fluid cleanliness. Additionally, Royal Purple's best-selling bearing and hydraulic lubricants are filtered to a typical ISO 4406:99 cleanliness level of 14/13/11. (See pages 50-51 in technical appendix.) This is typically 200 times cleaner than conventional lubricants delivered in steel drums or by bulk delivery.

Bearing and hydraulic equipment manufacturers state this improvement in oil cleanliness will increase bearing and hydraulic component life from 300 to 500 percent. (See pages 53-54 in technical appendix.)

Royal Purple is the only lubricant manufacturer that has established these high cleanliness requirements for its standard products.

### VI. Saves Energy.

Energy costs constitute the single largest expense of operating rotating equipment. The typical energy costs for rotating equipment are 20 to 25 times greater than direct maintenance costs.

Royal Purple's premium, synthetic lubricants with Synerlec® and Synslide® additive technologies have extremely low coefficients of friction and are proven to save energy over other mineral and synthetic oils in rotating equipment. In fact, Royal Purple's lubricants frequently produce energy savings from 1 to 3 percent or more. In most instances, these savings exceed the total cost of the oil within

"After changing to Royal Purple, we recorded a 6 percent decrease in power consumption and a 12 percent decrease in operating temperature on this air compressor with the use of Royal Purple's Synfilm 46 compressor oil."

— Maintenance Supervisor,  
Appliance Manufacturer

## The Royal Purple Advantage

several months, turning what was once an oil expense into a profit.

Total elimination of lubrication expenses would not produce significant cost savings from the total operating costs of the rotating equipment. However, significant savings can be achieved through small percentage reductions in the large expense items — energy and maintenance costs. See example below.

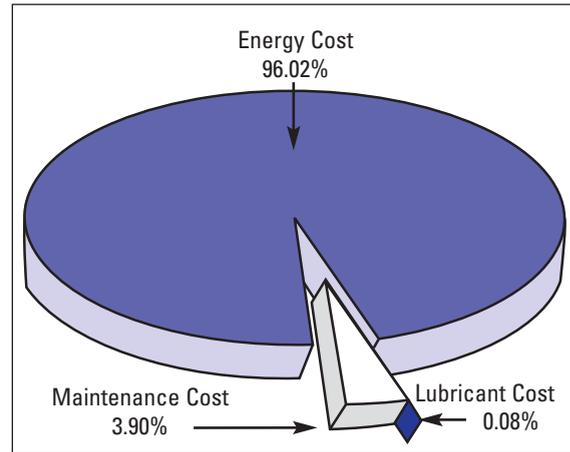
### Actual Rotating Equipment Budget of a Large Petrochemical Plant

Item	Annual Cost	Percent
Energy Cost	\$121,461,630	96.02%
Maintenance Cost	\$4,938,122	3.90%
Lubricant Cost	\$99,840	0.08%
Lube Cost as a % of Maint. Cost	2.00%	
Lube Cost as a % of Energy Cost	0.08%	

Source: Heinz P. Bloch, P.E.

Changing to Royal Purple's lubricants allows plants to achieve significant savings. Energy savings of just 0.1 percent exceed the total lubrication cost. (Lubricant cost as a percentage of energy cost was 0.08 percent.) Maintenance savings of just 3 percent would exceed the lubrication cost as well. (Lubricant cost as a percentage of maintenance cost was 2 percent.)

If this plant were to achieve an energy savings of 2 percent and a maintenance savings of 30 percent, it would produce an annual savings of approximately \$3.9 million!



Item	Annual Cost	Percent
Energy Cost	\$121,461,630	96.02%
Maintenance Cost	\$4,938,122	3.90%
Lubricant Cost	\$99,840	0.08%
Lube Cost as a % of Maint. Cost	2.00%	
Lube Cost as a % of Energy Cost	0.08%	

Source: Heinz P. Bloch, P.E.

2% Energy Savings	\$2,429,232.60
30% Maintenance Savings	\$1,481,436.60
<b>Total Savings</b>	<b>\$3,910,669.20</b>

"Using Synfilm in tests on nine pieces of equipment, average energy savings were 2.54 percent, which paid for the incremental cost of the more expensive oil in just 19 days."

— Maintenance Superintendent, Chemical Plant

## The Royal Purple Advantage

While the actual budget numbers as well as the potential savings from the use of Royal Purple's lubricants will vary from plant to plant, it is universally true that Royal Purple's lubricants will produce greatly leveraged savings from both the energy and maintenance budgets.

The savings noted in the previous example are not an unrealistic expectation. Many plants have documented millions of dollars in savings per year after converting to Royal Purple's lubricants.



**Pour in the Purple.  
Pour on the Savings.**

### Purchase Price vs. Value

What is the cost of oil? Some people may tell you it's the price you paid for it. They may even tell you how much money they've saved when they find a less expensive oil. But what is the real cost of the oil?

1. It's the purchase price.
2. It's the cost in service as represented by energy savings.
3. It's the cost of labor and replacement parts.
4. It's the cost of downtime and lost production.
5. It's the oil service life as represented by oil drain frequency.
6. It's the cost of used oil disposal.

## Summary of Customer Benefits

### I. High Film Strength.

Royal Purple's lubricants are up to 700 percent stronger than other synthetic oils.

- ✓ Reduced wear and downtime.
- ✓ Improved equipment life and reliability.
- ✓ Lower operating temperatures.
- ✓ Reduced part replacement.
- ✓ Reduced bearing and equipment vibrations.
- ✓ Reduced maintenance costs.

### II. Longer Oil Life.

Royal Purple's lubricants last up to 400 percent longer than other synthetic oils.

- ✓ Much less oil is purchased.
- ✓ Disposal costs are greatly reduced.
- ✓ Fewer oil changes save labor costs.
- ✓ Cleaner equipment.

### III. Outstanding Corrosion Protection.

Royal Purple's lubricants provide greater protection than traditional circulating and EP oils.

- ✓ Uniquely combines both high film strength and outstanding rust and corrosion protection into one oil.

### IV. Excellent Demulsibility.

Royal Purple's lubricants save equipment and oil changes by rapidly and completely separating from water.

- ✓ Proprietary additive technologies protect in wet environments by displacing harmful water from metal surfaces.
- ✓ Rapidly and completely separates from water and does not emulsify with water.
- ✓ Water is easily drained from bottom of oil reservoir.

### V. Saves Energy.

Royal Purple's lubricants reduce energy costs.

- ✓ Energy savings typically exceed the total cost of oil within a few months.

### VI. High Cleanliness.

Royal Purple's bearing and hydraulic oils are typically 200 times cleaner than conventional lubricants delivered in steel drums or by bulk delivery.

- ✓ Always packaged in new, clean polydrums and pails.
- ✓ Clean oil greatly improves the life of bearings and equipment.

## Customer Feedback

### Actual Testimonies from Royal Purple customers.

"In 1995, we had fifty-six documented mill motor trip outs due to over temperatures on motor bearings. During 1996 and now the 1997 season, we have had only one alarm and it was due to the high speed coupling tightening up from lack of grease."

— Senior Maintenance Coordinator,  
Cement Plant

"Prior to making the switch, we experienced eight to ten gear box failures a year, at a cost of more than \$10,000 each. After converting to Royal Purple Synfilm GT 150, we have experienced only one failure in the past year."

— Maintenance, Area specialists,  
Chemical Plant

"Recently I did a 16,000 hour inspection on two D-399 Caterpillar engines. I was completely surprised at the condition of the main bearings, camshaft and cylinders. There was virtually no wear found in the engines."

— Assistant Superintendent,  
— Oil Exploration Company

"I knew Royal Purple performed well when contaminated with water. . . . The Royal Purple protected the gears even though there was more seawater than Royal Purple at times."

— Captain,  
Tugboat

"Over the past three years, these engines have accumulated in excess of 14,000 hours without an oil change."

— Maintenance Superintendent,  
Offshore Drilling Contractor

"We had amazing results. We not only exceeded a 30 to 40°F temperature drop, but also noticed that there was less vibration in the unit."

— Service Contractor,  
Manufacturing Facility

"Based on our data, using the synthetic oil Royal Purple in all lubricated equipment should provide a 4 percent to 8 percent reduction in electrical consumption. This reduction is valued between \$150,000 and \$220,000 a year."

— Maintenance Superintendent,  
Refinery

"I am very pleased to report that after changing to Royal Purple Synfilm ISO 32, a dramatic decrease in downtime of approximately fifty percent has been experienced."

— Supervisor,  
Gas Plant

"Royal Purple is proving each and every day to be the best lubrication in reciprocating compressors in services ranging from hydrogen to butane to isobutane."

— Rotating Equipment Reliability Superintendent,  
Refinery

"This product works great in everything. In loaders alone, scheduled oil changes were every two hundred hours. With your product, we now . . . oil change every thousand hours."

— Maintenance Supervisor,  
Fertilizer Plant

**To read additional customer quotes or to view entire testimonies, visit our web site at [www.royalpurple.com](http://www.royalpurple.com).**





# ROYAL PURPLE

*Products*

All values reported are typical and may vary.

Due to continual product research and development, the information contained herein is subject to change without notice.

Additional product information is available by requesting product data sheets on individual products or by visiting Royal Purple's web site at [www.royalpurple.com](http://www.royalpurple.com).

*Royal Purple — The Performance Oil that Outperforms™*

## Alphabetical Product Listing

<b>Product Name</b>	<b>Page</b>		
		Royal Purple® 2-Cycle TCW III	30
Acilube™	16	Syn V EMD™	30
Acivac™	16	Syndraulic®	30
Aegis®	17	Syndraulic® Extreme	31
Air Hammer Oil	17	Synergy®	31
Barrier Fluid FDA®	18	Synergy® Worm Gear Oil	32
Barrier Fluid GT®	18	Synfilm®	32
CAP™	19	Synfilm® GT	33
CMT™	19	Synfilm® GTO	34
Coupling Grease	19	Synfilm® NGL	34
Crystal-Clear®	20	Synfilm® Recip.	35
Dezel Hi-Base®	21	Synmist®	35
Hy-Therm™ 707	21	SynTractor® III	36
Marine Hydraulic Oil™	22	Synway™	36
Max ATF®	22	Thermasil™ T-100	36
Max-Chain®	23	Thermax™ Grease	37
Max EZ®	23	Thermax™ Semi-Fluid Grease	37
Maxfilm®	23	Thermyl-Glyde®	37
Max-Gear®	24	Thermyl-Glyde® Worm Gear Oil	38
MaxSolv™	24	Thermyl-Tuff®	39
Max-Tuff™	25	Ultra-Performance® Clear FDA Grease	39
Needle Oil	25	Ultra-Performance® FDA Grease	39
NGL-NS™	25	Ultra-Performance® Grease	40
Open Gear Guard XP	26	Ultra-Performance® Grease 32	40
Paper Mill Grease	26	Uni-Temp™	41
Parafilm®	27	VP Preservative Oil 10	42
Para-Syn®/PM	27	Wire Rope Lubricant	42
Poly-Guard® FDA	28		
Quadrex®	28		
Royal Flush	29		
Royal Purple® Motor Oil	29		

## Product Listing by Use

### Automotive Products

<b>Use</b>	<b>Recommended Product</b>	<b>Page</b>
Assembly Lubricant	Max-Tuff™	25
Chassis Lubrication	Ultra-Performance® Grease	40
Differentials	Max-Gear®	24
Engine — 2-Cycle Gasoline/Diesel	Royal Purple® Motor Oil	29
Engine — 4-Cycle Gasoline/Diesel	Royal Purple® Motor Oil	29
Engine — Two Cycle Gasoline	Royal Purple® 2-Cycle TCW III	30
Power Steering	Max EZ®	23
Tractor Fluid	SynTractor® III	36
	SynTractor® III WG	36
Transfer Cases 4 Wheel Drive	Max ATF®	22
	Max-Gear®	24
	Royal Purple® Motor Oil	29
Transmissions — Automatic	Max ATF®	22
Transmissions — Manual	Max-Gear®	24
Transmissions — T-04 Spec	CMT™	19
Wheel Bearings	Ultra-Performance® Grease	40

### Commercial Engine Oils

<b>Use</b>	<b>Recommended Product</b>	
EMD	Syn V EMD™	30
Engine — 2-Cycle Diesel (>0.5% Fuel Sulfur content)	Dezel Hi-Base®	21
Engine — 2-Cycle Gasoline/Diesel	Royal Purple® Motor Oil	29
Engine — 4-Cycle Diesel (>0.5% Fuel Sulfur content)	Dezel Hi-Base®	21
Engine — 4-Cycle Gasoline/Diesel	Royal Purple® Motor Oil	29
Natural Gas — 2-Cycle	Aegis®	17
Natural Gas — 4-Cycle	Quadrex®	28

## Product Listing by Use

### Food Grade Lubricants

<b>Use</b>	<b>Recommended Product</b>	<b>Page</b>
Chains	Poly-Guard® FDA	28
Compressors	Poly-Guard® FDA	28
Direct Contact	Crystal-Clear® FDA	20
Gears	Poly-Guard® FDA	28
Grease	Ultra-Performance® Clear FDA Grease	39
	Ultra Performance® FDA Grease	39
Hydraulics	Poly-Guard® FDA	28
Mechanical Seals	Barrier Fluid FDA®	18

