

# POWER UP

## LUBRICANTS



PRICEWATERHOUSECOOPERS 

ISO 9001:2000



**BOUNDARY LUBRICANT FOR ENGINES PROVIDES ADVANCED LUBRICATION TECHNOLOGY FOR TODAY**

# NNL 690

**POWER UP<sup>1</sup>**  
**FOR ENGINES**

Power Up **NNL 690** is a unique boundary lubricant which is specifically formulated to solve many of today's tribological problems in high pressure boundary conditions where metal to metal contact is inevitable. **NNL 690** works by forming a wear reducing, protective film which is capable of withstanding extreme pressures as high as 200,000 lbs per sq. inch. **NNL 690** provides critical engine parts, such as the ring zone, cam lobes and turbocharger, with boundary lubrication protection far exceeding that of conventional oils. **NNL 690** is a carefully balanced, complete additive package which contains anti-wear and extreme pressure additives, detergent/dispersants, viscosity index improvers, corrosion inhibitors and acid neutralizers.

## Primary Benefits of NNL 690:

- Strong film affinity maintains lubrication at start-up.
- By reducing the generation of large wear particles, the efficiency of the oil filter is improved.
- High base number helps neutralize acids that cause corrosion.
- Reduces friction and metal to metal contact in high load areas of the engine.
- Extends equipment life and increases equipment availability.
- Has a powerful detergent which cleans and suspends sludge and varnish.



**NNL 690** is specifically designed for use in engines calling for medium to high ash oils (1.0% or more) and is suitable for use in most other lubricated equipment using non-E.P. oils. **NNL 690** provides engines with exceptional anti-wear protection and also contains a superb detergent/dispersant package, viscosity index improvers and excellent anti-corrosion additives. **NNL 690** is a balanced additive package that provides complete lubrication when used with good quality mineral based and synthetic oils.

The primary benefit of **NNL 690** is friction reduction at the boundary lubrication regime (metal to metal contact). This includes the ring zone, turbocharger and camshaft lobe areas in engines, and the pump, cylinder rods and valves in hydraulics.

## Secondary Benefits of NNL 690:

- Reduces ultrasonic wear noise which relates directly to component wear.
- Helps prevent sludge and varnish formation.
- Lowers operating temperatures by reducing friction.
- Provides an improved seal around the ring zone area, improving combustion efficiency and reducing smoke opacity and blow-by.
- Reduces fuel and/or electrical power consumption.
- Improves filtration efficiency by reducing the generation of large wear particles.
- Extends equipment life and increases equipment availability.
- Reduces friction and lowers temperatures in critical bearing and ring zones.

"Since adding NNL 690 to my truck engine my fuel economy has improved 1/2 mile to the gallon from 5.9 miles per gallon to 6.4 miles per gallon. In the past, on cold mornings, I had problems with the truck starting up. Now with the addition of NNL 690 it starts right up every morning, even in temperatures as low as 0 °F."

**Kevin Lovell, K&S Trucking - Yuma, Colorado**



# POWER UP NNL 690: SCIENTIFICALLY VERIFIED TO IMPROVE FLUID ANTI-WEAR CHARACTERISTICS

Decreasing operating expenses, longer machinery life and remarkable fuel conservation are some of the benefits enjoyed by using **NNL 690**. This means that your vehicles and equipment will last longer, operate more efficiently and save you money. **NNL 690** reduces metal to metal contact like no other product. **NNL 690** cleans, protects and reduces operating temperatures.

**OUR TESTS PROVE IT! Check for yourself.**

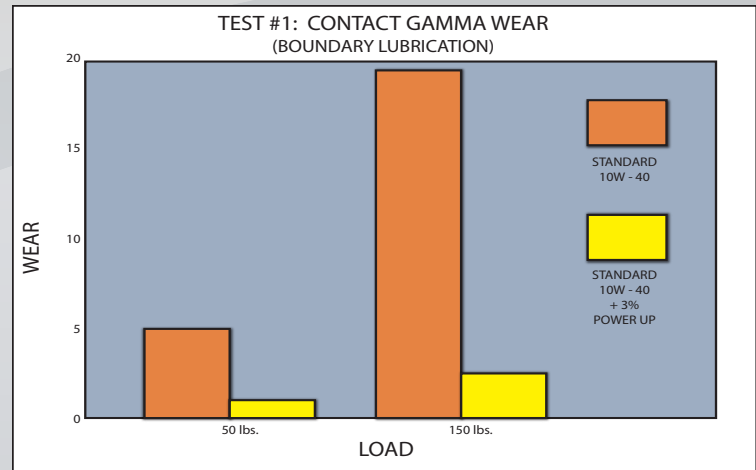
## TEST CONCLUSIONS

Testing by Fluid Engineering Services Inc., in Stillwater, Oklahoma, with over 80 years of fluid power engineering experience, concluded that "test results reveal that the Power Up NNL-690 has an SLI (Service Life Improvement) of 2.5 over regular oils alone." This means when NNL 690 was tested with conventional oils it increased the component life at least 2 1/2 times longer than oils that were not treated.

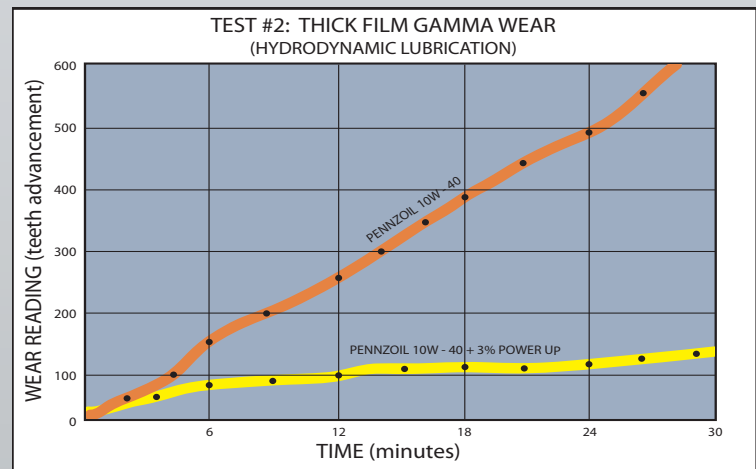
- **High Film Strength**
- **Better Protection at High Temperatures**
- **Protects Against Dry Start Up Wear**
- **Improves Oil Flow in Cold Weather**
- **Keeps Parts Clean and Moving Freely**
- **Reduced Fuel Consumption**
- **Protects Against Water and Antifreeze Contamination and Diesel Dilution**

"The motor is a custom Perkins V8 that is 640 cu.ft. making over 3000 horsepower. That kind of power is real hard on the internal motor parts but when I use NNL 690 in my oil, I see a much longer life out of the parts. I also use NNL 690G in the rear end of the tractor because with the front end of the tractor off the ground all the time I have to steer it down the track with the brakes and with NNL 690G it frees up the rear end so I do not have to use the brakes as much as I did before."

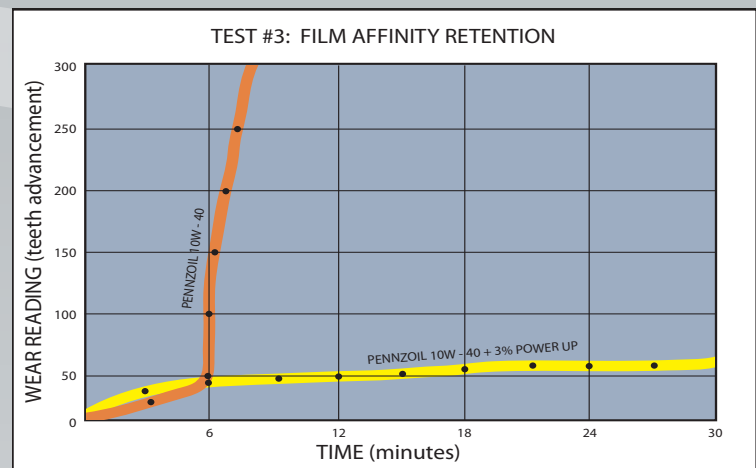
**Robby Crutchfield, BRUTAL FORCE Massey Ferguson SS Pulling Tractor**  
Photo by Tracy Waters



In two test pairs, after the addition of Power Up NNL 690, under heavily loaded conditions, the amount of wear was reduced between 39% and 87% depending on the load.



An average of 18.9% wear reduction was recorded after the addition of Power Up NNL 690 even under hydrodynamic lubrication conditions.



Fluid film retention performance is improved as much as 300% by using Power Up NNL 690 as demonstrated when oil supply is removed.



**NNL 690 PAYS LONG TERM DIVIDENDS IN INCREASED SERVICE LIFE AND REDUCED EQUIPMENT REPAIRS**

# NNL 690

## EXTREME LUBRICATION PROTECTION

In independent Contact Gamma wear tests, **NNL 690** significantly reduced the amount of wear generated when an engine oil alone was used. Calculated estimates based on wear reduction (up to 86.9%) suggest that the use of **NNL 690** can extend equipment life over 7 times **by** reducing typical friction losses that occur in normal day to day operations.

A series of dynamometer and ultrasonic noise tests were carried out by an independent consultant to determine the effect of **NNL 690** on a diesel highway tractor engine. The application of 3% **NNL 690** increased the horsepower and torque, while reducing fuel consumption, ultrasonic wear noise and emissions. Some of the computer controlled and corrected dynamometer results are given in Figures 1 and 2.

