DEUTZ AG
Deutz-Mülheimer Straße 147-149
51063 Köln

Technical Circular
0199 - 99 - 2105 en
5th Exchange

Product:
DEUTZ Gas Engines

Date: 27.10.2003

This Circular supersedes: 0199-99-2105/4 of 11.05.2001

Copies to 0131

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Drawn up by: VS-TIM Phone: +49 (0) 221 822 3687
Fax: +49 (0) 221 822 2752

Adress:

Note: The part numbers indicated in this document serve technical explanation purposes.
Exclusively the spare parts documentation is binding for the definition of spare parts.

DEUTZ gas engines – Lube oil

This 5th Exchange Circular is issued essentially for

- providing more precise data on lube oils for special gases
- revising the limit values of the lube oil analysis
- updating the lube oil table.

The technical advancement of DEUTZ gas engines featuring high efficiencies and low exhaust emissions requires special, particularly adapted lube oils with a low ash content. **DEUTZ OIL TG-40 LA** is recommended by us for use in DEUTZ gas engines. This oil is adapted to the needs of gas engines and gas given excellent in-service results in heavy-duty engines operation. If this oil is not available, lube oils listed in enclosure 1 can be used as an alternative. For gas engines operating on special gases (e.g. dumping grounds, sewage plants) which are exposed to higher contamination (limits referred to 100% CH4)

Chlorine (Cl)	>	30 mg/m³
Fluorine (F)	>	15 mg/m³
Total chlorine + fluorine (Cl + F)	>	30 mg/m³
Sulphur (S)	>	300 mg/m³

special lube oils according to enclosure 2 are recommended, in spite of the higher sulphate ash content, if the specified limit values are exceeded or the anticipated lube oil service life is not attained due to the influence of attendant fuel gas substances.

Lube oil service life

The lube oil service life is dependent on:

- Gas quality
- Lube oil grade
- Ambient conditions
- Engine mode of operation

It is therefore necessary to determine for each engine plant the lube oil change intervals by analysis of the used oil.

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For bio gas, the 1st analysis should be carried out after 100 running hours and for the other types of gas after 300 running hours. Further intervals to be observed for analysis and lube oil change should be agreed between the operator and the laboratory on the basis of the following limit values.

Limit values for lube oil analysis						**Remarks Measuring method**
Viscosity at 100°C	min. 12 mm²/sec (cSt)					DIN 51 366, ASTM D 445 DIN EN ISO 3104
	max. increase 3 mm²/sec max. 18 mm²/sec					DIN 51 366
Water content	max. 0,2%					DIN 51777 ASTM D 1744
Glycol content	max. 500 ppm					DIN 51375 ASTM D 4291
Total base number TBN	> 40% of new oil min. 2,0 mgKOH/g					ISO 3771
AN	≤ of simultaneous TBN					ASTM 664
SAN	0 mgKOH/g					ASTM 664
i pH *	≥ 4,5					DEUTZ
Oxide 5,8 µm	20 A/cm					DIN 51 451
Nitr. 6,1 µm	20 A/cm					DIN 51 451
Wearing metals:		Engine 1015 2015	616 2016	620 2020 (604B/C)	632 2032	DIN 51391 ASTM D 5185
Aluminium	max. mg/kg	20	10	10	5	If two or more wearing metals exceed the limits of 10 mg/kg, the subsequent time interval for sampling must be cut in half. If higher values of wear are confirmed, please consult DEUTZ customer service.
Chromium	max. mg/kg	10	5	5	5	
Copper	max. mg/kg	20	25	15	10	
Iron	max. mg/kg	30	30	20	20	
Lead	max. mg/kg	20	20	20	10	
Tin	max. mg/kg	10	10	5	5	
Silicium	max. mg/kg out of dust **	15	15	15	15	DIN 51391 ASTM D 5185

* Biogas

** In the case of engines running on sewage and landfill gas the contamination can also be caused by siloxanes. The elements exposed to wear must be carefully observed.
The Si limit value is reached if the proportion of wearing metals increases to max. 300 mg/kg.

Not only the limit values but also the course of the recordings of a number of analyses of the oil should be considered in the assessment of the wear components to be sure to detect variations of the engine condition earliest possible.

You are advised to document the analysis of the oil and produce this evidence for reference, if necessary. In the case of abnormal wear within a series of analyses, you are obliged to make available the documented analysis to DEUTZ Product Engineering if engines under warranty are involved.

Following a series of three analyses, the analysis can be limited to the oil sample taken during lube oil change, provided the operating conditions remain the same.

