

## SENTRON™ NATURAL GAS ENGINE OILS



### Introduction

Petro-Canada SENTRON™ natural gas engine oils (NGEO) are premium performance, long life engine oils specially formulated to lubricate natural gas engines and compressors. SENTRON's extended drain intervals can mean lower maintenance costs, less used oil to dispose of and a more efficient and profitable operation.

SENTRON's exceptional performance is especially important in the severe service conditions common in compression, power generation and combined heat and power applications. Its outstanding anti-wear protection helps to minimize polish and wear of cylinder liners and wear of piston rings, while helping to reduce carbon build-up.

That can mean:

- Longer service intervals
- Cleaner engines with less wear
- Less downtime
- Less backfiring
- Fewer service calls

SENTRON natural gas engine oils are formulated with Petro-Canada's ultra pure HT Severely Hydrotreated base oils and highly advanced additive technology to help deliver a combination of extended oil life, extended drain intervals and excellent control of engine deposits. Offering exceptional protection against wear and corrosion, SENTRON helps provide worry-free operation, increased engine durability and engine life, which can lead to a reduction in overall operating costs.

SENTRON natural gas engine oils span the typical levels of sulphated ash and SAE viscosity grades required by gas engine manufacturers. Moreover, they have a proven track record of successful use under a wide range of operating conditions.

### Features and Benefits

- **Longer oil life provides long-lasting equipment protection**
  - Exceptional resistance to breakdown caused by oxidation and nitration.
  - Helps extend engine life by reducing varnish, sludge and carbon deposits.
  - Helps improve engine performance.
- **Extended drain interval can reduce maintenance and provide savings**
  - SENTRON LD 8000 can extend oil drain intervals in Caterpillar engines by providing up to 300%\* increase in oil life when compared to leading competitive conventional NGEOs. The extended drain interval helps to:
    - Reduce downtime and maximize production availability.
    - Lower operating costs by reducing maintenance costs.
- **Outstanding anti-wear/anti-scuff protection helps to:**
  - Control and minimize valve recession.
  - Reduce wear on piston rings, cylinder liners and bearings, prolonging engine life.
  - Reduce operating and maintenance costs.
- **Keeps engine parts clean by:**
  - Minimizing ring zone and valve stem deposits.
  - Minimizing port blockage in 2-cycle gas engines.
  - Improving engine lubrication by maintaining clean oil-ways.
  - Maximizing the time between major engine overhauls.
  - Preventing corrosion.
- **Extremely low oil volatility helps to:**
  - Improve work environment through absence of oil odour.
  - Minimize oil consumption.

#### What is the HT difference?

Petro-Canada starts with the 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.



\*Performance results may vary due to factors such as, but not limited to, engine optimization, load, fuel gas quality, proper maintenance, type of engine and application.

## Applications

Petro-Canada SENTRON natural gas engine oils are premium performance engine oils specially formulated to lubricate large natural gas engines and their integrated compressors, running on natural gas. Specific SENTRON oils also meet the more severe operational needs of co-generation, biogas, sewage gas, coal bed methane and halogen landfill gas operations. SENTRON NGEOs can be used in reciprocating compressor crankcases where an OEM allows an SAE 40 oil. SENTRON can also be used in compressor lubricators.

| Industry Classification |                        | Petro-Canada<br>SENTRON<br>Natural Gas Engine Oils  |
|-------------------------|------------------------|---|
| Ash Category            | Ash Content (wt % ash) |   |
| Ashless                 | <0.1                   | SENTRON ASHLESS 40  |
| Low Ash                 | 0.1-0.6                | SENTRON LD 8000<br>SENTRON LD 5000<br>SENTRON LD 3000<br>SENTRON 590<br>SENTRON CG 40 PLUS<br>SENTRON VTP 10W-40<br>SENTRON VTP 0W-30<br>SENTRON LD SYNTHETIC BLEND |
| Medium Ash              | 0.6-1.0                | SENTRON CG 40<br>SENTRON MID ASH 40   |

SENTRON natural gas engine oils cover the three main levels of sulphated ash required by natural gas engine manufacturers:

Please check with your Petro-Canada Technical Services Advisor for suitability.

