



Technical Bulletin

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913 / 914 / 2015

- GF3L 913 / G914 L03 / G914 L04 / G914 L06 / TCG914 L06 / TCG2015 V06 / TCG2015 V08
- Assemblies:
99

Operating media / gas engines

Replacement is made because of:

- Updating
 - See also the following description.
- Introduction
 - DIN 51624 - Natural gas requirements and test methods

This bulletin defines which operating media are approved in DEUTZ gas engines:

- Lubricating oil
- Combustion gas
- Cooling system protection



The "Technical Bulletin" applies only to the complete engines distributed by DEUTZ or the DEUTZ dealer.

Note:
The part numbers indicated in this document are not subject to updating.
Binding for the identification of spare parts is exclusively the spare parts documentation.

Lubricating oil

General

Modern gas engines place very high demands on the lubricating oil used. The continuously increasing specific engine performances over the last few years are leading to an increased thermal load on the lubricating oil, and the lubricating oil is also becoming more heavily contaminated due to reduced lubricating oil consumption and longer lubricating oil change intervals. For this reason, it is necessary to observe the requirements and recommendations in this Technical Bulletin in order not to reduce the life of the engine.

Lubricating oils always consist of a basic oil and an additive package. The most important tasks of a lubricating oil (e.g. wear protection, corrosion protection, neutralisation of acids from combustion products, prevention of coke and soot deposits on engine components) are assumed by the additives. The properties of the basic oil (e.g. mineral or synthetic) are also decisive for the quality of the product, e.g. with regard to the thermal load capacity and low-temperature performance.



Mixtures of engine lubricating oils should be avoided because the worst properties of the mixture always dominate. In principle, all engine lubricating oils are mixable so that a complete lubricating oil change from one type of lubricating oil to another is no problem as far as mixability is concerned.

Lubricating oil change intervals

The following lubricating oil change intervals are determined as standard:

Lubricating oil change intervals in oh	
Series	All.....operating hours (oh)
913	500*
914	500*
TCG 2015	1000*
* This value refers to the normal operating conditions and may vary according to the application and gas quality (type). The oil analyses must be within the scope of appendix 1 to achieve these intervals.	

T 1 Lubricating oil change intervals in operating hours

For operating gas engines, DEUTZ recommends the lubricating oils listed in Appendix 2.

Special lubricating oils (sulphate ash content 0.5 - 1.0 wt.%) may have to be used for operation with combustion gases. For oils requiring a higher ash content, please consult your application engineer.



The engine may only be operated with lubricating oils approved by DEUTZ. The owner is solely responsible for observing the lubricating oil specifications described in this technical bulletin. The engine manufacturer will not be liable for any damage caused by using non-approved lubricating oils or improper operation.

Lubricating oil change intervals according to analysis

The lubricating oil change intervals depend on the lubricating oil quality, the quality of the fuel and the operating conditions. Prolonging of the specified lubricating oil change intervals beyond the standard values requires prior lubricating oil analysis for approval by DEUTZ.

The owner must guarantee that the analysis values required for approval of the prolonged lubricating oil change intervals are submitted in advance.

Continuous lubricating oil analysis must be applied to ensure that the engine complies with the lubricating oil limit values (see appendix 1).

Lubricating oil analysis reports must be kept to provide proof of this proper operation of the engine.

In case of abnormal wear values within the analysis series, the analysis must be submitted to the responsible DEUTZ Service Partner for engines that are still under guarantee.

The trend analysis is most suitable for monitoring the analysis values of a longer period of time. The individual analysis values are recorded here in tables or graphs. This allows an assessment of the condition of the lubricating oil and the engine (trend detection).

The lubricating oil sampling is carried out according to Technical Bulletin 0199-99-01187.

Combustion gas

At the moment

- natural gas (CNG : Compressed Natural Gas) is approved as a combustion gas for gas engine operation.

is approved as a combustion gas for gas engine operation.

Other gases (e.g. biogas, landfill gas, etc.) are not approved for series use. Individual project inspection is carried out by DEUTZ AG.

Natural gas

Natural gas is a combustible gas found in underground deposits. It is often found together with mineral oil as it evolves in a similar way. Natural gas is a gas mixture whose composition varies considerably depending on where it is found. Natural gases consist mainly of methane but differ in their further chemical composition.

