

FUCHS Automotive Lubricants

Innovative Lubricants Need Experienced Application Engineers

Consultation with an experienced application engineer should precede every lubricant change-over. This guarantees that the optimum lubricant system is selected. Our experienced engineers can not only offer advice on application but also inform you about our comprehensive range of lubricants.



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FUCHS Automotive Lubricants

TITAN

Outstanding Economy and Long Life



Lubricants for Stationary Gas Engines



FUCHS Automotive Lubricants

It all Depends on the Right Lubricant.

The Specialist for Gas Engine Oils.

Few people understand engines better than FUCHS. Because as the world's largest independent manufacturer of lubricants we focus exclusively on the development and manufacturing of lubricants. Ongoing investments in our worldwide R&D centres as well as close cooperation with the German automotive industry have made us what we are today: A lubricant specialist with a full line of products and a multitude of special solutions. Particularly for stationary gas engines, the selection of the right engine oil is of critical importance. For reliable operation, high efficiency and long life.

Requirements of Gas Engine Oils.

Gas engines used in power stations, landfill sites, sewage plants and biogas plants are characterised by continuous operation at full power. The good anti-knock properties of fuel gas cause high effective pressures in gas engines which again lead to very high combustion temperatures. The result is an increased formation of NO_x which reacts with the used engine oil and causes oxidation and nitration along with an increase in viscosity. Furthermore, the formation of organic and inorganic acids pose the danger of oil acidification and corrosive wear in the oil circuit.

Consequently, gas engine oils have to meet the following demands:

- high thermal stability
- high ageing resistance and
- good neutralisation properties

The High Performance Engine Oils of the TITAN GANYMET Series

TITAN GANYMET engine oils from FUCHS were specially developed for stationary Otto and pilot injection gas engines and offer a broad spectrum of applications. Special high-performance additives with a high resistance to oxidation and nitration guarantee reliability even under extreme operating conditions. Our special formulations offer a maximum degree of wear protection and work against the formation of sludge, deposits, acids and corrosion.



Picture: MAN Nutzfahrzeuge AG



Picture: MAN Nutzfahrzeuge AG

Technical Background

The sulphated ash (SA) in an engine oil is formed from certain additive components in the oil. These ash-forming agents affect engine cleanliness, neutralisation capacity, ageing resistance and the anti-wear properties of the oil.

The element zinc is one of these ash-forming agents and is usually found in conventional engine oils as a metal-organic compound in the form of ZnDTP (zinc dialkyldithiophosphates). This compound offers high protection against wear and good anti-oxidation properties. However, this additive gets into the combustion chamber of the engine by passing the piston rings. When burnt, ash components are formed which are deposited on the pistons, cylinder head, valves and catalytic converter. These deposits cause wear of engine components and lead to a drop in performance and early engine failure in the long run.

The following applies: The higher the proportion of ZnDTP, the greater the wear protection and antioxidation characteristics – but also the amount of sulphated ash.

Additives which contain calcium compounds are the principal constituent of so-called detergents. These play a significant role on avoiding coking deposits on the piston crown, rings and ring grooves. The deposits again have a grinding effect on the cylinder liners and lead to reflecting surfaces.

The detergents are also responsible for the neutralisation capacity and alkaline reserve (expressed as the Total Base Number, TBN) of an engine oil and thus avoid acidity increase and thereby protect the oil against corrosion in the oil circuit.

The following applies: The higher the proportion of detergents and calcium compounds, the greater the engine cleanliness and the TBN – but also the proportion of sulphated ash formed.

This conflict is easily explained: A higher proportion of detergents and ZnDTP in the oil results in greater neutralisation capacity, better wear protection and improved ageing resistance but also causes increased formation of sulphated ash. It is hence impossible to develop a universal product for all gas engines. As engine manufacturers recommend or prescribe various sulphated ash thresholds for different types of fuel gas, the possibilities of optimising single characteristics of an oil are limited. Therefore it is important to select the best suitable gas engine oil for the specific application in question.

Engine manufacturers generally recommend low-ash (SA < 0.5 % wt) oils for engines running on relatively clean gases (e.g. natural gas) because they allocate greater importance to engine cleanliness than to high neutralisation capacity. Engine oils with a higher sulphated ash content (max. 1 % wt) however, are usually accepted when using gases with a higher degree of noxious components such as sulphur, chlorine and fluorine as an increased neutralisation capacity is required to achieve longer oil change intervals.



Picture: DEUTZ POWER SYSTEMS



FUCHS Automotive Lubricants

Zinc-Free Technology Clearly Superior

Why Zinc-Free?

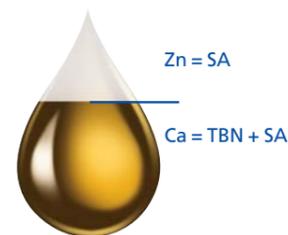
Two different formulation technologies are illustrated in the highly-simplified drop diagram on the right. The left drop represents the conventional formulation technology whereas the right drop shows the zinc-free LowSAPS technology developed by FUCHS – both in relation to ash-forming components and TBN. The volume of each drop demonstrates the sulphated ash potential of each formulation. To enable a comparison between the two formulation technologies, the ash forming potential is defined with 0.8 % wt for both technologies and thus the volume of both drops is the same.

