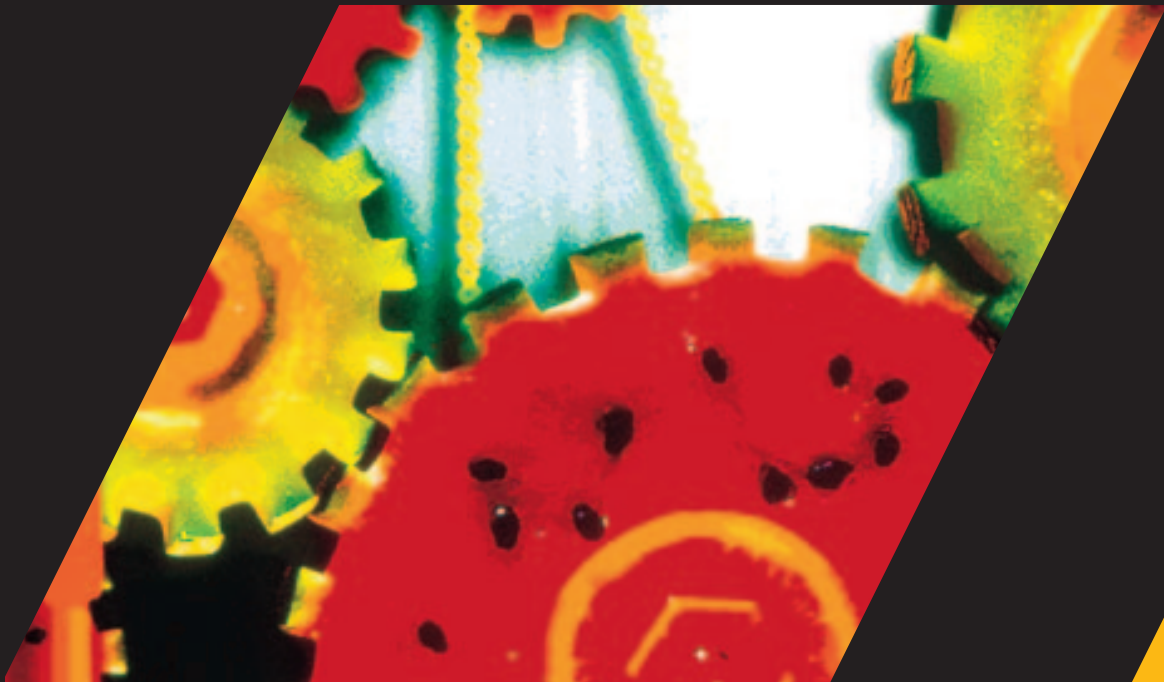


**KLÜBER**  
LUBRICATION

... Λιπαντικά



για τις βιομηχανίες τροφίμων και φαρμάκων

Ο κόσμος μας είναι η Λίπανση

## Περιεχόμενα

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# Βελτιώστε την Ποιότητα & Προστατεύσατε το περιβάλλον

## Μιά απλή αρχή που αποδίδει διπλά

Οι πελάτες θα σας έχουν σε εκτίμηση όταν τους παρέχετε ποιοτικά προϊόντα και υπηρεσίες. Με βάση αυτή την απλή θεώρηση η Klüber κατασκευάζει ειδικά λιπαντικά για σχεδόν 70 χρόνια.

Με 27 θυγατρικές, 14 εργοστάσια και περισσότερους από 1,500 εργαζόμενους παγκόσμια, η Klüber είναι ο αξιόπιστος συνεργάτης στην λίπανση.

Επιλεγμένες πρώτες ύλες, αυθεντίες στη λίπανση, εγκαταστάσεις παραγωγής high-tech και αυστηρά test ασφαλείας εξασφαλίζουν την υψηλή ποιότητα των προϊόντων μας.

