

Gas engine - lubricants

Durability of lubricants

The durability of lubricants depends on the quality of the gas, the quality of the lubricant, the ambient conditions and the mode of operation of the engine. Therefore it is necessary to determine the intervals for changing lubricants by making used oil analyses.

The first analysis for biogases must be made after 100 operating hours, for all other types of gas after 300 operating hours. Further intervals of analysing and the required change of lubricants must be agreed on between the operating company and the laboratory on the basis of chart 1.

| Limit values for the analysis of lubricants | | Comments / measuring methods |
|---|--|--|
| Viscosity at 100 | min. 11 mm ² /sec (cSt) max. increase: 3 mm ² /sec max. 17 mm ² /sec | DIN 51 366, ASTM D 445 DIN EN ISO 3104 |
| Water content | max. 0.5 % | DIN 51777 ASTM D 1744 |
| Glycol content | max. 500 ppm | DIN 51375 ASTM D 4291 |
| Total base number TBN | > 40% of the value of the unused oil, min. 2.0 mgKOH/g | ISO 3771 |
| TAN | ≤ 130 % of the new value | ASTM 664 |
| SAN | ≥ 0 mgKOH/g and ≤ 130 % of the new value | ASTM 664 |
| i pH * | ≥4,5 | DEUTZ |
| Oxidation 5.8 µm | 20 A/cm | DIN 51 451 |
| Nitration 6.1 µm | 20 A/cm | DIN 51 451 |
| Wearing metals in the engine | | DIN 51391 / ASTM D 5185 |
| Aluminium | max. 20 mg/kg | If 2 or more wearing metals exceed 10 mg/kg, the following time interval for sampling must be halved. If the increased wear rating is confirmed you must contact the service department. |
| Chromium | max. 5 mg/kg | |
| Copper | max. 20 mg/kg | |
| Iron | max. 30 mg/kg | |
| Lead | max. 20 mg/kg | |
| Tin | max. 5 mg/kg | |
| Silicon | max. 20 mg/kg from dust ** | DIN 51391 ASTM D 5185 |

* Bio gas

** In case of waste water treatment plants and landfill gas plants, the contamination may also be caused by siloxanes. If the Silicon value reached 300 mg/kg or if the wearing metals increased, the wearing elements would have to be carefully monitored.

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When evaluating the wearing elements, not only limit values must be considered but also the characteristics during several oil analyses in order to identify changes of the engine condition at an early stage. We recommend keeping the analysis results in order to have them available in case of queries. In case of abnormal wearing rates within an analysing sequence for engines which are still within warranty, the analysis must be provided for the service department of Senergie. After 3 analysing sequences, the analysis can be restricted to the change lubricant provided that the operating conditions remain the same..

Explanatory notes on the limit values of lubricant analyses

| Abbreviation | Term | Explanatory note |
|--------------|---------------------|--|
| TBN | Total Base Number | Total base number which characterises the alkaline reserve of the oil and the chemical neutralisation capacity |
| TAN | Total Acid Number | Covers weak and strong acids |
| SAN | Strong Acid Number | Covers only strong acids, e.g. sulphur acid |
| ipH | Initial pH-Value | Initial pH value |
| Oxid. 5.8 µm | Oxidation | Records carbonyl compounds in the IR spectrum (infrared) of 5.8 µm |
| Nitr. 6.1 µm | Nitration | Formation of saltpetre caused by floor bacteria, measured in the IR spectrum (infrared) of 6.1 µm |
| A/cm | | Absorption per cm of wavelength in the spectrogram |
| KOH | Potassium hydroxide | |

Change of lubricant

The lubricant is changed after the result of the analysis, during engine revisions or after the ingress of coolant into the lubricant. If the mode of operation is changed, the interval for changing lubricants must be determined anew.

A sample of the lubricant must be taken from the crankcase immediately after the stop of the engine. For this purpose, the extraction hose must be adjusted to the length of the dip stick to avoid the suction of oil mud from the bottom of the oil pan. The oil is extracted with a gun. Before filling the sample bottle, the first cubic centimetres which have been extracted must be returned into the engine.

Change of the lubricant filter

The cartridges for the lubricant filters must be replaced when the lubricant is changed and after that, they must be replaced after approx. 1,000 operating hours (see maintenance plan of the operating manual). If water is analysed in the lubricant, if SAN is measured in the lubricant or if major maintenance work has been accomplished at the aggregate, filter change is obligatory.