Requirements for natural gas compositions			
Component	min.	Typical	max.
Methane number (MN)	70	-	95
Methane (CH ₄) in vol.-%	80	91	98
Alkanes (ethane, propane, butane, pentane) in vol.-%	0	5	18
Inert gases (nitrogen and carbon monoxide) in vol.-%	0	4	15

T 2 Requirements for natural gas compositions



DEUTZ recommends compliance with the requirements for natural gas according to DIN 51624, see Appendix 3.

General

If the combustion gas does not meet these requirements or the combustion gas contains by-products which are not specified without the concrete combustion gas analysis being approved in writing, all guarantee rights will be voided.

Failure of a combustion gas to comply with the minimum properties or its contamination by unspecified ingredients will lead to a reduction in the life of the engine and all components affected.

A gas analysis must always be submitted to DEUTZ Service or the dealer at commissioning (not older than 2 weeks) and documented in the commissioning report. A gas analysis must be made after commissioning and compliance with the requirements tested.



All gas analysis reports must be submitted to DEUTZ Service or the dealer in case of a guarantee claim.

The respective manufacturer documents must be consulted for system parts such as catalytic converters and exhaust gas heat exchangers with regard to the gas composition and exhaust temperature. Because of the different composition of the combustion gases not every engine in a series achieves the maximum possible power for the series with every approved combustion gas.

According to the scope of delivery, engines may only be operated with the combustion gas prescribed.



Cooling system protection agent

Only valid for water-cooled engines of the TCG 2015 series

The use of cooling system protection agents and the conditioning of the coolant is specified in TR 0199-99-1115 or DEUTZ Corporation Parts Bulletin # 006-2010.



The best results are achieved with the original DEUTZ cooling system protection.

This cooling system protection agent is adapted to the materials used in DEUTZ engines and is continuously monitored.

The cooling system protection agent is available through the DEUTZ Organisation.

Cooling system protective agent	
Container	Part no.:
5 l canister	01011490
20 l canister	01016416
210 l barrel	12211500
Available from DEUTZ Corporation:	
6 gallons	308321
55 gallons	308322

T 3 Cooling system protective agent

If the Deutz cooling system protection agent is not available, i. e. delivery restrictions abroad, products approved by DEUTZ can be used as an alternative in exceptional cases.

If you have questions on this topic, please contact the staff member(s) below.

E-mail: lubricants.de@deutz.com

or

Email: service-kompaktmotoren.de@deutz.com

For the America region:

Email: service@deutzusa.com

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Enclosure(s):

- Appendix 1
 - Lubricating oil change according to analysis - limits for DEUTZ gas engines

- Appendix 2
 - Recommended gas engine lubricating oils

- Appendix 3
 - DIN 51624 - Fuels for motor vehicles - Natural gas requirements and test methods



Appendix 1			
Lubricating oil change according to analysis - limits for DEUTZ gas engines			
Measured value	Limit values		Test method
Kinematic viscosity at 100 °C	min.	12.0 mm ² /s	ASTM D 445
	max.	18.0 mm ² /s (TCD 2015)	DIN EN ISO 3104
	max.	22.0 mm ² /s (913 / 914)	DIN 51659-1,-2,-3
Base number (TBN)	min.	2.0 mg KOH/g and 50% of the fresh oil content	ASTM D 2896 DIN ISO 3771 DIN 51639-1
Acid number (TAN)	--	TAN < TBN	ASTM D 664 DIN EN 14634
Water content	max.	0.2 %(m/m)	ASTM D 6304 DIN 51777-1,-2 DIN EN ISO 12937
Glycol content	max.	500 mg/kg	ASTM D 2982 DIN 51375-2
Silicon	max.	15 mg/kg	ASTM D 5185 DIN 51399-1,-2
Sodium	max.	25 mg/kg	ASTM D 5185 DIN 51399-1,-2
Oxidation	max.	20 A/cm	ASTM E 2412 DIN 51452
Nitration	max.	20 A/cm	
Wear metals^{*1}			
Iron	max.	40 mg/kg	ASTM D 5185 DIN 51399-1,-2
Copper	max.	20 mg/kg	
Aluminium	max.	20 mg/kg	
Lead	max.	20 mg/kg	
Chrome	max.	10 mg/kg	
Tin	max.	7 mg/kg	
Nickel	max.	7 mg/kg	
<p>*1) The term parts per million (ppm) is often used in lubricating oil analyses. The term ppm alone is not a unit of measure. It usually describes the weight concentration (1 ppm (w/w) = 1 mg/kg). 1 ppm = 10⁻⁶ parts per million = 0.0001 %</p>			