Για να προστατεύσουμε τους ανθρώπους και το περιβάλλον προσφέρουμε ειδικά λιπαντικά για μεγαλύτερα διαστήματα ανα-λίπανσης και οικολογικά - Την επιτυχία μας στον τομέα αυτό δηλώνει και η σχετική περιβαλλοντική διάκριση που μας απονεμήθηκε από την Δημαρχία του Μονάχου. Η Klüber, πρώτη εταιρεία στο Μόναχο που πέρασε τον έλεγχο EC Eco εφαρμόζει περιβαλλοντική πολιτική σύμφωνη με το



Όλες οι μονάδες παραγωγής της Klüber είναι πιστοποιημένες σύμφωνα με το Διεθνές Σύστημα Διαχείρισης Ποιότητας ISO 9001

σύστημα διαχείρισης ποιότητας ISO 9001.

Βασιζόμενοι μόνον στην πολυετή εμπειρία μας είμαστε σε θέση να υποστηρίξουμε αποτελεσματικά τις βιομηχανίες τροφίμων στην προσπάθειά τους να ικανοποιήσουν τον καταναλωτή.

Οι ακριβείς τεχνικές συμβουλές που παρέχουμε τοπικά τα παγκόσμια πρότυπα ποιότητας που ακολουθούμε αποτελούν έναν από τους πολλούς λόγους για τους οποίους βασίζονται στην Klüber οι ευαίσθητοι κλάδοι των τροφίμων, των φαρμάκων και του καπνού.

Η απόλυτη ικανοποίησή σας είναι πρόκληση για εμάς.



Εάν το επιθυμείτε, μπορούμε να σας στείλουμε το ισχύον πιστοποιητικό.

# Λιπαντικά για τις βιομηχανίες τροφίμων και φαρμάκων.

Επι δεκαετίες η Klüber ανέπτυξε και κατασκεύασε ειδικά λιπαντικά για τις απαιτήσεις που έχει η βιομηχανία επεξεργασίας τροφίμων.

Τα λιπαντικά τροφίμων<sup>1</sup> πρέπει να:

- πληρούν τις διατάξεις τροφίμων
- να είναι αδρανή
- να μην έχουν καμία γεύση ή οσμή και
- να είναι εγκεκριμένα διεθνώς

Furthermore, food-grade lubricants have to meet general technical requirements, i.e

- reduce friction and wear
- protect against corrosion
- dissipate heat
- and
- have a sealing effect

Depending on the operating conditions and manufacturing processes in the individual food-processing plant, food grade lubricants have to ensure for example

- resistance to food products
- resistance to chemicals
- resistance to water
- neutral behaviour towards plastics and elastomers
- steam resistance
- sugar dissolving properties
- compatibility with rubber and sealing materials

Historically the USDA (United States Department of Agriculture) but now the NSF (National Sanitary Foundation) register lubricants for use in the food industry.

The lubricant manufacturer has to prove that all ingredients used in its formulation are on the FDA (U.S Food and Drug Administration) list of allowable substances in accordance with the Guidelines of Security CFR 21<sup>2</sup>.section 178.3570 ,

<sup>1</sup> μ , μ μ μ μ μ μ μ

<sup>2</sup> FDA (US Food & Drug Administration)

Based on the specified raw material lists, NSF registration is done in two categories:

**Food Grade Lubricant according to NSF H1:**

Suitable for an incidental, technically unavoidable contact with the food product.

**Special lubricant according to NSF H2:**

Suitable for use in the food-processing and pharmaceutical industries provided that a contact with the food product is absolutely impossible.

Since September 30, 1998, the USDA has no longer been issuing registrations of food-grade lubricants and the registration is now conducted by the NSF.

**What about already registered or new products?**

Those USDA registrations already granted will remain in effect. Now as before, USDA H1 and USDA H2 stand for the suitability of products for use in the food industry.

