Powerful, naturally.
Environmentally acceptable and biodegradable lubricants for the marine industry
Combine environmental and economic benefits with speciality lubricants from Klüber Lubrication

**Superior environmentally friendly lubricant portfolio – Powerful, naturally**

Reducing impacts from shipping operations on the environment is important to the future of our planet. We are increasingly successful in developing products suited to comply with the requirements of the marine industry. Klüber Lubrication already has the most comprehensive range of lubricants for this industry, meeting the highest environmental requirements.

**Your economic benefits – we offer more than lubricants**

Efficiency, sustainability, competitiveness and profitability are crucial for business success. Our products and services can contribute to your success and competitiveness. In a personal exchange with you, we would like to introduce our services and discuss the comprehensive advantages of our products.

**Klüber Lubrication – the benchmark for speciality lubricants**

Our wide portfolio of synthetic, environmentally friendly lubricants is a real alternative to conventional mineral oils. Unique tribological know how, raw materials of highest quality, customised additive packages and our decades of experience in designing lubricants in close cooperation with leading OEMs from different industries are the backbone for our benchmark-setting marine product range.

Whether hydrodynamic oil film thickness, load carrying capacity, corrosion protection, water washout stability, resistance to hydrolysis and oxidation or low-temperature performance – our speciality lubricants are right at the forefront of lubrication.

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**An example: superior wear protection with Klüberbio LG 39-700 N / 701 N**

Klüber Lubrication’s new open gear greases – formulated with more than 90 % renewable materials – combine biodegradability and strong performance.

Klüberbio LG 39-700 N and 701 N set benchmark in wear protection, low-temperature performance and reduced environmental impact:
- Lifetime of equipment
- Energy consumption
- Operational costs
- Reliability and efficiency

![Modified FZG slow speed wear test acc. to DGMK 377-01](image)

Klüberbio LG 39-700 N and 701 N show lower wear rates than other open gear lubricants.
An example: superior hydrodynamic oil film thickness with Klüberbio RM 2 stern tube oils

Oil film thickness ensuring hydrodynamic lubrication is a key prerequisite for reliable operation of propeller shafts.

Klüberbio RM 2-100/150 oils provide a significantly higher oil film thickness and load carrying capacity under dynamic operation than other available EALs and thus prevent high-temperature alarms and journal bearing failures.

Further key performance characteristics and advantages are:
- Resistance against scoring/wear
- Shear and oxidation stability
- Inherent viscosity of base oil – no viscosity improvers added
- Good seal compatibility (approved by all leading OEMs)
- Demulsifying oil

Oil film thickness vs. speed
Test results of 100 mm²/s stern tube oils at 40° C

Klüberbio RM 2-100 achieves higher oil film thickness in hydrodynamic operation than other EAL stern tube oils.
Selection of speciality lubricants on board

This illustration shows the various applications of our marine lubricants. To show as many applications as possible in one illustration, we included components of the following ship types in this synthetic ship: Ferry, cruise ship, cargo ship, wind turbine installation vessel, anchor handling tug supply vessel.
Jacking system
Tooth rack & pinion: Klüberbio LG 39-700 N/-701 N, Klüberbio AG 39-602

Planetary gearbox
Klüberbio EG 2-320*

Anchor handling winch
Open gear: Klüberbio AG 39-602, Klüberbio LG 39-700 N/-701 N
Enclosed gear: Klüberbio EG 2-320
Hydraulic motor: Klüberbio LR 9
Steel wire rope: Klüberbio AG 39-602

Offshore crane
Bearings: Klüberbio BM 32-142
Slewing gear: Klüberbio AG 39-602
Hydraulic system: Klüberbio LR 9
Steel wire rope: Klüberbio AG 39-602

Rail crane
Bearings: Klüberbio BM 32-142
Hydraulic system: Klüberbio LR 9
Steel wire rope: Klüberbio AG 39-602
Rack & pinion: Klüberbio AG 39-602

Stern roller
Bearings: Klüberbio LG 39-700 N

Towing pins
Klüberbio AG 39-602

Fairleads
Bearings: Klüberbio BM 32-142
Klüberbio AG 39-602

Azipod
Propeller shaft seal: Klüberbio RM 2
Steering shaft seal: Klüberbio AG 39-602
Klüberbio LG 39-701 N

Rudder
Bearings and seals: Klüberbio LG 39-700 N/-701 N
Klüberbio AG 39-602

Thrust / rudder propeller
Steering shaft seal: Klüberbio AG 39-602
Gear: Klüberbio EG 2

* under development
## Environmentally acceptable (EAL) and biodegradable lubricants for the marine industry

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<td>– Air compressor</td>
<td>– Air compressor</td>
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<td>Open gear grease</td>
<td>Klüberbio LG 39-700 N&lt;br&gt;Klüberbio LG 39-701 N</td>
<td>– NLGI 0, NLGI 1&lt;br&gt;– Biodegradability &gt; 60 %&lt;br&gt;– OSPAR, Denmark, Norway Yellow 1&lt;br&gt;– EAL</td>
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<td>Open gear and steel wire rope grease</td>
<td>Klüberbio AG 39-602</td>
<td>– NLGI 1 – 1.5&lt;br&gt;– Biodegradability &gt; 60 %&lt;br&gt;– EAL</td>
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<td>Multi-purpose EP 2 grease</td>
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<tr>
<td>Multi-purpose EP 2 grease</td>
<td>Klüberbio M 72-82</td>
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<tr>
<td>Rust removing agent</td>
<td>Klüberbio Z 2-5</td>
<td>– ISO VG 5&lt;br&gt;– Biodegradability &gt; 60 %</td>
<td></td>
<td>– Miscellaneous</td>
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ISO viscosity class according to DIN ISO 3448
Consistency grade according to DIN 51818
Biodegradability according to OECD 301 F/B test after 28 days
EAL – lubricant complies with requirements of Environmentally Acceptable Lubricants as defined in Appendix A of the 2013 Vessel General Permit
<sup>1</sup> Under development
<sup>2</sup> Biodegradability according to OECD 301 B after 35 days
For an overview of our other lubricants for the marine industry, please see our brochure “Seaworthy”

Find our brochures on www.kluebermarine.com/brochures

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Klüber Lubrication München SE & Co. KG
Geisenhausenerstraße 7
81379 München
Germany

Local first-instance court Munich, Germany
Certificate of registration 46624
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 85 years.

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