Reliable and efficient cement production.

Speciality lubricants meeting the highest requirements
Producing cement reliably and safely while reducing downtime is a continual challenge faced every day. Machines in the cement industry are subject to extreme operating conditions like high contamination, temperatures, vibrations and shock loads. These conditions make maintenance and repair of your machinery a very challenging task.

In the extreme environment in which drives, bearings, conveyors and other components have to function, the lubricant has to meet the highest demands. First, the right lubricant has to be selected, as there is no standard solution for many of the applications in this industry.

Depending on the mode of operation and the location of use, you have to use different lubricants that are made up of different base oils, additives, viscosities and consistencies. Making the wrong decision can lead to premature component failure or even production stoppages, resulting in high maintenance costs and production losses. In addition, your plant must run efficiently and cost-effectively with minimum impact on the environment.

Klüber Lubrication supports you by offering solutions particularly suited to these requirements of the cement industry.

We offer a range of speciality lubricants tailored to the needs of the cement industry that show their strengths particularly in critical applications. We support you in selecting the right lubricant and are with you as partner from changeover to routine checks, from the lubricant sampling and the set-up of lubrication systems to the optimisation of lubricant quantities. Our long-standing experience of more than 80 years in the industrial lubrication and intense cooperation with well-known OEMs helps us develop just the right lubricant to ensure high reliability, optimised consumption and achievement of the design life.
Cement plant applications:
Optimally equipped with our speciality lubricants
Lubricants for raw cement plant transport
Apron feeders, belt & screw conveyers, bucket elevators, stackers & reclaimers

Better protection against temperature influence and shock loads

During the transport of raw material and additional materials, bearings and joints are mainly influenced by excessive contamination from dust and water in combination with high temperature fluctuations. The consequence: high wear and short lifetime of the loaded components. High-quality speciality lubricants help you prevent damage; the right lubricant protects your machines against temperatures and shock loads or oscillating movements.

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
</table>
| Cardan shafts, pivoting bearings, sliding and rolling bearings | Klüberlub BEM 41-122 | - Temperature range: -30 °C to 140 °C  
- Grease based on a mixture of mineral oil and synthetic hydrocarbon oil thickened with a special lithium soap and light-coloured solid lubricants  
- NLGI grade 2  
- Speed factor up to 400,000 mm/min | - Prolongs life of bearings subjected to high surface pressure and slow, oscillating movements  
- Prevents fretting corrosion and scuffing in pivoting bearings  
- Preferably used for steel/steel bearings |
| Klübersplex BEM 41-132 | - Temperature range: -40 °C to 150 °C  
- Grease based on a mixture of synthetic hydrocarbon oil, mineral oil and a special lithium soap  
- NLGI grade 2  
- Speed factor up to 1,000,000 mm/min | - Longer service life  
- Less maintenance  
- Prolongs life of bearings subjected to vibration and shock loads |
| Circulation systems/screw conveyor drives | PETAMO GHY 133 N | - Temperature range: -40 °C to 160 °C  
- Grease based on polyurea thickener, mineral oil, synthetic hydrocarbon oil and additives  
- NLGI grade 2  
- Speed factor up to 500,000 mm/min | - High thermal loads, increased lifetime and reduced consumption  
- Corrosion protection |
| Lubricating nipples/automatic lubricant dispenser | Klübermatic dispenser with suitable lubricant | - Automatic lubricant dispenser suitable for single-point lubrication in rolling and plain bearings, slideways, open gears, toothed racks, shaft seals and chains | |
| Drive gearboxes | Klüberoil GEM 1 N | - Max. temperature: up to 100 °C  
- Gear/multipurpose oils based on selected mineral oils  
- F23 scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test | - Approved by leading gear drive manufacturers  
- Low maintenance cost  
- Protection even at peak loads, vibrations and oscillation |
| Klübersynth GEM 4 N | - Max. temperature: up to 140 °C  
- Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil  
- F23 scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test | | |
| Klübersynth GH 6 | - Max. temperature: up to 160 °C  
- Polyglycol synthetic oil  
- F23 scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test  
- Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability | - Reduces power losses and improves energy efficiency  
- Protection even at peak loads, vibrations and oscillation, high temperatures  
- Extended service life of bearings, seals  
- Longer oil change intervals resulting in cost savings |

Check compatibility and follow the application notes in the product information sheet.
Lubricants for crushing processes

Crushing processes are particularly demanding for bearings, as vibrations, shocks and contamination are extremely high, and temperatures fluctuate considerably. Speciality lubricants can protect highly loaded bearings in these processes; they reduce wear, extend maintenance intervals and increase reliability.

We make speciality lubricants to suit these requirements: they have the right viscosity and consistency combined with the right additives and offer reliable lubricant pumpability. They are also chemically and physically stable, contributing to long bearing life.

### Vibrating screens

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
</table>
| Bearings | Klüberplex BEM 41-132 | - Temperature range -40 °C to 150 °C  
- Grease based on mixture of synthetic hydrocarbon oil, mineral oil and a special lithium soap  
- NLGI grade 2  
- Speed factor up to 1,000,000 mm/min | Longer service life  
- Less maintenance  
- Prolongs life of bearings subjected to vibration and shock loads |
| Legs | Klüberlub BVH 71-461 | - Temperature range -20 °C to 160 °C  
- NLGI grade 1  
- Grease based on mineral oil, synthetic hydrocarbon oil and polyurea | Efficient at increased temperatures, vibrations and shock loads |
| Legs | Klüberlub BE 41-542 | - Temperature range -20 °C to 140 °C  
- NLGI grade 2  
- Speed factor up to 500,000 mm/min  
- Extreme-pressure grease based on highly viscous mineral oil, special lithium soap, antiwear, anti-oxidant and anticorrosion additives | Protects highly loaded bearings running at slow to medium speeds |

### Crushers

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
</table>
| Crusher main bearing | Klüberlub BE 41-1501 | - Temperature range -10 °C to 150 °C  
- NLGI grade 1  
- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure / antiwear (EP / AW) additives  
-Contains solid lubricants (MoS₂ and graphite) | Increased bearing life  
- Improved pumpability  
- Increased productivity due to less downtime  
- Recommended by leading OEMs |
| Drive gearbox | Klüberol GEM 1 N | - Max. temperature: up to 100 °C  
- Gear/multipurpose oils based on selected mineral oils  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test | Approved by leading gear drive manufacturers  
- Low maintenance cost  
- Protection even at peak loads, vibrations and oscillation |
| | Klüber synth GEM 4 N | - Max. temperature: up to 140 °C  
- Gear/multipurpose oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test | Approved by leading OEMs  
- Reduces power losses and improves energy efficiency  
- Protection even at peak loads, vibrations and oscillation, high temperatures  
- Extended service life of bearings, seals  
- Longer oil change intervals resulting in cost savings |
| Drive gearbox | Klüber synth GH 6 | - Max. temperature: up to 160 °C  
- Polyglycol synthetic gear oil  
- Excellent results in FAG FE8 rolling bearing test  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability | Approved by leading OEMs  
- Protection even at peak loads, vibrations and oscillation, high temperatures  
- Prevents premature rolling bearing failure  
- Extended service life  
- Longer oil change intervals resulting in cost savings |