### Industrial Gear Lubricants

<b>Use</b>	<b>Recommended Product</b>	
AGMA EP Gear Oils	Synergy®	31
	Thermyl-Glyde®	37
AGMA R&O Gear Oils	Parafilm®	27
	Poly-Guard® FDA	28
	Synfilm®	32
	Synfilm® GT	33
AGMA Worm Gear Oils	Synergy® Worm Gear Oil	32
	Synfilm® GT	33
	Thermyl-Glyde® Worm Gear Oil	38
	Thermax™ Semi Fluid Grease	37
Open Gear Lubricant	Open Gear Guard XP	26
	Thermasil™ T-100	36
	Thermyl-Tuff®	39

### Industrial Greases

<b>Use</b>	<b>Recommended Product</b>	
Bearings — Heavily loaded	Thermax™ 680	37
Bearings — Typical	Ultra-Performance® Grease	40
Bearings — Heavily loaded, medium RPM	Paper Mill Grease	26
Couplings	Coupling Grease	19

## Product Listing by Use

### Industrial Greases, Continued

<b>Use</b>	<b>Recommended Product</b>	<b>Page</b>
Bearings — Heavily Loaded-low rpm	Thermasil™ T-100	36
Bearings — Heavily Loaded-low rpm	Thermax™ Semi-Fluid Grease	37
Bearings — High Speed	Ultra-Performance® Grease 32	40
Food Grade	Ultra-Performance® Clear FDA Grease	39
	Ultra Performance® FDA Grease	39

### Industrial Hydraulic Lubricants

<b>Use</b>	<b>Recommended Product</b>	
Food Grade	Poly-Guard® FDA	28
Industrial Anti-Wear	Syndraulic®	30
Freezer Service	Syndraulic® Extreme	31
Environmental	Marine Hydraulic Oil™	22

### Industrial Lubricants

<b>Use</b>	<b>Recommended Product</b>	
Bearings	Synfilm®	32
	Synfilm® GT	33
	Parafilm®	27
Chains	Max-Chain®	23
	Uni-Temp™	41
Compressor Lubricant — Refrigeration	Crystal-Clear®	20
Compressor — Process Gas	NGL-NS™	25
	Synfilm® NGL	34
	Uni-Chem™	41
	Synfilm® GT	33
Compressor — Centrifugal Air	Synfilm® Recip.	35
Compressor — Reciprocating Air	Synfilm®	32
Compressor — Rotary Screw Air	Parafilm®	27
	Synfilm® GT	33
Compressor — Vane Air	Parafilm®	27

## Product Listing by Use

<b>Industrial Greases, Continued</b>		<b>Page</b>
<b>Use</b>	<b>Recommended Product</b>	
Cylinder Lubricant	CAP™ 700	19
	Thermyl-Glyde®	37
Food Grade Lubricant	Crystal-Clear® FDA	20
	Poly-Guard® FDA	28
Flushing Lubricant	Royal Flush	29
Heat Transfer Oil	Hy-Therm™ 707	21
Mechanical Seal Barrier Fluid	Barrier Fluid FDA®	18
	Barrier Fluid GT®	18
Mist Oils	Synmist®	35
Paper Machines	Para-Syn®/PM	27
Penetrating Aerosol	Maxfilm™	23
Pumps	Parafilm®	27
	Synfilm®	32
	Synfilm® GT	33
Rock Drill	Air Hammer Oil	17
Rust Preventative	VP Preservative Oil 10	42
Sewing Machine Needles	Needle Oil	25
Solvent	Max-Solv™	24
Spindle Lubricant	Synfilm® GT	33
	Needle Oil	25
Steam Cylinder Lubricant	Thermyl-Glyde®	37
Turbines, Gas/Steam	Synfilm® GT	33
	Synfilm® GTO	34
Vacuum Pumps	Synfilm® GT	33
Way Lubricant	Synway™	36
Wire Rope Lubricants	Wire Rope Lubricant	42

## Product Information

Acilube  
Acivac

### Acilube™ — Synthetic Lubricant for Acid Gas Service (with Synerlec®)

Acilube™ is recommended for lubricating compressors in acidic environments.

Acilube™ provides extra corrosion protection to metal surfaces subjected to acidic gases and minimizes their detrimental effect on the oil. Acilube™ is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Fire°F	Pour Point°F	ISO Grade
Acilube 20	20	4.3	105	41	123	445	485	-65	—
Acilube 32	32	5.8	165	46	125	460	510	-60	32
Acilube 46	46	7.4	236	51	124	495	525	-55	46
Acilube 68	68	9.6	350	59	124	485	550	-50	68
Acilube 100	100	12.5	517	70	116	440	485	-40	100
Acilube 150	150	15.9	784	84	110	400	455	-25	150

### Acivac™ — Synthetic Lubricant for Acid Gas Service

Acivac™ is recommended for rotary vane vacuum pumps operating in acidic atmospheres. Acivac™ is not recommended for use with strong oxidizers.

Most lubricants severely react with acids to form sludge, which causes the blades to stick, to wear prematurely and/or to break. Acivac™ minimizes the effects of acids on the oil, which greatly extends both the life of the oil and the pumps. Acivac™ reduces the downtime caused by pumps that no longer can maintain proper vacuums and is recommended for vacuums in the presence of acids such as HCl, H<sub>2</sub>SO<sub>4</sub>, H<sub>2</sub>S and HBr. Acivac™ is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Fire°F	Pour Point°F	ISO Grade
Acivac 32	32	5.8	165	46	124	475	535	<-70	32
Acivac 46	46	7.4	236	51	124	500	550	<-70	46
Acivac 68	68	9.6	350	59	127	455	520	-65	68
Acivac 100	100	12.7	517	71	122	430	500	-65	100

Aegis  
Air Hammer Oil

## Product Information

### Aegis® — 2-cycle Natural Gas Engine Oil (with Synerlec®)

Aegis® is an ashless, fuel-saving, high performance, synthetic, gas engine oil blend designed to offset both rising fuel and operating costs. Aegis® is primarily formulated for 2-cycle gas engines, but is so oxidation stable it is an excellent 4-cycle engine oil. Its performance advantages include saving fuel and keeping engines cleaner for maximum combustion efficiency. Its noncorrosive EP properties prevent scuffing and seizing, extend ring and bearing life, keep filters from plugging and greatly extend oil life in 4-cycle engines.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Fire°F	Pour Point°F	SAE Grade
Aegis 30	95.0	11.8	492	67	115	440	505	-15	30
Aegis 40	125.4	14.4	652	77	115	425	490	-10	40

### Air Hammer Oil — Premium Rock Drill Oil (with Synslide®)

Air Hammer Oil is recommended for users looking for much longer tool oil life and significantly improved reliability.

Air Hammer Oil is an ultra-tough, para-synthetic rock drill oil/air hammer oil designed to increase the life of air hammers and rock drills. Air Hammer Oil outperforms other E.P. rock drill oils because it contains Synslide® additive technology, Royal Purple's proprietary, synthetic oil film so tough it is not squeezed out of the pressure area. It virtually eliminates the wear associated with boundary lubrication conditions caused by the sliding action of the heavily loaded piston and is noncorrosive to both ferrous and nonferrous metals. Slippery, synthetic molecules increase the lubricity and oiliness of Air Hammer Oil, allowing rock drills/air hammers to run longer between overhauls.

Product	cSt @40°C	cSt @100°C	VI	Flash°F	Fire°F	ISO Grade
Air Hammer Oil 46	46	7.2	116	380	425	46
Air Hammer Oil 68	68	9.4	117	420	440	68
Air Hammer Oil 100	100	11.8	107	435	460	100

## Product Information

Barrier Fluid FDA  
Barrier Fluid GT

### Barrier Fluid FDA® — Buffer/Barrier Fluid for Mechanical Seals

Barrier Fluid FDA® is a pure, non-reactive, synthetic fluid that provides superior lubrication and cooling for double and tandem mechanical seals. Barrier Fluid FDA® provides very stable seal performance over an extremely wide temperature range, satisfying most seal service requirements. Barrier Fluid FDA® is extremely clean and has excellent low temperature fluidity and heat transfer properties. Barrier Fluid FDA® is sanctioned under the FDA CFR Title 21 Sections 178.3620(a)(b); 172.878; 175.105; 176.200 and 210; 177.2260, 2600 and 2800; 178.3570 and 3910. It is NSF Certified for H1 service. Barrier Fluid FDA® is essentially inert, allowing it to be used with most hydrocarbon gases and aqueous acids and bases. Barrier Fluid FDA® is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Boiling Point°F	Pour Point°F	ISO 4406
**Barrier Fluid FDA 22	5.2	1.75	44	32	—	335	538	-70	14/13/11
**Barrier Fluid FDA 34	17.4	3.9	93	39	123	445	655	-85	14/13/11
**Barrier Fluid FDA 56	30.6	5.8	157	46	135	462	718	-75	*
**Barrier Fluid FDA 78	46.7	7.8	239	52	136	482	759	-65	*
Barrier Fluid FDA 910	65.5	9.9	336	60	135	505	755	-65	14/13/11

\* Check with manufacturer regarding availability with 14/13/11 cleanliness.

\*\* NSF Certified H1.

### Barrier Fluid GT® — Buffer/Barrier Fluid for Double and Tandem Mechanical Seals

Barrier Fluid GT® is recommended for use at elevated temperatures where a nitrogen purge is not an option and when FDA purity is not required.

Barrier Fluid GT® has similar physical properties to Barrier Fluid FDA® plus additional oxidation stability. Barrier Fluid GT® is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Boiling Point°F	Pour Point°F
Barrier Fluid GT 22	5.2	1.75	44	32	—	335	538	-70
Barrier Fluid GT 34	17.4	3.9	93	39	123	445	655	-85
Barrier Fluid GT 56	30.6	5.8	157	46	135	462	718	-75
Barrier Fluid GT 78	46.7	7.8	239	52	136	482	759	-65
Barrier Fluid GT 910	65.5	9.9	336	60	135	505	755	-65

CAP  
CMT

## Product Information

### **CAP™** — Cylinder and Packing Gland Lubricant (with Synerlec®)

CAP™ is recommended for use in reciprocating compressors that compress gases such as hydrogen, nitrogen, ethylene, carbon dioxide, methane, ethane, butane, propane, propylene, helium, LPG, etc. CAP™ is commonly used in gas reinjection compressors.

CAP™ is a synthetic, compressor lubricant that forms a tacky, tenacious and tough oil film on both metal and ceramic surfaces. It is extremely shear stable, water resistant and impermeable to water vapor and hydrocarbon gases. CAP™ minimizes wear in high pressure compressors.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	Pour Point°F	Flash °F	Fire °F	ISO Grade
CAP 700/460	460	29.0	2474	143	10	320	360	460
CAP 700/680	680	39.5	3669	192	15	395	415	680
CAP 3X	255	21.5	1349	108	20	345	385	—

### **CMT™** — Manual Transmission Fluid (with Synerlec®)

Royal Purple's CMT™ oil meets the requirements for Caterpillar TO-4; Allison C-4, CF-2 and CF; Eaton; and Dana manual transmissions. Recommended for MT-1 applications and caterpillar powershift.

Royal Purple® CMT™ contains a blend of premium mineral and synthetic lubricants, which provide greater oxidation protection, low temperature fluidity and shock loading protection than conventional oils. This promotes greater oil life, smoother brake operation, reduced gear wear, controlled powershift transmission friction and more reliable equipment operation.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point°F	SAE Grade
CMT 10	26.0	5.2	134	44	135	435	-40	10
CMT 30	94.6	11.7	491	66	108	475	-40	30
CMT 50	188.0	18.4	986	94	108	475	-34	50
CMT 60	273.2	23.6	1442	118	108	475	-30	60

### **Coupling Grease** — Synthetic Coupling Grease (with Synslide®)

Royal Purple's Coupling Grease is a lithium complex, high film strength grease that provides superior resistance to oil separation from the high centrifugal forces generated by couplings. It is formulated with high viscosity synthetic oils and tacky, synthetic polymers, plus Royal Purple's proprietary Synslide® additive technology to provide the tenacity and film strength necessary to protect against heavy loads and high centrifugal forces.

## Product Information

Coupling Grease  
Crystal-Clear

Product	Base Oil cSt @40°C	Base Oil cSt @100°C	NLGI Grade	Drop Point °C	Cone Penetration	4-Ball Test	Specific Gravity
Coupling Grease	2995	112	0	>200	355 - 385	400	0.88

### Crystal-Clear® — Synthetic White Oil

Crystal-Clear® is recommended for lubricating gas compressors where the oil may come into contact with catalysts downstream of the compressor.

Crystal-Clear® is a pure, nonreactive lubricant that has excellent anti-wear properties. It provides very good protection against rust and corrosion yet will not poison catalysts downstream of the compressor. Crystal-Clear® 32,46 and 68 are NSF Certified for H1 service.

Crystal-Clear® resists dilution from hydrocarbon gases, effectively preventing both compressor and packing gland wear. It is a superior lubricant for hydrogen, hydrogen chloride, sulfur dioxide, nitrogen, carbon monoxide, carbon dioxide and helium compressors. It also excels in the lubrication of hyper compressors and hydrocarbon gas compressors such as ethylene, methane, ethane, butane, propane, acetylene, propylene, helium, LPG, etc.