The principal difference between the two additive technologies is that in the zinc-free formulation the zinc has been replaced by specially-adapted calcium compounds. The amount

though, was only increased as long as the desired sulphated ash content did not exceed 0.8 % wt. In addition, the increase in calcium components has a positive effect on the oil's neutralisation capacity which could be enhanced about 30 %. To give the new formulation the necessary anti-wear and anti-oxidation properties which were previously provided by zinc, completely new, ash-free additives were used. The major advantage of these new additives is that they do not influence the formation of sulphated ash and can thus be used in almost unlimited quantities. As a result, with the new formulation the anti-wear and anti-oxidation properties were not just maintained but significantly improved.

Conventional Gas Engine Oil

0,8 % wt SA = 7 TBN

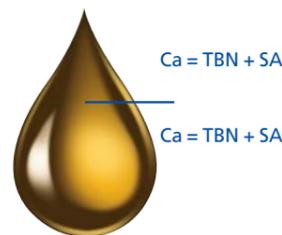


Advantages of Zinc-Free Sulphated Ash Deposits

Experiences have shown that there are significant differences in the morphology (structure) of the ash compounds. Ash deposits formed by the combustion of calcium are noticeably softer than those formed by the combustion of both calcium and zinc.

TITAN GANYMET PLUS

0,8 % wt SA = 9,2 TBN



Zinc-free sulphated ash deposits lead to considerably less abrasive wear and are less tenacious, a factor which ultimately influences the cleanliness of the combustion chamber.

Minimal Losses of Phosphorus

Phosphorus is an important component in the oil's anti-wear additive system. During combustion, small amounts from the oil on the cylinder walls are burnt and reach the catalytic converter where the catalytic surfaces can be damaged. The performance and life time of the catalytic converter is thus influenced by the amount of phosphorus in the exhaust gases.

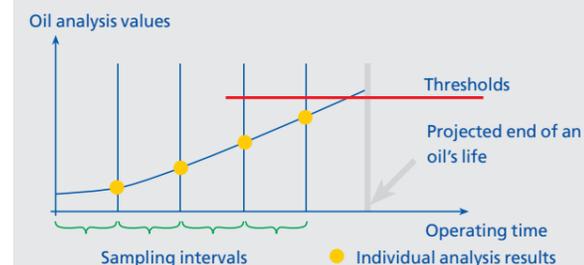
Various tests have shown that there are significantly smaller losses of phosphorus in zinc-free technologies than in formulations containing zinc. Consequently the lubricant retains the desired wear protection and contributes in addition to maintain the performance and life time of the catalytic converter.

All Advantages at a Glance

- Due to the higher neutralisation capacity (approx. 30 % higher TBN) at constant sulphated ash content, **significantly longer oil change intervals** can be implemented.
- Conversely, if the TBN value remains constant, the sulphated ash content falls and **engine cleanliness** visibly improves.
- **Clearly improved wear protection and higher oxidation stability** due to novel additives which do not form sulphated ash and can thus be used in greater concentrations.
- Noticeably **less abrasive wear** and greater engine cleanliness due to zinc-free sulphated ash deposits.
- Thanks to only minimal losses of phosphorus the wear protection properties of the oil are remained and performance and life time of the catalytic converter are not affected.

Monitoring and Laboratory Analysis

When a gas engine is commissioned, the oil change intervals are initially determined by the recommendations of the engine manufacturer.



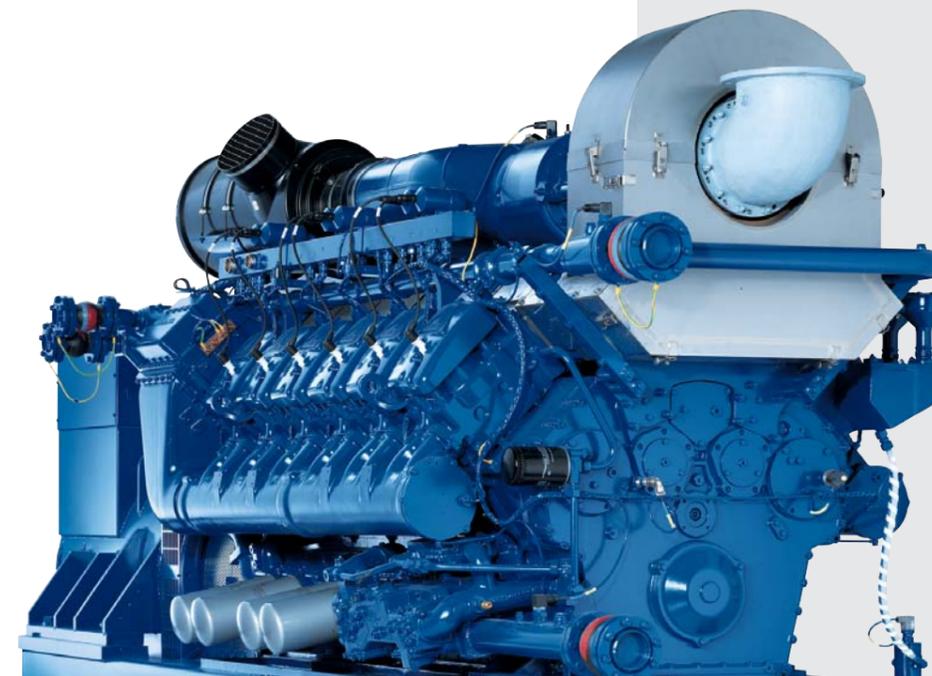
The lubricant's life and the optimum oil change intervals are however dependent on