* Check compatibility and follow the application notes in the product information sheet.
## Lubricants for crushing processes
### Vertical roller mills

### Oil lubrication

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main bearing/roller bearing</td>
<td>Klüber synth GH 6*-680, -1000, -1500 (CLP PG 680, -1000, -1500)</td>
<td>- Max. temperature up to 160 °C (Klübersynth GH 6)</td>
<td>- Prevents premature rolling bearing failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Max. temperature up to 150 °C (SYNTHESO HT)</td>
<td>- Reduces power losses and improves energy efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Polyglycol synthetic oil</td>
<td>- Extended service life</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Excellent results in FAG FE8 rolling bearing test</td>
<td>- Approved by leading OEMs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Excellent wear protection, ageing and oxidation resistance, good viscosit-temperature behaviour and very good thermal stability</td>
<td></td>
</tr>
</tbody>
</table>

### Main drive gearboxes

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main drive gearbox</td>
<td>Klüber oil GEM 1 N</td>
<td>- Max. temperature: up to 100 °C</td>
<td>- Approved by leading gear drive manufacturers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Gear/multipurpose oils based on selected mineral oils</td>
<td>- Low maintenance cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</td>
<td>- Protection even at peak loads, vibrations and oscillation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Excellent results in FAG FE8 rolling bearing test</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Klüber synth GEM 4 N</td>
<td>- Max. temperature: up to 140 °C</td>
<td>- Reduces power losses and improves energy efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil</td>
<td>- Protection even at peak loads, vibrations and oscillation, high temperatures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</td>
<td>- Extended service life of bearings, seals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Excellent results in FAG FE8 rolling bearing test</td>
<td>- Longer oil change intervals resulting in cost savings</td>
</tr>
<tr>
<td></td>
<td>Klüber synth GH 6*</td>
<td>- Max. temperature: up to 160 °C</td>
<td>- Reduces power losses and improves energy efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Polyglycol synthetic oil</td>
<td>- Protection even at peak loads, vibrations and oscillation, high temperatures</td>
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<td>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</td>
<td>- Prevents premature rolling bearing failure</td>
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<tr>
<td></td>
<td></td>
<td>- Excellent wear protection, ageing and oxidation resistance, good viscosit-temperature behaviour and very good thermal stability</td>
<td>- Extended service life</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>- Longer oil change intervals resulting in cost savings</td>
</tr>
</tbody>
</table>

### Grease lubrication

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main bearing/rock arm</td>
<td>Klüber lub BE 41-1501</td>
<td>- Temperature range: -10 °C to 150 °C</td>
<td>- Increased bearing life</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- NLGI grade 1</td>
<td>- Improved pumpability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/antwear (EP/AW) additives</td>
<td>- Increased productivity due to less downtime</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Contains solid lubricants (MoS2 and graphite)</td>
<td>- Recommended by leading OEMs</td>
</tr>
<tr>
<td></td>
<td>Klüber lub BE 41-1002</td>
<td>- Temperature range: -15 °C to 120 °C</td>
<td>- Good pumpability at low temperatures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- NLGI grade 2</td>
<td>- Less maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium thickener</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Contains solid lubricants</td>
<td></td>
</tr>
<tr>
<td>Elastomer seals of rollers</td>
<td>SYNTHESO GLEP 1</td>
<td>- Temperature range: -50 °C to 150 °C</td>
<td>- Compatible with EPDM seals. More no leakages due to seal failures</td>
</tr>
<tr>
<td></td>
<td>Klüber lub BE 41-1501</td>
<td>- Special lubricating grease with EP additives, compatible with EPDM</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Compatible with elastomers 72 NBR 902</td>
<td>- Increased component life</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Temperature range: -10 °C to 150 °C</td>
<td>- Improved pumpability</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- NLGI grade 1</td>
<td>- Increased productivity due to less downtime</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/antwear (EP/AW) additives</td>
<td>- Recommended by leading OEMs</td>
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<td></td>
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<td>- Contains solid lubricants (MoS2 and graphite)</td>
<td></td>
</tr>
</tbody>
</table>
### Component

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
</table>
| Top and bottom bearings | Klüberplex BEM 41-132       | - Temperature range -40 °C to 150 °C  
- Grease based on mixture of synthetic hydrocarbon oil, mineral oil and a special lithium soap  
- NLGI grade 2  
- Speed factor up to 1,000,000 mm/min | - Longer service life  
- Less maintenance  
- Prolongs bearing life subjected to vibration and shock loads |
|                 | Klüberlub BE 41-542         | - Temperature range -20 °C to 140 °C  
- NLGI grade 2  
- Extreme-pressure grease based on highly viscous mineral oil, special lithium soap, antiwear, anti-oxidant and anti-corrosion additives | - Protects highly loaded bearings running at slow to medium speeds |
|                 | Klüberlub BE 41-1501        | - Temperature range -10 °C to 150 °C  
- NLGI grade 1  
- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/antifreeze (EP/AF) additives  
- Contains solid lubricants (MoS₂ and graphite) | - Increased bearing life  
- Improved pumpability  
- Increased productivity due to less downtime  
- Recommended by leading OEMs |
| Gearboxes       | Klüberoil GEM 1 N           | - Max. temperature up to 100 °C  
- Gear/multipurpose oils based on selected mineral oils  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test | - Approved by leading gear drive manufacturers  
- Low maintenance cost  
- Protection even at peak loads, vibrations and oscillation |
|                 | Klüber synth GEM 4 N        | - Max temperature up to 140 °C  
- Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test | - Reduces power losses and improves energy efficiency  
- Protection even at peak loads, vibrations and oscillation, high temperatures  
- Extended service life of bearings, seals  
- Longer oil change intervals resulting in cost savings |
|                 | Klüber synth GH 6*          | - Max. temperature up to 160 °C  
- Polyglycol synthetic oil  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test  
- Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability | - Reduces power losses and improves energy efficiency  
- Protection even at peak loads, vibrations and oscillation, high temperatures  
- Prevents premature rolling bearing failure  
- Extended service life  
- Longer oil change intervals resulting in cost savings |

*Check compatibility and follow the application notes in the product information sheet.*
## Lubricants for crushing processes

### Roller presses

In bearings subjected to high shock loads the lubricating film has to ensure trouble-free operation, especially as lubrication starvation, contamination or the wrong lubricant can quickly contribute to bearing failure. Factors like long lead times for delivery of expensive spares can have an adverse effect on production and cost. Typical roller press bearings are cylindrical roller bearings operating at maximum 75 °C. We need to ensure adequate lubricant film formation to prevent metal-to-metal contact between the rollers and bearing raceways.

Klüberlub BE 41-1501 is a grease specially designed for such heavily loaded roller press bearing lubrication. Even at 75 °C, it ensures that no metal-to-metal contact occurs between rollers and bearing raceways.

