



## SENTRON\* LD 5000 NATURAL GAS ENGINE OIL

### Introduction

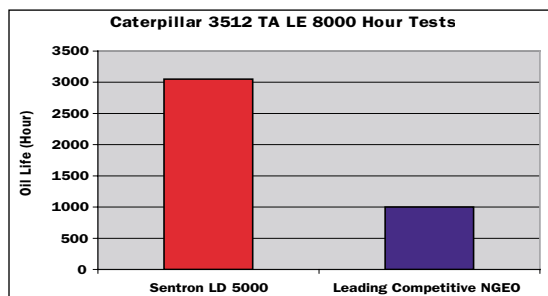
Petro-Canada's SENTRON\* LD 5000 Natural Gas Engine Oil (NGEO) is a revolutionary breakthrough formulation providing greatly extended protection to natural gas engines operating under both regular and severe conditions. SENTRON LD 5000's extended oil life and improved cleanliness over leading competitive NGEO means reduced oil change-outs, longer engine protection, less maintenance costs and used oil to dispose of, and a more efficient and profitable operation.

SENTRON LD 5000 NGEO is formulated with Petro-Canada's ultra pure HT Severely Hydrocracked base oils and breakthrough additive technology to deliver a winning combination of extended oil life and drain intervals, as well as excellent control of engine deposits to provide clean engines. Offering superior protection against wear and corrosion, SENTRON LD 5000 provides worry-free operation, increased engine durability and engine life, which helps customers to reduce overall operating costs.

### Features and Benefits

- **Longest oil life is beyond today's standards in premium performance**
  - 3052 hours of drain interval in a Cat 3500 TA LE engine is dramatically beyond today's standards
  - Exceptional resistance to breakdown caused by oxidation and nitration
  - Extended engine life by reducing varnish, sludge and carbon deposits to maintain optimal engine performance
  - Can reduce downtime by maximizing the time between major engine overhauls

SENTRON LD 5000's oil life is **200%** longer than that of leading competitive product.



\* Used oil life is determined using OEM used oil condemning limits for oxidation, nitration and viscosity increase based on field trials in the same CAT 3512 engine (Sentron LD 5000 did not reach these OEM condemning limits).

- **Keeps engine parts clean**
  - Minimizes piston, ring zone and valve stem deposits, which prolongs time between overhaul life and protects engines longer
  - Prevents excessive combustion chamber ash deposits
  - Improves engine lubrication by maintaining clean oil-ways



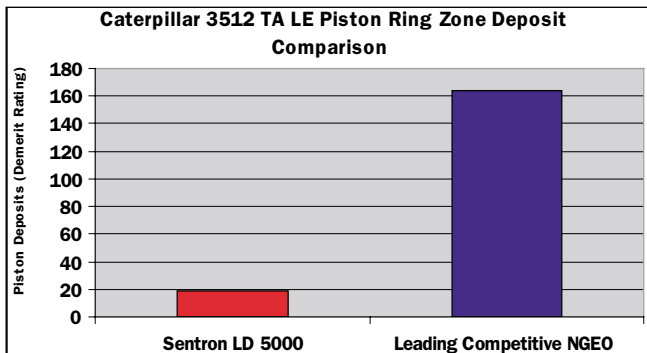
\* Ring-zone condition after 8,824 hours and up to 3,052 hours drain interval.

### What is the HT difference?

Petro-Canada starts with the patented HT purity process to produce water-white, 99.9% pure base oils. The result is a range of lubricants, specialty fluids and greases that deliver maximum performance for our customers.



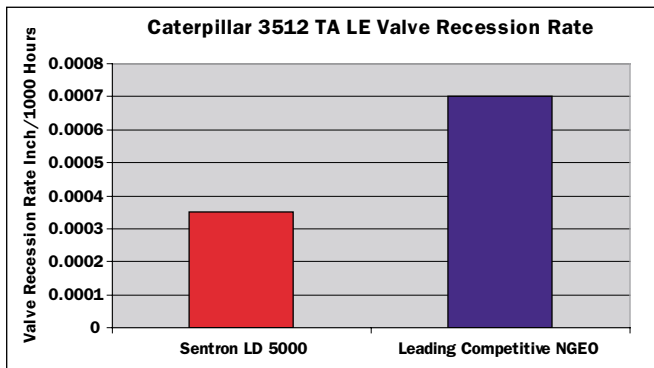
SENTRON LD 5000 is **860%** cleaner than a leading competitive NGEO after 8000 hour field tests in the same Caterpillar 3512 TA LE engine. This can lead to significantly longer overhaul life using SENTRON LD 5000 in place of the leading competitor's NGEO.



