Klübersynth GEM 4 N

Synthetic high-performance gear and multipurpose oil with KlüberComp Lube Technology

Your benefits at a glance

- High scuffing protection
- Excellent wear protection for gears and rolling bearings
- Good shear stability for reliable lubricant film formation
- High micropitting resistance
- Excellent ageing and oxidation resistance
- Wide service temperature range due to good viscosity-temperature behaviour
- Low foaming tendency
- Energy savings due to optimised friction behaviour
- Good elastomer compatibility
- Approvals by numerous gear OEMs

Your requirements - our solution

Klübersynth GEM 4 N is a synthetic high-performance gear and multipurpose oil based on polyalphaolefin satisfying the growing requirements and increasing power density of modern gears. Klübersynth GEM 4 N includes KlüberComp Lube Technology*, i.e. it is based on especially high-grade raw materials and advanced additives, enabling maximum performance in the lubrication of all gear components.

Klübersynth GEM 4 N clearly exceeds CLP requirements according to DIN 51517-3. Corresponding gears can be switched to Klübersynth GEM 4 N without prior consultation with the gear manufacturer provided the general application notes are observed.

Klübersynth GEM 4 N offers high scuffing load capacity. Gears are sufficiently protected against scuffing even at extremely high peak loads, vibrations or oscillations. The excellent wear protection of both gears and rolling bearings ensures that the service life calculated for the lubricated components is achieved, leading to lower maintenance and repair costs. The oil's high micropitting resistance of GFT ≥ 10 according to FVA 54/7 (tested at 90, 60 and 40 °C) offers sufficient protection to gears that are subject to high loads and would normally be susceptible to this type of damage.

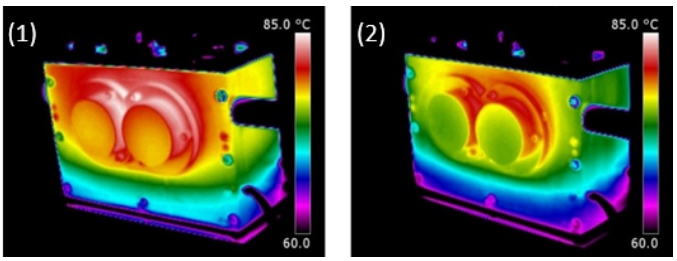
Klübersynth GEM 4 N offers a much longer service life than mineral oils due to the excellent ageing and oxidation resistance of the selected raw materials; thus service intervals can be extended and maintenance costs reduced. The product's low foaming tendency and anti-corrosive properties enable problem-free gear operation. Freudenberg seals made of 72 NBR 902, 75 FKM 585, 75 FKM 260466 and 75 FKM 170055 are statically and dynamically resistant to Klübersynth GEM 4 N. Leakage and oil contamination are prevented.

The excellent viscosity-temperature behaviour supports the formation of a sufficient lubricant film across a wide service temperature range, even at elevated and high temperatures. Therefore, a single viscosity grade can cover both low and high temperatures in many applications.

The optimised friction behaviour enabled by the carefully selected base oils and additives reduces power losses and improves application efficiency. This leads to lower oil temperatures and reduced energy consumption.

Examination on a test rig showed that for spur gears a reduction of the oil temperature from 85 °C with conventional oil (mineral oil) to 80 °C with Klübersynth GEM 4 N is possible.

Conventional gear oil (1) vs. Klübersynth GEM 4 N (2)



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Numerous field tests carried out in various facilities using gearboxes proved that specific energy savings in the area of 1 % - 6 % can be attained and operating costs reduced accordingly.

WECs have been known as a life-reducing failure mode among wind turbine operators, bearing manufacturers and lubricant formulators. Our intensive research and testing activities reveal the excellent protection against WEC provided by the additives contained in Klübersynth GEM 4 N.

