FUCHS Industrial Lubricants

Innovative Lubricants Need Experienced Application Engineers

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

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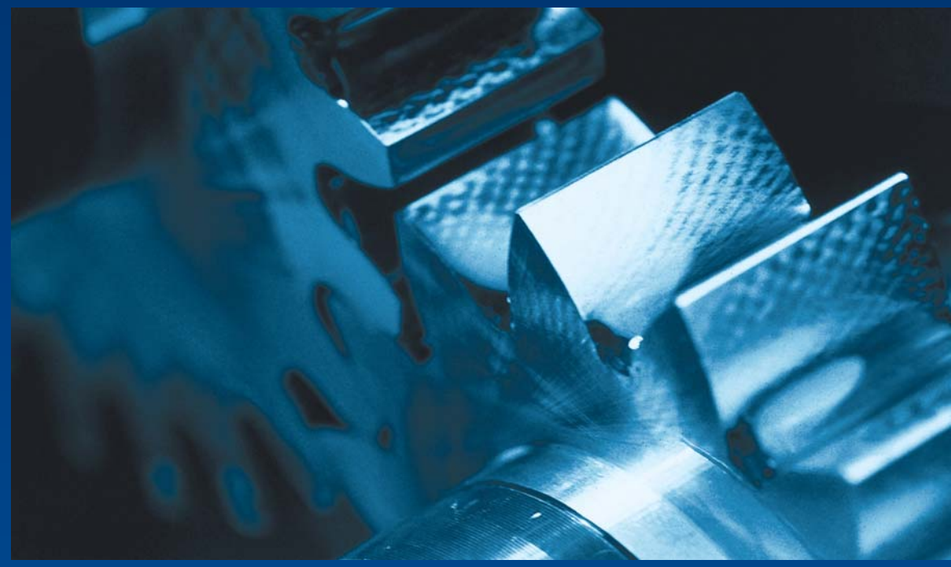
FUCHS Industrial Lubricants

RENOLIN

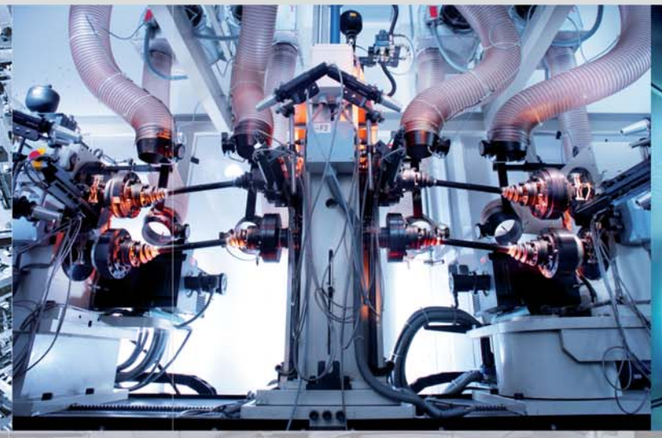
Industrial Oils for every application



Industrial Oils: Gear and Hydraulic Oils Compressor and Turbine Oils

FUCHS

YOUR STRONG **GLOBAL PARTNER** FOR INDUSTRIAL LUBRICANTS



HOW WE **EXCEL**

We are a German company whose almost 600 employees manufacture and market a wide range of lubricants and derived specialties. The company, which was founded in 1931 as RUDOLF FUCHS, is located in Mannheim and is a 100% subsidiary of FUCHS PETROLUB AG, which is the largest independent lubricants manufacturer worldwide.

Our company's degree of specialisation and innovation is way above the industrial average in this field. The full product line includes almost 2,000 lubricants and derived specialties for all walks of life, industrial processes and applications. Our customer's success is also our success. Because partnership to us means passing on benefits.

The advantage of a strong market presence: FUCHS is the largest independent manufacturer of lubricants in the world. The benefit of premium, innovative products from a full-line manufacturer: With a complete product line as well as tailor-made special solutions, FUCHS has a product for every application. The benefits of reliability: Certified according to DIN EN ISO 9001:2000 and ISO/TS 16949:2002, FUCHS has been continuously upgrading its highly specialised lubricants for decades.

And naturally, partnership for us also means providing our customers with competent support. With comprehensive marketing. With high-performance logistics. With the development of successful service concepts. And qualified consulting. Because together, we can achieve more.

WHAT **INCREASES THE VALUE** OF OUR PRODUCTS

We develop lubricants: application-specific and tailor-made for our customer's processes. Together we look for the best lubricants for our customers. This cooperation is unique in terms of its form, scope and intensity. We call it development partnership. The success of our development partnerships is based on an important fact: FUCHS is not one of the oil-giants.

FUCHS is a multinational, independent lubricant manufacturer. Our independence is the difference. We are open to new solutions, open for visions – the prerequisites for innovations. And innovation is the defining characteristic of FUCHS. 70% of our products are less than five years old and the great majority of our products are individual solutions. Challenge us and see!

DIN EN ISO 9001:2000
ISO/TS 16949:2002
DIN EN ISO 14001:2004
REG.NR. 2476

A major engineering element – Industrial Gear Oils.

Gear oils for all applications.

Germany is one of the world's leading manufacturers of drive trains and gearboxes. A gear oil represents an important engineering element in drive train technology and is used in almost all areas of application.

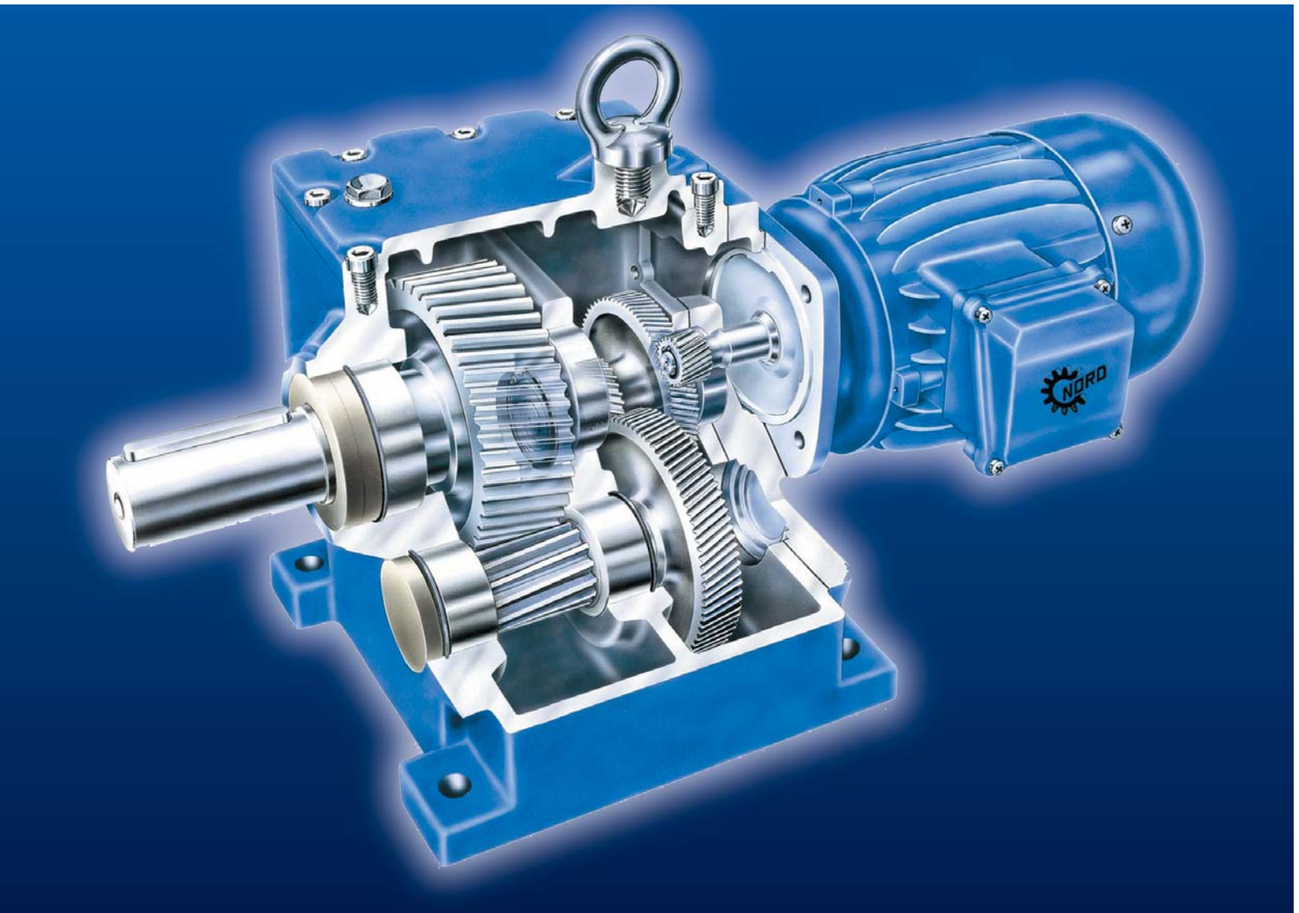
The demands made on gear oils have risen significantly. New developments in the field of drive train technology are mostly accompanied by increases in component performance: More performance or higher capacity needs to be transferred in ever shorter periods of time. At the same time, components and gearboxes become increasingly smaller and compact.

