TITAN / MAINTAIN

Lubricants for Stationary Gas Engines

LUBRICANTS.
TECHNOLOGY.
PEOPLE.

FUCHS

LUBRICANTS.
TECHNOLOGY.
PEOPLE.

We focus consistently on high-quality lubricants and related specialties.

We develop innovative and holistic solutions for a wide variety of applications.

We value the high level of commitment of our employees and their trusting interaction with one another.

Facts and figures

Company: FUCHS SCHMIERSTOFFE GmbH, a company of the FUCHS Group
Headquarters: Mannheim
Product range: A full range of more than 2,000 products and 6,000 articles
Certifications: IATF 16949, ISO 14001, ISO 45001, ISO 50001
References: One of the leading lubricants OEM for the German automotive industry

FUCHS has developed, produced and sold high-quality lubricants and related specialties for more than 85 years – for virtually all areas of application and sectors. With over 100,000 customers and 62 companies worldwide, the FUCHS Group is the leading independent supplier of lubricants.

A team of more than 950 specialists across Germany works to guarantee the satisfaction of our customers. Whatever their requirements, we have the ideal lubricant for their specific applications and processes. In our technology center we link interdisciplinary expertise in a quick and efficient way – and work on innovative lubricant solutions to meet the demands of today and tomorrow every single day.

FUCHS lubricants stand for performance and sustainability, for safety and reliability, for efficiency and cost savings. They represent a promise: technology that pays off.

IT'S ALL ABOUT THE RIGHT LUBRICANT

FUCHS has a profound understanding of engine oil technology. As the world's largest independent lubricant manufacturer, we concentrate exclusively on the manufacturing and development of lubricants. Continuous investments in our worldwide development centers and cooperation with the German automotive industry have helped make us what we are today: a lubricant specialist with a comprehensive product portfolio and a large number of custom solutions.

The specialist for gas engine oils

Particularly in the field of stationary gas engines, choosing the right engine oil and being able to call on competent support for continuous operation are critically important for reliable operation, high availability and efficiency, as well as a long service life.

Gases and their composition

In different applications of cogeneration units, different fuel gases can be used. In general, fuel gases can be divided into two categories: natural gases and special gases. This differentiation is based on the different degree of purity of the gases. Natural gas or purified biogas, for example, have far fewer impurities than special gases. The category of special gases includes, for example, biogas, sewage gas, wood gas, landfill gas and mine gas. Fuel gases essentially consist of main components and accompanying substances.

Main components such as methane provide the energy required for the combustion process and actively participate in or influence it. In addition, the main components define the fuel properties relevant for physical engine operation (knock resistance, calorific value, combustion air ratio, combustion temperature, flame propagation speed, ignition properties). In addition to methane, hydrogen and higher hydrocarbons, such as propane or butane, as well as inert gases are among the main components.

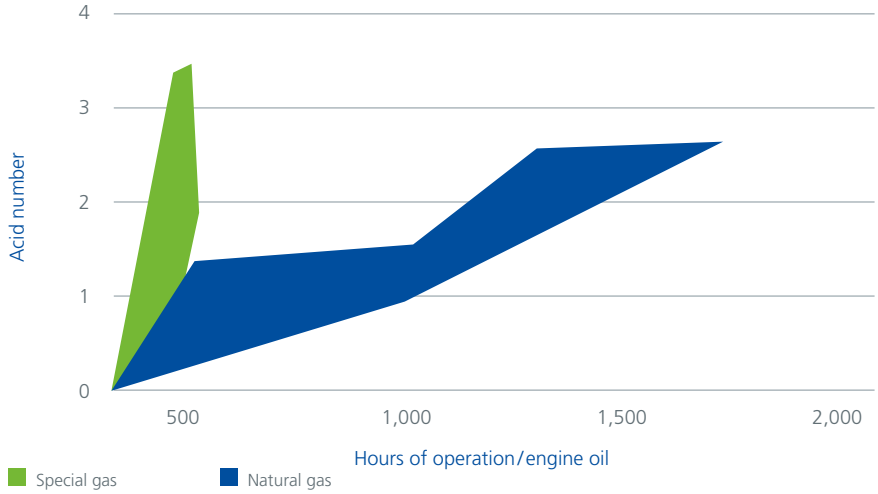
Accompanying substances are usually impurities or residues from the gas production that appear in the ppm range, and do not contribute energetically to the combustion process respectively hinder combustion. These include chlorine, fluorine, sulphur or hydrogen sulphide, ammonia, silicon or dust. The actual effects of these impurities during engine operation depend on the amount present in the combustion chamber.