Klübersynth GEM 4 N is approved by Siemens-Flender, SEW Eurodrive, Getriebebau Nord, Lenze, Moventas, Rexnord, Hansen, Brevini, Stöber Antriebstechnik, ZAE Antriebssysteme, David Brown, FLSmidth MAAG Gears, etc. Klübersynth GEM 4-320 N is approved for use in wind power plants by Winergy, Moventas, ZF WP, Bosch Rexroth, Bonfiglioli, ACCIONA ENERGY, and many more.

By using Klübersynth GEM 4 N you can benefit from a number of advantages that will help you save costs easily and efficiently. We look forward to hearing from you.

* For further information, please see our flyer: KlüberComp Lube Technology – Gear oils meeting the highest requirements

Application

Klübersynth GEM 4 N was specially developed for the lubrication of spur, bevel, hypoid and planetary gears that are subject to high loads. Such gears are frequently used in the wind, steel, mining and sugar industries. It is also used for the lubrication of standard worm gears as defined in DIN 3996.

Klübersynth GEM 4 N can also be used for the lubrication of plain and rolling bearings, all kinds of toothed couplings, chains, guideways, joints, spindles and pumps, especially in applications where the equipment is exposed to elevated temperatures or pronounced temperature fluctuations.

Application notes

Klübersynth GEM 4 N can be applied by means of immersion, immersion circulation or injection.

The use of drip-feed oilers, brushes, oil cans or suitable automatic lubricating systems is also possible. When using automatic lubricating systems, please note the manufacturer's instructions regarding the maximum permissible viscosity. The low-viscosity varieties are also used for oil mist lubrication.

Klübersynth GEM 4 N is miscible with mineral oils. However, for the Klübersynth GEM 4 N oil to deliver its full performance, any residues of a previously used mineral oil should not exceed 5 % in quantity.

For use at permanent temperatures of 80 °C max., seals made of NBR may be used. For higher temperatures, seals made of FKM should be chosen. It should be noted that elastomers from one or several manufacturers can behave differently; therefore tests should be performed.

For checking the contact pattern during running-in, the inspection paint Klübertop P 39-462 Spray (Art. No. 081295) can be used.

When changing over to Klübersynth GEM 4 N, residues of a previously used gear oil can be more easily removed if Klüber Summit Varnasolv HV (Article No. 050135) is added.

Viscosity selection

When determining the oil viscosity for gear lubrication, the gear manufacturer's instructions take priority. Only for applications where manufacturer's instructions are not available, the suitable viscosity can be determined as laid down in the worksheet "Hints for Practice - selection of oil viscosity for gears". To determine the correct oil viscosity for bearings, please observe the bearing manufacturer's instructions.

Due to the better viscosity-temperature behaviour of Klübersynth GEM 4 compared to mineral oils, the actual viscosity of Klübersynth GEM 4 N during operation differs and can be determined by means of the enclosed diagram.

Material safety data sheets

Material safety data sheets can be requested via our website www.klueber.com. You may also obtain them through your contact person at Klüber Lubrication.