A gear oil, as one of the most important and complex engineering elements, must satisfy changing application conditions and performance requirements. Oil volumes get smaller, oil circulation cycles increase and the energy transferred to the lubricant increases.

This leads to an increase in the thermal and oxidative load on the lubricant. And in addition, the technical demands on industrial lubricants have changed dramatically over recent years – these have become more "stringent". New, complex bench tests with exact thresholds have been developed to better reflect the demands and problem areas in drive trains and gears.

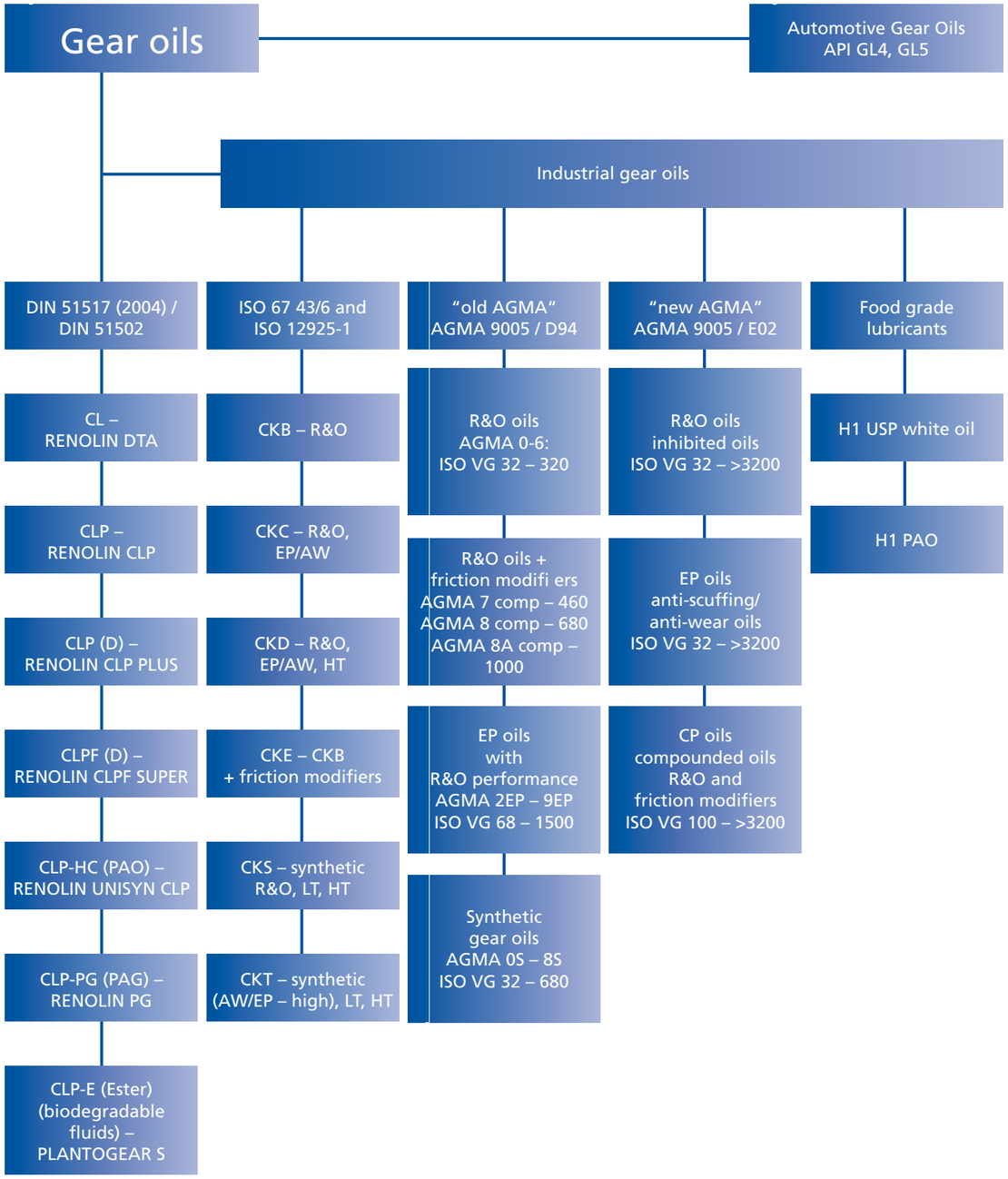
Gear oils can be divided into two main groups according to their use:

- General lubricating and gear oils for industrial applications (stationary gear oils) conforming to DIN 51 517, ISO 6743/6 and
- Lubricating and gear oils for automotive applications (mobile gear oils), commercial vehicle gear oils and Automatic Transmission Fluids conforming to API GL 4, GL 5, etc.



RENOLIN

General classification of gear oils.



New AGMA standard – wind power gear oils: ICE 61400-4 WD3b 2008-12: draft

L = Anti oxidant, anti corrosion = R&O

P = Anti-wear, extreme pressure = AW/EP (anti-scuffing, anti-wear, extreme pressure)

D = Detergent / Dispersant
F = MoS_2 (black colour)

HT = High Temperature
LT = Low Temperature
FM = Friction Modifier

C = General lubricating oil

While the information and figures given here are typical of current production and confirm to specification, minor variations may occur. Subject to amendment.