Please select viscosity and consistency according to your operating parameters, e.g. temperature, speed and load. Your Klüber Lubrication contact will be glad to help you.

### Component Features Application notes and benefits

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
</table>
| Main bearing     | Klüberlub BE 41-1501 | - Temperature range -10 °C to 150 °C  
- NLGI grade 1  
- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure / antwear (EP / AW) additives  
- Contains solid lubricants (MoS$_2$ and graphite) | - Increased bearing life  
- Improved pumpability  
- Increased productivity due to less downtime  
- Recommended by leading OEMs |
|                  | Klüberlub BE 41-1002 | - Temperature range -15 °C to 120 °C  
- NLGI grade 2  
- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1000), special lithium thickener  
- Contains solid lubricants | - Good pumpability at low temperatures  
- Less maintenance |
| Planetary gearbox | Klüberoil GEM 1 N  | - Max. temperature up to 100 °C  
- Gear / multipurpose oils based on selected mineral oils  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test | - Approved by leading gear drive manufacturers  
- Low maintenance cost  
- Protection even at peak loads, vibrations and oscillation |
|                  | Klübersynth GEM 4 N  | - Max. temperature up to 140 °C  
- Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test | - Reduces power losses and improves energy efficiency  
- Protection even at peak loads, vibrations and oscillation, high temperatures  
- Extended service life of bearings, seals  
- Longer oil change intervals resulting in cost savings |
|                  | Klübersynth GH 6' | - Max. temperature up to 160 °C  
- Polyglycol synthetic oil  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test  
- Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability | - Reduces power losses and improves energy efficiency  
- Protection even at peak loads, vibrations and oscillation, high temperatures  
- Prevents premature rolling bearing failure  
- Extended service life  
- Longer oil change intervals resulting in cost savings |

*Check compatibility and follow the application notes in the product information sheet*
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<th>Features</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Pinion bearings</td>
<td>Klüberlub BE 41-1501</td>
<td>– Temperature range -10 °C to 150 °C&lt;br&gt;– NLGI grade 1&lt;br&gt;– Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/antiwear (EP/AW) additives&lt;br&gt;– Contains solid lubricants (MoS$_2$ and graphite)</td>
<td>– Increased bearing life&lt;br&gt;– Improved pumpability&lt;br&gt;– Increased productivity due to less downtime&lt;br&gt;– Recommended by leading OEMs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck bearings / drive gearboxes</td>
<td>Klüberoil GEM 1 N</td>
<td>– Max. temperature up to 100 °C&lt;br&gt;– Gear/multipurpose oils based on selected mineral oils&lt;br&gt;– FZG scuffing test, A/6.3/90, scuffing load stage ≥ 14&lt;br&gt;– Excellent results in FAG FE8 rolling bearing test</td>
<td>– Approved by leading gear drive manufacturers&lt;br&gt;– Low maintenance cost&lt;br&gt;– Protection even at peak loads, vibrations and oscillation</td>
</tr>
<tr>
<td></td>
<td>Klüber synth GEM 4 N</td>
<td>– Max. temperature up to 140 °C&lt;br&gt;– Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil&lt;br&gt;– FZG scuffing test, A/6.3/90, scuffing load stage ≥ 14&lt;br&gt;– Excellent results in FAG FE8 rolling bearing test</td>
<td>– Reduces power losses and improves energy efficiency&lt;br&gt;– Protection even at peak loads, vibrations and oscillation, high temperatures&lt;br&gt;– Extended service life of bearings, seals&lt;br&gt;– Longer oil change intervals resulting in cost savings</td>
</tr>
<tr>
<td></td>
<td>Klüber synth GH 6*</td>
<td>– Max. temperature up to 160 °C&lt;br&gt;– Polyglycol synthetic oil&lt;br&gt;– FZG scuffing test, A/6.3/90, scuffing load stage ≥ 14&lt;br&gt;– Excellent results in FAG FE8 rolling bearing test&lt;br&gt;– Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability.</td>
<td>– Reduces power losses and improves energy efficiency&lt;br&gt;– Protection even at peak loads, vibrations and oscillation, high temperatures&lt;br&gt;– Prevents premature rolling bearing failure&lt;br&gt;– Extended service life&lt;br&gt;– Longer oil change intervals resulting in cost savings</td>
</tr>
<tr>
<td>Rubber seals of neck/shoe bearings and girth gear cover</td>
<td>POLYLUB GA 352 P</td>
<td>– Temperature range -35 °C to 120 °C&lt;br&gt;– Adhesive long-term grease based on synthetic hydrocarbon oil, mineral oil and aluminium complex soap&lt;br&gt;– Good water resistance</td>
<td>– Good sealing effect prevents entry of contaminants like dust and water&lt;br&gt;– Protects components against corrosion</td>
</tr>
</tbody>
</table>

Check compatibility and follow the application notes in the product information sheet.
# Lubricants for crushing processes

## Bed compression grinding units

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
</table>
| Roller bearings/plummer blocks/reducer coupling | Klüberlub BE 41-1501 | – Temperature range -10 °C to 150 °C  
– NLGI grade 1  
– Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/antikorrosion (EP/PAW) additives  
– Contains solid lubricants (MoS\textsubscript{2} and graphite) | – Increased bearing life  
– Improved pumpability  
– Increased productivity due to less downtime  
– Recommended by leading OEMs |
| Rotary joints | PETAMO GHY 133 N | – Temperature range -40 °C to 160 °C  
– Grease based on polyurea thickener, mineral oil, synthetic hydrocarbon oil and additives  
– NLGI grade 2  
– Speed factor 500,000 mm/min | – Reduction of lubrication intervals, less maintenance  
– Cost reduction by reducing consumption  
– Prolongs bearing life even under high temperature and corrosive media |
| Scraper bearings | Klüberoil GEM 1-150 N | – Max. temperature up to 100 °C  
– Gear multipurpose oils based on selected mineral oils  
– FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
– Good results in FAG FE8 rolling bearing test | – Approved by leading gear drive manufacturers  
– Low maintenance cost  
– Protection even at peak loads, vibrations and oscillation |
| Bevel gearbox | Klübersynth GEM 4 N | – Max. temperature up to 140 °C  
– Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil  
– FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
– Excellent results in FAG FE8 rolling bearing test | – Reduces power losses and improves energy efficiency  
– Protection even at peak loads, vibrations and oscillation, high temperatures  
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| | Klübersynth GH 6 | – Max. temperature up to 160 °C  
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– Excellent results in FAG FE8 rolling bearing test  
– Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability | – Reduces power losses and improves energy efficiency  
– Protection even at peak loads, vibrations and oscillation, high temperatures  
– Prevents premature rolling bearing failure  
– Extended service life  
– Longer oil change intervals resulting in cost savings |