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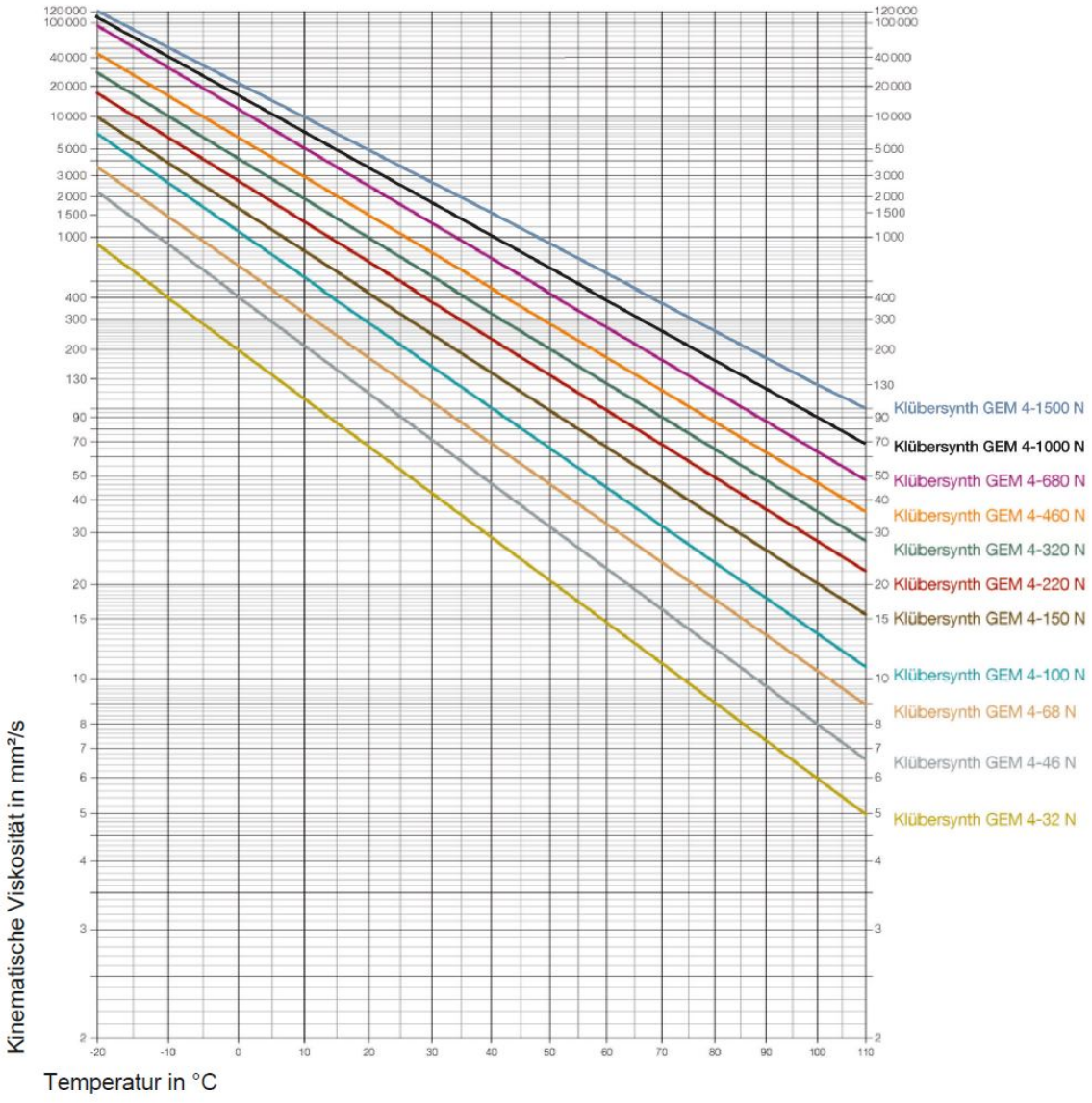
Viskositäts-Temperatur-Diagramm



Pack sizes	Klübersynth GEM 4-32 N	Klübersynth GEM 4-46 N	Klübersynth GEM 4-68 N	Klübersynth GEM 4-100 N
Canister 20 l	+	+	+	+
Drum 200 l	+	+	+	+

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Pack sizes	Klübersynth GEM 4-150 N	Klübersynth GEM 4-220 N	Klübersynth GEM 4-320 N	Klübersynth GEM 4-460 N
Canister 20 l	+	+	+	+
Drum 200 l	+	+	+	+

Pack sizes	Klübersynth GEM 4-680 N	Klübersynth GEM 4-1000 N	Klübersynth GEM 4-1500 N
Canister 20 l	+	+	+
Drum 200 l	+	+	+