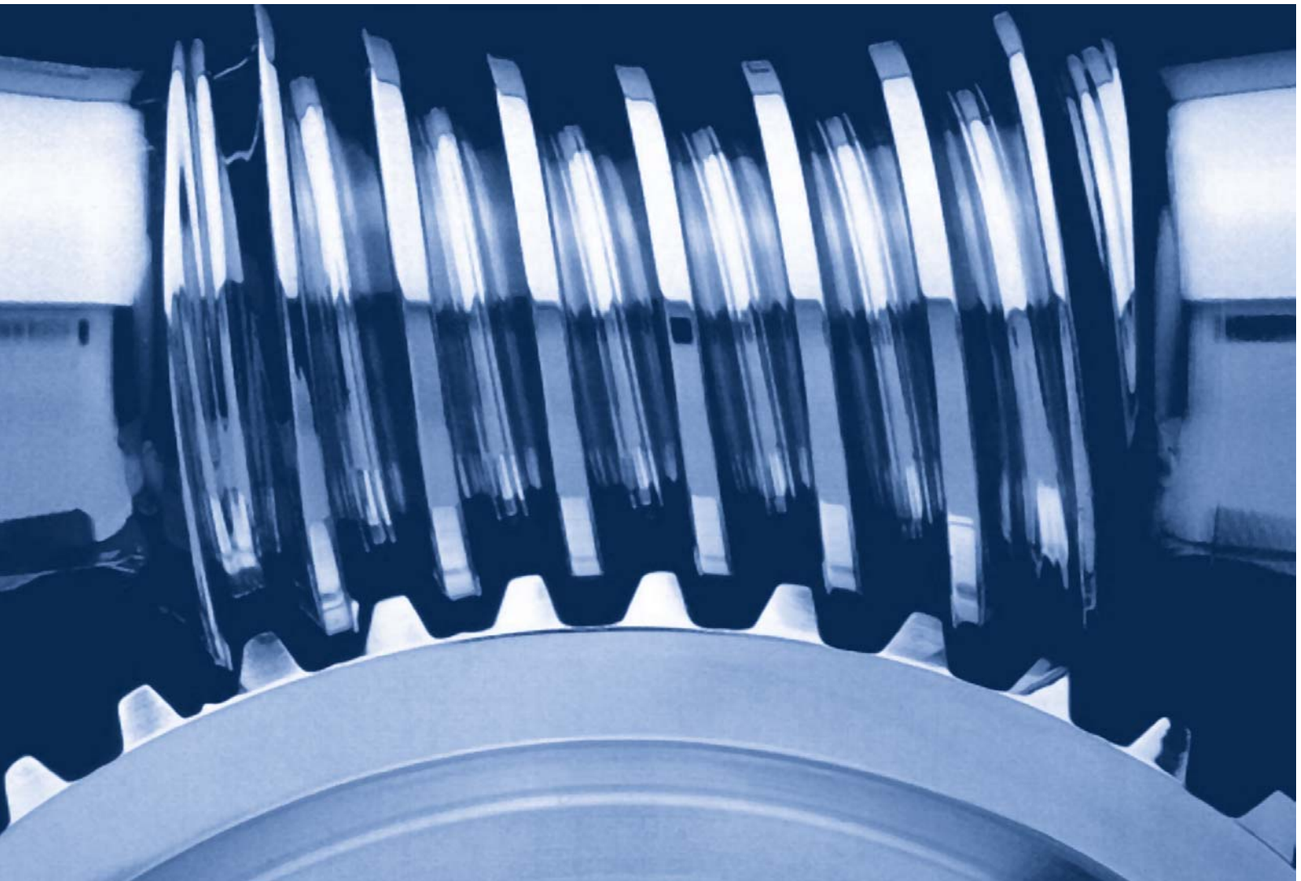
Reliable solutions for engineering and the environment.

Demands on industrial oils.

The demands made on industrial gear oils are increasing. Although the new DIN 51 517 (dated 2004) only specifies a scuffing test in line with FZG A/8,3/90 and the roller bearing test FE8 in addition to the physical characteristics, many gear manufacturers' specifications contain additional demands:

- Intensified scuffing test according to FZG A/16,6/140
- Micro-pitting test at 60 °C and at 90 °C according to GFT, FVA I-IV, C/8,3/90 and C/8,3/60
- FE8 roller bearing wear test in line with DIN 51 819, Part 3 (and variants) – D/7,5/80-80
- FZG low-speed wear test
- FZG pitting test
- Load-carrying capacity according to Brugger
- Filtration behaviour – dynamic test
- Foaming behaviour (e.g. Flender in-house test)
- Low temperature behaviour
- Low temperature flowability

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 advanced test rigs for the testing of industrial 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 drive train technology (FVA) and international customers results in a constant refinement and improvement of both standardized test procedures as well as FUCHS in-house bench tests.



RENOLIN

The FUCHS gear oil series.

Although mineral oil-based gear oils continue to dominate, synthetic oils are increasingly being used in the rapidly growing power transmission market. Compared to mineral oils, synthetic gear oils have a significantly longer life, generate lower service costs and offer excellent value for money in terms of reducing wear to gears and bearings. They are more expensive than mineral oils but these higher costs are compensated for by two-to-three times longer life, lower maintenance costs, wider application temperature range (multigrade characteristics), lower disposal costs, better technical performance and lower component wear.

In addition to a comprehensive product program of mineral oil-based gear oils including

- RENOLIN CLP
- RENOLIN MORGEAR

FUCHS has also developed a complete range of fully synthetic gear oils including:

- RENOLIN UNISYN CLP – based on polyalphaolefins (PAO)
- RENOLIN PG – based on polyalkylene glycols (PAG)

FUCHS is a leading player in the field of power transmission engineering and its product line satisfies 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.

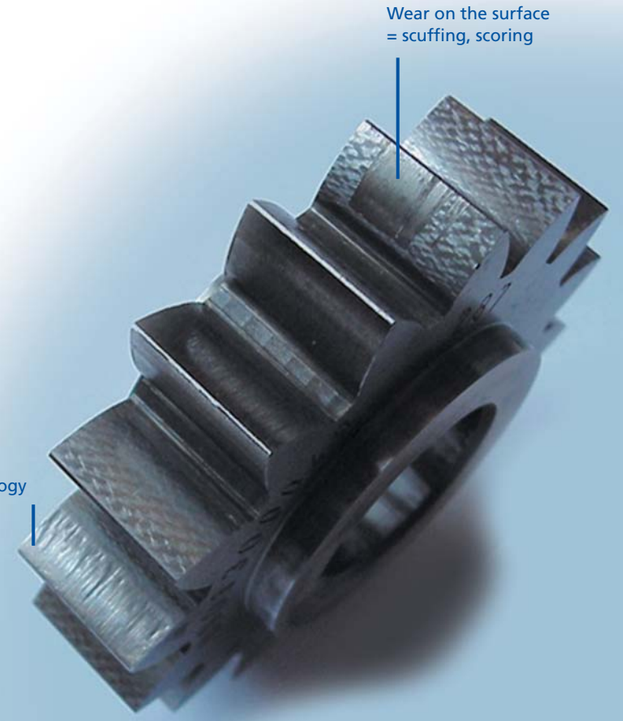
- RENOLIN UNISYN CLP series

These synthetic polyalphaolefin-based gear oils are characterized by a high natural, shear-stable viscosity index. This provides effective lubrication at both high and low application temperatures (multi-grade lubricants).