Appendix 2

Recommended gas engine lubricating oils

Manufacturer	Product name	Sales region	Base oils	SAE classes	Sulphated ash % (m/m)	Base number (TBN) mg KOH/g	Kinematic viscosity	
							at 40 °C mm ² /s	at 100 °C mm ² /s
Addinol Lube Oil GmbH	Gas engine lubricating oil MG 40 Extra LA	world- wide	Mineral	40	0,49	6,5	128,2	14,3
AVIA	AVIA Gas engine lubricating oil LA 40	world- wide	Mineral	40	0,49	6,4	133,0	14,4
BayWa AG	TECTROL METHA- FLEXX NG PLUS	Europe- wide	Mineral	40	0,49	6,5	142,5	14,4
BayWa AG	TECTROL METHA- FLEXX NG	Europe- wide	Mineral	40	0,45	5,5	153,0	14,4
BayWa AG	TECTROL METHA- FLEXX HC	Europe- wide	Hydroc- rack	40	< 0,68	8,9	107,0	14,4
BP Europa SE	Aral Degasol NGL	world- wide	Mineral	40	0,45	5,1	130,0	13,5
BP Europa SE	Castrol Duratec L	world- wide	Mineral	40	0,45	5,1	130,0	13,5
BP Europa SE	Castrol Duratec HPL	world- wide	Mineral	40	0,45	5,1	121,0	13,0
BP Europa SE	Castrol Duratec XPL	world- wide	Synthe- sis	40	0,45	4,9	109,0	14,0
Eni Schmi- ertechnik GmbH	Autol Gasmotoren öl ELA	Europe- wide	Mineral	40	0,50	5,5	138,0	14,0
Chevron (Texaco, Caltex)	HDAX 5200 Low Ash Gas Engine Oil	world- wide	Mineral (HT)	40	0,50	4,2	124,0	13,5



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							at 40 °C mm ² /s	at 100 °C mm ² /s
Chevron (Texaco, Caltex)	HDAX 7200 Low Ash Gas Engine Oil	world- wide	Mineral	40	0,51	5,1	110,0	13,5
Chevron (Texaco, Caltex)	HDAX 6500 LFG Gas Engine Oil	world- wide	Mineral	40	0,55	4,5	120,6	13,5
Chevron (Texaco, Caltex)	Geotex LA	Europe- wide	Mineral	40	0,45	5,2	125,3	13,2
Chevron (Texaco, Caltex)	Geotex PX	Europe- wide	MC	40	0,50	5,4	88,0	13,2
Conqord Oil (Kuwait Petroleum Company)	Roloil Mogas/40	Italy world- wide	Mineral	40	0,50	5,5	138,0	14,0
Conqord Oil (Kuwait Petroleum Company)	Roloil Mogas G4	Italy world- wide	Mineral	40	0,40	5,5	120,0	13,3
Conqord Oil (Kuwait Petroleum Company)	Roloil Mogas G5	Italy world- wide	Mineral	40	0,50	6,0	120,0	13,3
ExxonMobil	Mobil Pegasus 605	world- wide	Mineral	40	0,50	4,9	124,0	13,2
ExxonMobil	Mobil Pegasus 705	world- wide	Mineral	40	0,50	5,6	126,2	13,2
ExxonMobil	Mobil Pegasus 805	world- wide	Mineral	40	0,50	6,2	130,0	13,5

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Recommended gas engine lubricating oils

