

FOOD-GRADE LUBRICANTS

FOOD-GRADE LUBRICANTS FROM EXXON

Today's food and food-associated processing plants are running faster and harder than ever before. Whether it's a can line, a dairy, a beverage bottler, or a meat packer, plants can't afford to slow down. Rising costs, competitive pressures and demanding production requirements are forcing food processing equipment to work harder, longer and more efficiently. The lubricants used by the food industry have to meet not only these demanding performance requirements, but the stringent food safety requirements of the Food and Drug Administration.

Exxon Company, U.S.A. offers a complete line of food-grade lubricants specifically designed to meet the special needs of the food processing industry. We manufacture our products under strict quality controls to ensure consistently dependable lubricating performance and complete safety in food processing environments.

How Does Exxon Assure the Safety of its Food-Grade Lubricants?

Effective January 1, 1999, in accordance with the federal Food Quality Protection Act of 1998, the United States Department of Agriculture (USDA) eliminated its program of prior approval for all non-food compounds and proprietary substances used in federally inspected meat and poultry plants. The burden of review and approval of food-grade lubricants now rests with the manufacturer of the products and, ultimately, on the facilities that use the products.

Accordingly, Exxon has implemented a detailed review and approval process to ensure the safety of our food-grade lubricants. Exxon will provide customers a manufacturer's guaranty that certifies the lubricant to be safe and suitable when used as directed.

Lubricants formerly authorized by the USDA for use in certain food processing and other applications were typically defined by one of two USDA rating categories:

USDA H-1—to be used in equipment applications in which the lubricant may have incidental contact with edible products.

USDA H-2—to be used only when there is no possibility of the lubricant coming in contact with edible products. Exxon will continue to use this nomenclature with reference to our food-grade lubricants.

WHAT PERFORMANCE FEATURES ARE NEEDED?

The challenge in formulating lubricants for the food processing industry is to meet the necessary food-grade requirements while also meeting the performance features needed to adequately protect food processing machinery. The required performance characteristics of a lubricant vary

depending on the application, but key parameters often necessary for outstanding equipment protection are anti-wear, oxidation stability, extreme-pressure characteristics, and rust protection.

- **Anti-Wear**

Oils used in hydraulic systems are often subjected to high pressures and velocities. These forces can create conditions of thin-film lubrication and accelerated mechanical wear unless the fluid contains special protective additives.

Exxon USDA H-1 compliant oils that contain anti-wear additives include NUTO FG, TERESSTIC FG, and UNIVIS SPECIAL MIST EP. The anti-wear additives in these oils have been selected to provide peak performance in the equipment they are designed to lubricate. In addition, all of the anti-wear additives selected for these products meet the stringent requirements specified for a USDA H-1 compliant lubricant.

- **Oxidation Stability**

Oxidation stability is a measure of an oil's ability to resist oxidation, i.e., chemical deterioration, in the presence of air, heat, and other influences.

Oxidation resistance is an important quality in a lubricant. Insoluble oil and sludge resulting from oil oxidation can interfere with the performance of moving parts. Varnish and sludge can plug lines, screens, and filters and prevent equipment from operating efficiently. In addition, removing these contaminants can be very expensive and time-consuming.

Oxidation accelerates with time and increasing temperature. The deterioration process begins slowly, but speeds up as the oil nears the end of its useful life. Equipment metallurgy can also affect oxidation. Catalytic metals, such as copper and iron, which are commonly used in equipment, can also accelerate oxidation. The service life of an oil depends upon its ability to resist these influences.

Exxon's USDA H-1 compliant lubricants have natural oxidation stability because they are formulated with extremely stable base stocks. In addition, the oxidation stability of many of these oils and greases is further enhanced with carefully selected additives.

- **Extreme-Pressure Protection**

Extreme-pressure (EP) protection is a measure of an oil's ability to protect metal surfaces under heavy loads when the oil film has been pushed away or squeezed out by the mechanical action of gears or bearings. EP additives react with the metal surface to prevent welding, scuffing, and abrasions. Such additives have to be carefully selected,

however, because they can act as pro-oxidants, thus reducing the useful life of the oil.

Exxon USDA H-1 compliant lubricants that demonstrate EP characteristics include NUTO FG, UNIVIS SPECIAL MIST EP, FOODREX FG 1, and CARUM 330.

The EP additives in these oils have been selected to achieve the optimum balance between EP protection and oxidation life, while still meeting the requirements for a USDA H-1 compliant lubricant.

- **Rust Protection**

It is often difficult to keep lubrication systems free of water, particularly in the food industry, where many machines are constantly washed down to keep the surface free of dirt and contaminants. Even under the most favorable conditions, rust is a possibility... and a potential problem.

Rust can score mating surfaces, form scale in piping, plug passages and damage valves and bearings. Ram shafts are sometimes exposed directly to the elements, and any pitting of their highly polished surfaces is likely to rupture the packing around them.

Exxon formulates all of its USDA H-1 compliant food-grade lubricants with rust inhibitors to give extra protection against the destructive effects of water.

EXXON'S USDA H-1 COMPLIANT LUBRICANTS

Exxon offers a complete line of USDA H-1 compliant food-grade lubricants, including hydraulic oils, gear oils, greases and can seaming lubricants. All of these products are formulated with base stocks and additives that meet the requirements previously specified by the USDA. In addition, all of these products are formulated to provide outstanding equipment protection. These USDA H-1 compliant lubricants can be used in equipment or applications in which the lubricant may have incidental contact with edible products.

***Bottle-Filling Line* TERESSTIC FG 150**

Can Seamer Oil/General-Purpose Oil

TERESSTIC FG 150, developed in close consultation with the can and beverage industries, general-purpose oil was designed for use in oil-lubricated can seamers. Formulated with technical white oil base stocks, TERESSTIC FG 150 incorporates a unique additive chemistry that provides outstanding anti-wear properties along with excellent rust protection, even in the presence of syrups and juices. In addition to use in can seamers, TERESSTIC FG 150 can be used as a bearing and lightly loaded gear lubricant and general-purpose food-grade lubricant.

