

# METATRON™ 691

## DESCRIPTION :

**Metatron™ 691** is a multipurpose thermally stable and thermally durable extreme pressure synthetic gear lubricant that is recommended for use in all types of automotive and enclosed industrial gear drives

## COMPOSITION AND PERFORMANCE PROPERTIES :

**Metatron™ 691** is blended from the finest high quality severely hydrotreated polyalphaolefin (PAO) synthetic base fluids available. This unique combination provides the **Metatron™ 691** with the following advantages:

1. Excellent Low Temperature Properties - This results in the bearings and gears being instantly lubricated at sub-zero temperatures the moment they start turning.
2. Superior Oxidation Stability - All gear lubricants as they are increasingly exposed to high operating temperatures undergo the process of oxidation.. This results in the gear lubricant's thickening in viscosity and the buildup of acidic components. Because of the PAO's uniform and closed molecular structure, the process of oxidation is greatly reduced.
3. Excellent Resistance to Thermal Degradation.
4. Excellent Hydrolytic and Demulsibility Characteristics – Since PAOs are non-polar, they absorb less water, especially in gear drive applications that are subjected to high humidity or high moisture conditions. PAOs separate from condensed water much faster and more completely, thus resulting in the water being easily removed from the system. This property results in increased bearing and gear life, anti-wear protection and improved rust and corrosion control.
5. A High Viscosity Index -This results in a minimum change in viscosity. The adequate viscosity for proper bearing and gear lubrication is provided regardless of temperature change.
6. Excellent Stay In Grade Performance Without the Addition of Viscosity Index Improvers – The nature and the high viscosity index of the PAOs used in the formulation of **Metatron™ 691** eliminates the use of viscosity index improvers. This results in **Metatron™ 691** SAE 75W-140 grade being completely shear stable in service. **Metatron™ 691** will retain its excellent viscosity-temperature characteristics even under the most severe mechanical shearing that can be encountered.
7. Increased Wear Protection and Longer Gear Life – When conventional gear lubricants are cold they thicken in viscosity to a point where the distribution of the gear lubricant to the bearings and gears is slow or totally stopped. At high operating temperatures conventional gear lubricants thin out in viscosity

to a point where there is little or no lubrication to the bearings and gears. PAOs because of their high viscosity index and low temperature fluidity properties, allow the **Metatron™ 691** the ability to lubricate the bearings and gears under the most severe temperature conditions

#### 8. Compatibility with All Types of Seals.

Blended into these PAO synthetic base fluids is a highly specialized non-corrosive thermally stable and thermally durable multifunctional extreme pressure additive package the provides the **Metatron™ 691** with the following performance advantages:

1. Enhanced thermal and oxidative stability and durability to handle operating temperatures of 149°C to 177°C (300°F to 350°F).
2. Excellent extreme pressure properties to protect the gears and bearings from excessive wear and fatigue.
3. Prevention of the formation of sludge and carbon deposits that erode the seals.
4. Excellent seal compatibility.
5. Enhanced protection of copper, brass and bronze components from corrosion.
6. Non-corrosivity to brass, bronze and other non-ferrous metal parts.
7. Excellent protection of components from rust and corrosion in dry conditions and in the presence of moisture.
8. Excellent resistance to water and moisture.
9. Excellent water separability characteristics
10. Enhanced gear, bearing and seal cleanliness.
11. Excellent resistance to foaming.

### **THERMAL STABILITY AND DURABILITY :**

The trend among automotive and industrial gear drive manufacturers is to operate the equipment at higher speeds, loads, power densities and increased torque. This trend has resulted in automotive and industrial gear drives being subjected to higher operating temperatures. These higher operating temperatures have resulted in today's gear lubricants being subjected to extreme thermal stress.

Therefore it is important that a gear lubricant possess thermal stability and durability characteristics. Gear lubricants that do not possess these properties rapidly oxidize and decompose when subjected to high temperatures, resulting in the formation of sludge, varnish, and carbon deposits on the gears, bearings and seals, abraded seals, premature seal hardening and brittleness, and a loss of the gear lubricant's extreme pressure additive chemistries ability to protect against excessive wear, spalling and overall distress to the gears and bearings.

**Metatron™ 691** PAO synthetic base fluids in conjunction with the thermally stable and thermally durable multifunctional extreme pressure additive package enables the **Metatron™ 691** to resist oxidation and thermal stress at operating temperatures 65° (150°F) to 93° (200°F) higher than conventional gear lubricants. This results in :

1. A vast reduction in the formation of deposits.
2. Better heat transfer.
3. Excellent protection the gears and bearings even under the most extreme thermally stressed operating conditions.
4. Less wear to gears, bearings and seals
5. Increased oil seal life
6. Lower operating temperatures
7. Less energy consumption
8. Longer lubricant life
9. Less equipment downtime
10. Longer equipment life
11. Reduced maintenance costs

#### **MICRO MOLY PROTECTION:**

Most types of gearing are designed to operate under hydrodynamic lubrication conditions. That is a full fluid oil film must separate the metal surfaces of the gears and bearing during operation. However, during periods of cold start up, extremely high operating temperatures or high shock loading conditions this full fluid film can be destroyed. Unless a boundary lubricant is present in the gear lubricant when this full fluid film is destroyed, excessive wear can take place.