\* As measured by CRC (Coordinating Research Council) trained rater.

- Extended drain interval requires less maintenance and brings more savings**
  - Up to 200% longer drain intervals compared to leading competitive NGEOs
  - Reduces downtime to allow maximum production availability
  - Lowers operating costs by reducing maintenance costs
- Outstanding anti-wear/anti-scuff protection**
  - Controls and minimizes valve recession
  - Reduced wear of piston rings, cylinder liners and bearing prolongs engine life

Sentron LD 5000 has **50%** less valve recession than a leading competitive NGEO after 8000 hour field tests in the same Caterpillar 3500 Series engine.



- Extremely low oil volatility**
  - Improves work environment through absence of oil odor
  - Minimizes oil consumption

## Applications

Petro-Canada's SENTRON LD 5000 Natural Gas Engine Oil is recommended for use in Caterpillar, Superior, Waukesha and other turbocharged, naturally aspirated and lean burn engines that require a low ash natural gas engine oil. SENTRON LD 5000 incorporates additives for the extra performance required for severe service applications, including high output, turbocharged engines that encounter high exhaust gas temperatures. With its extremely robust base retention and acid resistance, it is also expected to meet the more severe operational needs of cogeneration (CHP), biogas, sewage gas, coal bed methane and halogen-free landfill gas operations. SENTRON LD 5000 has shown exceptional long-life performance in Caterpillar Series 3500 engines, and is suitable for use in engines fitted with catalytic converters. It can also be used in reciprocating gas compressors where a SAE40 weight oil is recommended.

## Operational Considerations

SENTRON LD 5000 NGEO with extended drain interval and oil life, as well as superior control of engine deposits and wear, provides worry-free operation and reduced cost to customers under normal recommended conditions. In deciding when to change oil, follow the Original Equipment Manufacturer (OEM)'s used-oil condemning limits. These include wear metals trend and/or absolute limits, as well as such common measures of oil deterioration as oxidation, nitration and viscosity.

Prior to the introduction of SENTRON LD 5000, greatly extended oil drain intervals have not been possible in natural gas engines. Thus special care to monitor used oil condition frequently and carefully over at least the first two drains using SENTRON LD 5000 extended drain oils, is recommended. Repeat this after major overhaul, or if load, temperature, or other operating conditions change significantly. For optimum results, conduct a 24-hour flush with SENTRON LD 5000 to remove all the previous normal-life oil. Contamination with large amounts of other used natural gas engine oils will shorten the life of SENTRON LD 5000 extended drain oils. No Nonsense Lubricants Warranty applies.