### Ashless

**SENTRON ASHLESS 40** (0.05% wt ash) is recommended primarily for 2-stroke cycle gas engines but may be used in certain 4-stroke cycle gas engines. SENTRON ASHLESS 40 minimizes combustion chamber and spark plug deposits.

### Low Ash

**SENTRON LD 8000** (0.52% wt ash) is a premium low ash SAE 40 lubricant, suitable for use in 4-stroke engines operating on natural pipeline gas, pre-treated sewage/bio-gas and selective pre-treated process gases. It provides revolutionary performance of up to 300%\* longer drain intervals over the leading global conventional competitor. SENTRON LD 8000 contains a specialized additive mix that provides greater TBN retention to help neutralize acids that can attack liner surfaces. SENTRON LD 8000 helps prevent deposits from ash and worn metal parts – deposits that could otherwise result in higher oil consumption.

**SENTRON LD 5000** (0.60% wt ash) provides excellent performance for up to 200%\* longer drain intervals and exceptional overall engine protection for maximum reliability and savings. Petro-Canada recommends its use in Caterpillar, GE (Jenbacher/Waukesha) and many turbocharged or naturally aspirated, stoichiometric or lean burn engines that require a low ash natural gas engine oil. SENTRON LD 5000 helps provide reduced valve recession and controls wear of piston rings, cylinder liners and bearings for prolonged engine life vs. competitive oils.

**SENTRON LD 3000** (0.47% wt ash) is recommended for most 4-stroke and some 2-stroke gas engines. It is suitable for use in engines fitted with catalytic converters. SENTRON LD 3000 helps provide a high level of performance in high output

turbocharged engines that prefer a low ash oil. It provides excellent control of engine deposits, even when there is a need for added high temperature deposit control. It is suitable for severe service applications including high output, turbocharged engines that encounter high exhaust gas temperatures. The result can be significantly less valve sticking for reduced backfiring in these severe applications.

**SENTRON 590** (0.59% wt ash) is recommended for selected 4-stroke gas engines. It is suitable for use in engines fitted with catalytic converters. SENTRON 590 provides a high level of performance in high output turbocharged engines that prefer a low ash oil. It helps provide excellent control of engine deposits, and is specially formulated for engines that operate in severe nitrating conditions. Combined with Petro-Canada's engine optimization recommendations, and in severe nitrating conditions, SENTRON 590 can deliver up to 200%\* longer drain intervals.

**SENTRON CG 40 PLUS** (0.52% wt ash) is a uniquely designed low ash formula for 4-stroke gas engines running in severe service landfill gas operations. It provides excellent control of deposits and other issues caused by high halogen gas levels produced by landfills. Unlike conventional landfill / biogas / sewer gas engine oils, SENTRON CG 40 PLUS is specifically designed to address current and future engines running in this severe contaminated gas application where higher BMEP engines are used.

**SENTRON VTP 10W-40** (0.54% wt ash) is specially formulated to meet the demands of stationary natural gas engines for exceptional cleanliness of the engine through all seasons. It is recommended for use in natural gas fuelled engines that require high zinc for improved valve train wear while providing excellent cold start capability. SENTRON VTP 10W-40 is suitable for use in applications where Cummins CES20074-2012 is specified.

**SENTRON VTP 0W-30** (0.58% wt ash) is a low ash, synthetic blend NGEo formulated specifically as an all season solution for small to mid-sized engines that are difficult to start in severe winter conditions. With a Pour Point of -45°C SENTRON VTP 0W-30 helps provide exceptional performance in extreme winter conditions, presenting opportunities for inventory consolidation. Its excellent cleanliness and control of valve stem deposits offer potential for less downtime and longer service life.

