

**RENOLIN**

**Product Program  
Gear and Circulating Oils**



**MOVING YOUR WORLD**





## FUCHS LUBRICANTS GERMANY

We do not just develop lubricants. We develop intelligent solutions for highly complex challenges.

To this end, we have pooled our expertise and experience from a wide range of application areas: FUCHS SCHMIERSTOFFE and FUCHS LUBRITECH became FUCHS LUBRICANTS GERMANY. Our goal: to keep our customers' world in motion. Efficient, sustainable, reliable. Today and tomorrow.

What can we move for you?

## FUCHS LUBRICANTS GERMANY

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### Facts and figures

**Company:** FUCHS LUBRICANTS GERMANY GmbH,  
a company of the FUCHS Group

**Locations:** Based in Mannheim, with sites in  
Bremen, Dohna, Hamburg, Kaiserslautern, Kiel and Wedel;  
approx. 1,400 employees

**Product range:** A full range of more than 3,000 products  
for all application areas

**Certifications i. a.:** ISO 9001, IATF 16949, ISO 14001,  
ISO 45001, ISO 50001, ISO 21469, HALAL, KOSHER  
(detailed certifications at [www.fuchs.com/de/en](http://www.fuchs.com/de/en))

**CO<sub>2</sub> neutral production\***

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Since 1931, we have been pursuing the same goal: to keep the world moving. With innovative and technological lubricant solutions that have a sustainable impact on the future. Unconditional reliability is our top priority, it is the foundation of our company and basis for everything that defines us.

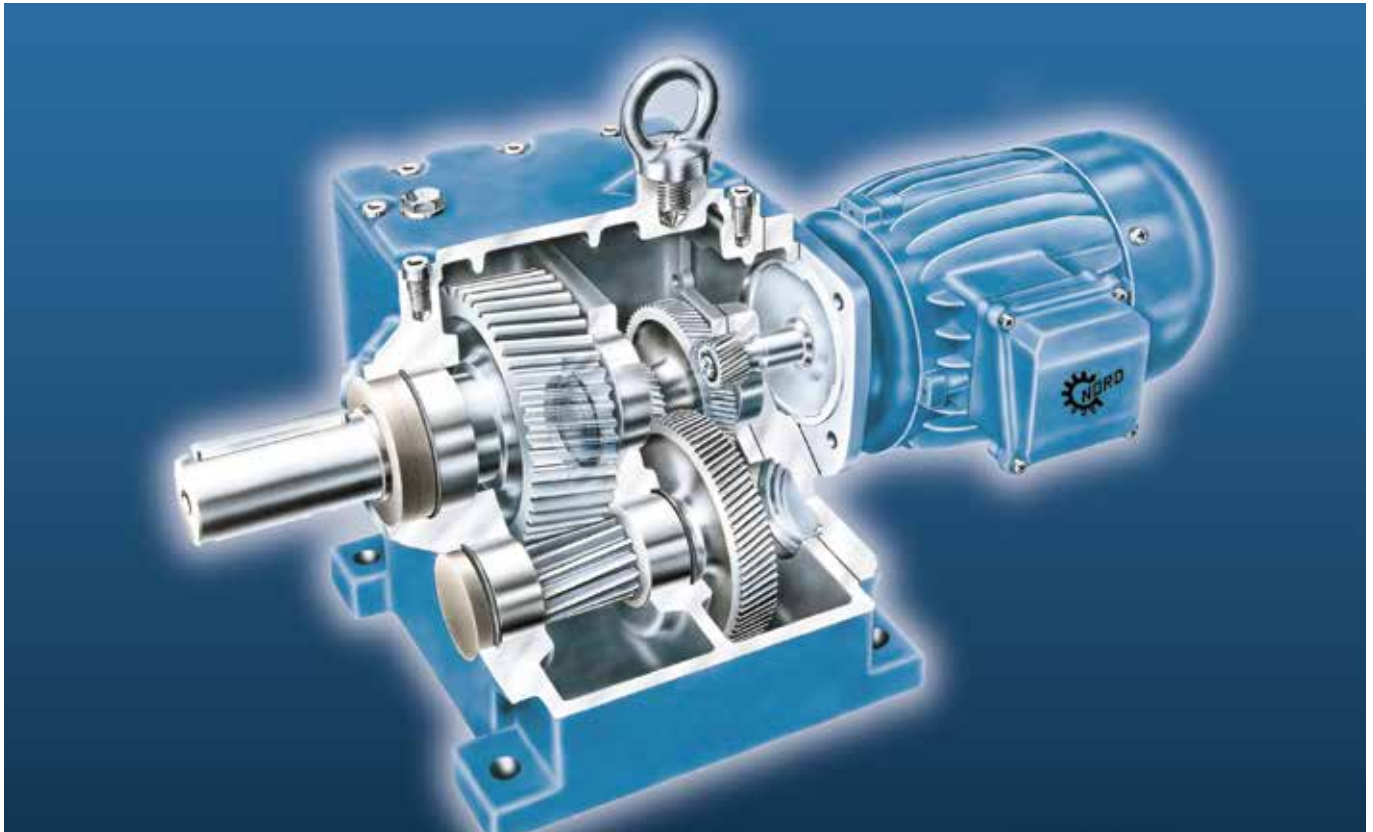
Reliability is both a driver and a demand. And it's a promise to all our customers in the fields of automotive suppliers and OEMs, mechanical engineering, metal processing, mining and exploration, aerospace, energy, construction and transport, agriculture and forestry, as well as the paper, steel, metal, cement, forging and food industries, but also qualified lubricant dealers, car dealerships and workshops.

Long-term experience, high development strength and the fulfillment of far-reaching standards are the basis for the special quality of our world-leading product brands. We deliver solutions that are simply more efficient and therefore more sustainable. We always think in holistic solutions. For the development of individual solutions, we enter into an intensive customer dialog with you. This is the way we live up to our claim of moving your world.

## MOVING YOUR WORLD

\*Partially also based on compensation

## An important design element – industrial gear oils



### Gear oils for all applications

Germany is among the world's largest producers of drive technology and transmissions. Transmission oil is an important construction element in drive technology and is used in nearly all areas of application.

The demands placed on transmission oils have grown sharply. Further developments in the field of drive technology usually result in an increase in the power density of components: Greater performance must be transmitted in ever shorter times. At the same time, the components and transmissions are becoming ever smaller and more compact.

As one of the most important and complex machine elements, gear oil must be capable of handling these altered application conditions and requirement criteria. Oil volumes become smaller, oil circulation cycles become larger and the energy transferred to the lubricant increases.