Senergie GmbH



H. Lorenz -

Annex: Lubricant chart

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Lubricants for gas engines of the manufacturers MWM Brazil and LIEBHERR for the operation with all gases with low pollution. (Good sewage gas, natural gas, liquid gas, etc.)

(in alphabetical order)

| Manufacturer | Type of lubricant | Viscosity Category SAE | Basic oil | Sulphate ash per cent per weight | TBN mgKOH/g | Viscosity at 40°C | Viscosity at 100°C |
|------------------|-----------------------|------------------------|-----------|----------------------------------|-------------|-------------------|--------------------|
| ARAL | Degasol LA | 40 | Mineral | 0,48 | 4,5 | 137,0 | 13,7 |
| BayWa | MethaFlexx NG | 40 | Mineral | 0,45 | 5,5 | 156,0 | 14,5 |
| BP | Energas NGL | 40 | Mineral | 0,45 | 5,1 | 130,0 | 13,5 |
| Mobil Oil | Pegasus 1 | 15W-40 | Synthetic | 0,48 | 7,0 | 132,0 | 13,6 |
| | Pegasus 705 | 40 | Mineral | 0,49 | 5,6 | 126,2 | 13,2 |
| FUCHS Europe | Fuchs Ganymet LA | 40 | Mineral | 0,43 | 5,7 | 156,0 | 14,5 |
| Kuwait Petroleum | Q 8 Mahler MA | 40 | Mineral | 0,50 | 5,5 | 141,2 | 13,9 |
| Motorex | Megalube | 40 | Mineral | 0,45 | | | |
| REPSOL | Extra Gas 40 | 40 | Mineral | 0,40 | 6,0 | 130,0 | 13,5 |
| | Long Life Gas 4005 V* | 40 | Synthetic | 0,40 | 5,1 | 118,0 | 13,2 |
| Deutsche Shell | Mysella LA | 40 | Mineral | 0,45 | 5,0 | 138,0 | 13,8 |
| TOTAL FINA ELF | ELF Nateria MH 40 | 40 | Mineral | 0,45 | 5,2 | 139,0 | 13,9 |
| | FINA Gasmotorenöl 505 | 40 | Mineral | 0,48 | 5,5 | 155,0 | 15,1 |

Products which are not listed in this recommendation for lubricants are not recommended by us or the manufacturer of the engine. There is no warranty claim for any damages which are caused by the use of products which are not listed.

V* Test: No final release

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Lubricants for gas engines of the manufacturers MWM Brazil and LIEBHERR for the operation with special gases with increased pollution. (Biogas, sulphur-containing sewage gas, landfill gas, etc.)

(In alphabetical order)

| Manufacturer | Type of lubricant | Viscosity Category SAE | Basic oil | Sulphate ash per cent per weight | TBN mgKOH/g | Viscosity at 40°C | Viscosity at 100°C |
|------------------|--------------------|------------------------|-----------|----------------------------------|-------------|-------------------|--------------------|
| BP | Energas LFM | 40 | Mineral | 0,75 | 7,2 | 121,0 | 13,0 |
| BayWa | MethaFlexx MC plus | 40 | Mineral | 0,80 | 9,2 | 132,0 | 14,5 |
| BayWa | MethaFlexx ZS plus | 40 | Mineral | 0,70 | 8,2 | 105,0 | 13,4 |
| FUCHS Europe | GANYMET Plus MC | 40 | Mineral | 0,80 | 9,2 | 135,7 | 14,7 |
| Kuwait Petroleum | Q 8 Mahler HA | 40 | Mineral | 0,90 | 7,9 | 141,2 | 14,1 |
| Mobil Oil | Pegasus 610 | 40 | Mineral | 0,96 | 9,5 | 131,0 | 13,5 |
| Roloil | Mogas 40 AC | 40 | Mineral | 0,90 | 7,9 | 141,2 | 14,1 |
| Texaco | Geotex LF 40 | 40 | Mineral | 0,99 | 8,0 | 138,0 | 14,0 |

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NOTES:

Shorter intervals between oil changes are more economic than early engine revisions caused by increased wear or repairs with long idle times!

The intervals for oil changes must be coordinated with the consent of the aggregate manufacturer and must be observed. ATTENTION! Please observe the limit values even if the oil supplier recommends longer intervals between oil changes!

Consumed engine oil must be stored and disposed environmentally and professionally. Please do not hesitate to contact us for information about authorised companies.