

PRODUCT	BENEFITS	FUEL TYPE	ISO VISCOSITY GRADES	SPECIFICATIONS AND APPROVALS <small>(Full details of approvals for all products can be obtained from your Shell representative; approvals and claims will vary by viscosity grade.)</small>
Shell Mysella S6 N	<ul style="list-style-type: none"> Extended oil life Improved protection against deposits 	Natural gas	40	Suitable for the latest generation of high efficiency gas engines. Approved by GE Jenbacher (Series 2, 3, Series 4 Version C, Series 6); and MWM new generation engines, especially with steel pistons
Shell Mysella S5 N	<ul style="list-style-type: none"> Extended oil life Extra protection against deposits and corrosion 	Natural gas or mild sour gas	40, 15W-40	Meets the requirements of Caterpillar stationary gas engines Approved by Cummins (QSV 81G/91G, OSK 60G); GE Jenbacher (Series 2, 3, 4 Fuel Class A and CAT, Series 6 (Version E&F) Fuel Class A and CAT); Guascor (FGLD, SFGLD); MAN (3271-2); MTU (MLT 5074, A001061/29E (Category 1), Onsite Energy Series 400 and 4000); MWM-Deutz (TR 0199-99-2105); MDE Dezentrale Energiesysteme (naturally aspirated 28xx, 30xx (D/M), turbocharged 28xx 30xx (T/L/Z)); MAK (GCM 34); Rolls-Royce (KG-1, KG-2, KG-3, KG-4, BV-G); Tedom (natural gas engines); Wärtsilä (34SG, 32DF, 50DF, 25SG, 28SG, 175SG, 220SG); and Waukesha (cogen and 220 GL (pipeline quality natural gas))
Shell Mysella S5 S	<ul style="list-style-type: none"> Extended oil life Extra protection against sour gas 	Natural or sour gas, including biogas, sewage gas and landfill gas	40	Meets the requirements of Caterpillar Approval process is ongoing for the following engine types: GE Jenbacher (Series 2, 3 fuel class B and C and CAT); MAN B&W Diesel (natural gas, landfill gas/digester gas/biogas gas engines, and dual fuel (pilot diesel)); MAN: 3271-4; MDE Dezentrale Energiesysteme (naturally aspirated 28xx, 30xx (D/M), turbocharged 28xx 30xx (T/L/Z)); Mitsubishi Heavy Industries; Rolls-Royce (KG-1, KG-2, KG-3 (biogas operation)); Wärtsilä (CR26); and Waukesha (cogen application (pipeline quality natural gas)).
Shell Mysella S3 N	<ul style="list-style-type: none"> Reliable protection Low ash content for four-stroke engines 	Natural gas or mild sour gas	40, 30	Meets the requirements of Caterpillar stationary gas engines and Waukesha Approved by GE Jenbacher (Series 2, 3, 4 fuel class A and CAT, Series 6 (Version E&F) fuel class A and CAT); MAN (natural gas, landfill gas/digester gas/biogas gas engines), dual fuel (pilot diesel); MTU (MLT 5074, A001061/29E (Category 1), Onsite Energy Series 400 and 4000); MWM-Deutz (TR 0199-99-2105); MDE Dezentrale Energiesysteme (28xx, 30xx); MAK (GCM 34); Nuovo Pignone (reciprocating compressor service Class A); Perkins (4000 series); Rolls-Royce (KG-1, KG-2, KG-3); Wärtsilä (34SG, 32DF, 50DF, 25SG, 28SG, 175SG, 220SG, 180SG, QSW, UD 24 S4G, UD 30S4G); and Waukesha: 220 GL (pipeline quality natural gas)
Shell Mysella S3 S	<ul style="list-style-type: none"> Extra protection Medium ash content for four-stroke engines 	Natural gas or sour gas	40	Approved by GE Jenbacher (Series 2, 3 fuel class B and C and CAT); MAN B&W Diesel (natural gas, landfill gas/digester gas/biogas gas engines, dual fuel (pilot diesel)); MAN (3271-4); MDE Dezentrale Energiesysteme (naturally aspirated 28xx, 30 xx (D/M), turbocharged 28xx 30xx (T/L/Z)); Mitsubishi Heavy Industries; Rolls-Royce (KG-1, KG-2, KG-3 (biogas operation)); Waukesha (cogen application (pipeline quality natural gas)); and Wärtsilä (CR26)
Shell Mysella S3 Z	<ul style="list-style-type: none"> Reliable protection Very low ash content for two- and four-stroke engines 	Natural gas	40, 30	Meets and exceeds the requirements of major original equipment manufacturers such as GE, Siemens and Alstom. Approved by FM Global against Standard 6930 for "Less flammable hydraulic fluids". Meets the requirements of ISO Standard 12922 and ASTM 4293 for HFDR-type fire-resistant hydraulic fluids
Shell Mysella S2 N	<ul style="list-style-type: none"> Reliable protection Low ash content for four-stroke engines 	Natural gas	40	Suitable for engine types where a low ash oil is required, such as Caterpillar, Waukesha and Genbacher engines
Shell Mysella S2 Z	<ul style="list-style-type: none"> Reliable protection Ash free content for two-stroke engines 	Natural gas	40, 30, 15W-40	Meets the requirements of Ajax; Allis-Chalmers; Caterpillar (except 3400, 3500, 3600); Clark; Climax; Colt-Fairbanks Morse; Cooper-Bessemer (two-cycle); Dresser-Rand (category I and II); Case IH; Minneapolis-Moline; Waukesha; White Superior (naturally aspirated); and Worthington