Besides their composition, fuel gases differ mainly in their calorific value and their anti-knock properties. The knock resistance of a fuel gas describes its resistance against uncontrolled pre-ignition and is indicated by the methane number. For example, a methane number of 100 describes a gas that is very resistant against knocking and a methane number of 0 describes a fuel gas that is very susceptible to knocking. The calorific value indicates the maximum amount of heat that can be used during the combustion. The higher the calorific value of a fuel gas, the higher the amount of gas used in the combustion process. Consequently, as the calorific value decreases, the content of impurities increases.

An overall difficulty is the varying composition and quality of fuel gases, even during engine operation. This can be compensated for by an adjusted facility and engine management so that the service life, reliability and efficiency of the engine are not restricted.

Consequently, the different types of fuel gases present the engine as well as the engine oil used with different challenges.

Change of the acidification of different fuel gas types – the same oil, same engine model



Overview of fuel gas types

Fuel gas	Methane number (MN)*	Impurities / pollutants	Effects on engine operating / lubricating oil
Natural gas 	MN: 60 – 99	Non-existent Very clean	▪ Danger of knocking with MN < 75. ▪ It leads to damages of engine components and reduces the oil service life
Biogas 	MN: ≥ 100	Sulfur and silicone compounds	▪ Reduction of the alkaline oil reserve (abrasive wear)
Landfill gas 	MN: 100 – 160	Chlorine, fluorine, sulfur and silicon compounds	▪ Corrosive wear ▪ Reduction of the alkaline oil reserve ▪ Silicon in the combustion chamber and deposits on the exhaust valve ▪ Abrasive wear
Sewer gas 	MN: 120 – 140	Sulfur and silicon compounds	▪ Corrosive wear ▪ Reduction of the alkaline oil reserve ▪ Silicon in the combustion chamber and deposits on the exhaust valve ▪ Abrasive wear
Mine gas 	MN: 95 – 100	Sulfur and silicon compounds	▪ Corrosive wear ▪ Silicon in the combustion chamber ▪ Abrasive wear
Wood gas 	MN: 40 – 90	Tar, pyroligneous acid	▪ Gas is cleaned before entering the combustion chamber, thereby preventing any impurities from coming into contact with the lubricant.

* MZ >100, by inert gases which do not participate in combustion

Requirements for gas engine oils

Gas engines used in power stations, landfill sites, sewage plants and biogas plants are characterised by continuous operation at full load. The good anti-knock properties of fuel gas causes high effective pressures in gas engines which again lead to very high combustion temperatures. As a restult, the formation of harmful nitrogen oxides (NO_x) increases.

These nitrogen oxides in turn can react with the engine oil and cause oxidation (ageing) and nitration – associated with an increase in viscosity.

The formation of acids (organic and inorganic) pose the danger of oil acidification and corrosive wear in the oil circuit.

This results in special requirements for gas engine oils:

- High thermal stability
- High resistance to ageing
- Good neutralisation properties

In addition to the aforementioned requirements, the gas engine oil must meet further challenges. These arise depending on the corresponding application, as applications with natural gas (reduced sulphur content) and applications with special gas need to be distinguished.

As a lubricant specialist, FUCHS offers you a wide range of high-quality gas engine oils with the TITAN GANYMET series, which have been specially developed for the different areas of application.

GAS ENGINE OILS

The composition and components of gas engine oils are mainly based on the specifications of the engine manufacturers. These specify different gas engine oils depending on the fuel gas and the resulting pollutant load.

A key aspect for distinguishing between gas engine oils is the sulphated ash content. The sulphated ash content has a direct influence on both the engine cleanliness and the neutralisation capacity of the oil. For example, a high sulphated ash content results in a high neutralisation capacity of the gas engine oil, but on the other hand also in reduced engine cleanliness, as sulphated ash can lead to deposits in the engine.

Technical background

The characteristics of an engine oil are defined by the use of selected base oils in combination with coordinated additives.

While base oils have for example an influence on the thermal stability of the engine oil, the alkaline reserve, among other things, is influenced by the additives used. Detergents, or so-called organometallic agents, which for example consist of zinc, are mainly used here. In today's engine oil technology, zinc is used as an additive to increase wear and corrosion protection as well as oxidation stability. Thereby zinc or the zinc dialkyldithiophosphate (ZnDTP) used counts among the ash formers. This means that so-called sulphate ash is formed by the burning of ZnDTP.

The sulphated ash formed can lead to deposits on piston rings or grooves as well as wear in the engine and thus limit the service life and functionality of the engine. In addition, catalytic converter surfaces are covered and detoxified by the sulphated ash, resulting in a loss of function.