- gas quality,
- lubricant quality,
- ambient conditions and
- mode of engine operation.

It is therefore necessary to monitor the condition of the engine oil with routine oil analyses (see chart) and then to set individual oil change intervals for every engine.

Regular analyses of used oil show the rate of degradation in all the measured parameters. So deviations in gas quality or different operating modes can be compensated quickly. This avoids potential engine damage and corresponding repair costs.

Make use of our fast, professional and complete service for oil analysis. Your engine will benefit. And you will save money.



Picture: DEUTZ POWER SYSTEMS

FUCHS Automotive Lubricants

Our Program of High Performance

Gas Engine Oils

Gas Engine Oils



Premium-Quality

Product	Characteristics	Specifications/Approvals
TITAN GANYMET ULTRA	Premium synthetic zinc-free high-performance engine oil for stationary Otto and pilot injection gas engines. The highest corrosion prevention together with the optimized zinc-free wear protection, excellent acid neutralisation properties and oxidation stability allow a safe and extended oil service in special aggressive gas operations (sewage gas, landfill gas and biogas).	DEUTZ POWER SYSTEMS MAN M 3271-2

High-Quality

Product	Characteristics	Specifications/Approvals
TITAN GANYMET PLUS	Zinc-free high-performance engine oil for stationary Otto and pilot injection gas engines. The highest corrosion prevention together with the optimized zinc-free wear protection and excellent acid neutralisation properties allow a safe and extended oil service in special aggressive gas operations (sewage gas, landfill gas and biogas).	DEUTZ POWER SYSTEMS DREYER & BOSSE JENBACHER TA 1000-1105 MDE SCHNELL MOTOREN
TITAN GANYMET PLUS LA	Zinc-free, "Low Ash" high-performance engine oil for stationary gas engines. The highest corrosion prevention together with the excellent zinc-free wear protection and acid neutralisation properties allow a safe and ex-tended oil service. Specially for gas engines fitted with exhaust catalyst and heat exchangers that specify an sulphate ash content of less than 0,5 weight %.	DEUTZ POWER SYSTEMS TEDOM 263.2-1P

Basic-Quality

Product	Characteristics	Specifications/Approvals
TITAN GANYMET	High-performance engine oil for stationary gas engines which run on all types of digester gases such as sewage gas, landfill gas and biogas.	JENBACHER TA 1000-1105 and 0125 MAN M 3271-2 MDE
TITAN GANYMET LA	"Low Ash" high-performance engine oil for stationary gas engines. Specially for gas engines fitted with exhaust catalyst and heat exchangers that specify a sulphate ash content of less than 0,5 weight %.	DEUTZ POWER SYSTEMS JENBACHER TA 1000-1107 MAN M 3271-2 MDE MTU

While the information and figures given here are typical of current production and confirm to specification, minor variations may occur. Subject to amendment. Edition: 01/2008

Check Out the Benefits of TITAN GANYMET Engine Oils!

This questionnaire will enable us to determine the most suitable lubricant for your gas engine.

Simply fill in and fax to: + 49 621 3701-302

*Required data

Your details:

Company*: _____ Telephone*: _____
 Address*: _____ Fax*: _____
 Department*: _____ E-mail*: _____
 Customer No.: _____

Engine details:

Type*: _____ Running hours*/day: _____ /week: _____ /month: _____
 Manufacturer*: _____ Engine power (KW)*: _____ Power used in %*: _____
 Year and hours*: _____ Sump volume*: _____
 Total oil volume*: _____

Gas details:

Type of gas*: _____ If no, please complete (values referring to 100 % CH₄)*:
 Gas analysis available*: Yes No
 (If yes, please attach copy)
 Total sulphur (S) From: _____ To: _____
 Hydrogen sulphide (H₂S) From: _____ To: _____
 Total chlorine (Cl) From: _____ To: _____
 Total fluorine (F) From: _____ To: _____
 Ammonia (NH₃) From: _____ To: _____

Details of current oil in use

Product name*: _____ Requirement litres/month: _____
 Manufacturer*: _____ Price/litre: _____
 Oil life*: _____ Did you have any problems with your current oil?
 If yes, please specify. _____
 Oil analysis *: Yes No
 (If yes, please attach copy) _____
 Would you like an appointment for further information?
 Simply tick the box:
 Signature: _____ Date: _____