Their compatibility with paints and elastomers is comparable with that of mineral oils. Compared to mineral oils, the service life of these oils is about two-to-three times longer. RENOLIN UNISYN CLP offers outstanding wear protection properties. As a result of their extremely low pourpoint, these oils display extraordinary cold flowing properties. And among synthetic gear oils, they represent the most important group.

- RENOLIN PG series

RENOLIN PG series products are based on special polyalkylene glycols. They display very low friction coefficients in tribological conditions. Their high natural viscosity index makes them shear-stable. RENOLIN PG oils can be used at both high and low temperatures. RENOLIN PG oils are primarily used to lubricate steel / bronze worm drives and are recommended for applications subject to unfavourable friction conditions and very high temperatures (e.g. calender lubrication and paper-making machines). Compatibility with machine components must be tested prior to use. Polyglycols are neither miscible nor compatible with mineral oils.



FUCHS Industrial Lubricants

Special lubricating oils and industrial gear oil – an overview.

RENOLIN CLP – Demulsifying high performance EP/AW gear oils and general lubricating oils

CLP oils (demulsifying)

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN CLP 68	High performance, gear oils and general lubricating oils with good ageing stability and additives to improve corrosion protection (combat ferrous and nonferrous metal corrosion caused by moisture). Outstanding anti-wear characteristics – good EP/AW performance, excellent protection against scuffing and micro-pitting, excellent FE8 roller bearing wear protection, good demulsifying properties, very good foaming suppression, zinc- and silicone oilfree. RENOLIN CLP oils fulfil and surpass the minimum requirements of lubricating oils. CLP according to DIN 51 517, Part 3 (2004), ISO 6743-6 and ISO 12925-1: CKC, CKD. US Steel 224, David Brown S1.53.10. Approved by leading gearbox manufacturers.	886	236	68	8.7	99	-24	Universal gear oils for all industrial applictions such as in bearings, knuckles, spur, bevel and worm drives and whenever the manufacturer recommends a Type CLP oil.
RENOLIN CLP 100		890	240	100	11.2	98	-24	
RENOLIN CLP 150		894	250	150	14.5	94	-24	
RENOLIN CLP 220		896	260	220	18.9	96	-24	
RENOLIN CLP 320		900	255	320	24.0	95	-14	
RENOLIN CLP 460		901	270	460	30.4	95	-12	
RENOLIN CLP 680		918	270	680	36.8	88	-10	

RENOLIN UNISYN CLP - Fully synthetic, high performance EP/AW gear oils based on polyalphaolefins (PAO)

CLP-HC oils / PAO-synthetic

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN UNISYN CLP 68	Fully-synthetic gear and general lubricating oils with excellent thermal and ageing stability, very high viscosity index (shear-stable), outstanding low temperature characteristics, good cold-flowing properties, very good air release, low foaming, good protection against micro-pitting. The RENOLIN UNISYN CLP series of oils surpass the minimum requirements of CLP-HC gear oils according to DIN 51 517, Part 3 together with DIN 51 502, ISO 6743-6 and ISO 12925-1: CKC, CKD, CKE, AISE 224, David Brown S1.53.101. Approved by leading gearbox manufacturers.	848	240	68	10.7	147	-56	For the lubrication of bearings and gearboxes which are subject to high thermal loads. RENOLIN UNISYN CLP oils are suitable for lubricated-for-life applications and in gearboxes with extended drain intervals. Miscible and compatible with mineral oils. Excellent low temperature characteristics, high, shear-stable viscosity index. RENOLIN UNISYN CLP 320 "Wind Power" gear oil, fullfil and surpass the requirements of important bearing and gear manufacturers. RENOLIN UNISYN is recommended for wind turbine gear sets worldwide.
RENOLIN UNISYN CLP 100		851	250	100	14.5	150	-53	
RENOLIN UNISYN CLP 150		853	250	150	19.6	150	-45	
RENOLIN UNISYN CLP 220		854	260	220	26.7	155	-42	
RENOLIN UNISYN CLP 320		860	260	320	35.0	155	-42	
RENOLIN UNISYN CLP 460		861	300	460	45.6	155	-39	
RENOLIN UNISYN CLP 680		862	300	680	62.2	160	-33	
RENOLIN UNISYN CLP 1000		864	300	1.000	84.0	165	-27	

RENOLIN MORGEAR - Demulsifying circulating oils with mild AW anti-wear additives for applications in the steel industry

Lubrication of MORGOIL bearings

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN MORGEAR 100	High-performance lubricating and circulating oils based on mineral oil, for the lubrication of MORGOIL bearings, mild AW additives guarantee excellent wear protection, synergistically acting additives protect against corrosion and guarantee excellent oxidation stability, excellent demulsibility (very good water separation properties). ISO 6743-6 and ISO 12925-1: CKB.	888	248	100	11.1	96	-19	For the lubrication of MORGOIL bearings, RENOLIN MORGEAR oils fulfil and surpass the requirements of DANIELI (Italy, 2000) and SMS (2005).
RENOLIN MORGEAR 220		895	255	226	19.2	96	-10	
RENOLIN MORGEAR 320		903	>260	320	24.0	95	-12	
RENOLIN MORGEAR 460		904	>270	470	31.1	96	-9	
RENOLIN MORGEAR 680		915	252	682	39.2	95	-7	

RENOLIN PG - Synthetic, high performance EP/AW gear oils based on polyalkylene glycols (PAG)

CLP-PG oils / polyglycol

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN PG 32	Fully synthetic gear and general lubrication oils based on special polyalkylene glycols (PAG) for applications subject to extreme thermal loads. High oxidation and ageing stability, high viscosity index (shear-stability), good viscosity-temperature behaviour, excellent EP performance, low coefficients of friction, high FZG, good protection against micropitting and good FE8 performance. The RENOLIN PG series of oils surpass the minimum requirements of CLP-PG lubricating oils according to DIN 51 517, Part 3 together with DIN 51 502, ISO 6743-6 and ISO 12925-1: CKC, CKD, CKE, (CKS), CKT. Approved by leading gearbox manufacturers.	1.022	220	32	7.1	194	-54	For gearboxes operating in extreme thermal and mechanical conditions such as in worm gears and calenders. Can also be used as a compressor oil for process gases such as methane, ethane, propane, etc. Particularly suitable for steel/ bronze bearings in worm gears. Not miscible or compatible with mineral oils.
RENOLIN PG 48		1.029	240	46	9.7	203	-48	
RENOLIN PG 68		1.035	240	68	13.8	212	-51	
RENOLIN PG 100		1.043	260	100	19.6	220	-48	
RENOLIN PG 150		1.051	260	145	27.0	224	-51	
RENOLIN PG 220		1.075	240	220	36.8	218	-36	
RENOLIN PG 320		1.075	240	320	54.4	237	-39	
RENOLIN PG 460		1.075	280	460	75.1	245	-36	
RENOLIN PG 680		1.075	280	680	110.3	261	-33	
RENOLIN PG 1000		1.075	280	1.000	162.0	281	-36	

While the information and figures given here are typical of current production and confirm to specification, minor variations may occur. Subject to amendment.

A Complete Line of High Performance Hydraulic Oils

We come across hydraulic fluids everywhere in our daily lives; almost every machine uses hydrualics. The hydraulic fluid is an important design and construction element in the planning, realisation and commissioning of hydraulic equipment. The performance of a hydraulic fluid has a major influence on the reliability and performance of hydraulic components.