There are two main categories for modified and new products for the food industry:

- **Food-grade lubricants suitable for applications where incidental contact with the product may occur (NSF H1)**

Manufacture (constituents, quantity and purity) conforming strictly to FDA 21 CFR § 178.3570

- **Special lubricants suitable for applications in the food-processing industry with no direct contact between the lubricant and the food product (NSF H2)**



*Confirms that the criteria for the former USDA H1 registration are met: the certificate of Klüber's General Management for USDA H1 conforming lubricants*

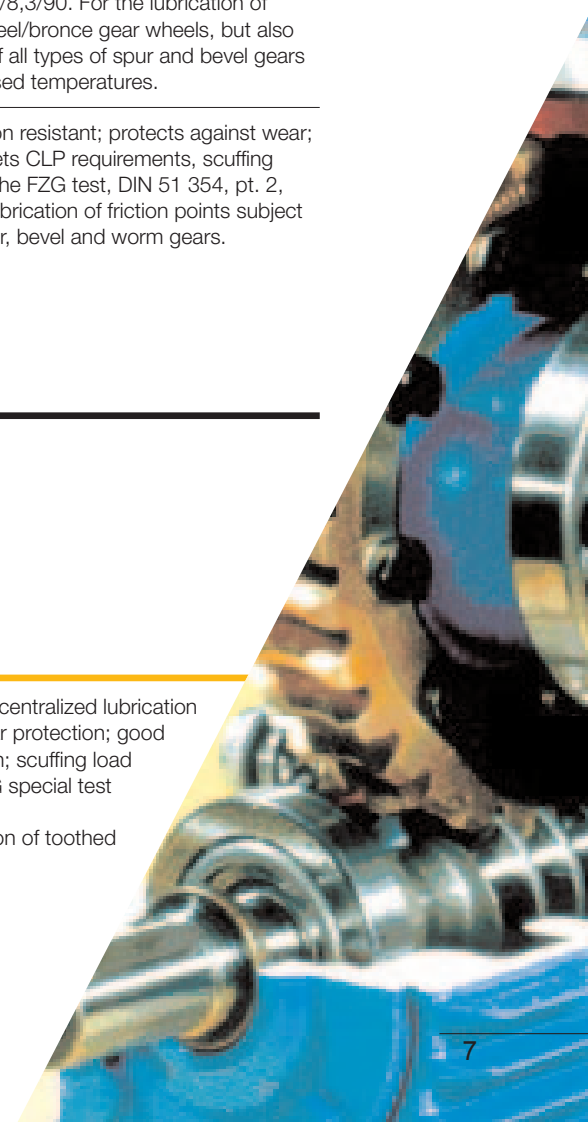
# Μειωτήρες

Κριτήρια Επιλογής	Όνομα Προϊόντος	Λάδι βάσης	Θερμοκρασία Λειτουργίας* (C°) ≈	ISO VG DIN 519 51	Ειδικό βάρος σους 20 °C (g/ml) DIN 51 757
Συνθετικά λάδια μειωτήρων για κανονική θερμοκρασία	Klüberoil 4 UH1-150 N	synth. hydro-,carbon oil ester oil	-30 μέχρι 120	150	0.85
	Klüberoil 4 UH1-220 N	synth. hydro-,carbon oil ester oil	-30 μέχρι 120	220	0.85
	Klüberoil 4 UH1-460 N	synth. hydro-carbon oil, ester oil	- 30 to 120	460	0.86
NSF H1 Χωρίς Ορυκτέλαιο	Klübersynth UH1 6-150	polyglycol oil	- 35 to 160	150	1.05
	Klübersynth UH1 6-220	polyglycol oil	- 30 to 160	220	1.05
	Klübersynth UH1 6-460	polyglycol oil	- 30 to 160	460	1.05
Synthetic long-term and high-temperature oils	Klüberoil GEM 1-150 N	Ορυκτέλαιο	-5 μέχρι 100	150	0.85
	Klüberoil GEM 1-220 N	Ορυκτέλαιο	- 5 to 100	220	0.85
	Klüberoil GEM 1-460 N	Ορυκτέλαιο	0 to 100	460	0.85
Multi-purpose gear oils	Klüberoil GEM 1-150 N	Ορυκτέλαιο	-5 μέχρι 100	150	0.85
	Klüberoil GEM 1-220 N	Ορυκτέλαιο	- 5 to 100	220	0.85
	Klüberoil GEM 1-460 N	Ορυκτέλαιο	0 to 100	460	0.85
NSF H2					

