your global specialist

Industrial sector

Availability under extreme conditions.

Speciality lubricants for oil refineries and petrochemical plants
The speciality lubricant – a key component in oil refinery operation

In any refinery, the reliability of "rotating" equipment is crucial to efficient, cost-effective production. This includes, for example, gas and air compressors, ball valves, centrifugal pumps, mechanical seals, gearboxes and screw connections. Any standstill or even just impeded performance of one of these critical components will significantly affect the profitability of your plant.

Ambient conditions in refineries are taxing and include extreme temperatures, strong effects stemming from chemicals and high physical requirements.

Klüber Lubrication has developed speciality lubricants for these demanding conditions. Depending on their application, they offer the following benefits:

- Higher productivity due to longer equipment service life
- Longer component life due to excellent wear protection
- Reliable plant operation as lubricants are resistant to media

On the following pages you will find a selection of products that have been tried and tested for the lubrication of components in oil refineries with consistent success.
Speciality lubricants for process gas compressors

Each individual compressor in your refinery makes a valuable contribution to your annual production result. Compressors are the most critical and cost-intensive element in your plant and require heightened maintenance attention.

Two factors are of decisive importance when selecting a compressor oil:

- **Product Base oil**
  - **Viscosity**
    - DIN 51562-1 at 40 °C, [mm²/s] approx.
  - **Notes and benefits**
    - For lubrication of reciprocating and screw-type compressors for natural gas
    - Good anticorrosive characteristics
    - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit NGSH-68**
  - Synthetic hydrocarbon
  - 68
  - For lubrication of reciprocating and screw-type compressors for natural gas
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit NGSH-100**
  - Synthetic hydrocarbon
  - 150
  - For lubrication of reciprocating and screw-type compressors for natural gas
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit NGSH-220**
  - Synthetic hydrocarbon
  - 220
  - For lubrication of reciprocating and screw-type compressors for natural gas
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit PGS 68**
  - Polyglycol oil
  - 68
  - For lubrication of reciprocating, screw-type and rotary vane compressors for natural and process gas
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit PGS 100**
  - Polyglycol oil
  - 100
  - For lubrication of reciprocating, screw-type and rotary vane compressors for natural and process gas
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit PGS 150**
  - Polyglycol oil
  - 150
  - For lubrication of reciprocating, screw-type and rotary vane compressors for natural and process gas
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit PGI 68**
  - Polyglycol oil
  - 68
  - For lubrication of propane gas compressors, e.g. refrigeration compressors
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit PGI 100**
  - Polyglycol oil
  - 100
  - For lubrication of propane gas compressors, e.g. refrigeration compressors
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit PGI 150**
  - Polyglycol oil
  - 150
  - For lubrication of propane gas compressors, e.g. refrigeration compressors
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit NGL 444**
  - Polyglycol oil
  - 79
  - For lubrication of high-pressure reciprocating compressors compressing natural gas, carbon dioxide or process gas
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit NGL 555**
  - Polyglycol oil
  - 100
  - For lubrication of high-pressure reciprocating compressors compressing natural gas, carbon dioxide or process gas
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit NGL 777**
  - Polyglycol oil
  - 150
  - For lubrication of high-pressure reciprocating compressors compressing natural gas, carbon dioxide or process gas
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit NGL 888**
  - Polyglycol oil
  - 220
  - For lubrication of high-pressure reciprocating compressors compressing natural gas, carbon dioxide or process gas
  - Good anticorrosive characteristics
  - Effective corrosion protection also with sour gas (hydrogen sulphide)

- **Klüber Summit DSL-100 XM**
  - Ester oil
  - 100
  - For lubrication of process gas compression without damage to downstream metal catalysts
  - Approval for hydrogen compression at UOP, USA

To give you a first overview, this table contains the most important compressor oils for use in oil refineries. In-depth consultation with our experts is essential to ensure selection of the perfect oil.

An investment that pays off

Switching over to a high-performance specialty lubricant pays off: although purchasing costs may seem higher at first, less maintenance and longer compressor life may already mean less strain on your budget in the medium term.