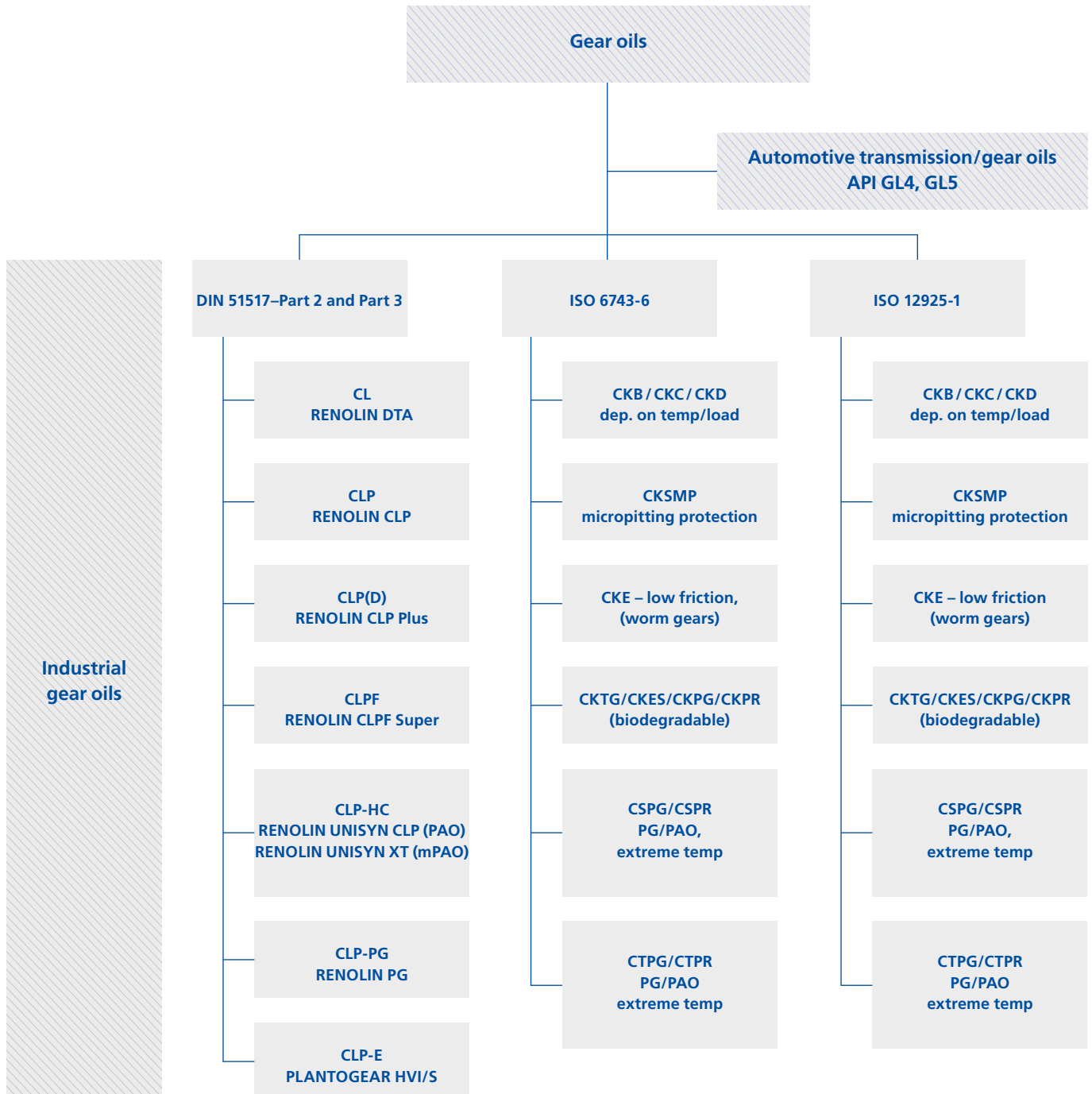
This leads to an increase in the thermal and oxidative load on the lubricants. And in addition, the technical demands on industrial gear oils have changed dramatically over recent years – these have become significantly more stringent. New, complex bench tests with exact thresholds and extreme test conditions have been developed to better reflect the demands and problem areas in drive chains in test facilities.

Gear oils can be divided into two main groups according to their use:

- Lubricating, circulating and gear oils for industrial applications (stationary gear oils) as per DIN 51517, ISO 6743/6, AGMA 9005. design requirements – wind turbines and lubricants – ISO 61400/4
- Lubricating and gear oils for automotive applications, motor vehicle and commercial vehicle gear oils, automatic transmission fluids (ATFs) as per API GL 4, GL 5 etc.

# Overview

## Industrial gear oils Classification – NEW classes



L = Anti-oxidants, corrosion protection (R&O)  
 P = Anti-wear/Extreme Pressure  
 = AW/EP  
 D = Detergent/Dispersant; = D  
 F =  $\text{MoS}_2$  solids

The product ranges listed are available in various viscosity classes.

# FUCHS industrial gear oils

## FUCHS Industrial gear oils portfolios Classification – ISO 12925-1

Product name	CKC R&O, AW/EP	CKD R&O, AW/EP, High temp.	CKSMP R&O, AW/EP, Micro- pitting pro- tection	CKE R&O, low friction	CKES Bio, synth. esters	CSPG extre- me temp, PG, mode- rate loads	CSPR extre- me temp, PAO, mode- rate loads	CTPG extre- me temp, PG, high loads	CTPR extre- me temp, PAO, high loads
RENOLIN CLP	●	●	●	–	–	–	–	–	–
RENOLIN CLP-PLUS	●	●	●	–	–	–	–	–	–
RENOLIN CLPF SUPER	●	●	–	–	–	–	–	–	–
RENOLIN UNISYN CLP	●	●	●	●	–	–	–	–	–
RENOLIN UNISYN XT	●	●	●	●	–	–	–	–	–
RENOLIN PG	●	●	●	●	–	●	–	–	–
PLANTOGEAR S/HVI	●	●	●	●	●	–	–	–	–
RENOLIN HIGHGEAR	●	●	●	●	–	–	–	–	–
RENOLIN HIGHGEAR SYNTH	●	●	●	●	–	–	–	–	–
RENOLIN SYNGEAR 220 HT	●	●	–	●	–	●	–	–	–
RENOLIN PentoGear 320 WT	●	●	●	●	–	–	–	–	–