Κριτήρια Επιλογής	Προϊόν	Base oil thickener	Service temperature *range (C°) ≈	Density at 20 °C g/cm <sup>3</sup> ( ≈	Base oil viscosity DIN .pt 562 51 1 mm) <sup>2</sup> (s/ at ≈ C° 40 C° 100	Colour
Synthetic, fluid gear grease  Compliant with NSF H1 Mineral-oil free base oils	Klübersynth UH1 14-1600	synth. hydro-carbon oil/ Al complex soap	- 45 to 120	0.85	160 21	light yellow

Kinematic viscosity DIN 51 562 pt. 1 (mm <sup>2</sup> /s) at 40 °C ≈ 100 °C		Viscosity index DIN ISO 2909 (VI) ≈	Pour point DIN ISO 3016 (°C)	Notes
150	19	150	≤ - 30	Wide service temperature range, good ageing and oxidation stability, good wear protection and load-carrying capacity, good corrosion protection, neutral towards sealing materials and paints. Klüberoil 4 UH1-68 N ... 1500 N-oils comply with CLP requirements DIN 51 517 T3; scuffing load stage > 12 in the FZG test, DIN 51 354, pt. 2, A/8,3/90. For the lubrication of spur, bevel and worm gears.
220	26	150	≤ - 30	
460	47	150	≤ - 30	
150	28,5	> 210	< - 35	Good ageing and oxidation stability, good wear protection; reduces friction; complies with CLP requirements; not miscible with mineral and synthetic hydrocarbons; good corrosion protection; compatibility with sealing materials and paints has to be checked. Scuffing load step 12 in the FZG test, DIN 51 354, pt. 2 A/8,3/90. For the lubrication of worm gears with steel/bronze gear wheels, but also for the lubrication of all types of spur and bevel gears operating at increased temperatures.
220	41	> 220	< - 35	
460	73	> 240	< - 30	
150	15	90	< - 10	Ageing and oxidation resistant; protects against wear; free of silicone; meets CLP requirements, scuffing load stage > 12 in the FZG test, DIN 51 354, pt. 2, A/8,3/90. For the lubrication of friction points subject to high loads in spur, bevel and worm gears.
220	19	90	< - 10	
460	30	85	< - 10	

Drop point DIN ISO 2176 (°C)	Speed factor** (n · d <sub>m</sub> ) mm × min <sup>-1</sup> ≈	Worked penetration DIN ISO 2137 (0.1 mm)	Consistency NLGI grade DIN 51 818	Apparent dynamic viscosity KL viscosity grade	Notes
> 220	500,000	400 to 430	00	EL	Applicable through centralized lubrication systems; good wear protection; good corrosion protection; scuffing load stage 12 in the FZG special test A/2,76/50. For splash lubrication of toothed and worm gears.



# Ρουλμάν

Selection criteria	Product	Base oil/ thickener	Service temperature range* (°C) ≈	Density at 20 °C (g/cm <sup>3</sup> ) ≈	Base oil viscosity DIN 51 562 pt. 1 (mm <sup>2</sup> /s) at		Colour
					40 °C	100 °C	
Lubricating grease for a wide service temperature range  <b>Compliant with NSF H1</b> Mineral-oil free	Klübersynth UH1 64-62	synth. hydro-carbon oil, ester oil, silicate	- 40 to 150	0.92	65	10	beige
Smooth running grease with good low-temperature behaviour  <b>NSF H1</b> Synthetic	Klübersynth UH1 14-31	synth. hydro-carbon oil, ester oil/ Al complex soap	- 45 to 120	0.90	30	6	white
Adhesive lubricating grease  <b>Compliant with NSF H1</b> Mineral-oil free	Klübersynth UH1 64-1302	synth. hydro-carbon oil, silicate	- 10 to 150	0.99	1,300	100	beige
High-temperature, long-term grease  <b>NSF H1</b>	BARRIERTA L 55/2	PFPE / PTFE	- 40 to 260	1.96	420	40	white