Example:

Following thorough consultation with our experts, a well-known refinery operator decided to switch his compressors over to Klüber Summit PGS 100. This enabled him to save approx. 127,400 EUR per year with a single screw-type compressor.
### Air compressors

<table>
<thead>
<tr>
<th>Product</th>
<th>Base oil</th>
<th>Kinematic viscosity DIN 51562-1 at 40 °C, [mm²/s] approx.</th>
<th>Notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klüber Summit SH 32</td>
<td>synthetic hydrocarbon</td>
<td>32</td>
<td>– Low maintenance and operating costs due to long oil change intervals of up to 10,000 operating hours in oil-injected screw-type compressors</td>
</tr>
<tr>
<td>Klüber Summit SH 46</td>
<td>synthetic hydrocarbon</td>
<td>46</td>
<td>– Easy changeover from mineral oils due to neutral behaviour of the oil towards seals</td>
</tr>
<tr>
<td>Klüber Summit SH 68</td>
<td>synthetic hydrocarbon</td>
<td>68</td>
<td>– Low evaporation rate leading to clean compressed air and clean compressed air lines. Prevention of unnecessary cleaning expenses and pneumatic valve downtime due to gumming</td>
</tr>
<tr>
<td>Klüber Summit SH 100</td>
<td>synthetic hydrocarbon</td>
<td>100</td>
<td>– Low formation of oxidation residues in the oil circuit enabling low operating costs due to long oil filter and oil separator lifetimes</td>
</tr>
<tr>
<td>Klüber Summit Supra 32</td>
<td>polyglycol oil</td>
<td>38</td>
<td>– Easier switchover of compressors that were previously running with polyglycol oils due to good oil miscibility</td>
</tr>
<tr>
<td>Klüber Summit Supra Coolant</td>
<td>polyglycol oil</td>
<td>55</td>
<td>– Low maintenance and operating costs due to long oil change intervals of up to 8,000 operating hours in oil-injected screw-type compressors</td>
</tr>
<tr>
<td>Klüber Summit Varnasolv</td>
<td>synthetic</td>
<td></td>
<td>– Good soil dissolving properties due to the ester content keeping the oil circuit clean and preventing cleaning costs</td>
</tr>
<tr>
<td>Klüber Summit Varnasolv</td>
<td>synthetic</td>
<td></td>
<td>– Low formation of oxidation residues in the oil circuit leading to low operating costs due to long oil filter and oil separator life</td>
</tr>
</tbody>
</table>

### Screw connections

<table>
<thead>
<tr>
<th>Product</th>
<th>Product characteristics</th>
<th>Notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klüberpaste HS 91-21</td>
<td>Black, easy-to-spread high-temperature paste with a new type of combination of solid lubricants for the assembly lubrication of screw connections</td>
<td>– Efficient assembly due to constant preload forces for screws of different sizes and materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Screws easy to undo even when subject to high temperatures for a long time</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– High purity means less strain on the screw connection as product is virtually free from chlorine, fluorine and sulphur</td>
</tr>
</tbody>
</table>

### Synthetic cleaning concentrate for compressors, hydraulic systems, gearboxes and other oil circulation systems

<table>
<thead>
<tr>
<th>Product</th>
<th>Product characteristics</th>
<th>Notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klüber Summit Varnasolv</td>
<td>synthetic</td>
<td>– Low maintenance and cleaning costs due to effective cleaning of varnish and carbon build-up without disassembly of the compressor unit</td>
</tr>
<tr>
<td>Klüber Summit Varnasolv</td>
<td>synthetic</td>
<td>– Application during operation, hence no compressor shutdown required for cleaning</td>
</tr>
<tr>
<td>Klüber Summit Varnasolv</td>
<td>synthetic</td>
<td>– Easy application Klüber Summit Varnasolv is neutral towards seals when mixed with oil at a concentration of 10 %</td>
</tr>
<tr>
<td>Klüber Summit Varnasolv</td>
<td>synthetic</td>
<td>– Cost-saving operation and maintenance of the cleaned compressor unit due to higher equipment efficiency or longer oil life</td>
</tr>
</tbody>
</table>

### Speciality lubricants for other applications

*Air compressors*
- **Klüber Summit SH 32**
  - Synthetic hydrocarbon
  - Kinematic viscosity: 32 mm²/s at 40 °C
  - Notes and Benefits:
    - Low maintenance and operating costs due to long oil change intervals of up to 10,000 operating hours in oil-injected screw-type compressors
    - Easy changeover from mineral oils due to neutral behaviour of the oil towards seals
    - Low evaporation rate leading to clean compressed air and clean compressed air lines. Prevention of unnecessary cleaning expenses and pneumatic valve downtime due to gumming
    - Low formation of oxidation residues in the oil circuit enabling low operating costs due to long oil filter and oil separator lifetimes