FIGURE 1: CORRECTED WHEEL HORSEPOWER VS. RPM

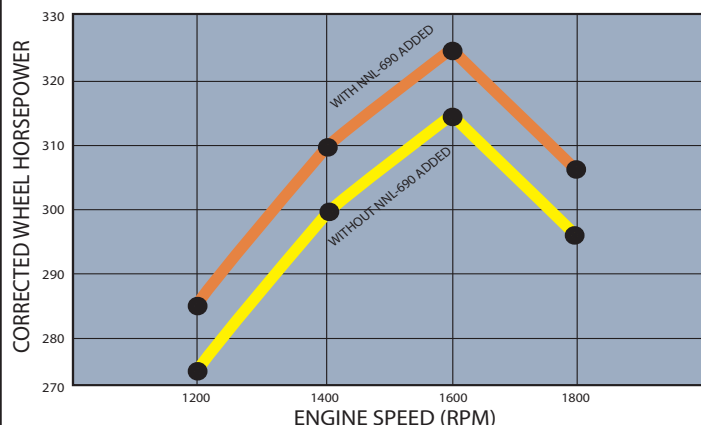
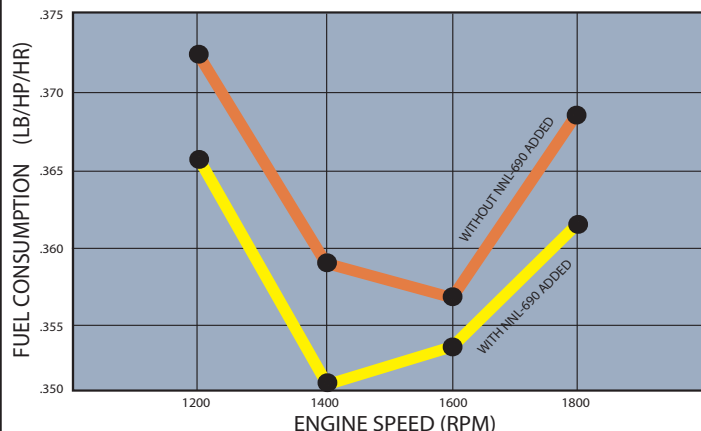


FIGURE 2: FUEL CONSUMPTION VS. RPM



**POWER UP**  
**FOR ENGINES**



"With oil sampling showing reduced wear counts after using Power Up NNL 690 in the engine, it was not a difficult decision to use Power Up products in rest of the drive train in my dozer. The transmission temperature dropped significantly and there are no more metal filings on the final drive magnetic drain plug. I have put on over 4,000 hours on this machine since I started using Power Up and have had no power train down time. It pays to use Power Up Lubricants."

**Patrick Culhane with Culhane Contracting - Waterville, Minnesota**





## NNL 690 PROVIDES YOU WITH A TOTAL PREVENTATIVE MAINTENANCE PROGRAM

| Typical Properties of NNL 690                                   |            |                           |
|---|------------|---------------------------|
| Property  | Method     | Result                    |
| Appearance  |            | Clear, light amber liquid |
| Color   | ASTM D1500 | 2.0                       |
| Viscosity<br>@ 40°C (104°F)<br>@ 100°C (212°F)                  | ASTM D445  | 70 cSt<br>9 cSt           |
| Viscosity Index   | ASTM D2270 | 102                       |
| Specific Gravity<br>@ 60°F (15.6°C)                             | ASTM D941  | 1.05 (H2O =1)             |
| Density   | ASTM D941  | 1.05 g/mL                 |
| Pour Point  | ASTM D97   | -17°F (-27°C)             |
| Flash Point   | ASTM D92   | 325°F (163°C)             |
| Acid Number   | ASTM D664  | 0.4 mg KOH/g              |
| Zinc and Lead Content   |            | nil                       |
| Colloidal Suspension<br>(Solid particles, PTFE, graphite, MoS2) |            | none                      |

| Special Notations on NNL 690 |  |
|------------------------------|--|
| Viscosity:                   | A 5% application of NNL 690 in typical SAE 30 to SAE 50 weight oil results in little or no change in viscosity or viscosity index of the oil.  |
| Pour Point:                  | NNL 690 is formulated to have a negligible effect on the pour point of typical engine oils.  |
| Alkaline Reserve:            | Power Up NNL 690 is blended with an acid scavenger to neutralize blow-by gases and acidic oil degradation products. The addition of 3% NNL 690 will increase the base number of engine oils by about 0.5 mg KOH/g.   |
| Application:                 | NNL 690 is intended for use in engine crankcases at 3% of the oil volume, each time the oil is changed. It can also be used in automatic transmissions at an application rate of 1%, power shift transmissions at 3% and in circulating systems at 3% to 5%, depending upon operating conditions. NNL 690 is compatible with all mineral oils and polyalphaolefin and diester based synthetic oils. NNL 690 is not recommended for use with water based fluids, phosphate esters or polyglycol fluids. |

| Test Data on NNL 690  |            |                       |
|---|------------|-----------------------|
| Property  | Method     | Result                |
| Copper Strip Corrosion<br>(266°F (130°C) x 2 Hours)   | ASTM D130  | 1b                    |
| Rust Preventing Characteristics<br>(100% NNL 690)<br>- Distilled Water<br>- Synthetic sea water | ASTM D665  | Pass<br>Pass          |
| Elastomer Compatibility<br>(3% in 10W-30 oil)   | (Modified) | ASTM D4289            |
| • Nitrile<br>• Neoprene<br>• Fluorocarbon   |            | Pass<br>Pass<br>Pass  |
| Contact Gamma Wear<br>@ 150 lb. load<br>10W-30 oil with NNL 690                                 |            | 592 teeth<br>77 teeth |



"I have been using Power Up products for over 10 years. I use NNL 690 in my engines, Hydra Maxx in my hydraulics, NNL 690G in my gear boxes, Gen 49D in my diesel fuel, and grease every bearing and every thing that turns with Thixogrease. One of my tractors, a John Deere 4640 recently had a cracked head bolt that allowed water and antifreeze to get into my engine but because of NNL 690, the John Deere mechanics were completely amazed at how good of shape the internals of the engine were in and how clean the engine was internally. I was expecting a total loss of the engine and the John Deere mechanics told me that we just needed to replace the head bolts and the engine would then be suitable for use again. I would not hesitate to recommend the use of Power Up lubricants to anyone that is looking to save money and extend their equipment life."

**Maurice Trites Jr., Maurice Trites Jr. Farms - Gillette, Arkansas**

### Product Application:

NNL 690 is intended for use in internal combustion engine crankcases at 3% of the oil volume, each time the oil is changed. It is also suitable for use in automatic transmissions at an application rate of 1%, in power shift transmissions at 3%, and in circulating systems at 3% or 5%, depending on the severity of service. NNL 690 is compatible with mineral based and synthetic oils based on polyalphaolefins and diesters. At recommended application rates, engine oil viscosity ratings and typical engine seal materials remain unchanged.

### Available in the following convenient sizes:

150 ml (5 oz.) Bottle  
1 Liter (35 oz.) Bottle  
5 Liter (1.4 Gallon / 175 oz.) Jug  
10 Liter (2.75 Gallon / 350 oz.) Jug  
20 Liter (5.5 Gallon / 700 oz.) Pail  
205 Liter (56.05 Gallon / 7,175 oz.) Drum



## NNL 690G: A BREAKTHROUGH IN WEAR REDUCTION FOR EXTREME PRESSURE GEAR OILS

# NNL 690G



Power Up **NNL 690G** has been developed to greatly enhance the lubricating properties of extreme pressure gear oils. Changing industry technology dictates improvements and demands specialization. Power Up has met this challenge head on.

### Primary Benefits of NNL 690G:

- Reduced friction
- Extremely high film strength
- Increased Energy Efficiency
- Improved lubrication
- Reduced dry starts
- Increases component life and equipment availability.
- Reduced operating temperatures
- Reduced maintenance costs and downtime

### Applications for NNL 690G:

Recommended wherever EP (extreme pressure) oils are used at 5% rates. Including but not limited to:

- Gear Reducers
- Bearing Housings
- Chain Drives
- Standard Transmissions (except synchromesh at 3% rates)
- Bull Gears and Pinions
- Mud Pumps
- Differentials (except limited slip or positrac)
- Final Drives
- Low Ash Engines
- Cone and Jaw Crushers
- Rotary Tables
- Tube and Ball Mills
- Drop Boxes

## BOUNDARY LUBRICANT FOR GEAR OIL

Power Up **NNL 690G** is specially formulated for use in all types of mobile and industrial equipment where Extreme Pressure (EP) oils are called for (API GL-3 or greater). Specific applications include gear reducers, bearing housings, differentials (except posi-trac or limited slip), cone and jaw crushers, pulverizing equipment, final drives, conveyor drive gear boxes, standard transmissions, drop boxes, rotary tables, tube and ball mills, chain drives, mud pumps, bull gear and pinion sets, etc.

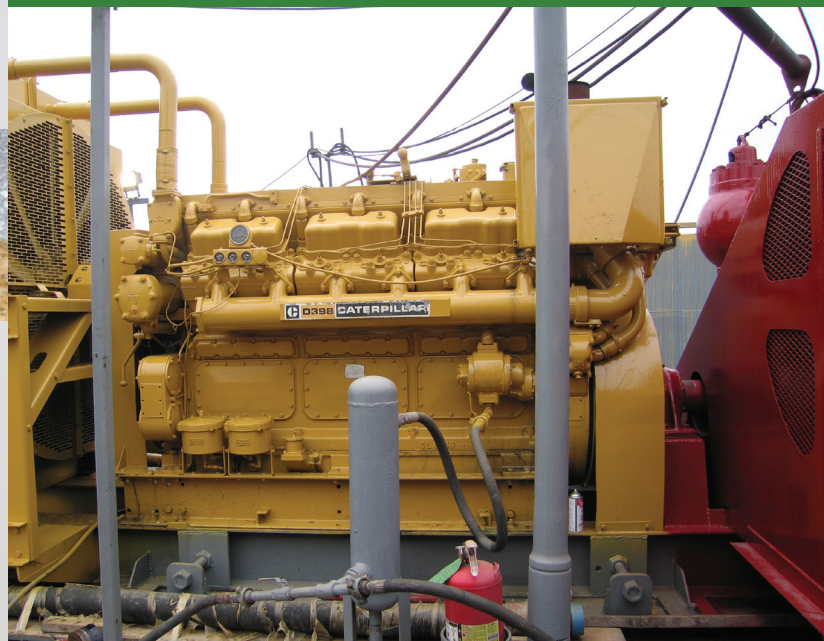
The primary benefit of **NNL 690G** is to reduce the friction caused by asperity (metal to metal) contact in the boundary lubrication regime. It is designed for lubricated systems which call for extreme pressure (EP) oils and engines requiring low ash-content oils.

