

your global specialist

Your powerful partner.

Lubricants for land and offshore drilling
and production activities



Challenges call for solutions

Speciality lubricants for the oil & gas industry

Today's challenges in the oil and gas industry are high and ever increasing: A growing demand for energy results in more complex wells and excess wear on drilling equipment. Whether on a land or an offshore rig, drilling components are exposed to numerous environmental impacts and rough conditions. They have to resist high pressure, wide temperature ranges and long operating hours. These extreme circumstances are pushing rig components to the limit and maintenance intervals become shorter because of corrosion and wear. In addition, many rig components are difficult to access, which turns maintenance into another great challenge. Klüber Lubrication speciality lubricants for the oil & gas industry will meet your individual requirements for rig components.

Individual solutions for you

Klüber Lubrication offers various speciality lubricants for the reliable operation of your rig machinery – from the crown to the mud system, from the deck crane to the jacking leg. Our products are especially designed for valves and fittings, threaded connections and all other rig components. Intelligent packages for automatic lubrication and biological solutions add to your flexibility and sustainability. To help you choose the right product for your demands, our experts offer on-site services.

An example: Clean deck and increased safety – no drip down of Klüberplex AG 11-462

Adhesion is important for open gear and steel wire rope lubricants to prevent dripping down, especially in tropical temperatures or on sun-heated surfaces.

Due to its unique composition, Klüberplex AG 11-462 shows excellent adhesion to metal. Customers benefit from reduced wear of machine elements and better corrosion protection.

In addition operators benefit from:

- Lower work load and grease consumption
- Cleaner decks – increasing worker safety
- Extended life of equipment operating in harsh environmental conditions

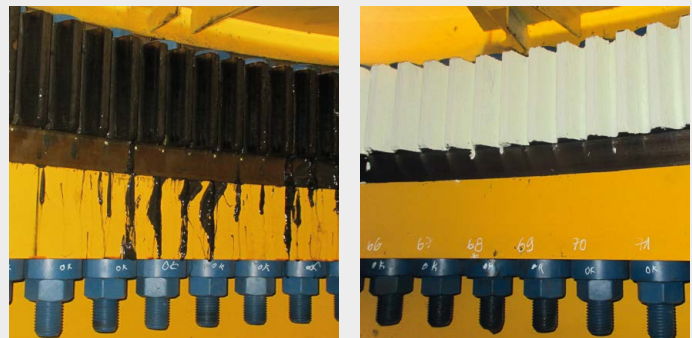
In-house adhesion test



NLGI 2 open gear grease Klüberplex AG 11-462

Pictures show 2.5 mm thick grease layer after 48 h at 70 °C on a vertically positioned metal sheet

Open slewing gear lubricated with



Standard black lubricant

Klüberplex AG 11-462

Result: Klüberplex AG 11-462 achieves better adhesion on metal surfaces at higher temperatures than other open gear lubricants.



Our speciality lubricants for higher efficiency

Our speciality lubricants reduce rig downtime, extend maintenance intervals and therefore increase safety, reliability and machine availability. They have been created to withstand extreme conditions like the exposure to heat, arctic cold or various gases. Their compatibility with a wide range of materials allows the application in numerous long-term operations. The result is a higher power rating of your rig machinery, a better output and lower costs.

Reliable quality

In order to keep our high product quality, we rely on our unique test house, which offers more than 100 testing installations for all our speciality lubricants. Continuous controls during and after the development of our products allow a constant top quality. Depending on the needs and wishes of our clients, we especially create test stands for particular purposes.

