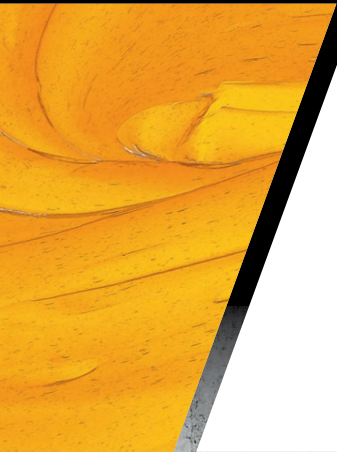


your global specialist

Industrial sector

## Reliable and efficient cement production.

Speciality lubricants meeting the highest requirements





## Speciality lubricants for the cement industry

Increased efficiency, productivity and reliability

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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.

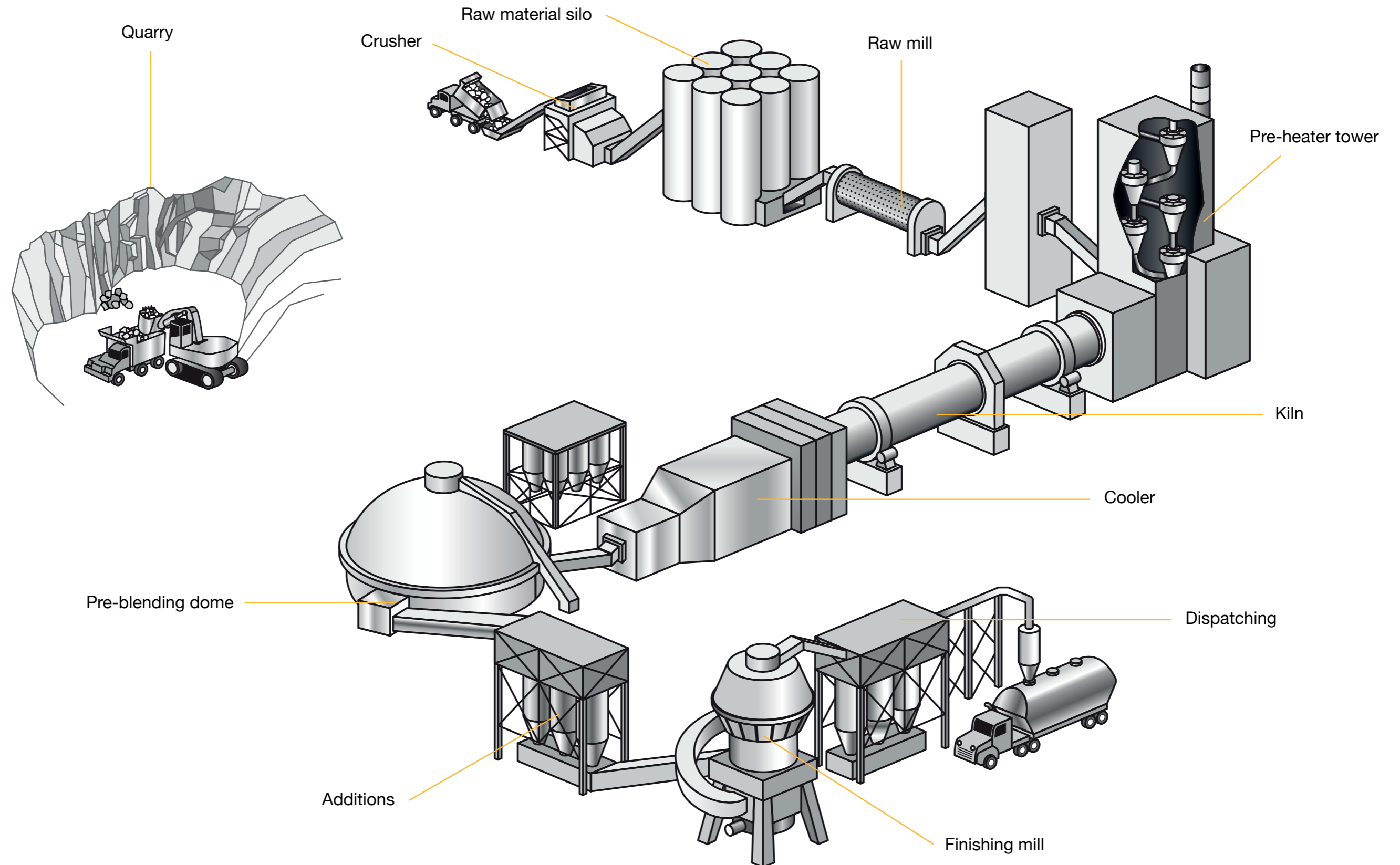
Depending on the mode of operation and the location of use, you have to use different lubricants that are made up of different base oils, additives, viscosities and consistencies. Making the wrong decision can lead to premature component failure or even production stoppages, resulting in high maintenance 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.

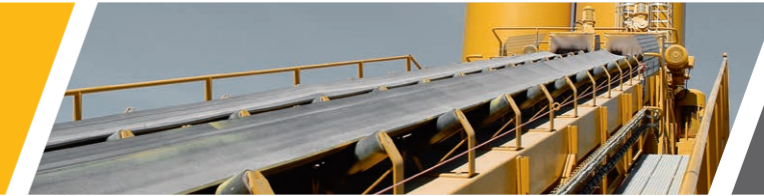


Cement plant applications:  
Optimally equipped with our speciality lubricants



# 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.

Component	Product	Features	Application notes and benefits
Cardan shafts, pivoting bearings, sliding and rolling bearings	Klüberlub BEM 41-122	<ul style="list-style-type: none"> <li>– Temperature range -30 °C to 140 °C</li> <li>– Grease based on a mixture of mineral oil and synthetic hydrocarbon oil thickened with a special lithium soap and light-coloured solid lubricants</li> <li>– NLGI grade 2</li> <li>– Speed factor up to 400,000 mm/min</li> </ul>	<ul style="list-style-type: none"> <li>– Prolongs life of bearings subjected to high surface pressure and slow, oscillating movements</li> <li>– Prevents fretting corrosion and scuffing in pivoting bearings</li> <li>– Preferably used for steel/steel bearings</li> </ul>
	Klüberplex BEM 41-132	<ul style="list-style-type: none"> <li>– Temperature range -40 °C to 150 °C</li> <li>– Grease based on mixture of synthetic hydrocarbon oil, mineral oil and a special lithium soap</li> <li>– NLGI grade 2</li> <li>– Speed factor up to 1,000,000 mm/min</li> </ul>	<ul style="list-style-type: none"> <li>– Longer service life</li> <li>– Less maintenance</li> <li>– Prolongs life of bearings subjected to vibration and shock loads</li> </ul>
Circulation systems / screw conveyor drives	PETAMO GHY 133 N	<ul style="list-style-type: none"> <li>– Temperature range -40 °C to 160 °C</li> <li>– Grease based on polyurea thickener, mineral oil, synthetic hydrocarbon oil and additives</li> <li>– NLGI grade 2</li> <li>– Speed factor up to 500,000 mm/min</li> </ul>	<ul style="list-style-type: none"> <li>– High thermal loads, increased lifetime and reduced consumption</li> <li>– Corrosion protection</li> </ul>
Lubricating nipple / automatic lubricant dispenser	Klübermatic dispenser with suitable lubricant	<ul style="list-style-type: none"> <li>– Automatic lubricant dispenser suitable for single-point lubrication in rolling and plain bearings, slideways, open gears, toothed racks, shaft seals and chains</li> </ul>	<ul style="list-style-type: none"> <li>– Continuous, maintenance-free, long-term lubrication</li> <li>– Reliability: clean and accurate lubrication 24 hours a day</li> <li>– Safety: frequency of maintenance staff having to work in dangerous areas is reduced</li> </ul>
Drive gearboxes	Klüberoil GEM 1 N	<ul style="list-style-type: none"> <li>– Max. temperature: up to 100 °C</li> <li>– Gear / multipurpose oils based on selected mineral oils</li> <li>– FZG scuffing test, A/8.3/90, scuffing load stage <math>\geq</math> 14</li> <li>– Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>– Approved by leading gear drive manufacturers</li> <li>– Low maintenance cost</li> <li>– Protection even at peak loads, vibrations and oscillation</li> </ul>
	Klübersynth GEM 4 N	<ul style="list-style-type: none"> <li>– Max. temperature: up to 140 °C</li> <li>– Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil</li> <li>– FZG scuffing test, A/8.3/90, scuffing load stage <math>\geq</math> 14</li> <li>– Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>– Reduces power losses and improves energy efficiency</li> <li>– Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>– Extended service life of bearings, seals</li> <li>– Longer oil change intervals resulting in cost savings</li> </ul>
	Klübersynth GH 6*	<ul style="list-style-type: none"> <li>– Max. temperature: up to 160 °C</li> <li>– Polyglycol synthetic oil</li> <li>– FZG scuffing test, A/8.3/90, scuffing load stage <math>\geq</math> 14</li> <li>– Excellent results in FAG FE8 rolling bearing test</li> <li>– Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability</li> </ul>	<ul style="list-style-type: none"> <li>– Reduces power losses and improves energy efficiency</li> <li>– Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>– Prevents premature rolling bearing failure</li> <li>– Extended service life</li> <li>– Longer oil change intervals resulting in cost savings</li> </ul>