Drop point DIN ISO 2176 (°C)	Speed factor** ( $n \cdot d_m$ ) $\text{mm} \times \text{min}^{-1}$ ≈	Worked penetration DIN ISO 2137 (0,1 mm)	Consistency NLGI grade DIN 51 818	Apparent dynamic viscosity KL viscosity grade	Notes
none	500,000	265 to 295	2	L	Good wear protection, good water resistance, high ageing and oxidation stability, good corrosion protection, good resistance to aggressive media. Also suitable for the lubrication of guide bars, lifting cylinders and joints.
> 220	800,000	310 to 340	1	L	Excellent low-temperature behaviour; good water resistance, good corrosion protection; high ageing and oxidation stability; Applicable through centralized lubrication systems. Suitable for use in freezing and deep-freezing tunnels.
none	50,000	265 to 295	2	S	For rolling bearings subject to high loads and low speeds, excellent wear protection; good water and hot steam resistance. Also suitable for the lubrication of tubular tracks, cam plates and stuffing boxes.
not measurable	300,000	265 to 295	2	S	Long-term lubricating grease for support rollers in automatic waffle baking ovens; resistant to most chemicals; neutral towards most elastomers and plastics.



# Plain bearings/joints

Selection criteria	Product	Base oil/ thickener	Service temperature range* (°C) ≈	Density at 20 °C (g/cm <sup>3</sup> ) ≈	Base oil viscosity DIN 51 562 pt. 1 (mm <sup>2</sup> /s) at		Colour
					40 °C	100 °C	
Universal lubricating grease  <b>NSF H1</b> Synthetic	<b>Klübersynth UH1 14-151</b>	synth. hydro-carbon oil/ Al complex soap	- 40 to 120	0.92	150	22	beige
White lubricating paste  <b>Compliant with NSF H1</b> Mineral-oil free, metal-free	<b>Klüberpaste UH1 84-201</b>	synth. hydro-carbon oil/ PTFE	- 45 to 120	1.13	200	75	white
Sugar-dissolving oil  <b>Compliant with NSF H1</b> Mineral-oil free	<b>Klüberfood NH1 6-10</b>	polyalkylene glycol oil	0 to 80	1.06	12	-	yellowish, slightly turbid
Adhesive lubricating grease  <b>NSF H2</b>	<b>POLYLUB GA 352 P</b>	mineral oil/ synth. hydro-carbon oil, Al complex soap	- 35 to 120	0.92	210	20	amber

# Corrosion protection

Selection criteria	Product	Service temperature range* (°C) ≈	Density at 20 °C (g/cm <sup>3</sup> ) ≈	Colour
Grease-like corrosion protection  <b>NSF H1</b>	<b>Klüberfood NH1 K 32 Spray</b>	-10 to 80	0.88	transparent

Drop point DIN ISO 2176 (°C)	Speed factor** ( $n \cdot d_m$ ) $\text{mm} \times \text{min}^{-1}$ $\approx$	Worked penetration DIN ISO 2137 (0.1 mm)	Consistency NLGI grade DIN 51 818	Apparent dynamic viscosity KL viscosity grade	Notes
> 250	300,000	310 to 340	1	L / M	Applicable through centralized lubrication systems; good water resistance; good wear protection; good corrosion protection: also suitable for the lubrication of gears, lifting cylinders, guide bars, cam plates.
> 240	–	310 to 340	1	S	Excellent low-temperature behaviour; good load-carrying capacity, good corrosion protection; neutral towards alloyed steels; universal assembly and screw paste. Assembly and screw paste for low-speed plain bearings, for guide rails, hinges, rollers etc.
none	–	–	–	–	Lubricating capacity; good wear and corrosion protection; particularly suitable for friction points subject to sugar, such as rocking levers, chain links, sensors, levers etc. For use on functional surfaces of tablet compressing, packaging, tin foiling and wrapping machines.
> 220	500,000	280 to 310	–	L / M	Water-resistant lubricating grease for plain bearings, racks, cylinder guides, pneumatic cylinders, support rollers, sliding rails.