*Synthetic cleaning concentrate for compressors, hydraulic systems, gearboxes and other oil circulation systems*
- **Klüber Summit Supra 32**
  - Polyglycol oil
  - Kinematic viscosity: 38 mm²/s at 40 °C
  - Notes and Benefits:
    - Easier switchover of compressors that were previously running with polyglycol oils due to good oil miscibility
    - Low maintenance and operating costs due to long oil change intervals of up to 8,000 operating hours in oil-injected screw-type compressors
    - Good soil dissolving properties due to the ester content keeping the oil circuit clean and preventing cleaning costs
    - Low formation of oxidation residues in the oil circuit leading to low operating costs due to long oil filter and oil separator lifetime

*Screw connections*
- **Klüberpaste HS 91-21**
  - Black, easy-to-spread high-temperature paste with a new type of combination of solid lubricants for the assembly lubrication of screw connections
  - Notes and Benefits:
    - Efficient assembly due to constant preload forces for screws of different sizes and materials
    - Screws easy to undo even when subject to high temperatures for a long time
    - High purity means less strain on the screw connection as product is virtually free from chlorine, fluorine and sulphur

*Ball valves*
- **NONTROP GB 3 G**
  - Base oil: mineral
  - Thickener: silicate
  - NLGI grade 3
  - Notes and Benefits:
    - Very good resistance to hydrocarbons such as propane, butane, ethane
    - Good adhesion to the friction point
    - High thermal stability
    - Neutral towards copper and its alloys
    - Very good load-carrying capacity with solid lubricants

- **UNISILKON L 641**
  - Base oil: silicone oil
  - Thickener: PTFE
  - Notes and Benefits:
    - Very good wetting
    - Operational smoothness due to the good viscosity-temperature behaviour
    - Very good resistance to cold and hot water and steam
    - High thermal stability
    - Good sealing effect
    - Neutral behaviour towards metal, elastomers and plastics

- **Klüberalfa YV 93-302 / 93-1202**
  - PFPE / PTFE grease
  - NLGI grade 2
  - Notes and Benefits:
    - High operational reliability in facilities and components used with gaseous oxygen
    - Due to wide compatibility with customary materials
    - Due to wide service temperature range
    - Multiple uses as sliding agent for industrial processes involving oxygen, air, carbon dioxide, inert and other gases as well as their condensates
    - May also be used for liquid-oxygen equipment
    - Individual batch BAM certificates

*Speciality lubricants for other applications*
Speciality lubricants for other applications

Chemical pumps – rolling bearings

<table>
<thead>
<tr>
<th>Product</th>
<th>Characteristics</th>
<th>Notes and benefits</th>
</tr>
</thead>
</table>
| BARRERTA KM 102       | PFPE/PTFE grease NLGI grade 2 | – Higher component availability over wide service temperature ranges
|                       |                         | where there is contact with aggressive chemicals due to long grease life          |
|                       |                         | – Improved component performance                                                  |
|                       |                         | – Due to low start-up torques even at low temperatures                             |
|                       |                         | – Due to good speed compatibility                                                 |
|                       |                         | – As friction coefficients are largely unaffected by temperature                 |

Mechanical shaft seals

<table>
<thead>
<tr>
<th>Product</th>
<th>Base oil</th>
<th>Kinematic viscosity DIN 51562-1 at 40 °C, [mm²/s] approx.</th>
<th>Notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klüberfluid NH1 4-005</td>
<td>synthetic hydrocarbon oil</td>
<td>5</td>
<td>– Higher process reliability as product has been tested and is recommended by Eagle Burgmann, the industrial sealing technology expert</td>
</tr>
<tr>
<td>PARALIQ P 12</td>
<td>white oil</td>
<td>20.5</td>
<td></td>
</tr>
<tr>
<td>Klüberoll 4 UH1-10 AF</td>
<td>synthetic hydrocarbon oil</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Klüber Summit DSL 32</td>
<td>ester oil</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Klüber Summit PGS 10 A</td>
<td>polyglycol oil</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Gears in cooling towers

<table>
<thead>
<tr>
<th>Product</th>
<th>Base oil</th>
<th>Kinematic viscosity DIN 51562-1 at 40 °C, [mm²/s] approx.</th>
<th>Notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klübersynth EG 4-150</td>
<td>synthetic hydrocarbon oil</td>
<td>150</td>
<td>– Synthetic high-performance gear oils</td>
</tr>
<tr>
<td>EG 4-220</td>
<td></td>
<td>220</td>
<td>– Stuffing load capacity acc. to API GL 4</td>
</tr>
<tr>
<td>EG 4-320</td>
<td></td>
<td>320</td>
<td>– Miscible with mineral oils</td>
</tr>
<tr>
<td>EG 4-680</td>
<td></td>
<td>680</td>
<td>– Very good corrosion protection</td>
</tr>
<tr>
<td>EG 4-1000</td>
<td></td>
<td>1000</td>
<td>– Resistant to ageing</td>
</tr>
</tbody>
</table>

Desulphurisation systems

Sulphur removed from crude oil is solidified into pastilles by means of a Rotoform system.
The rolling bearings used in this system require a high-temperature grease that is resistant to sulphuric components.