Crystal-Clear® meets all of the requirements of a white mineral oil but has the superior lubrication of a synthetic oil. Crystal-Clear® high viscosity index, thermal stability, low coefficient of friction and high specific heat index enable it to outperform white mineral oils over an extremely wide temperature range. Crystal-Clear® is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Pour Point°F	ISO Grade
Crystal-Clear 22	22.0	4.6	115	42	129	445	<-65	22
* Crystal-Clear 32	32.0	6.0	164	47	136	460	<-65	32
* Crystal-Clear 46	46.0	7.7	235	52	136	505	<-65	46
* Crystal-Clear 68	68.0	10.2	349	61	135	540	<-65	68
Crystal-Clear 100	100.0	13.8	514	75	140	510	-55	100
Crystal-Clear 150	150.0	20.0	771	101	154	520	-50	150
Crystal-Clear 220	220.0	24.9	1141	123	143	500	-35	220
Crystal-Clear 320	320.0	34.1	1664	166	150	500	-30	320
Crystal-Clear 460	460.0	44.2	2404	214	150	510	-30	460
Crystal-Clear 680	680.0	62.8	3555	303	163	500	-30	680
Crystal-Clear 1500	1500.0	85.0	8060	412	128	410	-5	1500

\* NSF Certified H1.



Dezel Hi-Base  
Hy-Therm 707

## Product Information

### Dezel Hi-Base® — Super-Tough Diesel Engine Oil (with Synerlec®)

Dezel Hi-Base® is recommended for diesel engines operating on high sulfur diesel fuels commonly found in South America, Africa, Asia and Mexico.

Dezel Hi-Base® is a long life, synthetic blend engine oil designed for engines using high sulfur fuels. These engines require engine oils with higher alkalinity (base numbers) to neutralize the corrosive acids formed when the sulfur in the fuel is burned. Generally, the base number required will be twenty times the sulfur content in the fuel. Dezel Hi-Base® is offered in the following standard base numbers: 10, 15, 17, 20 and 30. (For export sale only.) Note: Other base numbers available.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	Sulfated Ash % Weight
Dezel Hi-Base 30	84.4	10.8	437	63	115	435	-40	*1 to 7
Dezel Hi-Base 40	120.7	14.4	626	77	120	445	-35	*1 to 7
Dezel Hi-Base 15W40	105.5	14.4	593	77	140	420	-40	*1 to 7

\* Proportional to Base Number

### Hy-Therm™ 707 — Heat Transfer Oil

Hy-Therm™ 707 is a synthetic, heat transfer fluid that is more efficient than mineral oil based fluids. Its thermal conductivity (0.121 BTU/hr ft °F at 400°F) is 50 to 100 percent higher than many widely used heat transfer fluids. This means that heat goes in and comes out of Hy-Therm™ 707 much more quickly. A pound of Hy-Therm™ 707 can hold 30+ percent more heat with its specific heat of 0.665 BTU/lb. °F at 400°F. Hy-Therm™ 707 can safely be used in open systems up to 400°F and in closed systems under inert gas at 700°F. Fluid life and system cleanliness can greatly be enhanced when Hy-Therm™ 707 is used with inert gas (nitrogen, etc.) blanketing. Its low temperature fluidity eliminates the need to drain fluid during cold weather shutdowns, a common problem with many heat transfer fluids. Hy-Therm™ is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Fire °F	Pour Point °F	Specific Gravity
Hy-Therm 707	34.0	6.1	174	47	128	450	505	-60	0.83

## Product Information

Marine Hydraulic Oil  
Max ATF

### Marine Hydraulic Oil™ — Synthetic Blend Hydraulic Oil (with Synerlec®)

Marine Hydraulic Oil™ is an inherently biodegradable, ashless, environmentally responsible, high performance, hydraulic oil formulated for those users that need a high performance oil to protect their equipment yet are concerned about the environment.

Marine Hydraulic Oil™ meets the U.S. Fish and Wildlife Department's and the EPA's toxicity test requirements for marine life. Marine Hydraulic Oil™ is an excellent, high performance, hydraulic oil for use in sensitive environments such as off-shore platforms and other marine related services.

The long life and high film strength of Marine Hydraulic Oil™ greatly increases equipment reliability and provides excellent protection in highly corrosive environments. It gains its performance advantage over competing oils through its superior blend of base oils plus Royal Purple's proprietary Synerlec® additive technology. This unique, synthetic additive technology is proven to make bearings and equipment run smoother, cooler, quieter, longer and more efficiently.

Product	cSt @40°C	cSt @100°C	VI	Flash°F	Pour Point°F	ISO 4406	ISO Grade
Marine Hydraulic Oil 22	22.0	4.4	105	405	-40	*	22
Marine Hydraulic Oil 32	32.0	5.6	111	415	-40	14/13/11	32
Marine Hydraulic Oil 46	46.0	7.0	110	445	-35	14/13/11	46
Marine Hydraulic Oil 68	68.0	9.1	109	475	-35	14/13/11	68
Marine Hydraulic Oil 100	100.0	11.9	111	505	-25	—	100
Marine Hydraulic Oil 150	150.0	15.9	109	505	-25	—	150

\*Check with manufacturer regarding availability with 14/13/11 cleanliness.

### Max ATF® — Automatic Transmission Fluid

Max ATF® is recommended for all automatic transmissions requiring Ford Mercon® or GM Dexron® III type transmission fluids.

Max ATF® synthetic, automatic transmission fluid is a high performance, long life, multi-purpose transmission fluid. Max ATF® is more oxidation stable than other transmission fluids and greatly resists breakdown from heat and loss of proper lubricity.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Pour Point °F
Max ATF	32.5	7.5	164	51	210	450	-60

Max-Chain  
Max EZ  
Maxfilm

## Product Information

### Max-Chain® — Dry Film/EP Lubricant (with Synerlec®)

Max-Chain® is recommended for chains and open gears operating in dusty environments.

Max-Chain® is an advanced, high performance, synthetic lubricant that provides excellent protection for chains, open gears and exposed metal surfaces subjected to severe loading — even in wet, acidic environments. Max-Chain® is a unique, thixotropic lubricant blended with a solvent carrier. It can be easily applied by either spraying or brushing. Once applied the carrier film evaporates, leaving a tenacious, dry, wax-like film. This non-tacky film effectively minimizes the collection of abrasive dust and other airborne contaminants. Its dry lubricant film performance is enhanced with EP properties to greatly reduce wear and to effectively extend equipment life. Max-Chain® can lubricate up to 400°F (after carrying solvent has evaporated) and provides excellent protection against rust and corrosion. Max-Chain® is an undyed product. Note: Caution — Consult manufacturer for high temperature applications.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	Aerosol Flash°F	Flash°F
Max-Chain	3.8	1.4	39	31	105 min.	160

### Max EZ® — Synthetic Power Steering Fluid (with Synerlec®)

Max EZ® is an advanced power steering fluid designed to maximize the life and performance of all power steering units. Max EZ® is race proven to make power steering units run smoother, cooler, longer and more efficiently. Max EZ® is compatible and can be mixed with conventional power steering fluids.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Fire°F
Max EZ	46.8	8.9	237	56	175	400	445

### Maxfilm® — Multipurpose Aerosol Lubricant/Penetrant/Preservative (with Synerlec®)

Maxfilm® is a high film strength, multipurpose, synthetic lubricant/penetrant that excels in plantwide maintenance-related applications. Maxfilm® deeply penetrates, cleans and loosens rusted parts and provides long-lasting lubrication and protection against rust and corrosion. Its high film strength facilitates ease of drilling or tapping of both steel and aluminum. Maxfilm® is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	Flash°F
Maxfilm	3.0	1.25	37	30	150

## Product Information

Max-Gear  
MaxSolv

### Max-Gear® — High Performance Gear Oil (with Synerlec®)

Max-Gear® is recommended for truck and automotive differentials, outboard motor lower units or in rear axles or manual transmissions requiring an API fluid.

Max-Gear® is a high performance automotive gear oil designed to provide maximum protection to heavily loaded gears while increasing power throughput through the drive train. Max-Gear® virtually eliminates both gear and bearing wear — even under severe squeeze film conditions caused by extremely high loads, sudden shock loads or low RPMs. Slippery, synthetic molecules not only reduce wear and friction but significantly increase Max-Gear's cold weather fluidity and lubricity, making it the ideal choice for vehicles operating in cold climates. Gears run smoother, quieter, cooler and longer without overhauls. It is noncorrosive to both ferrous and nonferrous metals.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Pour Point°F	Timken OK Load	SAE Grade
Max-Gear SAE 75W90	132.3	19.1	677	97	164	385	-25	100	75W90
Max-Gear SAE 75W140	247.0	33.0	1261	160	180	365	-15	100	75W140
Max-Gear SAE 80W90	150.3	16.8	782	87	120	395	-15	100	80W90
Max-Gear SAE 90	194.3	19.2	1018	98	112	390	-15	100	90
Max-Gear SAE 85W140	324.4	28.5	1708	140	119	375	-15	100	85W140

### MaxSolv™ — Super-Solvent Metallic Cleaner

MaxSolv™ is a very powerful chemical solvent which rapidly removes oxidized oil deposits such as sludge, varnish and lacquer that are commonly formed in a wide range of equipment. With MaxSolv™, maintenance personnel can replace the dangerous acid and caustic cleaners, eliminate labor-intensive mechanical cleaning methods and let the equipment clean itself of deposits while continuing normal operation. MaxSolv™ is designed to be added to the existing oil just prior to draining the oil and refilling the equipment with new oil. MaxSolv™ works by softening and then displacing or dissolving oxidized oil deposits. Deposits will be removed when draining the old oil, with any remaining sediment being easily flushed or wiped clean. Carefully read the MaxSolv™ product sheet before use, as MaxSolv™ also removes metal coatings such as paint, Teflon, etc. MaxSolv™ is an undyed product.

Product	Flash °F	Spec. Gravity	Auto Ign. °F	Boiling Point °F	Pour Point °F
MaxSolv	186	1.025	555	400	-10

Max-Tuff  
Needle Oil  
NGL-NS

## Product Information

### Max-Tuff™ — Assembly Lube (with Synslide®)

Max-Tuff™ is an ultra-tough, synthetic lubricant designed for use in reassembling repaired equipment. Max-Tuff™ utilizes unique, synthetic molecules that adhere tenaciously to metal surfaces to create a formidable, load-bearing physical barrier between surfaces. This minimizes the possibility of boundary conditions (metal-to-metal contact) while providing excellent protection to both ferrous and nonferrous metals against rust and corrosion.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F
Max-Tuff	600	35.7	3234	174	94	300

### Needle Oil — Synthetic Industrial Oil (with Synerlec®)

Needle Oil is a high-performance lubricant for industrial applications such as high speed spindles and die grinders. Needle Oil has a high film strength to protect bearings from wear, excellent thermal and oxidation stability to minimize deposits and to extend drain intervals and a low coefficient of friction to maximize energy savings. It rapidly separates from water and protects bearings and other components from rust and corrosion. Needle Oil is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Fire °F	ISO Grade
Needle Oil 5	5.8	1.8	46	32	—	475	520	5
Needle Oil 10	5.7	1.8	46	32	—	475	515	10
Needle Oil 22	21.5	4.5	112	41	127	475	520	22
Needle Oil 32	32.0	6.0	164	47	136	475	520	32

### NGL-NS™ — Hydrocarbon Gas Compressor Oil

NGL-NS™ is a premium, synthetic lubricant specifically designed to increase the service life of reciprocating gas compressors in hydrocarbon service where sulfur-sensitive catalysts are present downstream of the compressor.

NGL-NS™ is virtually sulfur free and is formulated with dense, closely packed, synthetic molecules to greatly resist dilution from compressed hydrocarbon gases. It is also extremely hydrophobic and rapidly separates from water, which protects bearings and other components from rust and corrosion. NGL-NS™ makes gas compressors run longer with minimum wear. NGL-NS™ is an undyed product.

## Product Information

NGL-NS  
Open Gear Guard XP  
Paper Mill Grease

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Fire°F	Pour Point°F	ISO Grade
NGL-NS 100	100	13.2	515	72	130	400	475	-45	100
NGL-NS 150	150	16.5	781	86	117	395	510	-40	150
NGL-NS 220	220	21.3	1153	107	115	370	470	-35	220
NGL-NS 320	320	27.0	1690	133	112	450	520	-30	320
NGL-NS 460	460	34.6	2443	169	112	460	530	-20	460

### Open Gear Guard XP — Dry Film/EP Lubricant (with Synslide®)

Open Gear Guard XP is designed to lubricate open gears subjected to heavy loads in dusty or dirty environments. It is a unique, thixotropic lubricant blended with a solvent carrier that is easily applied by either spraying or brushing. Once applied, the carrier film evaporates leaving a tenacious, dry, wax-like film that minimizes the collection of abrasive dust and other airborne contaminants. Open Gear Guard XP is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	Flash °F
Open Gear Guard XP	3.5	1.4	38	31	145 min.

### Paper Mill Grease — Synthetic Paper/Pulp Processing Grease (with Synslide®)

Royal Purple® Paper Mill Grease is a high performance, aluminum complex, synthetic grease designed to lubricate a wide range of typical paper/pulp processing applications using a single grease.

Paper Mill Grease is the appropriate bearing lubricant for all paper machine bearings from the wet end through the dry end operating at speeds of 1500 RPM to 6500 RPM. Due to its superior film strength, it is highly recommended on wet end roll bearings, wire return rolls, couch rolls, suction press rolls, granite or synthetic covered press rolls and wet felt rolls. It is also recommended for dry end rolls such as dryer felt rolls, coater rolls, calendar rolls, winder rolls and super calendar rolls. (For shafts in excess of seven inches in diameter or speeds in excess of 3000 RPM, consult your Royal Purple® representative or call Royal Purple's technical support staff at 281-354-8600.) Royal Purple® Paper Mill Grease's versatility allows its use in auxiliary equipment such as pumps, refiners, fans and conveyors.

