TITAN | MAINTAIN

Lubricants for stationary gas engines

LUBRICANTS.
TECHNOLOGY.
PEOPLE.

FUCHS

MOVING YOUR WORLD

FUCHS LUBRICANTS

We do not just develop lubricants. We develop intelligent solutions for highly complex challenges.

To this end, we have pooled our expertise and experience from a wide range of application areas:
FUCHS LUBRICANTS and FUCHS LUBRITECH became FUCHS LUBRICANTS GERMANY.
Our goal: to keep our customers' world in motion. Efficient, sustainable, reliable.
Today and tomorrow.

What can we move for you?

FUCHS LUBRICANTS (UK) plc

Facts and figures

Company: FUCHS LUBRICANTS (UK) plc,
a company of the FUCHS Group
Locations: Based in Hanley, Stoke-on-Trent, England.
With approx. 350 UK employees (approx. 6000 worldwide)
Product range: A full range of more than 3,000 products
for all application areas
Certifications : IATF 16949, BS EN 9100, ISO 9001, ISO 45001,
ISO 14001 & ISO 50001
(detailed certifications at www.fuchs.com/uk)
CO_2 neutral production*

Since 1931, we have been pursuing the same goal: to keep the world moving. With innovative and technological lubricant solutions that have a sustainable impact on the future. Unconditional reliability is our top priority, it is the foundation of our company and basis for everything that defines us.

Reliability is both a driver and a demand. And it's a promise to all our customers in the fields of automotive suppliers and OEMs, mechanical engineering, metal processing, mining and exploration, aerospace, energy, construction and transport, agriculture and forestry, as well as the paper, steel, metal, cement, forging and food industries, but also qualified lubricant dealers, car dealerships and workshops.

Long-term experience, high development strength and the fulfilment of far-reaching standards are the basis for the special quality of our world-leading product brands. We deliver solutions that are simply more efficient & therefore more sustainable. We always think in holistic solutions. For the development of individual solutions, we enter into an intensive customer dialogue with you. This is the way we live up to our claim of moving your world.

MOVING YOUR WORLD

*Partially also based on compensation

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 centres 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.

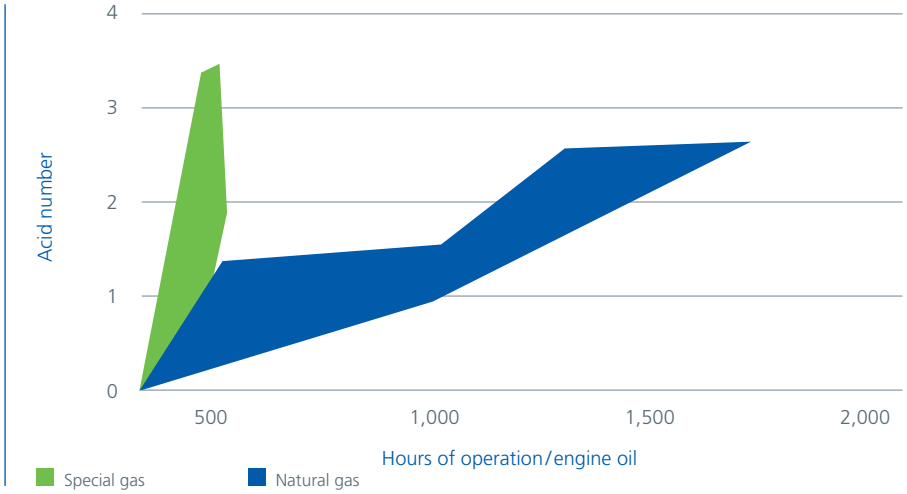
Gases and their composition

In different applications of cogeneration units, different fuel gases can be used. Fuel gas is defined as an appropriate gas mixture for gas engines, which vary in composition, fuel value and knock resistance. The methane number of natural gas is for example 70 – 90 and decreases the knock resistance in comparison to gases like biogas, sewage or landfill gas with a methane number of 100 – 160. The gas quality and composition can vary during operation which can be compensated by using an adjusted facility and engine management. If the characteristics of the gas quality change or if dangerous substances increase, the lifetime, the reliability and the efficiency of the engine can be shortened. Fuel gases consist of components which provide the needed energy for the combustion process and impurities which influence reliable operation.