## Petro-Canada Gas Engine Oils Selection Table

MANUFACTURER	ENGINE TYPE	ENGINE MODEL	MANUFACTURER'S ASH LEVEL REQUIREMENTS	RECOMMENDATION
Ajax (Cooper Energy Service)	2-stroke cycle	All - Ashless preferred	<0.1%	Sentron 541C
Caterpillar	4-stroke cycle	3000 Series etc.	0.4% min - 0.6% max	Sentron 445, MG440, 470, LD4000, LD5000
C.E.S. Superior (Cooper Energy Service)	4-stroke cycle	All except 1700 and 2400	0.5% -1.0%	Sentron 840, CG40, 470, LD5000
	4-stroke cycle	1700 & 2400	0.4% - 0.6%	Sentron 445, MG440, 470, LD4000, LD5000
Clark Brothers (Dresser Ind.)	2-stroke cycle	All	Ashless Low Ash Acceptable	Sentron 541C Sentron 445, MG440, 470, LD4000, LD5000
Cooper Bessemer (Cooper Energy Service)	2-stroke cycle	All - Ashless preferred	<0.1%	Sentron 541C
	4-stroke cycle	All	Low Ash Acceptable	Sentron 445, MG440, 470, LD4000, LD5000
Cummins	4-stroke cycle	L10	<0.5%	Sentron MG440
	4-stroke cycle	G, GTA	0.85% max	Sentron 445, MG440, 840, 470, LD4000, LD5000
Deutz MWM	4-stroke cycle	Group D Group F	0.5% max 0.5% - 0.75%	Sentron 445, MG440, 470, LD4000 Sentron 840
Guascor	4-stroke cycle	All	0.9% max	Sentron 445, 840, CG40, LD4000, LD5000, MG440, 470
Iveco	4-stroke cycle	All	0.45% max	Sentron 445, MG440
Ingersoll-Rand (Dresser Ind.)	4-stroke cycle	Category I	Approval based on field performance	Sentron 541C Sentron 445, MG440, LD4000, LD5000
	4-stroke cycle	Category II - III	Approval based on field performance	Sentron 445, CG40, MG440, 470, LD4000, LD5000
Jenbacher	4-stroke cycle	Leanox	0.6% min - 1.0% max	Sentron CG 40, LD5000
	4-stroke cycle	Lambda I and All Leanox	0.5%	Sentron 445, 470, LD4000
M.E.P., Fairbanks Morse	2-stroke cycle 4-stroke cycle	All	0.2 % - 0.5%	Sentron 445, MG440, 470, LD4000
MAN	4-stroke cycle	All	0.4% - 0.7%	Sentron 445, MG440, 470, LD4000, LD5000
Perkins	4-stroke cycle	All	0.5% min - 1.0% max	Sentron 840, CG 40, 470, LD4000, LD5000
Ulstein Bergen	4-stroke cycle	All	0.5% max	Sentron 445, MG440, 470, LD4000
Wartsila	4-stroke cycle	150 SG, 175 SG 25 SG, 28 SG, 34 SG	0.3% min - 0.6% max	Sentron 445, MG440, 470, LD4000, LD5000
Waukesha Engine Div. (Dresser Ind.)	4-stroke cycle	VSG F11, G, GSI, GSID	0.35% - 1.0%	Sentron 445, 840, CG40, LD4000, LD5000 MG440, 470
	4-stroke cycle	F817, F1197	0.35% - 1.0%	Sentron 445, 840, CG40, LD4000, LD5000 MG440, 470
	4-stroke cycle	Clinton G2476, L3711, L3712, H2475, F1850, H884	Ashless preferred	Sentron 541C, 445, MG440, 470, LD4000, LD5000
	4-stroke cycle	VHP F2895, F3521, L5108, L5790, L7042, P9390 G, GSI, GL	0.35% - 1.0% <sup>1</sup>	Primary Sentron 445, CG40, LD4000, LD5000 MG440, 470 Secondary - Sentron 840
	4-stroke cycle	VGF, F-18, H-24, L-36,  P-48, GSI, GSID	0.35% - 0.5% <sup>1</sup>	Primary - Sentron 445, MG440, 470, LD4000  Secondary - Sentron 840
	4-stroke cycle	VGF, F-18, H-24, L-36, P-48, G, GL, GLD	0.45% - 0.75% <sup>1</sup>	Sentron 445, MG440, 470, LD4000
	4-stroke cycle	AT 25/27 8L GL AT 25/27 12L GL AT 25/27 16V GL	0.35% - 1.0% <sup>1</sup>	Primary - Sentron 445, CG40, LD4000, LD5000 MG 440, 470 Secondary - Sentron 840
	4-stroke cycle	VHP F3524, L5794, L7044,  GSI, L5774, L5794 LT	0.45% - 0.75% <sup>1</sup>	Primary - Sentron 445, MG440, 470, LD4000, LD5000 Secondary - Sentron 840

<sup>1</sup>0.1% Zn max. is recommended

## Typical Performance Data

PROPERTY	ASTM TEST METHOD	SETRON LD 5000
Ash Type		Low Ash
Sulphated Ash, % wt	D874	0.57
SAE Grade		40
Flash Point, COC, °C °F	D92	272 522
Kinematic Viscosity cSt @ 40°C cSt @ 100°C SUV @ 100°F SUV @ 210°F	D445	124 13.4 575 71
Pour Point, °C °F	D97	-30 -22
Total Acid Number	D664	1.1
Total Base Number	D2896	4.9

The values quoted above are typical of normal production. They do not constitute a specification.

## Health and Safety

Petro-Canada SETRON LD 5000 has no adverse affect on health provided it is used as directed. To obtain Material Safety Data Sheets (MSDS), contact one of our TechData Info Lines.

## TechData Info Lines

If you would like to know more about Petro-Canada SETRON LD 5000, or any other product in our complete line of quality lubricants, please contact us at:

**Petro-Canada  
Lubricants Centre**  
385 Southdown Road  
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