\* 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

Component	Product	Features	Application notes and benefits
Bearings	Klüberplex BEM 41-132	<ul style="list-style-type: none"> <li>Temperature range -40 °C to 150 °C</li> <li>Grease based on mixture of synthetic hydrocarbon oil, mineral oil and a special lithium soap</li> <li>NLGI grade 2</li> <li>Speed factor up to 1,000,000 mm/min</li> </ul>	<ul style="list-style-type: none"> <li>Longer service life</li> <li>Less maintenance</li> <li>Prolongs life of bearings subjected to vibration and shock loads</li> </ul>
	Klüberlub BVH 71-461	<ul style="list-style-type: none"> <li>Temperature range -20 °C to 160 °C</li> <li>NLGI grade 1</li> <li>Grease based on mineral oil, synthetic hydrocarbon oil and polyurea</li> </ul>	<ul style="list-style-type: none"> <li>Efficient at increased temperatures, vibrations and shock loads</li> </ul>
	Klüberlub BE 41-542	<ul style="list-style-type: none"> <li>Temperature range -20 °C to 140 °C</li> <li>NLGI grade 2</li> <li>Speed factor up to 500,000 mm/min</li> <li>Extreme-pressure grease based on highly viscous mineral oil, special lithium soap, antiwear, anti-oxidant and anticorrosion additives</li> </ul>	<ul style="list-style-type: none"> <li>Protects highly loaded bearings running at slow to medium speeds</li> </ul>

## Crushers

Component	Product	Features	Application notes and benefits
Crusher main bearing	Klüberlub BE 41-1501	<ul style="list-style-type: none"> <li>Temperature range -10 °C to 150 °C</li> <li>NLGI grade 1</li> <li>Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/antiwear (EP/AW) additives</li> <li>Contains solid lubricants (MoS<sub>2</sub> and graphite)</li> </ul>	<ul style="list-style-type: none"> <li>Increased bearing life</li> <li>Improved pumpability</li> <li>Increased productivity due to less downtime</li> <li>Recommended by leading OEMs</li> </ul>
Drive gearbox	Klüberoil GEM 1 N	<ul style="list-style-type: none"> <li>Max. temperature: up to 100 °C</li> <li>Gear/multipurpose oils based on selected mineral oils</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>Approved by leading gear drive manufacturers</li> <li>Low maintenance cost</li> <li>Protection even at peak loads, vibrations and oscillation</li> </ul>
	Klübersynth GEM 4 N	<ul style="list-style-type: none"> <li>Max. temperature: up to 140 °C</li> <li>Gear/multipurpose oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>Approved by leading OEMs</li> <li>Reduces power losses and improves energy efficiency</li> <li>Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>Extended service life of bearings, seals</li> <li>Longer oil change intervals resulting in cost savings</li> </ul>
	Klübersynth GH 6*	<ul style="list-style-type: none"> <li>Max. temperature: up to 160 °C</li> <li>Polyglycol synthetic gear oil</li> <li>Excellent results in FAG FE8 rolling bearing test</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability</li> </ul>	<ul style="list-style-type: none"> <li>Reduces power losses and improves energy efficiency</li> <li>Approved by leading OEMs</li> <li>Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>Prevents premature rolling bearing failure</li> <li>Extended service life</li> <li>Longer oil change intervals resulting in cost savings</li> </ul>

\* Check compatibility and follow the application notes in the product information sheet

# Lubricants for crushing processes

## Vertical roller mills



### Oil lubrication

Component	Product	Features	Application notes and benefits
Main bearing/roller bearing	Klübersynth GH 6*-680, -1000, -1500 (CLP PG 680, -1000, -1500)	<ul style="list-style-type: none"> <li>- Max. temperature up to 160 °C (Klübersynth GH 6)</li> <li>- Max. temperature up to 150 °C (SYNTHESO HT)</li> <li>- Polyglycol synthetic oil</li> <li>- Excellent results in FAG FE8 rolling bearing test</li> <li>- Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability</li> </ul>	<ul style="list-style-type: none"> <li>- Prevents premature rolling bearing failure</li> <li>- Reduces power losses and improves energy efficiency</li> <li>- Extended service life</li> <li>- Approved by leading OEMs</li> </ul>
	SYNTHESO HT 1000 (CLP PG 1000)		

### Main drive gearboxes

Component	Product	Features	Application notes and benefits
Main drive gearbox	Klüberoil GEM 1 N	<ul style="list-style-type: none"> <li>- Max. temperature: up to 100 °C</li> <li>- Gear /multipurpose oils based on selected mineral oils</li> <li>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>- Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>- Approved by leading gear drive manufacturers</li> <li>- Low maintenance cost</li> <li>- Protection even at peak loads, vibrations and oscillation</li> </ul>
	Klübersynth GEM 4 N	<ul style="list-style-type: none"> <li>- Max. temperature: up to 140 °C</li> <li>- Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil</li> <li>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>- Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>- Reduces power losses and improves energy efficiency</li> <li>- Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>- Extended service life of bearings, seals</li> <li>- Longer oil change intervals resulting in cost savings</li> </ul>
	Klübersynth GH 6*	<ul style="list-style-type: none"> <li>- Max. temperature: up to 160 °C</li> <li>- Polyglycol synthetic oil</li> <li>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>- Excellent results in FAG FE8 rolling bearing test</li> <li>- Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability</li> </ul>	<ul style="list-style-type: none"> <li>- Reduces power losses and improves energy efficiency</li> <li>- Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>- Prevents premature rolling bearing failure</li> <li>- Extended service life</li> <li>- Longer oil change intervals resulting in cost savings</li> </ul>

