

NATURAL GAS ENGINE OILS



PREMIUM LUBRICANTS FOR THE  
NATURAL GAS INDUSTRY



## LOW ASH N GEO

### EL MAR® LA4<sup>EXD</sup>

#### Premium-Quality, Next-Generation Low Ash Natural Gas Engine Oil

State-of-the-art, premium-quality engine oil for use in high-output 4-stroke cycle natural gas engines operating under severe conditions, El Mar LA4<sup>EXD</sup> combines the benefits of high-quality Group II base stocks and a field-proven performance additive to keep engines operating in optimal conditions. It promotes engine cleanliness, prevents deposits on critical parts, reduces valve recession, and provides outstanding wear and corrosion protection. Combined with its capability for exceptional oxidation and nitration resistance, and reduced oil consumption, El Mar LA4<sup>EXD</sup> helps to extend oil-drain intervals without compromising performance and operational efficiency.

#### APPLICATIONS

- Turbocharged, lean burn and naturally aspirated gas engines requiring low-ash engine oil of API CF level performance
- Meets the requirements of engines with exhaust after-treatment devices
- Extended drain capable



### EL MAR LOW ASH

#### Premium-Quality Low Ash Gas Engine Oil

Formulated from advanced dispersant-detergent technology in high-quality base stocks, El Mar Low Ash provides superior engine protection in 4-stroke cycle gas engines by controlling sludge and minimizing carbon and lacquer deposits on piston lands, rings, grooves and undercrowns. The low-ash formulation reduces ash deposits, protects valve guide, prevents valve recession, and provides wear and corrosion protection to critical parts, thus helping to reduce maintenance costs and extend engine life.

#### APPLICATIONS

- Turbocharged, lean burn and naturally aspirated gas engines requiring low-ash engine oil
- Meets the requirements of engines with exhaust after-treatment devices

## VERY LOW ASH N GEO

### EL MAR 2000

#### High-Quality, Very Low-Ash Natural Gas Engine Oil

El Mar 2000 is a high-quality, low-ash engine oil developed for naturally aspirated and moderately turbocharged, 2-stroke cycle and 4-stroke cycle, moderate-speed gas engines. It is compounded from high-quality base stocks and select additives to meet the lubrication needs of today's fuel efficient, low-emission engines. It has low carbon-forming tendencies and good resistance to oxidation and nitration.

#### APPLICATIONS

- Low- to medium-speed, 2-stroke cycle engines where port plugging is a major concern
- Medium-speed, 4-stroke cycle engines operating under moderate loads, as well as low- to medium-speed, naturally aspirated gas engines



## Conoco Lubricants: Pioneering products for every need.

It's no easy feat to protect high-output natural gas engines, which are as efficient as they are demanding. ConocoPhillips is on the front lines of pioneering natural gas engine oils that comply with emissions regulations, protect engines, keep critical components free from sludge and deposits, prevent deterioration of valves and reduce maintenance costs. Working closely with OEMs and in partnership with the natural gas industry, ConocoPhillips has developed a wide range of advanced, high-quality products for every need, from small oil patches to widespread installations.

Explore our full lineup of oils and compressor fluids, meet partners who help make it all happen, and discover additional services and support that can help you protect your natural gas engines like never before.

## ASHLESS N GEO

### EL MAR ASHLESS SUPREME

#### Premium, Ashless, Natural Gas Engine Oil

Formulated from high-quality, paraffinic base oils and the latest additive technology, El Mar Ashless Supreme meets the severe lubrication requirements of naturally aspirated and turbo-charged, 2-stroke cycle engines. It has demonstrated outstanding performance in minimizing deposits in engines known to promote the formation of severe port carbon deposits.