Product	Base Oil cSt @40°C	Base Oil cSt @100°C	VI	Drop Point °F	NLGI Grade
Paper Mill Grease	244	24	122	536	1.5

Parafilm  
Para-Syn/PM

## Product Information

### **Parafilm®** — Compressor, Pump, Turbine and General Plant Lubricant (with Synerlec®)

Parafilm® is recommended for use in air compressors, pumps, turbines, bearings and general plant equipment where premium performance is desired but the use of a fully synthetic oil is not a viable option.

Parafilm® is a high film strength, para-synthetic lubricant that offers Royal Purple's renown performance advantages in an economical mineral/synthetic oil blend. Parafilm® separates from water, extends oil drain intervals, keeps equipment clean and provides excellent protection against rust and corrosion.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Fire °F	ISO Grade
Parafilm 32	32	5.7	165	45	117	385	435	32
Parafilm 46	46	7.1	236	50	114	405	455	46
Parafilm 68	68	9.0	351	57	107	435	480	68
Parafilm 100	100	12.0	519	68	110	460	515	100

### **Para-Syn®/PM** — Para-Synthetic Paper Machine Oil (with Synerlec®)

Para-Syn®/PM is a premium oil designed to eliminate bearing wear and high temperature deposits that are consistently troublesome to paper machines. Para-Syn®/PM rapidly separates from water, has high filterability and greatly extends oil drain intervals, protecting bearings and gears against wear and corrosion.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	Timken OK Load	ISO Grade
Para-Syn/PM 100	100	10.5	524	62	85	425	-40	60	100
Para-Syn/PM 150	150	14.0	791	76	89	445	-40	60	150
Para-Syn/PM 220	220	18.1	1167	93	90	475	-40	60	220
Para-Syn/PM 320	320	22.3	1714	112	85	485	-40	60	320

## Product Information

Poly-Guard FDA  
Quadrex

### **Poly-Guard® FDA** — High Performance FDA/NSF Certified H-1 Oil (with Purolec®)

Poly-Guard® FDA is recommended for use in compressors, pumps, gear boxes, bearings, blowers or almost any other equipment in food processing or pharmaceutical plants requiring oil.

Poly-Guard® FDA is a superior anti-wear, long life, synthetic lubricant that is NSF Certified for H1 service and meets the FDA CFR Title 21 Section 178.3620(b) purity requirement. Poly-Guard® FDA reduces wear and keeps equipment cleaner, allowing for substantially longer oil drain intervals. Poly-Guard® FDA is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Pour Point°F	ISO Grade
Poly-Guard FDA 15	15	3.6	82	38	115	400	-85	15
Poly-Guard FDA 22	22	4.6	115	42	126	405	-80	22
Poly-Guard FDA 32	32	6.0	164	46	133	450	-65	32
Poly-Guard FDA 46	46	7.7	235	52	134	450	-55	46
Poly-Guard FDA 68	68	10.0	349	60	131	485	-45	68
Poly-Guard FDA 100	100	12.7	517	70	122	445	-45	100
Poly-Guard FDA 150	150	16.5	782	86	116	480	-45	150
Poly-Guard FDA 220	220	21.3	1154	107	115	480	-25	220
Poly-Guard FDA 320	320	27.3	1689	134	114	475	-30	320
Poly-Guard FDA 460	460	34.6	2443	169	112	475	-15	460
Poly-Guard FDA 680	680	49.3	3612	239	125	480	-15	680

### **Quadrex®** — Premium 4-Cycle Gas Engine Oil (with Synerlec®)

Quadrex® is a low ash, fuel saving, high performance, synthetic blend 4-cycle natural gas engine oil. Quadrex® saves fuel and reduces maintenance costs. It extends drain intervals, ring and bearing life, prevents piston seizing and scuffing and keeps engines clean.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash°F	Pour Point°F	Sulfated Ash % Max	SAE Grade
Quadrex 30	85.2	10.6	442	62	108	460	10	0.45	30
Quadrex 40	128.8	14.1	672	76	108	505	20	0.45	40

\*Available with high TBN's for sour gas service.

Royal Flush  
Royal Purple Motor Oil

## Product Information

### Royal Flush — Oil Circulation System Cleaner

Royal Purple's Royal Flush is a safe, effective and inexpensive product for cleaning sludge and varnish from equipment while in service.

Royal Flush can be used in three ways: First, Royal Flush can be added to an existing oil to clean varnish and sludge from equipment prior to draining the existing oil. Second, Royal Flush can be used as a temporary oil fill to clean varnish and sludge from equipment before refilling with new Royal Purple oil. And third, Royal Flush can be used as a temporary oil fill for cleaning and flushing a polyglycol oil that is incompatible with the new oil to be used (i.e. when changing from a polyglycol oil to a Royal Purple PAO or para-synthetic oil). Royal Flush is an undyed product.

Product	cSt @40°C	cSt @100°C	VI	Flash °F	Fire °F	Pour Point °F	Specific Gravity
Royal Flush	46	6.3	79	470	520	-5	0.944

### Royal Purple® Motor Oil — High Performance Engine Oil (with Synerlec®)

Royal Purple® Motor Oil is recommended for use in gasoline and diesel automotive, commercial fleet and stationary industrial engines.

Royal Purple® Motor Oil is a long life, high film strength engine oil that greatly exceeds the performance of other premium mineral and synthetic oils. Royal Purple® Motor Oil reduces engine wear, extends drain intervals, saves fuel, increases horsepower, keeps engines clean and meets new engine warranty requirements.

Note: Follow manufacturer's oil change recommendations during warranty.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Total Base No.	API Service	SAE Grade
RP SAE 30	79.0	10.6	408	63	119	460	10.5	CF,CF-2/SJ	30
RP SAE 40	121.0	14.2	631	74	113	460	10.5	CF,CF-2/SJ	40
RP SAE 50	182.0	18.6	955	92	113	460	10.5	CF,CF-2/SJ	50
RP SAE 5W20	49.5	8.7	253	56	156	455	8.0	SL	5W20
RP SAE 5W30	65.3	11.0	332	64	157	440	12.0	SL	5W30
RP SAE 10W30 (gas)	70.3	10.8	360	63	140	430	12.0	SL	10W30
RP SAE 10W30 (diesel)	67.3	10.9	344	62	144	400	10.0	CF-4,CG-4, CH-4,CI-4/SL	10W30
RP SAE 10W40	94.0	14.0	482	75	148	400	12.0	CF-4,CG-4, CH-4,CI-4/SL	10W40
RP SAE 15W40	110.1	15.3	567	79	140	450	10.5	CF-4,CG-4, CH-4, CI-4Plus/SL	15W40
RP SAE 20W50	170.0	20.2	880	102	138	435	10.5	CF,CF-4/SJ	20W50

## Product Information

Royal Purple 2-Cycle TCW III  
Syn V EMD  
Syndraulic

### Royal Purple® 2-Cycle TCW III — 2-Cycle Gasoline Engine Oil (with Synerlec®)

Royal Purple® 2-Cycle TCW III is recommended for use in both pre-mixed and injected gasoline 2-cycle engines.

Royal Purple® 2-Cycle TCW III is a high performance engine oil that improves performance and reduces wear in both standard and high performance 2-cycle gasoline engines. Royal Purple® 2-Cycle TCW III's synthetic solvency keeps spark plugs and exhaust ports clean for maximum engine efficiency. This engine cleanliness combined with Royal Purple® 2-Cycle TCW III's low coefficient of friction promotes increased horsepower and engine speed. Engines operate with greater combustion efficiency and go longer between overhauls when lubricated with Royal Purple® 2-Cycle TCW III.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	Flash °F	Fire °F
RP 2-Cycle TCW III	36.0	6.15	185	47	230	275

### Syn V EMD™ — Synthetic EMD Engine Oil (with Synerlec®)

Syn V EMD™ is recommended for EMD/GE diesel engines with silver-coated bearings.

Syn V EMD™ engine oil keeps engines cleaner, provides superior anti-wear/anti-scuffing/anti-seizing protection, greatly extends the oil and filter change intervals, reduces fuel consumption and significantly reduces the normally high oil consumption in most EMD diesel engines.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	SAE Grade
Syn V EMD 40	151.2	13.8	798	75	85	465	-35	40

### Syndraulic® — Premiere Hydraulic Oil (with Synerlec®)

Syndraulic® is a clean, long life, energy efficient, minimum leak, hydraulic oil possessing exceptional film strength and wear protection properties. It is formulated to greatly increase both the life of the oil and the seals, filters and pumps of hydraulic systems. Syndraulic® can lower operating temperatures and restore normal operation to erratically operating hydraulic systems. Syndraulic® 32,46 and 68 are NSF Certified for H2 service.



Syndraulic  
Syndraulic Extreme  
Synergy

## Product Information

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	ISO 4406	ISO Grade
Syndraulic 10	10	2.0	62	33	95	380	-70	*	10
Syndraulic 15	15	3.7	82	39	125	380	-55	*	15
Syndraulic 22	22	4.6	115	42	124	390	-40	—	22
**Syndraulic 32	32	5.7	165	45	120	410	-35	14/13/11	32
**Syndraulic 46	46	7.1	237	50	112	440	-35	14/13/11	46
**Syndraulic 68	68	9.3	351	58	113	430	-25	14/13/11	68
Syndraulic 100	100	11.6	521	66	104	450	-10	—	100
Syndraulic 150	150	15.1	787	80	101	450	-5	—	150

\* Check with manufacturer regarding availability with 14/13/11 cleanliness.

\*\* NSF Certified H2.

### Syndraulic® Extreme — Freezer Service Synthetic Hydraulic Oil (with Synerlec®)

Syndraulic® Extreme is a clean, long life, energy-efficient, minimum leak, hydraulic oil specifically designed for hydraulic systems operating at low ambient temperatures. Its high viscosity index coupled with its excellent low temperature fluidity make it the ideal choice for forklifts operating in blast freezers and other cold storage facilities. Syndraulic® Extreme also performs exceptionally well at normal ambient temperatures, eliminating the need to stock two different hydraulic oils or to dedicate specific forklifts to either freezer or non-freezer service.

Syndraulic® Extreme is formulated to greatly increase not only the life of the oil but also the seals, filters and pumps of hydraulic systems. Syndraulic® Extreme can lower operating temperatures and restore normal operation to erratically operating hydraulic systems.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Fire °F	Pour Point °F	Specific Gravity
Syndraulic Extreme	32.0	5.9	163	46	130	455	505	<-70	0.846

### Synergy® — High Performance EP Gear Oil (with Synslide®)

Synergy® is Royal Purple's best-selling EP gear oil and is designed to smoothly lubricate industrial gears under virtually all conditions.

Synergy® is an ultra-tough, long life, gear oil with slippery, synthetic molecules, which greatly increase its lubricity and oiliness properties. Gears run smoother, quieter, cooler and longer without overhauls.

Synergy® is noncorrosive to both ferrous and nonferrous metals. Its ability to rapidly and completely separate from water prevents sludge and wear commonly found in wet gear boxes (such as cooling tower gear boxes). Synergy® employs a dense, high molecular weight, synthetic cushioning additive to prevent fatigue failure in gears subjected to sudden shock loads. (For more information, ask for our "Gear Lubrication Manual" and "Synergy® Product Sheet".)

## Product Information

Synergy  
Synergy Worm Gear Oil  
Synfilm

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	4-Ball Weld, kfg	Timken OK Load	AGMA/ ISO Grade	SAE Grade
Synergy 68	68	8.85	351	58	97	420	-30	400	100+	2EP	75W80
Synergy 100	110	11.9	518	70	97	420	-5	400	100+	3EP	80W85
Synergy 150	157	15.3	781	87	98	425	-5	400	100+	4EP	80W90
Synergy 220	236	21.4	1155	106	108	445	0	400	100+	5EP	90
Synergy 320	343	25.5	1687	136	97	445	-10	400	100+	6EP	85W140
Synergy 460	465	32.0	2440	172	100	430	10	400	100+	7EP	140
Synergy 680	711	43.0	3630	224	102	450	10	400	100+	8EP	250
Synergy 1000	1000	59.0	5376	286	114	450	10	400	100+	8AEP	250

### Synergy® Worm Gear Oil — High Performance Gear Oil (with DynaGlyde®)

Synergy® Worm Gear Oil is a high film strength, para-synthetic lubricant that contains slippery, synthetic molecules and special anti-wear additives to provide the lubricity and oiliness properties necessary to excel in worm gear lubrication (including cylindrical and double enveloping worm gears). Synergy® Worm Gear Oil utilizes a dense, high molecular weight, synthetic cushioning additive that protects against fatigue failure from sudden shock loads. It is noncorrosive to both ferrous and nonferrous metals, has excellent oxidation stability and water separating properties and will not turn rancid (a common problem with other worm gear oils). Textron/Cone drive approved.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	AGMA/ ISO Grade
Synergy Worm Gear 220	220	19.7	1160	100	102	445	25	5/220
Synergy Worm Gear 320	320	25.5	1697	126	103	440	30	6/320
Synergy Worm Gear 460	460	32.6	2452	161	105	435	35	7/460
Synergy Worm Gear 680	680	43.7	3643	212	108	430	40	8/680
Synergy Worm Gear 1000	1000	54.9	5402	266	105	425	40	8A/1000

### Synfilm® — Synthetic Air Compressor and Industrial Oil (with Synerlec®)

Synfilm® is Royal Purple's best-selling industrial lubricant and is recommended for use in air compressors, pumps, bearings, gears, air tools, etc.