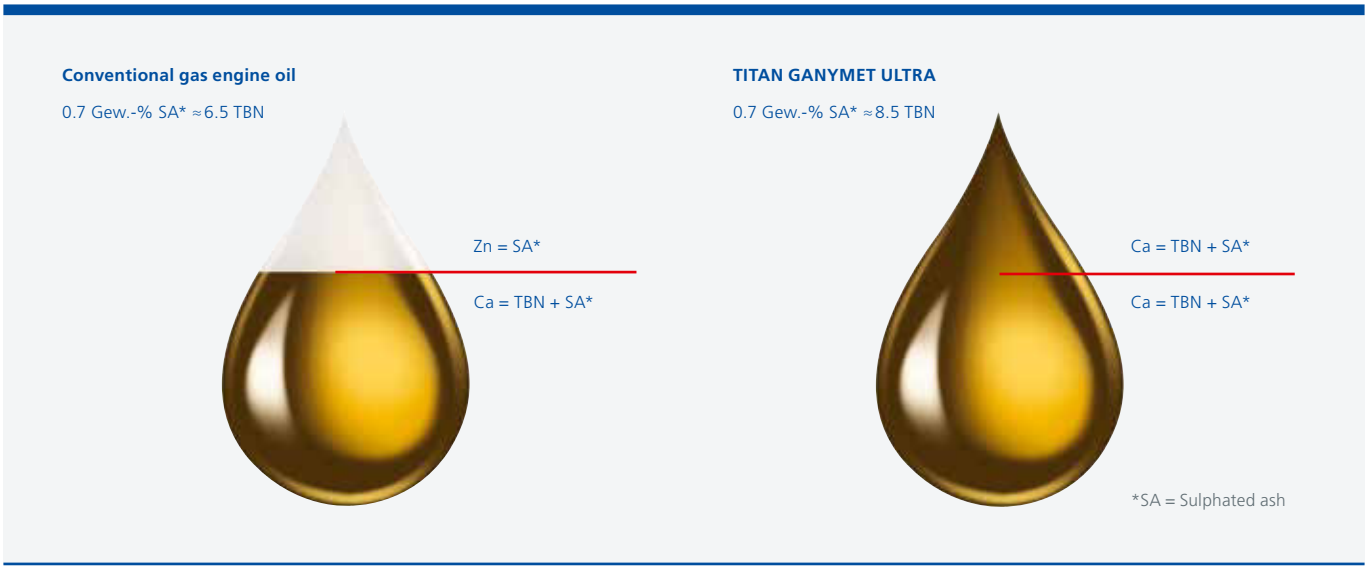
On the other hand, fuel gases with a high level of impurities require engine oils with a high content of ash formers to delay premature acid formation and oil ageing. Due to this conflict, gas engine manufacturers prescribe different engine oils with different sulphate ash limits depending on the fuel gas and the area of application.

The higher the proportion of ash formers, the higher the wear protection and antioxidant properties – but also the proportion of sulphated ash formed.

When operating engines with fuel gases with a low pollutant load (e.g. natural gas or purified biogas), low-ash engine oils (sulphated ash content < 0.6 wt.%) are generally recommended by engine manufacturers. The background to this is that due to the lower pollutant load, the neutralisation capacity does not have to be as high compared to special gases. Consequently, the focus is on a higher engine cleanliness. In contrast, when operating gas engines with fuel gases with a higher pollutant load, an engine oil with a higher sulphated ash content (maximum 1 wt.%) is usually approved in order to increase the neutralisation capacity and thus achieve longer oil change intervals.

A trend generally observed on the market is the increased use of steel pistons in gas engines. More and more engine manufacturers are taking this step in order to further increase the efficiency and thus the power output of gas engines. Due to their material properties and geometry, steel pistons can be charged higher than ordinary aluminium pistons. For the oil, however, these changes also mean higher stress.