#### APPLICATIONS

- 2-stroke cycle and some 4-stroke cycle natural gas engines for which the engine manufacturer specifies an ashless natural gas engine oil

### EL MAR ASHLESS HEAVY DUTY

#### Ashless Natural Gas Engine Oil

El Mar Ashless Heavy Duty is an ashless gas engine oil formulated from high-quality, paraffinic base stocks, and dispersant-type, ashless technology. It is specifically formulated to meet the requirements of less severe, naturally aspirated and turbocharged, 2-stroke cycle engines. It is free of ash-forming additives and provides exceptionally clean intake ports in 2-stroke cycle engines, as well as extended spark plug life for all spark-ignited gas engines.

#### APPLICATIONS

- 2-stroke cycle natural gas engines whose manufacturers recommend an ashless natural gas engine oil

## ASHLESS NON-DETERGENT

### EL MAR GEO OIL

#### High Quality, Non-Detergent Ashless Gas Engine Oil

Conoco El Mar GEO is a high-quality, rust- and oxidation-inhibited, non-detergent, ashless gas engine oil. Formulated from high-viscosity index paraffinic base oils and a non-detergent additive system to provide exceptional resistance to oxidation and nitration, the oil minimizes spark plug and combustion chamber deposits, prevents wear and provides excellent protection against corrosion. It is fortified with agents to control foaming during normal use, and formulated to be compatible with catalytic converters.

#### APPLICATIONS

- El Mar GEO SAE 15W-40 is recommended specifically for Cooper-Ajax engines. It meets the low-temperature viscosity requirements of Ajax engines where cold starts and frequent start/stop cycles may be encountered



## MID ASH DUAL FUEL N GEO

### EL MAR MID ASH SUPREME

#### Premium-Quality, Mid-Ash Gas Engine Oil

Recommended for naturally aspirated and moderately to highly turbocharged, 4-cycle gas engines, such as Cooper-Superior (formerly White-Superior) and Waukesha VHP GL turbocharged lean-burn engines (3521, 5115, 7042 and 9390) requiring a nominal 1% sulfated ash oil. El Mar Mid Ash Supreme is formulated with a limited phosphorus and zinc content for catalytic converter protection.

#### APPLICATIONS

- 4-stroke cycle gas and dual-fuel engines burning sour gas or landfill gas
- Gas engines in wastewater treatment plants fueled by digester gas
- Agricultural engines using animal waste gas

## MID ASH SEVERE FUEL

### EL MAR MID ASH HEAVY DUTY

#### Mid-Ash Natural Gas Engine Oil

El Mar Mid Ash Heavy Duty is formulated from superior-quality base stocks and selected additives to meet the unique service requirements of 4-cycle, high-speed, turbocharged gas engines which demand a mid-ash product. It is particularly effective in natural gas engines and dual-fueled engines operating under high-load, high-temperature conditions.

#### APPLICATIONS

- Natural gas-fueled cogeneration systems and in other systems subject to corrosive environment such as the engines in landfill operations, production fields operating on sour gas, and wastewater treatment plants fueled by digester gas where the high-TBN oil with exceptional acid neutralization capability is needed



®

CONOCO GETS IT DONE

# COMPRESSOR FLUIDS

## SYNDUSTRIAL® ROTARY COMPRESSOR OIL

### Synthetic Polyalkylene Glycol/Ester Air Compressor Oil

Syndustrial® Rotary Compressor Oil is formulated with a blend of PAG and ester base oils, and carefully selected additives to provide outstanding deposit control, oxidation resistance, corrosion inhibition and rust protection in the presence of hot compressed air. It provides extended service life compared to semi-synthetic, paraffinic and naphthalenic compressor oils.

#### APPLICATIONS

- Oil-flooded rotary screw, rotary lobe and rotary vane air compressors where the manufacturer specifies a synthetic coolant or this type of lubricant
- Drop-in replacement for private label compressor oils marketed by Sullair and Ingersoll-Rand with similar chemistry

## SYNDUSTRIAL® PAG COMPRESSOR OIL

### Synthetic Polyalkylene Glycol Compressor Oil for Gas Compression

Syndustrial® PAG Compressor Oil is formulated with synthetic PAG base oils and carefully selected additives to provide long service life, excellent wear protection, resistance to washout and protection against rust and corrosion. It is highly resistant to gas dilution and absorption into the gas stream, and is fortified to resist corrosion in the presence of hydrogen sulfide when processing sour gas.