We are where you are

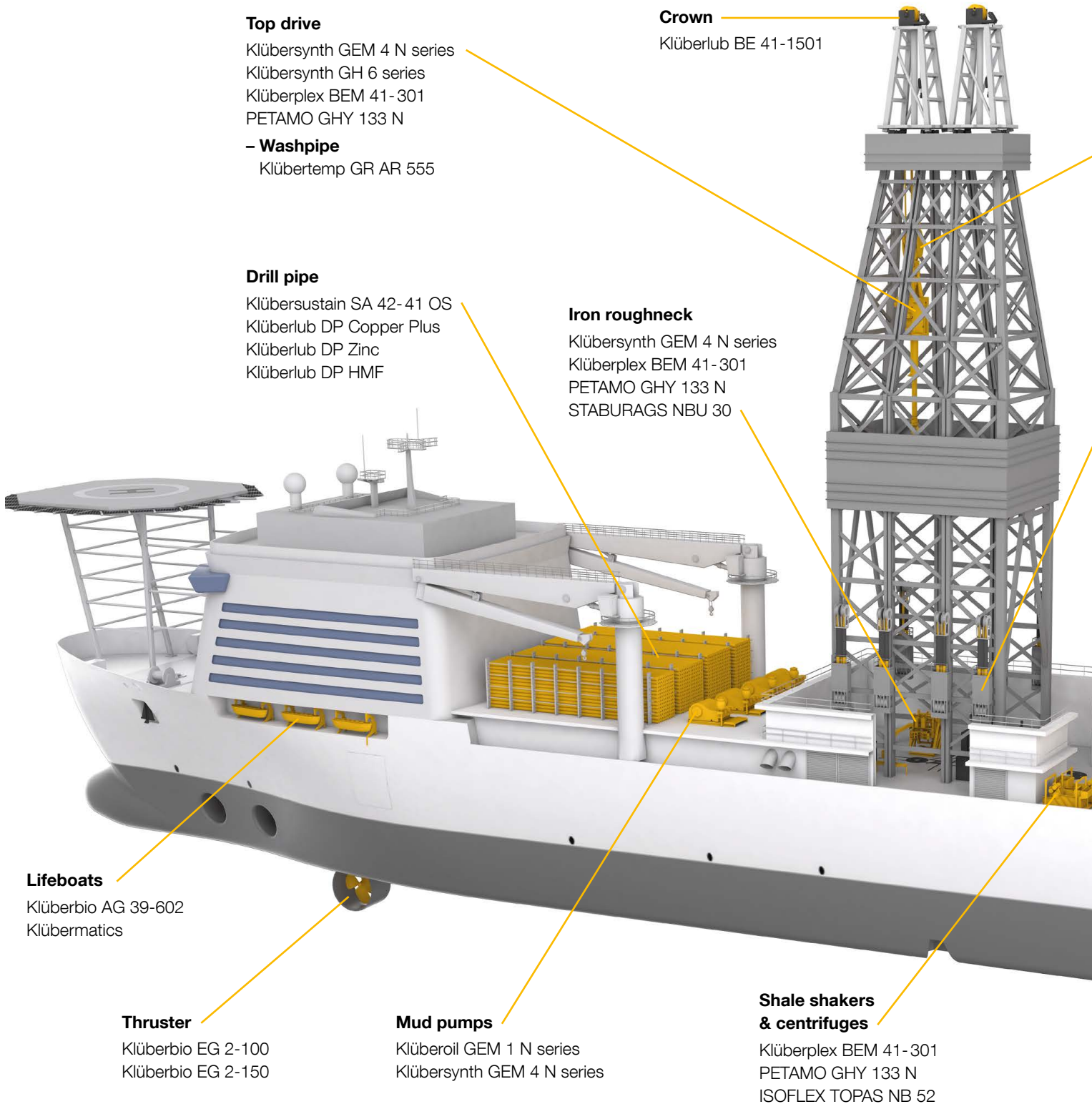
Our company sites are all over the world, bringing us closer to you. We are your global lubrication specialist and our experts will support you with their holistic know-how in tribological systems wherever you need us. Our long expertise in the marine industry is the base for outstanding competence in the whole offshore sector. For more information, please also consult our marine brochure.

| Your challenges – our solutions | Our experience – your benefit |
|---|--|
| Customised solutions coping with the toughest demands | Cost savings due to extended maintenance intervals |
| High performance capabilities | Improved efficiency resulting in energy savings |
| Automatic lubricant dispensers | Less downtime for more productivity |
| Worldwide availability in the highest quality | Optimum wear protection for longer service life of equipment |
| Expert field service | We are where you are |



Drillship

Selection of our products



Top drive
Klübersynth GEM 4 N series
Klübersynth GH 6 series
Klüberplex BEM 41-301
PETAMO GHY 133 N

– Washpipe
Klübertemp GR AR 555

Drill pipe
Klübersustain SA 42-41 OS
Klüberlub DP Copper Plus
Klüberlub DP Zinc
Klüberlub DP HMF

Crown
Klüberlub BE 41-1501

Iron roughneck
Klübersynth GEM 4 N series
Klüberplex BEM 41-301
PETAMO GHY 133 N
STABURAGS NBU 30