Fuchs has a leading market position in the hydraulic fluid market and satsifies all areas of application and hydraulic groups with a complete product portfolio which includes:

- Mineral oil based hydraulic fluids
- Fire resistant hydraulic fluids
- Biodegradable fluids

Mineral Oil Based Hydraulic Fluids

The Fuchs range of mineral oil based hydraulic fluids includes tried and tested mulifunctional Renolin MR series, the zinc free Renolin ZAF series in addition to the Renolin B PLUS series of HLP oils.

Fire Resistant Hydraulic Fluids

HYDROTHERM 46 M is a well-known water-glycol fluid which complies with the 7th Luxembourg Report and has been approved by a host of component manufacturers. It offers extraordinarily long life, extremely good wear protection and high chemical stability.

The PLANTOFLUX AT-S series of HFDU fluids based on selected carbonic acid esters is approved by Factory Mutual in the USA and is used with great success in the iron, steel and aluminium industries.

Biodegradable Hydraulic Fluids

As one of the pioneers in the area of rapidly biodegradable fluids, our product program includes

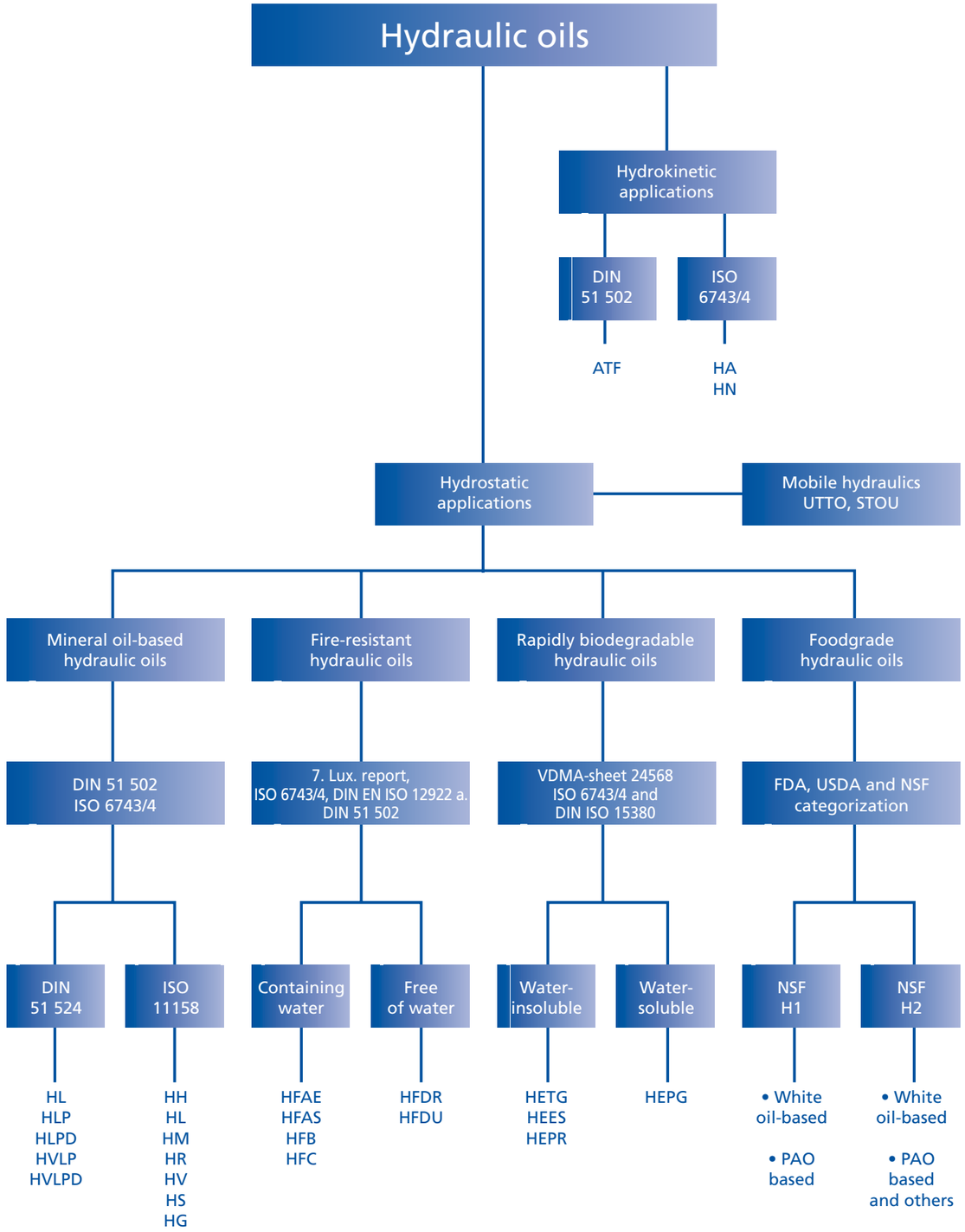
PLANTOHYD N – Vegetable oil based fluids
PLANTOHYD S – Partially saturated esters
PLANTOSYN – Saturated esters

The PLANTOHYD S and PLANTOSYN product series are biodegradable hydraulic fluids based on selected ester oils. The products surpass the highest technical and ecological requirements with regard to excellent biodegradability, low toxicity, excellent performance. The raw materials are based on renewable sources. PLANTO oils offer:

- High Shear Stability
- Outstanding viscosity-temperature behaviour
- A stable lubricating film

The optimum fluid for every application –
and the optimum solution for every problem.

Summary of the various hydraulic oil categories.



RENOLIN

Specialties for the specialist – an overview.

RENOLIN B PLUS – High performance demulsifying AW/EP hydraulic and general lubricating oils, Denison HFO approved

HLP oils (demulsifying)

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN B 10 PLUS	General lubricating and hydraulic oils with good ageing resistance and additives to improve corrosion protection. Good viscosity temperature behaviour, good wear protection, demulsifying, good air release, contain zinc. The RENOLIN B PLUS series fulfil and surpass the minimum demands on HLP hydraulic oils according to DIN 51 524-2. ISO 6743/4, HM ISO 11158, HM Denison HF0, HF1, HF2	845	130	10	2.6	100	<-9	As lubricating oils but also as hydraulic oils if good ageing resistance, wear protection and demulsifying properties are required. Universal hydraulic oils for all systems, even if thermally stressed. Excellent filtration behaviour.
RENOLIN B 22 PLUS		860	160	22	4.3	100	<-9	
RENOLIN B 32 PLUS		860	190	32	5.4	100	<-9	
RENOLIN B 46 PLUS		868	220	46	6.8	100	<-9	
RENOLIN B 68 PLUS		875	225	68	8.8	100	<-9	
RENOLIN B 100 PLUS		882	230	99	11.4	100	<-9	

RENOLIN B HVI – High performance demulsifying AW/EP hydraulic oils with a high Viscosity Index, Denison HFO approved

HVLP oils (demulsifying)

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN B 15 HVI	Hydraulic and general lubricating oils (machine oils) with a high Viscosity Index and additives to improve ageing resistance, corrosion protection and wear protection. Mineral oil-base and containing zinc, RENOLIN B-HVI oils are HVLP hydraulic and general lubricating oils according to DIN 51 524-3. ISO 6743/4, HV ISO 11158, HV Denison HF0, HF1, HF2	859	180	15	3.8	151	-36	RENOLIN B-HVI oils are suitable for all hydraulic systems, especially when a high viscosity index is specified or if excess viscosity during start-ups or insufficient viscosity at operating temperatures is a problem. High VI provides multigrade characteristics. "Energy-saving-fluids", high-efficiency fluids.
RENOLIN B 32 HVI		858	180	32	6.3	152	-36	
RENOLIN B 46 HVI		866	200	46	8.1	149	-36	
RENOLIN B 68 HVI		873	200	68	11.0	154	-36	

EP = Extreme pressure additives, to avoid wear seizures and scuffing at high pressures and loads
AW = Anti wear additives, to avoid wear in boundary friction conditions

While the information and figures given here are typical of current production and confirm to specification, minor variations may occur. Subject to amendment.