Synfilm® is a clean, dry, long life, high film strength, energy efficient, synthetic lubricant that significantly increases bearing life and equipment reliability in air compressors, pumps, gears, etc. Synfilm® rapidly and completely separates from water and provides excellent protection against rust and corrosion. Synfilm® users experience lower operating temperatures, reduced bearing vibration, extended oil drain intervals and longer equipment life.

Synfilm  
Synfilm GT

## Product Information

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	Cinc. Mil. "A"	ISO 4406	ISO Grade
Synfilm 22	22	4.4	115	41	112	350	-65	Pass	—	22
Synfilm 32	32	5.8	164	46	123	455	-55	Pass	14/13/11	32
Synfilm 46	46	7.5	236	51	129	475	-50	Pass	14/13/11	46
Synfilm 68	68	9.8	350	59	126	485	-45	Pass	14/13/11	68
Synfilm 100	100	12.9	517	71	124	485	-50	Pass	—	100
Synfilm 150	150	15.5	785	82	106	480	-30	Pass	—	150

### Synfilm® GT — Multi-Purpose Industrial Oil (with Synerlec®)

Synfilm® GT is recommended for use in gas and steam turbines, blowers and vacuum pumps, bearings, gears, air tools, etc. Synfilm® GT should be considered instead of Synfilm® when: oil reservoir temperatures exceed 200°F, improved low temperature fluidity is desired or when a viscosity grade is not available in Synfilm®.

Synfilm® GT is a clean, dry, long life, high film strength, energy efficient, synthetic lubricant that significantly increases bearing life and equipment reliability. Synfilm® GT rapidly and completely separates from water, has very low temperature fluidity, provides excellent protection against rust and corrosion and is extremely oxidation stable, allowing for long oil life and extended oil drain intervals. Synfilm GT® 32, 46, 68, 100, 150, 220, 320 and 460 are NSF Certified for H2 service.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	Cinc. Mil. "A"	ISO 4406	ISO Grade
Synfilm GT 10	10	2.0	62	33	100	355	-80	Pass	*	10
Synfilm GT 22	22	4.5	115	41	115	350	-75	Pass	*	22
**Synfilm GT 32	32	5.8	165	46	126	485	-70	Pass	14/13/11	32
**Synfilm GT 46	46	7.4	236	51	126	520	-70	Pass	14/13/11	46
**Synfilm GT 68	68	9.9	350	60	128	510	-65	Pass	14/13/11	68
**Synfilm GT 100	100	12.6	518	70	120	440	-30	Pass	—	100
**Synfilm GT 150	150	16.1	783	84	112	485	-25	Pass	—	150
**Synfilm GT 220	220	21.5	1153	108	117	485	-15	Pass	—	220
**Synfilm GT 320	320	27.0	1685	139	112	500	-15	Pass	—	320
**Synfilm GT 460	460	34.1	2446	166	110	500	10	Pass	—	460
Synfilm GT 680	680	44.3	3637	215	110	500	15	Pass	—	680

\* Check with manufacturer regarding availability with 14/13/11 cleanliness.

\*\* NSF Certified H2

## Product Information

Synfilm GTO  
Synfilm NGL

### Synfilm® GTO — Gas Turbine Oil

Synfilm® GTO is recommended for the lubrication of gas turbines where unique operating conditions exist or where Original Equipment Manufacturer warranties require the use of non-EP oils. Synfilm® GTO is approved by Solar Turbines.

Synfilm® GTO is a long life, dry, energy efficient, synthetic lubricant that increases bearing life and equipment reliability in air compressors, pumps, turbines, gears, etc.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	Cinc. Mil. "A"	ISO Grade
Synfilm GTO 10	10	2.8	61	36	109	440	-75	Pass	10
Synfilm GTO 32	32	5.8	165	46	132	480	-70	Pass	32
Synfilm GTO 46	46	7.4	236	51	125	520	-65	Pass	46

### Synfilm® NGL — Hydrocarbon Gas Compressor Oil (with Synerlec®)

Synfilm® NGL is a long life, high film strength, synthetic lubricant specifically designed to increase the service life of rotary screw, centrifugal, rotary vane and reciprocating gas compressors in hydrocarbon service. Synfilm® NGL is the ideal lubricant for gas compressor service because it is formulated with dense, closely packed molecules to greatly resist dilution from compressed hydrocarbon gases. Its high film strength protects bearings, cylinders, rings and rider bands from wear. Synfilm® NGL has excellent thermal and oxidation stability to minimize deposits and to extend oil drain intervals. It also has a low coefficient of friction to maximize energy savings and to protect bearings and other components from rust and corrosion.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	ISO Grade
Synfilm NGL 46	46	7.2	236	50	115	385	-50	46
Synfilm NGL 68	68	9.0	352	57	107	385	-45	68
Synfilm NGL 100	100	12.2	518	68	115	470	-25	100
Synfilm NGL 150	150	16.0	783	84	111	470	-20	150
Synfilm NGL 220	220	20.7	1156	104	110	485	-10	220
Synfilm NGL 320	320	26.0	1695	129	106	485	-10	320
Synfilm NGL 460	460	32.0	2457	157	101	495	-5	460

Synfilm Recip.  
Synmist

## Product Information

### Synfilm® Recip. — Reciprocating Air Compressor Oil (with Synerlec®)

Synfilm® Recip. is a long life, high film strength, energy efficient, synthetic lubricant that excels in the lubrication of reciprocating air compressors. Synfilm® Recip. has excellent solvency properties and outstanding oxidation stability that virtually eliminates carbon build-up on discharge valves, a common problem for reciprocating compressors.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	ISO Grade
Synfilm Recip. 68	68	7.9	355	53	75	495	-30	68
Synfilm Recip. 100	100	10.1	526	61	75	495	-25	100
Synfilm Recip. 100 Multi-Visc.	100	13.3	516	73	131	505	-30	100
Synfilm Recip. 150	150	14.5	789	78	95	495	-30	150

### Synmist® — Air Mist Lubricant (with Synerlec®)

Synmist® is a high film strength, synthetic lubricant specifically designed for use in centralized air-mist lubrication systems. Synmist® is designed to readily atomize to eliminate large, unwanted, wet oil droplets that can accumulate in mist systems. Synmist® also exhibits superior reclassification properties, which ensure oil is delivered onto the bearing surface where it is needed. Synmist® rapidly and completely demulsifies from water and displaces moisture from bearing surfaces. Equipment runs smoother, quieter, cooler, longer and more efficiently. Synmist® is wax free; therefore, it does not cause a wax build-up and does not congeal at low temperatures. Synmist® is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	ISO Grade
Synmist 32	32	5.8	165	46	123	455	-75	32
Synmist 46	46	7.4	236	51	124	465	-75	46
Synmist 68	68	8.2	354	54	84	480	-55	68
Synmist 100	100	12.2	518	68	114	490	-40	100
Synmist 150	150	14.9	787	79	99	500	-35	150
Synmist 220	220	19.4	1162	99	100	500	-35	220
Synmist 320	320	30.0	1678	147	128	525	-15	320
Synmist 460	460	45.1	2400	218	153	550	-5	460

## Product Information

SynTractor III  
Synway  
Thermasil T-100

### SynTractor® III — Universal Tractor Fluid (with Synerlec®)

SynTractor® III is recommended for farm tractors where one common reservoir supplies the transmission, hydraulic system, differentials, wet brakes and final drives.

SynTractor® III is a high performance, high film strength, long life, multi-purpose tractor fluid. SynTractor® III meets the requirements for Allison C-4; David Brown; J.I. Case; Caterpillar TO-2; Allis Chalmers; John Deere J20C/D; and Ford M2C134-C/D, M2C86-C and M2C41-B.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Fire °F	Pour Point °F
SynTractor III	58.7	9.4	300	58	142	430	455	-50
SynTractor III WG (Winter Grade)	43.6	9.1	220	57	197	400	430	-70

### Synway® — Slide and Way Lubricant (with Synslide®)

Synway® is an ultra-tough, tenacious lubricant designed to effectively lubricate machine tool slides and ways. Synway® allows smooth, uniform, chatter-free motion for precision control — even at low table speeds. Its excellent demulsibility properties plus its tacky, adhesive nature make it highly resistant to wash-off or dilution by water or coolants.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	4-Ball Weld, kfg	Timken OK Load
Synway 32	32	5.6	165	45	112	400	400	100+
Synway 68	68	8.9	352	56	105	415	400	100+
Synway 100	100	11.1	522	64	95	370	400	100+
Synway 220	220	19.2	1162	98	90	370	400	100+

### Thermasil™ T-100 — Maximum Load Silica Gel Synthetic Grease (with Synslide®)

Thermasil™ T-100 is a viscous, water resistant, tacky grease designed to protect extremely heavily loaded, low speed bearings or sliding surfaces (such as open gears, skid-rails, etc.) that operate in wet or hot environments where other EP greases perform poorly or even fail. Thermasil™ T-100 is extremely resistant to water washout and provides excellent corrosion protection. It is especially suited for lubricating very low speed, heavily loaded bearings, bushings, pinions, gears, sliding surfaces, etc. Thermasil™ T-100 is an undyed product.

Product	Base Oil cSt @40°C	Drop Point °F	NLGI Grade	Timken OK Load
Thermasil T-100	4866.0	N/A	0	100+

Thermax 680 Grease  
Thermax Semi-Fluid Grease  
Thermyl-Glyde

## Product Information

### Thermax™ Grease — Special Purpose EP Grease (with Synslide®)

Thermax™ Grease is recommended for low speed or high temperature bearings requiring the use of a grease formulated with a heavy base oil.

Thermax™ Grease is a special purpose, ultra-tough, aluminum complex, synthetic grease. It is designed to lubricate equipment requiring grease with a high viscosity base oil. Thermax™ Grease has very good oxidation stability, greatly resists water washout and provides rust and corrosion protection to both ferrous and nonferrous metals. Thermax™ Grease excels in bearings and sliding surfaces that operate at low speeds, under heavy or shock loads, at high temperatures or in wet environments. Typical applications can be found in steel mills, paper mills or in marine service.

Product	Base Oil cSt @40°C	Drop Point °F	NLGI Grade	Timken OK Load
Thermax 680	680	522	2	100+
Thermax 1000	1000	522	0	100+

### Thermax™ Semi-Fluid Grease — Special Purpose Synthetic Grease for Gear Boxes (with Synslide®)

Thermax™ Semi-Fluid Grease is an ultra-tough, aluminum complex grease designed to lubricate gear boxes requiring the use of a semi-fluid grease and leaky gear boxes. It has the fluidity to pour like an oil from the container while having enough body at operating temperature to resist channeling or leaking past faulty seals often found in older gear boxes. Thermax™ Semi-Fluid Gear Grease also has very good oxidation stability and provides excellent rust and corrosion protection to both ferrous and nonferrous metals.

Product	Base Oil cSt @40°C	Drop Point °F	NLGI Grade	Timken OK Load
Thermax Semi-Fluid Grease	380	522	0	100

### Thermyl-Glyde® — Severe Service Gear and Bearing Oil (with Synslide®)

Thermyl-Glyde® gear oil has all of the advantages of Synergy® but is recommended where heavy loads, shock loads, low operating speeds and/or high operating temperatures are encountered.

Thermyl-Glyde® is an ultra-tough, multi-synthetic lubricant for severe service gears, bearings, couplings and ways. Thermyl-Glyde® is noncorrosive to both ferrous and nonferrous metals and rapidly and completely separates from water, preventing the sludge and wear commonly found in wet gear boxes. Thermyl-Glyde® employs a dense, high molecular weight, synthetic cushioning additive to prevent fatigue failure in gears subjected to sudden shock loads. (For more information, ask for our “Gear Lubrication Manual” and “Thermyl-Glyde® Product Sheet”.)

## Product Information

Thermyl-Glyde  
Thermyl-Glyde Worm Gear Oil

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	4-Ball Weld, kfg	Timken OK Load	AGMA/ ISO Grade
Thermyl-Glyde 32	32	5.7	164	43	117	350	-50	400	100+	—/32
Thermyl-Glyde 46	46	7.2	236	50	118	385	-45	400	100+	1EP/46
Thermyl-Glyde 68	68	9.8	350	59	125	395	-45	400	100+	2EP/68
Thermyl-Glyde 100	100	12.4	518	69	117	425	-30	400	100+	3EP/100
Thermyl-Glyde 150	150	16.5	781	86	117	435	-30	400	100+	4EP/150
Thermyl-Glyde 220	220	20.7	1156	104	110	425	-25	400	100+	5EP/220
Thermyl-Glyde 320	320	26.6	1692	131	110	430	-25	400	100+	6EP/320
Thermyl-Glyde 460	460	34.6	2443	169	112	430	-15	400	100+	7EP/460
Thermyl-Glyde 680	680	43.0	3646	209	106	425	10	400	100+	8EP/680
Thermyl-Glyde 1000	1000	56.6	5391	275	109	415	10	400	100+	8AEP/1000
Thermyl-Glyde 1500	1500	83.3	8076	404	125	420	10	400	100+	—/1500

### Thermyl-Glyde® Worm Gear Oil — Synthetic Gear Oil (with DynaGlyde®)

Thermyl-Glyde® Worm Gear Oil is recommended for use in very heavily loaded, slow speed and/or high temperature worm gear service.