Typical Inspections

TERESSTIC FG 150

Color, ASTM D 1500

0.5

Viscosity,

cSt @ 40°C

146.8

cSt @ 100°C

14.3

Viscosity Index

97

Specific gravity @ 15.6°F (60°F)

0.879

Flash point, °C(°F)

200(392)

Rust test, ASTM D 665B

Pass

EXXON USDA H-1 COMPLIANT LUBRICANTS SUMMARY

Lubricants	ISO/NLGI Grades	Typical Applications
NUTO FG	32, 46, 68, 100	hydraulic pumps, bearings, lightly loaded gears
UNIVIS SPECIAL MIST EP	68, 100, 150, 220, 320, 460	bearings, gear systems requiring EP protection of 30-lb Timken OK load or less
TERESSTIC FG 150	150	can seamers, lightly loaded gears, bearings
GLYCOLUBE FG	150, 220, 400	bearings, gears, compressors, chains
ZERO-POL S	68, 220	refrigeration compressors
FOODREX FG 1 grease	1	bearings, gears, can seamers, most centrally lubricated grease systems
CARUM 330 grease	1	bearings, gears

NUTO FG

Hydraulic Oils

NUTO FG is a line of super-premium hydraulic oils formulated with technical white oil base stocks. It is available in four viscosity grades (ISO 32, 46, 68, 100). Each grade provides outstanding wear protection for pumps, excellent extreme-pressure properties for bearings and lightly loaded gears, and superior oxidation stability for long, trouble-free life. NUTO FG is suitable for hydraulic systems up to pressures of 3000 psi.

Typical Inspections

	Nuto FG 32	Nuto FG 46	Nuto FG 68	Nuto FG 100
Color, ASTM D 1500	0.5	0.5	0.5	0.5
Viscosity, cSt @ 40°C	31.0	46.5	68.2	102.1
Specific gravity @ 15.6°C(60°F)	0.867	0.870	0.873	0.876
Flash point, °C(°F)	200(392)	200(392)	200(392)	200(392)
Pour Point, °C(°F)	-23(-10)	-23(-10)	-20(-5)	-18(0)
Oxidation life, ASTM D 943, hrs	—	6000+	—	—
ASTM D 2272 (RBOT), min	232	254	240	265
Rust Test, ASTM D 665B	Pass	Pass	Pass	Pass
Copper corrosion, ASTM D 130	1a	1a	1a	1a
Water Separability, ASTM D 1401	Pass	Pass	Pass	Pass
FZG Test, Failure Load Stage (FLS)	—	10	—	—
Vickers V-104C Vane Pump Test, ASTM D 2882, total wt. loss, mg	—	2.5	—	—

Cheese Packaging Operation UNIVIS SPECIAL MIST EP Gear Oils

UNIVIS SPECIAL MIST EP is a line of premium synthetic gear oils formulated with polyiso-butylene (PIB) base stocks. It is available in six viscosity grades (ISO 68, 100, 150, 220, 320, 460). These oils provide EP wear protection (30-lb Timken OK load) and have been successfully used for a number of years in the aluminum rolling industry. UNIVIS SPECIAL MIST EP is Anheuser-Busch Taste Test approved. UNIVIS SPECIAL MIST EP also incorporates a mist suppressant and is suitable for use in mist lubrication systems.

Typical Inspections

	Univis Special Mist EP 68	Univis Special Mist EP 100	Univis Special Mist EP 150	Univis Special Mist EP 220	Univis Special Mist 320	Univis Special Mist 460
Viscosity,						
cSt @ 40°C	73.1	100.0	150.0	233.0	305.4	435.6
SUS @ 100°F	382	525	796	1245	1640	2350
Specific gravity @ 15.6°C (60°F)	0.852	0.858	0.861	0.864	0.866	0.870
Flash point, COC						
°C	146	148	148	150	158	170
°F	295	298	298	302	316	338
Pour Point						
°C	-39	-33	-33	-33	-30	-27
°F	-38	-27	-27	-27	-22	-17
Color, ASTM D 1500	0.5	0.5	0.5	0.5	0.5	0.5
Rust prevention, ASTM D 665A	Pass	Pass	Pass	Pass	Pass	Pass
Corrosion protection, ASTM D 130 1 hr @ 100°C	1A	1A	1A	1A	1A	1A
Timken OK load, ASTM D 2782, lb	30	30	30	30	30	30

GLYCOLUBE FG

Synthetic Multi-Purpose Lubricants

GLYCOLUBE FG premium food-grade synthetic lubricants, formulated from polyalkylene glycol (PAG) basestock, offer superb high-temperature performance in bearings, hydraulics and gears in a wide range of food processing and packaging operations where incidental food contact may occur. Their performance properties and advantages include:

- FDA 21 CFR 178.3570(a) and USDA H-1 compliant
- Exceptional control of sludge, varnish and lacquer formation
- Superb oxidative and thermal stability
- High viscosity indexes
- Excellent anti-wear and EP performance
- Excellent lubricity
- Long service life
- Desirable low-stain and evaporative properties for aluminum foil manufacture

Typical Inspections

		GLYCOLUBE FG		
Property		150	220	400
Weight per Gallon, lb				
	@ 60°F (15.6°C)	8.35	8.38	8.39
	@ 68°F (20°C)	8.32	8.35	8.36
Specific Gravity, 20/20°C		0.9996	1.0036	1.0041
Viscosity, cSt				
	@ 100°F (37.8°C)	155	285	425
	@ 210°F (98.9°C)	22.9	40.7	59.5
Viscosity Index 187 206 220				
Pour Point, °F (°C)		-20 (-29)	-15 (-26)	-5 (-21)
Flash Point, ASTM D 93, °F (°C)		355 (179)	405 (207)	355 (179)
Coefficient of Expansion at 55°C, per °C		0.00078	0.00081	0.00079
Additives				
	Rust Inhibitor	Yes	Yes	Yes
	Oxidation Inhibitor	Yes	Yes	Yes
Extreme Pressure		Yes	Yes	Yes
Turbine Oil Test, ASTM D 665A		Pass	Pass	Pass
Copper Corrosion, ASTM D 130		No Effect	No Effect	No Effect
Babbitt Corrosion (89 Sn/7.5 Sb/3.5 Cu)		No Effect	No Effect	No Effect
Mist Test		Pass	Pass	Pass
FZG Spur Gear Test, Stages Passed (12 max)		12	12	12
Shell Four-Ball Wear Test, ASTM D 2266				
Scar diameter, mm		0.38	0.38	0.38
Timken Test, lb				
	OK Load	40	45	45
	Score	45	50	50

ZERO-POL S

Refrigeration and Compressor Oils ZERO-POL S is a line of premium synthetic refrigeration lubricants formulated with polyalpha-olefin (PAO) base stocks. It is available in two ISO viscosity grades (68 and 220). These oils have excellent thermal stability and extremely low pour points for use in refrigeration and other compressors in severe industrial service.

