KLÜBER LUBRICATION

your global specialist

Detailed information

The right lubricant for each component.

A selection of speciality lubricants for bearings, linear guides, gears, chains, screws, compressors and pneumatic applications

The right lubricant for each component

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You need a lubricant – we've got it: for each industry, component size or any conceivable load on the lubrication point. We've created this brochure on the most frequently used components to show you the quick way to find the right lubricant for your requirements.

The intention of this lubricant selection brochure
This brochure is an overview providing you with comprehensive know-how gained from our more than 80 years of experience in the lubricants sector. The products presented in this brochure represent merely a fraction of our extensive lubricant range and meet most requirements. They were selected by specialists for the individual technical fields.
We also have special lubricants for requirements and components not shown in this brochure. Do not hesitate to contact us if you feel that your requirements are not met by the products presented here. Our lubrication experts are glad to be of advice and can help you find the right lubricant for your application.

The intention of this product selection brochure is to provide a logical guide through the Klüber Lubrication specialised product range. The structure of the brochure first considers the various application requirements and then leads you toward selection of the appropriate lubricant solution.

Whenever products appear to have similar properties, we highlight the differences in grey in the respective fields to assist with the final product selection. Which criteria are the most important depends on the application.

- Most important selection criterion
- Selection criterion of secondary importance
- Selection criterion of tertiary importance

We generally recommend consulting our lubrication experts prior to selecting a lubricant.

Please refer to our product information leaflets for detailed product specifications. You can obtain them through your contact person at Klüber Lubrication or download them from our website www.klueber.com.

Rolling bearings

Special greases

Selection criteria	Upper service temperature approx.	Lower service temperature approx.	Speed factor n·dm [min^{-1}·mm], approx.	Base oil viscosity DIN 51562 [mm^2/s] at approx. 40 °C / 104 °F	Base oil viscosity DIN 51562 [mm^2/s] at approx. 100 °C / 212 °F	Base oil	Thickener	Speciality lubricants from Klüber Lubrication	Description / application examples
High-temperature applications	260 °C 500 °F	–40 °C –40 °F	300 000	420	40	PFPE	PTFE	BARRIERTA L 55/2	– Tried-and-tested long-term grease for rolling bearings subject to high temperatures – Very good long-term stability – Very good corrosion protection – Approved and recommended by many manufacturers – Tested and listed for use in the food-processing industry according to NSF H1[1)]
	200 °C 392 °F	–40 °C –40 °F	1 000 000	130	20	PFPE, ester	PTFE, polyurea	Klübersynth BHP 72-102	– Patented hybrid grease concept for long-term lubrication – Also for wet and corrosive environments and vibrations
	180 °C 356 °F	–40 °C –40 °F	1 000 000	80	11	ester	polyurea	Klübersynth BEP 72-82	– Excellent corrosion protection – Long bearing life due to special wear protection additives preventing premature material fatigue caused by vibration or high speeds – For motor vehicle applications, e.g. pulleys, generators, clutch release bearings, fan bearings, wiper motors
Low-temperature applications	110 °C 230 °F	–70 °C –94 °F	1 000 000	9	2.6	ester	lithium soap	ISOFLEX PDL 300 A	– Heavy-duty grease for low friction moments
Low-noise applications	180 °C 356 °F	–45 °C –49 °F	1 000 000	72	9.5	ester	polyurea	Klüberquiet BQ 72-72	– For lifetime and long-term lubrication at high and low temperatures – For double-sealed and shielded rolling bearings – For applications in e.g. in electric motors, fans, air conditioning systems and hard disc drives
	140 °C 284 °F	–50 °C –58 °F	1 000 000	25	5	ester	lithium soap	ASONIC GL 432	– For low temperatures and low friction moments – For the lifetime lubrication of double-sealed ball bearings such as miniature and instrument bearings

Most important selection criterion Selection criterion of secondary importance Selection criterion of tertiary importance