## Combination drive units

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
</table>
| Combination gear drives in mills | Klüberoil GEM 1 N | – Max. temperature up to 100 °C  
– Gear multipurpose oils based on selected mineral oils  
– FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
– Excellent results in FAG FE8 rolling bearing test | – Approved by leading gear drive manufacturers  
– Low maintenance cost  
– Protection even at peak loads, vibrations and oscillation |
| Klübersynth GEM 4 N | – Max. temperature up to 140 °C  
– Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil  
– FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
– Excellent results in FAG FE8 rolling bearing test | – Reduces power losses and improves energy efficiency  
– Protection even at peak loads, vibrations and oscillation, high temperatures  
– Extended service life of bearings, seals  
– Longer oil change intervals resulting in cost savings |
| Klübersynth GH 6 | – Max. temperature up to 160 °C  
– Polyglycol synthetic oil  
– FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
– Excellent results in FAG FE8 rolling bearing test  
– Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability | – Reduces power losses and improves energy efficiency  
– Protection even at peak loads, vibrations and oscillation, high temperatures  
– Prevents premature rolling bearing failure  
– Extended service life  
– Longer oil change intervals resulting in cost savings |

---

*Check compatibility and follow the application notes in the product information sheet.*
The pre-heating section is marked by extreme conditions like high temperature, speed, contaminants and others. The lubrication of bearings subjected to thermal loads is a demanding task. Speciality lubricants from Klüber Lubrication are designed to increase the component life in challenging situations.

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gearbox drive manifold</td>
<td>Klüber synth GH 6 °</td>
<td>- Max. temperature up to 160 °C</td>
<td>- Reduces power losses and improves energy efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Polyglycol synthetic oil</td>
<td>- Protection even at peak loads, vibrations and oscillation, high temperatures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- FZG scuffing test, A / 8.3 / 8.6, scuffing load stage ≥ 14</td>
<td>- Prevents premature rolling bearing failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Excellent results in FAG FE8 rolling bearing test</td>
<td>- Extended service life</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Excellent wear protection, ageing and oxidation resistance, good</td>
<td>- Longer oil change intervals resulting in cost savings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>viscosity-temperature behaviour and very good thermal stability</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Axle bearings</td>
<td>Klüberplex BEM 41-132</td>
<td>- Temperature range -40 °C to 150 °C</td>
<td>- Longer service life</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Grease based on mixture of synthetic hydrocarbon oil, mineral oil</td>
<td>- Less maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and a special lithium soap</td>
<td>- Prolongs life of bearing even under vibration and shock loads, high temperatures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- NLGI grade 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Speed factor 1,000,000 mm/min</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PETAMO GHY 133 N</td>
<td>- Temperature range -40 °C to 160 °C</td>
<td>- Reduction of lubrication intervals, less maintenance</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Grease based on polyurea thickener, mineral oil, synthetic hydrocarbon oil and additives</td>
<td>- Cost reduction by reducing consumption</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- NLGI grade 2</td>
<td>- Prolongs bearing life even under high temperature and corrosive media</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Speed factor 500,000 mm/min</td>
<td></td>
</tr>
</tbody>
</table>

Check compatibility and follow the application notes in the product information sheet.
## Lubricants used in clinker production
### Rotary kiln

The lamellar seal and the riding ring form one of the frequently lubricated friction points in kilns. It is important to ensure that solid lubricants enter the contact area of these friction points to prevent metal-metal wear.

### Lubrication of kiln riding rings and lamellar seals

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
</table>
| Riding ring | WOLFRACOAT C Fluid | - Temperature range: -25 °C to 1,050 °C  
- Viscous high-temperature release agent and lubricating compound based on a mineral and ester oil mixture. It contains solid lubricants, metal pigments and an inorganic thickener.  
- Ignition temperature ≥ 370 °C | - Occupational safety: applied through spray equipment  
- Low consumption: low costs, high efficiency  
- No residue formation at high temperatures  
- Protection against thermal stress |
| Lamellar inlet/outlet sealing | GRAFLOSCON BY 20 ULTRA | - Temperature range: -30 °C to 700 °C  
- Based on flame-resistant high-temperature dispersion  
- Contains solid lubricant and synthetic oil  
- Solvent-free dispersion  
- Thermal stability of the lubricating film ≥ 700 °C | - Easy to apply (no settling of solid lubricants, solvent-free)  
- No residue formation at high temperatures  
- Protection against thermal stress |
|         | GRAFLOSCON C-50 500 PLUS | - Adhesive lubricant based on mineral oil with aluminium complex thickener and solid lubricant (fine graphite)  
- Resistant to high pressure  
- Contains antiwear additives, adhesion improvers and corrosion inhibitors  
- Thermal stability of lubricant film up to 200 °C | |

#### Support roller bearings and thrust roller bearings

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
</table>
| Thrust roller bearing/support roller bearings/pinion bearing (grease-lubricated) | Klüberlub BE 41-1501 | - Temperature range: -10 °C to 150 °C  
- NLGI grade 1  
- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/antwear (EP/AW) additives  
- Contains solid lubricants (MoS2 and graphite) | - Increased bearing life  
- Improved pumpability  
- Increased productivity due to less downtime  
- Recommended by leading OEMs |
| Thrust roller bearing/support roller bearings/pinion bearing (oil lubricated) | Klüberoil GEM 1 N | - Max. temperature up to 100 °C  
- Gear multipurpose oils based on selected mineral oils  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test | - Approved by leading gear drive manufacturers  
- Protection even at peak loads, vibrations and oscillation |
|         | Klüberox SYN 4 N | - Max. temperature up to 140 °C  
- Gear and multipurpose oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test | - Approved by leading OEMs  
- Reduces power losses and improves energy efficiency  
- Protection even at peak loads, vibrations and oscillation, high temperatures  
- Extended service life of bearings, seals  
- Longer oil change intervals resulting in cost savings |
|         | Klüberox GH 6* | - Max. temperature up to 160 °C  
- Polyglycol synthetic oil  
- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14  
- Excellent results in FAG FE8 rolling bearing test  
- Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability | - Reduces power losses and improves energy efficiency  
- Approved by leading OEMs  
- Protection even at peak loads, vibrations and oscillation, high temperatures  
- Prevents premature rolling bearing failure  
- Extended service life  
- Longer oil change intervals resulting in cost savings |

*Check compatibility and follow the application notes in the product information sheet*
## Lubricants used in clinker production

### Rotary kiln

Bearings in coolers are subjected to high temperatures. Standard greases fail quickly and cause bearing damage, resulting in high maintenance costs.