R&O – Circulating oils with antioxidants and corrosion inhibitors

AW/EP – Wear protection and high-pressure additives

Micro-pitting – Oils with high micropitting resistance

Low friction – Low friction coefficients

Extreme temp – For extreme temperature conditions

## Lubricating Oils – ISO 12925-1

ISO-L Symbol	Composition and properties	ISO-L Symbol	Composition and properties
CKB	Refined mineral oils with oxidation stability, anticorrosion (ferrous and non-ferrous metal) and antifoam properties.	CKES	Gear oils, based on synthetic esters, with enhanced oxidation, corrosion protection (ferrous and non ferrous metals), extreme pressure and anti-wear properties.
CKC	Refined mineral oils with oxidation stability, anticorrosion (ferrous and non-ferrous metal) and antifoam with enhanced extreme pressure and antiwear properties.	CSPG	Gear oils, based on poly-glycols with enhanced oxidation, corrosion protection (ferrous and non-ferrous metals), extreme pressure and anti-wear properties, usable in extreme temperature conditions (high and low).
CKD	Lubricants with oxidation stability, anticorrosion (ferrous and non-ferrous metal), antifoam, extreme pressure and antiwear properties, with enhanced thermal/oxidative stability that permits use at a higher temperature.	CSPR	Gear oils, based on polyalphaolefins, with enhanced oxidation, corrosion protection (ferrous and non-ferrous metals), extreme pressure and anti-wear properties, usable in extreme temperature conditions (high and low).
CKSMP	Mineral, semi-synthetic or synthetic oils with reinforced thermal and oxidation stability, corrosion protection (ferrous and non ferrous metals), extreme-pressure and anti-wear properties, with particular protection against micro-pitting, low speed wear.	CTPG	Gear oils, based on poly-glycols with enhanced oxidation, corrosion protection (ferrous and non-ferrous metals), extreme pressure and anti-wear properties, usable in extreme temperature conditions (high and low).
CKE	Lubricants with oxidation stability, anticorrosion (ferrous and non-ferrous metal) and antifoam properties, ensuring low coefficient of friction.	CTPR	Gear oils, based on polyalphaolefins, with enhanced oxidation, corrosion protection (ferrous and non-ferrous metals), extreme pressure and anti-wear properties, usable in extreme temperature conditions (high and low).

# New mechanical tests for industrial gear oils

## WEC white etching cracks

Over the last few months and years, there have been more and more discussions on failures of roller bearings, gear teeth and transmissions as a result of the damage phenomenon known in the market as „white etching cracks“.

### The damage observed led to this question:

To what extent do certain additives and gear oil formulations prevent or promote white etching cracks in roller bearings and gears?

This in turn led to development of a roller bearing bench test, as these machine elements are particularly susceptible to the WEC phenomenon. The FE8 pitting test as per VW-PV-1483 was used to investigate the WEC-phenomenon. The test was performed on axial cylinder roller bearings with an axial load of 60 kN at speeds of 350 and 750 rpm, at an oil temperature of 100°C and oil flow rate of 2x0.1 l/min.

The fatigue life of the bearing and the influence of the oil formula are determined and the occurrence of the WEC damage on the cylinder raceway/cylinder roller is investigated.

An API GL4 manual transmission oil was defined as the low reference oil and used to bring about WEC damage on the roller bearing raceway.

RENOLIN CLP, RENOLIN UNISYN CLP, RENOLIN UNISYN XT, RENOLIN PG and PLANTOGEAR S are used as the high reference oil. With the high reference RENOLIN industrial gear oils, ISO VG 100, a service life > 9 million revolutions was reached in this roller bearing test without any WEC-type damage occurring.

RENOLIN gear oil formulations were also investigated with various anticorrosion oils, metal working fluids and critical additive components added. The robustness of the formulations display excellent wear protection characteristics and optimum protection with regard to the white etching cracks failure.

### Requirements of industrial gear oils

The demands made on industrial gear oils are increasing. Although the new DIN 51517-3 only specifies a scuffing load carrying test in line with FZG A/8.3 90 and the roller bearing test FE8 in addition to the physical characteristics, many leading gear manufacturers' specifications contain additional requirements:

- More stringent scuffing load carrying test according to FZG A/16.6/140 and FZG A/8.3/90
- Micropitting test at 60°C and 90°C as per GFT, FVA I-IV, C/8.3/90 and C/8.3/60
- FE8 roller bearing wear test as per DIN 51819-2 (and variations) – D/7.5/80-80
- FZG slow speed wear test
- FZG pitting test
- Filtration behavior – multipass tests
- Foaming behavior (e.g. Flender inhouse test)
- Low-temperature-behavior
- Cold flow properties
- Static and dynamic elastomer compatibility
- Compatibility with paintings
- etc.

These additional bench tests attempt to replicate the extreme conditions which gearboxes and gear oils are subject to and quantify the performance of the various formulations. FUCHS has state-of-the-art test rigs for the testing of industrial gear oils on which customer demands can be simulated. Close cooperation with the relevant DIN and ISO committees and working groups and intensive cooperation with the German research association for power transmission engineering (FVA) as well as renowned gear manufacturers and international customers results in a constant refinement and improvement of both standardized test procedures and FUCHS in-house bench tests.



## For the power transmission engineering of today and tomorrow



### Heavy-duty synthetic gear oils

Although mineral oil-based gear oils continue to dominate, synthetic oils are becoming increasingly popular in the rapidly growing power transmission engineering market. Synthetic gear oils already counted for approximately 20 - 25% of the total industrial gear oils market in Germany (2019).

Compared to mineral oils, synthetic gear oils have a significantly longer life, generate lower service costs and excel in terms of reducing wear to gears and rolling bearings. They are more expensive than mineral oils but these higher costs are compensated by increased operating hours (lifetime two to three times longer), lower maintenance costs, wider operating temperature range (multigrade characteristics), lower disposal costs, better technical performance, lower component wear and improved energy efficiency.

### RENOLIN industrial gear oils: Complete Portfolio

FUCHS offers a comprehensive product range of mineral oil-based gear oils

- RENOLIN CLP – demulsifying
- RENOLIN CLP PLUS – detergent/dispersant with AO booster
- RENOLIN AWD – »High Brugger« lubricating oils
- RENOLIN CLPF SUPER – black, containing MoS<sub>2</sub>
- RENOLIN HighGear – plastic deformation technology
- RENOLIN CLP VCI – special corrosion protection "Vapour Corrosion Inhibitors"

In addition, a complete range of fully synthetic gear oils have been developed and refined over recent years.

FUCHS synthetic industrial gear oils:

- RENOLIN UNISYN XT – polyalphaolefin-based new technology (mPAO)
- RENOLIN UNISYN CLP – polyalphaolefin-based (PAO)
- RENOLIN PG – polyalkylene glycol-based (PAG)
- PLANTOGEAR S – saturated ester-based (E)
- RENOLIN HighGear Synth – polyalphaolefin-based (PAO)
- RENOLIN UNISYN GEAR VCI – polyalphaolefin-based (PAO)
- RENOLIN PentoGear 320 WT – synthetic-based (alternative chemistry)

These product series make up a complete portfolio of new-generation synthetic gear oils boasting maximum technical performance.

FUCHS is a leading player in the field of power transmission engineering and its product range covers all industrial gear oil applications and performance levels. In addition, special grades are also available which were specially developed to meet specific customer demands.

**The optimum gear oil for every application.  
The optimum solution for every problem.**



## FUCHS industrial gear oils are adapted for every application

### RENOLIN UNISYN XT series

The products of the RENOLIN UNISYN XT series are demulsifying, fully-synthetic industrial gear oils with elevated aging resistance, excellent load-carrying capacity and wear protection, based on polyalphaolefins of the latest generation (mPAO).

Their compatibility with paints and elastomers is comparable with that of mineral oils (= excellent). Compared to conventional mineral oils, the service life of RENOLIN UNISYN XT series is two to three times longer.

RENOLIN UNISYN XT displays exceptional wear-protection characteristics. As a result of their extremely low pour point, these oils display outstanding cold flow properties.

### RENOLIN UNISYN CLP range

The oils of the RENOLIN UNISYN CLP are high-performance wind turbine gear oils based on polyalphaolefines (PAO). They provide a high shear-stable viscosity index. Hence they are suitable for high and low temperature applications.