Typical Inspections

	ZERO-POL S 68	ZERO-POL S 220
Viscosity,		
cSt @ 40°C	68	240
cSt @ 100°C	10.4	27.2
Pour point, °C(°F)	-48(-54)	-45(-49)
Cloud point, COC, °C(°F)	-51(-60)	-51(-60)
Flash point, COC, °C(°F)	254(489)	264(507)
Density @ 15°C, kg/m ³	834	843

Margarine Packaging Plant **FOODREX FG 1**

Grease

FOODREX FG 1 is a premium industrial grease formulated with an aluminum-complex thickener and USP white oil base stock. FOODREX FG 1 provides excellent water resistance and outstanding pumpability. It is white in color, has a smooth-tacky appearance and contains an extreme-pressure additive for carrying heavy loads. In addition, FOODREX FG 1 is KOSHER and PAREVE certified.

Typical Inspections

FOODREX FG 1

Penetration, ASTM D 217, worked 60X, mm/10	325
Thickener type	Aluminum-Complex
Color	White
Texture	Smooth, tacky
Dropping point, ASTM D 2265, °C(°F)	232(450)
Base oil viscosity	
SUS @ 100°F	800
SUS @ 210°F	75
cSt @ 40°C	160
cSt @ 100°C	14
Base oil viscosity index, ASTM D 2270	90
Four-ball EP test, ASTM D 2596	
Weld point, kg	315
Load wear index, kg	39
Rust test, ASTM D 1743	Pass

CARUM 330

Grease

CARUM 330 grease is formulated with a calcium-complex thickener and USP white oil basestock. CARUM 330 provides excellent water resistance but is not recommended for use in central systems.

Typical Inspections

CARUM 330

Color	White
Texture	Buttery
Penetration, ASTM D 217, worked, 60 strokes, mm/10	325
Dropping Point, ASTM D 2265	
°C	260+
°F	500+
Base oil viscosity, cSt @ 40°C	70.4
Water washout, 79°C(175°F), ASTM D 1264, %	2
Corrosion protection, ASTM D 1743	1
Timken OK load, ASTM D 2509, kg(lb)	20(45)
Four-ball wear test, ASTM D 2266 10kg, 1800 rpm, 75°C(167°F), 1 hr, scar diameter, mm	0.25
Oxidation test, ASTM D 942, kPa (psi) drop in 100 hr	41.4 (6)

EXXON'S USDA H-2 APPROVED LUBRICANTS

Exxon Company, U.S.A. offers a complete line of USDA H-2 food-grade lubricating oils and greases to meet nearly every USDA H-2 requirement found in the food processing industry. These products are to be used when there is no possibility of the lubricant coming in contact with edible products. The following tables summarize Exxon USDA H-2 approved lubricants and their typical applications.

EXXON USDA H-2 COMPLIANT OILS SUMMARY*		
Lubricants	Grades	Typical Applications
AVIATION OIL EE	80, 100	aircraft piston engines
CORAY	15, 22, 32, 46, 100, 150, 220	uninhibited naphthenic oils for once-through lubrication
CYLESSTIC TK	460, 680, 1000	worm gears and steam cylinders
ENMIST	100, 220, 460	mist oils for gears and bearings
FAXAM	22, 46	uninhibited paraffinic oils for once-through lubrication
MILLCOT K	220	adhesive oil for gears and bearings of textile and materials-handling equipment
NUTO H	32, 46, 68, 100, 150	premium-quality anti-wear hydraulic oils
SPARTAN EP	68, 100, 150, 220, 320, 460, 680, 1000, 1500, 2200, 3200	premium-quality industrial gear oils
SPINESSTIC	10	high quality oil for lubrication of high-speed machine elements
SYNESSTIC	68	synthetic (diester) lubrication for air compressors, hydraulic systems, and bearings
TERESSTIC GT	32	super-premium gas and steam turbine lubricant
TERESSTIC	33, 46, 68, 77, 100, 150, 220, 320, 460	premium circulating oils for bearings and turbines
UNIVIS SPECIAL	22, 32, 46, 68	anti-stain hydraulic and bearings oils for the aluminum rolling industry
UNIVIS SPECIAL EP	220, B 320, B 320 A, B 2200	anti-stain bearing and gear oils for the aluminum rolling industry
ZERICE N	22, 46, 68	premium quality inhibited oils designed specifically for ammonia refrigeration

- This list is inclusive of only those products for which Exxon has previously applied and received USDA H-2 approval. Other Exxon lubricants may meet the requirements of USDA H-2 but have not been formally approved.

EXXON USDA H-2 COMPLIANT GREASES* SUMMARY		
Lubricants	Soap Type	Typical Applications
ANDOK 260	sodium	synthetic-grease for extra-long life in ball and roller bearings
BEACON 325	lithium	synthetic-grease for bearing lubrication
ESTAN 1 and 2	calcium	extremely water resistant grease for bearings
LIDOK EP 1 and EP 2	lithium	general-purpose EP grease for bearings and gears
NEBULA EP 0 and EP 1	calcium-complex	extremely water resistant grease for bearings and gears
RONEX MP	lithium-complex	multi-purpose high-temperature grease
UNIREX N 2	lithium-complex	electric motor bearings

* This list is inclusive of only those products for which Exxon has previously applied and received USDA H-2 approval. Other Exxon lubricants may meet the requirements of USDA H-2 but have not been formally approved.

Health studies have shown that many petroleum hydrocarbons pose potential human health risks that may vary from person to person. As a precaution, exposure to liquids and vapors of petroleum products should be minimized.

