

Description:

Klübersynth UH1 6 oils are gear and high-temperature oils on a polyglycol basis.

They comply with the German law governing foodstuffs and associated ancillaries (LMBG, §5/1) and meet the requirements set forth in the Guidelines of Sec. 21 CFR 178.3570 of FDA regulations. These oils comply with the USDA H1 requirements

Klübersynth UH1 6 oils meet the CLP requirements; in the FZG Four Square Gear Oil Tester acc. to DIN 51 354, pt. 2, A/8.3/90, these oils achieve a scuffing load stage of > 12 and a specific change in weight < 0.2 mg/kWh. In the enhanced FZG test A/16.6/90 the Klübersynth UH1 6 oils with a viscosity ISO VG 220 or higher had a scuffing load stage of > 12. Klübersynth UH1 6 oils offer corrosion protection, ageing and oxidation resistance, shear stability as well as high-temperature stability.

Application:

Klübersynth UH1 6 oils were especially developed for the lubrication of worm gears with steel/bronze pairings. Due to the special polyglycol base oils and additives, these oils reduce friction and wear considerably.

Klübersynth UH1 6 oils are also suitable for the lubrication of bevel and spur gears including machine elements such as plain and rolling bearings, especially when exposed to high temperatures.

Furthermore, they can be used to lubricate lifting, drive and transport chains.

Application notes:

Klübersynth UH1 6 oils can be applied by immersion, immersion circulation and injection.

Klübersynth UH1 6 oils are **not** miscible with mineral oils and synthetic hydrocarbons. We recommend cleaning the lubrication points or rinsing gears or closed systems with the Klübersynth UH1 6 oil which will be used after conversion.

Especially with a view to the H1 requirements in the food-processing industry, any mixing of Klübersynth UH1 6 oil with non-food-grade lubricants should be avoided.

Klübersynth UH1 6 oils are neutral towards ferrous metals and almost all nonferrous metals. There may be increased wear when the contact surfaces of design elements made of aluminium or aluminium alloys are exposed to dynamic loads (sliding speed and high loads). If necessary, preliminary tests should be carried out.

For permanent temperatures at the seal edge up to 100 °C, NBR seals (acrylonitrile-butadiene rubber) may be used. For higher temperatures, it is safer to use FKM seals (fluorinated rubber) instead.

It should be noted that elastomers from the one or several manufacturers can behave differently.

Klübersynth UH1 6 oils

- Synthetic high-temperature and gear oils
- Comply with USDA H1
- Wide operating temperature range
- Reduce friction
- Good wear protection
- Excellent ageing and oxidation stability
- Fulfill or exceed CLP requirements

Therefore, the data given in the “compatibility with elastomers” table should be used for reference purposes only. A compatibility test should always be carried out with the elastomers which are actually used.

We recommend using two-component paints (reaction paints). Oil gauge glasses should preferably be made of natural glass or polyamide materials.

The suitability of design materials and paints in contact with Klübersynth UH1 6 oils should be tested, especially prior to series application.

Viscosity selection for rolling bearings:

To select the correct oil viscosity observe the bearing manufacturer's instructions or refer to worksheet 3 from the Society of Tribology (GfT).

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When determining the correct viscosity for gears, the manufacturer's instructions take priority. Only in cases where there are no gear manufacturer's instructions, the viscosity can be selected in accordance with the enclosed worksheet "Klübersynth UH1 6 oils – selection of oil viscosity for gears".

Service temperature range*:

For immersion lubrication of gears and chains

Klübersynth UH1 6-150
approx. – 35 °C to approx. 160 °C
Klübersynth UH1 6-220
approx. – 30 °C to approx. 160 °C
Klübersynth UH1 6-320/460
approx. – 25 °C to approx. 160 °C
Klübersynth UH1 6-680
approx. – 20 °C to approx. 160 °C

When applied via automatic systems, the manufacturer's instructions on the max. viscosity have to be observed.

Minimum shelf life:

The minimum shelf life is approx. 36 months if the product is stored in the original closed container in a dry place.