### Secondary Benefits of NNL 690G:

- Reduces ultrasonic wear noise which relates directly to component wear.
- Reduces dry start-ups.
- Lowers operating temperatures and slows oil degradation.
- Decreases wear in cold temperature applications (conventional EP additives are very dependent upon temperature to chemically react with the wear surfaces). The high film strength protection provided by NNL 690G is less dependent on temperature.
- Reduces fuel and/or electrical amperage consumption in gearbox or reducer applications.
- Improves filtration efficiency by reducing the generation of large wear particles.
- Non toxic.

"When we did our inspections on our mudpumps prior to using your product we would always find a lot of metal flake on the magnets that we placed in the bottom of our oil reservoirs. Since adding NNL 690G to our gear oil, we have dramatically reduced the amount of these metal particles found thus increasing the life of our mudpumps. These findings along with our oil analysis program we feel that we are saving thousands of dollars in wear related costs."

**Pat Burns, General Manager, Energy Drilling - Natchez, Mississippi**

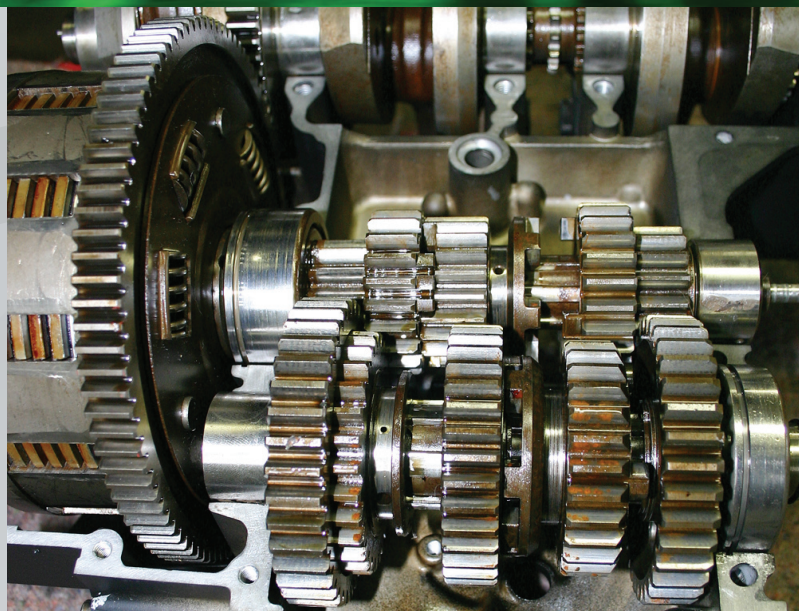




# NNL 690G: INSIST ON THE MOST TECHNOLOGICALLY ADVANCED GEAR LUBRICANT AVAILABLE

| Typical Properties of NNL 690 G                                 |            |                           |
|---|------------|---------------------------|
| Property  | Method     | Result                    |
| Appearance  |            | Clear, light amber liquid |
| Color   | ASTM D1500 | Less than 1.5             |
| Viscosity<br>@ 40°C (104°F)<br>@ 100°C (212°F)                  | ASTM D445  | 80 cSt<br>8.5 cSt         |
| Viscosity Index   | ASTM D2270 | 73                        |
| Specific Gravity<br>@ 60°F (15.6°C)                             | ASTM D941  | 0.99 (H2O =1)             |
| Density   | ASTM D941  | 0.99 g/mL                 |
| Pour Point  | ASTM D97   | -4°F (-20°C)              |
| Flash Point   | ASTM D92   | 305°F (152°C)             |
| Acid Number   | ASTM D664  | 1.5 mg KOH/g              |
| Zinc Content, ppm<br>Lead Content, ppm                          |            | nil<br>nil                |
| Colloidal Suspension<br>(Solid particles, PTFE, graphite, MoS2) |            | none                      |

| Special Notations on NNL 690G |   |
|-------------------------------|---|
| Viscosity:                    | A 5% application of <b>NNL 690G</b> in typical 90 weight gear oil results in little or no change in viscosity or viscosity index.   |
| Pour Point:                   | <b>NNL 690G</b> is formulated to have a negligible effect on the pour point of typical gear oils.   |
| Ash Content:                  | Power Up <b>NNL 690G</b> has a very low total ash content (less than 0.2%). It is therefore suitable for use in the crankcase of engines that require a low ash or ashless oil.   |
| Application:                  | <b>NNL 690G</b> is intended for use in gear boxes using extreme pressure (API GL-3 or greater) oils. It should be added with each oil change at 5% of the gear oil volume. In engine cranks, <b>NNL 690G</b> should be added at 3% of the oil volume each time the oil is changed. It can also be used in automatic transmissions at an application rate of 1%, power shift transmissions at 3% and in circulating systems at 3% to 5%, depending upon operating conditions. <b>NNL 690G</b> is compatible with all mineral oils and polyalphaolefin and diester based synthetic oils. <b>NNL 690G</b> is not recommended for use with water based fluids, phosphate esters or polyglycol fluids. |



| Test Data on NNL 690G   |           |                   |
|---|-----------|-------------------|
| Property  | Method    | Result            |
| Copper Strip Corrosion<br>(266°F (130°C) x 2 Hours)   | ASTM D130 | 1a                |
| Rust Preventing Characteristics<br>- NNL 690G<br>- 5% NNL 690G in ISO 220 gear oil              | ASTM D665 | Pass<br>Pass      |
| Foaming Tendency<br>- 5% NNL 690G in ISO 220 gear oil<br>Sequence 1<br>Sequence 2<br>Sequence 3 | ASTM D892 | Nil<br>Nil<br>Nil |

## Product Application:

NNL 690G is intended for use in all types of mobile and industrial equipment where EP oils are called for. NNL 690G should be applied with each oil change at 5% of the gearbox capacity. With gear oils heavier than ISO 320, NNL 690G should be used at 3%. In internal combustion engine cranks using low ash or ashless oils, NNL 690G should be used at 3% of the oil volume with each change. It is also suitable for use in automatic transmissions at an application rate of 1%, in power shift transmissions at 3%, and in circulating systems at 3% or 5%, depending on the severity of service. NNL 690G is compatible with mineral based oils and with synthetic oils based on polyalphaolefins and diesters. At recommended application rates, it will not effect typical gear or engine oil viscosity ratings or seal materials.

## Available in the following convenient sizes:

150 ml (5 oz.) Bottle  
1 Liter (35 oz.) Bottle  
5 Liter (1.4 Gallon / 175 oz.) Jug  
10 Liter (2.75 Gallon / 350 oz.) Jug  
20 Liter (5.5 Gallon / 700 oz.) Pail  
205 Liter (56.05 Gallon / 7,175 oz.) Drum

## NNL 690G GREATLY ENHANCES GEAR OILS





**INTRODUCING...THIXOGREASE, A REVOLUTIONARY NEW GENERATION OF MULTI-PURPOSE GREASE**

# ThixOgrease

**THIXOGREASE**, the new generation, multi purpose grease from Power Up, provides superior protection in the boundary lubrication regime. **THIXOGREASE** is ideal for applications where high loads, extreme pressure or high temperature cause serious metal to metal contact and wear. Superior water wash resistance and rust corrosion inhibition allow **THIXOGREASE** to excel in areas where conventional greases fail. **THIXOGREASE** is made of a unique base which offers minimal oil separation or hardening and demonstrates excellent compatibility with many traditional soap oil greases.

The primary benefit of **THIXOGREASE** is to reduce the friction caused by asperity (metal to metal) contact in the boundary lubrication regime. It is designed for grease filled applications where high temperature, extreme pressure, water and corrosion are normal conditions.

## Secondary Benefits of THIXOGREASE:

- **Thixogrease reduces ultrasonic wear noise which relates directly to lower component wear.**
- **The high dropping point (570°F) and temperature pumpability of Thixogrease allow for a wide operating temperature range of 0°F to 480°F (-18°C to 250°C).**
- **Thixogrease is formulated with rust and corrosion inhibitors to withstand contamination and protect critical components.**
- **Exceptional water wash resistance allows Thixogrease to work in marine, pulp and paper, and similar applications.**
- **Thixogrease has outstanding shear stability, minimizing relubrication requirements.**
- **Thixogrease is ideal for use in centralized lubricating systems due to its excellent pumpability.**

This new product from Power Up Lubricants is formulated entirely of a Thixotropic complex and unlike conventional grease, offers virtually no chance of oil separation or hardening.

## **SUPERIOR PERFORMANCE IN MAXIMUM TEMPERATURE RANGE APPLICATIONS**



**THIXOGREASE** will not melt down into fluid at temperatures approaching 570°F (300°C), outperforming most soap-based greases by 20%. It maintains its soft, smooth and greasy texture even when cooled and will not harden. It remains highly effective at 0°F (-18°C) and withstands low temperature torque tests to -40°F (-40°C).

**POWER UP**  
MULTI-PURPOSE GREASE



## **REDUCED EQUIPMENT WEAR**

Comparison tests of pressure performance and wear protection show **THIXOGREASE** to have unsurpassed EP lubricating properties, withstanding over 5 times greater pressure and up to a 45% reduction in scoring of metal surface, maximizing life expectancy of bearings. A microscopic layer of **THIXOGREASE** has proven effective in heavy unit loading up to **200,000 PSI**, which means exceptional protection.

**THIXOGREASE** has the unique ability to maintain its integrity and effectiveness even in the presence of contaminating soap-based greases. Results from ASTM's Salt Spray test showed water resistance of up to 20 times greater than conventional greases.

"Using our old grease, we were having an abundance of kingpin and u-joint failures. Since switching to Thixogrease we now grease our trucks every 25,000 miles and have virtually eliminated kingpin and u-joint replacement."