#### APPLICATIONS

- Oil-flooded rotary screw and rotary vane compressors processing natural gas, carbon dioxide, or other hydrocarbon gases
- Gas compression applications where resistance to dilution and lubricant carryover are critical
- Cylinder lubricant for reciprocating compressors processing natural gas, carbon dioxide and other process gases which require chemical resistance

## SYNDUSTRIAL® GAS COMPRESSOR OIL

### Synthetic-Blend Natural Gas Compressor Oil

Syndustrial® Gas Compressor Oil is a carefully balanced blend of synthetic ester and hydrotreated paraffinic base oils and select additives to provide optimum deposit control and excellent high temperature oxidation and thermal stability. Its high viscosity and the use of synthetic ester base stocks help combat the problems associated with gas dilution and oil absorption, resulting in better wear protection, extended service intervals and reduced oil consumption.

#### APPLICATIONS

- Crankcase and cylinder lubrication of reciprocating compressors pumping natural gas
- Reciprocating compressors commonly found in remote gas gathering stations



## WET GAS COMPRESSOR OIL

### Compounded Compressor Oil For "Wet" Natural Gas Service

Wet Gas Compressor Oil is a high-quality lubricant developed for the lubrication of oil-flooded rotary compressors and for cylinder lubrication in reciprocating compressors in natural gas service. It is specially formulated to minimize the effects of gas dilution and oil absorption, and to resist wash-off in compressors handling "wet" gas (natural gas containing liquid hydrocarbons and/or water).

#### APPLICATIONS

- Oil-flooded rotary screw, rotary lobe and rotary vane compressors handling wet natural gas
- Industrial reciprocating compressors pumping wet natural gas
- Reciprocating compressors commonly found in remote gas gathering stations

## HYDROCLEAR GAS COMPRESSOR FLUID

### High-Quality Hydrocracked Gas Compressor Fluids

Hydroclear Gas Compressor Fluid is a high-quality lubricant developed to lubricate oil-flooded rotary compressors and the cylinders of reciprocating compressors in natural gas service. Our high-quality hydrocracked base oil, combined with specially tailored additives, provide protection against rust, corrosion, oxidation, wear and foaming needed to produce long and trouble-free service.

#### APPLICATIONS

- Provides excellent service and value in applications for which the compressor outlet pressure is less than 150 psig, the specific gravity of the gas stream is less than 1.0, and the gas outlet temperatures are well above the condensation point of the gas

## SYNDUSTRIAL® R&O OIL

### Synthetic Diester Rust and Oxidation-Inhibited Compressor Oil

Syndustrial® R&O Oil is a synthetic diester lubricant developed for use in reciprocating and some rotary air compressors operating under severe service conditions and in a moisture-free environment. It is recommended for applications where operating conditions may be unfavorable or too severe for conventional mineral oil-based lubricants. It has better oxidation resistance and thermal stability than conventional mineral-oil based lubricants, resulting in fewer deposits and longer service life.

#### APPLICATIONS

- Reciprocating air compressors
- Some rotary compressors operating in dry environments
- Circulating systems requiring a synthetic diester lubricant
- Plain and rolling element bearings operating at very high or very low temperatures
- Industrial equipment operating over a wide temperature range where an inhibited mineral oil is recommended

## MULTIPURPOSE R&O OIL

### Hydrocracked Rust and Oxidation-Inhibited Industrial Oil

Conoco Multipurpose R&O Oil is a rust and oxidation-inhibited industrial oil with ashless wear protection formulated from hydrocracked base stocks. It is specially formulated with proprietary additive chemistry and is recommended for use in a variety of systems which require rust and oxidation-inhibited oils. The added benefit of mild antiwear protection can significantly increase equipment life.