RENOLIN MR – High detergent AW/EP general lubricating and hydraulic oils with excellent corrosion protection

HLPD-oils (detergent/dispersant)

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN MR 1	RENOLIN MR products are special HLPD lubricating and hydraulic fluids according to DIN 51 502 with outstanding corrosion protection, powerful cleaning and sludge transportation properties. Contain zinc as well as being detergent and dispersant. RENOLIN MR oils are used in a number of hydraulic systems as problem solvers, especially when standard oils cannot fulfil all the requirements. RENOLIN MR products fulfil and surpass the minimum demands on HLPD hydraulic oils according to DIN 51 524-2. ISO 6743/4-HM with high DD-performance.	821	130	5	1.6	80	<-3	RENOLIN MR 3: For machine tool spindles and bobbin bearings in the textile industry. RENOLIN MR 5, 10 and 20: Heavy-duty hydraulic oils with good corrosion protection up to continuous temperatures of 100 °C. RENOLIN MR 5, 10 and 20: For smaller gearboxes, especially when fitted with electromagnetic clutches. RENOLIN MR 30: For larger gearboxes. Running-in and corrosion protection oil.
RENOLIN MR 3		837	130	10	2.6	91	<-9	
RENOLIN MR 5		861	200	22	4.3	105	<-9	
RENOLIN MR 10		862	200	32	5.4	102	<-9	
RENOLIN MR 15		879	200	46	6.9	105	<-9	
RENOLIN MR 20		881	200	68	8.9	105	<-9	
RENOLIN MR 30		886	200	100	11.4	100	<-9	

RENOLIN ZAF – Demulsifying AW/EP, zinc- and ash-free hydraulic oils

Zinc-and ash-free HLP oils (demulsifying)

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN ZAF 32	Zinc- and ash-free lubricating and hydraulic oils with good ageing resistance. They contain additives which reduce wear and inhibit corrosion. HLP according to DIN 51524-2 HM according to ISO 6743/4 HM according to ISO 11158	860	215	32	5.4	100	-30	Demulsifying, zinc- and ash-free hydraulic and general lubricating oils with good ageing resistance for all hydraulic drives even if thermally stressed. Reduce environmental pollution and waste water treatment costs.
RENOLIN ZAF 46		868	230	46	6.7	100	-27	
RENOLIN ZAF 68		874	230	68	8.7	100	-24	

EP = Extreme pressure additives, to avoid wear seizures and scuffing at high pressures and loads
AW = Anti wear additives, to avoid wear in boundary friction conditions

While the information and figures given here are typical of current production and confirm to specification, minor variations may occur. Subject to amendment.

Specialties for the specialist – an overview.

Fire Resistant Fluids HFDU

PLANTOFLUX AT-S – Synthetic, environmentally harmless hydraulic fluids

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
PLANTOFLUX AT 46 S	PLANTOFLUX AT-S are fire resistant fluids based on synthetic esters. With their high VI, they cover a wide operating temperature range. They offer high oxidation and ageing resistance, excellent corrosion protection and anti-wear properties. Approved according to Factory Mutual USA (FMUSA), Type HFDU (according to DIN 51 502, VDMA 24317, FM-USA), Rapidly biodegradable according to CEC-L-33-A-93	918	264	46	9.7	197	<-30	PLANTOFLUX AT-S are primarily used as fire resistant hydraulic fluids in machines or plants operating in hazardous conditions, i.e. where naked flames and high temperatures are present and the fire risk caused by fluid leakage is high, most notably: steel mills, blast furnaces, continuous casting machines and coke plants.
PLANTOFLUX AT 68 S		930	274	68	12.6	185	<-33	

Fire Resistant Fluids HFC

HYDROTHERM 46 M – Water glycol environmentally harmless hydraulic fluids

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
HYDROTHERM 46 M	Fire resistant, Group HFC hydraulic fluid according to DIN 51 502, aqueous polymer solution containing up to 50% water. Hydrotherm 46M fulfils the requirements of the 7th Luxembourg Report, is biodegradable and free of nitrite and mono ethylene glycol. Approved by Danieli, Buhler & Mannesmann Rexroth	1084	N/A	46	9.5	195	-42	For use in mobile & stationary hydraulic systems, in the steel industry in rolling mills at risk of fire, in casting bays and in mining applications.

Biodegradable oils HETG

PLANTOHYD N - Vegetable oil based, environmentally harmless hydraulic fluids

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
PLANTOHYD 40 N	Vegetable oil-based hydraulic fluid with additives to increase oxidation and ageing stability. Rapidly biodegradable, > 90 % in 14 days. HETG 46 according to ISO 15380	922	> 306	44	9,6	223	-36	Universally applicble in hydraulic systems from – 27 °C to 70 °C. Changeover guidelines ISO 15380 should be observed.

Biodegradable oils HEES

PLANTOHYDS S and PLANTOSYN HVI – Ester-based, environmentally harmless hydraulic fluids

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
PLANTOHYD 15 S	Synthetic ester oils with additives to increase ageing stability. Rapidly biodegradable, > 90 % in 14 days. PLANTOHYD S and PLANTOSYN offer excellent natural wear protection (FZG Stage 12). 15 S: HEES 15 22 S: HEES 22 32 S: HEES 32 46 S: HEES 46 68 S: HEES 68 according to ISO 15380 Fully-saturated synthetic ester oil offering the highest performance. HEES 46 according to ISO 15380.	927	225	15	4,0	161	-51	Universally applicable as hydraulic or general lubricating oils. Especially in situations where environmental protection is a priority. Temperature range: - 35 °C to 90 °C. Changeover guide-lines ISO 15380 should be observed. PLANTOSYN HVI products are recommended when temperature range, ageing stability and material compatibility are priorities. PLANTOHYD S and PLANTOSYN oils out-perform mineral oil-based hydraulic oils in a number of areas.
PLANTOHYD 22 S		926	240	22	5,4	191	-36	
PLANTOHYD 32 S		921	246	32	7,1	188	-51	
PLANTOHYD 46 S		921	304	49	9,6	186	-42	
PLANTOHYD 68 S		927	304	68	12,2	177	-48	
PLANTOSYN 46 HVI		905	290	46	8,1	150	-33	

While the information and figures given here are typical of current production and confirm to specification, minor variations may occur. Subject to amendment.

RENOLIN

FUCHS Turbine and Compressor Lubricants

It All Depends on The Right Lubricant.

The demands on turbine oils.

The global demand for energy continues to increase. Apart from the building of new power stations, an ever greater emphasis is also being placed on increasing the efficiency of energy production.