Oils and greases in contact with the skin can result in removal of skin oils and plugging of sweat glands and hair follicles. This can lead to skin irritation or dermatitis. Therefore, good personal hygiene should always be practiced. Petroleum products should be promptly removed from the skin. Soiled clothing should not remain in contact with the skin.

Oils and greases are readily removed from the skin by waterless hand cleaners, followed by washing with soap, water and a soft skin brush. They can be removed from clothing by dry-cleaning or washing with laundry detergent. If petroleum products contact the eyes, flush the eyes with fresh water until the irritation subsides.

WARNING: "Empty" containers retain residue (liquid and/ or vapor) and can be dangerous. Do not pressurize, cut weld, braze, drill, grind or expose such containers to heat, flame, sparks or other sources of ignition; they may explode and cause injury or death. Do not attempt to clean, since residue is difficult to remove and even a trace of remaining material constitutes an explosive hazard. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. Additional important health and safety information on Exxon products is provided in Material Safety Data Sheets, available from: Sales Publications, Marketing Technical Services, Exxon Company, U.S.A., P.O. Box 2180, Houston, TX 77252-2180.

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DYMALUBE FOOD GRADE LUBRICANTS

Our food grade lubricating compounds may be used, either as a lubricant or an anti-corrosion film, on equipment or parts where edible products are being processed.

We provide the following:

- Food Grade Hydraulic Oils
- Food Grade Greases
- Food Grade Gear Oils

Dymalube Food Grade Lubricants are USDA H-1 approved for use as a lubricant or anti-rust film on equipment or machine parts in locations in which there is exposure of the lubricated part to edible products. They may also be used as a release agent on gaskets or seals of tank closures. In adherence to the USDA H-1 definition, these lubricants can be used at their minimum amount to accomplish the desired technical effect on the equipment. As well, the anti-rust films can be washed or wiped from the equipment surface to leave the surface effectively free of any substance which could be transferred to food being processed.

Dymalube Food Grade Hydraulic Oils

Our oils are clear, non-toxic synthetic hydraulic oils used in a very wide range of food process machinery. They are available in ISO grades 32-46-68-100-150 & 460. These oils possess excellent oxidation resistance qualities, and have high load carrying capabilities.

Dymalube Grade Greases

Dymar has a wide variety of food grade greases to effectively lubricate any machinery used to manufacture, process, package, or store food products. These greases have excellent properties, including:

- Highest quality anti wear capabilities
- Oxidation resistance
- Water washout resistance
- High temperature capabilities

Dymalube Grade Gear Oils

Dymar Food Grade Gear Oils are specifically designed to lubricate a wide range of enclosed gears. Our gear oils contain highly refined oils, with extreme pressure additives and anti wear properties. They also contain tackifiers to ensure excellent adhesion to the gears, under all service conditions.

Food Grade Lubricants

Avatar Corporation offers a complete line of USDA H-1 lubricants. These gear oils, greases, hydraulic and compressor oils are designed to give superior oxidative stability and high-temperature performance. They comply with FDA 21 CFR 178.3570, "Lubricants with incidental food contact" and are Kosher certified.

ProTech™ 'H' Series hydraulic oils are used in most piston, vane and gear pumps of hydraulic, bearing and circulating systems to provide superior anti-wear properties and oxidative stability for minimal varnish and sludge formation. Oxidation stability tests show greater than 8000 hours to 2.0 Acid Number. All grades pass ASTM D-665A Water Rust Test and ASTM D-665B Synthetic Sea Water Rust Test.

ProBio™ 32/46H is a new, high performance, vegetable based, biodegradable oil. It is virtually nontoxic and demonstrates excellent rust protection. This product is recommended for hydraulic systems which operate at temperatures between 0 and 180°F. It can be utilized in applications requiring either ISO 32 or ISO 46 oil.

'H' Series	ISO Grade	ASTM Grade	Viscosity at 100°F, SUS	Pour Point °C/°F
ProTech 32H	32	150	49 - 182	-9.4/15
ProTech 32HN	32	150	149 - 182	-34.4/-30
ProBio 32/46H	32/46	-	159 - 189	-17.8/0
ProTech 46H	46	215	214 - 262	-12.2/10
ProTech 46HN	46	215	214 - 262	-34.4/-30
ProTech 68H	68	315	316 - 389	-9.4/15
ProTech 100H	100	465	468 - 583	-9.4/15

ProTech 'G' Series gear oils feature extreme pressure additives for improved high-temperature performance. Gear damage due to air entrainment is reduced by the addition of antifoam agents. All grades pass ASTM D-665A Water Rust Test and ASTM D-665B Synthetic Sea Water Rust Test.

'G' Series	AGMA Grade	ASTM Grade	Viscosity at 100°F, SUS	Pour Point °C/°F
ProTech 68G	2	315	316 - 389	-9.4/15
ProTech 150G	4	700	795 - 875	-12.2/10
ProTech 220G	5	1000	1042 - 1283	-12.2/10
ProTech 320G	6	1500	1526 - 1866	-12.2/10
ProTech 460G	7	2150	2194 - 2707	-12.2/10

ProTech 'G2' Series greases are used on slides, cams, exposed gears, hot break bearings, pumps, fans, cookers and scrubbers. Extreme pressure grades are available upon request.

'G2' Series	NLGI Grade	Color	Thickener Complex	Dropping Point, °F
ProTech 312G2	2	Clear	Aluminum	475 min
ProTech 1220G2	2	White	Bentonite	650 min
ProTech 2310G2	0	White	Aluminum	420 min
ProTech 2311G2	1	White	Aluminum	450 min
ProTech 2312G2	2	White	Aluminum	470 min
ProTech 2332G2	2	White	Calcium	275 min

ProSyn™ 46C compressor oil is formulated from synthetic hydrocarbon oil and contains rust and oxidation inhibitors. It is recommended for rotary compressors in which incidental food contact may occur. It exhibits excellent anti-wear properties, minimal varnish lacquering and deposition. Reduced compressor maintenance and lower oil consumption have been demonstrated. ProSyn 46C meets FDA CFR 178.3570 and USDA H-1 criteria.