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Rolling bearings

Special greases

Selection criteria	Upper service temperature approx.	Lower service temperature approx.	Speed factor n·dm [min^{-1} ·mm], approx.	Base oil viscosity DIN 51562 [mm^2/s] at approx. 40 °C / 104 °F	Base oil viscosity DIN 51562 [mm^2/s] at approx. 100 °C / 212 °F	Base oil	Thickener	Speciality lubricants from Klüber Lubrication	Description / application examples
High-speed and spindle bearing applications	120 °C 248 °F	–50 °C –58 °F	2 100 000	22	5	synthetic hydrocarbon / ester	polyurea	Klüberspeed BF 72-23	– Especially for spindle bearings with inclined or vertical mounting position, but also for horizontal shafts in machine tools
High-load and heavy-duty applications	150 °C 302 °F	–40 °C –40 °F	1 000 000	130	14	synthetic hydrocarbon / mineral oil	special lithium soap	Klüberplex BEM 41-141	– For rolling and plain bearings subject to high loads – For vibrations and oscillations – For applications such as main bearings in wind turbines
	140 °C 284 °F	–20 °C –4 °F	500 000	540	28	mineral oil	lithium soap	Klüberlub BE 41-542	– For low to medium speeds
	140 °C 284 °F	–15 °C 5 °F	500 000	220	19	mineral oil	special calcium soap	Klüberplex BE 31-222	– For ball bearings subject to high loads in wet processing zones – For medium rotating speeds
Applications in the food & pharma industry	120 °C 248 °F	–45 °C –49 °F	300 000	150	22	synthetic hydrocarbon	aluminium complex soap	Klübersynth UH1 14-151	– NSF H1-registered[1] and ISO 21469-certified – supports compliance with the hygienic requirements of your production. Further information on our website www.klueber.com – Excellent low-temperature behaviour – Good wear protection – Good water resistance, reducing the risk of corrosion and premature bearing failure – For medium rotation speeds
Applications requiring electric conductivity	150 °C 302 °F	–40 °C –40 °F	1 000 000	150	19	synthetic hydrocarbon	lithium soap, solid lubricant	Klüberlectric BE 44-152	– For the long-term lubrication of rolling bearings subject to static electricity, e.g. in electric motors, paper making machines, copying machines, film stretchers, guides in belt conveyors and fans – Electric resistance based on DIN 53 482 ([Ω x cm]), (electrode spacing 1 cm, electrode surface 1 cm^2) ≤ 10 000

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Plain bearings

Special greases

Industry	Type of operation	Sliding speed [m/s]	Max. surface pressure [N/mm²]	Upper service temperature approx.	Lower service temperature approx.	Speciality lubricants from Klüber Lubrication	Description	Benefits
Plant and machine building, appliance industry	Oscillating/ rotating	< 1	approx. 100	260 °C 500 °F	–40 °C –40 °F	Klüberalfa BHR 53-402	High-temperature, long-term lubricating grease with largely neutral behaviour towards many materials (metals, plastics)	Lifetime lubrication enables a significant reduction in lubrication quantities
				180 °C 356 °F	–30 °C –22 °F	PETAMO GHY 441	Alternative to Klüberlub BVH 71-461, suitable for higher ambient temperatures	Extended relubrication intervals, also at high temperatures owing to its long-term stability
				160 °C 320 °F	–20 °C –4 °F	Klüberlub BVH 71-461	The preferred lubricant option for plain bearings, offering long service life and relubrication intervals	Suitable for universal standard applications
				150 °C 302 °F	–40 °C –40 °F	POLYLUB GLY 501	Especially for plastic plain bearings;[2]) also available in other base oil viscosities	Good compatibility with many plastics
				140 °C 284 °F	–20 °C –4 °F	Klüberlub BE 41-542	More solid alternative to Klüberlub BVH 71-461 (NLGI 2)	KP2N-20 grease according to the standard for bearing lubricants DIN 51825, which is often required
				140 °C 284 °F	–30 °C –22 °F	Klüberlub BEM 41-122	For steel/steel spherical plain bearings	Improved functionality and long-term lubrication due to the formation of a wear-resistant tribolayer
	Mainly rotating	≥ 1	approx. 10	150 °C 302 °F	–50 °C –58 °F	POLYLUB GLY 151	Also for plastic plain bearings owing to its good compatibility	Suitable for universal standard applications
		≥ 2	approx. 1	130 °C 266 °F	–50 °C –58 °F	Klübersynth LR 44-21	Also for plastic plain bearings owing to its good compatibility	Suitable for universal standard applications
Food-processing and pharmaceutical industry	Oscillating/ rotating	< 1	approx. 100	140 °C 284 °F	–5 °C 23 °F	Klübersynth UH1 64-1302	NSF H1-registered[1]) and certified according to ISO 21469 for use in the food-processing and pharmaceutical industries	Long lifetime owing to good water resistance and wear protection
				120 °C 248 °F	–35 °C –31 °F	Klüberfood NH1 94-301	NSF H1-registered[1]) for use in the food-processing and pharmaceutical industries	Good corrosion- and wear protection, also when subject to micro movements; can be applied via centralised lubrication systems
	Mainly rotating	≥ 1	approx. 10	120 °C 248 °F	–40 °C –40 °F	Klübersynth UH1 14-151	NSF H1-registered[1]) and certified according to ISO 21469 for use in the food-processing and pharmaceutical industries	Reduced risk of bearing failure due to good water resistance
Plant and machine building, appliance and automotive industry if lubricant contact with the environment cannot be excluded	Mainly rotating	≥ 1	approx. 10	100 °C 212 °F	–40 °C –40 °F	Klüberbio M 72-82	Readily biodegradable. The preferred option to avoid contamination of soil or water.	Suitable for many applications due to good wear and water resistance

