Lubricants for Gas cogeneration engines
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Introduction

When you choose Repsol Lubricants, you get so much more. Because in addition to a product of the highest quality, you also get the Repsol guarantee: an integrated global energy company which carries out exploration, production, refining, distribution and marketing activities in more than 90 countries. It provides millions of people and companies all over the world with the most efficient, responsible and innovative energy solutions.

And you also choose the maximum innovation. Because at Repsol we have our research center Repsol Technology Lab. at the forefront of R&D&I worldwide, where our technicians and researchers are constantly striving to improve every product, ensuring maximum efficiency and enhanced technical and environmental quality.

Maximum quality

In this sector, gas-fuelled engines are used for electricity generation and cogeneration (simultaneously generating electrical energy and useful thermal energy which is used to generate steam, hot domestic water, etc.). The use of gases from different processes (biogas, landfill gas, purifier gas and other types of non-conventional gases) results in significant savings in the operating costs of these types of engines, as well as an environmental solution for the process.

The Repsol range of oils for gas-fuelled engines meets market needs by adapting to the demands of each type of customer according to their engine, type of gas and application. These products have been approved for use in the engines of leading manufacturers [MWM Deutz, Jenbacher, MAN, Rolls Royce, Wärtsilä and Cummins] and also meet the technical requirements of Caterpillar and Waukesha, among others.

Repsol markets lubricants used in other energy generation machinery, such as turbines (water, steam and gas) and diesel/petrol engines. For further information please see our catalogues at www.repsol.com.
1. Lubricants for gas-fuelled
cogeneration engines

**REPSOL SUPER LONG LIFE GAS 4005**

State-of-the-art lubricant oil designed especially for stationary
gas-fuelled engines which require extremely long oil change
intervals. This product is formulated using base oils which are
more highly refined than conventional oils. It also incorporates
innovative additive technology, giving it excellent performance,
extremely high resistance to oxidation and optimum TBN
retention. This means that oil change intervals can be increased
more than in other products designed for similar applications.

**Quality level**
- WÄRTSILÄ [approved]
- CATERPILLAR [field test]
- WAUKESHA [approval in process]
REPSOL LONG LIFE GAS 4005

Extremely long-lasting lubricant oil which incorporates hydrogenated base oils and state-of-the-art additives that allow oil change intervals to be increased in comparison with mineral oils. Suitable for modern stationary engines fuelled by gas which require the use of oil with a maximum ash content of 0.5%.

Its balanced formulation means that its resistance to the oxidation and nitration present in these types of engines, which operate under severe conditions, is better than that of conventional lubricants. In applications where the gas used as fuel is biogas or any other type of gas, the useful life of the lubricant will depend on the contaminant level of the gas in question.

Quality level

- JENBACHER 1000-1109 [approved]
- MWM DEUTZ [approved]
- MAN Diesel & Turbo medium-speed engines [approved]
- CUMMINS [approved]
- MAN 3271-2
- WAUKESHA
- CATERPILLAR
- WÄRTSILÄ

REPSOL LONG LIFE BIOGAS 4005

Extremely long-lasting lubricant oil specifically developed for stationary engines which run on landfill gas, biogas and process gas (with a low methane content and a high concentration of corrosive gases). Its formula incorporates highly-refined base oils which ensure that the lubricant is long-lasting in severe operating conditions with landfill gases. The product specifications have been verified with state-of-the-art engines operating at full load.

Quality level

- JENBACHER TA 1000-1109 [approved] for type B and C gases

REPSOL SYNTHEtIC MOTOR GAS 404

REPSOL SYNTHEtIC MOTOR GAS 404 lubricant oil is designed to lubricate engines using special or enriched gases, where combustion may be highly sensitive to ash or deposits in valves and pistons.

Quality level

- JENBACHER 1000-1109 [approved] for special gases

REPSOL SUPER MOTOR GAS 4005

Extremely long-lasting mineral lubricant oil especially designed to meet the lubrication requirements of modern stationary engines fuelled by natural gas. Its formulation has a maximum ash content of 0.5%, minimising deposit formation and guaranteeing maximum performance and uptime. It enables longer oil change intervals, thereby minimising maintenance costs.

Quality level

- JENBACHER 1000-1109 [approved]
- MWM DEUTZ [approved]
- ROLLS ROYCE BERGEN K-G1/K-G2/K-G3
- CATERPILLAR
- WÄRTSILÄ
- WAUKESHA
- GUASCOR
**Mineral lubricant oil for naturally aspirated and turbocharged stationary gas-fuelled engines. Suitable for a wide range of gases, such as natural gas, biogas, landfill gas, process gas and other gases with a higher sulphur content than natural gas (check with manufacturer).**

It has been especially formulated for applications in which manufacturers require a product with a high alkaline reserve and medium ash content.

**Quality level**
- **REPSOL EXTRA GAS 40**
  - GUASCOR (approved)
  - MWM DEUTZ (approved)

**REPSOL MOTOR GAS HTM 40**

Mineral lubricant oil for naturally aspirated and turbocharged stationary gas-fuelled engines. Suitable for a wide range of gases, such as natural gas, biogas, landfill gas, process gas and other gases with a higher sulphur content than natural gas (check with manufacturer).