Clear advantage for zinc-free technology



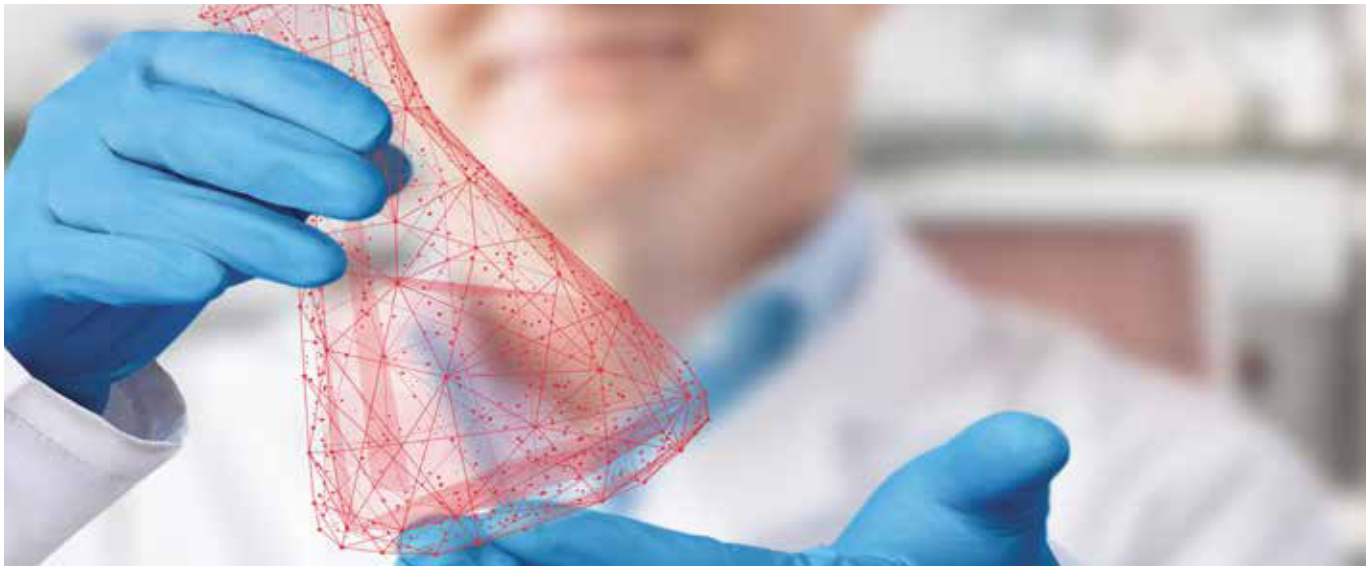
Why zinc-free?

Basically, it should be noted that ash formers also have to be distinguished from each other, as not all sulphated ash is the same. The decisive factor here is the choice of additives used in the engine oils. Ash deposits that are formed, for example, during the burning of calcium compounds are softer than precisely those that are formed during the burning of zinc. Consequently, the danger of abrasive wear in the engine is much lower.

In the drop diagram above, two different formulation technologies are illustrated in a highly simplified way. The drop on the left illustrates the conventional formulation technology, the right drop illustrates the zinc-free Low SAPS technology developed by FUCHS – both in terms of ash-forming components and TBN contribution.

The drop volume represents the sulphated ash contribution of each formulation. As the sulphated ash contribution was set at 0.7 wt% for both formulation technologies to allow a performance comparison between the two technologies, the volume of both droplets is identical.

The main difference between the two additive technologies is that in the zinc-free formulation the zinc was replaced by specially adapted calcium compounds. In order to be able to maintain the necessary wear and corrosion protection as well as the antioxidation properties, for which the zinc was previously responsible, new types of ash-free additives were used. The great advantage of these new additives is that they do not influence the sulphated ash contribution and thus an almost unlimited addition is possible.