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							at 40 °C mm ² /s	at 100 °C mm ² /s
ExxonMobil	Mobil Pegasus 905	predominantly South America	Mineral	40	0,50	6,0	125,0	13,0
ExxonMobil	Mobil Pegasus 1005	world-wide	Mineral	40	0,50	5,0	125,0	13,0
ExxonMobil	Mobil Pegasus 1	world-wide	Synthesis	15W-40	0,50	6,5	93,8	13,0
ExxonMobil	Mobil Pegasus SR*1	world-wide	Mineral	40	0,50	6,0	130,0	14,0
Fuchs Petrolub AG	TITAN GANYMET PLUS LA	world-wide	Mineral	40	0,50	6,6	141,5	14,9
Fuchs Petrolub AG	TITAN GANYMET LA	world-wide	Mineral	40	0,45	5,5	149,0	14,5
HESSOL Lubrication GmbH	HESSOL Gas engine lubricating oil Low Ash	world-wide	Mineral	40	0,49	6,8	128,2	14,3
Kuwait Petroleum	Q8 Mahler MA	world-wide	Mineral	40	0,50	5,5	138,0	14,0
Kuwait Petroleum	Q8 Mahler G4	world-wide	Mineral	40	0,40	5,5	120,0	13,3
Kuwait Petroleum	Q8 Mahler G5	world-wide	Mineral	40	0,50	6,0	120,0	13,3
Kuwait Petroleum	Roloil Mahler MA	USA	Mineral	40	0,50	5,5	1380	14,0
Kuwait Petroleum	Roloil Mahler G4	USA	Mineral	40	0,40	5,5	120,0	13,3
Kuwait Petroleum	Roloil Mahler G5	USA	Mineral	40	0,50	6,0	120,0	13,3



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Recommended gas engine lubricating oils

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							at 40 °C mm ² /s	at 100 °C mm ² /s
NILS	Burian Light	world-wide	Mineral	40	0,49	6,8	128,2	14,3
Shell	Shell Mysella S5 N 40	world-wide	Mineral	40	0,48	4,5	135,0	13,5
Shell	Shell Mysella S3 N 40	world-wide	Mineral	40	0,45	5,0	135,0	13,5
SRS Schmierstoff Vertrieb GmbH	SRS Mihagrun LA 40	world-wide	Mineral	40	0,48	5,6	147,0	14,3
SRS Schmierstoff Vertrieb GmbH	SRS Mihagrun LAX 40	world-wide	Mineral	40	0,50	5,2	127,0	13,2
Total Lubrifiants	Nateria MH 40	world-wide	Mineral	40	0,45	5,5	142,2	14,8
Total Lubrifiants	Nateria MP 40	world-wide	Mineral	40	0,48	4,6	122,5	13,8
*1	Unpurified for natural, landfill and biogas							

T 5 Appendix 2

Appendix 3

DIN 51624 - Fuels for motor vehicles - Natural gas requirements and test methods

Edition February 2008

Property	Unit	Limit value		Test method
		min.	max.	
Calorific value for natural gas H	MJ/kg	46	-	DIN 51857 DIN EN ISO 6976
Calorific value for natural gas L	MJ/kg	39	-	DIN 51857 DIN EN ISO 6976
Density absolute	kg/m ³	0,72	0,91	DIN 51857 DIN 1871 DIN EN ISO 6976
Methane number (calculated)	-	70,0	-	AVL method
Methane content	% (n/n)	80	-	DIN EN ISO 6975
Total content C ₂ -KW	% (n/n)	-	12	DIN EN ISO 6975
Retrograde condensation	-	can be excluded		DIN EN ISO 6570
Total content > C ₂ -KW	% (n/n)	-	8,5	DIN EN ISO 6975
Propane content	% (n/n)	-	6	DIN EN ISO 6975
Butane content	% (n/n)	-	2	DIN EN ISO 6975
Pentane content	% (n/n)	-	1	DIN EN ISO 6975
Hexane content and higher KW	% (n/n)	-	0,5	DIN EN ISO 6975
Oxygen content	% (n/n)	-	3	DIN EN ISO 6975
Hydrogen content	% (n/n)	-	2	DIN EN ISO 6975
Total content of nitrogen (N ₂) and Carbon dioxide (CO ₂)	% (n/n)	-	15	DIN EN ISO 6975
Content of hydrogen sulphide	mg/kg	-	7	DIN 51855 E DIN EN ISO 6326-1
Content of thiol sulphur	mg/kg	-	8	DIN 51855 E DIN EN ISO 6326-1: 2005-06
Total sulphur content until 31.12.2008	mg/kg	-	20	E DIN EN ISO 6326-1: 2005-06



Appendix 3				
DIN 51624 - Fuels for motor vehicles - Natural gas requirements and test methods				
Edition February 2008				
Property	Unit	Limit value		Test method
		min.	max.	
Total sulphur content from 01.01.2009	mg/kg	-	10	E DIN EN ISO 6326-1: 2005-06
Water content	mg/kg	-	40	DIN EN ISO 18453 DIN EN ISO 10101-3
Content of compressor oil and floating particles	-	-	-	To be determined

T 6 Appendix 3