ProSyn	ISO Grade	Viscosity at 100°F, SUS	Pour Point °C/°F
ProSyn 46C	46	49 - 54	-57.2/-71

ANDEROL® & PQ® Food-Grade Lubricants

Product Name	General Description
PQ AA 10, PQ AA 20, PQ AA 30, PQ AA 40	USDA H-1 white mineral oils/general purpose compressor, hydraulic, and other applications/for use where incidental food contact may occur
PQ AA 80, PQ AA 85W-140, PQ AA 90, PQ AA 140, PQ AA 250, PQ AA 1000	USDA H-1 white mineral oils based gear lubricant. Equivalent in viscosity to AGMA 3, AGMA 4/6, AGMA 5, AGMA 6, AGMA 8, and AGMA 8A.
PQ Trolley Lube	Food packing plants
FGC 5	USDA H-1, OU (Kosher for Pareve) and Halal approved compressor and hydraulic oil for use where incidental food contact may occur
FGC 10, FGC 20, FGC 30, FGC 40, FGC 150	USDA H-1, OU (Kosher for Pareve) and Halal approved compressor and hydraulic oil for use where incidental food contact may occur. ISO Viscosity Grades 32, 46, 68, 100, and 150.
FGH 22, FGH 32, FGH 46, FGH 68, FGH 100	USDA H-1, OU (Kosher for Pareve) and Halal approved hydraulic oil for use where incidental food contact may occur. ISO Viscosity grades 22, 32, 46, 68, and 100.
6068, 6100, 6150, 6220, 6320, 6460, 6680	High performance USDA H-1 approved gear oil/mild EP oil for ferrous and non-ferrous metals/will not corrode or cause pitting in yellow metals. ISO Viscosity Grades 68, 100, 150, 220, 320, 460 and 680.
HTC PG 150	Very high temperature chain lubricant for use where incidental food contact may occur
HTC 220, HTC 460	USDA H-1 high temperature food grade chain lubricant. ISO Viscosity Grades 220, 460.

	See also our Food Grade Greases	
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Typical Properties

Product Name	Base Fluid	ISO Grade	Viscosity 40°C cSt	Viscosity 100°C cSt	SAE Grade	Specific Gravity@ 15.6°C	Flash Point °C	Pour Point °C
PQ AA 10	White oil	32	29	5.0	10	0.87	180	-15
PQ AA 20	White oil	46	51	7.3	10W-20	0.87	210	-15
PQ AA 30	White oil	68/100	87	10.6	30	0.88	225	-15
PQ AA 40	White oil	150	135	14.0	40	0.88	230	-18
PQ AA 80	White oil	68	77	9.6	Gear 80	0.87	220	-12
PQ AA 85W-140	White oil	320	327	24.8	Gear 85W-140	0.88	240	-12
PQ AA 90	White oil	220	207	17.0	Gear 90	0.89	190	-18
PQ AA 140	White oil	320/460	368	28.0	Gear 140	0.89	190	-18
PQ AA 250	White oil	460/680	640	43.0	Gear 250	0.90	230	-6
PQ AA 1000	White oil	1000	1080	54.0	>250	0.89	200	-10
PQ Trolley Lube	White oil	46	430	6.8	20	0.88	210	-20
FGC 5	PAO	22	20.4	4	5	0.83	240	-60
FGC 10	PAO	32	31	5.9	5	0.83	245	-50
FGC 20	PAO	46	47	7.8	10	0.83	270	-50
FGC 30	PAO	68	65	10.2	20	0.84	250	-50
FGC 40	PAO	100	101	13.4	30	0.84	270	-45
FGC 150	PAO	150	159	20	40	0.85	250	-35
FGH 22	PAO	22	20.4	4	5	0.83	240	-60
FGH 32	PAO	32	31	5.7	10	0.83	240	-55
FGH 46	PAO	46	46	7.7	10W-20	0.83	250	-55
FGH 68	PAO	68	63	9.7	20	0.84	250	-45
FGH 100	PAO	100	100	13.4	30	0.84	250	-45
6068	PAO	68	64	10.1	20	0.84	243	-51

Product Name	Base Fluid	ISO Grade	Viscosity 40°C cSt	Viscosity 100°C cSt	SAE Grade	Specific Gravity@ 15.6°C	Flash Point °C	Pour Point °C
6100	PAO	100	97	13	30	0.85	240	-40
6150	PAO	150	165	18.3	40	0.86	230	-45
6220	PAO	220	215	21.9	-	0.86	224	-35
6320	PAO	320	295	28	-	0.86	230	-35
6460	PAO	460	453	37.6	-	0.86	220	-30
6680	PAO	680	675	51	-	0.87	240	-22
HTC PG 150	PAG	150/220	196	34	-	1.01	230	-29
HTC 220	PAO	220	215	22	-	0.86	215	-40
HTC 460	PAO	460	455	38	-	0.86	215	-25

ANDEROL (United States)

215 Merry Lane
East Hanover, NJ 07936
Phone: 973-887-7410
Fax: 973-884-3825
Email: info2@royallube.com

ANDEROL BV (Europe)

Phone: 31 (0)43 352 4190
Fax: 31 (0)43 352 4199

ANDEROL Japan K.K.

Phone: (81) 6 6445 5853
Fax: (81) 6 6445 5854

Avatar Corporation

Food Grade Lubricants

Avatar Corporation offers a complete line of USDA H-1 lubricants. These gear oils, greases, hydraulic and compressor oils are designed to give superior oxidative stability and high-temperature performance. They comply with FDA 21 CFR 178.3570, "Lubricants with incidental food contact" and are Kosher certified.

ProTech™ 'H' Series hydraulic oils are used in most piston, vane and gear pumps of hydraulic, bearing and circulating systems to provide superior anti-wear properties and oxidative stability for minimal varnish and sludge formation. Oxidation stability tests show greater than 8000 hours to 2.0 Acid Number. All grades pass ASTM D-665A Water Rust Test and ASTM D-665B Synthetic Sea Water Rust Test.

ProBio™ 32/46H is a new, high performance, vegetable based, biodegradable oil. It is virtually nontoxic and demonstrates excellent rust protection. This product is recommended for hydraulic systems which operate at temperatures between 0 and 180°F. It can be utilized in applications requiring either ISO 32 or ISO 46 oil.