Characteristics	Klübersynth GEM 4-32 N	Klübersynth GEM 4-46 N	Klübersynth GEM 4-68 N	Klübersynth GEM 4-100 N
Article number	012229	012230	012231	012232
Service temperature, lower limit	-50 °C	-40 °C	-40 °C	-40 °C
Service temperature, upper limit	140 °C	140 °C	140 °C	140 °C
Designation, DIN 51502	CLP HC 32	CLP HC 46	CLP HC 68	CLP HC 100
Designation, ISO 12925-1	CKC 32	CKC 46	CKC 68	CKC 100
Density, DIN 51757, 15°C	840 kg/m³	approx. 840 kg/m³	850 kg/m³	approx. 850 kg/m³
Flash point, DIN EN ISO 2592, Cleveland open cup	≥ 200 °C	≥ 200 °C	≥ 200 °C	≥ 200 °C
Flender foam test, ISO 12152, 25°C, oil-air dispersion, increase after 5 min	-	-	-	≤ 10 %
Flender foam test, ISO 12152, 25°C, total volume, increase after 1 min	-	-	-	≤ 15 %
Foam test, ISO 6247 / ASTM D892, 24°C, sequence I	≤ 100/10 ml	≤ 100/10 ml	≤ 100/10 ml	-
Foam test, ISO 6247 / ASTM D892, 24°C, sequence III	≤ 100/10 ml	≤ 100/10 ml	≤ 100/10 ml	-
Foam test, ISO 6247 / ASTM D892, 93.5°C, sequence II	≤ 100/10 ml	≤ 100/10 ml	≤ 100/10 ml	-
ISO viscosity grade, DIN ISO 3448, ISO VG	32	46	68	100
Kinematic viscosity, DIN EN ISO 3104 / DIN 53000-1, based on standard / ASTM D445 / ASTM D7042, 100°C	approx. 6 mm²/s	approx. 8 mm²/s	approx. 11 mm²/s	approx. 14 mm²/s
Kinematic viscosity, DIN EN ISO 3104 / DIN 53000-1, based on standard / ASTM D445 / ASTM D7042, 40°C	approx. 32 mm²/s	approx. 46 mm²/s	approx. 68 mm²/s	approx. 100 mm²/s
Viscosity index, DIN ISO 2909	≥ 135	≥ 140	≥ 140	≥ 150
Copper corrosion, DIN EN ISO 2160, 3 h, 100°C	1 - 100 - 3 corrosion degree	1 - 100 - 3 corrosion degree	1 - 100 - 3 corrosion degree	1 - 100 - 3 corrosion degree

Klübersynth GEM 4 N

Synthetic high-performance gear and multipurpose oil with KlüberComp Lube Technology

Characteristics	Klübersynth GEM 4-32 N	Klübersynth GEM 4-46 N	Klübersynth GEM 4-68 N	Klübersynth GEM 4-100 N
Steel corrosion, DIN ISO 7120 / ASTM D665, method A, 24 h, 60°C	rust-free	rust-free	rust-free	rust-free
Pour point, DIN ISO 3016, ASTM D97, ASTM D5950, ASTM D7346	≤ -50 °C	≤ -40 °C	≤ -40 °C	≤ -40 °C
Ageing behaviour, DIN EN ISO 4263-4 / ASTM D2893, 312 h, 95°C, increase in viscosity at 100°C	≤ 6 %	≤ 6 %	≤ 6 %	≤ 6 %
FAG FE8 rolling bearing test, DIN 51819-3, D-7.5 / 80-80, wear of cage	≤ 200 mg	≤ 200 mg	≤ 200 mg	≤ 200 mg
FAG FE8 rolling bearing test, DIN 51819-3, D-7.5 / 80-80, wear of rolling elements	< 5 mg	< 5 mg	< 5 mg	< 5 mg
FZG scuffing test, DIN ISO 14635-1, based on standard, A / 16.6 / 90, failure load stage	≥ 12	≥ 12	≥ 12	≥ 12
FZG scuffing test, DIN ISO 14635-1, A / 8.3 / 90, failure load stage	≥ 14	≥ 14	≥ 14	≥ 14
Minimum shelf life from the date of manufacture - in a dry, frost-free place and in the unopened original container, approx.	24 months	24 months	24 months	24 months