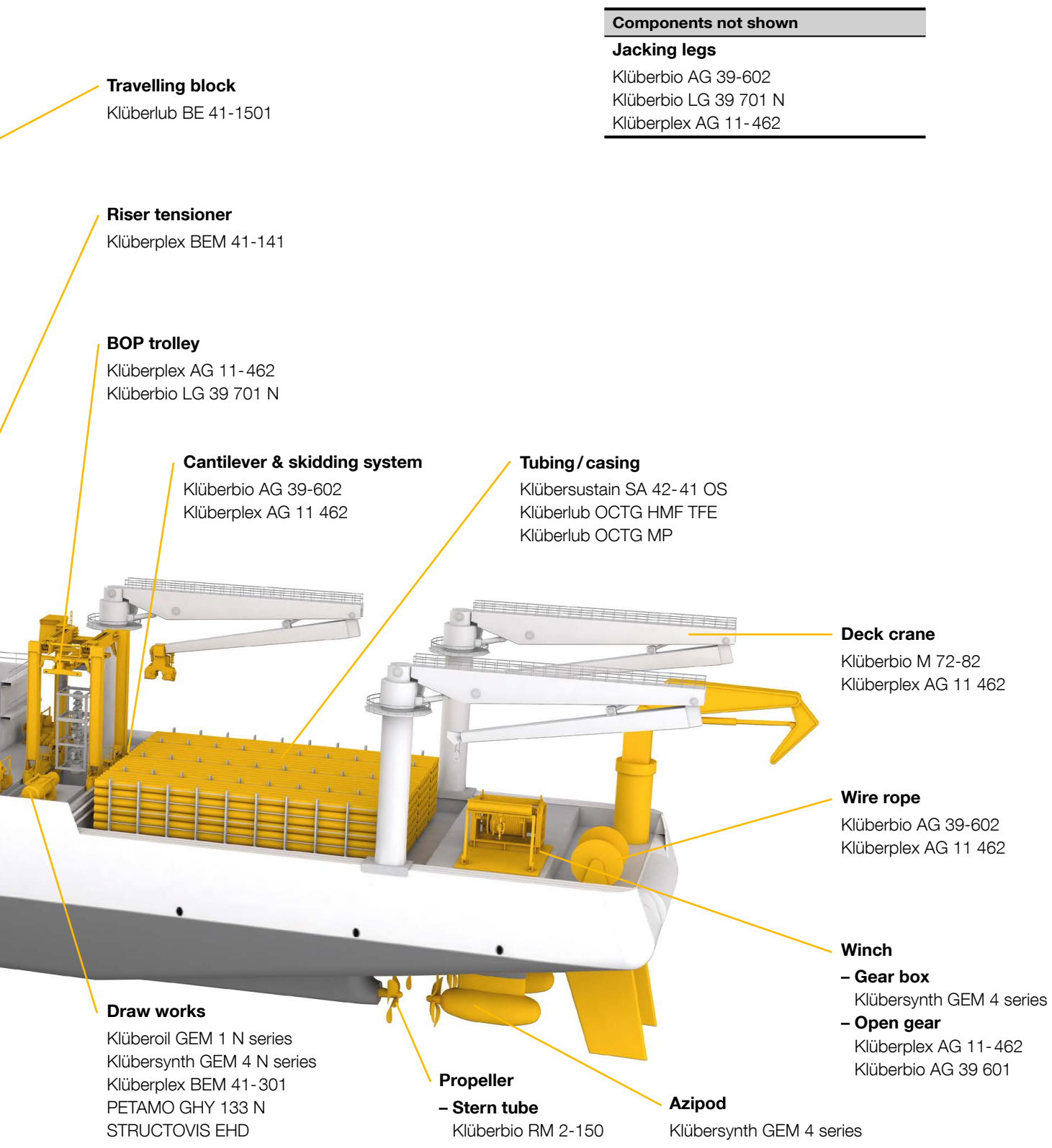
Lifeboats
Klüberbio AG 39-602
Klübermatics

Thruster
Klüberbio EG 2-100
Klüberbio EG 2-150

Mud pumps
Klüberoil GEM 1 N series
Klübersynth GEM 4 N series

Shale shakers & centrifuges
Klüberplex BEM 41-301
PETAMO GHY 133 N
ISOFLEX TOPAS NB 52

This illustration shows the various applications of our lubricants. To show as many applications as possible in one illustration, we included components of the different ship types in this synthetic ship.



