

CITGO PACEMAKER® GAS ENGINE OIL 1900 XL SERIES



Date 10/13

DESCRIPTION: CITGO Pacemaker Gas Engine Oil (GEO) 1900 XL series are next-generation, state-of-the-art, premium-performance low ash and low phosphorus products. These engine oils are specifically designed for use in stoichiometric and lean-burn gas engines fueled by natural gas. CITGO Pacemaker GEO 1900 XL series are particularly designed for high-output, 4-cycle natural gas engines operating under severe operating conditions.

PERFORMANCE BENEFITS: Formulated for highly loaded engines, these products are well suited for high nitration conditions typically found in stoichiometric operation.

APPLICATIONS: CITGO Pacemaker GEO 1900 XL series low ash lubricants are recommended in a wide range of engines operating on virtually any variation of natural, synthetic, digester, or landfill gas sources. These next generation products were developed to withstand the most rigorous demands of modern natural gas engines.

Recommended for high and medium speed 4-cycle engines manufactured by:

- Caterpillar
- Waukesha
- Superior
- Jenbacher
- Wärtsilä
- Worthington (low-speed engines)
- Cooper-Bessemer (low-speed engines)
- Cummins
- Dresser-Rand (Categories I, II, III)

CUSTOMER BENEFITS:

- Exceptional resistance to oxidation and nitration—field proven performance shows significantly improved nitration control (see Field Test Results on next page)
- Demonstrate market leading extended drain capability based on extensive field testing
- Extend oil drain intervals (up to two times vs. other premium oils operating in severe conditions) which will reduce lubricant cost, reduce downtime, maximize production and lower operating cost
- Control deposits and minimizes wear of pistons, rings and liners
- Exceptional protection against piston scuffing and ring and liner wear
- Retain TBN to neutralize combustion acids from sour gas
- Minimize valve recession to provide longer head life
- Improve TAN control
- Catalyst compatible

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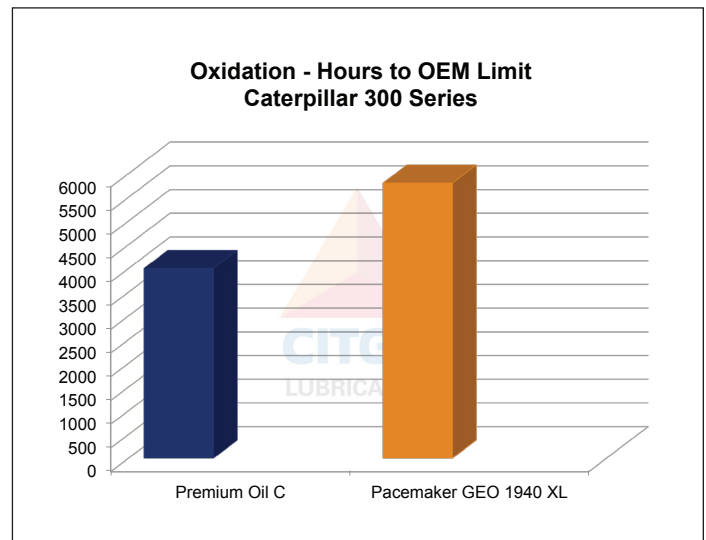
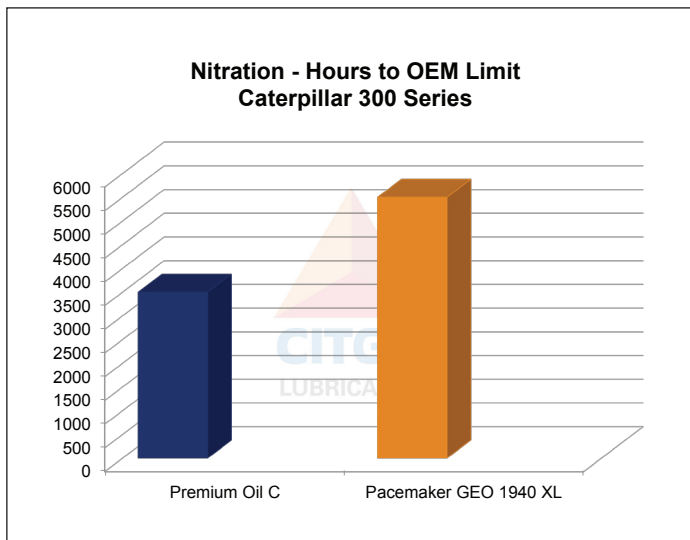
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**CUSTOMER
BENEFITS
(Cont'd.):**