Minimal losses of phosphorus

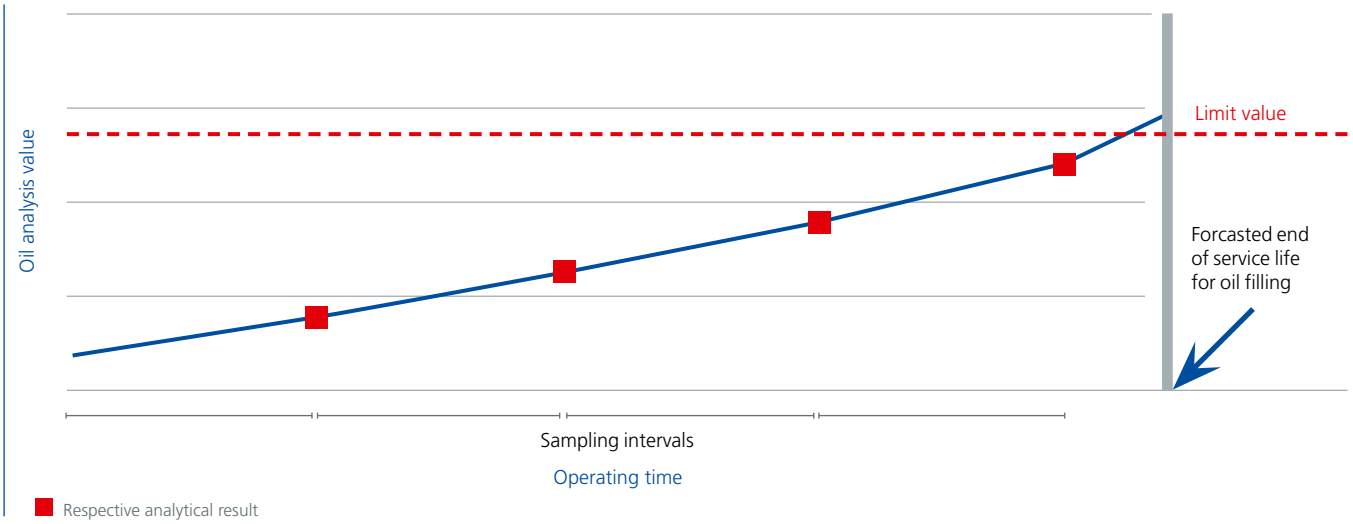
Phosphorus is an important component of anti-wear additives used in engine oils. During the combustion process, however, a certain amount of phosphorus is burned and enters the catalytic converter via the exhaust gases. There it can lead to poisoning effects on the catalytic surfaces and consequently to a loss of function. Thus, the performance and service life of the catalytic converters depend, among other things, on the amount of phosphorus contained in the exhaust gas.

Various scientific test procedures have shown that the use of zinc-free additive technology results in less phosphorus in the exhaust gases. Consequently, both the wear protection of the lubricant and the service life of the catalytic converter can be sustainably extended.

All advantages at a glance

- Significantly longer oil change interval due to higher neutralisation capacity (approx. 25% higher TBN) with the same sulphated ash content.
- Improved wear protection and higher oxidation stability due to new, ashless additives.
- Lower abrasive wear due to zinc-free sulphated ash deposits.
- Higher engine cleanliness.
- Minimisation of phosphorus losses and thus extension of wear protection and performance as well as catalytic converter life.

Condition monitoring of the engine oil



Monitoring and laboratory analysis

When a gas engine is commissioned, the oil change intervals are initially determined in accordance with the engine manufacturer's operating fluid specifications.

Constant oil analyses are very important in this regard, as they give an indicication on how quickly and in what way the oil quality changes. This enables a quick reaction to deviations in the gas quality or the operating mode of the engine and protects the engine from possible damage.

In general, the oil service life and thus the necessary oil change intervals are influenced by the following parameters:

- Gas quality
- Lubricating oil quality
- Engine type
- Oil volume
- Environmental conditions
- Modes 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.

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

Lubricants for stationary gas engines

Brand name	Description	Approvals	FUCHS Recommendations
	Premium-Quality		
TITAN GANYMET ULTRA Natural gas Special gas TBN: 8.5 mg KOH/g SA: 0.7 %	Premium Synthetic Zinc-free High Performance Engine Oil for stationary Otto and pilot injection gas engines. The highest corrosion protection together with the optimized zinc-free wear protection, excellent acid neutralisation properties and oxidation stability allow a safe and extended oil service in natural gas and especially aggressive gas operations (sewage gas, landfill gas and biogas) also with formaldehyde catalysts.	2G TA-003 agenitor series 2,3 AGROGEN CATERPILLAR TR 0199-99-12105 INNIO JENBACHER TA 1000-1109 - A, CAT: series 2, 3, 4 (A, B), 6 (C, E) - B, CAT: series 2, 3, 4 (A, B), 6 (C, E) MAN M 3271-4 MTU Onsite Energy A001072/01D MWM TR 0199-99-2105 SEVA TRS-07 SPANNER RE2 TEDOM 61-0-0281.1/L, B, S	–
TITAN GANYMET ULTRA LA Natural gas TBN: 7.1 mg KOH/g SA: 0.5 %	Super High Performance Engine Oil, zinc-free, for stationary gas engines.	INNIO JENBACHER TA 1000-1109 - A: series 2, 3, 4 (all versions), 6 (all versions incl. Steel piston gas engines versions F und J (J624))	–
	High-Quality		
TITAN GANYMET PLUS Special gas TBN: 9.2 mg KOH/g SA: 0.8 %	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).	CATERPILLAR TR 0199-99-12105 DREYER & BOSSE INNIO JENBACHER TA 1000-1109 - B: series 2, 3 MTU Onsite Energy A001072/01D MWM TR 0199-99-2105 SEVA TRS-07	–
TITAN GANYMET PLUS LA Natural gas TBN: 6.6 mg KOH/g SA: 0.5 %	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 extended 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 %.	CATERPILLAR TR 0199-99-12105 DEUTZ TR 0199-99-01213 MWM TR 0199-99-2105 SEVA TRS-07 TEDOM 61-0-0281.1/G, P	CATERPILLAR CUMMINS WAUKESHA