### Coolers

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
</table>
| Fan bearings | STABURAGS N 12 M F | - Temperature range -20 °C to 140 °C  
- Mineral oil grease for long term application, at high temperatures  
- Contains solid lubricant (MoS₂)  
- Speed factor 500,000 mm/min | - Protects bearings subjected to high temperature and loads  
- Enhanced corrosion protection |
| Electric motor bearings | Klüberplex BEM 41-132 | - Temperature range -40 °C to 150 °C  
- Grease based on mixture of synthetic hydrocarbon oil, mineral oil and a special lithium soap  
- NLGI grade 2  
- Speed factor 1,000,000 mm/min | - Longer service life  
- Less maintenance  
- Prolongs life of bearing even under vibration and shock loads, high temperatures |
| Reciprocating grates | STABUTHERM GH 461 | - Temperature range -20 °C to 180 °C  
- NLGI grade 1  
- High-temperature grease based on mineral oil and polyurea  
- Suitable for centralised lubrication systems  
- Very adhesive and resistant to water | - Bearing cost reduction due to good wear protection, good load-carrying capacity and excellent corrosion protection at high temperatures |
| Slow-running rolling bearings | Klüberbarynth HB 74-401 | - Temperature range -40 °C to 200 °C  
- NLGI grade 1  
- High-temperature grease based on synthetic oil and polyurea thickener  
- High base oil viscosity and special additives | - Increased bearing life  
- Improved pumpability  
- Increased productivity due to less downtime |
| Reciprocating grates | Klüberlub BE 41-1501 | - Temperature range -10 °C to 150 °C  
- NLGI grade 1  
- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme-pressure/antiklevener additives  
- Contains solid lubricants (MoS₂ and graphite) | - Continuous, maintenance-free, long-term lubrication  
- Reliability: clean and accurate lubrication 24 hours a day  
- Safety: frequency of maintenance staff having to work in dangerous areas is reduced |
| Slow-running rolling bearings | Klübermatic dispenser with suitable lubricant | - Automatic lubricant dispenser suitable for single-point lubrication in rolling and plain bearings, slideways, open gears, toothed racks, shaft seals and chains | - |
## Lubricants for open gear drives

You expect your open gears to work reliably. We offer you a comprehensive range of specialty lubricants to reach this goal and select the right viscosity lubricant for your open gear. We will be happy to support you on site during routine inspections, start-up, after repair, or with new gears.

There are two basic types of lubricants for open gears: graphite-based greases and Klüber fluids that are free of solid lubricants. Klüber fluids have been used successfully for more than 15 years and are an increasingly preferred alternative. These are oils with additive packages tailored to the particular requirements of open gears. The most important selection criterion is viscosity. The product must be selected based on the tooth flank condition, load and temperature distribution, vibrations, mechanical condition of gear and pinion and the surroundings.

### Operational open gear lubricants – transparent fluids

<table>
<thead>
<tr>
<th>Climate zone</th>
<th>Subtropical to tropical</th>
<th>Tropical</th>
<th>Temperate</th>
<th>Temperate</th>
<th>Subtropical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate type</td>
<td>Mild winters and hot summers</td>
<td>Hot and wet all year</td>
<td>Cold winters and mild summers</td>
<td>Cold winters and mild summers</td>
<td>Hot, humid summers and generally mild winters</td>
</tr>
<tr>
<td>Type of lubrication system</td>
<td>Spray lubrication, immersion, circulation, paddle wheel</td>
<td>Spray lubrication, immersion, paddle wheel</td>
<td>Spray lubrication</td>
<td>Spray lubrication</td>
<td>Spray lubrication, immersion, circulation, paddle wheel</td>
</tr>
<tr>
<td>Product</td>
<td>Klüberfluid C-F 3 Ultra</td>
<td>Klüberfluid C-F 3 Ultra M</td>
<td>Klüberfluid C-F 3 Ultra S</td>
<td>Klüberfluid C-F 4 Ultra</td>
<td>Klüberfluid C-F 4 Ultra</td>
</tr>
<tr>
<td>Colour</td>
<td>Transparent</td>
<td>Transparent</td>
<td>Transparent</td>
<td>Transparent</td>
<td>Transparent</td>
</tr>
<tr>
<td>Maximum peripheral speed in m/s</td>
<td>10</td>
<td>12</td>
<td>7</td>
<td>8</td>
<td>10 °C to 80 °C</td>
</tr>
<tr>
<td>Temperature limits for spraying</td>
<td>15 °C to 120 °C</td>
<td>2 °C to 100 °C</td>
<td>0 °C to 80 °C</td>
<td>0 °C to 110 °C/0 °C to 80 °C</td>
<td>10 °C to 80 °C</td>
</tr>
<tr>
<td>Temperature limits for immersion or circulation lubrication</td>
<td>15 °C to 120 °C</td>
<td>Not applicable</td>
<td>0 °C to 80 °C</td>
<td>0 °C to 80 °C</td>
<td>10 °C to 120 °C/10 °C to 80 °C</td>
</tr>
<tr>
<td>Viscosity at 40 °C</td>
<td>18,500 mm²/sec</td>
<td>25,500 mm²/sec</td>
<td>4,000 mm²/sec</td>
<td>3,100 mm²/sec</td>
<td>8,000 mm²/sec</td>
</tr>
<tr>
<td></td>
<td>– Easy inspection during operation with UV lamp</td>
<td>– Easy inspection during operation with UV lamp</td>
<td>– Easy inspection during operation with UV lamp</td>
<td>– Easy inspection during operation with UV lamp</td>
<td>– Easy inspection during operation with UV lamp</td>
</tr>
<tr>
<td></td>
<td>– Cost reduction due to less consumption</td>
<td>– Cost reduction due to less consumption</td>
<td>– Cost reduction due to less consumption</td>
<td>– Cost reduction due to less consumption</td>
<td>– Cost reduction due to less consumption</td>
</tr>
<tr>
<td></td>
<td>– Excellent wear protection even at elevated temperatures</td>
<td>– Excellent wear protection even at elevated temperatures</td>
<td>– Excellent wear protection even at elevated temperatures</td>
<td>– Excellent wear protection even at elevated temperatures</td>
<td>– Excellent wear protection even at elevated temperatures</td>
</tr>
<tr>
<td></td>
<td>– Tested and approved by OEMs</td>
<td>– Tested and approved by OEMs</td>
<td>– Tested and approved by OEMs</td>
<td>– Tested and approved by OEMs</td>
<td>– Tested and approved by OEMs</td>
</tr>
<tr>
<td></td>
<td>– Reduction in power consumption</td>
<td>– Reduction in power consumption</td>
<td>– Clean system: no accumulation of used grease in the cover</td>
<td>– Clean system: no accumulation of used grease in the cover</td>
<td>– Clean system: no accumulation of used grease in the cover</td>
</tr>
</tbody>
</table>

### Benefits of Klüber Lubrication transparent open gear lubricants:

- Greater film thickness (higher lambda value) – even at higher operating temperatures resulting in better tooth flank protection
- Intelligent additive package for protection under extreme pressure and mixed friction conditions
- Good flow characteristics ensure clean gears
- No blocking of the spray nozzles results in enhanced life of spray system and cost savings
- Good vibration dampening
- Reduced tooth flank temperature

### Profitability

- Tooth flanks can be inspected during operation through the transparent film
- Immediate identification of progressive damage in form of material spalling or metal chips
- No more “unpleasant surprises” at shutdowns – if required corrective measures can be planned ahead
- Reduced wear
- Reduced lubricant consumption: up to 50 % less compared to graphite based products
# Lubricants for open gear drives