#### APPLICATIONS

- General purpose lubrication, air compressors, steam turbines, hydraulic systems, circulating oil systems, oil-filled couplings, centrifugal pumps and lightly loaded gearboxes

# HIGH MARKS FOR EL MAR® LA4<sup>EXD</sup>

## Enhanced natural gas engine oil shines in field testing.

Field test results prove that El Mar LA4<sup>EXD</sup> is one of the best natural gas engine oils you can put in your hardworking engines. Operate with confidence using the state-of-the-art technology that builds on the proven protective advantages offered by Conoco's heritage of premium-quality gas engine oils.

In field testing, the new El Mar LA4<sup>EXD</sup> formulation outperformed the previous formulation, which in turn had already excelled against a leading competitor at most inspection points in a matching test.

To show the performance enhancements of El Mar LA4<sup>EXD</sup>, we have included the results of our 2001 field test on Caterpillar 3606 engines using El Mar LA4 and a leading competitive oil. In most aspects, El Mar LA4<sup>EXD</sup> outperforms the previous-generation El Mar LA4 and the competitive oil, showing better cleanliness, less deposits, reduced wear and corrosion, and better resistance to oil oxidation.

FIELD TEST RATING SUMMARY				
Deposit Test Results	El Mar LA4 <sup>EXD</sup> 7585 Hours	El Mar LA4 7100 Hours	Competitor Oil 7166 Hours	
Sludge Merit	9.98	9.91	9.77	Higher Better
Piston Tops Demerit	14.8	17.7	19.6	Lower Better
Fireface Demerit	15.9	21	18.8	

General Wear Test Results	El Mar LA4 <sup>EXD</sup> 7585 Hours	El Mar LA4 7100 Hours	Competitor Oil 7166 Hours	
Avg Valve Recession Inches/1000 hrs	0.0003	0.0024	0.0066	Lower Better
Liner Wear - Polishing	0% Polishing, Excellent Condition	3% Polishing, Very Good Condition	3% Polishing, Very Good Condition	

Oil Analysis Results	OEM Max Limit	El Mar LA4 <sup>EXD</sup> 7585 Hours	El Mar LA4 7100 Hours	Competitor Oil 7166 Hours	
Max TAN, D664		1.18	2.4	3.22	Lower Better
Max IR Oxidation, abs/cm	25	11	9	16	
IR Nitration, abs/cm	25	1	10	13	
Max Fe, ppm		6	15	12	
Max Pb, ppm		2	7	11	

## PARTNERS IN PERFORMANCE

### From R&D to dedicated field service, we're here to support you

ConocoPhillips Lubricants has earned a reputation for leading the way in advanced, high-quality products. What you may not know, however, is that our lubricants expertise extends far beyond new product development. Our state-of-the-art research and development facility is just the tip of the iceberg in the way that we work to support you in your daily operations and help improve your overall bottom line. We have a highly trained Technical Service Group available to perform lubrication surveys, engine borescope inspections and thermography surveys, as well as dedicated local Marketers who can service all your lubrication needs.

### Technical Services Group

Our Technical Services Group is the backbone of the products we sell. When you purchase Conoco branded products, you are purchasing a product that has been tested in every application before it is packaged and sold. The Technical Service Group is involved in the field testing of our NGE0 products and knows the application inside and out; they are always available to assist you in maximizing the performance of our products. Contact the Technical Services Group for help in:

- Assisting customers in product selection and application
- Resolving lubricant-related problems as required
- Conducting lube surveys
- Interpreting oil analysis results
- Conducting borescope inspections and thermograph surveys