**Salt spray test, DIN 50 021,  
5% NaCl solution at 35 °C,  
material steel 101-A  
Corrosion after 50 h  
[corrosion degree]**

≤ 1

# Taps, valves, fittings

Selection criteria	Product	Base oil/ thickener	Service temperature range* (°C) ≈	Density at 20 °C (g/cm <sup>3</sup> ) ≈	Colour	Drop point DIN ISO 2176 (°C)
Sealing grease for valves & fittings	PARALIQ GTE 703	silicone oil/ PTFE	- 50 to 150	1.31	white	> 250
<b>NSF H1</b> Mineral-oil free	Klübersynth UH1 64-2403	synth. hydro- carbon oil/ silicate	- 10 to 140	0.87	beige	none

# Hydraulic systems

Selection criteria	Product	Base oil	Service temperature range* (°C) ≈	ISO VG DIN 51 519	Density at 20 °C (g/ml) DIN 51 757 ≈
Hydraulic oil  <b>Compliant with NSF H1</b> Mineral-oil free	Klüberfood 4 NH1 68 Klüber-Summit HySyn FG 68	synth. hydro- carbon oil	- 40 to 135	68	0.83

# Pneumatic systems

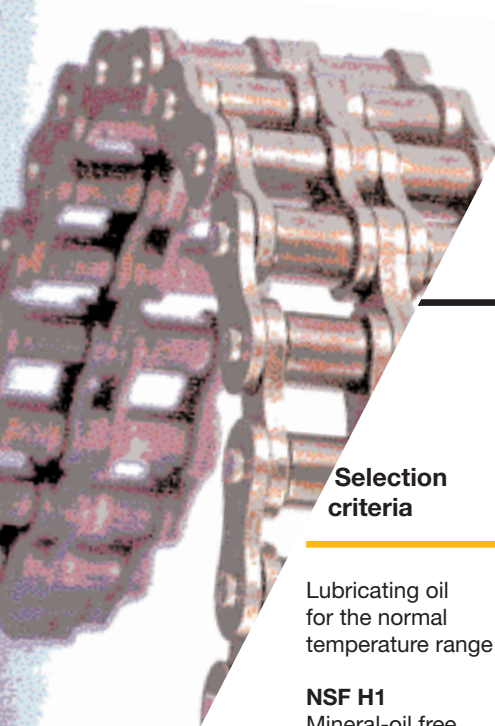
Selection criteria	Product	Base oil	Service temperature range* (°C) ≈	ISO VG DIN 51 519	Density at 20 °C (g/ml) DIN 51 757 ≈
Pneumatic oil for pressurized air maintenance units  <b>NSF H1</b> Mineral-oil free	Klüber-Summit HySyn FG 32	synth. hydro- carbon oil	- 45 to 135	32	0.83

Worked penetration DIN ISO 2137 (0.1 mm)	Consistency NLGI Klasse DIN 51 818	Apparent dynamic viscosity, KL viscosity grade	Compatible with elastomers*	Notes
220 to 250	3	S	EPDM, FPM, NBR	PARALIQ GTE 703 has also been certified as <b>NSF 51</b> and <b>NSF 61</b> . Resistant to disinfectants and cleaning agents; does not affect beer froth formation, resistant to hot and cold water; neutral in smell or taste. For use in bottling machines.
220 to 250	3	S	NBR	

\* The data in this product survey is based on our current knowledge and does not imply any claim to completeness. As mixtures within the elastomer groups mentioned are manifold, we recommend having the compatibility of the selected product tested by the elastomer manufacturer.

Kinematic viscosity DIN 51 562 pt. 1 (mm <sup>2</sup> /s) at 40 °C   100 °C		Pour point DIN ISO 3016 (°C)	Notes
66	9.9	≤ - 45	Good oxidation stability, wide service temperature range, complies with VDL- (DIN 51 506) and HLP- (DIN 51 524 pt. 2) requirements.