The main components define the most important fuel characteristics (e.g. knock resistance, fuel value, combustion temperature, flame propagation speed and ignition properties) involved in the engine operation and combustion process. The main important components are methane, the main contributor to the fuel value and energy content of the combustion gas, hydrogen and chained hydrocarbons such as propane and butane as well as inert gases like nitrogen and carbon dioxide.

The most usual impurities found in the different gas types are sulphur compounds or hydrogen sulphide, chlorine, fluoride, silicon compounds or dust. The effects of these impurities are proportional to the amount present in the engine during operation. The lower the fuel value of the combustion gas, the higher the amount of gas being used in the combustion process. With more gas being used there is a higher amount of impurities. In order to be able to evaluate and compare different gases even with identical concentrations of pollutant elements but with different energy content, the concentration of trace elements must be referenced to the fuel value of the combustion gases. Impurities such as sulphur compounds occur primarily on special gases so that the oxidation and the acidification proceed faster. Another difficulty of these gases is the varying composition and quality which can change continuously during operation. The engine and engine oils therefore have to meet different challenges depending on the gas type.

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: 70 – 90	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: 100 – 150	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 (CMM)** 	MN: 95 – 100	Sulfur and silicon compounds	Corrosive wear Silicon in the combustion chamber Abrasive wear
Wood gas 	MN: 120 – 140	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
**Gas from active mines (CMM – Coal Mine Methane)

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.

The result is an increased formation of NOX which reacts with the used engine oil and causes oxidation and nitration along 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.

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

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

Depending on the application, the characteristics of engine oils have to be customized. It can be differentiated for example between applications with natural gas or cleaned biogas (reduced sulphur content) and applications with special gases.

The high performance engine oils of the TITAN GANYMET range

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 & corrosion.

Technical background

In an engine oil, the sulphated ash (SA) is formed from certain additive (functional metallic) 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 metalorganic compound in the form of ZnDTP (zinc dialkyldithiophosphates). This compound offers high protection against wear and corrosion as well as good antioxidation properties. However, this additive gets into the combustion chamber of the engine by passing the piston rings. When burnt, ash components are formed and build deposits on the pistons, cylinder head, valves and catalytic converter. These deposits cause wear of engine components and lead to a drop in performance and premature engine failure.

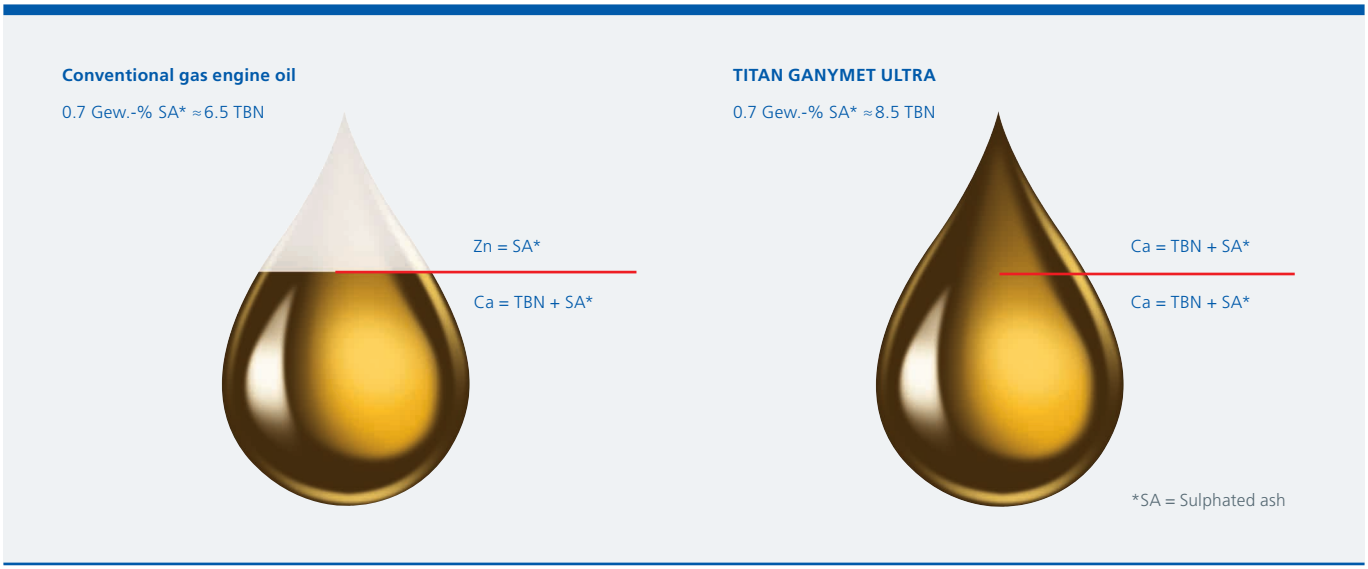
The following applies: The higher the proportion of ZnDTP, the greater the wear protection and antioxidation characteristics – but also the amount of sulphated ash.