Most important selection criterion Selection criterion of secondary importance Selection criterion of tertiary importance

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Plain bearings

Special oils and dry lubricants

Lubricating oils for hydrodynamic plain bearings:

Application/requirement	Speciality lubricants from Klüber Lubrication	Description	Benefits
Standard	Klüberoil GEM 1-100, 150, 220, 320, 460 N	Viscosity depends on temperature and speed	Tried-and-tested gear oil series compatible with conventional plain bearing metals
Particular long-term resistance	Klüber Summit SH 32, 46, 68, 100	Viscosity depends on temperature and speed	Long-term, reasonably priced compressor oil series compatible with conventional plain bearing metals
	Alternative: Klübersynth GH 6-…, if the required viscosity is not available in the Klüber Summit SH series		Tried-and-tested long-term gear oil series compatible with conventional plain bearing metals

Dry lubricants for tribologically optimised plain bearings:

Type of lubricant	Speciality lubricants from Klüber Lubrication	Description	Benefits
Bonded coatings	Klübertop TG 05 N	Bonded coatings should be selected with regard to component geometry and material as well as the type of application, operating conditions and application methods. Further products available on request	Thermosetting binder for good wear protection and adhesion to sliding surfaces; ensures safe function of components; can also be used for emergency and running-in lubrication in combination with oil lubrication
	Klübertop TP 39 N AB		Thermosetting binder for good wear protection and adhesion to sliding surfaces; ensures safe function of components; mainly used for dry-running plain bearings < 1 m/s.
	Klübertop TP 46-111		Thermosetting, water-miscible PTFE bonded coating for dry-running plastic bearings; offers good media resistance.

Most important selection criterion Selection criterion of secondary importance

Linear guides

Special oils and fluid greases

Oil lubrication for continuous lubrication:

Industry/requirements	Linear type	Speciality Lubricants from Klüber Lubrication	Description
General/increased corrosion protection	All	Klübersynth MZ 4-17	Good compatibility with other lubricants; can also be used for initial lubrication
General	Rolling motion guides	Klüberoil GEM 1-46, 68, 220 N	CLP gear oil offering good corrosion- and wear protection. Viscosity to be selected according to speed. Klüberoil GEM 1-46 N is suitable for particularly low ambient temperatures
General	Slideways	LAMORA D 68, 220	CGLP slideway oil with good demulsifying behaviour towards cooling lubricants, tried-and-tested also for plastic guideways. Viscosity to be selected according to speed
Food-processing and pharmaceutical industry	All	Klüberoil 4 UH1-68 N	NSF H1-registered and ISO 21469-certified.[1] Good ageing resistance and wear protection. Also available in other viscosities (ISO VG 32 … 1500)
Readily biodegradable	All	Klüberbio C 2-46	Low water hazard ensures unharmed environment. High-performance lubricant. Also available in ISO VG 100 as Klüberbio CA 2-100

Fluid grease lubrication for the continuous lubrication of all linear types:

Industry/requirements	NLGI grade/requirements	Speciality Lubricants from Klüber Lubrication	Description
General/low speed (< 15 m/min)	NLGI 00/000	MICROLUBE GB 00	With high-pressure and antiwear additives, without solid lubricants
General/medium speed (corresponds to 15 to 60 m/min)	NLGI 000	CENTOPLEX GLP 500	Good pressure absorbtion capacity
General/medium speed (> 60 m/min)	NLGI 0/00	ISOFLEX TOPAS NCA 5051	Low base oil viscosity for low friction and smooth running
General/higher temperatures	NLGI 0/00	ISOFLEX TOPAS NCA 5051	Synthetic base oil with good ageing resistance
General/high load, micromovements, vibration	NLGI 0, 00/000	MICROLUBE GB 0, 00	With high-pressure and antiwear additives, without solid lubricants. Select NLGI grade according to lubrication specification
Food-processing and pharmaceutical industry	NLGI 000	Klüberfood NH 1 94-6000	NSF H1-registered.[1] Good corrosion protection and good pressure-absorption capacity

