KLÜBER LUBRICATION

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your global specialist

Klüber Lubrication – your global specialist

Innovative tribological solutions are our passion. Through personal contact and consultation, we help our customers to be successful worldwide, in all industries and markets. With our ambitious technical concepts and experienced, competent staff we have been fulfilling increasingly demanding requirements by manufacturing efficient high-performance lubricants for more than 80 years.

Gear oils for added value.

Cost and energy efficient solutions with KlüberComp Lube Technology.

Freudenberg

A company of the Freudenberg Group

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Gear oils for added value

Special lubrication solutions by Klüber Lubrication help you achieve the goals of higher revenue and an improved ecological footprint: Our special gear oils ensure long maintenance intervals or even lifetime lubrication, high efficiency and lasting component protection, even at the gear's performance limits. Our specialists will recommend to you the perfect oil for your requirements. Together we can lower your maintenance costs, energy consumption and CO_2 emissions.

Speciality lubricants meeting the highest requirements

Gear manufacturers and users today are faced with ever-increasing requirements: higher power density with the same or even smaller gear designs, longer gear running time, higher reliability and ever-higher energy efficiency are expected. High-performance lubricants with above-average performance capabilities help to keep wear low and increase the efficiency of your application.

We have combined the requirements of today's power transmission technology in an holistic approach named KlüberComp Lube Technology, which incorporates four important aspects:

- Components – Consideration of all lubricated components, i.e. gear teeth, rolling bearings and radial shaft seals
- Composition – Lubricant formulations incorporating high-quality raw materials, which are e.g. resistant to ageing, free of heavy metals, and have lower residue formation
- Competence – Personal discussion and service, optimal product selection, product streamlining, oil condition monitoring, training of customer's staff
- Competitive – Maximum performance, standardised and application-specific testing under extreme test conditions.

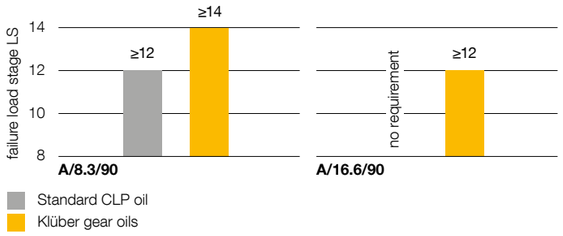
Due to this holistic approach, many gear manufacturers and operators have selected mineral and synthetic gear oils made by Klüber Lubrication.

Reliability through protection for all gear components

The performance capability of high-performance gear oils refers to all the gear components to be lubricated, i.e. gear teeth, rolling bearings and radial shaft seals. Gear oils from Klüber Lubrication are developed to the highest standards to offer superior protection for your machinery.

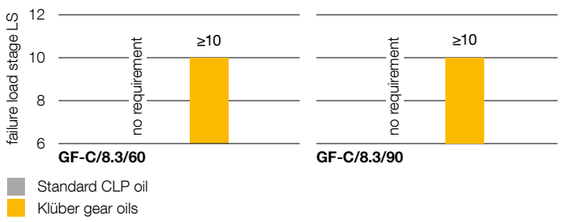
- Gears - Scuffing: the FZG scuffing test is generally undertaken to test the capability of gear oils to protect against scuffing damage. Load stage 12 of the FZG scuffing test is the minimum requirement for CLP oils. Klüber Lubrication's gear oils surpass this level, offering superior protection even under extreme shock load conditions.

FZG scuffing test results



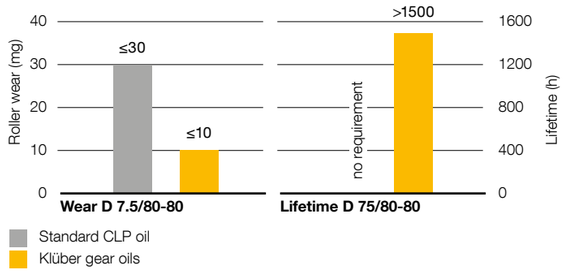
- Gears - Micropitting: the micropitting test according to FVA 54/7 has become the industry standard for assessing a gear oil's micropitting load-carrying capacity as low, medium or high. Klüber Lubrication's gear oils are classified as having high micropitting resistance.