**Ed Szarmack, CalArk Trucking - Little Rock, AR**





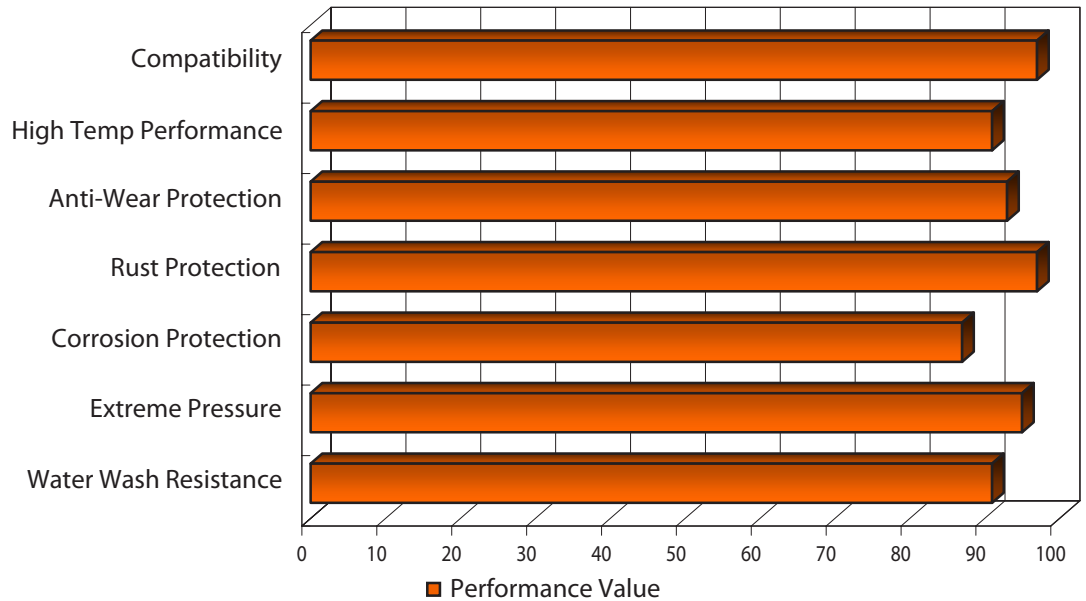
# GIVE YOUR EQUIPMENT THE ADVANTAGE OF THE LATEST IN GREASE TECHNOLOGY

## SUPERIOR GREASE PERFORMANCE

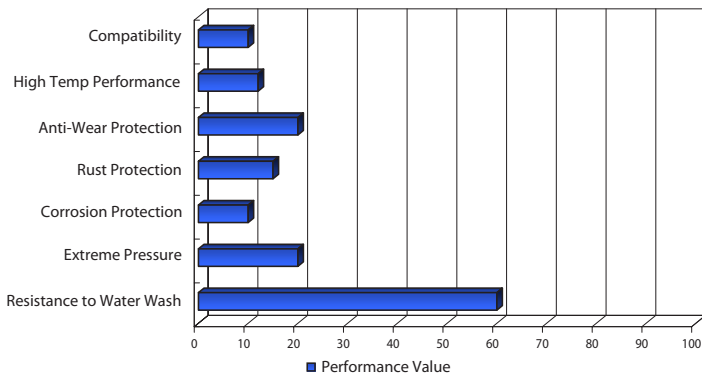
These graphs illustrate that Power Up Thixogrease (right) and its' proprietary Overbased Calcium Sulfinate formula outperforms Aluminum, Lithium, Calcium, Bentonite (clay), and Poly Urea base or complex greases (below) in all major categories of compatibility, high temp performance, anti-wear protection, rust protection, corrosion protection, extreme pressure and resistance to water wash. Power Up Thixogrease gives you the flexibility of using a complete formulated multi-purpose grease no matter what the application.

## Thixogrease

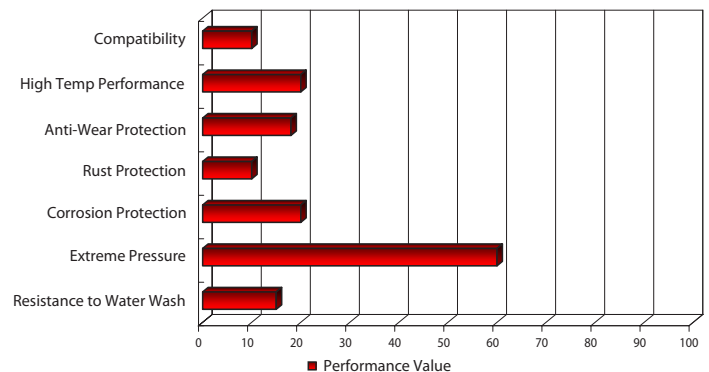
### A FULLY FORMULATED MULTI-PURPOSE GREASE



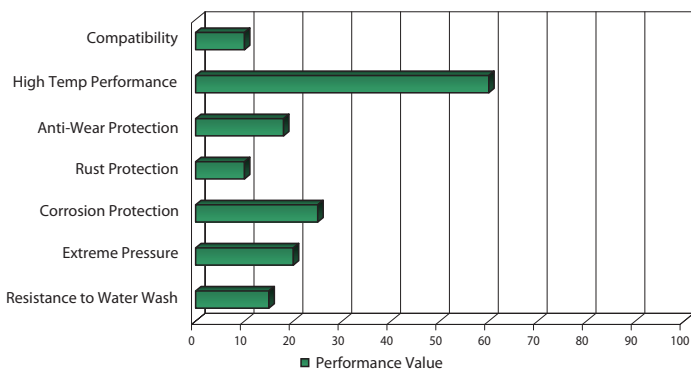
### Special Purpose Marine Grease



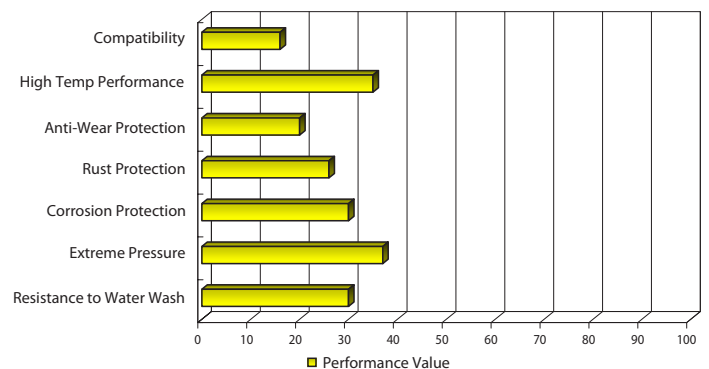
### Extreme Pressure Grease



### Extreme Temperature Grease



### Multi-Purpose Grease





# THIXOGREASE PROVEN THROUGH INDEPENDENT TESTING TO BE THE SUPERIOR GREASE SOLUTION

Independent tests have concluded **THIXOGREASE** to be superior in all categories. These tests were regulated by NLGI, the National Lubricating Grease Institute and ASTM, the American Society for Testing Materials. They confirmed that **THIXOGREASE** is highly efficient for use in centralized grease systems and offered superior performance in applications including industrial, automotive, marine, farming and mining.

## Test results prove it!

- **Superior performance at elevated temperatures**
- **Maintains consistency over extended use, extreme pressure and heat**
- **Highly compatible with residual greases**
- **Excellent resistance to water and oxidation**
- **Minimal contamination risk**

| High Temperature Capabilities  |             |                  |                   |            |
|--|-------------|------------------|-------------------|------------|
| Grease Type  | THIXOGREASE | Lithium* Complex | Aluminum* Complex | Poly* Urea |
| NGLI Grade   | 2           | 2                | 2                 | 2          |
| Dropping Point D566  |             |                  |                   |            |
| °F   | 570+        | 570              | 550               | 463        |
| °C   | 300+        | 300              | 288               | 239        |
| Wheel Bearing Leakage D1273 Modified at 163°C Grams                                  | 0.2         | 3.1              | 1.2               | 0.8        |
| Lubrication Life D3336 at 300°F (149°C), No. 204 Bearing, 10,000 RPM Hrs. to Failure | 800         | 580              | 97                | 420        |
| Reversibility  | Yes         | No               | Yes               | No         |

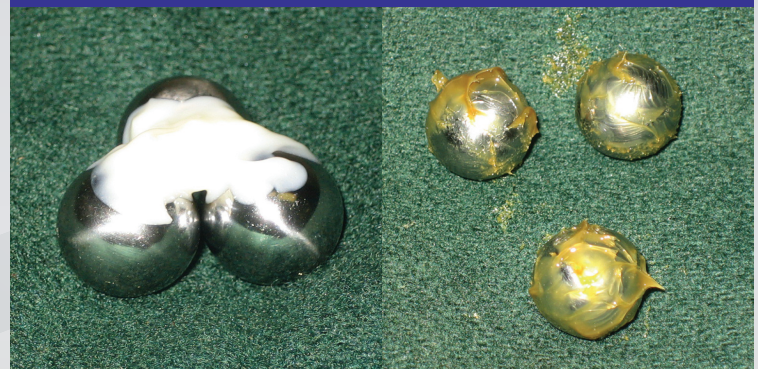
\*Data reprinted from Lubrication Engineering

| Shear Stability                              |             |                  |                   |            |
|--|-------------|------------------|-------------------|------------|
| Grease Type                                  | THIXOGREASE | Lithium* Complex | Aluminum* Complex | Poly* Urea |
| NGLI Grade                                   | 2           | 2                | 2                 | 2          |
| Pen at 25°F, D217mm/10 Pen Worked 10,000 60X | +5          | +10              | +15               |            |
| 100,000 60X                                  | +4          | +30              | +60               |            |
| Roll Stability D1831:                        |             |                  |                   |            |
| Worked Penetration as Received               | 290         |                  |                   |            |
| After 2 Hours at Ambient                     | 302         | Liquified        | Liquified         |            |
| After 100 Hours at 150°F                     | 296         |                  |                   |            |

| Resistance to Water  |             |                  |            |
|--|-------------|------------------|------------|
| Grease Type  | THIXOGREASE | Lithium* Complex | Poly* Urea |
| NGLI Grade   | 2           | 2                | 2          |
| Pen at 25°F, D217mm/10 Pen Worked 10,000 with 50 Water 60X | +10         |                  |            |
| 100,000 with 50% Water 60X                                 | +5          |                  |            |
| Water Wash Out D1264 at 70°C Loss                          | 2.7         |                  |            |
| Shell Roll D1831 as Received                               | 290         |                  |            |
| After 2 Hours Rolling with 50% Water (77°F)                | 279         |                  |            |
| Rust Test D1743 Rating                                     | Pass        | Pass             | Pass       |
| ASTM B117-73 Salt Spray Test Hours to Failure at 1.5 mil   | 950         | 48               | 48         |

| Extreme Pressure Performance and Wear Protection               |             |                  |                   |            |
|--|-------------|------------------|-------------------|------------|
| Grease Type  | THIXOGREASE | Lithium* Complex | Aluminum* Complex | Poly* Urea |
| NGLI Grade   | 2           | 2                | 2                 | 2          |
| Timken OK Load D2509 Lbs                                       | 270         | 55               | 50                | 70         |
| 4-Ball EP Test D2596 LWI Weld Point Kg                         | >95         | 45               | 45                | 80         |
| 4-Ball Wear Test D2266 [mm] Scar 40 Kg, 1200 RPM, 75 °C 1 Hour | 0.30        | 0.50             | 0.55              | 0.35       |

4-Ball EP Test on THIXOGREASE



Picture 1: Steel balls welded together in standard 4 ball EP wear with traditional Lithium complex grease

Picture 2: Steel balls coated in Thixogrease remain unmarked and moving freely in 4 ball EP wear test with 4 times the load of the previous test.