\* Check compatibility and follow the application notes in the product information sheet

### Grease lubrication

Component	Product	Features	Application notes and benefits
Main bearing/rocker arm	Klüberlub BE 41-1501	<ul style="list-style-type: none"> <li>- Temperature range -10 °C to 150 °C</li> <li>- NLGI grade 1</li> <li>- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/ antiwear (EP/AW) additives</li> <li>- Contains solid lubricants (MoS<sub>2</sub> and graphite)</li> </ul>	<ul style="list-style-type: none"> <li>- Increased bearing life</li> <li>- Improved pumpability</li> <li>- Increased productivity due to less downtime</li> <li>- Recommended by leading OEMs</li> </ul>
	Klüberlub BE 41-1002	<ul style="list-style-type: none"> <li>- Temperature range -15 °C to 120 °C</li> <li>- NLGI grade 2</li> <li>- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1000), special lithium thickener</li> <li>- Contains solid lubricants</li> </ul>	<ul style="list-style-type: none"> <li>- Good pumpability at low temperatures</li> <li>- Less maintenance</li> </ul>
Elastomer seals of rollers	SYNTHESO GLEP 1	<ul style="list-style-type: none"> <li>- Temperature range -50 °C to 150 °C</li> <li>- Special lubricating grease with EP additives, compatible with EPDM</li> </ul>	<ul style="list-style-type: none"> <li>- Compatible with EPDM seals. No more leakages due to seal failures</li> </ul>
	Klüberlub BE 41-1501	<ul style="list-style-type: none"> <li>- Compatible with elastomers 72 NBR 902</li> <li>- Temperature range -10 °C to 150 °C</li> <li>- NLGI grade 1</li> <li>- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/ antiwear (EP/AW) additives</li> <li>- Contains solid lubricants (MoS<sub>2</sub> and graphite)</li> </ul>	<ul style="list-style-type: none"> <li>- Increased component life</li> <li>- Improved pumpability</li> <li>- Increased productivity due to less downtime</li> <li>- Recommended by leading OEMs</li> </ul>



# Lubricants for crushing processes

## Separators



Component	Product	Features	Application notes and benefits
Top and bottom bearings	Klüberplex BEM 41-132	<ul style="list-style-type: none"> <li>- Temperature range -40 °C to 150 °C</li> <li>- Grease based on mixture of synthetic hydrocarbon oil, mineral oil and a special lithium soap</li> <li>- NLGI grade 2</li> <li>- Speed factor up to 1,000,000 mm/min</li> </ul>	<ul style="list-style-type: none"> <li>- Longer service life</li> <li>- Less maintenance</li> <li>- Prolongs bearing life subjected to vibration and shock loads</li> </ul>
	Klüberlub BE 41-542	<ul style="list-style-type: none"> <li>- Temperature range -20 °C to 140 °C</li> <li>- NLGI grade 2</li> <li>- Extreme-pressure grease based on highly viscous mineral oil, special lithium soap, antiwear, anti-oxidant and anticorrosion additives</li> </ul>	<ul style="list-style-type: none"> <li>- Protects highly loaded bearings running at slow to medium speeds</li> </ul>
	Klüberlub BE 41-1501	<ul style="list-style-type: none"> <li>- Temperature range -10 °C to 150 °C</li> <li>- NLGI grade 1</li> <li>- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/ antiwear (EP / AW) additives</li> <li>- Contains solid lubricants (MoS<sub>2</sub> and graphite)</li> </ul>	<ul style="list-style-type: none"> <li>- Increased bearing life</li> <li>- Improved pumpability</li> <li>- Increased productivity due to less downtime</li> <li>- Recommended by leading OEMs</li> </ul>
Gearboxes	Klüberoil GEM 1 N	<ul style="list-style-type: none"> <li>- Max. temperature up to 100 °C</li> <li>- Gear /multipurpose oils based on selected mineral oils</li> <li>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>- Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>- Approved by leading gear drive manufacturers</li> <li>- Low maintenance cost</li> <li>- Protection even at peak loads, vibrations and oscillation</li> </ul>
	Klübersynth GEM 4 N	<ul style="list-style-type: none"> <li>- Max temperature up to 140 °C</li> <li>- Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil</li> <li>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>- Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>- Reduces power losses and improves energy efficiency</li> <li>- Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>- Extended service life of bearings, seals</li> <li>- Longer oil change intervals resulting in cost savings</li> </ul>
	Klübersynth GH 6*	<ul style="list-style-type: none"> <li>- Max. temperature up to 160 °C</li> <li>- Polyglycol synthetic oil</li> <li>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>- Excellent results in FAG FE8 rolling bearing test</li> <li>- Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability</li> </ul>	<ul style="list-style-type: none"> <li>- Reduces power losses and improves energy efficiency</li> <li>- Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>- Prevents premature rolling bearing failure</li> <li>- Extended service life</li> <li>- Longer oil change intervals resulting in cost savings</li> </ul>

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# 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	Product	Features	Application notes and benefits
Main bearing	Klüberlub BE 41-1501	<ul style="list-style-type: none"> <li>– Temperature range -10 °C to 150 °C</li> <li>– NLGI grade 1</li> <li>– Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/ antiwear (EP/AW) additives</li> <li>– Contains solid lubricants (MoS<sub>2</sub> and graphite)</li> </ul>	<ul style="list-style-type: none"> <li>– Increased bearing life</li> <li>– Improved pumpability</li> <li>– Increased productivity due to less downtime</li> <li>– Recommended by leading OEMs</li> </ul>
	Klüberlub BE 41-1002	<ul style="list-style-type: none"> <li>– Temperature range -15 °C to 120 °C</li> <li>– NLGI grade 2</li> <li>– Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1000), special lithium thickener</li> <li>– Contains solid lubricants</li> </ul>	<ul style="list-style-type: none"> <li>– Good pumpability at low temperatures</li> <li>– Less maintenance</li> </ul>
Planetary gearbox	Klüberoil GEM 1 N	<ul style="list-style-type: none"> <li>– Max. temperature up to 100 °C</li> <li>– Gear/multipurpose oils based on selected mineral oils</li> <li>– FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>– Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>– Approved by leading gear drive manufacturers</li> <li>– Low maintenance cost</li> <li>– Protection even at peak loads, vibrations and oscillation</li> </ul>
	Klübersynth GEM 4 N	<ul style="list-style-type: none"> <li>– Max. temperature up to 140 °C</li> <li>– Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil</li> <li>– FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>– Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>– Reduces power losses and improves energy efficiency</li> <li>– Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>– Extended service life of bearings, seals</li> <li>– Longer oil change intervals resulting in cost savings</li> </ul>
	Klübersynth GH 6*	<ul style="list-style-type: none"> <li>– Max. temperature up to 160 °C</li> <li>– Polyglycol synthetic oil</li> <li>– FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>– Excellent results in FAG FE8 rolling bearing test</li> <li>– Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability</li> </ul>	<ul style="list-style-type: none"> <li>– Reduces power losses and improves energy efficiency</li> <li>– Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>– Prevents premature rolling bearing failure</li> <li>– Extended service life</li> <li>– Longer oil change intervals resulting in cost savings</li> </ul>

\* Check compatibility and follow the application notes in the product information sheet