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Linear guides

Special greases

Grease lubrication for extended relubrication intervals:

Linear type	Industry/requirements	Selection criterion	Speciality lubricants from Klüber Lubrication	Description
Rolling motion guides, primarily with balls	Universal	Low speed (< 15 m/min)	Klüberplex BE 31-222	Lubricating grease, good adhesion and sealing effect
		Medium speed (corresponds to 15 to 60 m/min)	Klüberplex BE 31-102	Lubricating grease, good adhesion and sealing effect
		High speed (> 60 m/min)	ISOFLEX NCA 15	Lubricating grease, good adhesion and sealing effect
Miniature guideway	Universal		ISOFLEX TOPAS AK 50	Fluid grease. NLGI 0 for easy application
Roller screw drives	Universal		Klüberplex BEM 41-132	Good lubricating capacities in linear contact
Trapezoidal thread drives	Plastic nut	Low speed (< 15 m/min)	POLYLUB GLY 801	Good compatibility with plastics. Lubricants for higher speeds on request
	Metal nut	Medium speed (corresponds to 15 to 60 m/min)	Klüberplex BEM 41-132	Good wear protection for long relubrication intervals. Lubricants for high/low speeds on request
Sliding motion guides	Universal	Medium speed (corresponds to 15 to 60 m/min)	Klüberplex BEM 41-132	Good wear protection for long relubrication intervals. Lubricants for high/low speeds on request
All	Smooth running	High accelerations and speed	ISOFLEX TOPAS NCA 52	Ageing-resistant lubricating grease for long-term lubrication
	Micromovement/vibration	Normal load	Klüberplex BEM 34-132	Tried-and-tested grease against tribocorrosion
	High load		Klüberlub BE 71-501	Good wear protection, applicable through central lubricating systems
	High temperature	Not in high vacuum, UV light, aggressive media	Klübersynth BM 44-42	Very wide temperature range. Compatible with plastics. Low-cost alternative to PFPE oils. Tried-and-tested for automotive applications (steering system)
	Clean room production/semi-conductor, LCD, HDD production	Friction point temperature up to 60 °C (140 °F) not in high vacuum or aggressive radiation	Klübersynth BEM 34-32	Primarily supplied in small 50 g packs for relubrication in clean room environments
	Clean room production/semi-conductor, LCD, HDD production	High temperature range, under high vacuum, UV radiation	BARRIERTA KM 192	Low evaporation rate
	Food-processing and pharmaceutical industry		Klüberfood NH1 94-301	NSF H1-registered[1)]
	Ecologically sensitive areas	Readily biodegradable for a clean environment	Klüberbio M 72-82	Low water hazard ensures unharmed environment. Good water resistance. High pressure absorption capacity

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Gears

Special oils

Industry	Gear type		Speciality lubricants from Klüber Lubrication	ISO viscosity grade, ISO VG	Service temperature range		Performance parameters						DIN 51 502, DIN 51517-3, AGMA 9005 designation	Registrations and tests
	Spur, bevel, planetary and hypoid gears	Worm gear			Upper service temperature, approx.	Lower service temperature, approx.	Energy saving potential	Oil life	Scuffing load capacity of gearing	Micro-pitting resistance of gearing	Wear protection of rolling bearings	Elastomer compatibility Radial shaft seals		
General	+++	+	Klüberoil GEM 1 N	46, 68, 100, 150, 220, 320, 460, 680, 1000	100 °C 212 °F	–15 °C 5 °F	+	+	+++	+++	+++	+++	CLP, EP oil	NSF H2
General	+++	++	Klübersynth GEM 4 N	32, 46, 68, 100, 150, 220, 320, 460, 680	140 °C 284 °F	–50 °C –58 °F	++	++	+++	+++	+++	+++	CLP HC, EP oil	
General	+++	+++	Klübersynth GH 6	22, 32, 46, 68, 100, 150, 220, 320, 460, 680, 1000, 1500	160 °C 320 °F	–55 °C –67 °F	+++	+++	+++	+++	+++	+++	CLP PG, EP oil	
Food & pharma	+++	+++	Klübersynth UH1 6	100, 150, 220, 320, 460, 680	160 °C 320 °F	–35 °C –31 °F	+++	+++	+++	+++	+++	+++	CLP PG, EP oil	NSF H1[1)], NSF ISO 21469
Food & pharma	++	++	Klüberoil 4 UH1 N	22, 32, 46, 68, 100, 150, 220, 320, 460, 680, 1500	120 °C 248 °F	–35 °C –31 °F	++	++	++	++	+++	+++	CLP HC, EP oil	NSF H1[1)], NSF ISO 21469
Ecologically sensitive areas	++	++	Klübersynth GEM 2	220, 320	130 °C 266 °F	–30 °C –22 °F	++	++	+++	+++	+++	++	CLP E[2)], EP oil	CEC-L-33-A-93