# THIXOGREASE REDUCES FRICTION CAUSED BY ASPERITY (METAL TO METAL) CONTACT

## Typical Properties of THIXOGREASE

| Property   | Method     | Result                |
|--|------------|-----------------------|
| Color Texture  |            | Brown Smooth, buttery |
| NLGI Grade   |            | NLGI #2               |
| Penetration  | ASTM D217  | 287                   |
| Dropping Point   | ASTM D2265 | > 570°F (300°C)       |
| Kinematic Viscosity<br>@40°C (104°F)<br>@100°C (212°F) | ASTM D445  | 139 cSt<br>13 cSt     |
| Viscosity Index  | ASTM D2270 | 84                    |
| Pour Point   | ASTM D97   | -5°F (-15°C)          |

## Special Notations on THIXOGREASE

|                              |  |
|------------------------------|--|
| Operating Temperature Range: | Power Up Thixogrease has been proven to be suitable for applications at temperatures from 0°F to 480°F (-18°C to 250°C). It is easily pumpable at extremely low temperatures and has a dropping point greater than 570°F (300°C), allowing its use in applications with brief excursions to 500°F (260°C). |
| NLGI Specifications:         | Power Up Thixogrease meets or exceeds the specifications of the NLGI GB-LB classification for heavy duty chassis lubrication and medium wheel bearing applications.  |
| Compatibility:               | Where possible, it is always recommended that the old grease be cleaned out of any bearing prior to the application of a different type or grade of grease. The grease compatibility chart provided is a general guide only and may not be true for all brands of the given greases.                       |

## HIGH FILM STRENGTH IN HIGH PRESSURE APPLICATIONS



**THIXOGREASE PROVIDES SUPERIOR PROTECTION  
WHERE RELIABILITY IS MOST CRITICAL**

## Test Data on THIXOGREASE

| Property                            | Method     | Result                  |
|-------------------------------------|------------|-------------------------|
| Timken OK Load                      | ASTM D2509 | > 70 lbs (31kg)         |
| 4 Ball E.P.<br>- LWI<br>- Weld Load | ASTM D2596 | 75<br>1,100 lbs (500kg) |
| 4 Ball Wear                         | ASTM D2266 | 0.37mm                  |
| Corrosion Preventative Properties   | ASTM D1743 | Pass                    |
| Oil Separation                      | ASTM D1742 | 0.27%                   |
| Water Washout                       | ASTM D1264 | 0.10% loss              |

**\*\* Typical Properties and Test Data of NLGI #0 Available on Request**



*"In our Latourneau 800 we were having repeated failures on our bucket tilt pins. After switching to Thixogrease, we went an entire year without any failures saving us over \$100,000 per year on this one application in part replacement, maintenance costs and downtime. We also cut our grease consumption down 67% because Thixogrease does not separate."*  
**Maintenance Supervisor, Obed Mountain Coal - Alberta, Canada**

**THIXOGREASE** is currently available in following grades:

NGLI No. 0 - Most suitable for centralized grease systems, this grease is readily pumpable and will not bleed excessively or age harden.

NLGI No. 2 - A multi-purpose grease when superior lubrication performance is required. **THIXOGREASE** No. 2 is successfully used in the industrial, automotive, marine, farming, mining, forestry and construction industries.

Thixo Tak 2 - Also available is a tackier version of Thixogrease for high speed applications where grease retention is required.

Available in the following convenient sizes:

10 Tube Carton - 400 gram (14.1 oz.) Cartridges  
60 Tube Case - 400 gram (14.1 oz.) Cartridges  
17 kilogram (37.4 lb.) Pails  
55 kilogram (121 lb.) Kegs  
180 kilogram (396 lb.) Drums



## GEN 49D IS THE COMPLETE DIESEL FUEL SYSTEM TREATMENT

# Gen49D

## Diesel Fuel System Treatment

with Cetane

**Gen 49D** is an alcohol free lubricant formulated to separate water and provide diesel fuel system performance improvements.

**Gen 49D** is specifically formulated to separate water and provide complete diesel fuel system performance improvements. **Gen 49D** is specifically formulated to meet all manufacturers requirements including GM, Caterpillar, Cummins and Detroit Diesel.

### Primary benefits of using Gen 49D are:

- Increased Fuel economy
- Improved combustion
- Power Increase
- Reduced engine wear
- Cleaner components
- Lower maintenance costs
- Reduced emissions
- Winter fuel / AntiGel protection
- Long term fuel stability
- Cold Start Performance



## IMPROVES CETANE OF FUEL

Higher cetane means better ignition quality. Gen 49D will increase the cetane number of your diesel fuel by 2 to 3 numbers, which is important for efficient engine operation and emission control. Cetane number is a measure of its ignition quality. High cetane number fuels will start to burn earlier in the compression stroke, important for efficient engine operation and emissions.

### Cetane Improvers provide:

- Improved cold start performance
- Reduced fuel consumption
- Reduced engine noise
- Improved engine durability
- Decrease in Particulates, Nitrogen Oxides (NOx), Carbon Monoxide, and Hydrocarbon Emissions
- Reduce white and black smoke production

## POWER UP FOR DIESEL FUEL

### GEN-49D WITH ANTI-GEL PROTECTION

**Gen 49D** fights water and gelling the leading problem with winter fuel. Cold flow is improved up to 27°F (15°C). This gives your fuel the very best chance of flowing in extreme cold conditions.

**Gen 49D** contains a powerful deicer that lowers the freeze point of water and prevents ice crystals from forming that may plug filters and cause misfiring. Additionally the antigel characteristic keeps crystal molecules from collecting or clumping to ensure problem free winter operation.

### FUEL STABILIZER

**Gen 49D** adds an excellent stabilizing package to your diesel fuel. High temperature stress on fuels results in degradation products such as particulate solids which may lead to injector damage and filter plugging. Gen 49D also fights the effects of oxygen and water in stored fuel, neutralizing the effect of water.

### CORROSION INHIBITOR

Diesel fuel is corrosive by nature and corrosion products such as iron oxide cause filter plugging and injector damage. **Gen 49D** fights corrosion and rust in the fuel tank and through the entire fuel system.

"Prior to using Gen 49D, we were using an average of 900 gallons a day of diesel fuel per drilling rig. With the addition of Gen 49D we now are averaging 810 gallons per day per drilling rig. As an added bonus, due to the lubricating properties of Gen 49D, we now get extended fuel pump life and through the detergents present in the additive, our injectors are far cleaner."

**Pat Burns, General Manager, Energy Drilling - Natchez, Mississippi**





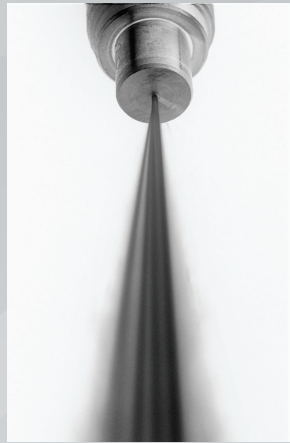
# GEN 49D SAVES YOU MONEY....A ZERO COST SOLUTION FOR HIGH PRICED FUEL

## FUEL INJECTOR CLEANER

Poor injector spray patterns result in poor combustion and fuel economy while injectors treated with Gen 49D remain clean with a good spray pattern insuring optimal performance.

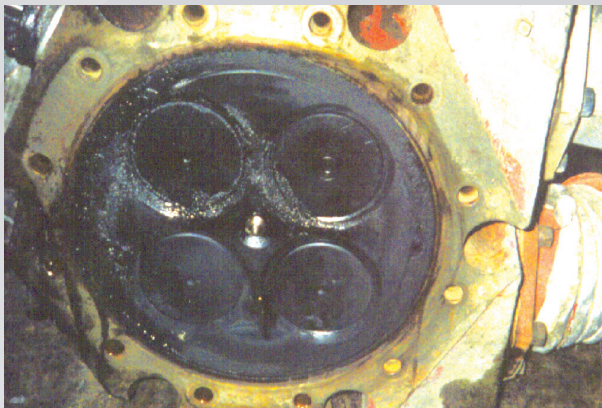


Fouled Injector  
Without Gen 49D

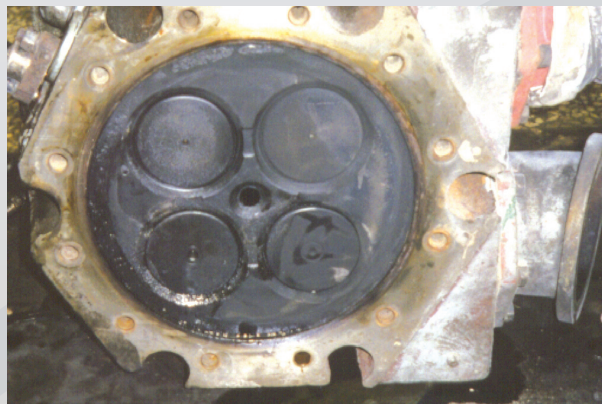


Clean Injector  
With Gen 49D

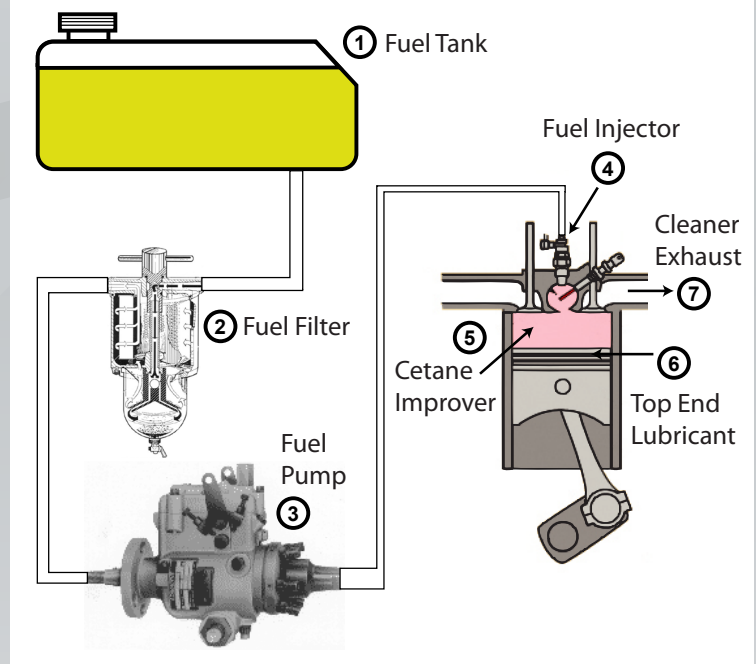
## TRAIN CYLINDER HEADS COMPARISON



Untreated cylinder head shows hardened carbon deposits in control unit #4203 severely inhibiting engine performance.