## Graphite-based operational open gear lubricants

<table>
<thead>
<tr>
<th>Climate zone</th>
<th>Temperate</th>
<th>Temperate to subtropical</th>
<th>Subtropical to tropical</th>
<th>Subtropical to tropical</th>
</tr>
</thead>
<tbody>
<tr>
<td>Climate type</td>
<td>Cold winters and mild summers</td>
<td>Cold winters and hot summers</td>
<td>Mild winters to hot summers</td>
<td>Mild winters to hot summers</td>
</tr>
<tr>
<td>Type of lubrication system</td>
<td>Spray lubrication</td>
<td>Spray lubrication</td>
<td>Spray lubrication</td>
<td>Spray lubrication</td>
</tr>
<tr>
<td>Product</td>
<td>GRAFLOSCON C-SG 0 ULTRA</td>
<td>GRAFLOSCON C-SG 1000 ULTRA</td>
<td>GRAFLOSCON C-SG 2000 ULTRA</td>
<td>Klüberfluid C-F 1 Ultra</td>
</tr>
<tr>
<td>Temperature limits for spraying</td>
<td>0 °C to 90 °C</td>
<td>5 °C to 100 °C</td>
<td>15 °C to 120 °C</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Temperature limits for immersion or circulation lubrication</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Base oil viscosity at 40 °C</td>
<td>680 mm²/sec</td>
<td>1000 mm²/sec</td>
<td>2000 mm²/sec</td>
<td>250 mm²/sec</td>
</tr>
<tr>
<td>Application notes and benefits</td>
<td>– Tried-and-tested, cost-effective operational lubricant contributing to a long service life of your drive, low lubricant consumption and reduced operating costs</td>
<td>– Approved by OEMs</td>
<td>– Service lubricant for open drives with splash or circular lubrication</td>
<td>– Long service life of gears</td>
</tr>
</tbody>
</table>

## Lubricant Specifications

- **GRAFLOSCON C-SG 0 ULTRA**
  - Temperature limits for spraying: 0 °C to 90 °C
  - Temperature limits for immersion or circulation lubrication: Not applicable
  - Base oil viscosity at 40 °C: 680 mm²/sec

- **GRAFLOSCON C-SG 1000 ULTRA**
  - Temperature limits for spraying: 5 °C to 100 °C
  - Temperature limits for immersion or circulation lubrication: Not applicable
  - Base oil viscosity at 40 °C: 1000 mm²/sec

- **GRAFLOSCON C-SG 2000 ULTRA**
  - Temperature limits for spraying: 15 °C to 120 °C
  - Temperature limits for immersion or circulation lubrication: Not applicable
  - Base oil viscosity at 40 °C: 2000 mm²/sec

- **Klüberfluid C-F 1 Ultra**
  - Temperature limits: Not applicable
  - Temperature limits for immersion or circulation lubrication: Not applicable
  - Base oil viscosity at 40 °C: 250 mm²/sec

- **Klüberfluid C-F 2 Ultra**
  - Temperature limits: Not applicable
  - Temperature limits for immersion or circulation lubrication: Not applicable
  - Base oil viscosity at 40 °C: 3200 mm²/sec

## Notes

- **Climate type**
  - Cold winters and mild summers
  - Cold winters and hot summers
  - Mild winters to hot summers
  - Cold winters and mild summers
  - Mild winters to hot summers

- **Temperature limits for spraying**
  - 0 °C to 90 °C
  - 5 °C to 100 °C
  - 15 °C to 120 °C

- **Temperature limits for immersion or circulation lubrication**
  - Not applicable
  - Not applicable
  - Not applicable

- **Base oil viscosity at 40 °C**
  - 680 mm²/sec
  - 1000 mm²/sec
  - 2000 mm²/sec
  - 250 mm²/sec
  - 3200 mm²/sec

- **Application notes and benefits**
  - Tried-and-tested, cost-effective operational lubricant contributing to a long service life of your drive, low lubricant consumption and reduced operating costs
  - Approved by OEMs

- **Service lubricant for open drives with splash or circular lubrication**
  - Long service life of gears
  - Approved by OEMs
**Priming open gear lubricants**

<table>
<thead>
<tr>
<th>Application method</th>
<th>Manual or brush lubrication only</th>
<th>Manual or brush lubrication only</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td>Klüberplex AG 11-462</td>
<td>GRAFLOSCON A-G 1 ULTRA</td>
</tr>
<tr>
<td><strong>Colour</strong></td>
<td>White</td>
<td>Black</td>
</tr>
<tr>
<td><strong>Base oil viscosity at 40 °C</strong></td>
<td>460 mm²/sec</td>
<td>500 mm²/sec</td>
</tr>
</tbody>
</table>

**Application notes and benefits**

- Low contamination of machine environment due to use of white solid lubricants and low lubricant consumption
- High load-carrying capacity and adhesiveness prevents metal-to-metal contact of tooth flanks
- Clear contact pattern
- Corrosion protection
- Priming and contrast lubricant for determining the parallel alignment of tooth flanks
- Priming and contrast lubricant for determining the parallel alignment of tooth flanks
- High load-carrying capacity and adhesiveness prevents metal-to-metal contact of tooth flanks
- Long durability of lubricating film protects tooth flanks even during prolonged gear alignment procedures
- Priming and contrast lubricant for determining the parallel alignment of tooth flanks
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- Priming and contrast lubricant for determining the parallel alignment of tooth flanks

**Running-in open gear lubricants**

<table>
<thead>
<tr>
<th>Application method</th>
<th>Spray, immersion and circulation lubrication</th>
<th>Immersion and circulation lubrication</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td>Klüberfluid B-F 2 Ultra</td>
<td>Klüberfluid B-F 1 Ultra</td>
</tr>
<tr>
<td><strong>Colour</strong></td>
<td>Milky</td>
<td>Black</td>
</tr>
<tr>
<td><strong>Viscosity at 40 °C</strong></td>
<td>400 mm²/sec</td>
<td>500 mm²/sec</td>
</tr>
<tr>
<td><strong>Temperature limits for spraying</strong></td>
<td>-5 °C to 100 °C</td>
<td>-15 °C to 90 °C</td>
</tr>
<tr>
<td><strong>Temperature limits for immersion or circulation lubrication</strong></td>
<td>0 °C to 100 °C/10 °C to 100 °C</td>
<td>Not applicable</td>
</tr>
<tr>
<td><strong>Number of hours of operation</strong></td>
<td>Spray 500–600</td>
<td>500–600</td>
</tr>
<tr>
<td><strong>Benefits for you</strong></td>
<td>Quickly smoothes the rough surfaces and improves the contact ratio. This contributes to a longer service life of the gears. Free from solvents and eco-friendly. Easy inspection through UV indicator</td>
<td>Reduces surface roughness and improves tooth flank quality thus contributing to longer service life of drives and reduced maintenance costs Free from heavy metals, solvents, bitumen, and chlorine Easy application Controlled wear for tooth face connection</td>
</tr>
</tbody>
</table>

**Repair open gear lubricants**

**Purpose**

<table>
<thead>
<tr>
<th>Application method</th>
<th>Manual or brush lubrication only</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product</strong></td>
<td>Klüberfluid D.F.1 Ultra*</td>
</tr>
<tr>
<td><strong>Colour</strong></td>
<td>Green</td>
</tr>
<tr>
<td><strong>Base oil viscosity at 40 °C</strong></td>
<td>490 mm²/sec</td>
</tr>
<tr>
<td><strong>Benefits for you</strong></td>
<td>Ready-to-use product Ready to use</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

* Should be applied by a Klüber Lubrication specialist only

**Environmentally sustainable operational lubricant for open gear drives**

**Sustainable drive lubricant for total loss lubrication made from renewable raw materials – Klübersustain LG 39-700**

Sustainable production is becoming increasingly important in the cement industry, both for economic considerations and legal requirements.