<table>
<thead>
<tr>
<th>Product</th>
<th>Characteristics</th>
<th>Notes and benefits</th>
</tr>
</thead>
</table>
| BARRERTA LS/2         | PFPE/PTFE grease NLGI grade 2 | – Higher plant availability and less maintenance
|                       |                         | – at very high operating temperatures up to 260 °C                                 |
|                       |                         | – When exposed to aggressive chemicals and vapours                                  |

Products for maintenance

<table>
<thead>
<tr>
<th>Product</th>
<th>Characteristics</th>
<th>Notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klübertec 2 2-6</td>
<td>Fully synthetic, highly liquid rust remover with strong penetrating effect</td>
<td>– Eco-friendly due to biodegradability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Easy handling as product is supplied ready for use and easy to spray</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Reduces need for cleaning, as product is fully synthetic and shows no tendency to gumming</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Less maintenance required as product combines cleaning, lubricating and antio corrosive effects</td>
</tr>
</tbody>
</table>

Oil Condition Analysis

<table>
<thead>
<tr>
<th>Product</th>
<th>Characteristics</th>
<th>Notes and benefits</th>
</tr>
</thead>
</table>
| KlüberMonitor – Oil Condition Analysis | Lab analysis to determine the condition of a used lubricating oil | – Oil Condition Analysis provides information on the current condition of an oil
|                       |                         | – Reliable: if performed regularly, the analysis reduces the risk of expensive components or systems breaking down |
|                       |                         | – Highly effective: useful lubricant life is maximised                               |
|                       |                         | – Conventional use: set supplied for sampling and shipment; standardised, easy-to-read and comprehensible report with recommendations |
|                       |                         | – Detailed product expertise available at Klüber Lubrication; professional interpretation of results |
The right lubricant at the right place at the right time

Systems for automatic lubrication

We at Klüber Lubrication understand ourselves as a solution provider. We not only supply high-performance oils and greases, but also “intelligent packages” for automatic lubrication of your machines and components. Selected lubricants covering a wide range of typical applications are available in automatic lubricant dispensers for single-point lubrication. These tried-and-tested systems based on electromechanical or electrochemical technology are available with standard, long-term or high-pressure greases, standard or high-temperature chain oils and special oils and greases for the food-processing industry. We are also able to supply other lubricants in automatic dispensers on request and for higher order volumes, provided they have been tested and approved for use – please contact your Klüber Lubrication consultant for details.

Your benefits at a glance

Profitability

Continuous production processes and predictable maintenance intervals reduce production losses to a minimum. Consistently high lubricant quality ensures continuous, maintenance-free long-term lubrication for high plant availability. Continuous supply of fresh lubricant to the lubrication points keeps friction low and reduces energy costs.

Lubrication with Klübermatic can reduce costs by up to 25 %

Safety

Longer lubrication intervals reduce the frequency of maintenance work and the need for your staff to work in danger zones. Lubrication systems from Klüber Lubrication can therefore considerably reduce occupational safety risks in work areas that are difficult to access.

Lubrication with Klübermatic can decrease the risk of accidents by up to 90 %

Reliability

Automatic lubrication systems from Klüber Lubrication ensure reliable, clean and precise lubrication around the clock. Plant availability is ensured by continuous relubrication of the application.

Lubrication with Klübermatic may help to prevent up to 55 % of rolling bearing failures

From low-cost to high-tech – automatic systems for all requirements

Klüber Lubrication offers you the following technological solutions:

– freely adjustable lubrication increments between 1 and 12 months
– range of specialty lubricants
– self-contained or machine-controlled lubrication systems (time control with programmable controller)
– combination of tried-and-tested Klüber Lubrication lubricants with proven automatic lubricant dispensers

Klübermatic FLEX Klübermatic NOVA Klübermatic STAR VARIO Klübermatic STAR CONTROL

Flexible use – and for lubrication points with high requirements

For applications subject to wide temperature fluctuations

Precise and adjustable lubricant metering

Externally controlled single-point relubrication

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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.