'H' Series	ISO Grade	ASTM Grade	Viscosity at Pour Point 100°F, SUS °C/°F	
ProTech 32H	32	150	49 - 182	-9.4/15
ProTech 32HN	32	150	149 - 182	-34.4/-30
ProBio 32/46H	32/46	-	159 - 189	-17.8/0
ProTech 46H	46	215	214 - 262	-12.2/10
ProTech 46HN	46	215	214 - 262	-34.4/-30
ProTech 68H	68	315	316 - 389	-9.4/15
ProTech 100H	100	465	468 - 583	-9.4/15

ProTech 'G' Series gear oils feature extreme pressure additives for improved high-temperature performance. Gear damage due to air entrainment is reduced by the addition of antifoam agents. All grades pass ASTM D-665A Water Rust Test and ASTM D-665B Synthetic Sea Water Rust Test.

'G' Series	AGMA Grade	ASTM Grade	Viscosity at Pour Point 100°F, SUS °C/°F	
ProTech 68G	2	315	316 - 389	-9.4/15
ProTech 150G	4	700	795 - 875	-12.2/10
ProTech 220G	5	1000	1042 - 1283	-12.2/10
ProTech 320G	6	1500	1526 - 1866	-12.2/10
ProTech 460G	7	2150	2194 - 2707	-12.2/10

ProTech 'G2' Series greases are used on slides, cams, exposed gears, hot break bearings, pumps, fans, cookers and scrubbers. Extreme pressure grades are available upon request.

'G2' Series	NLGI Grade	Color	Thickener Complex	Dropping Point, °F
ProTech 312G2	2	Clear	Aluminum	475 min
ProTech 1220G2	2	White	Bentonite	650 min
ProTech 2310G2	0	White	Aluminum	420 min
ProTech 2311G2	1	White	Aluminum	450 min
ProTech 2312G2	2	White	Aluminum	470 min
ProTech 2332G2	2	White	Calcium	275 min

ProSyn™ 46C compressor oil is formulated from synthetic hydrocarbon oil and contains rust and oxidation inhibitors. It is recommended for rotary compressors in which incidental food contact may occur. It exhibits excellent anti-wear properties, minimal varnish lacquering and deposition. Reduced compressor maintenance and lower oil consumption have been demonstrated. ProSyn 46C meets FDA CFR 178.3570 and USDA H-1 criteria.

ProSyn	ISO Grade	Viscosity at 100°F, SUS	Pour Point °C/°F
ProSyn 46C	46	49 - 54	-57.2/-71

Food Grade Lubricants

Clarion™ Food Grade White Mineral Oils

They meet or exceed the requirement set forth in the U.S. FDA regulations 21 CFR 172.878 and 178.3620(a) for direct and indirect food contact.

Clarion™ Food Grade A/W Hydraulic Oils

Designed specifically for use in food processing equipment. These products meet or exceed the requirements of U. S. FDA Regulation 21 CFR 178.3570 governing petroleum products which may have incidental contact with food.

Clarion™ Food Grade HTEP Grease

A high temperature, extreme pressure, water resistant grease in an NLGI No. 2 grade.

National Sanitary Foundation International Sponsors Replacement Program for Food-Grade Lubricants

The National Sanitary Foundation International (NSF), an independent standard-setting organization, has finalized a program designed to certify food-grade lubricants and other proprietary substances, similar to the approval process that had been operated by the U.S. Department of Agriculture's (USDA) Food Safety and Inspection Service (FSIS), the termination of which was announced over two years ago.

The NSF program, detailed in an article in the January issue of *Compoundings*, applies to compounds that had been subject to prior approval by the FSIS, including food-grade lubricants, cleaning compounds, sanitizers, laundry agents, boiler and water treatments, and pesticides.

Under the prior approval program, FSIS did not test products submitted for approval. Rather, it evaluated them based on the accompanying application and information obtained from the Food and Drug Administration, the Environmental Protection Agency, and the Occupational Safety and Health Administration. USDA acknowledged that it received between 16,000 and 18,000 applications for approval of nonfood compounds and proprietary substances each year, many of which were requests for formulation changes or new use patterns for substances already approved, and approved approximately 9,000 applications. However, nearly 40 percent of the applications were returned because of incomplete paperwork or because additional information was needed.

FSIS eliminated the prior approval program in 1998 because the Agency believes that the program was redundant with reviews performed by other government agencies, and that it was inconsistent with the USDA's new food safety strategy. Under the revised Hazard Analysis and Critical Control Point (HACCP) regulations, every meat and poultry establishment is responsible for implementing the necessary controls for the safe and effective production of meat and poultry products. Consequently, they will be responsible also for determining the safety and effectiveness of the nonfood compounds and proprietary substances used in the production of their products.

Individual establishments still will be required to meet maximum food safety standards; however, their means of doing so will be largely self-determined. USDA believes that this new flexibility in performance standards will encourage innovation within the industry, which could result in more effective sanitation procedures specifically tailored to individual plants.

FSIS resources previously devoted to the prior approval process would be redirected to implement inspections under the HACCP program. USDA estimates that elimination of the prior approval process will result in a savings of between \$150,000 and \$187,000 in staff salaries and administrative and mailing costs.

FSIS maintains that it is committed to ensuring that USDA-inspected establishments do not use chemical compounds in a way that will result in the adulteration of the food they produce. Although the Agency is no longer processing applications and making

additions to the list, it is in the process of developing a compliance guide for meat and poultry establishments concerning the appropriate use of nonfood compounds and proprietary substances. FSIS is also developing an instructional directive for inspection personnel on how to verify that meat and poultry establishments are using nonfood compounds and proprietary substances in a manner that will not adulterate food products.

Working with the USDA, NSF has captured all of the prior review processes and packaged them under the "NSF Nonfood Compounds Registration Program." Under the NSF Registration Program, products authorized previously by the USDA are also fully registered and listed by the NSF in a document known as the "White Book." All products that are subsequently reviewed by NSF are highlighted in the NSF listing and carry an NSF Registration number on the product label.