COMPREHENSIVE PRODUCT AND SERVICE PROVISION

Shell Lubricants was named the number one lubricants supplier (Kline & Company, 2017) and has a 60-year history of innovation. We are constantly investing to develop better lubrication solutions, as demonstrated by

- **Shell Turbo S4 X** – a premium industrial gas turbine oil based on Shell GTL technology
- **Shell Diala S4 ZX-I** – a premium, inhibited transformer oil

Whatever your needs or application, Shell can provide a full range of oils and greases, including synthetic, high-performance products and additional services.



Find out more by visiting
www.shell.com/lubricants

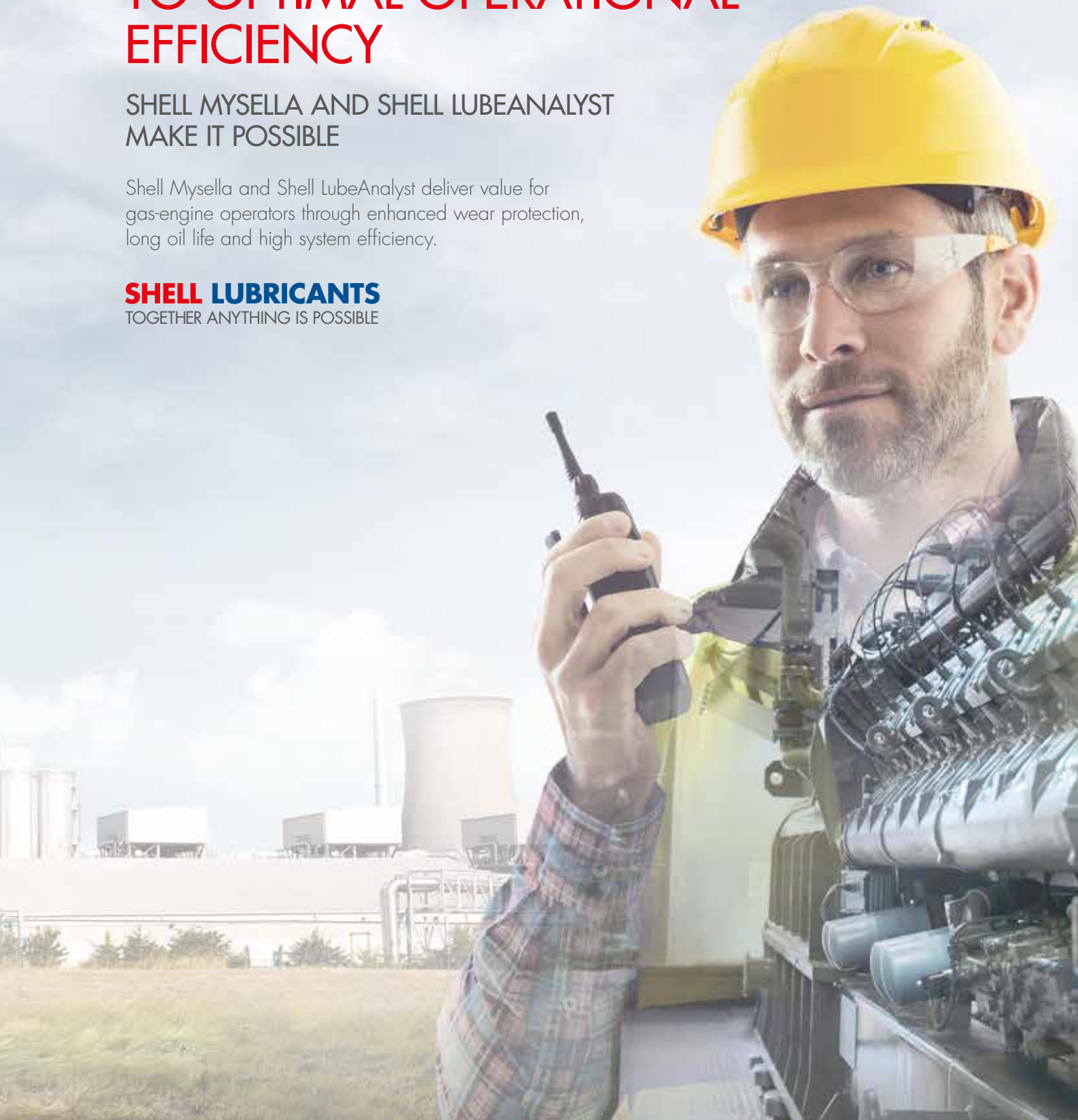


FROM ENGINE PROTECTION TO OPTIMAL OPERATIONAL EFFICIENCY

SHELL MYSELLA AND SHELL LUBEANALYST
MAKE IT POSSIBLE

Shell Mysella and Shell LubeAnalyst deliver value for gas-engine operators through enhanced wear protection, long oil life and high system efficiency.

SHELL LUBRICANTS
TOGETHER ANYTHING IS POSSIBLE



EVERY PART OF YOUR MACHINE OR PROCESS HAS BEEN METICULOUSLY ENGINEERED, SO YOU WANT TO BE SURE THAT YOU CHOOSE A LUBRICANT THAT HAS BEEN DESIGNED TO ENSURE THAT YOUR EQUIPMENT IS WELL PROTECTED AND WORKS EFFICIENTLY.

The Shell Mysella range of gas-engine oils has been developed to enable equipment operators to select the oil that will deliver optimum value to their operations through enhanced wear protection, long oil life and high system efficiency.



WEAR PROTECTION

The Shell Mysella range of gas-engine oils is designed to minimise deposit build-up and to keep your engine clean. For instance, Shell Mysella S5 N provides superior deposit control, even in the latest generation of high-output engines that operate in very severe conditions with very high piston temperatures and pressures. This helps to maintain excellent ring belt cleanliness and cylinder liner protection.