Characteristics	Klübersynth GEM 4-150 N	Klübersynth GEM 4-220 N	Klübersynth GEM 4-320 N	Klübersynth GEM 4-460 N
Article number	012233	012234	012235	012236
Service temperature, lower limit	-40 °C	-40 °C	-30 °C	-30 °C
Service temperature, upper limit	140 °C	140 °C	140 °C	140 °C
Designation, DIN 51502	CLP HC 150	CLP HC 220	CLP HC 320	CLP HC 460
Designation, ISO 12925-1	CKC 150	CKC 220	CKC 320	CKC 460
Density, DIN 51757, 15°C	approx. 860 kg/m³	approx. 860 kg/m³	approx. 860 kg/m³	approx. 860 kg/m³
Flash point, DIN EN ISO 2592, Cleveland open cup	≥ 200 °C	≥ 200 °C	≥ 200 °C	≥ 200 °C
Flender foam test, ISO 12152, 25°C, oil-air dispersion, increase after 5 min	≤ 10 %	≤ 10 %	≤ 10 %	≤ 10 %
Flender foam test, ISO 12152, 25°C, total volume, increase after 1 min	≤ 15 %	≤ 15 %	≤ 15 %	≤ 15 %
Foam test, ISO 6247 / ASTM D892, 24°C, sequence I	-	-	-	-
Foam test, ISO 6247 / ASTM D892, 24°C, sequence III	-	-	-	-
Foam test, ISO 6247 / ASTM D892, 93.5°C, sequence II	-	-	-	-
ISO viscosity grade, DIN ISO 3448, ISO VG	150	220	320	460

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Characteristics	Klübersynth GEM 4-150 N	Klübersynth GEM 4-220 N	Klübersynth GEM 4-320 N	Klübersynth GEM 4-460 N
Kinematic viscosity, DIN EN ISO 3104 / DIN 53000-1, based on standard / ASTM D445 / ASTM D7042, 100°C	approx. 20 mm²/s	approx. 27 mm²/s	approx. 36 mm²/s	approx. 47 mm²/s
Kinematic viscosity, DIN EN ISO 3104 / DIN 53000-1, based on standard / ASTM D445 / ASTM D7042, 40°C	approx. 150 mm²/s	approx. 220 mm²/s	approx. 320 mm²/s	approx. 460 mm²/s
Viscosity index, DIN ISO 2909	≥ 150	≥ 150	≥ 155	≥ 160
Copper corrosion, DIN EN ISO 2160, 3 h, 100°C	1 - 100 - 3 corrosion degree	1 - 100 - 3 corrosion degree	1 - 100 - 3 corrosion degree	1 - 100 - 3 corrosion degree
Steel corrosion, DIN ISO 7120 / ASTM D665, method A, 24 h, 60°C	rust-free	rust-free	rust-free	rust-free
Pour point, DIN ISO 3016, ASTM D97, ASTM D5950, ASTM D7346	≤ -40 °C	≤ -40 °C	≤ -35 °C	≤ -30 °C
Ageing behaviour, DIN EN ISO 4263-4 / ASTM D2893, 312 h, 95°C, increase in viscosity at 100°C	≤ 6 %	≤ 6 %	≤ 6 %	≤ 6 %
FAG FE8 rolling bearing test, DIN 51819-3, D-7.5 / 80-80, wear of cage	≤ 200 mg	≤ 200 mg	≤ 200 mg	≤ 200 mg
FAG FE8 rolling bearing test, DIN 51819-3, D-7.5 / 80-80, wear of rolling elements	< 5 mg	< 5 mg	< 5 mg	< 5 mg
FZG scuffing test, DIN ISO 14635-1, based on standard, A / 16.6 / 90, failure load stage	≥ 12	≥ 12	≥ 12	≥ 12
FZG scuffing test, DIN ISO 14635-1, A / 8.3 / 90, failure load stage	≥ 14	≥ 14	≥ 14	≥ 14
Minimum shelf life from the date of manufacture - in a dry, frost-free place and in the unopened original container, approx.	24 months	24 months	24 months	24 months