FZG micropitting test results



- Bearings: gear damage is often caused by high rolling bearing wear or premature fatigue of rolling bearings. The influence of high-performance gear oils on the wear behaviour of rolling bearings is measured in the FE8 wear test. Klüber Lubrication's gear oils surpass this test's minimum requirements for CLP oils, while also fulfilling the requirements of the FE8 lifetime test. Consequently, these rolling bearings can attain the service life projected by the bearing design engineer.

FE8 test results



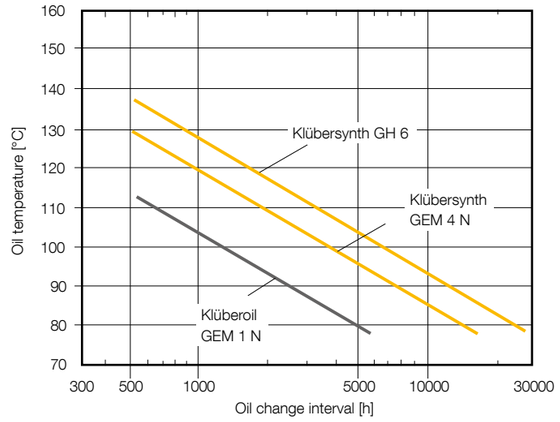
- Seals: wear-induced leaks from radial shaft seals at an early stage require expensive cleaning and repair. Lube & Seal the joint project between Freudenberg Sealing and Vibration Control Technology and Klüber Lubrication has brought about perfect harmonisation of lubricant and seal. In this combination, Klüber Lubrication's high-performance gear oils enable continuous operation without premature seal failure.

High efficiency in worm gears

The effectiveness of Klüber high-performance gear oils has been proven. Especially polyglycol gear oils made by Klüber enable significant wear reduction and better efficiency in worm gears such that the manufacturer's specifications are often exceeded by far.

Achievable oil change intervals

The prolonged service time of synthetic lubricants can reduce equipment downtime and save resources.



KlüberEfficiencySupport

You expect the same performance from our service as from our lubricants: quality of the highest level, providing tailor-made services and added value for you.

- KlüberEnergy: Consulting service to improve the energy efficiency of your equipment verified by energy measurements with energy and cost savings reports.
- KlüberMaintain: Support for your lubrication management and maintenance programmes like TPM (Total Productive Maintenance) considering the necessary lubrication maintenance tasks.
- KlüberMonitor: Diagnostic analysis of used lubricant enabling improved machine operation and higher uptime. High-quality recommendations based on trend analyses and test rigs.
- KlüberRenew: Services to increase the service life of your expensive components such as large gear drives and chains including staff training.

For superior protection of all your components, Klüber Lubrication's gear oils based on mineral or synthetic PAO or polyglycol oils are a good choice

			Gear Type			Service temperature range		Performance parameters							
Klüber gear oils	**Base oil**	**Available ISO VG**	**Spur, bevel, planetary gears**	**Hypoid gears**	**Worm gears**	**Lower service temperature (approx)**	**Upper service temperature (approx)**	**Oil life time**	**Scuffing protection**	**Micropitting resistance**	**Pitting resistance**	**Wear protection of rolling bearings**	**Elastomer compatibility radial shaft seals**	**DIN 51517-3, AGMA 9005 designations**	**Potential energy saving**
Klüberoil GEM 1 N	MIN	46…1000	+++	++	+	-15°C	100°C	+	+++	+++	+++	+++	+++	CLP, EP oil	+
Klübersynth GEM 4 N	PAO	32…680	+++	+	++	-45°C	140°C	++	+++	+++	+++	+++	+++	CLP, EP oil	++
Klübersynth GH 6	PG	22…1500	++	+++	+++	-55°C	160°C	+++	+++	+++	+++	+++	+++	CLP, EP oil	+++
Standard CLP oil	-	-	-	-	-	no requirement	no requirement	-	minimum requirement	no requirement	no requirement	no requirement	-	CLP, EP oil	no requirement

+++ optimimum performance/benefit ++ improved performance/benefit + standard performance