Thermyl-Glyde® Worm Gear Oil is a high film strength, slippery, synthetic lubricant with special anti-wear additives to provide the lubricity and oiliness properties necessary to excel in worm gear lubrication (including cylindrical and double enveloping worm gears). Thermyl-Glyde® Worm Gear Oil utilizes a dense, high molecular weight, synthetic cushioning additive that protects against fatigue failure from sudden shock loads. Thermyl-Glyde® Worm Gear Oil is noncorrosive to both ferrous and nonferrous metals, has excellent oxidation stability and water separating properties and will not turn rancid (a common problem with other worm gear oils). Textron/Cone drive approved.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Fire °F	AGMA/ ISO Grade
Thermyl-Glyde Worm Gear 320	320	26.6	1692	131	110	420	470	6/320
Thermyl-Glyde Worm Gear 460	460	36.5	2434	178	120	420	470	7/460
Thermyl-Glyde Worm Gear 680	680	45.9	3630	223	115	425	475	8/680
Thermyl-Glyde Worm Gear 1000	1000	64.2	5345	311	126	425	475	8A/1000

Thermyl-Tuff

Ultra-Performance Clear FDA Grease

Ultra-Performance White FDA Grease

## Product Information

### Thermyl-Tuff® — Maximum Load Synthetic Lubricant (with Synslide®)

Thermyl-Tuff® is recommended for heavily loaded open gears, skid rails, bushings, couplings, bearings, cables, etc., or low speed bearings operating at high temperatures.

Thermyl-Tuff® is a viscous, tacky, semi-fluid lubricant that protects extremely heavily loaded sliding surfaces such as open gears, skid rails, etc., where other EP products perform poorly or even fail. Thermyl-Tuff® cannot be washed off by water and its superior, synthetic corrosion inhibitors provide outstanding protection in wet and/or corrosive environments. Thermyl-Tuff® is an undyed product.

Note: Extremely tacky. This product will entrap contaminants in dusty environments.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Pour Point °F	Timken OK Load
Thermyl-Tuff 100	4800	148	26718	722	107	20	100+
Thermyl-Tuff 200	8800	256	48988	1251	130	27	100+
Thermyl-Tuff 300	16000	457	88863	2236	154	35	100+

### Ultra-Performance® Clear FDA Grease — Clear Synthetic Food Service Grease

Ultra-Performance® Clear FDA Grease is a colorless, nonstaining, nondrying, biodegradable, aluminum complex H1 grease. It is certified by NSF for use in federally inspected meat and poultry plants. Ultra-Performance® Clear FDA Grease exceeds the FDA CFR Title 21 Section 178.3750 purity regulation and is specifically designed for use in the food processing industry where it may have incidental contact with food. Ultra-Performance® Clear FDA Grease contains a bacteriostatic agent to retard bacterial and fungus growth. It is extremely water resistant even after frequent wash downs. Polymer additives plus Teflon\* provide superior adhesive/cohesive strength to lower friction and to protect against high stock loads.

\*E.I. Dupont Company Registered Trademark

Product	Base Oil cSt @40°C	Drop Point °F	NLGI Grades	Low Temp. Pumpability °F
Ultra-Performance Clear FDA	126	500	1 1/2	15

### Ultra-Performance® White FDA Grease — White Synthetic Food Service Grease

Ultra-Performance® White FDA Grease is an aluminum complex, white H1 grease NSF Certified for use in federally inspected meat and poultry plants. It meets or exceeds the FDA CFR Title 21 Section 178.3750 purity requirement and is specifically designed for use in the food processing industry where it may have incidental contact with food. Ultra-Performance® White FDA Grease contains a bacteriostatic agent to retard bacterial and fungus growth. It contains both anti-wear and EP type additives to protect against metal-to-metal contact, providing longer machine life and increased productivity.

## Product Information

Ultra-Performance White FDA Grease  
Ultra-Performance Grease  
Ultra-Performance Grease 32

Product	Base Oil cSt @40°C	Drop Point °F	NLGI Grade	Low Temp. Pumpability °F
Ultra-Performance White FDA	126	500	2	15

### Ultra-Performance® Grease — Synthetic Grease (with Synslide®)

Ultra-Performance® Grease satisfies the widest range of grease requirements and is recommended for bearings and general purpose use.

Ultra-Performance® Grease is a high performance, aluminum complex grease. It has outstanding EP capabilities and excellent water resistance to both emulsion and washout. Ultra-Performance® Grease can be pumped at low temperatures, is stable at high temperatures and has excellent oxidation resistance to extend service life and to provide a margin of safety between relubrication intervals.

Product	Base Oil cSt @40°C	Drop Point °F	NLGI Grade	Unworked Cone Penetration	Timken OK Load
Ultra-Performance Grease	150	520	0	358	100
Ultra-Performance Grease (multi-purpose)	150	520	1	310	100
Ultra-Performance Grease	150	520	2	293	100

### Ultra-Performance® Grease 32 — Special Purpose Synthetic Grease (with Synslide®)

Ultra-Performance® Grease 32 is recommended for lubricating bearings operating at high speeds or at very low temperatures that require a grease with light viscosity oils.

Ultra-Performance® Greases 32 is designed for use in high speed bearings such as fan and spindle bearings. Its tough, slippery, synthetic EP film adheres tenaciously to metal, providing superior lubrication, excellent water resistance to both emulsion and washout and high temperature stability. It also has excellent low temperature fluidity making it ideal for service in low ambient temperatures.

Product	Base Oil cSt @40°C	Drop Point °F	NLGI Grade	Timken OK Load
Ultra-Performance Grease 32	32	>500	2	100

Uni-Temp

## Product Information

### Uni-Temp™ — Synthetic Refrigeration Oil (with Synerlec®)

Uni-Temp™ is a long life, high film strength, refrigeration lubricant that provides superior performance in both rotary screw and reciprocating refrigeration compressors. Uni-Temp™ is wax free and remains fluid at temperatures as low as -90°F. By not congealing on the evaporator coils, cooling efficiency is maximized and the need to shut down the system to clean the coils is eliminated. Uni-Temp™ is proven to virtually eliminate high oil consumption problems while producing average documented energy savings that exceed 5 percent. Uni-Temp™ is recommended for use with ammonia, propane and all fluorocarbon freon R-12, R-22, R-114, etc. Uni-Temp™ 300 is NSF Certified for H2 service. Note: Uni-Temp™ has not been extensively tested in 134a refrigerant systems. Uni-Temp™ is an undyed product.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	VI	Flash °F	Pour Point °F	Timken OK Load	ISO Grade
Uni-Temp 100	20.8	4.2	109	40	107	420	-90	60	22
Uni-Temp 150	32.0	5.7	165	46	118	445	-70	60	32
Uni-Temp 300*	63.0	9.0	324	56	118	445	-45	60	68
Uni-Temp 500	106.0	13.4	548	73	124	445	-45	60	100
Uni-Temp 800	156.0	18.2	809	93	130	445	-45	60	150
Uni-Temp 32/68/100	75.0	10.3	386	61	121	460	-55	60	multi-visc.

\*Uni-Temp 300 is filtered to a typical ISO 4406 cleanliness level of 14/13/11.

\*NSF Certified H2.

## Product Information

VP Preservative Oil 10  
Wire Rope Lubricant

### VP Preservative Oil 10 — Vapor Phase Corrosion Inhibitor

VP Preservative Oil 10 is recommended for use to prevent rust and corrosion in engines, gearboxes and other closed systems that will be stored for periods up to one year or more.

VP Preservative Oil 10 is an oil that prevents rust and corrosion of all metal surfaces to which it is applied. It also fills closed spaces with vapors that prevent rust and corrosion of surfaces not contacted by the oil. VP Preservative Oil 10 is an undyed product.

Product	cSt @40°C	Flash °F	Fire °F
VP Preservative Oil 10	19.5	400	420

### Wire Rope Lubricant — (with Synslide®)

Royal Purple's Wire Rope Lubricant contains specially formulated synthetic lubricants, penetrants and synthetic additives that significantly extend the service life of wire ropes over a wide range of temperatures and working conditions common to the mining, marine and construction industries. Wire Rope Lubricant has state-of-the-art corrosion inhibitors, exceptional penetrating and wetting ability and a strong adhesive film to keep the lubricant in place.

Product	cSt @40°C	cSt @100°C	SUS @100°F	SUS @210°F	Flash °F	Pour Point °F	Timken OK Load
Wire Rope Lubricant	440	28	2366	138	480	-50	100

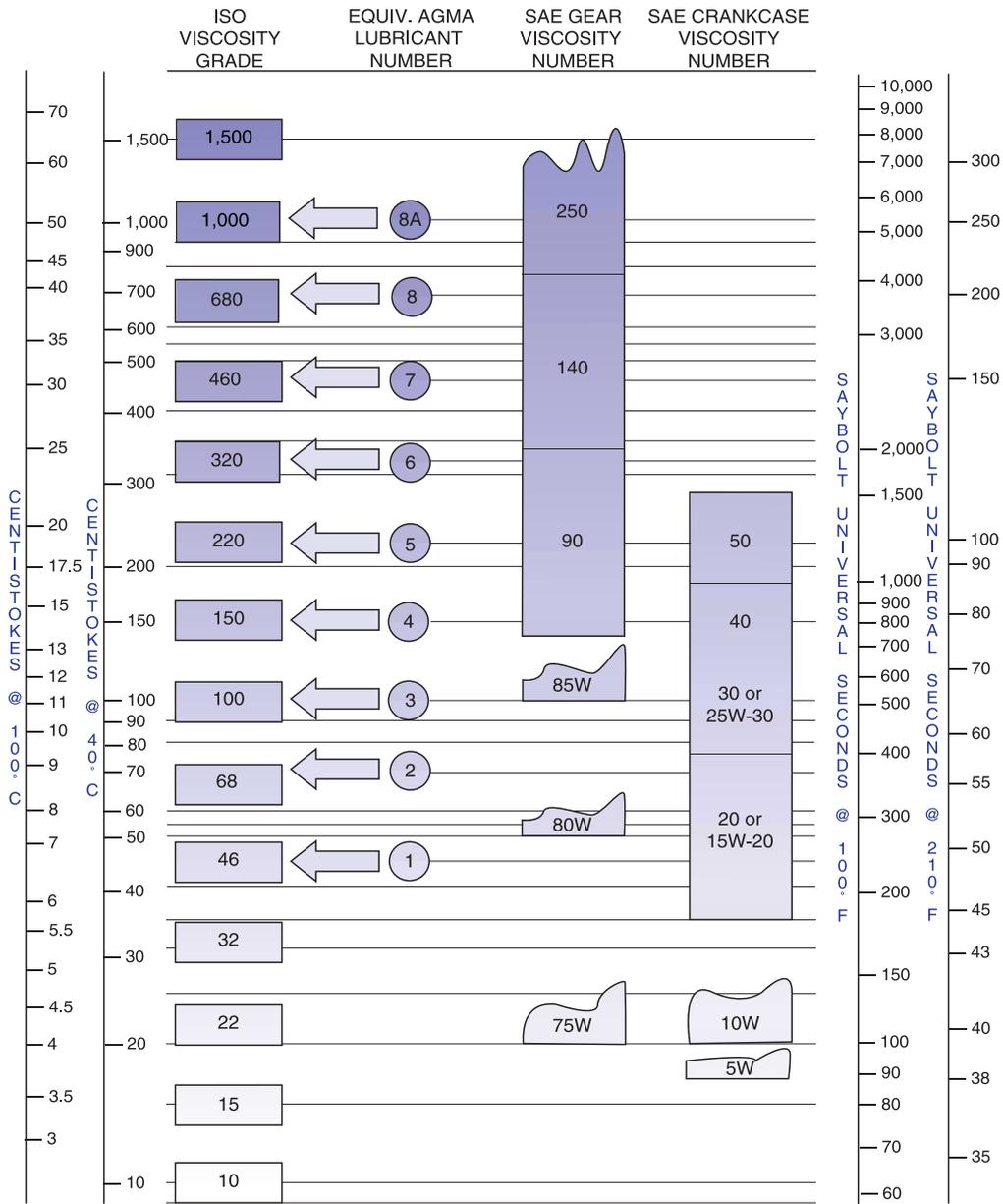
# Notes



ROYAL PURPLE

*Technical Appendix*

# Comparative Viscosity Classifications



VISCOSITIES AT VARIOUS TEMPERATURES ASSUME 95 VI OILS  
 Note: Viscosities at various temperatures are related horizontally.  
 SAE gear and crankcase specifications are at 100°C only.

## ISO Viscosity Grades

<b>International Standards Organization (ISO) Viscosity Grades</b>			
<b>ISO Grade</b>	<b>Viscosity Range cSt @ 40°C</b>	<b>Approximate Range* SUS @ 100°F</b>	<b>Approximate Range* SUS @ 210°F</b>
2	1.98 - 2.42	32.8 - 34.4	—
3	2.88 - 3.52	36.0 - 38.2	—
5	4.1 - 5.06	40.4 - 43.5	—
7	6.12 - 7.48	47.2 - 52.0	—
10	9.0 - 11.0	57.6 - 65.3	34.6 - 35.7
15	13.5 - 16.5	75.8 - 89.1	37.0 - 38.3
22	19.8 - 24.2	105 - 126	39.7 - 41.4
32	28.8 - 35.2	149 - 182	43.0 - 45.0
46	41.4 - 50.6	214 - 262	47.1 - 49.9
68	61.2 - 74.8	317 - 389	52.9 - 56.9
100	90 - 110	468 - 575	61.2 - 66.9
150	135 - 165	709 - 871	73.8 - 81.9
220	198 - 242	1047 - 1283	90.4 - 101
320	288 - 352	1533 - 1881	112 - 126
460	414 - 506	2214 - 2719	139 - 358
680	612 - 748	3298 - 4048	178 - 202
1000	900 - 1100	4864 - 5975	226 - 256
1500	1350 - 1650	7365 - 9079	291 - 331

\*Assumes Viscosity Index (VI) of 95.