OIL LIFE

Shell Mysella oils are designed to deliver long oil life to help you maintain your operations efficiently and cost-effectively. For instance, Shell Mysella S5 S can provide extended oil-drain intervals in engines fuelled by sour gases such as biogas or sewage gas. These gas types may contain high levels of halogen compounds, which can rapidly reduce the oil life of more traditional gas-engine lubricants.

SYSTEM EFFICIENCY

The Shell Mysella range of gas-engine oils has been designed to provide high engine efficiency. For instance, Shell Mysella S5 N helps to provide excellent cleanliness for heat recovery boilers, turbochargers and intercoolers.

REAL-WORLD VALUE DELIVERY

The Shell Mysella range of gas-engine oils has been used successfully throughout the world. A compressed natural gas supplier, which uses more than 130 gas engines from manufacturers such as Caterpillar and Waukesha to drive the compressors at its compressed natural gas outlets across Delhi, India, was very impressed by Shell Mysella S5 N. By switching to this oil, the company

- increased the engines' oil-drain interval from 850 to 1,100 hours
- reduced oil consumption
- increased filter life
- enhanced equipment availability.

As a result, the compressed natural gas supplier **cut its annual operating costs by over \$84,000¹**.

¹The savings indicated are specific to the calculation date and mentioned site. These calculations may vary from site to site and from time to time, depending on, for example, the application, the operating conditions, the current products being used, the condition of the equipment and the maintenance practices.