Pack sizes:

20 l canister
200 l drum

Product data:

	Klübersynth UH1 6-150	Klübersynth UH1 6-220	Klübersynth UH1 6-320	Klübersynth UH1 6-460	Klübersynth UH1 6-680
ISO VG DIN 51 519	150	220	320	460	680
Density, DIN 51 757, at 20 °C, g/ml, approx.	1.05	1.05	1.05	1.05	1.05
Kinematic viscosity, DIN 51 562, pt. 1 at 20 °C, mm ² /s, approx. at 40 °C, mm ² /s, approx. at 100 °C, mm ² /s, approx.	420 150 30	600 220 40	900 320 55	1300 460 80	1900 680 110
Viscosity index, DIN ISO 2909	≥ 210	≥ 220	≥ 220	≥ 240	≥ 250
Flash point, DIN ISO 2592, °C	> 280	> 280	> 280	> 280	> 270
Pour point, DIN ISO 3016, °C	≤ – 35	≤ – 35	≤ – 30	≤ – 30	≤ – 25

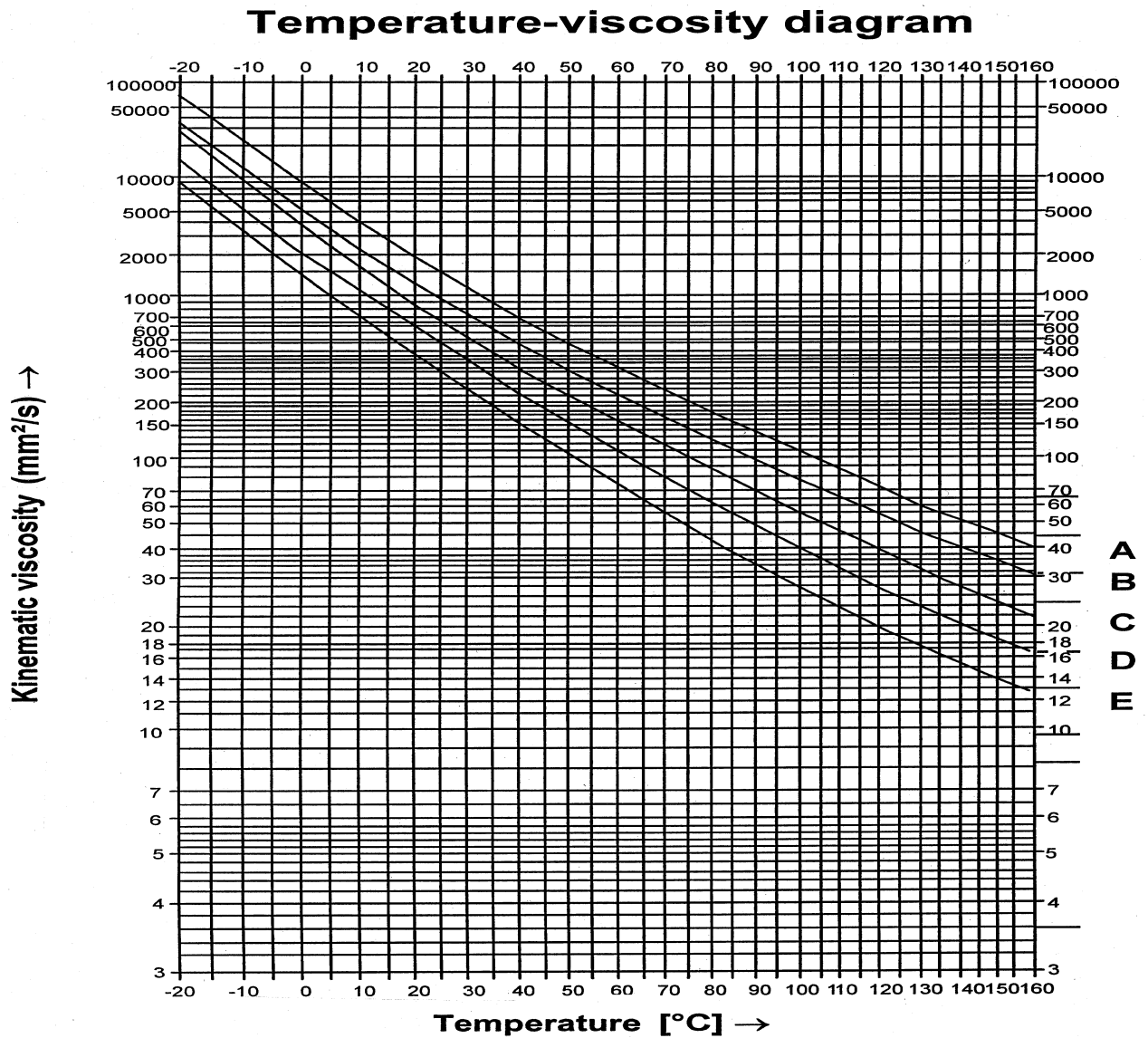
Compatibility with elastomers:

	Klübersynth UH1 6-150	Klübersynth UH1 6-220	Klübersynth UH1 6-320	Klübersynth UH1 6-460	Klübersynth UH1 6-680
towards 72 NBR 902, at 100 °C / 168 h change in volume % approx. change in hardness (Shore A) approx.	3 – 2	– 2 1	– 3 3	– 3 3	– 3 3
towards 75 FKM 585, at 150 °C / 168 h change in volume % approx. change in hardness (Shore A) approx.	1 1	1 1	1 1	1 1	1 1

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

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A = Klübersynth UH1 6-680
B = Klübersynth UH1 6-460
C = Klübersynth UH1 6-320

D = Klübersynth UH1 6-220
E = Klübersynth UH1 6-150

Klübersynth UH1 6 oils

Safety Data Sheet

1.1 Product name: Klübersynth UH 1 6 oils Code-No.: a) -150; b) -220; c) -460; d) -320; e) -680 a) 096 058; b) 096 059; c) 096 060; d) 096 063; e) 096 064; 06.02.2001
1.2 Klüber Lubrication München KG Emergency telephone no.: Geisenhausenerstraße 7 ++49 - 89 7876 - 0 D-81379 München Tel. ++49 - 89 78 76 - 0 telephone exchange Fax: ++49 - 89 78 76 - 333
2. Composition / information on ingredients Chemical characterization (preparation): Polyalkylene glycol oil
3. Hazards identification No particular hazards known
4. First aid measures After inhalation: Not applicable After contact with skin: Wash off with soap and plenty of water After contact with eyes: Rinse with plenty of water After ingestion: Do not induce vomiting. Obtain medical attention Advice to doctor: Treat symptomatically. If swallowed or in the event of vomiting, risk of product entering the lungs
5. Fire-fighting measures Suitable extinguishing media: Water spray, foam, dry powder, carbon dioxide (CO ₂) Unsuitable extinguishing media: High volume water jet Special Hazards: In case of fire the following can be released: Carbon monoxide, hydrocarbons Special protective equipment for firefighters: Standard procedure for chemical fires Additional information: Water mist may be used to cool closed containers. In the event of fire and/or explosion do not breathe fumes
6. Accidental release measures Personal precautions: Risk of slipping due to leakage/spillage of product Environmental precautions: Do not flush into surface water or sanitary sewer system Methods for cleaning up / taking up: Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust). Dispose of absorbed material in accordance with the regulations Additional information: None
7. Handling and storage Advice on safe handling: Avoid formation of aerosol Advice on protection against fire and explosion: No special precautions required Requirements on storage rooms and vessels: Store at room temperature in the original container Incompatible materials: Incompatible with oxidizing agents Further information on storage conditions: None
8. Exposure controls / personal protection Additional advice on system design: Not applicable Ingredients and specific control parameters: None Respiratory protection: No special protective equipment required Hand protection: No special protective equipment required Eye protection: No special protective equipment required Body protection: No special protective equipment required Other protection measures: No special protective equipment required General protection and hygiene measures: Clean skin thoroughly after work; apply skin cream. Do not inhale aerosol