Cylinder head is clean with very small amounts of soft residue.



## 7 CRITICAL FUNCTIONS OF GEN 49D

1. **FUEL TANK** - Gen 49D begins working in the preflame zone of the fuel system by putting a protective coating inside the fuel tank and lines and stabilizes the fuel which prevents water from causing rust and corrosion.
2. **FUEL FILTER** - By cutting down on rust and corrosion, fuel filters last longer. Note: Gen 49D may cause fuel filters to become dirty when used for the first time as it will clean the system as it protects. This may require a quick filter change (especially in old or high mileage equipment).
3. **FUEL PUMP** - The only lubricant in the fuel pump is the fuel itself. Gen 49D adds an environment friendly lubricant to the fuel to prevent excessive wear and premature failure of pumps and injectors.
4. **FUEL INJECTOR** - Gen 49D is formulated with an injector cleaner that dissolves carbon and other power robbing deposits from the spray nozzle. This generates a better mist improving fuel combustion efficiency and cleaner emissions.
5. **CETANE IMPROVER** - Increasing the Cetane rating of diesel fuel will cause the fuel to atomize and ignite quicker. This creates a cleaner burn, more power and less smoke. Gen 49D is equipped with Cetane Improvers and combustion enhancers that will increase the Cetane rating of diesel up to 3 numbers.
6. **TOP END LUBRICANT** - Creating a seal around the top ring is critical in preventing power loss and less blow by of gases into the engine oil. Gen 49D creates this lubricating film on the fire side of the piston giving you a better explosion and more bang for your buck. This results in better fuel economy and improved horsepower.
7. **CLEANER EXHAUST** - In addition to reducing emissions and engine smoke, Gen 49D will lower exhaust temperatures which shows that the fuel is burning up in the cylinder head, where it is supposed to, and not in the tail pipe.



# GEN 49D WITH CETANE: YOUR COMPLETE FUEL SYSTEM TREATMENT FROM FUEL TANK TO PISTON

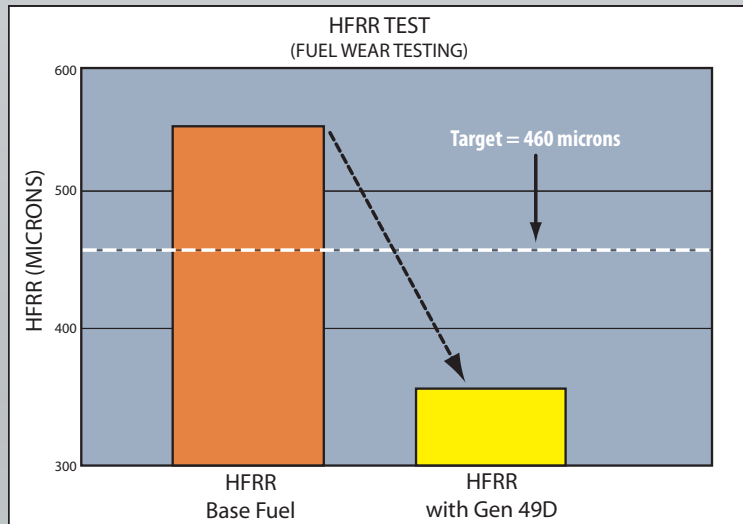
## COLD STARTING PERFORMANCE

Starting your equipment each day can seem to be the easiest of all tasks....that is until it won't start. All the proprietary components of Gen 49D working together ensure exceptional starting efficiency especially in cold conditions. Gen 49D will save unnecessary strain on starters and high stress on batteries. One of the first benefits our customers report is how much easier their equipment fires after applying Power Up Gen 49D for the first time.

## SAVES UP TO 10% ON FUEL COST



**Gen 49D** contains a powerful synthetic lubricant package which reduces friction and wear in the top end of the cylinder, injectors and fuel pump. Poor fuel lubricity is commonly seen in new low sulphur fuels. **Gen 49D** is approved for and surpasses the new standards for diesel fuel and exhibits wear and friction reduction significantly below typical levels. Poor fuel lubricity results increased maintenance costs, downtime and poor fuel economy. In the HFRR test, we see typical fuel measure in excess of 500 microns of wear, the 2005 standard will be 460 micron of wear.



*Gen 49D protects your fuel pump, the injectors and top end of the engine from premature wear and failure, reducing costs and increases life over straight diesel fuel.*

The preflame region before fuel enters the combustion chamber is only a small part of the complete lubrication protection offered by **Gen 49D**. **Gen 49D** is designed and formulated to lubricate the top end of the combustion chamber where the severe stresses of burning new, dry low sulphur fuels are causing premature wear and poor performance. Fuel injectors, intake and exhaust valves and piston rings are being subjected to more extreme conditions than ever before.

## TESTS SHOW POSITIVE PROOF

New generation diesel fuels are now required to contain less than 0.05% sulphur and less than 35% aromatic content (10% in California). This new, dry fuel has been implicated in increased wear of fuel system components, especially pumps and injectors.

Using a modified ASTM D5001 Ball on Cylinder Lubricity Evaluation (BOCLE) the lubricity of diesel fuel can be measured. The test consists of a hardened steel ball bearing wearing against a rotating steel bearing race. Poor diesel fuel lubricity will result in increased wear on the steel ball.



Figure 1 - .63 mm



Figure 2 - .36 mm

The photograph in Figure 1 is a magnified picture of the wear scar left when only low sulphur diesel fuel is lubricating the wearing surfaces. The actual size of this scar is 0.63 mm across.

The photograph in Figure 2 shows the wear spot left on the ball bearing when 0.1% **Gen 49D** is added to the same low sulphur diesel fuel. The fuel's lubricity is improved dramatically. The wear spot with **Gen 49D** is only 0.36 mm across. The area of the scar is more than three times smaller than with diesel fuel alone. It is also obvious that there is a lot less scoring of the worn area!

**Gen 49D** protects your investment, prevents fuel system component wear and will improve your equipment's performance and service life!

## GEN 49D SAVES MONEY...GUARANTEED



## GEN 49D REDUCES FUEL CONSUMPTION AND SAVES MONEY GUARANTEED

| Typical Properties of Gen 49D |            |                     |
|-------------------------------|------------|---------------------|
| Property                      | Method     | Result              |
| Appearance                    |            | Clear, Amber liquid |
| Color                         | ASTM D1500 | 2.0                 |
| Viscosity<br>@ 104°F (40°C)   | ASTM D445  | 5.8 cSt             |
| Density<br>@ 68°F (20°C)      | ASTM D941  | 0.925 g/mL          |
| Pour Point                    | ASTM D97   | -40°F (-40°C)       |
| Flash Point (COC)             | ASTM D92   | 169°F (76°C)        |
| Fire Point (COC)              | ASTM D92   | 172°F (78°C)        |

| Test Data on Gen 49D   |            |                                     |
|--|------------|-------------------------------------|
| Property   | Method     | Result                              |
| BOCLE Fuel Lubricity<br>- Neat #2 Diesel<br>- Diesel & 800 ppm Gen 49D | ASTM D5001 | 0.615mm<br>0.510mm                  |
| HFRR Fuel Lubricity<br>- Neat #2 Diesel<br>- Diesel & 800 ppm Gen 49D  |            | 0.556mm<br>0.353mm                  |
| Rust Prevention<br>- Neat #2 Diesel<br>- Diesel & 800 ppm Gen 49D      | ASTM D665  | 27% Surface Rust<br>0% Surface Rust |
| Pour Point<br>- Neat #2 Diesel<br>- Diesel & 800 ppm Gen 49D           | ASTM D97   | -2°F (-19°C)<br>-24°F (-31°C)       |



"I have a Volvo with a Series 60 Detroit Diesel. When I started using NNL 690 and Gen 49D, the truck had 697,000 miles on it. The first thing I noticed was my fuel economy increased. Prior to using NNL 690 and Gen 49D in my truck, my worst fuel economy was 4.8 mpg and the best was 6.5 mpg. After running NNL 690 and Gen 49D my worst fuel economy was 5.4 mpg and the best was 7.8 mpg. I had such great success with my fuel economy that I decided to try the NNL 690 in my power steering pump as well as my transmission in both differentials. By adding 5 oz of NNL 690 to my power steering pump the truck was far easier to steer. I have a 754 CR Allison transmission and I had a temperature drop of at least 20 degrees. My truck now has 1,163,000 miles on it and it doesn't use any more oil today than it did at 697,000 miles.

**John Couch, Owner, Couch Trucking - Wagoner, Oklahoma**

### Product Application:

Gen 49D with Cetane Improver should be added with each fuel fill at the rate of 0.08% (1 part Gen 49D added to 1250 parts of diesel fuel). This is equivalent to 1 ounce per 10 gallons or 8mL per 10 mL of diesel fuel.



"The Brooklyn VI is a 110 ft. long party boat out of Sheepshead Bay. It is powered by (3) 1292 Detroit Diesel engines, each putting out 815 hp. Using NNL 690 and Gen 49D I noticed a difference in both power and fuel economy. On my first trip after adding NNL 690 I had a 12% fuel savings which equaled 200 gallons of fuel. I saved another 10% in fuel after adding Gen 49D with Cetane Improver. I now use all the Power Up products and have saved 10's of thousands of dollars in savings."