Additives which contain calcium compounds are the principal constituent of socalled detergents. These play a significant role in 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 polished 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 reduces acidity increase and thereby protects against corrosion.

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.

Therefore carefully balanced formulations are required to enable the use of these additives: 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 limits for different types of fuel gas, the possibilities of optimising single character istics of an oil are limited. Therefore it is important to select the most suitable gas engine oil for the specific application. 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.

Clear advantage for zinc-free technology



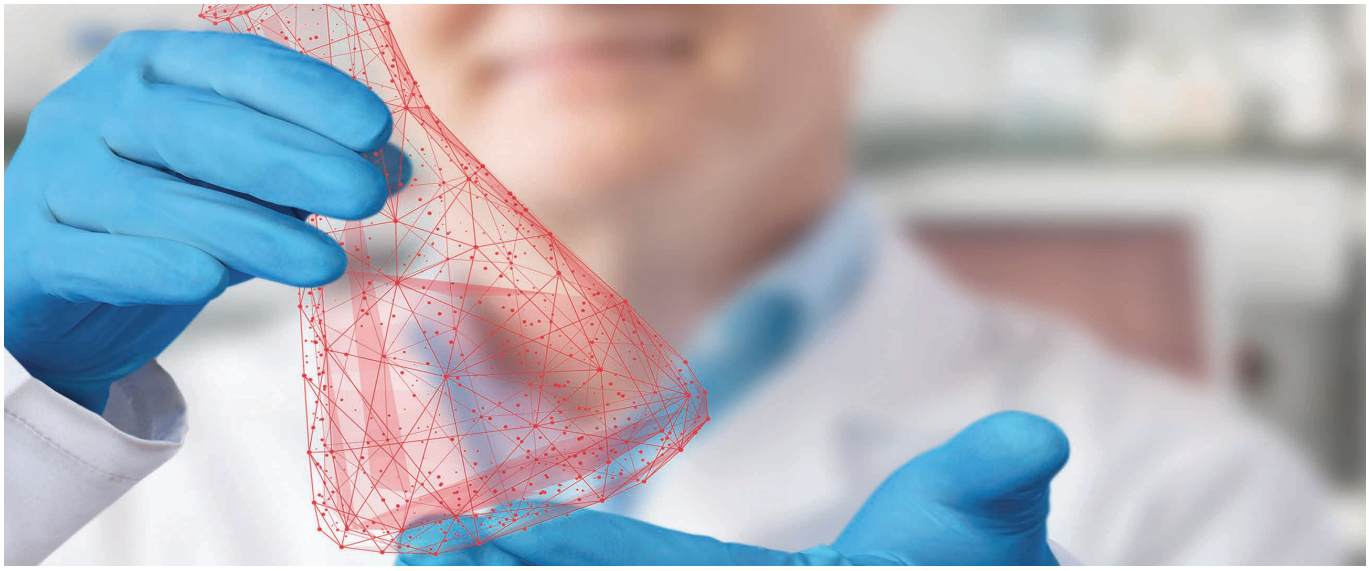
Why zinc-free?

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 by the recommendations of the engine manufacturer.

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.

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

- Gas quality
- Lubricating oil quality
- Environmental conditions
- Modes of engine operation

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.