**SENTRON LD SYNTHETIC BLEND** (0.51% wt ash) is a 15W-40 multigrade extension of the SENTRON line, formulated as a synthetic blend to extend drain intervals and give better low temperature performance in comparison to mono-grade SAE 40's. SENTRON LD SYNTHETIC BLEND has low temperature starting capabilities down to -20°C. Field trial results have shown outstanding piston cleanliness which may result in longer equipment life and less downtime.

### Medium Ash

**SENTRON MID ASH 40** (0.80% wt ash) is recommended for use in high performance, 4-stroke cycle gas engines requiring a medium ash content.

**SENTRON CG 40** (0.93% wt ash) is designed specifically for 4-stroke cycle gas engines running in severe service such as co-generation, sewage or sour gas or low halogen landfill gas operations. SENTRON CG 40 gives exceptional performance in turbocharged, naturally aspirated rich and lean burn gas engines as well. As it contains low levels of phosphorus and zinc, it may be suitable for use in engines equipped with certain catalytic converters.

\*Performance results may vary due to factors such as, but not limited to, engine optimization, load, fuel gas quality, proper maintenance, type of engine and application.

## Petro-Canada Gas Engine Oils Selection Table\*

| MANUFACTURER                               | ENGINE TYPE    | FUEL GAS               | ENGINE Model  | MANUFACTURER'S ASH LEVEL REQUIREMENTS | RECOMMENDATIONS  |
|--|----------------|------------------------|---|---------------------------------------|--|
| 2G   | 4-stroke cycle | natural                | All   | 0.4% to 0.6%                          | SENTRON LD 5000, LD 8000   |
| Ajax<br>(Cooper Energy Service)            | 2-stroke cycle | natural                | All - Ashless preferred                                 | <0.1%                                 | SENTRON ASHLESS 40   |
| BU Drive                                   | 4-stroke cycle | natural                | All   | n/a                                   | SENTRON LD 5000, LD 8000   |
|  |                | biogas                 | All   | n/a                                   | SENTRON LD 5000, LD 8000, CG 40 PLUS                                   |
| Caterpillar                                | 4-stroke cycle | natural                | G3300, G3400, G3500, G3600                              | 0.4% - 0.6%                           | SENTRON LD 3000, 590, LD 5000, LD 8000, LD SYNTHETIC BLEND             |
|  |                | biogas                 | All   | 0.4% - 0.6%                           | SENTRON LD 5000, LD 8000, CG 40 PLUS                                   |
| Caterpillar Power Systems<br>(MWM)         | 4-stroke cycle | natural                | All   | 0.6% max                              | SENTRON LD 5000, LD 3000, LD 8000                                      |
|  |                | biogas                 | All   | 0.6% - 1.0%                           | SENTRON CG 40, CG 40 PLUS  |
| Clark Brothers<br>(Dresser Rand)           | 2-stroke cycle | natural                | All   | Ashless                               | SENTRON ASHLESS 40   |
|  |                |                        |   | Low Ash acceptable                    | SENTRON LD 3000, LD 8000   |
| Cooper Bessemer<br>(Cooper Energy Service) | 2-stroke cycle | natural                | All - Ashless preferred                                 | <0.1%                                 | SENTRON ASHLESS 40   |
|  | 4-stroke cycle | natural                | All   | Low Ash acceptable                    | SENTRON LD 3000, 590, LD 5000, LD 8000                                 |
| Cummins                                    | 4-stroke cycle | natural                | LG10G, QSK19G, K19G, G19, G38, G50, G28, G855, G14      | <0.6%                                 | SENTRON LD 5000, LD 8000, LD SYNTHETIC BLEND                           |