RENOLIN UNISYN CLP displays exceptional wear and corrosion protection. The compatibility with typically used materials is excellent. RENOLIN UNISYN CLP oils provide two to three times longer oil drain intervals compared to mineral oils.

**RENOLIN UNISYN CLP 220 and 320 are successfully approved in wind turbine applications.**

### RENOLIN PG series

Products of the RENOLIN PG series are based on special polyalkylene glycols. They display very low friction coefficients in tribological mixed friction condition.

RENOLIN PG oils can be used at both high and low temperatures. RENOLIN

PG oils are primarily used to lubricate steel/bronze worm gears and steel/steel gear sets. RENOLIN PG products are recommended for applications subject to unfavorable friction conditions and very high temperatures. Its compatibility with components still needs to be verified. Polyglycols are neither miscible nor compatible with mineral oils/polyalphaolefins.

### PLANTOGEAR S series

The rapidly biodegradable PLANTOGEAR S series of oils are based on fully saturated, synthetic ester oils. They boast very low friction coefficients, a good load-carrying capacity and a high natural shear-stable viscosity index.

The polar structure of ester oils provides for good cleaning properties and dirt carrying capacity. Furthermore, saturated esters display excellent thermal stability and low friction.

Products from the PLANTOGEAR S series can be used to clean gearboxes which have been contaminated with deposits and sludge.

The PLANTOGEAR S series has been awarded the European Ecolabel.

### RENOLIN HighGear/RENOLIN HighGear Synth

RENOLIN HighGear series contain special additive systems which form high-performance protective films on gear teeth and protect machine elements against wear, even under extreme loads, mixed friction conditions, high pressures, high specific contact pressures, at low speeds and when the surfaces of the teeth are predamaged.

This is achieved by the use of synergistic additive combinations of mild sulfur carriers, surface-active phosphorous and zinc additives together with mineral oil-soluble molybdenum compounds.

This technology is also referred to as a plastic deformation (PD) reaction or surface roughness smoothing.

As opposed to the previously available technologies, RENOLIN HighGear was further developed in particular in terms of thermal and oxidation stability, long-term stability (to avoid sludge formation) and its excellent corrosion protection.



### NEW: RENOLIN CLP VCI

The RENOLIN CLP VCI products are industrial gear oils with excellent EP/AW properties and a high load carrying capacity. They are based on selected mineral oils and synergistically acting additives to improve oxidation stability, corrosion protection and wear protection. In addition, the RENOLIN CLP VCI oils contain special corrosion protection additives which guarantee vapour phase corrosion protection (Vapour Corrosion Inhibitors – VCI). RENOLIN CLP VCI series is especially suitable for the use in gearboxes which are stored or transported over a longer period of time. RENOLIN CLP VCI oils are fully tested CLP gear oils acc. to DIN 51517-3.

# RENOLIN Gear and circulating oils – an overview

## RENOLIN DTA – demulsifying circulating, spindle and hydraulic oils

CL/HL oils (demulsifying)

Product name	Description	Density at 15°C [kg/m <sup>3</sup> ]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm <sup>2</sup> /s]	Kin.Visc. at 100°C [mm <sup>2</sup> /s]	VI Viscosity index	Pour-point [°C]	Main application area
RENOLIN DTA 2	Spindle, hydraulic and lubricating oils (machine oils) on the basis of selected base oils with additives to improve aging behavior and corrosion protection. All RENOLIN DTA products are DIN 51524-1 (HL) hydraulic oils and DIN 51517-2 (CL) circulating oils based on mineral oil, demulsifying (water-separating) and free of zinc.  ISO 6743/4, HL, ISO 6743-6 and ISO 12925-1: CKB.	805	100	2.2	–	–	–27	For thermally-stressed bearings and hydraulic systems with peak temperatures of approx. 120°C. General lubrication without specific wear protection requirements (without AW/EP).  (Refer to product information 4-1292* for further details)
RENOLIN DTA 5		837	120	4.6	1.6	106	–40	
RENOLIN DTA 7		839	155	7.4	2.2	103	–27	
RENOLIN DTA 10		851	174	10	2.6	92	–27	
RENOLIN DTA 15		856	195	15	3.4	98	–27	
RENOLIN DTA 22		865	210	22	4.2	94	–27	
RENOLIN DTA 32		874	222	32	5.4	102	–24	
RENOLIN DTA 46		874	228	46	6.8	101	–24	
RENOLIN DTA 68		882	250	68	8.7	99	–18	
RENOLIN DTA 100		881	248	100	11.2	97	–18	
RENOLIN DTA 150		889	266	150	15.5	94	–15	
RENOLIN DTA 220		893	280	220	18.8	95	–12	
RENOLIN DTA 320		898	280	320	24.0	95	–12	
RENOLIN DTA 460	904	315	460	30.4	95	–12		
RENOLIN DTA 680	913	302	680	37.9	92	–12		

## RENOLIN CLP – demulsifying EP / AW gear and circulating oils

CLP oils (demulsifying)

Product name	Description	Density at 15°C [kg/m <sup>3</sup> ]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm <sup>2</sup> /s]	Kin.Visc. at 100°C [mm <sup>2</sup> /s]	VI Viscosity index	Pour-point [°C]	Main application area
RENOLIN CLP 68	High-performance gear and circulating oils with good aging stability and additives to improve corrosion protection (also combat steel and non-ferrous metal corrosion caused by moisture). Outstanding anti-wear characteristics – good EP/AW performance, excellent scuffing load carrying capacity and protection against micropitting, excellent FE8 roller bearing wear protection, good demulsifying properties, very good foaming behavior, zinc-free and silicone oil-free. RENOLIN CLP oils fulfill and exceed the minimum requirements of CLP lubricating oils according to DIN 51517-3: CLP; ISO 6743-6 and ISO 12925-1: CKC, CKD, CKSMP; US Steel 224, David Brown S1.53.10. Approved by leading gearbox manufacturers.	866	236	68	8.7	99	–24	Universal gear oils for industrial applications such as in bearings, joints, spur, bevel and worm gears and whenever the manufacturer recommends an oil type CLP.  (Refer to product information 4-1208* for further details)
RENOLIN CLP 100		890	240	100	11.2	98	–21	
RENOLIN CLP 150		894	250	150	14.5	96	–24	
RENOLIN CLP 220		896	260	220	18.9	96	–24	
RENOLIN CLP 320		900	255	320	24.0	95	–12	
RENOLIN CLP 460		901	270	460	30.4	95	–12	
RENOLIN CLP 680		918	270	680	36.8	88	–10	

\* PI = Product-information

EP = Extreme pressure additives, to avoid wear and scuffing at high pressures and loads