## Common Industrial Lubricants

### Royal Purple Recommendations

Royal Purple always recommends that the original equipment manufacturer's (OEM) manual be used to determine the proper type and viscosity of lubricant for any piece of equipment. The most commonly recommended lubricant types are:

**R&O Oils** — These are generally mineral oils containing small amounts of rust and oxidation inhibitors and no anti-wear additives.

R&O oils are sometimes referred to as circulating oils, turbine oils, gear and bearing oils or simply by their AGMA gear oil classification (example AGMA 5 R&O gear oil). Some of the most common brand names of R&O oils are:

Mobil DTE® (light, medium, etc.)  
 Exxon Teresstic® (32, 46, etc.)  
 Shell Turbo® & Turbo® T  
 Chevron AIO

When an OEM recommends the use of an Industrial R&O Oil, Royal Purple generally recommends:

Synfilm®  
 or  
 Synfilm® GT.

**Anti-Wear (AW) Hydraulic Oils** — These are generally mineral oils that contain anti-wear additives along with rust and oxidation inhibitors. Some of the most common brand names for AW hydraulic oils are:

Mobil DTE® 20 series  
 Exxon Nuto® H  
 Shell Tellus®  
 Chevron Clarity AW®

When an OEM recommends the use of an AW hydraulic oil, Royal Purple generally recommends:

Syndraulic®.

**Extreme Pressure Gear Oils** — These are generally mineral oils that contain sulfur-phosphorous additives that generally meet AGMA EP performance requirements. Some of the most common brand names for EP gear oils are:

Mobil Mobilgear®  
 Exxon Spartan® EP  
 Shell Omala®  
 Chevron Gear Compound EP

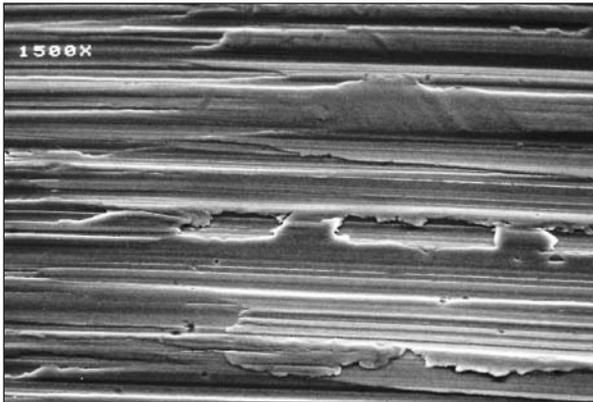
When an OEM recommends the use of an EP gear oil, Royal Purple recommends:

Synergy®  
 or  
 Thermyl-Glyde®.

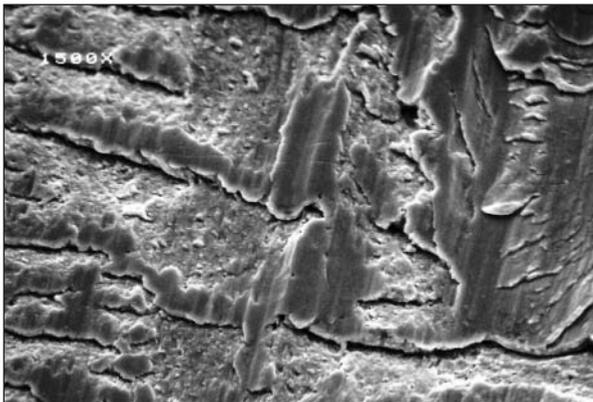
"Our vibration analyst predicted bearing failure was imminent, so we decided to try Royal Purple. We replaced the SAE 30 Shell oil with Royal Purple Synfilm® 100 and the vibration and noise abated immediately and ran for eleven months."

— Maintenance Leaders

## Microscopic Photos of Micro-Polishing



New mechanical bearing surface appears smooth until magnified 1,500 times.

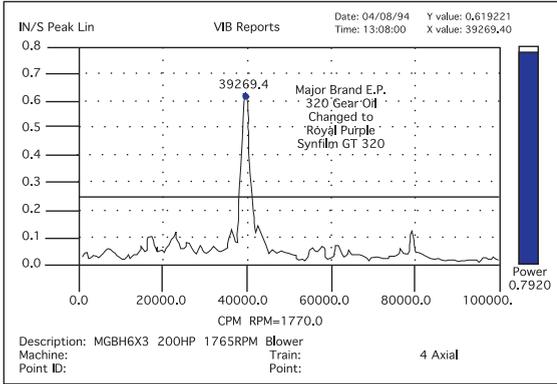


Same bearing surface galled using a premium, competitive synthetic oil (1,500 power).

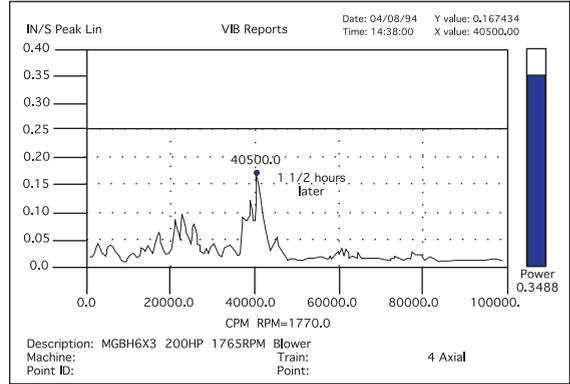


Same bearing surface after being micro-polished by Royal Purple's proprietary Synerlec® additive technology (1,500 power).

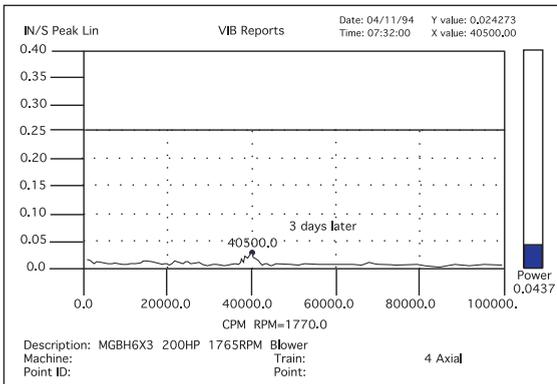
# Micro-Polishing Reduces Vibrations



1. 200 HP Roots Blower at a chemical plant is experiencing high vibrations while being lubricated with a competitor's ISO 320 EP gear oil.



2. Same blower 1 1/2 hours after the oil is changed to Royal Purple® Synfilm® GT 320.



3. Same blower three days after the oil is changed to Royal Purple® Synfilm® GT 320.

## Impact of Vibration Reduction on Bearing Life

(Assumes dynamic load is the major force component)

% Reduction in Vibration	Percent Increase in Bearing Life	
	Ball Bearing Types	Other Rolling Element Bearing
5	17	19
10	37	42
15	63	72
20	95	110
25	137	161
30	192	228
40	363	449
50	700	908

Table provided courtesy of L. Douglas Berry, *Reliability Magazine*

## ISO 4406:99 Cleanliness Level Standards

### Oil Cleanliness

Clean oil greatly extends the life of bearings and equipment. Most oils are not clean. They don't look dirty, but they are full of small particles in the 2 to 30 micron range that the eye cannot see, yet they are very damaging to equipment. These particles consist mainly of fibers, silica (dirt) and metals.

The amounts and sizes of particles can be measured with a laser particle counter and then quantified using the ISO 4406:99 Cleanliness Rating, which reports on the particle content of 1 milliliter of oil (approximately equal to one eye dropper).

ISO 4406:99 Cleanliness Level Standards		
Range Number	Number of Particles per ml	
	More Than	Up to and Including
24	80,000	160,000
23	40,000	80,000
22	20,000	40,000
21	10,000	20,000
20	5,000	10,000
19	2,500	5,000
18	1,300	2,500
17	640	1,300
16	320	640
15	160	320
14	80	160
13	40	80
12	20	40
11	10	20
10	5	10
9	2.5	5
8	1.3	2.5
7	.64	1.3
6	.32	.64

Note: The classification rating follows a geometric progression where each level decreases in cleanliness and is twice as dirty as the previous level.

## ISO 4406:99 Cleanliness Level Standards

Oil Cleanliness levels may be reported using either a two or three digit rating.

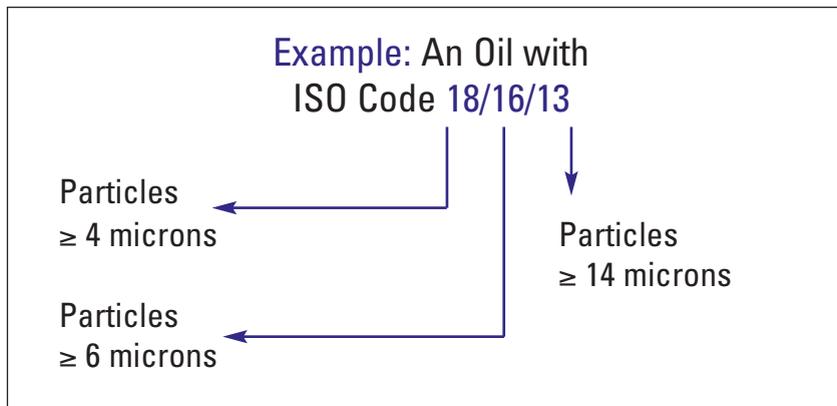
The cleanliness level of an oil with a particle count of:

2000  $\geq$  4 microns

500  $\geq$  6 microns

60  $\geq$  14 microns

would be reported as 18/16/13.



Royal Purple's best selling bearing and hydraulic oils are extremely clean, having a typical ISO cleanliness rating of 14/13/11.

**Quality Isn't Expensive. It's Priceless!™**

## Clearances of Rotating Equipment

Because machine clearances are very small, oil should be extremely clean.

### Typical Dynamic Clearances of Rotating Equipment

Component	Dynamic Clearances
Gears	0.1-1.0 microns
Journal Bearings	0.5-100 microns
Pump, Gear	
Tooth to Side Plate/to Case	0.5-5.0 microns
Pump, Piston	
Piston to Bore	5.0-40 microns
Valve Plate to Cylinder	0.5-5.0 microns
Pump, Vane	
Vane Sides	5.0-13 microns
Vane Tips	0.5-1.0 microns
Rolling Element Bearings	0.1-1.0 microns
Valves	
Directional Spool to Sleeve	2.0-8.0 microns
Proportional Spool to Sleeve	1.0-6.0 microns
Servo Spool to Sleeve	1.0-4.0 microns

Concern for the size and amount of solid particulates that are  $\geq 2$  microns becomes evident when examining typical mechanical clearances for equipment. Particulates that are larger than the mechanical clearances greatly accelerate wear by abrasion.

## Measuring the Benefit of Clean Oil

### Effect of Fluid Cleanliness on Rolling Contact Bearing Life

#### Life Extension Factor (LEF)

B A	2x	3x	4x	5x	6x	7x	8x	9x	10x
	26/23	22/19	20/17	18/15	17/14	16/13	15/12	15/12	14/11
25/22	21/18	19/16	17/14	16/13	15/12	14/11	14/11	13/10	13/10
24/21	20/17	18/15	17/14	16/13	15/12	14/11	13/10	13/10	12/9
23/20	19/16	17/14	15/12	14/11	13/10	13/10	12/9	11/8	11/8
22/19	18/15	16/13	14/11	13/10	12/9	11/8	11/8	—	—
21/18	17/14	15/12	13/10	12/9	11/8	11/8	—	—	—
20/17	16/13	14/11	13/10	11/8	—	—	—	—	—
19/16	15/12	13/10	11/8	—	—	—	—	—	—
18/15	14/11	12/9	—	—	—	—	—	—	—
17/14	13/10	11/8	—	—	—	—	—	—	—
16/13	12/9	—	—	—	—	—	—	—	—
15/12	11/8	—	—	—	—	—	—	—	—
14/11	11/8 <sup>1</sup>	—	—	—	—	—	—	—	—
13/10	11/8 <sup>1</sup>	—	—	—	—	—	—	—	—
12/9	11/8 <sup>2</sup>	—	—	—	—	—	—	—	—

<sup>1</sup> Life Extension Factor 1.5      <sup>2</sup> Life Extension Factor 1.3

**In the above example, improving the ISO 4406:99 cleanliness level of a bearing oil from 20/17 to 13/10 will increase antifriction bearing life by 4 (400 percent increase).**

Table provided courtesy of Diagnostics, Inc.