+++ Optimum performance/enhanced benefit ++ Improved performance/benefit + Standard performance

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2) Complies with CLP requirements, except for demulsibility and resistance to SRE NBR 28 elastomer

Chains

Speciality lubricants

Industry	Upper service temperature approx.	Selection criteria	Speciality lubricants from Klüber Lubrication
Food-processing and pharmaceutical industries	250 °C 482 °F	High-temperature chain oil, NSF H1-registered[1], ISO 21469-certified	Klüberfood NH1 CH 2-220 Plus
	160 °C 320 °F	Special high-temperature chain oil based on polyglycol for chains in can lacquering lines; NSF H1-registered[1] and ISO 21469-certified	Klüberfood NH1 C 6-150
	120 °C 248 °F	NSF H1-registered[1] and ISO 21469-certified. For normal temperatures	Klüberoil 4 UH1-32, 46, 68, 100, 150, 220, 320, 460 N
Other industries	1 000 °C 1 832 °F Note: above approx. 200 °C/392 °F dry lubrication	Solid lubricant suspension, e.g. for chains in burning, melting or annealing furnaces. **Note: for applications at service temperatures above 250 °C/482 °F**	WOLFRAKOTE TOP FLUID
	500 °C 932 °F Note: above approx. 200 °C/392 °F dry lubrication	High-temperature chain oil containing solid lubricants; also for plate carrier chains in baking ovens. **Note: for applications at service temperatures above 250 °C/482 °F**	Klüberoil YF 100
	250 °C 482 °F	Conveyors with dryers (e.g. powder painting) Conveyor chains in hardening furnaces (e.g. mineral wool and gypsum plate production)	Klübersynth CHM 2-100, Klübersynth CH 2-100 N or other viscosity grades of the Klübersynth CH 2-series
		For continuous fibreboard presses. Especially for belt lubrication.	HOTEMP SUPER N PLUS
		Lubrication of chains and pins (ContiRoll presses)	HOTEMP SUPER CH 2-100
		Especially for fabric conveyor chains in textile finishing machines	Klübersynth CTH 2-260
		For conveyor chains in biaxial film stretchers; especially for high and highest chain speeds and stretching temperatures. Approved by Messrs. Brückner	Klübersynth CH 2-280 Klübersynth CFH 2-400
	120 °C 248 °F	Chain lubricant based on mineral oil, also for conveyor chains in wet processing zones	STRUCTOVIS HD-series; especially STRUCTOVIS FHD and STRUCTOVIS EHD
		Lubricating wax for chains, up to 70 - 80°C/158 - 176°F “quasi-dry” lubricating film; especially for the initial lubrication by the chain manufacturer	Klüberplus SK 11-299
	110°C 230 °F	Biodegradable chain oils	Klüberbio CA 2 oils (multi-purpose oils)
	80 °C 176 °F		Klüberbio C 2-46 (especially for escalator step chain and passenger conveyors)