# Lubricants for crushing processes

## Tube mills/ball mills



Component	Product	Features	Application notes and benefits
Pinion bearings	Klüberlub BE 41-1501	<ul style="list-style-type: none"> <li>- Temperature range -10 °C to 150 °C</li> <li>- NLGI grade 1</li> <li>- Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/antiwear (EP/AW) additives</li> <li>- Contains solid lubricants (MoS<sub>2</sub> and graphite)</li> </ul>	<ul style="list-style-type: none"> <li>- Increased bearing life</li> <li>- Improved pumpability</li> <li>- Increased productivity due to less downtime</li> <li>- Recommended by leading OEMs</li> </ul>
Neck bearings/ drive gearboxes	Klüberoil GEM 1 N	<ul style="list-style-type: none"> <li>- Max. temperature up to 100 °C</li> <li>- Gear /multipurpose oils based on selected mineral oils</li> <li>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>- Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>- Approved by leading gear drive manufacturers</li> <li>- Low maintenance cost</li> <li>- Protection even at peak loads, vibrations and oscillation</li> </ul>
	Klübersynth GEM 4 N	<ul style="list-style-type: none"> <li>- Max temperature up to 140 °C</li> <li>- Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil</li> <li>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>- Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>- Reduces power losses and improves energy efficiency</li> <li>- Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>- Extended service life of bearings, seals</li> <li>- Longer oil change intervals resulting in cost savings</li> </ul>
	Klübersynth GH 6*	<ul style="list-style-type: none"> <li>- Max. temperature up to 160 °C</li> <li>- Polyglycol synthetic oil</li> <li>- FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>- Excellent results in FAG FE8 rolling bearing test</li> <li>- Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability.</li> </ul>	<ul style="list-style-type: none"> <li>- Reduces power losses and improves energy efficiency</li> <li>- Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>- Prevents premature rolling bearing failure</li> <li>- Extended service life</li> <li>- Longer oil change intervals resulting in cost savings</li> </ul>
Rubber seals of neck/shoe bearings and girth gear cover	POLYLUB GA 352 P	<ul style="list-style-type: none"> <li>- Temperature range -35 °C to 120 °C</li> <li>- Adhesive long-term grease based on synthetic hydrocarbon oil, mineral oil and aluminium complex soap</li> <li>- Good water resistance</li> </ul>	<ul style="list-style-type: none"> <li>- Good sealing effect prevents entry of contaminants like dust and water</li> <li>- Protects components against corrosion</li> </ul>

\* Check compatibility and follow the application notes in the product information sheet

# Lubricants for crushing processes



## Bed compression grinding units

Component	Product	Features	Application notes and benefits
Roller bearings/plummer blocks/reducer coupling	Klüberlub BE 41-1501	<ul style="list-style-type: none"> <li>Temperature range -10 °C to 150 °C</li> <li>NLGI grade 1</li> <li>Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/antiwear (EP/AW) additives</li> <li>Contains solid lubricants (MoS<sub>2</sub> and graphite)</li> </ul>	<ul style="list-style-type: none"> <li>Increased bearing life</li> <li>Improved pumpability</li> <li>Increased productivity due to less downtime</li> <li>Recommended by leading OEMs</li> </ul>
Rotary joints	PETAMO GHY 133 N	<ul style="list-style-type: none"> <li>Temperature range -40 °C to 160 °C</li> <li>Grease based on polyurea thickener, mineral oil, synthetic hydrocarbon oil and additives</li> <li>NLGI grade 2</li> <li>Speed factor 500,000 mm/min</li> </ul>	<ul style="list-style-type: none"> <li>Reduction of lubrication intervals, less maintenance</li> <li>Cost reduction by reducing consumption</li> <li>Prolongs bearing life even under high temperature and corrosive media</li> </ul>
Scraper bearings	Klüberoil GEM 1-150 N	<ul style="list-style-type: none"> <li>Max. temperature up to 100 °C</li> <li>Gear/multipurpose oils based on selected mineral oils</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>Good results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>Approved by leading gear drive manufacturers</li> <li>Low maintenance cost</li> <li>Protection even at peak loads, vibrations and oscillation</li> </ul>
Bevel gearbox	Klübersynth GEM 4 N	<ul style="list-style-type: none"> <li>Max. temperature up to 140 °C</li> <li>Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>Reduces power losses and improves energy efficiency</li> <li>Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>Extended service life of bearings, seals</li> <li>Longer oil change intervals resulting in cost savings</li> </ul>
	Klübersynth GH 6*	<ul style="list-style-type: none"> <li>Max. temperature up to 160 °C</li> <li>Polyglycol synthetic oil</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>Excellent results in FAG FE8 rolling bearing test</li> <li>Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability</li> </ul>	<ul style="list-style-type: none"> <li>Reduces power losses and improves energy efficiency</li> <li>Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>Prevents premature rolling bearing failure</li> <li>Extended service life</li> <li>Longer oil change intervals resulting in cost savings</li> </ul>
Coupling bearing	Klüberoil GEM 1-320 N	<ul style="list-style-type: none"> <li>Max. temperature up to 100 °C</li> <li>Gear/multipurpose oils based on selected mineral oils</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>Good results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>Approved by leading gear drive manufacturers</li> <li>Low maintenance cost</li> <li>Protection even at peak loads, vibrations and oscillation</li> </ul>

## Combination drive units

Component	Product	Features	Application notes and benefits
Combination gear drives in mills	Klüberoil GEM 1 N	<ul style="list-style-type: none"> <li>Max. temperature up to 100 °C</li> <li>Gear/multipurpose oils based on selected mineral oils</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>Approved by leading gear drive manufacturers</li> <li>Low maintenance cost</li> <li>Protection even at peak loads, vibrations and oscillation</li> </ul>
	Klübersynth GEM 4 N	<ul style="list-style-type: none"> <li>Max. temperature up to 140 °C</li> <li>Gear oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>Reduces power losses and improves energy efficiency</li> <li>Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>Extended service life of bearings, seals</li> <li>Longer oil change intervals resulting in cost savings</li> </ul>
	Klübersynth GH 6*	<ul style="list-style-type: none"> <li>Max. temperature up to 160 °C</li> <li>Polyglycol synthetic oil</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage ≥ 14</li> <li>Excellent results in FAG FE8 rolling bearing test</li> <li>Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability</li> </ul>	<ul style="list-style-type: none"> <li>Reduces power losses and improves energy efficiency</li> <li>Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>Prevents premature rolling bearing failure</li> <li>Extended service life</li> <li>Longer oil change intervals resulting in cost savings</li> </ul>

\* Check compatibility and follow the application notes in the product information sheet

## Lubricants used in clinker production

### Pre-heating



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.

Component	Product	Features	Application notes and benefits
Gearbox drive manifold	Klübersynth GH 6*	<ul style="list-style-type: none"> <li>- Max. temperature up to 160 °C</li> <li>- Polyglycol synthetic oil</li> <li>- FZG scuffing test, A/8.3/90, scuffing load stage <math>\geq</math> 14</li> <li>- Excellent results in FAG FE8 rolling bearing test</li> <li>- Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability</li> </ul>	<ul style="list-style-type: none"> <li>- Reduces power losses and improves energy efficiency</li> <li>- Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>- Prevents premature rolling bearing failure</li> <li>- Extended service life</li> <li>- Longer oil change intervals resulting in cost savings</li> </ul>
Axle bearings	Klüberplex BEM 41-132	<ul style="list-style-type: none"> <li>- Temperature range -40 °C to 150 °C</li> <li>- Grease based on mixture of synthetic hydrocarbon oil, mineral oil and a special lithium soap</li> <li>- NLGI grade 2</li> <li>- Speed factor 1,000,000 mm/min</li> </ul>	<ul style="list-style-type: none"> <li>- Longer service life</li> <li>- Less maintenance</li> <li>- Prolongs life of bearing even under vibration and shock loads, high temperatures</li> </ul>
	PETAMO GHY 133 N	<ul style="list-style-type: none"> <li>- Temperature range -40 °C to 160 °C</li> <li>- Grease based on polyurea thickener, mineral oil, synthetic hydrocarbon oil and additives</li> <li>- NLGI grade 2</li> <li>- Speed factor 500,000 mm/min</li> </ul>	<ul style="list-style-type: none"> <li>- Reduction of lubrication intervals, less maintenance</li> <li>- Cost reduction by reducing consumption</li> <li>- Prolongs bearing life even under high temperature and corrosive media</li> </ul>

\* 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.