Products eligible for NSF registration include all compounds used in food handling, processing, and storage, such as disinfectants and lubricants. The evaluation process to be used by NSF will mirror that which was in place under the FSIS program, including toxicological review of ingredients, label review, determination of intended use classification, and registration approval decision. Additional information on the new NSF program, including the White Book and product registration forms, is available on the organization's web site at www.nsf.org/usda.

Material Safety Data Sheet

Chevron White Oil AFP

MSDS: 7422 Revision #: 1 Revision Date: 02/09/99

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CHEVRON White Oil

PRODUCT NUMBER(S): CPS231037 CPS231038 CPS231039 CPS231040
CPS231041 CPS231042

SYNONYM: CHEVRON Packers Oil

CHEVRON Superla DCO 55

CHEVRON Superla DCO 75

CHEVRON White Oil AFP

CHEVRON White Oil 8-T

CHEVRON White Oil 9-T

COMPANY IDENTIFICATION EMERGENCY TELEPHONE NUMBERS

Chevron Products Company HEALTH (24 hr): (800)231-0623 or
Global Lubricants (510)231-0623 (International)
555 Market St. TRANSPORTATION (24 hr): CHEMTREC
Room 803 (800)424-9300 or (703)527-3887
San Francisco, CA 94105-2870 Emergency Information Centers
are located in U.S.A.
Int'l collect calls accepted

PRODUCT INFORMATION: MSDS Requests: (800)414-MSDS or (800)414-6737
Environmental, Safety, & Health Info: (415) 894-0434
Product Information: (800) 582-3835

2. COMPOSITION/INFORMATION ON INGREDIENTS

100.0 % CHEVRON White Oil
CONTAINING

COMPONENTS	AMOUNT	LIMIT/QTY	AGENCY/TYPE
WHITE MINERAL OIL			
Chemical Name: WHITE MINERAL OIL			
CAS8042475	100.00%	5 mg/m3 (mist)	ACGIH TWA
		10 mg/m3 (mist)	ACGIH STEL
		5 mg/m3 (mist)	OSHA PEL

COMPOSITION COMMENT:

All the components of this material are on the Toxic Substances Control Act Chemical Substances Inventory.

This product fits the ACGIH definition for mineral oil mist. The ACGIH TLV is 5 mg/m³, the OSHA PEL is 5 mg/m³.

3. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS

EYE:

Not expected to cause prolonged or significant eye irritation.

SKIN: Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin.

INGESTION:

Not expected to be harmful if swallowed.

INHALATION:

Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit.

4. FIRST AID MEASURES

EYE: No specific first aid measures are required because this material is not expected to cause eye irritation. As a precaution remove contact lenses, if worn, and flush eyes with water.

SKIN: No specific first aid measures are required because this material is not expected to be harmful if it contacts the skin. As a precaution, remove clothing and shoes if contaminated. Use a waterless hand cleaner, mineral oil, or petroleum jelly to remove the material. Then wash skin with soap and water. Wash or clean contaminated clothing and shoes before reuse.

INGESTION: No specific first aid measures are required because this material is not expected to be harmful if swallowed. Do not induce vomiting. As a precaution, give the person a glass of water or milk to drink and get medical advice. Never give anything by mouth to an unconscious person.

INHALATION: If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.

5. FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:

Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

FLAMMABLE PROPERTIES:**FLASH POINT:** (COC) >265F (>130C)**AUTOIGNITION:** NDA**FLAMMABILITY LIMITS** (% by volume in air): Lower: NA Upper: NA**EXTINGUISHING MEDIA:** CO₂, Dry Chemical, Foam, Water Fog**NEPA RATINGS:** Health 0; Flammability 1; Reactivity 0.**FIRE FIGHTING INSTRUCTIONS:** This material will burn although it is not easily ignited.**COMBUSTION PRODUCTS:** Normal combustion forms carbon dioxide and water vapor; incomplete combustion can produce carbon monoxide.

6. ACCIDENTAL RELEASE MEASURES

CHEMTREC EMERGENCY NUMBER (24 hr):(800)424-9300 or (703)527-3887
International Collect Calls Accepted

ACCIDENTAL RELEASE MEASURES:

Stop the source of the leak or release. Clean up releases as soon as possible, observing precautions in Exposure Controls/Personal Protection. Contain liquid to prevent further contamination of soil, surface water or groundwater. Clean up small spills using appropriate techniques such as absorbent materials or pumping. Where feasible and appropriate, remove contaminated soil. Follow prescribed procedures for reporting and responding to larger releases.

7. HANDLING AND STORAGE

Drum is not designed to contain pressure. Do not use pressure to empty drum or drum may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty drums should be completely drained, properly bunged, and promptly returned to a drum reconditioner, or properly disposed of. Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to

harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS

Use in a well-ventilated area. If user operations generate an oil mist, use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended mineral oil mist exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

EYE/FACE PROTECTION:

No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.

SKIN PROTECTION:

No special protective clothing is normally required. Where splashing is possible, select protective clothing depending on operations conducted, physical requirements and other substances. Suggested materials for protective gloves include: <Viton> <Nitrile> <Silver Shield>

RESPIRATORY PROTECTION:

No respiratory protection is normally required. If user operations generate an oil mist, determine if airborne concentrations are below the recommended mineral oil mist exposure limits. If not wear a NIOSH approved respirator that provides adequate protection from measured concentrations of this material. Use the following elements for air-purifying respirators: particulate.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DESCRIPTION:

Colorless liquid.

pH: NDA

VAPOR PRESSURE: NA

VAPOR DENSITY

(AIR=1): NA

BOILING POINT: NA

FREEZING POINT: NDA

MELTING POINT: NA

SOLUBILITY: Soluble in hydrocarbon solvents; insoluble in water.

SPECIFIC GRAVITY: 0.818 - 0.840 @ 25/25C (min.)

EVAPORATION RATE: NA

VISCOSITY: 7.5 - 17.0 cSt @ 40C (min.)

PERCENT VOLATILE

(VOL): NA

10. STABILITY AND REACTIVITY

HAZARDOUS DECOMPOSITION PRODUCTS:

No data available.

CHEMICAL STABILITY:

Stable.

CONDITIONS TO AVOID:

No data available.