### ConocoPhillips Lubricants R&D

Located in Ponca City, Oklahoma, the ConocoPhillips Research and Development (R&D) facility occupies 7 laboratories full of state-of-the-art testing and development tools. Our highly trained and well-respected team of researchers provides expertise in all areas of lubricant development and use for ConocoPhillips Lubricants and its customers. R&D works closely with the Lubricants Product Management and Base Oil Sales and Marketing groups to consistently ensure that we produce the highest performing, most robust products. Some of R&D's activities include:

- Developing new and revolutionary products
- Establishing performance, manufacturing, and chemical specifications for all lubricant products
- Handling complex product issues
- Representing ConocoPhillips Lubricants at technical lubricant industrial specification meetings



# ADDITIONAL SERVICES & SUPPORT

## Borescopes Inspections

The source for natural gas engine inspections.

When you need to inspect equipment in hard to reach places, reach for ConocoPhillips' Borescope services. The Borescope is an ideal tool for inspections requiring straight-line access to hidden areas. The borescope instrument uses a compact fiber bundle to illuminate the object of inspection and an optical lens system to transmit the image back to the eyepiece. This is ideal for inspecting components inside the cylinder, the intake and exhaust valves, piston and liners, etc, without a full disassembly. The Borescope is easy to use and ensures a non-destructive inspection solution with minimal set-up.



## Thermography Surveys

Top-notch thermographic services for natural gas needs.

Another valuable service that ConocoPhillips Lubricants offers to its customers is infrared thermography, or infrared imaging. This technology is used for predictive and preventive maintenance (P/PM), to detect bearing, valve and electrical problems before they become apparent with other methods.



## Dedicated Field Service & Support

We have strategically placed field service representatives and technical sales representatives across the country to provide hands on support and training to our customers. They know the natural gas business and will work with your maintenance organization to ensure the lubricant products are applied correctly and are working properly. Our dedicated sales staff always looks for opportunities to help your maintenance staff maximize equipment life and operations continuity.

## Dedicated ConocoPhillips Lubricants Marketers

Our Marketers are lubricant service experts in the natural gas business; they provide a level of service that is rarely found in other industries. They set the lubricant tank and deliver lubricants in the same stop, getting your engine up and running the same day. Our full service programs make sure that you have oil in your equipment 24/7 to continue non-stop gas flow. The natural gas business has become very fluid and our program continues to evolve to meet the highly demanding industry.



## Oil Analysis with AnalysisPlus™

In an environment where equipment is expected to run 24 hours a day, 7 days a week under extreme conditions, downtime caused by equipment failure can quickly put a company out of business. Oil analysis is made easy with ConocoPhillips Lubricants and AnalysisPlus. With testing options to meet your program needs and 12 laboratories conveniently located across North America, AnalysisPlus gives you a snapshot into the condition of both the lubricants you're using and the unit you're monitoring, all the time. Identifying minor problems before they become major failures will save you money and unscheduled downtime and is a timely, cost-effective way for you to maximize equipment reliability and boost company profits.

- Establish efficient drain intervals
- Eliminate downtime
- Increase asset reliability
- Extend equipment life with confidence
- Reduce costs

Oil analysis helps detect equipment failures in progress and assists in finding the root cause of a problem as well, to help aid you in preventing failures and costly losses in production. No matter what the application — on or offshore drilling, field services or oil & gas production — if equipment is down, it's costing you money. Highly contaminated operating environments, extreme operating conditions and the economics of equipment replacement only increase the value of oil analysis as a necessary part of managing asset reliability.