Kinematic viscosity DIN 51 562 pt. 1 (mm <sup>2</sup> /s) at 40 °C   100 °C		Viscosity index DIN ISO 2909 (VI)	Pour point DIN ISO 3016 (°C)	Notes
32	5.9	130	≤ - 50	Air compressor oil with good oxidation stability



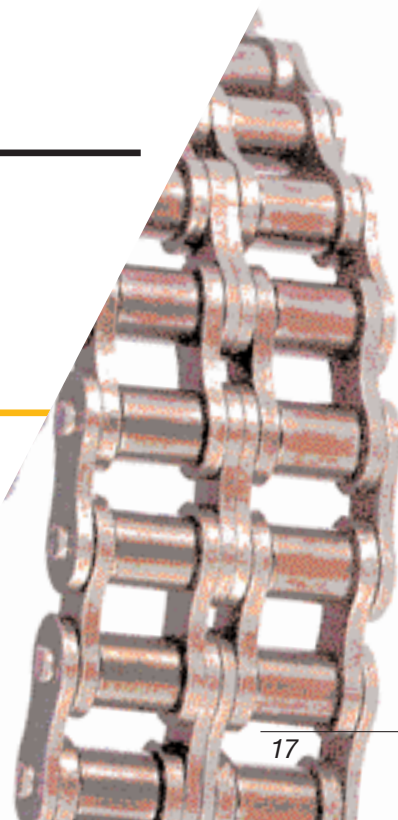
# Chains

Selection criteria	Product	Base oil	Service temperature range* (°C) ≈	ISO VG DIN 51 519	Density at 20 °C (g/ml) DIN 51 757 ≈
Lubricating oil for the normal temperature range <b>NSF H1</b> Mineral-oil free	Klüberoil 4 UH1-460 N	synth. hydrocarbon oil, ester oil	- 30 to 120	460	0.86
Low-temperature oil <b>NSF H1</b> Mineral-oil free	Klüberoil 4 UH1-68 N	synth. hydrocarbon oil, ester oil	- 35 to 120	68	0.84
High-viscous lubricating oil <b>NSF H1</b> Mineral-oil free	Klüberoil 4 UH1-1500 N Spray <i>data of the solvent-free active agent</i>	synth. hydrocarbon oil, ester oil	- 20 to 120	1,500	0.89
High-temperature chain oil <b>NSF H2</b>	Klüberoil YF 100	polyalkylene glycol oil solid lubricant	- 30 to 500	-	1.04
Intrinsically viscous long-term lubricant <b>NSF H2</b>	STRUCTOVIS EHD	synth. hydrocarbon oil, mineral oil	- 5 to 120	460	0.89

Selection criteria	Product	Base oil/ thickener	Service temperature range* (°C) ≈	Density at 20 °C (g/cm <sup>3</sup> ) ≈	Base oil viscosity DIN 51 562 (mm <sup>2</sup> /s) at ≈		Colour
					40 °C	100 °C	
Lubricating grease for chains with high wear protection <b>NSF H1</b> Mineral-oil free	Klüber HTS Grease	synth. hydrocarbon oil, silicate	- 15 to 140	0.98	1,300	105	beige

Kinematic viscosity DIN 51 562 pt. 1 (mm <sup>2</sup> /s) at 40 °C ≈ 100 °C		Viscosity index DIN ISO 2909 (VI) ≈	Pour point DIN ISO 3016 (°C)	Notes
460	47	150	< - 30	Good wear protection, load-carrying capacity and corrosion protection. For the lubrication of lifting, drive and transport chains, spindles and joints.
68	11	140	< - 35	Good wear protection, high load-carrying capacity. Suitable for the lubrication of lifting, drive and transport chains.
1,500	125	180	< - 25	Good wear and corrosion protection and EP properties, high ageing and oxidation stability, load-carrying capacity. Suitable for the lubrication of lifting, drive and transport chains.
120	20	-	-	Solid-matter containing high-temperature chain oil for the lubrication of transport chains in prebaking ovens equipped with plates; good wetting properties, excellent penetrating properties; above 200 °C gradual transition to dry lubrication.
460	36	> 100	- 10	Good adhesion, good wear and corrosion protection, provides Hydrokapilla effect (penetrates beneath moisture / water); suitable for transport chains in the wet zone.