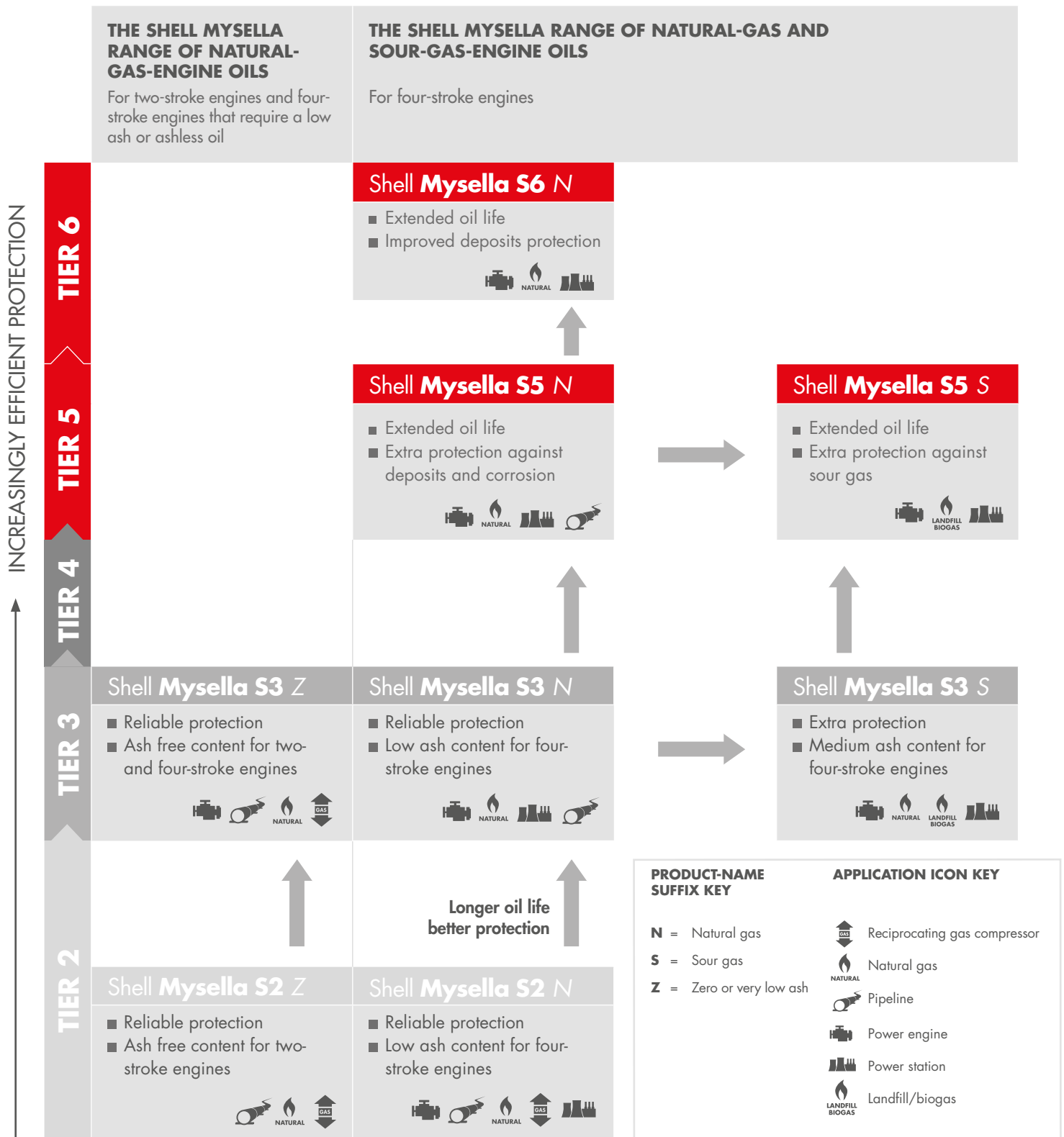
THE SOUR-GAS CHALLENGE

An increasing number of stationary gas engines are fuelled by sour gases. Sour gases derive from the decomposition of matter in, for example, landfill sites, biomass digesters and sewage. These gases offer a unique set of challenges to the engine operator: acids in the gas can cause corrosion and the rapid reduction of oil life. In addition, siloxanes, which are commonly found in landfill gases, can cause excessive deposit formation. Shell has worked to understand the mechanisms behind these problems and has developed Shell Mysella S5 S to offer a long-life solution for engines fuelled by sour gases without increasing the oil's ash content.