AW = Anti-wear additives, to avoid wear in mixed friction areas

## RENOLIN CLP PLUS – detergent EP/AW gear oils with improved oxidation stability

### CLP-D oils (detergent)

Product name	Description	Density at 15 °C [kg/m <sup>3</sup> ]	FLP Cleveland [°C]	Kin. Visc. at 40 °C [mm <sup>2</sup> /s]	Kin. Visc. at 100 °C [mm <sup>2</sup> /s]	VI Viscosity index	Pour-point [°C]	Main application area
RENOLIN CLP 46 PLUS	High-performance gear and circulating oils offering excellent wear protection, good EP performance and excellent corrosion protection. Carefully selected antioxidants guarantee good aging stability and special surface-active substances lower friction, which can reduce operating temperatures and increase efficiency. Special detergent/dispersant additives offer very good cleaning properties and dirt holding capacity. RENOLIN CLP PLUS oils have excellent foaming characteristics and offer good protection against micropitting. The RENOLIN CLP PLUS series of oils are free from zinc and silicone oil. RENOLIN CLP PLUS oils fulfill the minimum requirements of lubricating oils according to DIN 51517-3: CLP; ISO 6743-6 and ISO 12925-1: CKC, CKD, CKSMP. CLP PLUS were developed specially for the extreme conditions in which mining industry conveyors operate and can increase service life in such conditions.	885	200	46	6.8	102	-27	Special gear oils for highly stressed mechanical industrial, spur, double-spur, bevel and worm gears. Long-life oils (tested for 30,000 hours in brown coal open pit mining conveyors and approved).
RENOLIN CLP 68 PLUS		888	236	68	8.7	100	-27	
RENOLIN CLP 100 PLUS		891	240	100	11.2	97	-24	
RENOLIN CLP 150 PLUS		895	250	150	14.8	97	-24	Improved oxidation stability.
RENOLIN CLP 220 PLUS		899	260	220	18.9	96	-24	
RENOLIN CLP 320 PLUS		899	255	320	24.0	95	-18	(Refer to product information 4-1226* for further details)
RENOLIN CLP 460 PLUS		904	270	460	30.2	94	-14	<b>Mineral oil-based</b>
RENOLIN CLP 680 PLUS		908	270	680	39.6	95	-17	

## RENOLIN CLPF SUPER-EP / AW gear oils with MoS<sub>2</sub> (solid lubricant / black color)

### CLP oils/black

Product name	Description	Density at 15 °C [kg/m <sup>3</sup> ]	FLP Cleveland [°C]	Kin. Visc. at 40 °C [mm <sup>2</sup> /s]	Kin. Visc. at 100 °C [mm <sup>2</sup> /s]	VI Viscosity index	Pour-point [°C]	Main application area
RENOLIN CLPF 100 SUPER	EP gear oils with synergistic chemical EP/AW additives and physical MoS <sub>2</sub> -based solid lubricant additives. The MoS <sub>2</sub> -based solid lubricant additives cover a wide range of temperatures in mixed friction areas. They reduce friction and have a damping effect. Excellent wear protection in mixed friction areas, good dirt holding capacity (detergent effect), excellent foaming behavior, very good FE8 roller bearing wear protection, free from zinc and silicone oil. The RENOLIN CLPF SUPER series of oils surpass the minimum requirements of CLPD lubricating oils according to DIN 51517-3, ISO 6743-6 and ISO 12925-1: CKC, CKD.	891	240	100	11.2	98	-21	For highly-stressed gearboxes operating at low circumferential speeds and high loads, even when subject to shock loading, for noise reduction and for the lubrication of spindles and gearboxes in forging presses.
RENOLIN CLPF 220 SUPER		901	260	220	18.8	95	-21	
RENOLIN CLPF 320 SUPER		900	255	320	24.0	95	-14	
RENOLIN CLPF 460 SUPER		911	270	460	30.4	95	-12	(Refer to product information 4-1264* for further details)
RENOLIN CLPF 680 SUPER		922	270	680	36.8	88	-10	
RENOLIN CLPF 1500 SUPER		906	240	1.500	70.5	104	-12	<b>Mineral oil-based</b>

\* PI = Product-information

EP = Extreme pressure additives, to avoid wear and scuffing at high pressures and loads

AW = Anti-wear additives, to avoid wear in mixed friction areas

## RENOLIN AWD – detergent EP/AW gear oils with high Brugger performance

CLP-D oils/ high Brugger

Product name	Description	Density at 15°C [kg/m³]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm²/s]	Kin.Visc. at 100°C [mm²/s]	VI Viscosity index	Pour-point [°C]	Main application area
<b>RENOLIN AWD 68</b>	Special gear and circulating oils when products with particularly good wear protection properties are required. Special additives reduce friction and form reaction layers which offer excellent wear protection in extreme mixed friction and load conditions. Brugger value >70 N/mm², excellent FE8 roller bearing wear protection, good dirt holding capacity (detergent dispersant), free from zinc and silicone oil, high additive reserves. The RENOLIN AWD series of oils surpass the minimum requirements of CLPD lubricating oils according to DIN 51517-3: CLP; ISO 6743-6 and ISO 12925-1: CKC, CKD, CKSMP. Approved by leading press manufacturers.	882	221	68	8.9	105	-24	For highly-stressed industrial gearboxes and circulating systems, especially when good load-carrying capacity in extreme mixed friction and load conditions is required. High Brugger value of >70 N/mm². Used in applications including press lines in the automotive industry.  (Refer to product information 4-1060* for further details)  <b>Mineral oil-based</b>
<b>RENOLIN AWD 100</b>		886	222	100	11.2	97	-24	
<b>RENOLIN AWD 150</b>		894	208	150	14.6	96	-12	
<b>RENOLIN AWD 220</b>		896	210	220	18.7	95	-12	

## RENOLIN UNISYN XT – the latest generation of fully synthetic, polyalphaolefin-based industrial gear oils (mPAO), very high viscosity index

Low-temperature gear oils, mPAO-synthetic, CLP-HC

Product name	Description	Density at 15°C [kg/m³]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm²/s]	Kin.Visc. at 100°C [mm²/s]	VI Viscosity index	Pour-point [°C]	Main application area
<b>RENOLIN UNISYN XT 68</b>	The RENOLIN UNISYN XT range is based on new, innovative polyalphaolefins, synthetic hydrocarbons. The viscosity index is extremely high: VI > 180. Furthermore, the cold flow properties are outstanding, and pour point values and low-temperature viscosities are extremely low. The RENOLIN UNISYN XT series displays excellent protection against micropitting, excellent FE8 performance and meets and exceeds CLP-HC as per DIN 51517-3 and ISO 12925-1: CKC, CKD, CKE, CKSMP. Approved by leading gearbox manufacturers.	850	238	68	11.0	154	-54	For the lubrication of bearings and gearboxes which are subject to high thermal loads. RENOLIN UNISYN XT has a very high viscosity index and guarantees a stable lubricating film. For lubrication of and use in gears with extended oil change intervals. Miscible and compatible with mineral oils. Surpasses the low-temperature properties of conventional PAOs, for high thermal and mechanical loads. Long lifetime.  <b>mPAO-synthetic</b>
<b>RENOLIN UNISYN XT 100</b>		850	238	100	15.3	162	-48	
<b>RENOLIN UNISYN XT 150</b>		850	238	150	21.4	168	-45	
<b>RENOLIN UNISYN XT 220</b>		860	242	220	29.4	174	-42	
<b>RENOLIN UNISYN XT 320</b>		860	242	320	40.2	179	-42	
<b>RENOLIN UNISYN XT 460</b>		860	242	460	54.5	188	-39	
<b>RENOLIN UNISYN XT 680</b>		860	244	680	75.5	192	-39	
<b>RENOLIN UNISYN XT 1000</b>		860	244	1000	101	195	-33	