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Screws

Special pastes and dry lubricants

	Service temperature range		Screw material						Colour	Application notes	Speciality lubricants from Klüber Lubrication
	upper service temperature range approx.	lower service temperature range approx.	standard	friction values for initial tightening[1] standard screw material	standard deviation (S)	special steel A 2-70	friction values for initial tightening[2] special steel A 2-70	standard deviation (S)			
Pastes	1 200 °C 2 192 °F	–30 °C –22 °F	•	$\mu_K = 0.15$ $\mu_G = 0.17$	$S_K = 0.008$ $S_G = 0.026$	•	$\mu_K = 0.11$ $\mu_G = 0.13$	$S_K = 0.007$ $S_G = 0.007$	light-grey	NSF H1-registered[5] and ISO 21469-certified Above 200 °C dry lubrication	Klüberpaste UH1 96-402
	1 000 °C 1 832 °F	–40 °C –40 °F	•	$\mu_K = 0.09$ $\mu_G = 0.11$	$S_K = 0.009$ $S_G = 0.02$	•	$\mu_K = 0.11$ $\mu_G = 0.13$	$S_K = 0.011$ $S_G = 0.032$	black	Approved acc. to VW-TL 52112 and Ford Tox No. 138624. Above 200 °C dry lubrication	Klüberpaste HEL 46-450
	140 °C 284 °F	–40 °C –40 °F	•	$\mu_K = 0.11$ $\mu_G = 0.10$	$S_K = 0.008$ $S_G = 0.012$	•	$\mu_K = 0.10$ $\mu_G = 0.09$	$S_K = 0.013$ $S_G = 0.01$	beige	For screws and bolts subject to normal temperatures	DUOTEMPI PMY 45
	120 °C 248 °F	–45 °C –49 °F	•	$\mu_K = 0.10$ $\mu_G = 0.13$	$S_K = 0.004$ $S_G = 0.017$	•	$\mu_K = 0.09$ $\mu_G = 0.19$	$S_K = 0.009$ $S_G = 0.022$	white	NSF H1-registered[5] and ISO 21469-certified	Klüberpaste UH1 84-201
	120 °C 248 °F	–30 °C –22 °F	•	$\mu_K = 0.13$ $\mu_G = 0.11$	$S_K = 0.012$ $S_G = 0.011$	–	not measured	not measured	whitish	For use in agricultural, forestry and water resources industries	Klüberbio EM 72-81
Dry lubrication	1 000 °C 1 832 °F	–40 °C –40 °F	•	$\mu_K = 0.14$ [3] $\mu_G = 0.14$ [3]	$S_K = 0.006$ [3] $S_G = 0.028$ [3]	–	–	–	grey	Dispersion. A dry alternative to high-temperature screw pastes for cleaner handling	Klüberplus S 04-807
	350 °C 662 °F	–180 °C –292 °F	•	$\mu_K = 0.06$ [3] $\mu_G = 0.07$ [3]	$S_K = 0.003$ [3] $S_G = 0.007$ [3]	•	$\mu_K = 0.05$ $\mu_G = 0.08$	$S_K = 0.007$ $S_G = 0.007$	grey	Bonded coating for high pressure. Low friction values	UNIMOLY C 220
	180 °C 356 °F	–40 °C –40 °F	•	$\mu_K = 0.12$ [3] $\mu_G = 0.14$ [3]	$S_K = 0.005$ [3] $S_G = 0.006$ [3]	–	–	–	black	Bonded coating offering good resistance to chemicals and oils. Good corrosion protection. Not suitable for special steels.	Klübertop TP 03-111
	90 °C 194 °F	–40 °C –40 °F	•	$\mu_K = 0.13$ [4] $\mu_G = 0.17$ [4]	$S_K = 0.011$ [4] $S_G = 0.033$ [4]	•	$\mu_K = 0.14$ $\mu_G = 0.12$	$S_K = 0.018$ $S_G = 0.017$	transparent (colour of the water-free lubricating film)	Lubricating wax emulsion. Ready-to-handle. Can be diluted with tap water	Klüberplus SK 12-205

Most important selection criterion

1) Measured with screws M 10x30-8.8, DIN EN ISO 4017, black and nuts M 10-8, DIN ISO 4032, bright; number of screws 20 each. μK = bearing surface friction coefficient, μG = thread friction coefficient
2) Measured with screws M 10x50, DIN EN ISO 4017, bright, A2-70, DIN EN ISO 3506-1, and nuts M 10, DIN EN ISO 4032-1, bright, A2-80, DIN EN ISO 3506-1; number of screws 20 each. μK = bearing surface friction coefficient, μG = thread friction coefficient
3) Screws pretreated with zinc-phosphatized surface
4) Friction values and standard deviation with a mixing ratio of 1 : 3.