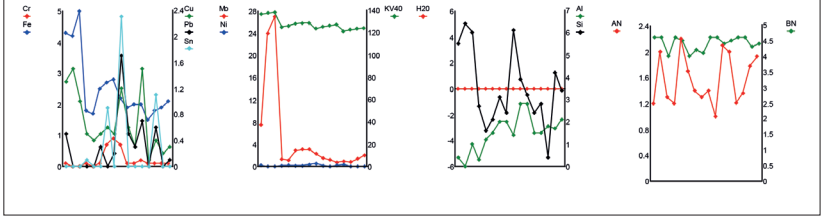
LUBRICANTS. TECHNOLOGY. PEOPLE. FUCHS

Make:	WAUKESKA	Sample No:	
Model:	BL - AT27GL	Location:	
Serial No:		Client:	
System:	Gas Engine	Kit Ref/Bottle No:	
Brand:	FUCHS TITAN GANYMET	Job No.:	
Grade:		Sampled:	
Unique No.:		Received:	

Diagnosis Key: Normal | Caution | Serious — Diagnostician:

Wear appears satisfactory. Condition satisfactory. Advice : Resample at recommended sampling interval to follow trends.

Results			Current Sample	Historical Samples		
Sample No			10083530	10071025	10054235	30011991
Status			✓	✓	✓	✓
Sampled			30/01/23	09/12/22	10/10/22	19/08/22
Top-up			249	226	216	289
Fluid Age	HOURS		5000	3750	2500	1250
Unit Age	HOURS		60644	59330	58080	56843
Received			03/02/23	16/12/22	14/10/22	24/08/22
Fluid Condition						
KV@40	mm²/s	LM-3*	123.8	123.4	122.5	121.0
KV@100	mm²/s	LM-3*	13.6	13.5	13.6	13.6
AN	mg KOH/g	LM-7*	1.93	1.78	1.36	1.21
TBN	mg KOH/g	LM-4*	4.4	4.3	4.6	4.6
Ox Area	Abs/0.1mm	LM-13	11.21	11.07	10.39	10.33
z-App	-	LM-12	Dark	Dark	Dark	Debris Present
Ox DIN	Abs/cm	LM-13	N/A	N/A	N/A	N/A
Nit Area	Abs/0.1mm	LM-13	6.25	6.13	5.63	5.08
Nit DIN	Abs/cm	LM-13	N/A	N/A	N/A	N/A
Sulfation	Abs/0.1mm	LM-13	15.54	15.21	15.22	15.11
pH	pH units	LM-7*	5.6	6.1	5.8	6.1
Cl (Chlorine)	ppm	LM-39*	<100	<100	<100	<100
Glycol%	%		0.0	0.0	0.0	0.0
Additives						
Boron (B)	mg/kg	LM-5*	4.2	3.3	2.1	2.3
Barium (Ba)	mg/kg	LM-5*	0.0	0.0	0.0	0.0
Calcium (Ca)	mg/kg	LM-5*	1533	1522	1486	1443
Magnesium (Mg)	mg/kg	LM-5*	10	4.3	5.7	5.0
Phosphorus (P)	mg/kg	LM-5*	281	270	268	265
Sulphur (S)	mg/kg	LM-5*	2848	2877	2851	2769
Zinc (Zn)	mg/kg	LM-5*	403	372	360	346
Contamination						
Water %	%	LM-1	<0.1	<0.1	<0.1	<0.1
Sodium (Na)	mg/kg	LM-5*	0.8	0.5	0.6	0.0
Potassium (K)	mg/kg	LM-5*	0.5	0.5	0.0	0.0
Silicon (Si)	mg/kg	LM-5*	3.4	4.2	0.4	2.8
Lithium (Li)	mg/kg	LM-5*	0.2	0.2	0.4	0.7
Wear Metals						
Aluminium (Al)	mg/kg	LM-5*	2.1	1.7	1.8	1.5
Tin (Sn)	mg/kg	LM-5*	0.0	0.0	1.1	0.0
Lead (Pb)	mg/kg	LM-5*	0.1	0.0	0.6	0.0
Copper (Cu)	mg/kg	LM-5*	0.3	0.2	0.4	0.1
Iron (Fe)	mg/kg	LM-5*	2.1	1.9	1.8	1.5
Chromium (Cr)	mg/kg	LM-5*	0.1	0.1	0.1	0.1
Molybdenum (Mo)	mg/kg	LM-5*	2.0	1.4	0.8	0.9
Nickel (Ni)	mg/kg	LM-5*	0.0	0.0	0.0	0.3
Manganese (Mn)	mg/kg	LM-5*	0.0	0.2	0.2	0.2
Titanium (Ti)	mg/kg	LM-5*	0.1	0.0	0.2	0.2
Vanadium (V)	mg/kg	LM-5*	0.0	0.0	1.1	1.2
Cadmium (Cd)	mg/kg	LM-5*	0.0	0.1	0.0	0.0