**Rob Sapanara, Owner, Brooklyn VI - Brooklyn, New York**

| Gen 49D Diesel Lubrication Blend Ratio       |                                      |
|--|--------------------------------------|
| Application Rate 1 oz to 10 Gallons (1250:1) |                                      |
| Fuel   | ml of Gen 49D = Liters of Fuel x 0.4 |
| 40 Liters (10 Gallons)                       | 30 Milliliter (1 ounces)             |
| 450 Liters (120 Gallons)                     | 350 Milliliter (12 ounces)           |
| 1250 Liters (330 Gallons)                    | 1 Liter (35 ounces)                  |
| 6,250 Liters (1,650 Gallons)                 | 5 Liters (175 ounces)                |
| 12,500 Liters (3,300 Gallons)                | 10 Liters (350 ounces)               |
| 25,000 Liters (6,600 Gallons)                | 20 Liters (700 ounces)               |
| 256,250 Liters (67,650 Gallons)              | 205 Liters (7,175 ounces)            |

**Gen-49D** is available in the following convenient sizes:

- 12 oz. Bottle
- 1 Liter (35 oz.) Bottle
- 5 Liter (1.4 Gallon / 175 oz.) Jug
- 10 Liter (2.75 Gallon / 350 oz.) Jug
- 20 Liter (5.5 Gallon / 700 oz.) Pail
- 205 Liter (56.05 Gallon / 7,175 oz.) Drum



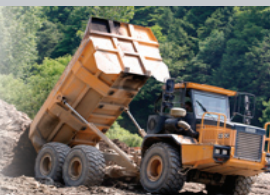
# HYDRA MAXX PROVIDES LONG TERM PREVENTATIVE MAINTENANCE FOR ALL HYDRAULIC APPLICATIONS



**HYDRA MAXX** is the first hydraulic treatment specifically designed to maintain maximum operating efficiency of your hydraulic system. This unique hydraulic system treatment from Power Up Lubricants works with your existing oil to provide long term protection for pumps, motors, valves, cylinders, seals and hoses. **HYDRA MAXX** is formulated with anti-wear and extreme pressure additives to reduce friction and wear and dramatically improve the hydraulic oil's ability to withstand heavy loading, shock and vibration. **HYDRA MAXX** also contains additives to improve corrosion inhibition, cold temperature flow and water separability.

- Improves cold weather flow of fluid
- Reduces wear of hydraulic pumps and motors
- Inhibits rust and corrosion of internal metallic surfaces
- Improved film strength provides EP protection
- Replenishes depleted additives

## LOWERS OPERATING TEMPERATURES



In independent Contact Gamma wear tests, **HYDRA MAXX** significantly reduced the amount of wear generated when a premium hydraulic oil alone was used. Calculated estimates suggest that the use of **HYDRA MAXX** will extend equipment life 2.39 times by reducing wear up to 58%.

## COLD WEATHER FLUID FLOW

**HYDRA MAXX** was mixed at 5% with typical R&O and AW hydraulic oils to determine its effect on the pour point of the oil. The results in Table 1 show that **HYDRA MAXX** lowers the pour point of these oils by up to 18°F (10°C).

Table 1 - Fluid Pour Point Data

| Fluid                         | Neat Oil      | +5% Hydra Maxx |
|-------------------------------|---------------|----------------|
| A ISO 22<br>ISO 32<br>ISO 68  | -69°F (-56°C) | -76°F (-60°C)  |
|                               | -44°F (-42°C) | -58°F (-50°C)  |
|                               | -36°F (-38°C) | -51°F (-46°C)  |
| B ISO 32<br>ISO 68<br>ISO 100 | -4°F (-20°C)  | -22°F (-30°C)  |
|                               | -4°F (-20°C)  | -20°F (-29°C)  |
|                               | -6°F (-21°C)  | -18°F (-28°C)  |
| C ISO 32                      | -26°F (-32°C) | -44°F (-42°C)  |
| D ISO 32                      | -31°F (-35°C) | -47°F (-44°C)  |
| E ISO 32 (HVI 36)             | -54°F (-48°C) | -67°F (-55°C)  |



## INHIBITS RUST AND CORROSION

Rust and corrosion contamination causes many premature pump failures. **HYDRA MAXX** dramatically enhances a fluid's ability to fight rust and corrosion formation. **HYDRA MAXX** has an excellent copper corrosion rating of 1b in the ASTM D130 Copper Corrosion test. A mixture of 5% **HYDRA MAXX** in straight paraffinic oil easily passes the ASTM D665 Rust Prevention Characteristics test. The photograph in Figure 2 shows the improvement in rust prevention.

## QUICKLY DEMULSIFIES IN WATER

**HYDRA MAXX** improves a fluid's ability to demulsify water more readily, allowing water to be separated from the lubricant. The effect that **HYDRA MAXX** has on the water separation properties of typical hydraulic fluids was evaluated using ASTM method D1401. The improvements in demulsibility are given in Table 2.

Table 2 - ASTM D1401 Water Separability

| Fluid | Neat Oil                                     | +5% Hydra Maxx                                  |
|-------|--|---|
| W     | 41-39-0 mL<br>(15 min.)                      | -76°F (-60°C)<br>-58°F (-50°C)<br>-51°F (-46°C) |
| X     | -4°F (-20°C)<br>-4°F (-20°C)<br>-6°F (-21°C) | -22°F (-30°C)<br>-20°F (-29°C)<br>-18°F (-28°C) |
| Y     | -26°F (-32°C)                                | -44°F (-42°C)                                   |
| Z     | -31°F (-35°C)                                | -47°F (-44°C)                                   |

These results provide the volume of oil-water-emulsion phases (and the time required) for separation.

## EXTREME PRESSURE PROTECTION

**HYDRA MAXX** demonstrates an incredible lubricating film strength capable of withstanding loads of up to 200,000 PSI.

## REDUCES OPERATING TEMPERATURES

Friction reduction dramatically lowers operating temperatures, adding life to pumps, seals and hoses.

## EMULSIFIES TRACE WATER CONTAMINANTS

**HYDRA MAXX** allows a fluid to emulsify trace water, maintaining full lubrication of metal surfaces without film rupture.

# PROVIDES LONG TERM PROTECTION FOR PUMPS, MOTORS, VALVES, CYLINDERS, SEALS AND HOSES

| Typical Properties of Hydra Maxx   |            |                           |
|--|------------|---------------------------|
| Property   | Method     | Result                    |
| Appearance   |            | Clear, light amber liquid |
| Color  | ASTM D1500 | 1.7                       |
| Viscosity<br>@ 40°C (104°F)<br>@ 100°C (212°F)                                   | ASTM D445  | 42 cSt<br>6 cSt           |
| Specific Gravity<br>@ 60°F (15.6°C)  | ASTM D941  | 0.98 (H <sub>2</sub> O=1) |
| Density  | ASTM D941  | 0.98 g/mL                 |
| Pour Point   | ASTM D97   | -22°F (-30°C)             |
| Flash Point  | ASTM D92   | 284°F (150°C)             |
| Base Number  | ASTM D4739 | 1.5 mg KOH/g              |
| Acid Number  | ASTM D664  | 0.5 mg KOH/g              |
| Zinc and Lead Content  |            | Nil                       |
| Colloidal Suspensions<br>(Solid particles, PTFE,<br>graphite, MoS <sub>2</sub> ) |            | None                      |

| Test Data on Hydra Maxx   |                          |   |
|---|--------------------------|---|
| Property  | Method                   | Result  |
| Copper Strip Corrosion<br>(130°C x 2 hours)   | ASTM D130                | 1b  |
| Rust Preventing Properties  | ASTM D665                | PASS  |
| Elastomer Compatibility (5%<br>in ISO 32 Paraffinic oil)                                  | ASTM D4289<br>(Modified) |   |
| • Nitrile<br>• Neoprene<br>• Fluorocarbon   |                          | PASS<br>PASS<br>PASS  |
| Hydrolytic Stability<br>(5% in ISO 32 Paraffinic oil)                                     | ASTM D2619               |   |
| • Viscosity change<br>• Copper weight loss<br>• Copper appearance<br>• Acid number change |                          | Negligible<br>0.67 mg/cm <sup>2</sup><br>1b - 2b, shiny<br>0 mg KOH/g |

| Special Notations on Hydra Maxx |  |
|---------------------------------|--|
| Viscosity:                      | A 5% application of HYDRA MAXX in typical ISO 32, 46 and 68 hydraulic oils results in little or no change in viscosity or viscosity index of the oil.  |
| Pour Point:                     | HYDRA MAXX imparts a positive influence to the pour point of most hydraulic oils. A typical ISO 32 oil with a pour point of -22°F (-30°C) improved to -36°F (-38°C) with the addition of 5% HYDRA MAXX.  |
| Demulsibility:                  | HYDRA MAXX improves an oil's ability to separate water. A typical ISO 32 oil which normally requires 25 minutes for complete separation (using ASTM D1401) improved to only 15 minutes when 5% HYDRA MAXX was mixed with the oil.  |
| Application:                    | HYDRA MAXX is recommended in hydraulic system applications where gear, piston and vane pumps are used to circulate oil and transmit power. HYDRA MAXX should be applied at 3% (30mL/L or 4 oz./gal.) of the circulating oil volume in operating conditions over 32°F/0°C/ and at 5% (50 mL/L or 6 oz./gal.) of circulating oil volume in operating conditions where the temperature may drop below 32°F/0°C. HYDRA MAXX is recommended for use with mineral oils and polyalphaolefin and diester based synthetic fluids. |

## HYDRA MAXX PROVIDES LONG TERM RELIABILITY



"Before using Hydra Maxx in our automatic transmissions, we were going through 30 transmissions annually. Now with the addition of Hydra Maxx, we go through less than 5 transmissions per year. On top of that, we have now gone from 3000 to 6000 miles on an oil change and at our old oil change rate were losing engines every year. Now I can't remember the last time we lost an engine."