\* PI = Product-information

EP = Extreme pressure additives, to avoid wear and scuffing at high pressures and loads  
AW = Anti-wear additives, to avoid wear in mixed friction areas

## RENOLIN UNISYN CLP – fully synthetic, high-performance EP / AW gear oils based on polyalphaolefin (PAO)

### CLP-HC oils/PAO-synthetic

Product name	Description	Density at 15°C [kg/m³]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm²/s]	Kin.Visc. at 100°C [mm²/s]	VI Viscosity index	Pour-point [°C]	Main application area
<b>RENOLIN UNISYN CLP 220</b>	Fully-synthetic gear and circulating oils with excellent thermal and aging stability, very high viscosity index (shear-stable), outstanding low-temperature behavior, very good flow behavior at low temperatures, excellent air release properties and foaming behavior, good protection against micropitting, excellent FE8 performance, good demulsifying properties, free from zinc and silicone oil. The RENOLIN UNISYN CLP series of oils surpass the minimum requirements of CLP-HC gear oils according to DIN 51517-3, ISO 6743-6 and ISO 12925-1: CKC, CKD, CKE, CKSMP; AISE 224, David Brown S1.53.101. Approved by leading gearbox manufacturers.	854	260	220	26.7	155	-42	RENOLIN UNISYN CLP oils are recommended for use in pitch and azimuth applications as well as in main gearboxes for wind turbines. RENOLIN UNISYN CLP oils are suitable for a wide operating temperature range and provide excellent low temperature behaviour. They show very good material compatibility and are miscible with mineral oil based and ester-based gear oils.  (Refer to product information 4-1104* for further details)
<b>RENOLIN UNISYN CLP 320</b>		860	260	320	35.0	155	-42	

**PAO-synthetic**

## RENOLIN PG – synthetic, high-performance EP / AW gear oils based on polyalkylene glycol (PAG)

### CLP-PG oils/polyglycol-synthetic

Product name	Description	Density at 15°C [kg/m³]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm²/s]	Kin.Visc. at 100°C [mm²/s]	VI Viscosity index	Pour-point [°C]	Main application area
<b>RENOLIN PG 32</b>	Fully synthetic gear and circulating oils based on special polyalkylene glycols (PAG) for applications subject to extreme thermal loads. High oxidation and aging stability, high viscosity index (shear-stable), good viscosity-temperature behavior, excellent load-carrying capacity, low coefficients of friction, high FZG, good protection against micropitting, excellent FE8 performance, very good resistance to pitting. The RENOLIN PG series of oils surpass the minimum requirements of CLP-PG lubricating oils according to DIN 51517-3; ISO 6743-6 and ISO 12925-1: CKC, CKD, CKE, CKSMP, CSPG, CTPG. Approved by leading gearbox manufacturers.	1,022	220	32	7.1	194	-54	For gearboxes operating in extreme thermal and mechanical conditions, such as worm gears and calender lubrication. Can also be used as compressor oils for process gases such as methane, ethane, propane, etc. Particularly suitable for steel/bronze sliding pairs in worm gears. Not miscible or compatible with mineral oils.  (Refer to product information 4-1293* for further details)
<b>RENOLIN PG 46</b>		1,029	240	46	9.7	203	-48	
<b>RENOLIN PG 68</b>		1,035	240	68	13.85	212	-51	
<b>RENOLIN PG 100</b>		1,043	260	100	19.6	220	-48	
<b>RENOLIN PG 150</b>		1,051	260	145	27.0	224	-51	
<b>RENOLIN PG 220</b>		1,075	240	220	36.8	218	-33	
<b>RENOLIN PG 320</b>		1,075	240	320	54.4	237	-36	
<b>RENOLIN PG 460</b>		1,075	280	460	75.1	245	-36	
<b>RENOLIN PG 680</b>		1,075	280	680	110.3	261	-33	
<b>RENOLIN PG 1000</b>		1,075	280	1.000	162.0	281	-36	

**Polyglycol-synthetic**

\* PI = Product-information

EP = Extreme pressure additives, to avoid wear and scuffing at high pressures and loads  
AW = Anti-wear additives, to avoid wear in mixed friction areas

## RENOLIN Gear and circulating oils – an overview

### PLANTOGEAR S – rapidly biodegradable, high-performance EP / AW gear oils based on saturated esters

CLP-E oils/synthetic esters, rapidly biodegradable

Product name	Description	Density at 15°C [kg/m³]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm²/s]	Kin.Visc. at 100°C [mm²/s]	VI Viscosity index	Pour-point [°C]	Main application area
<b>PLANTOGEAR 100 HVI**</b> EU Ecolabel DE/027/177	Biodegradable, high-performance gear oils based on special saturated esters. Extremely high thermal and aging stability, high viscosity index (shear-stable), good viscosity-temperature behavior, for low-temperature applications, excellent cleaning power due to polar ester structure, reduced friction, excellent wear protection, good FZG scuffing load carrying capacity, good protection against micropitting, outstanding FE8 performance, rapidly biodegradable and self-cleaning. The PLANTOGEAR S series of oils surpass the minimum requirements of CLP-E lubricating oils according to DIN 51517-3; ISO 6743-6 and ISO 12925-1: CKC, CKD, CKE, CKSMP, CKES. The PLANTOGEAR S range has been awarded the European Ecolabel. Approved by leading gearbox manufacturers.	927	>270	100	13.7	138	-33	For highly-stressed spur, bevel, planetary and worm gears, above all in areas where leakages could present a hazard to soil and the ground or surface water. For both high and low application temperatures. High, shear-stable viscosity index. Can be used as a cleaning fluid.  <b>GEARMASTER ECO 320 – rapidly biodegradable and approved wind turbine gear oil.</b>  (Refer to product information 4-1387* for further details)  <b>Synthetic saturated ester – biodegradable</b>
<b>PLANTOGEAR 150 HVI**</b> EU Ecolabel DE/027/178		928	>270	150	19.1	145	-30	
<b>PLANTOGEAR 220 S**</b> EU Ecolabel DE/027/102		938	280	220	26.2	152	-30	
<b>PLANTOGEAR 320 S**</b> EU Ecolabel DE/027/103		943	280	320	35.1	155	-30	
<b>PLANTOGEAR 460 S**</b> EU Ecolabel DE/027/107		951	280	460	48.0	163	-30	
<b>PLANTOGEAR 680 S**</b> EU Ecolabel DE/027/108		958	280	680	66.0	170	-30	
<b>GEARMASTER ECO 320</b>		943	280	320	35.1	155	-33	