|  |                | natural                | B, C, G5.9, G8.3  | Suitable for CES 20074                | SENTRON VTP 10W-40   |
|  |                | natural                | All QSV, QSK except 19G                                 | 0.4% - 0.6%                           | SENTRON LD 3000, LD 5000, LD 8000                                      |
| Detroit Diesel                             | 4-stroke cycle | natural                | 50G and 60G   | <0.8%                                 | SENTRON LD SYNTHETIC BLEND   |
| Dresser Rand (Guascor)                     | 4-stroke cycle | natural                | All   | 0.9% max                              | SENTRON LD 3000, LD 5000, LD 8000, 590, LD SYNTHETIC BLEND             |
| Ingersoll-Rand<br>(Dresser Ind.)           | 4-stroke cycle | natural                | Category I  | Approval based on field performance   | SENTRON ASHLESS 40, LD 3000, LD 5000, LD 8000, LD SYNTHETIC BLEND      |
|  |                | natural                | Category II - III                                       | Approval based on field performance   | SENTRON LD 3000, LD 5000, LD 8000, LD SYNTHETIC BLEND                  |
| GE Jenbacher                               | 4-stroke cycle | Class A                | 2&3   | 0.4% - 0.6%                           | SENTRON LD 5000, LD 3000, LD 8000                                      |
|  |                | Class A                | 4 (B version or lower) & 6 (E version or older) & 9     | 0.4% - 0.6%                           | SENTRON LD 5000, LD 3000, LD 8000                                      |
|  |                | Class A                | 6F (or newer) 4 (C version or higher)                   | 0.4% - 0.6%                           | SENTRON LD 5000, LD 8000   |
|  |                | Class B                | 2&3   | 0.4% - 0.6%                           | SENTRON CG 40, CG 40 PLUS  |
|  |                | Class B                | 4 & 6 (E version or older)                              | 0.4% - 0.6%                           | SENTRON LD 5000, LD 3000, LD 8000, CG 40 PLUS                          |
|  |                | Class C                | 2&3   | 0.4% - 0.6%                           | SENTRON CG 40, CG 40 PLUS  |
|  |                | Class C                | 4 & 6 (E version or older)                              | 0.4% - 0.6%                           | SENTRON CG 40 PLUS   |
| GE Oil and Gas (Superior)                  | 4-stroke cycle | natural                | All except 1700 & 2400                                  | 0.4% - 1.0%                           | SENTRON LD 3000, CG 40, LD 5000, LD 8000, 590                          |
|  |                | natural                | 1700 & 2400 Series                                      | 0.4% - 0.6%                           | SENTRON LD 3000, LD 5000, 590, LD 8000                                 |
| GE (Waukesha Engine Div.)                  | 4-stroke cycle | natural / biogas       | VSG F11, G, GSI, GSID                                   | 0.35% - 1.0%                          | SENTRON LD 3000, CG 40, LD 5000, LD 8000, 590, LD SYNTHETIC BLEND      |
|  |                | natural / biogas       | F817, F1197   | 0.35% - 1.0%                          | SENTRON LD 3000, CG 40, LD SYNTHETIC BLEND, LD 5000, LD 8000, 590      |
|  |                | natural                | Clinton, G2476, L3711, F1850, H884                      | Ashless preferred                     | SENTRON ASHLESS 40   |
|  |                | natural / biogas       | VHP F2895, F3521, L5108, L5790, L7042, P9390, G, GSI    | 0.35% - 1.0%                          | SENTRON LD 3000, CG 40 PLUS, LD 5000, LD 8000, 590, LD SYNTHETIC BLEND |