Travelling block
Klübertub BE 41-1501

Riser tensioner
Klüberplex BEM 41-141

BOP trolley
Klüberplex AG 11-462
Klüberbio LG 39 701 N

Cantilever & skidding system
Klüberbio AG 39-602
Klüberplex AG 11 462

Tubing/casing
Klübersustain SA 42-41 OS
Klübertub OCTG HMF TFE
Klübertub OCTG MP

Deck crane
Klüberbio M 72-82
Klüberplex AG 11 462

Wire rope
Klüberbio AG 39-602
Klüberplex AG 11 462

Winch
– **Gear box**
Klübersynth GEM 4 series
– **Open gear**
Klüberplex AG 11-462
Klüberbio AG 39 601

Draw works
Klüberoil GEM 1 N series
Klübersynth GEM 4 N series
Klüberplex BEM 41-301
PETAMO GHY 133 N
STRUCTOVIS EHD

Propeller
– **Stern tube**
Klüberbio RM 2-150

Azipod
Klübersynth GEM 4 series

Components not shown

Jacking legs
Klüberbio AG 39-602
Klüberbio LG 39 701 N
Klüberplex AG 11-462

Speciality lubricants for the oil & gas industry

Machinery on a drilling rig must meet the industry's aggressive demands of continuous operation and often extreme temperature and pressure conditions. A quality lubricant is needed in order to ensure reliable operations and reduce rig downtime due to relubrication or maintenance. Klüber Lubrication provides not only high-quality products but also the technical knowledge to help make the right lubricant selection.







| Product type | Speciality lubricant from Klüber Lubrication | Product description | Module | Component |
|--------------------------|--|--|---|---|
| Synthetic grease | ISOFLEX TOPAS NB 52 | High-performance synthetic grease for lubrication of bearings. Excellent wear protection, with a wide temperature service range. | Shale shaker motors | Rolling bearings, plain bearings |
| Heavy-duty grease | Klüberlub BE 41-1501 | Wear protection for low-speed rolling bearings subject to high loads. Resistance to ageing and protection against corrosion. Contains solid lubricants for emergency operations. | Crown, travelling block | Low-speed bearings |
| Gear oil | Klüberoil GEM 1 N series | High-performance gear oils / multi-purpose oils based on mineral oil and KlüberComp Lube Technology. | Topdrive, drawworks, mud system, iron roughneck | Gear drives |
| | Klübersynth GEM 4 N series | Synthetic high-performance gear and multi-purpose oils based on KlüberComp Lube Technology. | | |
| | Klübersynth GH 6 series | | | |
| Heavy-duty grease | Klüberplex BEM 41-301 | High-performance semi-synthetic grease for bearings on electric motors and heavily loaded bearings. Extended grease life providing improved equipment reliability. | Topdrive, drawworks, mud system, iron roughneck | High-load bearings, electric motor bearings |
| High-temperature grease | PETAMO GHY 133 N | Long-term and high-temperature grease for rolling bearings. Contains polyurea thickener, mineral oil, synthetic hydrocarbon oil and additives. | Topdrive, drawworks, mud system, iron roughneck | Electric motor bearings |
| Mineral oil-based grease | STABURAGS NBU 30 | Excellent corrosion protection, water resistance, as well as resistance to many diluted alkaline and acid solutions. | Iron roughneck, power tongs | Bearings, sliding elements |
| Mineral oil | STRUCTOVIS EHD | Excellent wear and corrosion protection for chains. Improved adhesive characteristics for high-speed chains. | Drawworks | Chains |

Biological lubrication for all rig components

Whether to fulfill new regulatory requirements, such as OSPAR or EAL norms, or rather simply because it's the right thing to do, more and more oil & gas operators are turning to environmentally friendly, biodegradable products to lubricate their machines. Oil & gas operations are often carried out in sensitive ecologic

environments like oceans or forests and therefore demand a lubricant that is not only environmentally safe but also high performing. By using Klüber Lubrication bio lubricants, you will not have to sacrifice quality for making the decision to go green.