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Air compressors

Special oils

Type of compressor	Food-processing and pharmaceutical industries	Oil change interval	Speciality lubricants from Klüber Lubrication	ISO viscosity grade, ISO VG	Product characteristics, advantages, benefits	Base oil
Reciprocating piston compressors Rotary vane compressors with total loss or oil circulation lubrication	•	depending on application	Klüber Summit HySyn FG	68, 100	– NSF H1-registered[2] and ISO 21469-certified for use in the food-processing and pharmaceutical industries – up to 160 °C (320 °F) discharge temperature	Synthetic hydrocarbon
		depending on application	Klüber Summit PS 200, 300, 400	68, 100, 150	– Reduced residue formation on valves and in cylinders compared to mineral oil based compressor oils – Longer service life of valves and piston rings resulting in reduced maintenance and downtime costs in comparison to mineral oil – Up to approx. 160 °C (320 °F) discharge temperature	Hydrogenated oil, diester oil
		depending on application	Klüber Summit DSL	68, 100, 125	– Excellent residue removal on valves and in cylinders due to 100 % fully synthetic formulation – Even longer service life of valves and piston rings resulting in reduced maintenance and downtime costs compared to mineral and hydrocarbon-based oils – More energy efficiency resulting from lower friction coefficient, better thermal conductivity, etc. – Up to 220 °C (428 °F) discharge temperature	Diester oil
Screw compressors with oil injection	•	oil change intervals up to 5 000 hours under normal operating conditions[1]	Klüber Summit FG 100, 200, 250	32, 46, 68	– NSF H1-registered[2] and ISO 21469-certified for use in the food-processing and pharmaceutical industries	Synthetic hydrocarbon
		oil change intervals up to 5 000 hours under normal operating conditions[1]	Klüber Summit PS 100, 150, 200	32, 46, 68	– Reduced maintenance costs – Reduction of downtime – Reduced formation of residues	Mineral oil, ester oil
		oil change intervals up to 8 000 hours under normal operating conditions[1]	Klüber Summit SB	46, 68	– Reduced maintenance costs – Reduction of downtime – Miscible with mineral and hydrocarbon oils	Synthetic hydrocarbon, ester oil
		oil change intervals up to 8 000 hours under normal operating conditions[1]	Klüber Summit Supra Coolant	55	– Particularly for compressors filled with polyglycol-based compressor oils by the manufacturer – Good chemical stability with low degradation and deposit formation – Not miscible with mineral oil and hydrocarbon-based oils	Polyglycol oil, ester oil
			Klüber Summit Supra 32	38		
		oil change intervals up to 10 000 hours under normal operating conditions[1]	Klüber Summit SH	32, 46, 68	– Reduced maintenance costs – Reduction of downtime – Good compatibility with elastomers – Non-hygroscopic	Synthetic hydrocarbon
		oil change intervals up to 12 000 hours under normal operating conditions[1] or for compressors running under severe operating conditions like seawater, extreme temperatures	Klüber Summit Ultima	46, 68	– Reduced maintenance costs – Reduction of downtime	Ester oil, synthetic hydrocarbon

Most important selection criterion | Selection criterion of secondary importance | Selection criterion of tertiary importance

1) Normal operating conditions are considered a discharge temperature of max. 85 °C (176 °F), a discharge pressure of max. 8 bar, dry and clean intake air, oil cycle > 1.5
2) This lubricant is NSF H1 registered and therefore complies with FDA 21 CFR § 178.3570. The lubricant was developed for incidental contact with products and packaging materials in the food-processing, cosmetics, pharmaceutical or animal feed industries. The use of this lubricant can contribute to increase reliability of your production processes. We nevertheless recommend conducting an additional risk analysis, e.g. HACCP.

Air compressors

Special oils

Application	Food-processing and pharmaceutical industries	Speciality lubricants from Klüber Lubrication	ISO viscosity grades, ISO VG	Product characteristics, advantages, benefits	Base oils
Gear lubrication in oil-free compressors	•	Klüber Summit HySyn FG 68	68	– NSF H1-registered[1] and ISO 21469-certified for use in the food-processing and pharmaceutical industries – Fully synthetic compressor oil	Synthetic hydrocarbon
		Klüber Summit SH 68	68	– Cost savings due to longer oil change intervals compared to mineral and partially synthetic oils – Fully synthetic compressor oil	Synthetic hydrocarbon, ester oil
		Klüber Summit Ultima 68	68	– Cost savings due to longer oil change intervals compared to mineral and partially synthetic oils – Fully synthetic compressor oil	Ester oil
Blower (gear lubrication)	•	Klüberoil 4 UH 1 N	100, 150, 220	– NSF H1-registered[1] and ISO 21469-certified for use in the food-processing and pharmaceutical industries	Synthetic hydrocarbon, ester oil
		Klüber Summit PS 400	150	– Cost savings due to longer oil change intervals compared to mineral oil	Mineral oil, ester oil
Cleaning of screw compressors, turbo compressors and rotary vane air compressors with oil circulation		Klüber Summit Varnasolv	78	– Effectively dissolves residues and impurities caused by mineral oils (e.g. carbon buildup, oxidation residues) and removes them together with the oil during oil change – No downtimes due to cleaning during operation – Lower costs due to simple cleaning procedure – Economical operation of the cleaned compressor	Ester oil based conditioner for screw-type compressors, turbo compressors and rotary vane compressors with oil circulation lubrication. May not be used for polyglycol oils.
Aeging test oil for checking the aging condition of compressor oils		Klüber Summit T.A.N-Kit		– Rapid way of checking the condition (neutralisation number) of compressor oils on the spot – Suitable for determining the compressor oil change intervals	Can be used for all conventional mineral and synthetic compressor oils, except polyglycol oils.
Rolling bearings of electric motors		Klüberquiet BQH 72-102		– Long-term and lifetime lubrication	Ester oil, polyurea thickener