Drop point DIN ISO 2176 (°C)	Speed factor** (n · d <sub>m</sub> ) mm × min <sup>-1</sup> ≈	Worked penetration DIN ISO 2137 (0.1 mm)	Consistency NLGI grade DIN 51 818	Apparent dynamic viscosity, KL viscosity grade	Notes
without	-	280 to 310	-	S	Good water and hot steam stability, high adhesion. Suitable for the lubrication of roller chains subject to high loads, joints, racks, tubular tracks, cam plates, stuffing boxes, etc.



# Compressors

Selection criteria	Product	Base oil	Service temperature range* (°C) ≈	ISO VG DIN 51 519	Density at 20 °C (g/ml) DIN 51 757 ≈
Compressor oil <b>NSF H1</b> Mineral-oil free	Klüber-Summit HySyn FG 46	synth. hydrocarbon oil	- 40 to 135	46	0.83

# Screws & bolts

Selection criteria	Product	Base oil/ thickener	Service temperature range* (°C) ≈	Density at 20 °C (g/cm³) ≈
Lubricating and assembly paste for the normal and high-temperature range  <b>Compliant with NSF H1</b> Mineral-oil free	Klüberpaste UH1 84-201	synth. hydrocarbon oil/ PTFE	- 45 to 120	1.13
High-temperature lubricating and assembly paste  <b>NSF H1</b> Mineral-oil free	Klüberpaste UH1 96-402	polyalkylene glycol oil/ silicate	- 30 to 1,200	1.58

Klüber viscosity class	Apparent viscosity (mPa s)	
EL	≤ 2,000	extremely light
L	2,000 ... 4,000	light
M	4,000 ... 8,000	medium
S	8,000 ... 20,000	heavy
ES	≥ 20,000	extremely heavy

Kinematic viscosity DIN 51 562 pt. 1 (mm <sup>2</sup> /s) at 40 °C ≈ 100 °C		Viscosity index DIN ISO 2909 (VI) ≈	Pour point DIN ISO 3016 (°C)	Notes
46	7.9	130	≤ - 45	Good oxidation stability. The viscosity grades ISO VG 32, 46 and 86 are suitable for screw-type and sliding vane compressors Klüber-Summit HySyn FG 100 for the lubrication of reciprocating compressors and sliding vane compressors.

Base oil viscosity DIN 51 562 pt. 1 (mm <sup>2</sup> /s) 40 °C ≈	Colour	Worked penetration DIN ISO 2137 (0.1mm) ≈	Four-ball tester welding load DIN 51 350 (N)	Notes
200	white	310 to 340	> 3,000	Good water resistance and anticorrosion properties; free from metals; neutral towards alloyed steels. For use as lubricating and assembly paste for guide rails, hinges, rollers etc. Suitable as screw paste for high-alloy steels to improve the tightening torque and ease disassembly after a long period of use.
360	light grey	265 to 295	> 2,500	Good high-temperature properties; good corrosion protection; free of metals; neutral towards alloyed steels. For use as assembly paste for bolts, pins, bushings etc. Lubricating paste for guide rails, hinges etc.

\* Service temperatures are guide values which depend on the lubricant's composition, the intended use and the application method. Depending on the mechano-dynamical loads, the time, the pressure and the temperature, lubricants change their consistency, apparent dynamic viscosity or viscosity resp. These changes in product characteristics may affect the function of a component.

\*\* Speed factors are a function of the rolling bearing type, the bearing size as well as the operating conditions to which the application point is exposed and therefore have to be confirmed by tests in each individual case.

## **We are where you are.**

Klüber Lubrication – the world market leader in speciality lubricants

- subsidiaries in over 30 countries
- more than 1,700 staff
- products available worldwide

Klüber Lubrication offers expert tribological solutions.

Through our worldwide presence, we meet customers' needs reliably and on time.

We supply tailor-made speciality lubricants to customers from nearly all branches of industry and around the world – oils, greases, bonded coatings, pastes and many more. Over 75 years of experience, industry-specific know-how, and exceptional test facilities all help to optimise our solutions.



Klüber Lubrication München KG  
A company of the Freudenberg Group

[www.klueber.com](http://www.klueber.com)