Klübersustain LG 39-700 is a new open gear lubricant. Its composition and performance are groundbreaking. The grease is based on natural oils thus improving your CO₂ footprint considerably. It also offers excellent protection with its high base oil viscosity and an additive package suited to the requirements of open gears.

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Overview of product benefits:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Application method</strong></td>
<td>Up to 90 % renewable raw materials Protection under extreme pressure and mixed friction conditions with special additive package High polarity for better adhesion to tooth flanks</td>
</tr>
<tr>
<td><strong>Product</strong></td>
<td>Quantity reduction of up to 40 % compared to graphite products Transparent lubricant facilitating tooth flank inspection during operation Good vibration damping behaviour (reduced vibration)</td>
</tr>
<tr>
<td><strong>Cleaning agent</strong></td>
<td>Decrease of tooth flank temperature No clogging of spray nozzles with solid lubricants Very good pumpability at low temperatures, usable down to -30 °C</td>
</tr>
</tbody>
</table>
Further applications in the cement industry

Lubrication of enclosed gears

Gearboxes in the cement industry are subjected to high temperatures, high loads, vibration, dust and a corrosive environment, which adversely affect reliability, equipment life and energy efficiency. Selecting a high-performance gear oil will help you overcome these challenges and provide hassle-free, energy-efficient operation.

Klüber Lubrication high-performance synthetic gear lubricants demonstrate outstanding viscosity-temperature behaviour even in extreme operating conditions.

<table>
<thead>
<tr>
<th>Product</th>
<th>Type of oil</th>
<th>Application notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Klüberoil GEM 1 N</td>
<td>Mineral oil based</td>
<td>- Temperature range -15 °C to 100 °C (depends on viscosity grade selected)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- High-quality mineral oil approved by leading gear drive manufacturers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Low maintenance cost</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Protection even at peak loads, vibrations and oscillation</td>
</tr>
<tr>
<td>Klübersynth GEM 4 N</td>
<td>Polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil</td>
<td>- Temperature range -50 °C to 140 °C (depends on viscosity grade selected)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Reduces power losses and improves energy efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Protection even at peak loads, vibrations and oscillation, high temperatures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Extended service life of bearings, seals</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Longer oil change interval resulting in cost savings</td>
</tr>
<tr>
<td>Klübersynth GH 6</td>
<td>Polyglycol synthetic oil</td>
<td>- Temperature range -55 °C to 160 °C (depends on viscosity grade selected)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Reduces power losses and improves energy efficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Approved by leading OEMs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Protection even at peak loads, vibrations and oscillation, high temperatures</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Prevents premature rolling bearing failure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Extended service life</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Longer oil change interval resulting in cost savings</td>
</tr>
</tbody>
</table>

Cleaning of enclosed gears

<table>
<thead>
<tr>
<th>Application notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dissolves varnish and carbon deposits, reducing maintenance and cleaning costs</td>
</tr>
<tr>
<td>No dismantling of systems needed prior to cleaning</td>
</tr>
<tr>
<td>Used during operation, no downtime of machines for cleaning</td>
</tr>
<tr>
<td>Reduced operating and maintenance costs due to higher efficiency (e.g. compressor) and longer service life of the fresh oil fill</td>
</tr>
</tbody>
</table>

Viscosity-temperature behaviour of oils

Comparison of viscosity indexes:

- Mineral oil VI approx. 85 – 100
- Polyalphaolefin VI approx. 130 – 160
- Polyglycol VI approx. 150 – 260

Hint: A high viscosity index facilitates start-up at low outside temperatures, reduces power loss to a minimum and enables the formation of a load-carrying lubricant film also at high temperatures.
Mineral oil-based products with poor oxidation stability tend to decrease lubricant costs through reduced consumption. The right compressor oil can also help considerably with the right compressor oil. It can also help improve the lifetime of the compressor and reducing maintenance costs. Carry-over is also reduced leading to lower top-ups.

### Further applications in the cement industry

Lubrication of compressors

Klüber Summit compressor oils can increase the oil life in the compressor up to four-fold whilst decreasing the operating temperature by up to 10 %, increasing the lifetime of the compressor and reducing maintenance costs. Carry-over is also reduced leading to lower top-ups.

<table>
<thead>
<tr>
<th>Component</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw-type compressor</td>
<td>Klüber Summit SH</td>
<td>- Air compressor oils based on synthetic hydrocarbon and additives - Specially designed for high-speed, oil-injected screw-type compressors - Good oxidation stability - High evaporation stability - Klüber Summit SH 52 is especially suitable for centrifugal compressors and Klüber Summit SH 102 for reciprocating piston compressors - Temperature range: depends on viscosity selected</td>
<td>- Achieve oil changeover interval of up to 10,000 hours. - Easy compressor oil conversion due to neutral behaviour of oils towards seals - No unnecessary cleaning or failure of gelled/pneumatic valves - Reduced operating costs due to extended oil filter and separator life</td>
</tr>
<tr>
<td>Reciprocating piston compressor</td>
<td>Klüber Summit DSL</td>
<td>- Air compressor oils based on a synthetic ester oil and additives - Can be mixed with mineral oils, synthetic hydrocarbon oils and polyglycol oils - Suitable for oil-injected screw-type compressors, centrifugal compressors, reciprocating piston compressors - Neutral behaviour of oils towards seals - Temperature range: depends on viscosity selected - Klüber Summit DSL 32, 46, and 68 are biodegradable</td>
<td>- Achieve oil changeover intervals of up to 8,000 operating hours. - Easier compressor oil conversion. - Good soil dissolving capacity, clean oil circuit due to the water content in the oil. - Low formation of oxidation products in the oil circuit, reduced operating costs due to extended oil filter and separator life</td>
</tr>
<tr>
<td>Cleaning agent</td>
<td>Klüber Summit Varnasolv</td>
<td>- Concentrated conditioner fluid containing synthetic ester oil and cleaning additives - Miscible with mineral oils, synthetic hydrocarbons, water oils and polyglycols - Neutral behaviour towards seals - Designed for cleaning screw-type compressors, hydraulic systems, gears and other oil circulating systems like calorifiers</td>
<td>- Dissolves varnish and carbon deposits, thus reduces maintenance and cleaning costs - No dismantling of systems needed prior to cleaning - Used during operation, no downtime of machines for cleaning - Reduced operating and maintenance costs due to higher efficiency (i.e. compression) and longer service life of the fresh oil filter</td>
</tr>
<tr>
<td>Check ageing condition of compressor oil (neutralisation number)</td>
<td>T.A.N.-Kit</td>
<td>- Easy and quick test method to check the ageing condition of compressor oils - Kit consists of a pipette (1 ml), a glass vial containing the test fluid and a cloth, all packed in a plastic bag</td>
<td>- Rapid way of checking the condition of compressor oils on the spot - Determine compressor oil change intervals - Easy to handle and portable - Can be used for all conventional mineral and synthetic compressor oils</td>
</tr>
</tbody>
</table>