Lubricants for stationary gas engines

Brand name	Description	Approvals	FUCHS Recommendations
		Basic-Quality	
TITAN GANYMET PRO MA Special gas TBN: 4.73 mg KOH/g SA: 0.56 %	High Performance Engine Oil for stationary gas engines running on digester gases such as sewage gas, landfill gas and biogas (e.g. GE Jenbacher gas classes B and C). Reduced sulphated ash content for less deposits.	CATERPILLAR TR 0199-99-12105 INNIO JENBACHER TA 1000-1109 - B, C: series 2, 3, 4 (A, B), 6 (C, E) MAN M 3271-4 MAN M 3271-5 MWM TR 0199-99-2105	CATERPILLAR (Special gas)
TITAN GANYMET PRO LA Natural gas TBN: 5.54 mg KOH/g SA: 0.5 %	„Low Ash" High Performance Engine Oil for stationary gas engines. Specially for gas engines with oxidation or formaldehyd catalysts and heat exchangers that specify a sulphated ash content of less than 0.5 weight %.	CATERPILLAR TR 0199-99-12105 INNIO JENBACHER TA 1000-1109 - A, B: series 2, 3, 4 (A, B), 6 (C, E) MWM TR 0199-99-2105 ROLLS-ROYCE BERGEN B35:40, C26:33, K-G1, -G2, -G3, -G4 WÄRTSILÄ GAS ENGINES 20DF, 31DF, 32DF, 34DF, 46DF, 50DF, 31SG, 34SG, 50SG, 34LPG	CATERPILLAR CUMMINS WAUKESHA
TITAN GANYMET Special gas TBN: 8.1 mg KOH/g SA: 0.99 %	High Performance Engine Oil for stationary gas engines which run on all types of digester gases such as sewage gas, landfill gas and biogas.	ASJA AMBIENTE ITALIA INNIO JENBACHER TA 1000-1109 - C: series 2, 3 MAN M 3271-4 MTU Onsite Energy A001072/01D SEVA TRS-07	–
TITAN GANYMET LA Natural gas TBN: 5.5 mg KOH/g SA: 0.45 %	„Low Ash" High Performance Engine Oil for stationary gas engines. Good corrosion prevention. Specially for gas engines fitted with exhaust catalyst and heat exchangers that specify a sulphate ash content of less than 0.5 weight %.	2G TA-003 agenitor series 2, 3 AGROGEN CATERPILLAR TR 0199-99-12105 INNIO JENBACHER TA 1000-1109 - A, CAT: series 2, 3, 4 (A, B), 6 (C, E) - B, CAT: series 2, 3, 4 (A, B), 6 (C, E) MAN M 3271-4 MTU Onsite Energy A001072/01D MWM TR 0199-99-2105 SEVA TRS-07 SPANNER RE2 TEDOM 61-0-0281.1/L, B, S	–