**Quality level**
- **REPSOL MOTOR GAS HTM 40**
  - JENBACHER 1000-1109 (for engines installed up to September 2009)
  - ROLLS ROYCE BERGEN K-G1/K-G2/K-G3 (for biogas)
2. Quality levels according to manufacturer

<table>
<thead>
<tr>
<th>Product name</th>
<th>ROLLS ROYCE</th>
<th>JENBACHER</th>
<th>MWM DEUTZ</th>
<th>MAN</th>
<th>CUMMINS</th>
<th>GUASCOR</th>
<th>CATERPILLAR</th>
<th>WÄRTSILÄ</th>
<th>WAUKESHA</th>
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</thead>
<tbody>
<tr>
<td>REPSOL SUPER LONG LIFE GAS 4005</td>
<td>Natural gas: BV-G/GR-G/K-G/K-G-X-G3</td>
<td>Class A. Natural gas: Series 2, 3, 4 and 6</td>
<td>Suitable for CAT NOTE: Series 4 and 6: extended oil change intervals</td>
<td>Natural gas and biogas</td>
<td>Diesel medium-speed engines in gas operation / 3271-2</td>
<td>QSK 60</td>
<td>Field test G-3516</td>
<td>Quality level</td>
<td>Quality level</td>
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<tr>
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<td>Natural gas: K-G/K-G/X-G3</td>
<td>Class A. Natural gas: Series 2, 3, 4 and 6</td>
<td>Natural gas and biogas</td>
<td>Quality level</td>
<td>Quality level</td>
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<tr>
<td>REPSOL LONG LIFE BIOGAS 4005</td>
<td>Class B and C</td>
<td>Special gases</td>
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<tr>
<td>REPSOL SYNTHETIC MOTOR GAS 404</td>
<td>Natural gas: K-G/X-G/X-G3</td>
<td>Class A. Natural gas: Series 2, 3, 4 and 6</td>
<td>Natural gas and biogas</td>
<td>Quality level</td>
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<tr>
<td>REPSOL EXTRA GAS 40</td>
<td>Natural gas and biogas</td>
<td>Class A: Natural gas (*up to Sept ’09) Class B and C: Biogas and landfill gas</td>
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<tr>
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<td>Biogas: K-G/K-G/X-G3</td>
<td>Class A: Natural gas (*up to Sept ’09) Class B and C: Biogas and landfill gas</td>
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3. Packs

<table>
<thead>
<tr>
<th>PRODUCT NAME</th>
<th>1000 L container</th>
<th>208 L drum</th>
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<tr>
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<td>✓</td>
</tr>
<tr>
<td>REPSOL LONG LIFE GAS 4005</td>
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<tr>
<td>REPSOL LONG LIFE BIOGAS 4005</td>
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<td>✓</td>
</tr>
<tr>
<td>REPSOL SYNTHETIC MOTOR GAS 404</td>
<td>✓</td>
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<td>✓</td>
</tr>
<tr>
<td>REPSOL MOTOR GAS HTM 40</td>
<td>✓</td>
<td>✓</td>
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At Repsol we know how important it is to ensure that your engines work in the best possible conditions. It is therefore essential to ensure that they are adequately lubricated.

The ADOC XXI programme is an exclusive service we offer our customers, based on more than 15 years’ experience in the analysis of lubricants. Through the periodic laboratory analysis of a sample of oil in service, the ADOC expert system tells you the condition and performance of your engines, whilst predicting any mechanical failures before they occur.

### Advantages of the ADOC XXI programme

- Improves the performance and productivity of your equipment.
- Reduces maintenance costs and unscheduled stoppages.
- Extends the useful life of lubricants and mechanical components, thereby minimising the associated replacement costs and the capital tied up in replacement parts.
- Enables maintenance and control activities to be scheduled.
- Leads to a significant improvement in the optimum working conditions of lubricants and components.

The ADOC Gas Cogeneration programme is designed to meet the growing demand of customers with large engines used in cogeneration which use gas as a fuel, primarily natural gas. ADOC Gas Cogeneration takes into account the particular characteristics of the lubricants especially designed for these engines, as well as the type of gas used and the special maintenance plans applied to this industrial sector.

The results obtained after the analysis are eventually summarised in a personalised report for each customer.

### How to access the ADOC Gas Cogeneration programme

Becoming a user of the ADOC Gas Cogeneration system is very simple. Just get in touch with our sales network or contact our Customer Service Department (901 111 999, saclubs@repsol.com).

You’ll be provided with a customer code, as well as a sampling kit which will include the following:

- **Special 125ml containers** to take samples.
- **Barcode labels** to identify the samples.
- **Cards** to send information on each sample.
- **Postage-paid envelopes** to send the samples to our laboratory.

You can find out the results of the analyses carried out using the ADOC Gas Cogeneration system by email or through the interactive services available at www.repsol.com.
Interpretation of results:

- **Correct**: value within appropriate margins.
- **Alert**: slight variation against normal value.
- **Alarm**: value above acceptable level. These values are adjusted to the limits provided by engine manufacturers.

**Diagnosis and recommendations**

Our Technical Assistance and Development Department issues a diagnosis which details any anomalous results and sets out the possible causes of the failure. Finally, a set of recommendations on possible alternatives or actions to be adopted in each case are given. In this case, the oil may continue in service.

**Degradation rate**

**Contamination rate**

**Personalised charts**

Making it easier to monitor the results and analyse trends.
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