Most important selection criterion

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Pneumatic systems

Cylinders in pneumatic systems

Application	Products	Seal types	Product characteristics	Application notes
Standard applications / food-grade applications	Klübersynth AR 34-401	Damping seal, piston seal, rod seal	Adhesive lubricating grease for wide piston speed ranges; reduced tendency to stick-slip at very low piston speeds; low breakaway torques after long periods of standstill; NSF H1 registered[1] for use in the food-processing and pharmaceutical industries; excellent compatibility with commercial sealing materials (except for EPDM).	For lubricant application the use round brushes or automatic greasing pistons has proven effective. It is important that after assembly the piston is moved several times over the full stroke length in order to ensure adequate wetting of the sealing elements on both sides if only one-sided lubrication was possible.
High-temperature applications	BARRIERTA KM 192	Damping seal, piston seal, rod seal	Very wide temperature range; low breakaway torques; high chemical stability; excellent compatibility with commercial sealing materials.	

Valves in pneumatics systems

Application	Products	Valve types	Product characteristics	Application notes
Standard applications	PETAMO GHY 133N	Seat valve, directional control valve	Adhesive lubricating grease for a wide service temperature range; reduces static and dynamic friction; good water resistance; good corrosion protection.	A similar procedure as for cylinders applies. Excessive lubrication of the piston seal after several piston strokes - depending on the size and circumference - ensures a more uniform lubricant layer.
High-temperature applications in the food-processing and pharmaceutical industries	UNISILKON L 641	Seat valve, directional control valve	Very adhesive, NSF H1 registered[1] lubricating grease especially for applications involving a high number of cycles, high air throughput and thermal fluctuations	

Most important selection criterion

1) This lubricant is NSF H1 registered and therefore complies with FDA 21 CFR § 178.3570. It was developed for incidental contact with products and packaging materials in the food-processing, cosmetics, pharmaceutical or animal feed industries. The use of this product can contribute to increase reliability of your production processes. We nevertheless recommend conducting an additional risk analysis, e.g. HACCP.

Notes

KlüberEfficiencySupport

Klüber Lubrication Services – Success for you from one tool box!

Manufacturers and operators require their machinery to run reliably and efficiently for the longest possible service life. Selection of the most appropriate lubrication solution offers a huge potential to maximise energy gain with minimum spare part and labour usage while increasing productivity.

In addition to its high-quality lubricants, the professional services provided by Klüber Lubrication enable versatile added value solutions for companies from various industries. Our range of services come together in one tool box, “KlüberEfficiencySupport”.

- **KlüberEnergy:** Services for optimum energy efficiency of your lubricant application. Reports on concrete savings
- **KlüberMaintain:** Support for your lubrication management and maintenance programme/TPM[1)] considering the necessary lubrication maintenance tasks
- **KlüberMonitor:** We recommend optimisations to increase your productivity on the basis of tribological analyses of your application and bench tests
- **KlüberRenew:** Services to increase the lifetime of your cost-intensive components such as large gear drives and chains including appropriate training

This Klüber Lubrication support matrix is a tried-and-tested multi-stage analytical approach.

We identify savings possibilities together with you to enable optimisation. We develop solutions to improve the energy efficiency of your equipment or the efficiency of your maintenance, production processes or components which extend well beyond a simple lubricant recommendation. In addition we verify the effects our measures have in practice to provide tangible value from the solutions proposed. This provides the basis for you to multiply the results.

1) Total Productive Maintenance

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

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

www.klueber.com

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Innovative tribological solutions are our passion. Through personal contact and consultation, we help our customers to be successful worldwide, in all industries and markets. With our ambitious technical concepts and experienced, competent staff we have been fulfilling increasingly demanding requirements by manufacturing efficient high-performance lubricants for more than 80 years.

Freudenberg

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