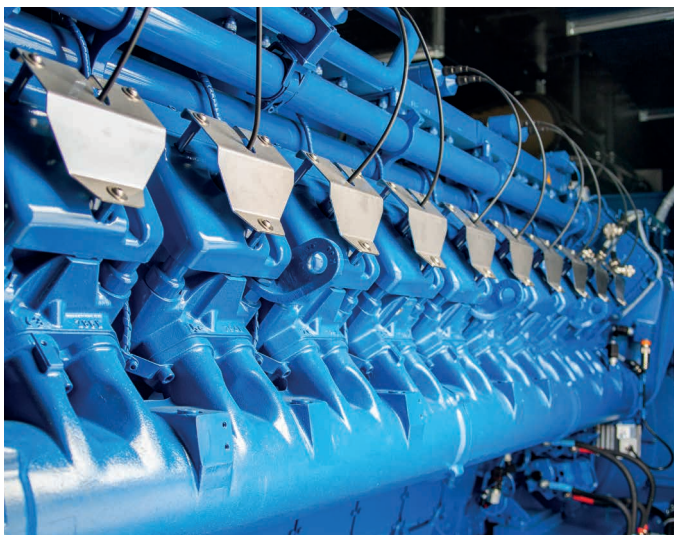


Vampire pump for oil sampling

CENT Condition Monitoring Kit

Lubricants for stationary gas engines

Brand name	Description	Approvals	FUCHS Recommendations
	Premium-Quality		
TITAN GANYMET ULTRA LA Natural gas Special gas	Premium gas engine oil of the latest generation, specially developed for use in highly charged gas engines with steel piston technology and turbocharging. It is suitable for gas engines of all performance ranges powered with natural gas. Formulated based on the latest, application oriented additive technologies and a high-performance, high-quality base oil combination.	DEUTZ TR 0199-99-01213 INNIO JENBACHER TA 1000-1109 - A: series 2, 3, 4 (all versions), 6 (all versions incl. Steel piston gas engines versions F and J (J624)) Bergen Engines B36:45, B35:40, C26:33 and K-series	CATERPILLAR Series 3500
TITAN GANYMET ULTRA TBN: 8.5 mg KOH/g SA: 0.7 % Natural gas Special gas	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 Series 400 (E, P, B with SRK), Series 4000 (L32FB, L62FB) MWM TR 0199-99-2105 SEVA TRS-07 SPANNER RE2 TEDOM 61-0-0281.1/L, B, S	–
	High-Quality		
TITAN GANYMET PLUS TBN: 9.2 mg KOH/g SA: 0.8 % Natural gas	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 Series 400 (B) MWM TR 0199-99-2105 SEVA TRS-07	–
TITAN GANYMET PLUS LA TBN: 6.6 mg KOH/g SA: 0.5 % Natural gas	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 TBN: 4.73 mg KOH/g SA: 0.56 % Special gas	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 TBN: 5.54 mg KOH/g SA: 0.5 % Natural gas	"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) MAN M 3271-2 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, 25SG, 28SG, 31SG, 34SG, 50SG, 34LPG, 175SG, 220SG	CATERPILLAR CUMMINS WAUKESHA
TITAN GANYMET PRO RR		ROLLS-ROYCE BERGEN BV-G, CR-G, K-G1, -G2, -G3	
TITAN GANYMET TBN: 8.1 mg KOH/g SA: 0.99 % Special gas	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 Series 400 (B) SEVA TRS-07	–
TITAN GANYMET LA TBN: 5.5 mg KOH/g SA: 0.45 % Natural gas	"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 %.	CATERPILLAR TR 0199-99-12105 DEUTZ TR 0199-99-01213 INNIO JENBACHER TA 1000-1109 - A, CAT: series 2, 3, 4 (A, B), 6 (C, E) MAN M 3271-2 MTU Onsite Energy Series 400 (E, P), Series 4000 (L61, L62, L63) MWM TR 0199-99-2105 SEVA TRS-07	CATERPILLAR CUMMINS WAUKESHA