Note: Mix the suspensions well before use to make sure the carrier oil and the solid lubricants are homogenised. The oil might ignite in the event of insufficient homogenisation.

### Lubrication of kiln riding rings and lamellar seals

Component	Product	Features	Application notes and benefits
Riding ring	WOLFRACOAT C Fluid	<ul style="list-style-type: none"> <li>Temperature range -25 °C to 1,050 °C</li> <li>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.</li> <li>Ignition temperature <math>\geq</math> 370 °C</li> </ul>	<ul style="list-style-type: none"> <li>Occupational safety: applied through spray equipment</li> <li>Low consumption: low costs, high efficiency</li> <li>Smaller pack sizes for easy handling</li> <li>Designed to lubricate surfaces subjected to high thermal loads</li> <li>Ease of application</li> <li>Shake vigorously prior to application</li> </ul>
Lamellar inlet/outlet sealing	GRAFLOSCON SY 20 ULTRA	<ul style="list-style-type: none"> <li>Temperature range -30 °C to 700 °C</li> <li>Based on flame-resistant high-temperature dispersion</li> <li>Contains solid lubricant and synthetic oil</li> <li>Solvent-free dispersion</li> <li>Thermal stability of the lubricating film 700 °C</li> </ul>	<ul style="list-style-type: none"> <li>Occupational safety: applied through spray equipment</li> <li>Easy to apply (no settling of solid lubricants, solvent-free)</li> <li>No residue formation at high temperatures</li> <li>Protection against thermal stress</li> </ul>
	GRAFLOSCON C-SG 500 PLUS	<ul style="list-style-type: none"> <li>Adhesive lubricant based on mineral oil with aluminium complex thickener and solid lubricant (fine graphite)</li> <li>Resistant to high pressure</li> <li>Contains antiwear additives, adhesion improvers and corrosion inhibitors</li> <li>Thermal stability of lubricant film up to 200 °C</li> </ul>	<ul style="list-style-type: none"> <li>Excellent adhesion</li> <li>Wear reduction</li> <li>Corrosion protection</li> </ul>

### Support roller bearings and thrust roller bearings

Component	Product	Features	Application notes and benefits
Thrust roller bearing/support roller bearings/pinion bearing (grease-lubricated)	Klüberlub BE 41-1501	<ul style="list-style-type: none"> <li>Temperature range -10 °C to 150 °C</li> <li>NLGI grade 1</li> <li>Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme pressure/antiwear (EP/AW) additives</li> <li>Contains solid lubricants (MoS<sub>2</sub> and graphite)</li> </ul>	<ul style="list-style-type: none"> <li>Increased bearing life</li> <li>Improved pumpability</li> <li>Increased productivity due to less downtime</li> <li>Recommended by leading OEMs</li> </ul>
Thrust roller bearing/support roller bearings/pinion bearing (oil lubricated)	Klüberoil GEM 1 N	<ul style="list-style-type: none"> <li>Max. temperature up to 100 °C</li> <li>Gear/multipurpose oils based on selected mineral oils</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage <math>\geq</math> 14</li> <li>Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>Approved by leading gear drive manufacturers</li> <li>Low maintenance cost</li> <li>Protection even at peak loads, vibrations and oscillation</li> </ul>
	Klübersynth GEM 4 N	<ul style="list-style-type: none"> <li>Max. temperature up to 140 °C</li> <li>Gear and multipurpose oils based on polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage <math>\geq</math> 14</li> <li>Excellent results in FAG FE8 rolling bearing test</li> </ul>	<ul style="list-style-type: none"> <li>Approved by leading OEMs</li> <li>Reduces power losses and improves energy efficiency</li> <li>Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>Extended service life of bearings, seals</li> <li>Longer oil change intervals resulting in cost savings</li> </ul>
	Klübersynth GH 6*	<ul style="list-style-type: none"> <li>Max. temperature up to 160 °C</li> <li>Polyglycol synthetic oil</li> <li>FZG scuffing test, A/8.3/90, scuffing load stage <math>\geq</math> 14</li> <li>Excellent results in FAG FE8 rolling bearing test</li> <li>Excellent wear protection, ageing and oxidation resistance, good viscosity-temperature behaviour and very good thermal stability</li> </ul>	<ul style="list-style-type: none"> <li>Reduces power losses and improves energy efficiency</li> <li>Approved by leading OEMs</li> <li>Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>Prevents premature rolling bearing failure</li> <li>Extended service life</li> <li>Longer oil change intervals resulting in cost savings</li> </ul>

\* 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

Component	Product	Features	Application notes and benefits
Fan bearings Electric motor bearings	STABURAGS N 12 M F	<ul style="list-style-type: none"> <li>– Temperature range -20 °C to 140 °C</li> <li>– Mineral oil grease for long-term application, at high temperatures</li> <li>– Contains solid lubricant (MoS<sub>2</sub>)</li> <li>– Speed factor 500,000 mm/min</li> </ul>	<ul style="list-style-type: none"> <li>– Protects bearings subjected to high temperature and loads</li> <li>– Enhanced corrosion protection</li> </ul>
Reciprocating grates Slow-running rolling bearings	Klüberplex BEM 41-132	<ul style="list-style-type: none"> <li>– Temperature range -40 °C to 150 °C</li> <li>– Grease based on mixture of synthetic hydrocarbon oil, mineral oil and a special lithium soap</li> <li>– NLGI grade 2</li> <li>– Speed factor 1,000,000 mm/min</li> </ul>	<ul style="list-style-type: none"> <li>– Longer service life</li> <li>– Less maintenance</li> <li>– Prolongs life of bearing even under vibration and shock loads, high temperatures</li> </ul>
Reciprocating grates Slow-running rolling bearings Clinker crushing bearing	STABUTHERM GH 461	<ul style="list-style-type: none"> <li>– Temperature range -20 °C to 180 °C</li> <li>– NLGI grade 1</li> <li>– High-temperature grease based on mineral oil and polyurea</li> <li>– Suitable for centralised lubrication systems</li> <li>– Very adhesive and resistant to water</li> </ul>	<ul style="list-style-type: none"> <li>– Bearing cost reduction due to good wear protection, good load-carrying capacity and excellent corrosion protection at high temperatures</li> </ul>
	Klübersynth HB 74-401	<ul style="list-style-type: none"> <li>– Temperature range -40 °C to 200 °C</li> <li>– NLGI grade 1</li> <li>– High-temperature grease based on synthetic oil and polyurea thickener</li> <li>– High base oil viscosity and special additives</li> </ul>	<ul style="list-style-type: none"> <li>– Extended component life due to good antiwear effect and corrosion protection</li> <li>– Cost reduction due to longer relubrication intervals even at elevated temperatures and high loads</li> </ul>
Clinker crushing bearings	Klüberlub BE 41-1501	<ul style="list-style-type: none"> <li>– Temperature range -10 °C to 150 °C</li> <li>– NLGI grade 1</li> <li>– Grease consisting of highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap and particularly effective extreme-pressure/antiwear additives</li> <li>– Contains solid lubricants (MoS<sub>2</sub> and graphite)</li> </ul>	<ul style="list-style-type: none"> <li>– Increased bearing life</li> <li>– Improved pumpability</li> <li>– Increased productivity due to less downtime</li> </ul>
Lubricating nipple/automatic lubricant dispenser for reciprocating grates/bearings	Klübermatic dispenser with suitable lubricant	<ul style="list-style-type: none"> <li>– Automatic lubricant dispenser suitable for single-point lubrication in rolling and plain bearings, slideways, open gears, toothed racks, shaft seals and chains</li> </ul>	<ul style="list-style-type: none"> <li>– Continuous, maintenance-free, long-term lubrication</li> <li>– Reliability: clean and accurate lubrication 24 hours a day</li> <li>– Safety: frequency of maintenance staff having to work in dangerous areas is reduced</li> </ul>