The use of new technologies in power stations and the increasing efficiency and performance of gas and steam turbines is placing greater demands on the performance of the lubricants used in these applications.

Significantly lower oil volumes for higher-performance turbines along with the use of oil circuits in combined cycle gas and steam turbines require long-life turbine oils which display, among others, outstanding thermal oxidation stability and excellent water and air release properties.

FUCHS has developed the RENOLIN ETERNA series to meet the demands of such machinery as well as highly stressed gearboxes.

The demands on air compressor oils.

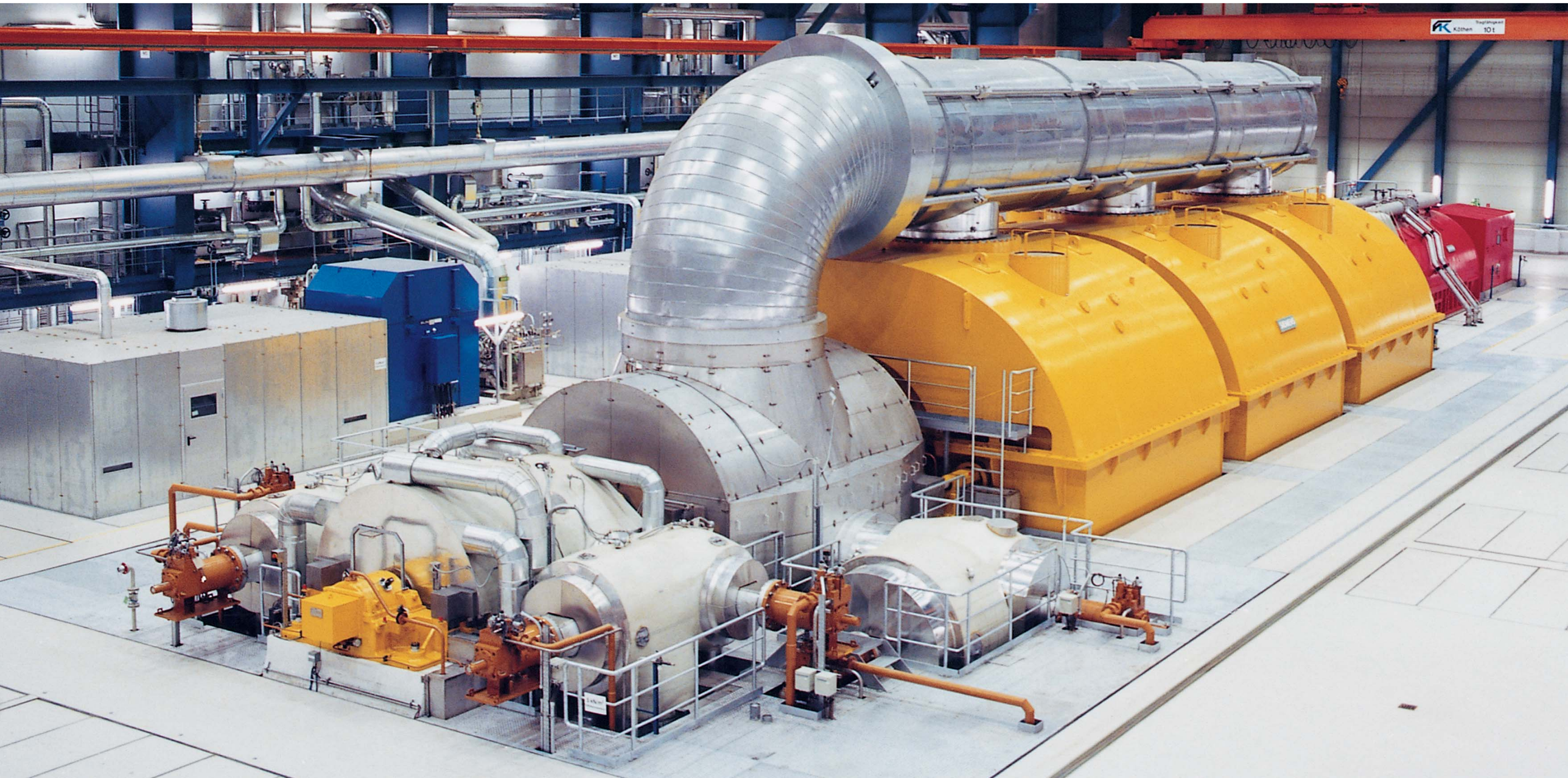
These days compressed air is an important energy transfer medium in a number of technical application areas.

The reliable generation of compressed air is of crucial importance to many users and as a result, air compressors are vital equipment in many industrial areas.

As short life or breakdowns can lead to production stoppages, the use of the right lubricant is a prerequisite for the reliable and efficient operation of plant and machinery. In recent years, compressed air generation has been optimised and as a result, greater demands are now placed on air compressor oils.

Operators expect long machinery service intervals and thus also longer life of compressor lubricants. But not just oil change intervals were extended; oil temperatures have risen along with the reduction in oil volumes.

To safely satisfy these demands, FUCHS developed special RENOLIN air compressor oils and subjected them to the severest of practical trials.



FUCHS Industrial Lubricants

High-tech Turbine Oils of the Highest Quality.

RENOLIN ETERNA

The RENOLIN ETERNA series was developed to satisfy the increasing demands of today's turbine oils and to facilitate a degree of rationalisation in gas and steam plants. These oils were also formulated for use in plants which integrate highly-stressed gearboxes.

RENOLIN ETERNA series products are perfect for use in gas, steam and expansion turbines as well as turbo-compressors with or without gearboxes. In addition, they can also be used as bearing and sealing oils in hydrogen-cooled generators and as mineral oil-based control fluids in the hydraulic control circuits of turbine plants.

The objective of our development of RENOLIN ETERNA turbine oils was to offer our customers excellent (EP/AW) wear protection, good ageing stability and minimal sludge and deposit-forming tendencies.

They are based on the very latest lubricant technology, containing premium, hydrogenated base oils. The outstanding properties of these base oils are further improved by the inclusion of carefully selected additives. RENOLIN ETERNA products are free of organometallic compounds and are therefore zinc- and ash-free. RENOLIN ETERNA offers excellent corrosion protection.

Benefits:

- Outstanding thermal oxidation stability. RENOLIN ETERNA achieves excellent life of > 10,000 hours in TOST test according to ISO 4263 as well as RPVOT test > 1,000 minutes according to ASTM D-2272.
- Good viscosity-temperature behaviour. RENOLIN ETERNA oils have high, shear-stable, natural Viscosity Index (VI> 130).
- Rapid air release: Air release < 4 minutes.
- Low foaming: Seq. I at +24.5 °C = 30/0.
- Low pourpoint: -15 °C.
- Good wear protection: FZG A/8, 3/90, damage load stage > 10.
- Excellent water release after steam treatment: < 50 seconds
- Low sludging and deposit-forming tendency.

Oil ageing, 168 hours at +135 °C in a beaker with a steel cylinder (FUCHS In-house test)
Thermal stability and deposit tendency of the various base oils in turbine oil formulations

Poor thermal stability
Significant deposits

Moderate thermal stability
Moderate deposits

High thermal stability
No deposits

RENOLIN

FUCHS Industrial Lubricants

Air Compressor Oils – a Major Design Element.