9. Physical and chemical properties Form liquid Colour yellow Odour characteristic Pourpoint a), b) < - 35; c), d) < - 30; e) < - 25 °C, DIN ISO 3016 Flash point a), c) > 280; b), d) ~ 250; e) > 270 °C, DIN ISO 2592 Ignition temperature not applicable Lower explosion limit not applicable Upper explosion limit not applicable Vapour pressure-first not applicable Density approx. 1,05 g/cm ³ , 20 °C, DIN 51 757 Water solubility partly soluble pH value no data available Kinematic viscosity, approx. a) 150; b) 220; c) 460; d) 320; e) 680 mm ² /s, 40 °C, DIN 51 562 Further information none
10. Stability and reactivity Conditions to avoid: Do not heat above flash point Materials to avoid: Strong oxidizing agents Hazardous decomposition products: None under normal use Additional information: None
11. Toxicological information The toxicological data has been taken from products of similar composition Acute toxicity: LD ₅₀ /oral/rat = > 2 g/kg (literature data) Chronic toxicity: None Human experience: Health injuries are not known or expected under normal use
12. Ecological information Information on elimination (persistence and degradability): The product has not been tested Behaviour in environmental compartments: Ecological injuries are not known or expected under normal use Ecotoxic effects: The product has not been tested Additional information: Should not be released into the environment
13. Advice on Disposal Disposal: Dispose of in accordance with your local, state and federal regulations as used oil for incineration Dispose of contaminated packaging and recommended cleaning: Offer rinsed packaging material to local recycling facilities
14. Transport information GGVS / GGVE: not applicable ADN / ADN: not applicable IMDG-Code: not applicable ICAO / IATA-DGR: not applicable Further information: Not classified as dangerous in the meaning of transport regulations
15. Regulatory information Labelling according to EU-guidelines: The product does not require a hazard warning label in accordance with EC-directives/German regulations on dangerous substances National regulations
16. Other information Classification as USDA H1 Issue-department of Safety Data Sheet: Chemical Documentation, Tel.: ++49 - 89 7876 - 564

The data in this product information is based on our general experience and knowledge at the time of printing and is intended to give information of possible applications to a reader with technical experience. It constitutes neither an assurance of product properties nor does it release the user from the obligation of performing preliminary tests with the selected product. We recommend contacting our Technical Consulting Staff to discuss your specific application. If required and possible we will be pleased to provide a sample for testing. Klüber products are continually improved. Therefore, Klüber Lubrication reserves the right to change all the technical data in this product information at any time without notice.



Klüber Lubrication München KG, a member of the Freudenberg group

Klübersynth UH1 6 oils

Synthetic gear and high-temperature oils for the food-processing and pharmaceutical industries

Worksheet “Selection of oil viscosity for gears”

The manufacturer’s instructions on oil viscosity take priority in any case. If the viscosity is not calculated e.g. on the basis of the EHD theory, it can be selected in accordance with this worksheet. Selection is based on DIN 51 509 Pt 1, “Selection of lubricants for toothed gears”. All information in this worksheet applies only to Klübersynth UH1 6 oils. The differing viscosity-temperature and viscosity-pressure behaviour of these synthetic oils as compared to mineral oils has been taken into account.

The correct viscosity must be selected independently for every gear stage, and a compromise is required for multistage gears. The selection of the correct viscosity in accordance with this worksheet is based on the oil’s expected operation temperature, i.e. the oil sump temperature or the temperature of the injected oil. This temperature is calculated by determining the gear’s thermal economy, taking into account the produced losses, or, in the case of gears already installed, by measuring the temperature. It might be required to select a lower viscosity to ensure lubricant supply during a cold start and at low ambient temperatures. In the individual case it is necessary to check the viscosity at the existing starting temperature (especially in the case of oil circulation lubrication), or to test the components at the expected starting temperature (especially in the case of immersion lubrication).

The required viscosity grade to the Klübersynth UH 1 6 oils for a gear stage is determined by means of the Klüber viscosity index and the expected oil operating temperature using the diagram of the last page.