# Lubricants for open gear drives



You expect your open gears to work reliably. We offer you a comprehensive range of speciality 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.

### 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

## Operational open gear lubricants – transparent fluids

Climate zone	Subtropical to tropical	Tropical	Temperate	Temperate	Subtropical
Climate type	Mild winters and hot summers	Hot and wet all year	Cold winters and mild summers	Cold winters and mild summers	Hot, humid summers and generally mild winters
Type of lubrication system	Spray lubrication, immersion, circulation, paddle wheel	Spray lubrication, immersion, paddle wheel	Spray lubrication	Spray lubrication, immersion, circulation, paddle wheel	Spray lubrication, immersion, circulation, paddle wheel
Product	Klüberfluid C-F 3 Ultra	Klüberfluid C-F 3 M Ultra	Klüberfluid C-F 3 S Ultra	Klüberfluid C-F 4 Ultra	Klüberfluid C-F 8 Ultra
Colour	Transparent	Transparent	Transparent	Transparent	Transparent
Maximum peripheral speed in m/s	10	12	10	7	8
Temperature limits for spraying	15 °C to 120 °C	2 °C to 100 °C	0 °C to 80 °C	0 °C to 80 °C	10 °C to 80 °C
Temperature limits for immersion or circulation lubrication	15 °C to 120 °C / 15 °C to 80 °C	Not applicable	Not applicable	0 °C to 110 °C / 0 °C to 80 °C	10 °C to 120 °C / 10 °C to 80 °C
Viscosity at 40 °C	16,500 mm <sup>2</sup> /sec	25,500 mm <sup>2</sup> /sec	4,000 mm <sup>2</sup> /sec	3,100 mm <sup>2</sup> /sec	8,000 mm <sup>2</sup> /sec
Application notes and benefits	<ul style="list-style-type: none"> <li>- Long service life of open gears</li> <li>- Easy inspection during operation with UV lamp</li> <li>- Cost reduction due to less consumption</li> <li>- Excellent wear protection even at elevated temperatures</li> <li>- Tested and approved by OEMs</li> <li>- Reduction in power consumption</li> <li>- Clean system: no accumulation of used grease in the cover</li> </ul>	<ul style="list-style-type: none"> <li>- Long service life of open gears</li> <li>- Easy inspection during operation with UV lamp</li> <li>- Cost reduction due to less consumption</li> <li>- Excellent wear protection even at elevated temperatures</li> <li>- Tested and approved by OEMs</li> <li>- Reduction in power consumption</li> <li>- Clean system: no accumulation of used grease in the cover</li> </ul>	<ul style="list-style-type: none"> <li>- Long service life of open gears</li> <li>- Easy inspection during operation with UV lamp</li> <li>- Cost reduction due to less consumption</li> <li>- Excellent wear protection</li> <li>- Tested and approved by OEMs</li> <li>- Reduction in power consumption</li> <li>- Clean system: no accumulation of used grease in the cover</li> </ul>	<ul style="list-style-type: none"> <li>- Long service life of open gears</li> <li>- Easy inspection during operation with UV lamp</li> <li>- Cost reduction due to less consumption</li> <li>- Excellent wear protection even at elevated temperatures</li> <li>- Tested and approved by OEMs</li> <li>- Reduction in power consumption</li> <li>- Clean system: no accumulation of used grease in the cover</li> </ul>	<ul style="list-style-type: none"> <li>- Long service life of open gears</li> <li>- Easy inspection during operation with UV lamp</li> <li>- Cost reduction due to less consumption</li> <li>- Excellent wear protection</li> <li>- Reduction in power consumption</li> <li>- Clean system: no accumulation of used grease in the cover</li> </ul>



## Lubricants for open gear drives



### Graphite-based operational open gear lubricants

Climate zone	Temperate	Temperate to subtropical		Subtropical to tropical	Temperate	Subtropical to tropical
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
Type of lubrication system	Spray lubrication	Spray lubrication		Spray lubrication	Immersion, paddle wheel, circulation	Immersion, paddle wheel, circulation
Product	GRAFLOSCON C-SG 0 ULTRA	GRAFLOSCON C-SG 1000 ULTRA		GRAFLOSCON C-SG 2000 ULTRA	Klüberfluid C-F 1 Ultra	Klüberfluid C-F 2 Ultra
Temperature limits for spraying	0 °C to 90 °C	5 °C to 100 °C		15 °C to 120 °C	Not applicable	Not applicable
Temperature limits for immersion or circulation lubrication	Not applicable	Not applicable		Not applicable	-15°C to 60 °C/5°C to 60 °C	5°C to 100 °C/15 °C to 80 °C
Base oil viscosity at 40 °C	680 mm <sup>2</sup> /sec	1000 mm <sup>2</sup> /sec		2000 mm <sup>2</sup> /sec	250 mm <sup>2</sup> /sec	3200 mm <sup>2</sup> /sec
Application notes and benefits	<ul style="list-style-type: none"> <li>- Tried-and-tested, cost-effective operational lubricant contributing to a long service life of your drive, low lubricant consumption and reduced operating costs</li> <li>- Approved by OEMs</li> </ul>			<ul style="list-style-type: none"> <li>- Service lubricant for open drives with splash or circular lubrication</li> <li>- Long service life of gears</li> <li>- Approved by OEMs</li> </ul>		

# Lubricants for open gear drives



## Priming open gear lubricants

Application method	Manual or brush lubrication only	Manual or brush lubrication only
Product	Klüberplex AG 11-462	GRAFLOSCON A-G 1 ULTRA
Colour	White	Black
Base oil viscosity at 40 °C	460 mm <sup>2</sup> /sec	500 mm <sup>2</sup> /sec
Application notes and benefits	<ul style="list-style-type: none"> <li>– Low contamination of machine environment due to use of white solid lubricants and low lubricant consumption</li> <li>– High load-carrying capacity and adhesiveness prevents metal-to-metal contact of tooth flanks</li> <li>– Clear contact pattern</li> <li>– Corrosion protection</li> <li>– Prevents metal-to-metal contact during assembly</li> <li>– Long durability of lubricating film – protects tooth flanks even during prolonged gear alignment procedures</li> <li>– Priming and contrast lubricant for determining the parallel alignment of tooth flanks</li> </ul>	<ul style="list-style-type: none"> <li>– High load-carrying capacity and adhesiveness prevents metal-to-metal contact of tooth flanks</li> <li>– Long durability of lubricating film protects tooth flanks even during prolonged gear alignment procedures</li> <li>– Priming and contrast lubricant for determining the parallel alignment of tooth flanks</li> </ul>