Lubrication has a significant influence on the behaviour of compressors and their reliability. It is therefore vital that the right lubricant is selected to ensure reliable, economical and safe operation. FUCHS can offer you the best air compressor oil for your compressor and your specific application.

The principal functions of a compressor lubricant include:

- Dissipation of heat
- Lubrication of bearings
- Avoidance of metal-to-metal contact
- Sealing (minimisation of reflux losses)
- Corrosion protection (ferrous and nonferrous metals)

To satisfy these requirements, high-performance air compressor oils must have the following characteristics:

- Outstanding oxidation and thermal stability*
- Low evaporation and coking tendency
- Good demulsification
- Low foaming
- Good long-term viscosity-temperature behaviour
- Good air release
- High corrosion protection
- Excellent ageing stability

* Temperature and ageing resistance (thermal and oxidation stability, evaporation and coking tendency) is of particular importance because of safety and long product life considerations.

FUCHS Screw Compressor Oils

In recent years, not only the market share of screw compressors has risen, but their performance has also increased. Such compressors today are not only smaller but also offer higher specific performance. Amongst others, this has placed greater demands on the lubricants used because the volumes of oil available for cooling and lubrication has progressively been decreased.

And to lower operating costs and to cut down-time for servicing, maintenance intervals have also been extended. Such extensions automatically lead to longer oil change intervals. These and higher air-outlet temperatures are further loads on the compressor oils. Many compressor plants these days are operated with air-outlet temperatures of > +110 °C compared to +75 °C to +85 °C in the past.

Typical oil volumes for screw compressors

Power (kW)	Oil volume (litre)	Oil circulation (litre/min)	Circulation factor
30	8	28	3,50
75	25	75	3,00
130	230	180	0,78
200	230	200	0,87
280	224	280	1,25

Typical oil change intervals for screw compressors*

Product	Type	Temperature up to max. +85 °C Oil change interval (h)	Temperature > +85 °C < +120 °C Oil change interval (h)
Standard oils	Mineral oil	2,000 – 3,000	1,000 – 2,000
Semi-synthetic oils	Hydrocracked oils	4,000 - 6,000	2,000 - 3,000
Synthetic oils	PAO (polyalphaolefins)	> 8,000	> 4,000

*) The above-mentioned oil change intervals are guidelines and refer to normally-stressed industrial compressed air in European ambient temperatures between +10 °C and +30 °C. At higher temperatures and polluted atmospheres (waste dumps, water purification plants, chemical industry, etc.), the oil change intervals must be adjusted to prevailing conditions.

RENOLIN

Turbine and Air Compressor Lubricants – an Overview.

RENOLIN TURBINE OILS – High quality turbine oils for use in steam and gas turbines

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN TURBINE 32	High quality mineral oil based turbine oils with high ageing resistnace, good corrosion protection and air release properties. L-TD turbine oils according to DIN 51 515.	873	220	32		100	-9	High quality turbine oils for lubricaton of bearings in steam and gas turbines. Suitable as R&O lubricant for use in turbo-compressors.
RENOLIN TURBINE 46		876	220	46		100	-9	
RENOLIN TURBINE 68		883	220	68		100	-9	
RENOLIN TURBINE 150		890	230	150		98	-9	
RENOLIN TURBINE 220		893	230	220		98	-9	
RENOLIN TURBINE 320		898	230	320		98	-9	

RENOLIN ETERNA – Premium quality turbine oils for use in steam and expansion turbines

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN ETERNA 32	Turbine oils based on Group III oils with very high ageing resistance and excellent wear protection, and mininal sludge and deposit-forming tendencies L-TD and L-TG Turbine oils according to DIN 51 515 -1 and -2	842	220	32	5.8	125	-15	Premium quality turbine oils for gas and steam turbines. For use as circlulating oils in turbo-compressors and oil free compressors.
RENOLIN ETERNA 46		846	218	46	7.6	131	-15	
RENOLIN ETERNA 68		851	228	68	9.9	128	-15	

RENOLIN 500 Series – Compressor oils for Rotary and Piston Compressors

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN 503	High quality mineral based compressor oils with ashfree and anti-wear additives. VCL/VDL air compressor oils according to DIN 51 506	842	220	32	5.8	125	-15	For use in thermally stressed compressors for which VCL/VDL oils are specified. Air compressor lubricants for oil-injected and oil-flooded rotary vane compressors with a compression temperature of up to 110 °C. Also recommended for reciprocating piston compressors with air discharge temperatures up to 220 °C.
RENOLIN 504		846	218	46	7.6	131	-15	
RENOLIN 505		851	228	68	9.9	128	-15	

RENOLIN UNISYN OL – Fully synthetic, high performance compressor oils based on polyalphaolefins (PAO)

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN UNISYN OL 68	Fully synthetic air compressor fluids based on PAO, with a very high Viscosity Index for extended oil change intervals. Display low foaming tendencies, good demulsification and excellent air release properties. VCL/VDL air compressor oils according to DIN 51 506	845	265	68	10.6	144	-60	For use in thermally stressed piston and rotary vane compressors for which VCL/VDL oils are specified. Renolin Unisyn OL is recommended for compressors that are subject to very high temperatures or extreme loads.
RENOLIN UNISYN OL 100		845	250	100	14.4	148	-60	
RENOLIN UNISYN OL 150		849	250	150	19.4	148	-57	

While the information and figures given here are typical of current production and confirm to specification, minor variations may occur. Subject to amendment.

Screw Compressor Lubricants – an Overview.

RENOLIN SC – Premium quality oils for use in screw compressors

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN SC 32	Screw compressor oils based on premium quality mineral oils with excellent ageing and oxidation resistance and anti wear additives.	871	228	32	5.8	102	-12	Air compressor lubricants for oil-injected and oil-flooded sliding vane and screw type compressors with a compression temperature of up to 110 °C. As circulating lubricating oil for various applications such as bearings and gearboxes and hydrostatic drives.
RENOLIN SC 46		877	230	46	7.6	103	-12	
RENOLIN SC 68		882	238	68	9.9	101	-12	

RENOLIN SC MC – Screw compressor oils for extended oil change intervals

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN SC 46 MC	Screw compressor oils based on MC (Group III) oils with a high viscosity index for extended oil change intervals.	858	230	46	7.2	117	-18	Air compressor lubricants for oil-injected sliding vane and screw-type compressors with a compression temperature of up to 110 °C.. Multigrade characteristics allow rationalization of grades.
RENOLIN SC 68 MC		852	240	71	11.8	160	-24	

RENOLIN UNISYN OL – Fully synthetic high performance screw compressors oils based on polyalphaolefins (PAO)

Product name	Description	Density at 15 °C kg/m³	Flash point Cleve-land °C	Kinematic viscosity at 40 °C mm²/s	Kinematic viscosity at 100 °C mm²/s	Viscosity index VI	Pour-point °C	Main application area
RENOLIN UNISYN OL 32	Fully synthetic air compressor fluids based on PAO, with a very high Viscosity Index for extended oil change intervals. Display low foaming tendencies, good demulsification and excellent air release properties.	838	240	32	10.6	142	<-60	For use in thermally stressed screw compressors. Renolin Unisyn OL is recommended for compressors that are subject to very high temperatures or extreme loads, and allow oil change intervals to be extended.
RENOLIN UNISYN OL 46		843	260	46	6.1	146	<-60	
RENOLIN UNISYN OL 68		845	265	68	7.9	144	-60