| Product type | Speciality lubricant from Klüber Lubrication | Characteristic and environmentally relevant information | Module (selection) | Component (selection) |
|--------------------------------------|---|---|---|--|
| Stern tube oil | Klüberbio RM 2-100 Klüberbio RM 2-150 | <ul style="list-style-type: none"> – ISO VG 100 – Biodegradability > 60 % – European Ecolabel – EAL  | <ul style="list-style-type: none"> – Controllable pitch propeller – Fixed pitch propeller | <ul style="list-style-type: none"> – Stern tube bearing and propeller shaft seal |
| Gear oil | Klüberbio EG 2-68 Klüberbio EG 2-100 Klüberbio EG 2-150 Klüberbio EG 2-320 | <ul style="list-style-type: none"> – ISO VG 68/100/150/320 – Meet CLP requirements according to ISO 51517-3 – Biodegradability > 60 % – European Ecolabel – EAL  | <ul style="list-style-type: none"> – Thruster – Azipod from ABB – Anchor handling/mooring winch | <ul style="list-style-type: none"> – Gear set, bearings and seal |
| Hydraulic oil | Klüberbio LR 9-32 Klüberbio LR 9-46 Klüberbio LR 9-68 | <ul style="list-style-type: none"> – ISO VG 32/46/68 – Meet HEES requirements according to DIN ISO 15380 – Biodegradability > 60 % – European Ecolabel – EAL  | <ul style="list-style-type: none"> – Anchor handling/mooring winch – Ship crane – Offshore crane – Controllable pitch propeller | <ul style="list-style-type: none"> – Hydraulic motor – Hydraulic components – Servo piston inside the hub |
| Chain oil | Klüberbio C 2-46 | <ul style="list-style-type: none"> – ISO VG 46 – Biodegradability > 60 % | <ul style="list-style-type: none"> – Derrick | <ul style="list-style-type: none"> – Chain |
| Compressor oil | Klüber Summit DSL 32 Klüber Summit DSL 46 Klüber Summit DSL 68 Klüber Summit DSL 100 ¹⁾ | <ul style="list-style-type: none"> – ISO VG 32/46/68 – Biodegradability > 60 % | <ul style="list-style-type: none"> – Air compressor | <ul style="list-style-type: none"> – Air compressor |
| Open gear grease | Klüberbio LG 39-700 N Klüberbio LG 39-701 N | <ul style="list-style-type: none"> – NLGI 0, NLGI 1 – Biodegradability > 60 % – OSPAR, Denmark, Norway Yellow 1 – EAL | <ul style="list-style-type: none"> – Jack-up system – Anchor handling winch – Stern roller – Rudder bearing | <ul style="list-style-type: none"> – Rack and pinion gear – Open gear – Slow turning bearing |
| Open gear and steel wire rope grease | Klüberbio AG 39-602 | <ul style="list-style-type: none"> – NLGI 1 – 1.5 – Biodegradability > 60 % – EAL | <ul style="list-style-type: none"> – Jack-up system – Anchor handling/mooring winch – Ship crane – Offshore crane – Thruster/azipod (sealing grease) | <ul style="list-style-type: none"> – Rack and pinion gear – Open gear – Steel wire rope – Bar guide at spooling device – Slow turning slide bearing – Seal |
| Multi-purpose EP 2 grease | Klüberbio BM 32-142 | <ul style="list-style-type: none"> – NLGI 2 – Biodegradability > 60 % – European Ecolabel – EAL  | <ul style="list-style-type: none"> – Deck machinery | <ul style="list-style-type: none"> – Bearings |
| Multi-purpose EP 2 grease | Klüberbio M 72-82 | <ul style="list-style-type: none"> – NLGI 2 – Biodegradability > 60 % | <ul style="list-style-type: none"> – Deck machinery | <ul style="list-style-type: none"> – Bearings – Seal |
| Rust removing agent | Klüberbio Z 2-5 | <ul style="list-style-type: none"> – ISO VG 5 – Biodegradability > 60 % | <ul style="list-style-type: none"> – Miscellaneous | |

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

¹⁾ Biodegradability according to OECD 301 B after 35 days

Threaded connections

Tough requirements – reliable solutions

Klüber Lubrication offers a full range of compounds to address costly issues in the field such as galling, seizing and leaking. The Klüberlub OCTG thread compound line is the solution for tubing and casing API threaded connections and speciality connections. The Klüberlub DP line of drilling compounds provides maximum protection for rotary shouldered connections in all tool joint and drill pipe applications. Speciality products for OSPAR and arctic grades are also available.