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 Additive based on monoethylene glycol. Free from nitrite, amine, phosphate and silicates. Product dyeing: orange	ASTM D 3306 TYPE I 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	AFNOR NFR 15-601 TYPE I 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) HYUNDAI MS 591-08 JASO M325, JIS K2234 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 TOYOTA TSK 2601G-8A VAUXHALL GME L1301 VW TL 774-D/F (G12+/different colour) VOLVO 128 6083/002 (= VOLVO LKW, VOLVO CE, from MY 2005, VOLVO PENTA from MY 05/2010)
MAINTAIN FRICOFIN concentrate	Super High Performance Coolant Additive based on monoethylene glycol. Free from nitrite, amine and phosphate. Product dyeing: blue-green.	AFNOR NF R 15-601 TYPE 1 ASTM D 3306 TYPE I ASTM D 4985 BS 6580:2010 CUNA NC 956-16 SAE J814; SAE J1034	BMW GS 94000 (BMW N 600 69.0) CAT / MWM TR 0199-99-2091 DEUTZ DQC CA-14 GE JENBACHER TA 1000-0201 MAN 324 TYPE NF; - PRITARDER MB-APPROVAL 325.0 MTU MTL 5048 PN-C 40007:2000 VOITH TURBO 172.00225010	DAF 74001 LIEBHERR TLV 035/TLV 23009 A OPEL/GM B 040 0240 VW TL 774-C (G11)
MAINTAIN FRICOFIN -35 Ready-to-use Mix	Super High Performance Coolant Ready-mix based on monoethylene glycol. Offers frost protection down to -35°C. Free from nitrite, amine and phosphate. Product dyeing: blue-green.	AFNOR NF R 15-601 TYPE 3 ASTM D 3306 TYPE III 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 JENBACHER TA 1000-0201 LIEBHERR TLV 035/TLV 23009 A MAN 324 TYPE NF; -PRITARDER MTU MTL5048 CAT/MWM TR 0199-99-2091 OPEL/GM B 040 0240 PN-C 40007:2000 VOITH TURBO 172.00225010 VW TL 774-C (G11)

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)	
GE JENBACHER	TITAN GANYMET ULTRA (BR 2, 3, 4 A-B & 6 C-E)* TITAN GANYMET PRO LA (BR 2, 3, 4 A-B & 6 C-E) TITAN GANYMET LA (BR 2 & 3)*		TITAN GANYMET ULTRA (BR 2&3) TITAN GANYMET PRO LA (BR 2, 3, 4 A-B & 6 C-E) TITAN GANYMET PRO MA (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
MAN	TITAN GANYMET LA	TITAN GANYMET ULTRA TITAN GANYMET TITAN GANYMET LA*	TITAN GANYMET ULTRA TITAN GANYMET TITAN GANYMET PRO MA	
MTU ONSITE ENERGY (MDE)	TITAN GANYMET ULTRA (BR 400) 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	
		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	
WAUKESHA	TITAN GANYMET PLUS LA TITAN GANYMET PRO LA TITAN GANYMET LA		TITAN GANYMET ULTRA TITAN GANYMET PLUS LA TITAN GANYMET PRO LA** TITAN GANYMET LA	
WÄRTSILÄ	TITAN GANYMET PRO LA		TITAN GANYMET PRO LA	

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

Notes

Engine make	Engine model	Gas type used	Hours run	FUCHS recommendation

Note
The information contained in this product information is based on the experience and know-how of FUCHS LUBRICANTS in the development and manufacturing of lubricants and represents the current state-of-the-art. The performance of our products can be influenced by a series of factors, especially the specific use, the method of application, the operational environment, component pre-treatment, possible external contamination, etc. For this reason, universally-valid statements about the function of our products are not possible. The information given in this product information represents general, non-binding guidelines. No warranty expressed or implied is given concerning the properties of the product or its suitability for any given application. We therefore recommend that you consult a FUCHS application engineer to discuss application conditions and the performance criteria of the products before the product is used. It is the responsibility of the user to test the functional suitability of the product and to use it with the corresponding care. Our products undergo continuous improvement. We therefore retain the right to change our product program, the products, and their manufacturing processes as well as all details of our product information sheets at any time and without warning, unless otherwise provided in customer-specific agreements. With the publication of this product information, all previous editions cease to be valid.