# NGEO RECOMMENDATION GUIDE

MANUFACTURER	ENGINE TYPE	ENGINE MODEL	ASH LEVEL REQUIREMENTS	RECOMMENDED NATURAL GAS ENGINE OIL
Ajax (Cooper Energy Service)	2-stroke cycle	All - Ashless Preferred	Ashless	EI Mar <sup>®</sup> GEO
Caterpillar	4-stroke cycle	3000 series, 399, 398	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
		3600 series	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup>
C.E.S. Superior (Cooper Energy Service)	4-stroke cycle	Naturally Aspirated	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
		Turbocharged	Mid Ash	EI Mar <sup>®</sup> Mid Ash Supreme
		1700 & 2400	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
Clark Brothers (Dresser Ind.)	2-stroke cycle	All	Ashless	EI Mar <sup>®</sup> Ashless Supreme / EI Mar <sup>®</sup> Ashless HD
Cooper Bessemer (Cooper Energy Service)	2-stroke cycle	All - Ashless Preferred	Ashless	EI Mar <sup>®</sup> Ashless Supreme
	4-stroke cycle	All	Low Ash Acceptable	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
Cummins	4-stroke cycle	L10	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
		G, GTA	Mid Ash	EI Mar <sup>®</sup> Mid Ash Supreme
Deutz MWM	4-stroke cycle	Group D	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
Ingersoll-Rand (Dresser Ind.)	4-stroke cycle	Category I, II - III	Approval based on field performance	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
Jenbacher	4-stroke cycle	Leanox	Mid Ash	EI Mar <sup>®</sup> Mid Ash Supreme
		Lambda	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
M.E.P. Fairbanks Morse	2-stroke cycle	All	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
	4-stroke cycle			
MAN	4-stroke cycle	All	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
Perkins	4-stroke cycle	All	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
Wärtsilä	4-stroke cycle	150 SG, 175 SG, 25 SG, 28 SG, 43 SG	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
Waukesha Engine Div (Dresser Ind.)	4-stroke cycle	VSG F11, G, GSI, GSID	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
		F817, F1197	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
		VHP F2895, F3521, L5108, L5790, L7042, P9390,G, GSI, GL	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
		VGf, F-18, H-24, L-36, P-48, G, GL, GLD, GSI	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
		AT 25/27 8L GL, AT 25/27 12L GL, AT 25/27 16V GL	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
		VHP F3524, L5794, L7044, GSI, L5774, L5794 LT	Low Ash	EI Mar <sup>®</sup> LA4 <sup>EXD</sup> / EI Mar <sup>®</sup> Low Ash
		Clinton G2476, L3711, L3712, H2475, F1850, H884	Ashless Preferred	EI Mar <sup>®</sup> Ashless Supreme
<b>SPECIAL APPLICATIONS</b>				
Converted Gasoline Engines	4-stroke cycle	Irrigation Service	Mid Ash	EI Mar <sup>®</sup> Mid Ash HD
Various	4-stroke cycle	Dual Fuel	Mid Ash	EI Mar <sup>®</sup> Mid Ash HD

CONOCO NGE PRODUCT	2-CYCLE	4-CYCLE	LOW ASH	MID ASH	ASHLESS	COMMENTS
EI Mar <sup>®</sup> LA4 <sup>EXD</sup>		•	•			Severe Service Extended Drains
EI Mar <sup>®</sup> Low Ash		•	•			Standard Service OEM Drains
EI Mar <sup>®</sup> 2000	•	•	•			Mild 4-Cycle Service
EI Mar <sup>®</sup> Mid Ash Heavy Duty		•		•		Sour Gas, Dual Fuel, Converted Automotive
EI Mar <sup>®</sup> Mid Ash Supreme		•		•		Sour Gas, Catalyst Compatible
EI Mar <sup>®</sup> Ashless Supreme	•				•	Severe Service Extended Drains
EI Mar <sup>®</sup> Ashless Heavy Duty	•				•	Standard Service OEM Drains
EI Mar <sup>®</sup> GEO	•				•	Non-Dispersant

INDUSTRY CLASSIFICATION			
Sulfated Ash Level	Ash Category	Sulfated Ash Level	Ash Category
Less than 0.1%	Ashless	0.5 - 1.5%	Mid Ash
0.1 - 0.5%	Low Ash	>1.5%	High Ash

For more information, contact your local Conoco Marketer, call **877-445-9198**,  
or visit **[conocophilipslubricants.com](http://conocophilipslubricants.com)**