|  |                | natural                | VHP GL  | 0.35% - 1.0% <sup>1</sup>             | SENTRON LD SYNTHETIC BLEND, LD 5000 <sup>2</sup> , LD 3000, LD 8000    |
|  |                | natural                | VGf, F-18, H-24, L-36, P-48, GSI, GSID                  | 0.35% - 0.5% <sup>1</sup>             | SENTRON LD 3000, LD SYNTHETIC BLEND                                    |
|  |                | natural                | VGf, F-18, H-24, L-36, P-48, G, GL, GLD                 | 0.45% - 0.75% <sup>1</sup>            | SENTRON LD 3000, LD 5000, LD 8000, 590, LD SYNTHETIC BLEND             |
|  |                | natural                | AT 25/27GL Series                                       | 0.35% - 1.0% <sup>1</sup>             | SENTRON LD 3000, CG 40, LD 5000, LD 8000, 590, LD SYNTHETIC BLEND      |
|  |                | natural                | VHP F3524, L5794, L7044, GSI, L5774, LT (4 series)      | 0.45% - 0.75% <sup>1</sup>            | SENTRON LD 3000, LD 5000, LD 8000, 590, LD SYNTHETIC BLEND             |
|  |                | natural                | 16V150LTD, 220GL, 275 GL                                | 0.40% - 0.55%                         | SENTRON LD 3000, LD 5000, LD 8000                                      |
| GM, Ford                                   | 4-stroke cycle | natural                | 350   | n/a                                   | SENTRON VTP 10W-40, VTP OW-30  |
| Iveco                                      | 4-stroke cycle | natural                | All   | 0.45% max                             | SENTRON LD 3000  |
| MAN  | 4-stroke cycle | natural                | All   | 0.4% - 0.7%                           | SENTRON LD 3000, LD 5000, LD 8000, 590, LD SYNTHETIC BLEND             |
|  |                | biogas                 | All   | 0.4% - 1.0%                           | SENTRON CG 40, CG 40 PLUS  |
| M.E.P, Fairbanks Morse                     | 2-stroke cycle | natural                | All   | 0.2% - 0.5%                           | SENTRON LD 3000, LD 5000, LD 8000, LD SYNTHETIC BLEND                  |
|  | 4-stroke cycle | natural                |   |                                       |  |
| MHI  | 4-stroke cycle | natural / biogas       | All   | 0.4% - 0.6%                           | SENTRON LD 5000, LD 8000, CG 40 PLUS                                   |
| MTU  | 4-stroke cycle | natural                | MTU 400/4000  | 0.4% - 0.6%                           | SENTRON LD 5000, LD 8000   |
|  |                | biogas                 | MTU 400/4000  | 0.4% - 1.0%                           | SENTRON CG 40, CG 40 PLUS  |
| Perkins                                    | 4-stroke cycle | natural / biogas       | All   | 0.5% min - 1.0% max                   | SENTRON LD 3000, LD 5000, LD 8000, 590, CG 40 PLUS                     |
| RRMEB                                      | 4-stroke cycle | natural                | All   | 0.4% - 0.6%                           | SENTRON LD 3000, LD 5000, LD 8000                                      |
| Schnell                                    | 4-stroke cycle | natural / biogas       | All   | 0.4% - 0.6%                           | SENTRON LD 5000, LD 8000, CG 40 PLUS                                   |
| TEDOM                                      | 4-stroke cycle | natural                | All   | 0.4% - 1.0%                           | SENTRON LD 5000, LD 8000   |
|  |                | biogas                 | All   | 0.4% - 1.0%                           | SENTRON CG 40, CG 40 PLUS  |
| Wärtsilä                                   | 4-stroke cycle | natural & periodic LFO | 150SG, 175SG, 220SG, 25SG, 28SG, 34SG, 32DF, 34DF, 50DF | 0.6% max                              | SENTRON LD 3000, LD 5000, LD 8000, 590                                 |