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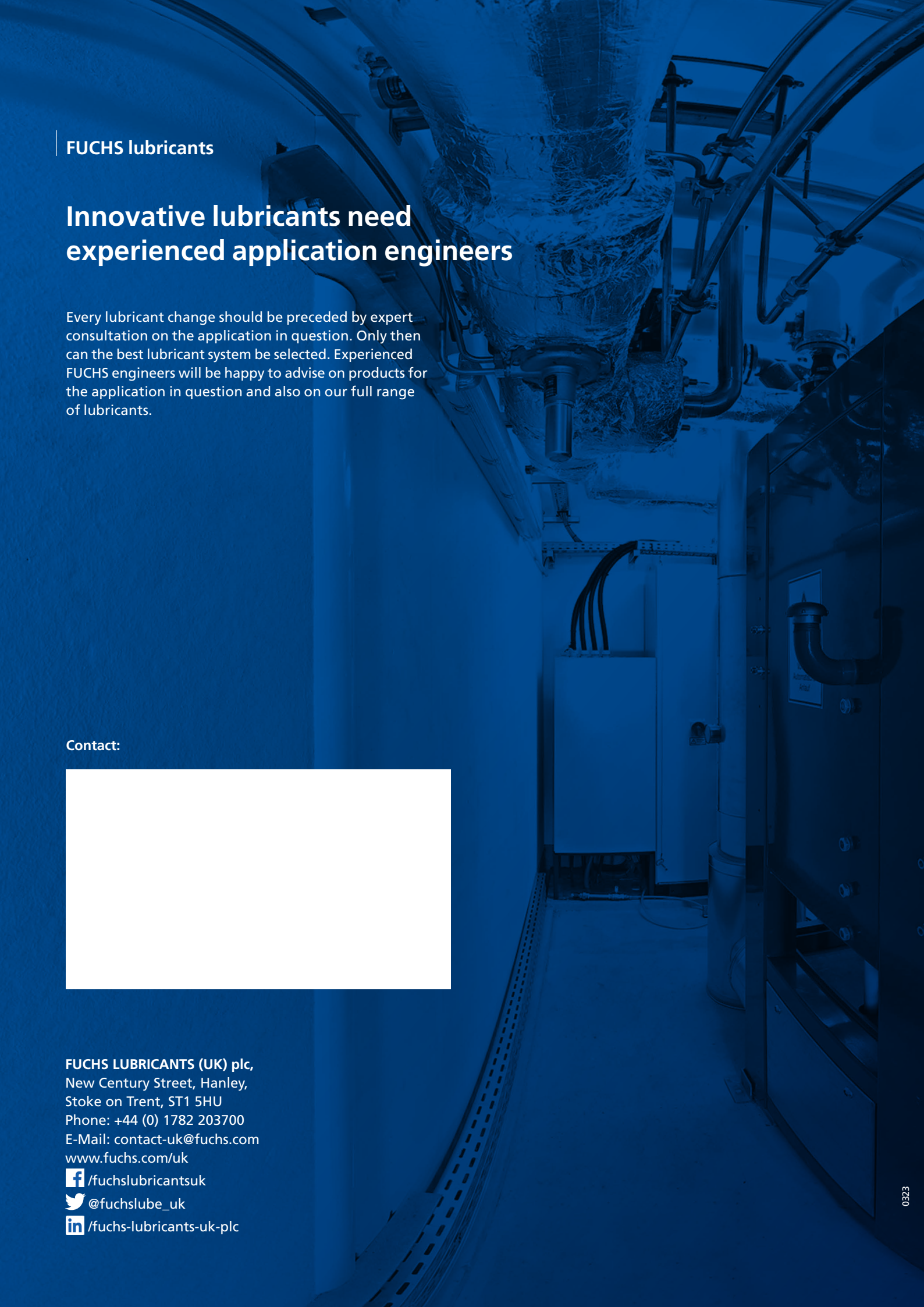

FUCHS lubricants

Innovative lubricants need experienced application engineers

Every lubricant change should be preceded by expert consultation on the application in question. Only then can the best lubricant system be selected. Experienced FUCHS engineers will be happy to advise on products for the application in question and also on our full range of lubricants.

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