Our products are rigorously tested to provide maximum sealing and ease of make-up and break out. They allow for long-term, trouble-free operation with optimised efficiency in the oil & gas industry.



| Speciality lubricant from Klüber Lubrication | Product description | NLGI class | Base oil | Flash-point | Specific gravity | Brush-able to | Temperature range | Friction factor | ASTM penetration at 77 °F (25 °C) |
|--|---|------------|----------------------------|-----------------|------------------|-----------------|-------------------------------|-----------------|-----------------------------------|
| Klüberlub DP Copper Plus ¹⁾ | High copper content, high-temperature compound for entire drill string, with storage protection | 1 | Mineral oil | 430 °F (221 °C) | 1.3 | 0 °F (-18 °C) | 0 to 500 °F (-18 to 260 °C) | 1.1 | 300 – 330 |
| Klüberlub DP Zinc ¹⁾ | Lead-Free alternative API standard tool joint compound | 1 | Mineral oil | 430 °F (221 °C) | 1.6 | 0 °F (-18 °C) | 0 to 500 °F (-18 to 260 °C) | 1.0 | 300 – 330 |
| Klüberlub DP HMF ¹⁾ | Premium metal-free compound used for drill pipe, collars, tools, casings, rotary shouldered, tubing and line pipe | 1 | Highly refined mineral oil | 430 °F (221 °C) | 1.1 | 0 °F (-18 °C) | 0 to 475 °F (-18 to 246 °C) | 1.0 | 310 – 340 |
| Klüberlub OCTG MP ¹⁾ | Lead-free alternative with superior performance to API Modified | 1 | Mineral oil | 430 °F (221 °C) | 1.2 | 0 °F (-18 °C) | 0 to 500 °F (-18 to 260 °C) | 0.9 | 310 – 340 |
| Klüberlub OCTG HMF TFE ¹⁾ | Heavy-metal-free thread compound with TFE fluorocarbon | 1 | Polyurea | 450 °F (232 °C) | 1.2 | > 0 °F (-18 °C) | 0 to 475 °F (-18 to 246 °C) | 1.0 | 310 – 340 |
| Klübersustain SA 42-41 OS | OSPAR approved thread compound | 0 | Synthetic ester | 570 °F (300 °C) | 1.3 | -40 °F (-40 °C) | -40 to 400 °F (-40 to 200 °C) | 1.0 | |

¹⁾Product is not available in Europe.

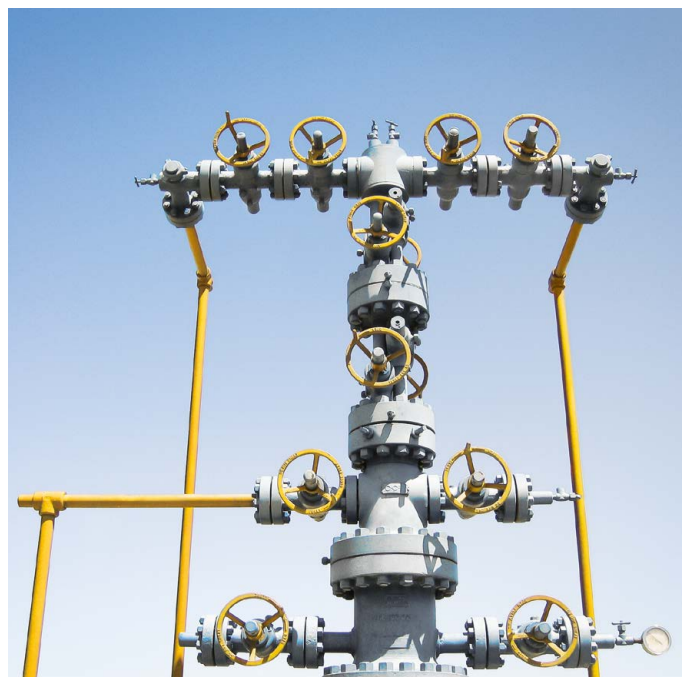
Valves and fittings

Ensure a steady flow

Valves and fittings include complex tribological systems. To minimise wear of such components, the lubricant has to be compatible with many materials. Our certified speciality lubricants are designed to meet your individual requirements, ensuring your valves and fittings operate reliably for their entire lifetime.