Oil chooser

	Clean gas		Contaminated gas	
MANUFACTURER	**Natural gas**	**Cleaned special gas**	**Biogas / Sewer gas**	**Landfill gas**
		Approvals		
2G AGENITOR	TITAN GANYMET ULTRA (series 2 & 3)		TITAN GANYMET ULTRA (series 2 & 3)	
CATERPILLAR **MWM**	TITAN GANYMET PLUS LA TITAN GANYMET PRO LA TITAN GANYMET LA		TITAN GANYMET ULTRA TITAN GANYMET PLUS (only in agreement with service partner)	
INNIO JENBACHER	**Gas class A** TITAN GANYMET ULTRA (BR 2, 3, 4 (A,B) & 6 (C,E))* TITAN GANYMET ULTRA LA (BR 2, 3, 4, & 6 (incl. F&J) TITAN GANYMET PRO LA (BR 2, 3, 4 (A,B) & 6 (C,E)) TITAN GANYMET LA (BR 2, 3)*		**Gas class B** TITAN GANYMET ULTRA (BR 2, 3, 4 (A,B) & 6 (C,E))* TITAN GANYMET PLUS (BR 2, 3) TITAN GANYMET PRO MA (BR 2, 3, 4 (A,B) & 6 (C,E)) TITAN GANYMET PRO LA (BR 2, 3, 4 (A,B) & 6 (C,E))	**Gas class C** TITAN GANYMET PRO MA (BR 2, 3, 4 (A,B) & 6 (C,E)) TITAN GANYMET (BR 2, 3)
MAN	TITAN GANYMET PRO LA*** TITAN GANYMET PRO MA* TITAN GANYMET LA		TITAN GANYMET ULTRA TITAN GANYMET PRO MA* TITAN GANYMET	
MTU ONSITE ENERGY	TITAN GANYMET ULTRA (BR 400 & 4000 L61, L62, L63)* TITAN GANYMET LA (BR 400)		TITAN GANYMET ULTRA (BR 400 & 4000 L32FB / L62 FB) TITAN GANYMET PLUS (BR 400) TITAN GANYMET (BR 400)	
AGROGEN	TITAN GANYMET ULTRA		TITAN GANYMET ULTRA	
SPANNER RE²	–		TITAN GANYMET ULTRA (wood gas operation)	
TEDOM	TITAN GANYMET PLUS LA		TITAN GANYMET ULTRA	
WÄRTSILÄ	TITAN GANYMET PRO LA (20DF, 31DF, 32DF, 34DF, 46DF, 50DF, 31SG, 34SG, 50SG, 34LPG)		TITAN GANYMET PRO LA (20DF, 31DF, 32DF, 34DF, 46DF, 50DF, 31SG, 34SG, 50SG, 34LPG)	
		Recommendations		
CATERPILLAR	TITAN GANYMET PLUS LA TITAN GANYET PRO LA TITAN GANYMET LA		TITAN GANYMET PLUS LA TITAN GANYMET PRO MA TITAN GANYMET LA	
CUMMINS	TITAN GANYMET PLUS LA TITAN GANYMET PRO LA TITAN GANYMET LA		TITAN GANYMET PLUS LA TITAN GANYMET PRO LA TITAN GANYMET LA	
INNIO WAUKESHA	TITAN GANYMET PLUS LA TITAN GANYMET PRO LA TITAN GANYMET LA		TITAN GANYMET PLUS LA TITAN GANYMET PRO LA** TITAN GANYMET LA	

*also for applications with formaldehyd catalyst; **some engines require SA < 0.5 %; ***approval process ongoing

MAINTAIN antifreeze coolants for gas engines

Gas engines create large amounts of heat during the combustion process. As the engine and its components can only release heat slowly, additional coolants are necessary, so that the engine does not break down due to overheating.

Our "ready-mixed" anti-freeze coolants are especially easy to use on stationary engines. No on-site mixing is needed.