### RENOLIN HighGear – industrial gear oils based on the latest additive technology. Smoothing PD technology

PD technology, mineral oil, surface smoothing

Product name	Description	Density at 15°C [kg/m³]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm²/s]	Kin.Visc. at 100°C [mm²/s]	VI Viscosity index	Pour-point [°C]	Main application area
<b>RENOLIN HighGear 220</b>	RENOLIN HighGear oils are based on selected mineral oil-based base oils. Synergistic additives guarantee the outstanding wear protection performance of these new high-tech gear oils. Highly effective tribo-protection layers reliably protect wetted machine components against wear. This new additive technology is also referred to as a surface smoothing PD (plastic deformation) reaction mechanism. These additives have a noticeable smoothing effect on surface roughness.  ISO 6743-6 and ISO 12925-1: CKC, CKD, CKE, CKSMP.	895	255	220	19.2	96	-10	RENOLIN HighGear can be used both in new gearboxes (spur, bevel, planetary and worm gears) to reduce friction, wear and noise in extreme conditions as well as in pre-damaged gearboxes and machine components to increase service life.  (Refer to product information 4-1093* for further details)  <b>Mineral oil-based</b>
<b>RENOLIN HighGear 320</b>		903	>260	320	24.0	95	-12	
<b>RENOLIN HighGear 460</b>		904	>270	460	31.1	96	-9	

\* PI = Product-information

EP = Extreme pressure additives, to avoid wear and scuffing at high pressures and loads  
AW = Anti-wear additives, to avoid wear in mixed friction areas



## RENOLIN HighGear Synth – industrial gear oils with the latest additive technology based on polyalphaolefin (PAO). Smoothing PD technology

PD technology, PAO-synthetic, CLP-HC, surface smoothing effect

Product name	Description	Density at 15°C [kg/m <sup>3</sup> ]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm <sup>2</sup> /s]	Kin.Visc. at 100°C [mm <sup>2</sup> /s]	VI Viscosity index	Pour-point [°C]	Main application area
<b>RENOLIN HighGear SYNTH 150</b>	RENOLIN HighGear Synth is based on synthetic polyalphaolefins (PAO). Special synergistic additives guarantee the outstanding wear protection performance of these new high-tech gear oils. Highly effective tribo-protection layers reliably protect wetted machine components against wear. RENOLIN HighGear Synth oils have a high, natural and shear-stable viscosity index and are suitable for both high and low temperature applications. Their high thermal and oxidation stability allow oil change intervals to be extended.  ISO 6743-6 and ISO 12925-1: CKC, CKD, CKE, CKSMP.	871	220	150	18.0	133	-36	RENOLIN HighGear can be used both in new gearboxes (spur, bevel, planetary and worm gears) to reduce friction, wear and noise in extreme conditions as well as in pre-damaged gearboxes and machine components to increase service life. Synthetic PAO components help reduce friction, lower operating temperatures and can increase mechanical efficiency. Excellent low-temperature characteristics, high, shear-stable viscosity index.  (Refer to product information 4-1096* for further details)  <b>PAO-synthetic</b>
<b>RENOLIN HighGear SYNTH 320</b>		876	220	320	31.2	135	-34	
<b>RENOLIN HighGear SYNTH 460</b>		878	220	460	41.6	140	-27	
<b>RENOLIN HighGear SYNTH 680</b>		880	220	680	57.9	149	-27	

## RENOLIN MORGEAR – demulsifying circulating oils with mild anti-wear (AW) additives for applications in the steel industry

Lubrication of MORGGOIL bearings, mineral oil

Product name	Description	Density at 15°C [kg/m <sup>3</sup> ]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm <sup>2</sup> /s]	Kin.Visc. at 100°C [mm <sup>2</sup> /s]	VI Viscosity index	Pour-point [°C]	Main application area
<b>RENOLIN MORGEAR 100</b>	High-performance circulating oils based on mineral oil, for the lubrication of MORGGOIL bearings. Mild EP/AW additives guarantee good wear protection, synergistically acting additives ensure good aging stability and excellent demulsifying power (very good water separation ability).	888	248	100	11.1	96	-19	For the lubrication of MORGGOIL bearings. RENOLIN MORGEAR oils fulfill and surpass the requirements of DANIELI and SMS.  <b>Mineral oil</b>
<b>RENOLIN MORGEAR 220</b>		895	255	226	19.2	96	-10	
<b>RENOLIN MORGEAR 460</b>		904	>270	470	31.1	96	-9	
<b>RENOLIN MORGEAR 680</b>	ISO 6743-6 and ISO 12925-1: CKB.	915	252	682	39.2	95	-7	

\* PI = Product-information

EP = Extreme pressure additives, to avoid wear and scuffing at high pressures and loads

AW = Anti-wear additives, to avoid wear in mixed friction areas

## RENOLIN Gear and circulating oils – an overview

### RENOLIN PentoGear 320 WT – industrial gear oil for wind energy plants and on the basis of unconventional base oils

Lubrication of wind energy plants, "synthetic" alternative chemistry

Product name	Description	Density at 15°C [kg/m <sup>3</sup> ]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm <sup>2</sup> /s]	Kin.Visc. at 100°C [mm <sup>2</sup> /s]	VI Viscosity index	Pour-point [°C]	Main application area
<b>RENOLIN PentoGear 320 WT</b>	RENOLIN PentoGear 320 WT is based on innovative base oil technology. RENOLIN PentoGear 320 WT surpasses the requirements of DIN 51517-3: CLP; ISO 6743-3 and ISO 12925-1: CKC, CKD, CKE, CKSMP.  Approved by leading gearbox manufacturers.	892	> 220	320	37	165	-39	RENOLIN PentoGear 320 WT is a high-performance gear oil developed specially for use in the main gears of wind energy plants. RENOLIN PentoGear 320 WT is also suitable as a universal applicable industrial gear oil.  <b>"Synthetic" alternative chemistry</b>