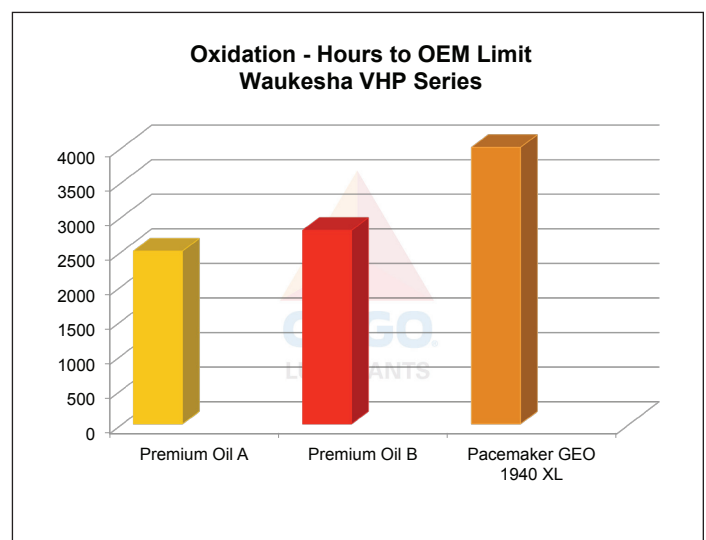
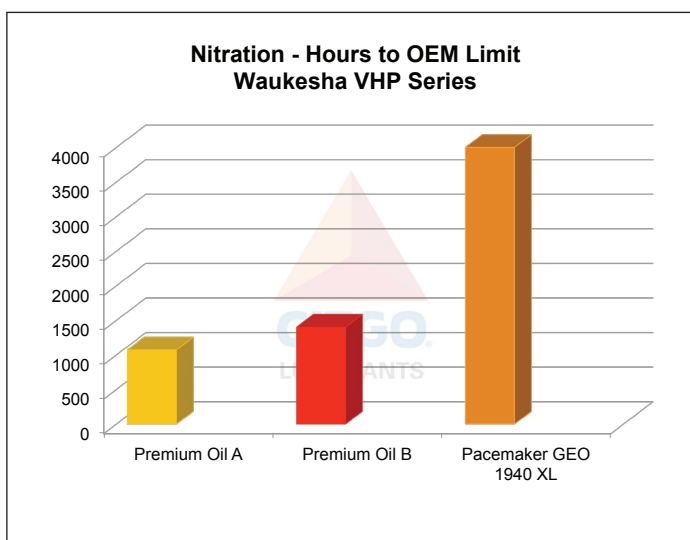
CITGO Severe Service Field Test Results

CITGO Pacemaker GEO 1900 XL Series provide exceptional resistance to oxidation and nitration.

Caterpillar 300 Series and Waukesha VHP Series stoichiometric engines are historically severe in nitration. Test results show CITGO Pacemaker GEO 1940 XL delivered up to 200% longer engine oil life compared to other premium oils.



Caterpillar 300 Series Stoichiometric Engines



Waukesha VHP Series Stoichiometric Engines

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TYPICAL PROPERTIES:

CITGO PACEMAKER® GAS ENGINE OIL 1900 XL SERIES

| Product Name | 1930 XL | 1940 XL | 1940 XL LP |
|---------------------------------------|----------------|----------------|-------------------|
| SAE Grade | 30 | 40 | 40 LP |
| Material Code | 632090001 | 632085001 | 632086001 |
| Gravity, ASTM D 4052, °API | 29.0 | 28.5 | 28.5 |
| Pounds Per Gallon | 7.34 | 7.37 | 7.36 |
| Viscosity, ASTM D 445, cSt at 40°C | 98 | 126.7 | 126 |
| cSt at 100°C | 11.5 | 13.6 | 13.6 |
| Viscosity Index, ASTM D 2270 | 105 | 103 | 104 |
| Pour Point, ASTM D 97, °F (°C) | -33 (-36) | 0 (-18) | -33 (-36) |
| Color, ASTM D 1500 | L5.0 | L5.0 | L5.0 |
| Sulfated Ash, ASTM D 874, m% | 0.5 | 0.5 | 0.5 |
| Total Base No., ASTM D 2896, mg KOH/g | 4.3 | 4.3 | 4.3 |
| Total Acid No., ASTM D 664, mg KOH/g | 0.64 | 0.72 | 0.69 |
| Phosphorus, ppm | 280 | 280 | 280 |