Brand name	Description	Specifications	Approvals	FUCHS Recommendations
MAINTAIN FRICOFIN LL concentrate	Premium Performance Coolant Concentrate based on monoethylene glycol. Free of nitrites, amines, phosphates and silicates with OAT-technology. Product dyeing: orange.	ASTM D 3306 TYPE 1 ASTM D 6210 TYPE I-FF BS 6580:2010 SAE J814 FORD WSS-M97-B44-D JAGUAR LAND ROVER STJLR.651.5003 FVV Heft R443 KSM 2142 UNE 26-361-88/1	Bez.Reg.Arnsbg. E62.12.22.64-2011-1 CAT/MWM TR 0199-99-2091 DAF 74002 DEUTZ DQC CB-14 MAN 324 TYPE SNF MB-APPROVAL 325.3 MTU MTL 5048	AFNOR NFR 15-601 TYPE 1; AS/NZS 2108:2004 TYPE A; ASTM D 4985; SAE J1034; ADE (ATLANTIS DIESEL ENGINES) BAIC GROUP FOTON Q-FPT 2313005-2013 CATERPILLAR MAK A4.05.09.01 CHRYSLER MS 12106; CNH MAT 3624 CUMMINS (ISBe engines at DAF and Leyland); CUMMINS CES 14603, CES 14439 DETROIT DIESEL 93K217; FIAT 9.55523 GM GMW 3420 (6277M)/GME L 1301 HYUNDAI MS 591-08; JASO M325 JIS K2234; JOHN DEERE JDM H5 KOMATSU AF-NAC (07.892 (2009)) LIEBHERR MD 1-36-130; MACK 014 GS 17009; MAZDA MEZ MN 121 D; PSA B 71 5110; RENAULT 41-01-001/- -S Type D Bergen Engines 2.13.01; SAAB B 040 1065 SKODA 61-0-0257; TOYOTA TSK 2601G-8A VW TL 774-D/F (G12+/different colour); VOLVO COOLANT VCS (STD 418-0001)
MAINTAIN FRICOFIN LL 50	Super High Performance Coolant Ready-Mix based on monoethylene glycol. Free of nitrites, amines and phosphates with hybrid technology. Offers frost protection down to -37°C. Product dyeing: blue-green.	ASTM D 3306 TYPE 3 ASTM D 6210 TYPE 3-FF BS 6580:2010	CAT/MWM TR 0199-99-2091 DAF 74002 DEUTZ DQC CB-14 MAN 324 TYPE SNF MB-APPROVAL 326.3 MTU MTL 5048	ASTM D 4985; SAE J1034 Bez.Reg.Arnsbg. E62.12.22.64-2011-1 CATERPILLAR MAK A4.05.09.01 CHRYSLER MS 12106; NH MAT 3624 CUMMINS CES 14603, CES 14439 DETROIT DIESEL 93K217; FIAT 9.55523 FORD WSS-M97-B44-D2; GM GMW 3420 (6277M); HYUNDAI MS 591-08 JAGUAR LAND ROVER STJLR.651.5003 JOHN DEERE JDM H5; KOMATSU AF-NAC (ready mix) (07.892 (2009)); LIEBHERR MD 1-36-130; MACK 014 GS 17009; MAZDA MEZ MN 121 D; PSA B 71 5110; RENAULT 41-01-001/- -S Type D; SAAB B 040 1065; SKODA 61-0-0257; OYOTA TSK 2601G-8A; VAUXHALL GME L1301; VOLVO COOLANT VCS (STD 418-0001); VW TL 774-D/F (G12+ /different colour)
MAINTAIN FRICOFIN concentrate	Super High Performance Coolant Concentrate based on monoethylene glycol. Free of nitrites, amines and phosphates with hybrid technology. Product dyeing: blue-green.	AFNOR NF R 15-601 TYPE 1 AS/NZS 2108:2004 TYPE A ASTM D 3306 TYPE 1 ASTM D 4985 BS 6580:2010 CUNA NC 956-16 SAE J814 SAE J1034	CAT/MWM TR 0199-99-2091 DEUTZ DQC CA-14 INNIO JENBACHER TA 1 000-0201; MAN 324 TYPE NF MAN 324 TYPE NF PRITARDER MB-APPROVAL 325.0; MTU MTL 5048; PN-C 40007:2000 VOITH TURBO 172.00225010	BMW GS 94000 (BMW N 600 69.0) DAF 74001 LIEBHERR TLV 035/TLV 23009 A OPEL/GM B 040 0240 VW TL 774-C (G11)
MAINTAIN FRICOFIN 50	Super High Performance Coolant Ready-Mix based on monoethylene glycol. Free of nitrites, amines and phosphates with hybrid technology. Offers frost protection down to -37°C. Product dyeing: blue-green.	AFNOR NF R 15-601 TYPE 3 ASTM D 3306 TYPE 3 ASTM D 4985 BS 6580:2010 SAE J814	DEUTZ DQC CA-14 MB-APPROVAL 326.0	BMW GS 94000 (BMW N 600 69.0) DAF 74001 INNIO JENBACHER TA 1000-0201 LIEBHERR TLV 035/TLV 23009 A MAN 324 TYPE NF MAN 324 TYPE NF PRITARDER MTU MTL 5048 CAT/MWM TR 0199-99-2091 OPEL/GM B 040 0240 PN-C 40007:2000; VOITH TURBO 172.00225010; VW TL 774-C (G11)

Save your benefit

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

Please fill in, take a photo and mail to:

Anwendungstechnik.Automotive-FS@fuchs.com

Customer Details

Company

Telephone

Contact Person/Title

Customer ID

Address

E-mail

Engine Details

Manufacturer

Type

Engine power (kW)

Year of manufacturer

Total operating hours

Mileage (h/week)

Oil volume

Operating hours of the current oil

Others

Oil consumption

Gas details

Gas type

Gas composition attached

Yes (please enclose a copy) ☐

No (please fill out the following) ☐

If no copy is attached, please fill in:

of: ppm/% to: ppm/%

Ammonia (NH_3)

of: ppm/% to: ppm/%

Hydrogen sulfide (H_2S)

of: ppm/% to: ppm/%

Fluorine (F)

of: ppm/% to: ppm/%

Sulphur (S)

of: ppm/% to: ppm/%

Chlorine (Cl)

Details of current oil in use

Product name

Manufacturer

Oil change interval reached

Experience with the product

Oil analysis attached?

Yes (please enclose a copy) ☐ No ☐

Date/city

Signature

Notes

Notes