## Running-in open gear lubricants

Application method	Spray, immersion and circulation lubrication	Spray lubrication	Immersion and circulation lubrication
Product	Klüberfluid B-F 2 Ultra	GRAFLOSCON B-SG 00 ULTRA	Klüberfluid B-F 1 Ultra
Colour	Milky	Black	Black
Viscosity at 40 °C	490 mm <sup>2</sup> /sec	500 mm <sup>2</sup> /sec	1300 mm <sup>2</sup> /sec
Temperature limits for spraying	-5 °C to 100 °C	-15 °C to 90 °C	Not applicable
Temperature limits for immersion or circulation lubrication	0 °C to 100 °C / -10 °C to 100 °C	Not applicable	0 °C to 100 °C / 10 °C to 80 °C
Number of hours of operation	Spray 500–600 Immersion 6000–7000	500–600	
Benefits for you	<ul style="list-style-type: none"> <li>– Quickly smoothens the rough surfaces and improves the contact ratio. This contributes to a longer service life of the gears.</li> <li>– Free from solvents and eco-friendly</li> <li>– Easy inspection through UV indicator</li> </ul>	<ul style="list-style-type: none"> <li>– Reduces surface roughness and improves tooth flank quality thus contributing to longer service life of drives and reduced maintenance costs</li> </ul>	<ul style="list-style-type: none"> <li>– Free from heavy metals, solvents, bitumen, and chlorine</li> <li>– Easy application</li> <li>– Controlled wear for tooth face correction</li> </ul>

## Repair open gear lubricants

Purpose	Repair	Repair	Cleaning agent
Application method	Manual or brush lubrication only	Manual or brush lubrication only	Manual or brush lubrication only
Product	Klüberfluid D-F 1 Ultra*	GRAFLOSCON D-SG 00 ULTRA	Klüberbio Z 2-5
Colour	Green	Black	Transparent
Benefits for you	<ul style="list-style-type: none"> <li>– Ready-to-use product</li> <li>– Suitable for application under full load conditions</li> <li>– No cleaning of gears required after use</li> <li>– Low consumption rate</li> <li>– Free from solvents, bitumen, heavy metals, chlorine, graphite and MoS<sub>2</sub></li> <li>– Light-coloured, transparent formulation</li> </ul>	<ul style="list-style-type: none"> <li>– Ready for use</li> <li>– Applied to the drive at full load capacity</li> <li>– No subsequent cleaning</li> <li>– Economic consumption</li> <li>– Free from solvents, bitumen, heavy metals or chlorine</li> </ul>	<ul style="list-style-type: none"> <li>– Eco-friendly, readily biodegradable</li> <li>– Easy to spray</li> <li>– Less cleaning required; fully synthetic product with no tendency to gumming</li> <li>– Less maintenance required as the product provides a cleaning, lubricating and anticorrosion effect at the same time</li> </ul>

\* 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 CO<sub>2</sub> footprint considerably. It also offers excellent protection with its high base oil viscosity and an additive package suited to the requirements of open gears.

#### Overview of product benefits:

- 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
- Quantity reduction of up to 40 % compared to graphite products
- Transparent lubricant facilitating tooth flank inspection during operation
- Good vibration damping behaviour (reduced vibration)
- Decrease of tooth flank temperature
- No clogging of spray nozzles with solid lubricants
- Very good pumpability at low temperatures, usable down to -30 °C

## Further applications in the cement industry



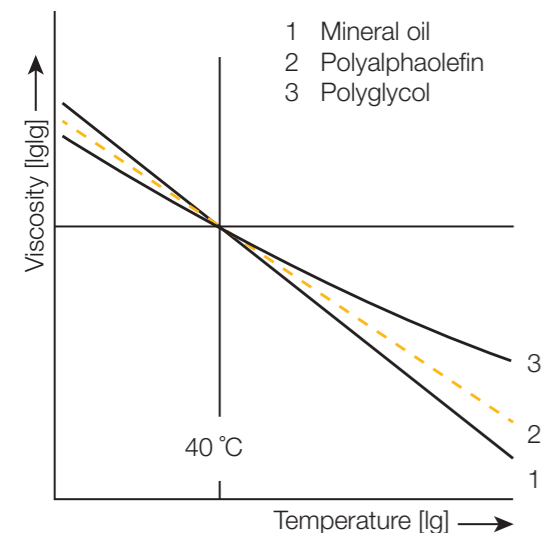
### Lubrication of enclosed gears

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.

Product	Type of oil	Application notes and benefits
Klüberoil GEM 1 N	Mineral oil based	<ul style="list-style-type: none"> <li>– Temperature range -15 °C to 100 °C (depends on viscosity grade selected)</li> <li>– High-quality mineral oil approved by leading gear drive manufacturers</li> <li>– Low maintenance cost</li> <li>– Protection even at peak loads, vibrations and oscillation</li> </ul>
Klübersynth GEM 4 N	Polyalphaolefin (PAO) and synthetic hydrocarbon (SHC) oil	<ul style="list-style-type: none"> <li>– Temperature range -50 °C to 140 °C (depends on viscosity grade selected)</li> <li>– Reduces power losses and improves energy efficiency</li> <li>– Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>– Extended service life of bearings, seals</li> <li>– Longer oil change interval resulting in cost savings</li> </ul>
Klübersynth GH 6	Polyglycol synthetic oil	<ul style="list-style-type: none"> <li>– Temperature range -55 °C to 160 °C (depends on viscosity grade selected)</li> <li>– Reduces power losses and improves energy efficiency</li> <li>– Approved by leading OEMs</li> <li>– Protection even at peak loads, vibrations and oscillation, high temperatures</li> <li>– Prevents premature rolling bearing failure</li> <li>– Extended service life</li> <li>– Longer oil change interval resulting in cost savings</li> </ul>

### 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.

### Cleaning of enclosed gears

Application	Product	Features	Application notes and benefits
Cleaning of enclosed gears	Klüber Summit Varnasolv	<ul style="list-style-type: none"> <li>– Concentrated conditioner fluid containing synthetic ester oil and cleaning additives</li> <li>– Miscible with mineral oils, synthetic hydrocarbons, ester oils and polyglycols</li> <li>– Neutral behaviour towards seals</li> <li>– Designed for cleaning screw-type compressors, hydraulic systems, gears and other oil circulating systems such as calenders</li> </ul>	<ul style="list-style-type: none"> <li>– Dissolves varnish and carbon deposits, reducing maintenance and cleaning costs</li> <li>– No dismantling of systems needed prior to cleaning</li> <li>– Used during operation, no downtime of machines for cleaning</li> <li>– Reduced operating and maintenance costs due to higher efficiency (e.g. compressor) and longer service life of the fresh oil fill</li> </ul>



## Further applications in the cement industry



### Lubrication of compressors

The efficiency of screw-type air compressors can increase considerably with the right compressor oil. It can also help decrease lubricant costs through reduced consumption. Mineral oil-based products with poor oxidation stability tend to form residues, resulting in frequent filter and oil changes and consequently higher operating costs.