**John Heard, Caddo Parish Sheriffs Department - Shreveport, LA**



### Product Application:

**HYDRA MAXX** is recommended in all hydraulic circulating systems at a 3% ratio for ambient temperatures above 0°C (32°F) and a 5% ratio in operating conditions where the temperature may drop below 0°C (32°F). **HYDRA MAXX** is recommended for use with mineral oils and polyalphaolefin and diester based synthetic fluids. **HYDRA MAXX** is not recommended for use with water based fluids, phosphate esters or polyglycol fluids.

### HYDRA MAXX is available in the following convenient sizes:

- 1 Liter (35 oz.) Bottle
- 5 Liter (1.4 Gallon / 175 oz.) Jug
- 10 Liter (2.75 Gallon / 350 oz.) Jug
- 20 Liter (5.5 Gallon / 700 oz.) Pail
- 205 Liter (56.05 Gallon / 7,175 oz.) Drum



**LHP-454 IS THE COMPLETE MULTIFUNCTIONAL PERFORMANCE ADDITIVE FOR UNLEADED GASOLINE**

# LHP-454

## Liquid Horsepower



LHP-454 is a one-shot multifunctional performance additive for use in gasoline engines. It improves performance by:

- Reducing Intake Valve Deposits
- Keeping Port Fuel Injectors clean
- Improving fuel economy
- Reducing exhaust emissions
- Reducing maintenance of the fuel system and emissions control equipment
- Optimizing drivability by preventing rough idling, stalling and surging
- Minimizing Octane Requirement
- Enhancing Corrosion Protection
- Improves moisture absorption and reduces fuel line freeze-up

"After applying LHP-454 to my BMW 540i, I reset the onboard computer that I use to monitor fuel consumption. It went from 23.9 mpg to 26.7 mpg in just under 100 miles of driving. On top of that, it seemed to have a lot more power driving around town."

**Shelie Cleveland - McKinney, Texas**

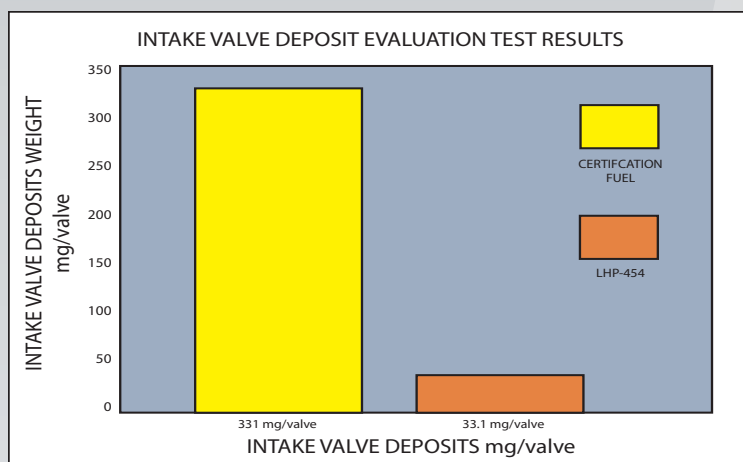


### Corrosion Protection

LHP-454 provides additional protection against corrosion for all engine components.

### Performance Testing

Intake valve deposit testing was performed using the standard ASTM D5500 test procedure for the evaluation of intake valve deposit formation. This method uses a 1985 BMW 318i, driven in a driving pattern comprising 10% city, 20% urban and 70% highway driving for 10,000 miles.



### Intake Valve Deposit Clean Up

The clean up performance of LHP-454 as evaluated in the Ford 2.3L. The testing comprises two 100-hour cycles the first of which is performed with base fuel to allow for deposit formation. The fuel is then treated for the second cycle.

LHP-454 provides superior intake valve detergency and meets EPA compliance performance criteria!

### LHP-454 Product Application:

At the recommended treat rate of 8 oz. in up to 20 gallons, LHP provides complete engine protection and improves performance. It is registered according to US-EPA certification standards. LHP-454 meets performance requirements specified by both the EPA and CARB.

LHP-454 is available in the following convenient sizes:

8 oz. (240 ml) One Shot Bottle  
20 Liter (5.5 Gallon / 700 oz.) Pail

# PROTECT AND PROLONG EQUIPMENT LIFE AND PROVIDE HEAVY DUTY PENETRATION OF RUSTED PARTS



R.C.L. 1000 is a revolutionary thin film, high load lubricant that protects and prolongs the life of equipment.

## R.C.L. 1000's primary benefits:

1. Resists rust & corrosion
2. Designed for thin film, heavy load lubrication.
3. Greatly reduces friction and drag
4. Reduces metal wear by forming a high strength boundary film
5. Prolongs operating life
6. Is compatible with typical seals, except EPDM
7. Is designed to withstand corrosive environments
8. Speeds drilling and tapping; cutting edges remain sharp longer
9. Displaces water

## Ideal for:

- **Rapid Penetration of Rusted and Seized Parts for Easy Separation**
- **Works Even in Wet Conditions**
- **Pleasant Aroma**
- **Prevents Rusting and Oxidation**



| Typical Properties of R.C.L. 1000 |                         |
|-----------------------------------|-------------------------|
| Appearance                        | Light Amber Translucent |
| Viscosity                         | 8 cSt @ 40°C            |
| Density                           | 0.84 g/ml (20°C/68°F)   |
| Flash Point                       | 266°F (130°C)           |
| Pour Point                        | -40°F (-40°C)           |

**R.C.L 1000** is available in the following convenient sizes:

17 oz. Aerosol (482 gram) Spray Can  
500 Milliliter (16.9 oz.) Bottle  
5 Liter (1.4 Gallon / 175 oz.) Jug  
20 Liter (5.5 Gallon / 700 oz.) Pail

Aerosols contain no ozone depleting ingredients.



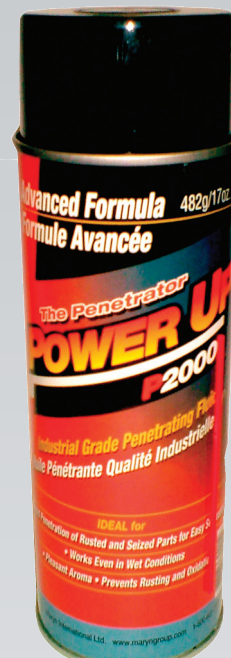
Penetrating Fluid 2000 is a specifically designed for heavy duty penetration of rusting parts, even in wet conditions.

## Penetrating Fluid 2000's primary benefits:

1. Heavy duty performance
2. Designed for rapid, deep penetration of rusted or seized parts
3. Excellent surfactancy
4. Penetrates in wet conditions
5. Water soluble
6. Reduces shear strength of rust particles at metal interface, minimizing the amount of force needed
7. Easily mistable
8. Pleasant aroma

## Ideal for:

- **Rapid Penetration of Rusted and Seized Parts for Easy Separation**
- **Works Even in Wet Conditions**
- **Pleasant Aroma**
- **Prevents Rusting and Oxidation**



| Typical Properties of Penetrating Fluid 2000 |                              |
|--|------------------------------|
| Appearance                                   | Light Amber Translucent      |
| Viscosity                                    | 4 cSt @ 40°C                 |
| Density                                      | 0.81 - 0.84 g/ml (15°C/59°F) |
| Flash Point                                  | 203°F (100°C)                |
| Pour Point                                   | -17°F (-27°C)                |

**Pen 2000** is available in the following convenient sizes:

17 oz. Aerosol (482 gram) Spray Can  
500 Milliliter (16.9 oz.) Bottle  
5 Liter (1.4 Gallon / 175 oz.) Jug  
20 Liter (5.5 Gallon / 700 oz.) Pail

Aerosols contain no ozone depleting ingredients.



# POWER UP MAKES YOU MONEY....8 WAYS POWER UP PRODUCTS PAY FOR THEMSELVES

## 1. Better Fuel Economy

Less frictional drag in engines with>NNL 690 and up to 10% saving in fuel using Gen 49D or LHP-454.

## 2. Insurance

Preventing major breakdowns and repairs (Overheating, anti-freeze leaks, loss of oil, etc.)

## 3. Retention Agent

Establishes a protective film on metal parts. No more cold or dry starting (winterizing).

## 4. Pour Point

Prevents cavitation and shudder. Dramatically decreases wear and stress on hydraulic pumps and motors during cold operating conditions (57°F degrees).

## 5. Extended Oil Intervals

Magnifies your additive package 10 to 15 times and boosts TBN.

## 6. Downtime

This can be the most costly expense to your operation. POWER UP WILL HELP!

## 7. Extended Service Life

Power Up can increase component life up to 2.5 times longer. Nobody prevents wear like Power Up! What is your equipment worth to you?

## 8. Peace of Mind

Knowing that you are getting the best protection that modern technology can provide.

**Power Up Products Application Quick Reference Chart**

| Component  | NNL-690              | NNL-690G             | Hydra Maxx |
|--|----------------------|----------------------|------------|
| Gasoline Engines                                 | 3 - 5%               | 3 - 5%               |            |
| Diesel Engines                                   | 3 - 5%               | 3 - 5%               |            |
| Engines requiring Low-Ash / Ashless Oil          |                      | 3 - 5%               |            |
| Small, air or water cooled two-stroke engines    | 3% (in 2-stroke oil) | 3% (in 2-stroke oil) |            |
| Automatic Transmissions                          | 1%                   | 1%                   | 1%         |
| Standard Transmissions Using EP Gear oil         |                      | 5%                   |            |
| Standard Transmissions Using ATF                 | 5%                   | 5%                   | 5%         |
| Standard Transmissions Using engine oil          | 5%                   | 5%                   | 5%         |
| Differentials / Transfer cases using EP Gear oil |                      | 5%                   |            |
| Differentials / Transfer cases using ATF         | 5%                   | 5%                   | 5%         |
| Power Steering Pumps                             | 3%                   | 3%                   | 3 - 5%     |
| Gear Drives (w/EP Gear Oil)                      |                      | 5%                   |            |
| Hydrostatic Drives                               | 3%                   | 3%                   | 3%         |
| Powershift Transmissions                         | 3%                   | 3%                   | 3%         |
| Ag-tractor TDH systems                           |                      | 3%                   | 3%         |
| Hydraulic Systems                                | 3%                   | 3%                   | 3 - 5%     |
| Compressors                                      | 3%                   | 3%                   | 3 - 5%     |
| Hydraulics/Compressors with Water separators     |                      |                      | 3 - 5%     |

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Distributed by:

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