### Lubrication of gear couplings

<table>
<thead>
<tr>
<th>Component</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gear coupling (grease-lubricated)</td>
<td>GRAFLOSCON C-SG 500 PLUS</td>
<td>- Peripheral speed ( n_{\text{max}} &lt; 1.6 ) - Adhesive lubricant based on mineral oil with aluminium complex thickener and solid lubricant (fine graphite) - Resistant to high pressure - Contains antiwear additives, adhesion improves and corrosion inhibitors</td>
</tr>
<tr>
<td>Klüberlub BE 41-1501</td>
<td>- Peripheral speed ( n_{\text{max}} &lt; 1.6 ) - Grease based on highly viscous mineral hydrocarbon oil (ISO VG 150), special lithium soap, extreme pressure, antiwear additives and solid lubricants (MoS₂ and graphite)</td>
<td></td>
</tr>
<tr>
<td>Klüberplex GE 11-680</td>
<td>- Peripheral speed ( n_{\text{max}} &gt; 1.6 ) - Adhesive lubricant with a mineral oil base and an aluminium complex soap thickener - Particularly suitable for elevated component temperatures and wherever lubricants containing solid lubricants should not be used</td>
<td></td>
</tr>
</tbody>
</table>

### Assembly pastes

<table>
<thead>
<tr>
<th>Application</th>
<th>Product</th>
<th>Features</th>
<th>Application notes and benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screw compound (screw connections)</td>
<td>WOLFRACOAT C</td>
<td>- Temperature range: -30 °C to 1,200 °C - Grey colour, high-temperature lubricating pastes containing metal solid lubricant pigments</td>
<td>- Prevents seizing at high temperatures - Easy assembly and disassembly of power-locking connections</td>
</tr>
<tr>
<td>Screw paste (in presence of moisture)</td>
<td>Klüberpaste HEL 46-450</td>
<td>- Temperature range: -40 °C to 1,000 °C - Black hot screw paste for high-alloy steels; it contains fully synthetic polyalphaolefin glycol and water base oils and a combination of inorganic solid lubricants</td>
<td></td>
</tr>
<tr>
<td>Rolling bearings and hub/shaft fits</td>
<td>ALTTEMP QNB 50</td>
<td>- Temperature range: -15 °C to 150 °C - White/barium lubricating paste containing a mineral base oil, a barium complex soap and inorganic solid lubricants - Suitable for friction points subjected to small motions under static and dynamic loads</td>
<td></td>
</tr>
<tr>
<td>Other sliding surfaces</td>
<td>WOLFRACOAT C FLUID</td>
<td>- Temperature range: -25 °C to 1,050 °C - Viscous high-temperature release agent and lubricating compound based on mineral and water oil mixture - It contains solid lubricants, metal pigments and an inorganic thickener</td>
<td></td>
</tr>
</tbody>
</table>

- Applicable through automatic lubrication systems
- Prevents failure and prolongs component life
- Adhesive lubricant
- Resistant to high pressures
- Anticorrosion properties
- Applicable through automatic lubrication systems
Klüber Lubrication offers KlüberEfficiencySupport, the professional service program, not only for large girth gear and pinion drives but for your entire machinery. Our systematic approach identifies and optimises the savings potential at your site and monitors system condition providing plant engineers with trend analysis and an “early warning” of potential failure.

Our trained and experienced lubrication engineers are equipped with IR thermometer, vibrometer and stroboscope. Your machine “health check” will be supported by a comprehensive report interpreted by specialists to determine any appropriate actions that may be required. These same engineers offer a plant-wide “health check” will be supported by a comprehensive report interpreted by specialists to determine any appropriate actions that may be required. These same engineers offer a plant-wide system condition providing plant engineers with trend analysis and optimises the savings potential at your site and monitors the useful service life of girth gears and pinions by controlling and modifying tooth flank surface roughness, contact ratio, load distribution, removal of surface pitting and ultimately a tooth flank repair where possible.

Our cement industry experts are located worldwide and are happy to support you on site.

For example: energy consumption, CO₂ emissions, life cycle cost reductions, etc. for all rotating equipment, from general conveyors to air compressors and “workshop” products. Millions are spent every year on corrective and remedial engineering and maintenance actions. These actions can be alleviated at source with proper consultation. Klüber Lubrication provides effective solutions that are comprehensive yet simple to implement.

KlüberRenew includes a running-in and repair service to increase the useful service life of girth gears and pinions by controlling and modifying tooth flank surface roughness, contact ratio, load distribution, removal of surface pitting and ultimately a tooth flank repair where possible.

Our cement industry experts are located worldwide and are happy to support you on site.

Onsite services offered by Klüber Lubrication

KlüberEfficiencySupport

KlüberEnergy
Consultant services for optimisation of the energy efficiency of your lubricant application. Verification through energy measurements and reporting of cost savings

KlüberMaintain
Support for your lubrication management and maintenance programmes / TPM ¹ considering the necessary lubrication maintenance tasks

KlüberMonitor
Increased productivity through used lubricant analyses. Recommendations for optimisation based on trend analyses and test rig results

KlüberRenew
Services to increase the lifetime of your cost-intensive components such as large gear drives and chains including appropriate training

KlüberCollege – Increasing people efficiency

⁰⁰¹ TPM: Total Productive Maintenance

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.

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.

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
Flexible use – and for lubrication points with high requirements

Klübermatic NOVA
For applications subject to wide temperature fluctuations

Klübermatic STAR VARIO
Precise and adjustable lubricant metering

Klübermatic STAR CONTROL
Externally controlled single-point relubrication
The data in this document is based on our general experience and knowledge at the time of publication and is intended to give information of possible applications to a reader with technical experience. It constitutes neither an assurance of product properties nor does it release the user from the obligation of performing preliminary field tests with the product selected for a specific application. All data are guide values which depend on the lubricant’s composition, the intended use and the application method. The technical values of lubricants change depending on the mechanical, dynamical, chemical and thermal loads, time and pressure. These changes may affect the function of a component. We recommend contacting us to discuss your specific application. If possible we will be pleased to provide a sample for testing on request. Products from Klüber Lubrication are continually improved. Therefore, Klüber Lubrication reserves the right to change all the technical data in this document at any time without notice.
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.