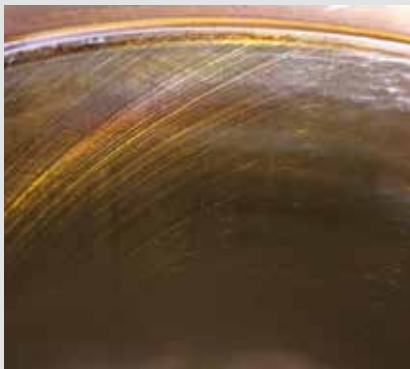


A RANGE OF GAS-ENGINE OILS TO MEET YOUR NEED

To meet the challenges of a wide range of gas engines and applications, Shell has designed a portfolio of fluids that enable you to choose a product to match your technical and operational needs.



THE SHELL MYSELLA RANGE OF GAS-ENGINE OILS HAS BEEN DESIGNED TO MINIMISE DEPOSIT BUILD-UP AND TO KEEP YOUR ENGINE CLEAN.



SHELL MYSELLA S6 N – FOR EXCEPTIONAL RESISTANCE TO OXIDATION AND DEPOSITS

Shell Mysella S6 N is high-performance oil for gas engines and formulated for improved cleanliness, protection against deposits and reduced valve wear. It is specifically designed to help boost engine efficiency and reliability, including in high BMEP and steel-piston engines.

Shell Mysella S6 N had >150% longer oil life (oil-drain interval based on BN retention) in field trials using an INNIO Jenbacher J420C engine compared with Shell Mysella S5 N.

EXTRA CLEANLINESS: In field trials using INNIO Jenbacher J420C and INNIO Jenbacher J6F engines, **Shell Mysella S6 N** visibly improved cleanliness across the engine, compared with a lower tier product, including the power unit (left) and liner.

Monitor, benchmark, improve and save

Shell LubeAnalyst is a health check for your lubricants and machinery. It is an oil condition monitoring service that helps you to keep your business running smoothly by identifying potential oil or equipment failures before they become critical. Shell LubeAnalyst will help your business to save money and time on maintenance and potential lost production caused by equipment failures.

It is an early-warning system that aims to give you peace of mind knowing that both your equipment and your lubricants are in optimum working order. A global platform, Shell LubeAnalyst is available in 95 countries and 27 languages, and has more than 75 million data points.

Shell provides four individual test suites (see Table 1) designed for your specific gas-engine application.

A comprehensive range of additional tests is available. Please consult your local Shell technical representative for further details.

Shell LubeAnalyst for gas engines

- is tailored to the needs of gas-engine operators
- meets the requirements of leading gas-engine manufacturers
- offers simple selection and handling using newly compiled test packages.

What's new?

Simplified selection

- All necessary analysis parameters are in one test suite, which can be used for natural gas and biogas operation.

Comprehensive monitoring

- The new oil analyses were developed for comprehensive monitoring of modern gas engines.
- They are tailored to the oil analysis requirements of leading gas-engine manufacturers.
- Test parameters such as ipH, sulphur and chlorine content are included.

ON-SITE SERVICE PACKAGE

The Shell offer extends beyond oil products and oil analysis. It also includes services such as contamination control and support with commissioning, flushing, filling and filtration.

SHELL LUBEANALYST PACKAGES FOR MONITORING THE OIL CONDITION OF MODERN GAS ENGINES

TEST	GEST OCM Standard – Gas Engine (Natural Gas)	GEAV OCM Advanced – Gas Engine (Natural Gas)	GEAL OCM Advanced – Gas Engine (Landfill Gas)
Viscosity at 100°C (ASTM D445)	■	■	■
Viscosity at 40°C (ASTM D445)		■	■
TAN (ASTM D664)	■	■	■
TBN (ASTM D2896)	■	■	■
Water content (acc. Karl Fischer)	■	■	■
FTIR (ASTM E2412)	■	■	■
Metals/ICP (ASTM D5185)	■	■	■
IpH (Jenbacher)		■	■
Sulphur content (inhouse)		■	■
Chlorine content (DIN 51 408/2)			■

Table 1: Test kits and test methodologies (tests may vary by region).