Explanatory notes to the limit values of the lube oil analysis

Abbreviation	Term	Explanation
TBN (mgKOH/g)	Total Base Number	Total base number, identifying the alkaline reserve of the oil and characterising the chemical capacity of neutralization
AN	Total Acid Number	covers weak and strong acids
SAN	Strong Acid Number	covers strong acids only, e.g. sulphuric acid
ipH	Initial pH-Value	Initial pH value
Oxid. 5,8 µm	Oxidation	covering carbonyl compounds in the IR spectrum (infrared) of 5.8 µm
Nitr. 6,1 µm	Nitration	Nitrification by ground bacteria, measured in the IR spectrum (infrared) of 6.1 µm
A/cm		Absorption per cm of wavelength in the spectrogram
KOH	Potassium hydroxide	

Lube oil change

Lube oil to be changed **after**

- Analysis
- Coolant ingress into lube oil
- Servicing work on maintenance level E 60 (see Operation Manual)
- Repair work exceeding the scope of maintenance level E 50 (see Operation Manual)
- at least once a year if engine is run less than 2,000 running hours annually.

New intervals for lube oil change must be fixed in case the mode of operation is changed, following service work E60 and/or repair work equivalent to E60.

The lube oil sample is to be taken

- with the engine running by means of the quick coupler directly form the lube oil circuit or
- directly after the engine has came to a standstill form the oil pan.

Fill the cubic centimetres taken as the initial sample back into the engine. Then fill into a clean test bottle.

Lube oil filter change

Lube oil filter cartridges to be changed

- together with the first lube oil change
- thereafter every 1,500 to 3,000 operating hours (see maintenance chart in Operation Manual)
- minimum once a year.

If water is analysed in the lube oil or a SAN is measured in the lube oil or servicing work acc. to maintenance level E 60 and/or repair work corresponding to E60 in terms of scope has been carried out, also filter cartridges must be changed in the course of the next lube oil change.

DEUTZ AG
Service Information Systems

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Encl. Lube Oil Tables

Lube Oil Table
DEUTZ Gas Engines

Enclosure 1 to
TR 0199-99-2105
5th Exchange
10 / 2003

Lube oils for gas engines operating with all types of low contaminated gases

Manufacturer	Type of lube oil	Viscosity-class SAE	Base oil	Sulphate ash weight per cent	Total base number (TBN) mgKOH/g	Viscosity at 40°C	Viscosity at 100°C
DEUTZ	**DEUTZ Öl TG-40 LA**	**40**	**Mineral**	**0,43**	**5,7**	**156,0**	**14,5**
ARAL AG	Degasol LA	40	Mineral	0,48	4,5	137,0	13,7
BP AG	Energol IC-DG 40S	40	Mineral	0,48	4,5	137,0	13,7
CEPSA	Troncoil Gas	40	Mineral	0,35	4,6	133,8	13,8
Exxon Mobil	Pegasus HPC Pegasus 1 Pegasus 605 Pegasus 705 Pegasus 805 Pegasus 905	40 15W-40 40 40 40 40	Mineral Synthetic Mineral Mineral Mineral Mineral	0,48 0,48 0,50 0,49 0,50 0,50	5,5 7,0 7,4 5,3 6,2 6,2	138,0 132,0 119,0 122,0 130,0 115,0	14,1 13,6 13,0 13,1 13,5 12,7
FUCHS Europe	Fuchs Titan GM 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
Petro-Canada	Sentinel 445	40	Hydro. Tr	0,40	4,7	127,0	13,2
Repsol	Extra Gas 40	40	Mineral	0,40	6,0	130,0	13,5
Roloil	Mogas / 40	40	Mineral	0,50	5,5	141,2	13,9
Shell	Mysella LA Mysella XL	40 40	Mineral Mineral	0,45 0,50	5,0 4,5	138,0 131,0	13,8 14,1
TOTAL FINA ELF	ELF Nateria MHW 40 ELF Nateria MH 40 FINA Gasmotorenöl 505	40 40 40	Mineral Mineral Mineral	0,35 0,45 0,48	4,6 5,2 5,5	133,8 139,0 155,0	13,8 13,9 15,1
TEXACO	GEOTEX LA GEOTEX PX	40 40	Mineral Mol. conv	0,45 0,50	5,5 5,4	129,4 88,0	13,3 13,2
WIPA Chemicals International	Ecosyn GE 4004	40	Ester	0,40	6,0	155,0	13,7

Lube Oil Table
DEUTZ Gas Engines

Enclosure 2 to
TR 0199-99-2105
5th Exchange
10 / 2003

Lube oils for gas engines operating with higher contaminated special gases

Manufacturer	Type of lube oil	Viscosity class SAE	Base oil	Sulphate ash weight per cent	Total base number (TBN) mgKOH/g	Viscosity at 40 °C	Viscosity at 100 °C
Caltex	Geostar LF 40	40	Mineral	0,99	8,0	138,0	14,0
Kuwait Petroleum	Q8 Mahler HA	40	Mineral	0,90	7,9	141,2	14,1
Mobil	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