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.

Component	Product	Features	Application notes and benefits
Screw-type compressor	Klüber Summit SH	<ul style="list-style-type: none"> <li>Air compressor oils based on synthetic hydrocarbon and additives</li> <li>Suited for highly loaded, oil-injected screw-type compressors</li> <li>Good oxidation stability</li> <li>High evaporation stability</li> <li>Klüber Summit SH 32 is especially suitable for centrifugal compressors and Klüber Summit SH 100 for reciprocating piston compressors</li> <li>Temperature range: depends on viscosity selected</li> </ul>	<ul style="list-style-type: none"> <li>Achieve oil changeover interval of up to 10,000 hours.</li> <li>Easy compressor oil conversion due to neutral behaviour of oils towards seals</li> <li>No unnecessary cleaning or failure of gummed pneumatic valves</li> <li>Reduced operating costs due to extended oil filter and separator life</li> </ul>
Reciprocating piston compressor	Klüber Summit DSL	<ul style="list-style-type: none"> <li>Air compressor oils based on a synthetic ester oil and additives</li> <li>Can be mixed with mineral oils, synthetic hydrocarbon oils and polyglycol oils</li> <li>Suitable for oil-injected screw-type compressors, centrifugal compressors, reciprocating piston compressors</li> <li>Neutral behaviour of oils towards seals</li> <li>Temperature range: depends on viscosity selected</li> <li>Klüber Summit DSL 32, 46, and 68 are biodegradable</li> </ul>	<ul style="list-style-type: none"> <li>Achieve oil changeover intervals of up to 8,000 operating hours</li> <li>Easier compressor oil conversion</li> <li>Good soil dissolving capacity, clean oil circuit due to the ester content in the oil, reduction of cleaning costs</li> <li>Low formation of oxidation residues in the oil circuit, reduced operating costs due to extended oil filter and separator life</li> </ul>
Cleaning agent	Klüber Summit Varnasolv	<ul style="list-style-type: none"> <li>Concentrated conditioner fluid containing synthetic ester oil and cleaning additives</li> <li>Miscible with mineral oils, synthetic hydrocarbons, ester oils and polyglycols</li> <li>Neutral behaviour towards seals</li> <li>Designed for cleaning screw-type compressors, hydraulic systems, gears and other oil circulating systems like calenders</li> </ul>	<ul style="list-style-type: none"> <li>Dissolves varnish and carbon deposits, thus reducing maintenance and cleaning costs</li> <li>No dismantling of systems needed prior to cleaning</li> <li>Used during operation, no downtime of machines for cleaning</li> <li>Reduced operating and maintenance costs due to higher efficiency (e.g. compressor) and longer service life of the fresh oil fill</li> </ul>
Check ageing condition of compressor oil (neutralisation number)	T.A.N.-Kit	<ul style="list-style-type: none"> <li>Easy and quick test method to check the ageing condition of compressor oils</li> <li>Kit consists of a pipette (1 ml), a glass vial containing the test fluid and a cloth, all packed in a plastic bag</li> </ul>	<ul style="list-style-type: none"> <li>Rapid way of checking the condition of compressor oils on the spot</li> <li>Determine compressor oil change intervals</li> <li>Easy to handle and portable</li> <li>Can be used for all conventional mineral and synthetic compressor oils</li> </ul>

### Lubrication of gear couplings

Component	Product	Features	Application notes and benefits
Gear coupling (grease-lubricated)	GRAFLOSCON C-SG 500 PLUS	<ul style="list-style-type: none"> <li>Peripheral speed <math>n_{max}/n &lt; 1.6</math></li> <li>Adhesive lubricant based on mineral oil with aluminium complex thickener and solid lubricant (fine graphite)</li> <li>Resistant to high pressure</li> <li>Contains antiwear additives, adhesion improvers and corrosion inhibitors</li> </ul>	<ul style="list-style-type: none"> <li>Prevents failure at high pressure</li> <li>Excellent adhesion</li> <li>Wear reduction</li> <li>Corrosion protection</li> </ul>
	Klüberlub BE 41-1501	<ul style="list-style-type: none"> <li>Peripheral speed <math>n_{max}/n &lt; 1.6</math></li> <li>Grease based on highly viscous mineral hydrocarbon oil (ISO VG 1500), special lithium soap, extreme pressure, antiwear additives and solid lubricants (MoS<sub>2</sub> and graphite)</li> </ul>	<ul style="list-style-type: none"> <li>Wear reduction</li> <li>Corrosion protection</li> <li>Prevents failure at high loads</li> </ul>
	Klüberplex GE 11-680	<ul style="list-style-type: none"> <li>Peripheral speed <math>n_{max}/n &gt; 1.6</math></li> <li>Adhesive lubricant with a mineral oil base and an aluminium complex soap thickener</li> <li>Particularly suitable for elevated component temperatures and wherever lubricants containing solid lubricants should not be used</li> </ul>	<ul style="list-style-type: none"> <li>Prevents wear and prolongs component life</li> <li>Adhesive lubricant</li> <li>Resistant to high pressures</li> <li>Anticorrosion properties</li> <li>Applicable through automatic lubrication systems</li> </ul>

### Assembly pastes

Application	Product	Features	Application notes and benefits
Screw compound (screw connections)	WOLFRACOAT C	<ul style="list-style-type: none"> <li>Temperature range -30 °C to 1,200 °C</li> <li>Grey colour, high-temperature lubricating paste containing metal solid lubricant pigments</li> </ul>	<ul style="list-style-type: none"> <li>Prevents seizing at high temperatures</li> <li>Easy assembly and disassembly of power-locking connections</li> </ul>
Screw paste (in presence of moisture)	Klüberpaste HEL 46-450	<ul style="list-style-type: none"> <li>Temperature range -40 °C to 1,000 °C</li> <li>Black hot screw paste for high-alloy steels; it contains fully synthetic polyalkylene glycol and ester base oils and a combination of inorganic solid lubricants</li> </ul>	<ul style="list-style-type: none"> <li>Corrosion protection</li> <li>Good water resistance</li> <li>Reliable screw connection ensured by constant and sufficient preload force</li> </ul>
Rolling bearings and hub/shaft fits	ALTEMP QNB 50	<ul style="list-style-type: none"> <li>Temperature range -15 °C to 150 °C</li> <li>White/beige lubricating paste containing a mineral base oil, a barium complex soap and inorganic solid lubricants</li> <li>Suitable for friction points subjected to small motions under static and dynamic loads</li> </ul>	<ul style="list-style-type: none"> <li>Prevents failure in components subjected to small to minimum motion under high static and dynamic load</li> <li>High pressure absorption ensures constant clamping force</li> <li>Corrosion protection</li> </ul>
Other sliding surfaces	WOLFRACOAT C FLUID	<ul style="list-style-type: none"> <li>Temperature range -25 °C to 1,050 °C</li> <li>Viscous high-temperature release agent and lubricating compound based on mineral and ester oil mixture</li> <li>It contains solid lubricants, metal pigments and an inorganic thickener</li> </ul>	<ul style="list-style-type: none"> <li>Corrosion protection</li> <li>Lubricates surfaces subjected to thermal loads</li> </ul>

## Onsite services offered by Klüber Lubrication

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 service to support sustainability needs and strategies.

For example: energy consumption, CO<sub>2</sub> 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.

### 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<sup>1)</sup> 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

<sup>1)</sup> 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.

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 speciality 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





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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 80 years.

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