INCOMPATIBILITY WITH OTHER MATERIALS:

May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

HAZARDOUS POLYMERIZATION:

Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS:

The eye irritation hazard is based on data for a similar material.

SKIN EFFECTS:

The skin irritation hazard is based on data for a similar material.

ACUTE ORAL EFFECTS:

The acute oral toxicity is based on data for a similar material.

ACUTE INHALATION EFFECTS:

The acute respiratory toxicity is based on data for a similar material.

ADDITIONAL TOXICOLOGY INFORMATION:

This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B).

12. ECOLOGICAL INFORMATION

ECOTOXICITY:

This material is not expected to be harmful to aquatic organisms.

ENVIRONMENTAL FATE:

This material is not expected to be readily biodegradable.

13. DISPOSAL CONSIDERATIONS

Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact

your sales representative or local environmental or health authorities for approved disposal or recycling methods.

14. TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT SHIPPING NAME: NONE

DOT HAZARD CLASS: NONE

DOT IDENTIFICATION NUMBER: NONE

DOT PACKING GROUP: N/A

ADDITIONAL INFO: Petroleum Oil, N.O.I.B.N. - Not hazardous by U.S. DOT.

ADR/RID Hazard class - Not applicable

15. REGULATORY INFORMATION

SARA 311 CATEGORIES: 1. Immediate (Acute) Health Effects: NO

2. Delayed (Chronic) Health Effects: NO

3. Fire Hazard: NO

4. Sudden Release of Pressure Hazard: NO

5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01=SARA 313 11=NJ RTK 22=TSCA Sect 5(a)(2)

02=MASS RTK 12=CERCLA 302.4 23=TSCA Sect 6

03=NTP Carcinogen 13=MN RTK 24=TSCA Sect 12(b)

04=CA Prop 65-Carcin 14=ACGIH TWA 25=TSCA Sect 8(a)

05=CA Prop 65-Repro Tox 15=ACGIH STEL 26=TSCA Sect 8(d)

06=IARC Group 1 16=ACGIH Calc TLV 27=TSCA Sect 4(a)

07=IARC Group 2A 17=OSHA PEL 28=Canadian WHMIS

08=IARC Group 2B 18=DOT Marine Pollutant 29=OSHA CEILING

09=SARA 302/304 19=Chevron TWA 30=Chevron STEL

10=PA RTK 20=EPA Carcinogen

The following components of this material are found on the regulatory lists indicated.

WHITE MINERAL OIL

is found on lists: 14,15,17,

EU RISK AND SAFETY LABEL PHRASES:

May cause long-term adverse effects in the aquatic environment.

NEW JERSEY RTK CLASSIFICATION:

Under the New Jersey Right-to-Know Act L. 1983 Chapter 315

N.J.S.A. 34:5A-1 et. seq., the product is to be identified as follows:

PETROLEUM OIL

WHMIS CLASSIFICATION:

This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

16. OTHER INFORMATION

NFPA RATINGS: Health 0; Flammability 1; Reactivity 0;

HMIS RATINGS: Health 1; Flammability 1; Reactivity 0;

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:-
Personal

Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

REVISION STATEMENT:

This revision updates Section 1 (Synonym).

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value TWA - Time Weighted Average

STEL - Short-term Exposure Limit TPQ - Threshold Planning
Quantity

RQ - Reportable Quantity PEL - Permissible Exposure Limit

C - Ceiling Limit CAS - Chemical Abstract Service Number

A1-5 - Appendix A Categories () - Change Has Been Proposed

NDA - No Data Available NA - Not Applicable

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Toxicology and Health Risk Assessment Unit, CRTC, P.O. Box 1627, Richmond, CA 94804

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modification of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

Safety data for polyisobutylene

General

Synonyms: 2-methyl-1-propene homopolymer, isobutylene polymer, polymerized 2-methylpropene, isobutylene resin

Molecular formula: $[C_4H_8]_n$

CAS No: 9003-27-4

EINECS No:

Physical data

Appearance:

Melting point: [Physical properties depend upon the number of monomer units in the polymer]

Boiling point:

Vapour density:

Vapour pressure:

Density ($g\ cm^{-3}$): Typically around 0.92 for commercially available liquid polymer

Flash point:

Explosion limits:

Autoignition temperature:

Water solubility:

Stability

Combustible. Incompatible with strong oxidizing agents.

Toxicology

n/a

Transport information

Personal protection

Synfluid® Polyalphaolefins

Product Overview

Synfluid® polyalphaolefins (PAOs) are the ideal platform for high performance lubricant products. Today's tougher equipment applications can push a lubricant to the breaking point, and most mineral oils are not up to the job. Synfluid PAOs offer a new technology alternative for crankcase lubricant, transmission fluid, gear oil, industrial oil, compressor oil, transformer oil, and aircraft lubricant. Synfluid PAOs are created to provide the competitive edge wherever machinery is pushed to the limit.

Performance Advantages

Unlike mineral oils, which are made of thousands of different compounds and impurities, Synfluid PAOs contain only well-defined hydrocarbon molecules with these performance advantages:

- High viscosity index (VI)
- Low volatility
- Wide operating temperature range
- Outstanding hydrolytic stability
- High-thermal stability
- Biodegradability (2, 2.5 & 4cSt)
- Non-toxicity
- High-pressure stability
- Oxidative stability
- Compatibility
- Low flammability

Synfluid® PAOs are FDA approved for incidental food contact and have Kosher approval.

General Offerings

Synfluid® PAOs are available in a wide range of viscosities, each providing a distinct molecular size and a variety of advantages including faster start-up, greater load-carrying ability, reduced maintenance, and cooler operation.

Additive System Profiles

See these tables of both Unique and Traditional PAOs with specifications.

Questions?

For your Synfluid® PAO questions you can contact our Synfluid® PAO Business Development Specialist, Lisa Fobian, toll free at (877) 895-4773 or you can send an e-mail to synfluid@chevron.com.

Product Viscosity Grade (cSt)	Flash Point degrees C (F)
2	160 (320)
2.5	186 (367)
4	219 (425)
5	246 (475)
6	239 (460)
7	260 (500)
8	257 (495)
9	271 (520)