Characteristics	Klübersynth GEM 4-680 N	Klübersynth GEM 4-1000 N	Klübersynth GEM 4-1500 N
Article number	012237	012321	012374
Service temperature, lower limit	-30 °C	-25 °C	-25 °C
Service temperature, upper limit	140 °C	140 °C	140 °C
Designation, DIN 51502	CLP HC 680	CLP HC 1000	CLP HC 1500
Designation, ISO 12925-1	CKC 680	CKC 1000	CKC 1500
Density, DIN 51757, 15°C	approx. 860 kg/m³	approx. 860 kg/m³	approx. 864 kg/m³
Flash point, DIN EN ISO 2592, Cleveland open cup	≥ 200 °C	≥ 200 °C	≥ 200 °C
Flender foam test, ISO 12152, 25°C, oil-air dispersion, increase after 5 min	≤ 10 %	≤ 10 %	≤ 10 %

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Characteristics	Klübersynth GEM 4-680 N	Klübersynth GEM 4-1000 N	Klübersynth GEM 4-1500 N
Flender foam test, ISO 12152, 25°C, total volume, increase after 1 min	≤ 15 %	≤ 15 %	≤ 15 %
Foam test, ISO 6247 / ASTM D892, 24°C, sequence I	-	-	-
Foam test, ISO 6247 / ASTM D892, 24°C, sequence III	-	-	-
Foam test, ISO 6247 / ASTM D892, 93.5°C, sequence II	-	-	-
ISO viscosity grade, DIN ISO 3448, ISO VG	680	1000	1500
Kinematic viscosity, DIN EN ISO 3104 / DIN 53000-1, based on standard / ASTM D445 / ASTM D7042, 100°C	approx. 62 mm²/s	approx. 90 mm²/s	approx. 130 mm²/s
Kinematic viscosity, DIN EN ISO 3104 / DIN 53000-1, based on standard / ASTM D445 / ASTM D7042, 40°C	approx. 680 mm²/s	approx. 1000 mm²/s	approx. 1500 mm²/s
Viscosity index, DIN ISO 2909	≥ 160	≥ 165	≥ 170
Copper corrosion, DIN EN ISO 2160, 3 h, 100°C	1 - 100 - 3 corrosion degree	1 - 100 - 3 corrosion degree	1 - 100 - 3 corrosion degree
Steel corrosion, DIN ISO 7120 / ASTM D665, method A, 24 h, 60°C	rust-free	rust-free	rust-free
Pour point, DIN ISO 3016, ASTM D97, ASTM D5950, ASTM D7346	≤ -30 °C	≤ -25 °C	≤ -25 °C
Ageing behaviour, DIN EN ISO 4263-4 / ASTM D2893, 312 h, 95°C, increase in viscosity at 100°C	≤ 6 %	≤ 6 %	≤ 6 %
FAG FE8 rolling bearing test, DIN 51819-3, D-7.5 / 80-80, wear of cage	≤ 200 mg	≤ 200 mg	≤ 200 mg
FAG FE8 rolling bearing test, DIN 51819-3, D-7.5 / 80-80, wear of rolling elements	< 5 mg	< 5 mg	< 5 mg
FZG scuffing test, DIN ISO 14635-1, based on standard, A / 16.6 / 90, failure load stage	≥ 12	≥ 12	≥ 12
FZG scuffing test, DIN ISO 14635-1, A / 8.3 / 90, failure load stage	≥ 14	≥ 14	≥ 14
Minimum shelf life from the date of manufacture - in a dry, frost-free place and in the unopened original container, approx.	24 months	24 months	24 months

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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 95 years.

Klüber Lubrication München GmbH & Co. KG /
Geisenhausenerstraße 7 / 81379 München / Germany /
phone +49 89 7876-0 / fax +49 89 7876-333.

Klübersynth GEM 4 N , 012232, 012235, 012321, 012234, 012229, 012230, 012237, 012374, 012236, 012233, 012231, en-GB
Edition 04.03.2025 - replaces edition 11.02.2025