**Metatron™ 691** contains a proven friction reducer and boundary called **Micro Moly™**. **Micro Moly™** is a liquid soluble type of moly that plates itself to the metal surfaces of the gears and bearings. Once plated, **Micro Moly™** forms an indestructible long lasting solid lubricant film that is capable of withstanding pressures up to of 500,000 psi. This solid lubricant film once plated to the gears and bearings will reduce friction, vibration and wear, thus extending equipment life.

**Micro Moly™** also provides a smooth finish surface on all of the moving surfaces of the gear drives. This smooth finish minimizes the action of cold welding and vibration, which can occur during start up after the gears have been standing idle and during periods of high shock loading. This in turn lessens starting loads and peak power demand, thus resulting in a realistic power cost savings.

## **MANUFACTURERS REQUIREMENTS AND SPECIFICATIONS:**

**Metatron™ 691** meets and exceeds the following specifications and manufacturer's requirements: API Service Classifications GL-5, MT-1, PG-2, Military Specification MIL-L-PRF-2105E, SAE 2306, Mack GO-J, Clark MS-8 Revision 1, Ford M2C-119A, M2C108C, M2C158A, General Motors Specifications 9985476, 9985044, Chrysler, John Deere J11D, Komatsu Dresser B22-0003 B22-0005, Metrior (Rockwell) o-76L, David Brown ET-19, Terex EMS 19003, VME America's EEMS S19003F, EEMS19107, Eaton Axles Specifications, White Motor MS0016, Volvo, Volkswagen US Steel 224, David Brown S1.53101 Type E, AGMA 9005, AGMA 250.04, AGMA 251.02, DIN 51517 Part 3 (CLP), Cincinnati Millicron P-74 and P&H Harnisfeger 497 Specification.

**TYPICAL PROPERTIES:**

SAE Grade	75W-140					
	100	150	220	320	460	680
ISO Grade	3EP	4EP	5EP	6EP	7EP	8EP
AGMA Grade	3EP	4EP	5EP	6EP	7EP	8EP
Viscosity cSt @ @ 40°C ASTM D-445	92.19-99.80	155.89-169.00	193.00-220	345.01-374.04	462.67-506.21	689.57-670.85
Viscosity @ 100°C ASTM D-445	13.07-13.94	19.47-20.70	25.00-30.50	35.93-37.94	43.06-45.88	55.87-58.12
Brookfield Viscosity (ASTM D-2893)						
@-26°C	--	--	25,200	--	--	--
@-40°C	--	--	140,000	--	--	--
Viscosity Index ASTM D-2270	141	144	178	150	145	146
Flash Point °C (°F) ASTM D-92	251° (484°)	258° (496°)	268° (514°)	268° (514°)	267° (513°)	276° (529°)
Fire Point °C (°F) ASTM D-92	271° (520°)	277° (530°)	277° (550°)	290° (555°)	288° (550°)	299° (570°)
Pour Point °C (°F) ASTM D-97	-48° (-55°)	-45.6° (-50°)	-45.6° (-50°)	-43° (-45°)	-34° (-30°)	-32° (-25°)
Rust Test (ASTM D-665)						
Procedure A (Distilled Water)	Pass	Pass	Pass	Pass	Pass	Pass
Procedure B (Salt Water)	Pass	Pass	Pass	Pass	Pass	Pass
Copper Strip Corrosion Test ASTM D-130	1a	1a	1a	1a	1a	1a
Four Ball E.P. Test ASTM D-2783						
Weld Point, kgs.	400	400	400	400	400	400
Load Wear Index	58.25	59.10	60	67.91	69.50	67.91
Four Ball Wear Test ASTM D-4172 1hr/40kg/54°C						
Scar diameter, mm.	0.4	0.35	0.35	0.35	0.28	0.28
Timken E.P. Test ASTM D-2782						
Ok Load, lbs.	65	70	70	70	70	70
Failure Load, lbs.	70	75	75	75	75	75
Falex E.P. Continuous Load ASTM D-3233 Failure Load, lbs.	2500	2500	2500	2500	2500	2500
FZG A/8.3/90 ASTM D-5182						
Failure Load	13 <sup>th</sup>	13 <sup>TH</sup>	13 <sup>TH</sup>	13 <sup>th</sup>	13 <sup>th</sup>	13 <sup>th</sup>
Oxidation Test ASTM D-2893						
% Viscosity increase after 312 hours @95°C	2%	2%	2%	1.5%	1.5%	1.5%
L-60-1 Thermal Oxidation Test ASTM D-5704						
% Viscosity Increase	20	20	20	20	20	20
Demulsibility Test ASTM D-2711	85	85	85	85	85	85
Free Water, ml	0.5	0.5	0.5	0.5	0.5	0.5
% Water in oil	Trace	Trace	Trace	Trace	Trace	Trace
Emulsion, ml						
Foam Tendency Test ASTM D-892	0/0	0/0	0/0	0/0	0/0	0/0
Sequence I	0/0	0/0	0/0	0/0	0/0	0/0
Sequence II	0/0	0/0	0/0	0/0	0/0	0/0
Sequence III						