Klüber Lubrication can offer the following advantages to your upstream operations:

- Cost savings through reducing downtime and component wear
- Expert recommendations coming from advanced knowledge of tribological solutions
- Superior products that will withstand extreme conditions (temperature, pressure, moisture)
- International presence – a long history of efficiently delivering products to all corners of the globe
- Lubricants for all conditions including arctic, extreme heat, H₂S and CO₂



| Speciality lubricant from Klüber Lubrication | Product description | Load handling | Wash-out resistance | Sour service | Base oil / thickener | Operating temperature range | Density @ 20 °C g/cm ³ approx. | NLGI class |
|--|---|---------------|---------------------|---------------------|------------------------|-------------------------------|---|------------|
| Klübersynth VA 62-253 G | Highly adhesive valve grease for sour service and aggressive media | High loads | Medium-high | Highly resistant | Ester oil/ silicate | –4 to 340 °F (–20 to 170 °C) | 1.08 | 3 |
| Klübersynth VA 62-3502 | Fully synthetic lubricating and sealing grease for valves and fittings | Medium loads | High | Moderate resistance | Ester oil/ silicate | –4 to 300 °F (–20 to 150 °C) | 1.15 | 2–3 |
| Klüberbeta RM 47-102 | Low temperature valve grease, resistant to aggressive media | Low loads | Low-medium | Low resistance | Silicone/ lithium soap | –58 to 350 °F (–50 to 180 °C) | 0.96 | 2 |
| Klübertemp GR AR 555 | Multi-purpose lubricant for high temperature drilling, production and completion operations | High loads | High | Highly resistant | PFPE | –4 to 480 °F (–20 to 250 °C) | 1.90 | 2 |
| Klübertemp GR M07 | Long-term lubricant; resistant to aggressive media; wide temperature range | Low loads | Low | Highly resistant | PFPE | –85 to 450 °F (–65 to 230 °C) | 1.91 | 1 |
| Klüberalfa HPX 93-1202 | High-temperature lubricant for extreme requirements | Medium loads | High | Highly resistant | PFPE/ solid lubricant | –4 to 570 °F (–20 to 300 °C) | 1.90 | 2 |

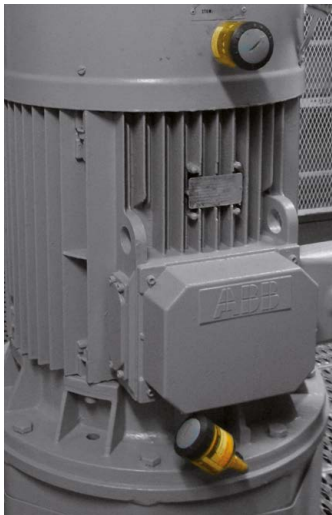
Lubricant dispensers

Many lubrication points are difficult to access or a special challenge from a health and safety perspective.

To increase safety, reliability and machine availability, Klüber Lubrication supplies high-performance oils and greases in “intelligent packages” for automatic lubrication of your machines and components.

Selected lubricants are available in automatic lubricant dispensers for single-point lubrication.

These tried-and-tested electromechanical or electrochemical devices are available with various speciality lubricants.



Engine room applications:

- fan bearings
- electric motor bearings
- pump bearings

Lubrication system:

Klübermatic FLEX 60 cm³
Klübermatic FLEX 125 cm³



Life raft davit applications:

- rolling bearings
- cable pulley

Lubrication system:

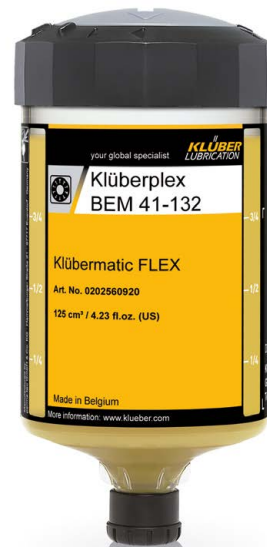
Klübermatic FLEX 60 cm³

Flexible – for use in demanding applications

Klübermatic FLEX is a compact, ready-to-use lubricator. It can be used for diverse applications at temperatures between –20 °C and +60 °C. The lubrication interval can be selected in monthly increments between 1 and 12 months. An electronically controlled chemical reaction generates the pressure to ensure continuous fresh lubricant supply to the lubrication point at set intervals. Klübermatic FLEX is available in volumes of 60 cm³ and 125 cm³.

Applications

Klübermatic FLEX is particularly suitable for single-point lubrication in rolling and plain bearings, slideways, open gears, toothed racks, shaft seals and chains. The lubrication system is dust-tight and protected against splash water (according to IP 68).





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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.