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

<sup>2</sup> SENTRON LD 5000 should only be used in high load applications when using VHP GL Type engine

\* The above table can be used as a guideline for product selection. Each natural gas engine can have unique characteristics and variations in operating parameters, and therefore, it is recommended to consult with Petro-Canada Technical Services Advisor to ensure the most appropriate lubricant selection is made

## Operational Considerations

SETRON natural gas engine oils with extended drain interval and oil life as well as excellent control of engine deposits and wear help provide worry-free operation and reduced cost to customers under normal recommended conditions. However,

actual oil life is dependent upon system design and operating practices, and should be established by used oil analysis, according to engine manufacturers' recommendations. Petro-Canada's No-Nonsense Lubricants Warranty applies.

## Typical Performance Data

| PROPERTY   | ASTM TEST METHOD | PETRO-CANADA NATURAL GAS ENGINE OILS |                      |                      |                      |                      |                           |                        |                       |                      |                      |                      |         |
|--|------------------|--------------------------------------|----------------------|----------------------|----------------------|----------------------|---------------------------|------------------------|-----------------------|----------------------|----------------------|----------------------|---------|
|  |                  | SETRON MID ASH 40                    | SETRON CG 40         | SETRON LD 8000       | SETRON LD 5000       | SETRON LD 3000       | SETRON LD SYNTHETIC BLEND | SETRON VTP 10W-40      | SETRON VTP 0W-30      | SETRON 590           | SETRON CG 40 PLUS    | SETRON ASHLESS 40    |         |
| Ash Type   | -                | Medium Ash                           | Medium Ash           | Low Ash              | Low Ash              | Low Ash              | Low Ash                   | Low Ash                | Low Ash               | Low Ash              | Low Ash              | Low Ash              | Ashless |
| Sulphated Ash, % wt  | D874             | 0.80                                 | 0.93                 | 0.52                 | 0.60                 | 0.47                 | 0.51                      | 0.54                   | 0.58                  | 0.59                 | 0.52                 | 0.05                 |         |
| SAE Grade  | -                | 40                                   | 40                   | 40                   | 40                   | 40                   | 15W-40                    | 10W-40                 | 0W-30                 | 40                   | 40                   | 40                   |         |
| Flash Point, COC, °C / °F  | D92              | 269/516                              | 273/524              | 277/531              | 272/522              | 273/524              | 247/477                   | 245/473                | 239/462               | 277/531              | 283/541              | 279/534              |         |
| Kinematic Viscosity<br>cSt @ 40°C/SUS @ 100°F<br>cSt @ 100°C/SUS @ 210°F | D445             | 126/657<br>13.9/75.2                 | 123/641<br>13.6/74.0 | 121/631<br>13.4/73.2 | 124/575<br>13.5/73.5 | 124/647<br>13.7/74.4 | 106/491<br>15.6/79.6      | 101/542.4<br>15.1/81.9 | 61.7/313<br>11.2/64.4 | 121/631<br>13.5/73.6 | 118/614<br>13.4/73.2 | 125/652<br>13.7/74.4 |         |
| Pour Point, °C / °F  | D5950            | -33/-27                              | -27/-17              | -30/-22              | -36/-33              | -27/-17              | -42/-44                   | -42/-44                | -42/-44               | -30/-22              | -27/-17              | -27/-17              |         |
| Acid Number (AN),<br>mg KOH / g  | D664             | 2.0                                  | 0.6                  | 0.9                  | 1.1                  | 0.9                  | 1.0                       | 1.9                    | 1.8                   | 1.0                  | 1.5                  | 0.7                  |         |
| Base Number (BN),<br>mg KOH / g  | D2896            | 6.9                                  | 8.1                  | 4.6                  | 4.9                  | 3.9                  | 4.7                       | 3.9                    | 4.8                   | 6.0                  | 4.5                  | 1.6                  |         |

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

## Health and Safety

To obtain Material Safety Data Sheets (MSDS), contact one of Petro-Canada's TechData info Lines.



## TechData Info Lines

If you are an **existing customer** looking to place an order, please call a Customer Order Management Representative at:

**Canada (English)** . . . . . Phone 1-800-268-5850  
**(French)** . . . . . Phone 1-800-576-1686  
**United States** . . . . . Phone 1-877-730-2369  
**Latin America/Europe/Asia** . . . . . Phone +1-866-957-4444

If you would like to **become a Petro-Canada lubricants customer** and require more information about specialty fluids, oils and greases that can help maximize your equipment performance, savings and productivity, please contact us at:

**North America** . . . . . Phone 1-866-335-3369  
**Europe** . . . . . Phone +44 (0) 121-781-7264  
**Germany** . . . . . Phone 0800-589-4751  
**China** . . . . . Phone +86 (21) 6362-0066

You can also e-mail us at [lubecsr@suncor.com](mailto:lubecsr@suncor.com)

Visit us on the web at [lubricants.petro-canada.com](http://lubricants.petro-canada.com)