## Measuring the Benefit of Clean Oil

### Effect of Fluid Cleanliness on Hydraulic System Life

#### Life Extension Factor (LEF)

A \ B	2x	3x	4x	5x	6x	7x	8x	9x	10x
	26/23	23/21	22/19	21/18	20/17	20/17	19/16	19/16	18/15
25/22	23/19	21/18	20/7	19/16	19/15	18/15	18/14	17/14	17/14
24/21	21/18	20/17	19/16	19/15	18/14	17/14	17/13	16/13	16/13
23/20	20/17	19/16	18/15	17/14	17/13	16/13	16/12	15/12	15/11
22/19	19/16	18/15	17/14	16/13	16/12	15/12	14/11	14/10	14/10
21/18	18/15	17/14	16/13	15/12	15/11	14/11	14/10	14/10	13/10
20/17	17/14	16/13	15/12	14/11	13/11	13/10	13/9	12/9	12/8
19/16	16/13	15/12	14/11	13/10	13/9	12/9	12/8	11/8	11/8
18/15	15/12	14/11	13/10	12/9	12/8	11/8	—	—	—
17/14	14/11	13/10	12/9	12/8	11/8	—	—	—	—
16/13	13/10	12/9	11/8	—	—	—	—	—	—
15/12	12/9	11/8	—	—	—	—	—	—	—
14/11	11/8	—	—	—	—	—	—	—	—
13/10	11/8 <sup>1</sup>	—	—	—	—	—	—	—	—
12/9	11/8 <sup>2</sup>	—	—	—	—	—	—	—	—

<sup>1</sup> Life Extension Factor 1.5      <sup>2</sup> Life Extension Factor 1.45

**In the above example, improving the ISO 4406:99 cleanliness level of a hydraulic oil from 20/17 to 13/11 will increase hydraulic system life by 6 (600 percent increase).**

Table provided courtesy of Diagnostics, Inc.

## Measuring the Benefit of Dry Oil

### Effect of Moisture Content on Machine Life

Life Extension Factor (LEF)

Current Moisture Level (PPM)	A \ B	2x	3x	4x	5x	6x	7x	8x	9x	10x
50,000		12,500	6,500	4,500	3,125	2,500	2,000	1,500	1,000	782
25,000		6,250	3,250	2,250	1,563	1,250	1,000	750	500	391
10,000		2,500	1,300	900	625	500	400	300	200	156
5,000		1,250	650	450	313	250	200	150	100	78
2,500		625	325	225	156	125	100	75	50	39
1,000		250	130	90	63	50	40	30	20	16
500		125	65	45	31	25	20	15	10	8
250		63	33	23	16	13	10	8	5	4
100		25	13	9	6	5	4	3	2	2

**In the above example, reducing the water content of an oil from 500 ppm to 45 ppm would increase the machine life by 4 (400 percent).**

Royal Purple industrial lubricants rapidly separate from water, allowing water to easily be drained from the bottom of oil reservoirs. In addition, Royal Purple's proprietary additive technologies ionically bond with all metal surfaces displacing harmful moisture.

**1 Drop of water per liter of oil is approximately 200 ppm (0.02%)**

1.0% Water = 10,000 ppm  
0.1% Water = 1,000 ppm  
0.01% Water = 100 ppm

Source Unknown

## Bearing Life Formula

### ISO Adjusted Bearing Life Formula for Antifriction Bearings

The ISO adjusted bearing life formula is used by bearing manufacturers and equipment design engineers to predict the service life of antifriction bearings.

$$L_{na} = a_{23} (L_{10})$$

$L_{na}$  = actual bearing life (millions of revolutions)

$a_{23}$  = oil film thickness ÷ composite surface roughness  
(composite surface roughness = combined roughness of the bearing and the opposing race;  $a_{23}$  is also called "relative oil film thickness")

$(L_{10})$  = bearing design life (includes all design and installation parameters such as fit, alignment, balance, etc.)

#### This formula illustrates:

1. The quality of lubrication is as important as the mechanical factors in determining the bearing life.
2. Oil film thickness must at least equal the combined surface roughness of the bearing and race in order for the bearing to reach its design life in service.
3. Bearing life is increased in direct proportion to:
  - a) the percentage increase in the thickness of the oil film.
  - b) the percentage reduction in the composite surface roughness.
 Bearing life is greatly increased by a combination of both a & b.

Note: Less than 10 percent of bearings in service ever reach their design life; however, improving relative oil film thickness can increase bearing life up to 4 times its design life.

**Royal Purple's oils with Synerlec® additive technology greatly increases bearing life by both increasing oil film thickness and smoothing bearing surfaces.**

## Value of Energy Savings

Royal Purple's lubricants typically produce energy savings that quickly exceed the total cost of the oil. Royal Purple has prepared this chart as a simple means of documenting these savings.



**Brake Horsepower x 0.746**  
**Motor Efficiency** x 1000 hours x \$KW/hour (1 year = 8,760 hours)

Assumptions: Motor Efficiency = 0.9 Cost per KW hour = \$0.10

Electric Motor Size	Dollars of Energy Savings per 1000 Operating Hours										1000 Hour Energy Cost
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	
500 H.P.	414.45	828.90	1243.35	1657.80	2072.25	2486.70	2901.15	3315.60	3730.05	4144.50	\$41,445.00
250 H.P.	207.23	414.45	621.68	828.90	1036.13	1243.35	1450.58	1657.80	1865.03	2072.25	\$20,722.50
100 H.P.	82.89	165.78	248.67	331.56	414.45	497.34	580.23	663.12	746.01	828.90	\$8,289
50 H.P.	41.45	82.90	123.35	165.80	207.25	248.70	290.15	331.60	373.05	414.50	\$4,144
20 H.P.	16.58	33.16	49.74	66.32	82.90	99.48	116.06	132.64	149.22	165.80	\$1,658
5 H.P.	4.14	8.28	12.42	16.56	20.70	24.84	28.98	33.12	37.26	41.40	\$414
1 H.P.	0.83	1.66	2.49	3.32	4.15	4.98	5.81	6.64	7.74	8.30	\$83
Amount of Energy Saved	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%	

This chart provides a simplified method for estimating the total power cost for operating electric motors and documenting the actual dollars saved (through energy savings) as a result of changing to Royal Purple's energy efficient lubricants.

### Assumptions:

- ✓ A motor efficiency rating of 0.9 was selected because it is a typical value.
  - ✓ An electrical cost of \$0.10 per kilowatt hour was selected for simplification.
- (If actual cost is \$0.06/kw/hr., multiply savings by 0.6; if cost is \$0.12/kw/hr., multiply savings by 1.2, etc.)

## Grease Compatibility Charts

### General Grease Compatibility Chart

	Aluminum Complex	Barium	Calcium	Calcium 12-Hydroxy	Calcium Complex	Clay	Lithium	Lithium 12-Hydroxy	Lithium Complex	Polyurea	Silicone
Aluminum Complex	X	I	I	C	I	I	I	I	C	I	I
Barium	I	X	I	C	I	I	I	I	I	I	I
Calcium	X	I	X	C	I	I	I	I	C	I	I
Calcium 12-Hydroxy	C	C	C	X	B	C	C	C	C	I	I
Calcium Complex	I	I	I	B	X	I	I	I	C	C	I
Clay	I	I	C	C	I	X	I	I	I	I	I
Lithium	I	I	C	C	I	I	X	C	C	I	I
Lithium 12-Hydroxy	I	I	B	C	I	I	C	X	C	I	I
Lithium Complex	C	I	C	C	C	I	C	C	X	I	I
Polyurea	I	I	I	I	C	I	I	I	I	X	I
Silicone	I	I	I	I	I	I	I	I	I	I	X

**C = Compatible**

**B = Borderline  
Compatible:**

Typically results in a light softening or hardening of the NLGI Grade and a lowering of the dropping point of the mixture of grease.

**I = Incompatible:**

Typically results in a softening or hardening of greater than 1 1/2 the NLGI grade, a shift in the dropping point, and a possible reaction of additives or base oils.

Source: E.H. Meyers' paper entitled "Incompatibility of Greases" 49th Annual NLGI Meeting

### Royal Purple Ultra-Performance® Grease Compatibility Chart

	Aluminum Complex	Barium	Calcium	Calcium 12-Hydroxy	Calcium Complex	Clay	Lithium	Lithium 12-Hydroxy	Lithium Complex	Polyurea	Silicone
Operating Temps. <225°F	C	C	C	C	C	I	C	C	C	C	I
Operating Temps. 225-350°F	C	B	B	C	B	I	B	B	C	B	I
Operating Temps. >350°F	C	I	I	C	I	I	I	I	C	I	I

Note: Ultra-Performance® greases are more stable. This chart is generated from independent lab testing and field experience. Actual compatibility results may vary. It is recommended that bearings be purged of old grease per OEM instructions to ensure proper lubrication and performance.

## Guide for Compressors in Gas Service

Royal Purple's line of specialty synthetic lubricants offers performance advantages in the lubrication of compressors in gas compression service.

### Royal Purple Product Overview

#### General Lubricants

1. Synfilm® NGL with Synerlec® additive technology is formulated to prevent hydrocarbon dilution.
2. Synfilm® GT with Synerlec® additive technology, is a synthetic, high temperature compressor oil.
3. Acivac™ is an excellent lubricant/corrosion preventive in acidic environments.
4. Uni-Chem™ is a stable, multi-synthetic formulation.

#### NSF Certified Lubricants

1. Crystal-Clear® is NSF Certified for H1 service.

### Product Application Guide

#### I. Chemically Reactive — Oxidizing Gases

Oxygen	These highly reactive gases will react with any carbon based oil;
Chlorine	therefore, these compressors are either non-lubricated or use special oils.
Fluorine	Royal Purple has no recommendation.
Bromine	
Nitrogen Oxide	

#### II. Chemically Reactive — Non-Oxidizing Gases

Hydrogen Chloride	1st choice	Acilube™ (in vacuum pump, use Acivac)
Hydrogen Sulfide	2nd	Crystal-Clear®
Sulfur Dioxide		

## Guide for Compressors in Gas Service

### III. Inert Gases or Reducing Gases

Nitrogen	1st choice	Synfilm® NGL
Hydrogen	2nd	Synfilm® GT
Helium	3rd	Crystal-Clear®
Carbon Monoxide		
Carbon Dioxide		
Natural Gas		

#### Hydrocarbon gases such as:

Methane	1st	Synfilm® NGL
Ethane	2nd	Synfilm® GT
Propane	3rd	Crystal-Clear®
Butane		
Pentane		

Methylene	1st	Crystal-Clear®
Ethylene		
Propylene		
Butylene		
Acetylene		

### IV. Refrigerant Gases

Ammonia	1st	Uni-Temp™
Freon (except R134)		

### V. Other Gases

	1st	Synfilm® NGL
	2nd	Synfilm® GT

Note: Check lubrication recommendations in equipment manual for correct ISO viscosity grade. If any catalyst is used downstream of the compressor, check with Royal Purple's Industrial Tech. Department prior to product selection.



**Royal Purple's lubricants are saving individual companies millions of dollars a year in gas compressor service!**

## NSF-Registered Lubricants

### Royal Purple® Product

### NSF Registration

Barrier Fluid® FDA 910	H1
Barrier Fluid® FDA 22	H1
Barrier Fluid® FDA 34	H1
Barrier Fluid® FDA 56	H1
Barrier Fluid® FDA 78	H1
Crystal-Clear® 32	H1
Crystal-Clear® 46	H1
Crystal-Clear® 68	H1
Crystal-Pure® 60X	H1
Poly-Guard® FDA 100	H1
Poly-Guard® FDA 1000	H1
Poly-Guard® FDA 15	H1
Poly-Guard® FDA 150	H1
Poly-Guard® FDA 22	H1
Poly-Guard® FDA 220	H1
Poly-Guard® FDA 32	H1
Poly-Guard® FDA 320	H1
Poly-Guard® FDA 46	H1
Poly-Guard® FDA 460	H1
Poly-Guard® FDA 68	H1
Poly-Guard® FDA 680	H1
Ultra-Performance® Clear FDA Grease	H1
Ultra-Performance® White FDA Grease	H1
Synfilm® GT 150	H2
Synfilm® GT 220	H2
Synfilm® GT 32	H2
Synfilm® GT 46	H2
Synfilm® GT 68	H2
Uni-Temp® 300	H2

## Notes

## Notes

## Notes

## Notes

# If Your Equipment Could Choose its Own Oil, It Would Choose Royal Purple.

## Lubrication Matters. So Does the Oil You Choose.

Upgrading to Royal Purple vastly improves equipment reliability, which saves you money.

Royal Purple offers only the most technologically advanced, high performance lubricants available on the market today.

Its oils are tested and proven to decrease maintenance and energy costs.

Energy savings alone typically exceed the total cost of the oil within a few months, virtually eliminating all lubricant expenses.

So change your oil to Royal Purple today and discover that increased equipment reliability and reduced maintenance costs are just an oil change away.



Royal Purple, Ltd. • One Royal Purple Lane • Porter, Texas 77365  
Phone: 281-354-8600 • Fax: 281-354-7600 • [www.royalpurple.com](http://www.royalpurple.com)

**Exclusive Performance  
Advantages:**

**High Film Strength**

**Extends Oil Drain  
Intervals**

**Rapidly and Completely  
Separates from Water**

**Extremely Clean**

**Saves Energy**

**Lowers Operating  
Temperatures**

**Reduces Bearing  
Vibrations**

**Fluid at Low  
Temperatures**

**Superior Rust and  
Corrosion Protection**

**Keeps Equipment Clean**

**Greatly Improves  
Equipment Reliability**

**Reduces the Need for  
Maintenance**

**Reduces Unscheduled  
Downtime**

**Environmentally  
Responsible**

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