### RENOLIN PENTOPOL M/B – synthetic gear and bearing oils for the aluminum industry, for aluminum rolling mills

Gear oil for the aluminum industry, synthetic, non staining

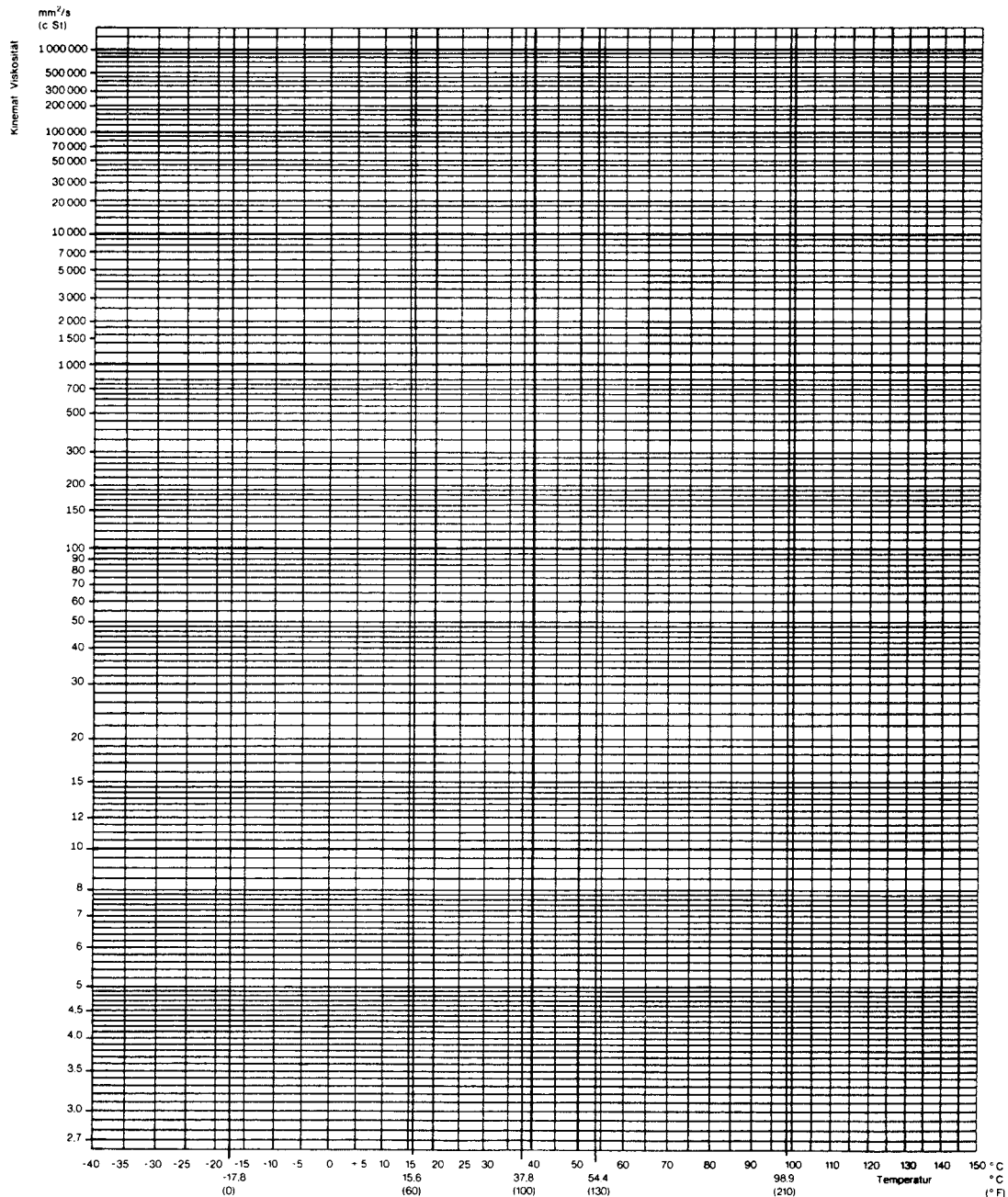
Product name	Description	Density at 15°C [kg/m <sup>3</sup> ]	FLP. Cleveland [°C]	Kin.Visc. at 40°C [mm <sup>2</sup> /s]	Kin.Visc. at 100°C [mm <sup>2</sup> /s]	VI Viscosity index	Pour-point [°C]	Main application area
<b>RENOLIN PENTOPOL M 77</b>	The RENOLIN PENTOPOL series is based on selected synthetic components in connection with synergistic additives. The RENOLIN PENTOPOL series was developed for the lubrication of machines, bearings and gears in the aluminum industry. The products have very good compatibility with aluminum and are preferred non-staining products for the aluminum industry. Moreover, the RENOLIN PENTOPOL products prevent the formation of hot spots and prevent from discolouration on the aluminum surface.	995	200	77	14	185	-45	For lubricating bearings, gears and machines in the aluminum industry, in aluminum roll stands and in aluminum rolling mills. Zinc- and ash-free aluminum non-staining fluids.
<b>RENOLIN PENTOPOL M 175</b>		995	> 240	175	29	206	-39	
<b>RENOLIN PENTOPOL B 150</b>		998	230	150	26	205	< -45	

### Special gear and circulating oils

Product name	Description
<b>RENOLIN UNISYN CLP PA</b>	Fully synthetic <b>polyalphaolefin-based high-performance paper machine oils</b> . Excellent demulsifying power (very good water separation ability), good aging stability, excellent wear protection, excellent corrosion protection, long lifetime. Surpass the paper machine oil requirements of SKF, FAG and VOITH.
<b>RENOLIN PA</b>	<b>Mineral oil-based paper machine and lubricating oils</b> oil with the latest additive technology for the special requirements of bearings and discs in paper machines; very good demulsifying properties, excellent corrosion protection and wear protection. Surpass the requirements on paper machine oils acc. to Voith specification.
<b>RENOLIN SynGear 220 HT</b>	Fully synthetic high-temperature EP industrial gear oil based on selected polyalkylene glycols, extreme high-temperature stability, low evaporation loss, high wear protection, high thermal and oxidative stability, <b>for lubrication of calenders in the paper and foils industries</b> , CKC/CKD/CSPG/CTPG gear oil according to ISO 6743/6 and ISO 12925-1.
<b>RENOLIN CLP VCI</b> <b>RENOLIN UNISYN GEAR VCI</b>	Special industrial gear oils oil based on mineral oil or polyalphaolefin (PAO), reliable long-time corrosion protection guaranteed both in the oil phase and vapor phase, fulfills and surpasses with the requirements of CLP industrial gear oils, good wear protection, good compatibility with gear oils, contains VCI additive booster.



# Viscosity-temperature diagram



## Note

The information contained in this product information is based on the experience and know-how of FUCHS LUBRICANTS GERMANY GmbH in the development and manufacturing of lubricants and represents the current state-of-the-art. The performance of our products can be influenced by a series of factors, especially the specific use, the method of application, the operational environment, component pre-treatment, possible external contamination, etc. For this reason, universally-valid statements about the function of our products are not possible.

Our products must not be used in aircraft or spacecraft. Our products may be used in the manufacture of components for aircraft or spacecraft if they are removed without residue from the components prior to assembly into the aircraft or spacecraft.

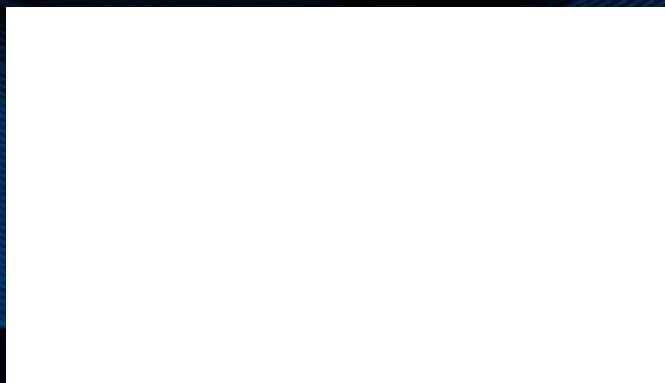
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FUCHS Lubricants

## Innovative lubricants need experienced application engineers

Every lubricant change should be preceded by expert consultation on the application in question. Only then can the best lubricant system be selected. Experienced FUCHS engineers will be happy to advise on products for the application in question and also on our full range of lubricants.

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