Determination of the Klüber viscosity index for a spur gear stage:

The required Klüber viscosity index for a spur gear stage is calculated in accordance with table 1.

Table 1:

Force-speed factor $K_S/v \left[\frac{\text{MPa} \cdot \text{s}}{\text{m}} \right]$	Klüber viscosity index KVZ
≤ 0.02	1
> 0.02 to 0.08	2
> 0.08 to 0.3	3
> 0.3 to 0.8	4
> 0.8 to 1.8	5
> 1.8 to 3.5	6
> 3.5 to 7.0	7
> 7.0	8

v = Peripheral speed at the reference circle [m/s]

K_S = Rolling pressure acc. to Stribeck [N/mm²]

$$K_S = \frac{F_t}{b \cdot d_1} \cdot \frac{U + 1}{U} \cdot Z_H^2 \cdot Z_e^2 \cdot K_A \text{ [N/mm}^2, \text{ MPa]}$$

F_t = Nominal peripheral force [N]

b = Tooth width [mm]

d_1 = Diameter of reference circle [mm]

U = Gear ratio = Z_2/Z_1 ; $Z_2 > Z_1$

Z_H = Distribution factor^{*1}

Z_e = Contact ratio^{*1}

K_A = Application factor^{*2}

^{*1} Note: Determination of Z_H and Z_e according to DIN 3990, Pt. 2.
For a rough calculation: $Z_H^2 \cdot Z_e^2 \approx 3$

^{*2} Note: Guide values for K_A are listed in DIN 3990, Pt. 6.

Example 1:

Single-stage spur gear driving a fan

Drive:	Electric motor
Nominal peripheral force:	$F_t = 3000 \text{ N}$
Tooth width:	$b = 25 \text{ mm}$
Diameter of reference circle:	$d_1 = 230 \text{ mm}$
Gear ratio:	$U = 2.5$
$Z_H^2 \cdot Z_e^2$:	≈ 3
K_A :	1
Peripheral speed:	4 m/s
Expected oil sump temperature:	$\approx 90 \text{ }^\circ\text{C}$
Rolling pressure acc. to Stribeck:	$K_S = 2.2 \text{ MPa}$
Force-speed factor:	$K_S/v = 0.55 \frac{\text{Mpa} \cdot \text{s}}{\text{m}}$
Acc. to table 1, Klüber viscosity index:	KVZ = 4

For this application we selected Klübersynth UH1 6-150 in accordance with the diagram on page 4.

Determination of the Klüber viscosity index for a worm gear stage:

The required Klüber viscosity index for a worm gear stage is calculated in accordance with table 2.

Table 2:

Force-speed factor $K_{S/v} \left[\frac{\text{N} \cdot \text{min}}{\text{m}^2} \right]$	Klüber viscosity index KVZ
≤ 60	5
> 60 to 400	6
> 400 to 1800	7
> 1800 to 6000	8
> 6000	9

$$\text{Force-speed factor } K_{S/v} = \frac{T_2}{n_1 \cdot a^3} \cdot K_A \left[\frac{\text{N} \cdot \text{min}}{\text{m}^2} \right]$$

- T_2 = Output moment [Nm]
- n_1 = Worm speed [min^{-1}]
- a = Center distance [m]
- K_A = Application factor

Note: Guide values for K_A are listed in DIN 3990 Pt. 6.

Example 2:

Worm gear stage of a gear motor driving a circular conveyor

- Drive: Electric motor
- Output moment: $T_2 = 300 \text{ Nm}$
- Worm speed: $n_1 = 350 \text{ min}^{-1}$
- Center distance: $a = 0.063 \text{ m}$
- Application factor: $K_A = 1$
- Force-speed factor: $K_{S/v} = 3427.9 \frac{\text{N} \cdot \text{min}}{\text{m}^2}$
- Klüber viscosity index acc. to table 2: KVZ = 8
- Expected oil sump temperature: $\approx 85 \text{ }^\circ\text{C}$

For this application Klübersynth UH1 6-460 was selected in accordance with the diagram on page 4.

