

ECOCOOL / ECO CUT

Water-miscible and Neat Cutting Fluids



LUBRICANTS. TECHNOLOGY. PEOPLE.

We focus consistently on high-quality lubricants and related specialties.

We develop innovative and holistic solutions for a wide variety of applications.

We value the high level of commitment of our employees and their trusting interaction with one another.



Facts and figures

Company: FUCHS SCHMIERSTOFFE GMBH, a company of the FUCHS Group

Headquarters: Mannheim

Product range: A full range of more than 2,000 products and 6,000 articles

Certifications: IATF 16949, ISO 14001, BS OHSAS 18001, ISO 50001

References: One of the leading lubricants OEM for the German automotive industry

FUCHS has developed, produced and sold lubricants and related specialties for more than 80 years – for virtually all areas of application and sectors. With over 100,000 customers and 58 companies worldwide, the FUCHS Group is the leading independent supplier of lubricants.

A team of more than 800 specialists across Germany works to guarantee the satisfaction of our customers. Whatever their requirements, we have the ideal lubricant for their specific applications and processes. In our technology centre we link interdisciplinary expertise in a quick and efficient way – and work on innovative lubricant solutions to meet the demands of today and tomorrow every single day.

FUCHS lubricants stand for performance and sustainability, for safety and reliability, for efficiency and cost savings. They represent a promise: technology that pays off.

WATER-MISCIBLE CUTTING FLUIDS FOR METALWORKING OPERATIONS

In manufacturing today, the demands made on cutting fluids have increased enormously. As part of the Industry 4.0 concept, the entire added-value chain of people, machines, logistics and cutting fluids should be interlinked and optimized to achieve largely self-organizing production with the help of advanced IT and communications technologies. For this, cutting fluid measurement data must be accessible online, evaluated and corresponding adjustments made. For measured data to be accurately analyzed, high stability cutting fluids are essential.

Safe, economical and sustainable in use

FUCHS is the specialist for metalworking operations. Our water-miscible cutting fluids are safe and reliable and fulfil all legislative requirements so that their use can be judged to be almost risk-free. The sustainability of our ECOCOOL products was factored into their formulation. FUCHS cutting fluids thus offer long service life even in boron-free versions.

FUCHS cutting fluids are:

- Free of nitrosamine-forming secondary amines
- Free of nitrite
- Free of hard complexing agents
- Skin compatible
- Free of chlorine, zinc and heavy metals
- Sustainable
- Economical

This means more than just workshop safety for ECOCOOL users. ECOCOOL lubricants are also extraordinarily long-life and economical. This lowers operating, maintenance and disposal costs. In addition, the carefully selected ingredients increase skin compatibility even at high pH values.

Optimum technical properties

FUCHS cutting fluids fulfil the technical requirements and make machining operations more efficient. ECOCOOL products guarantee:

- Optimum cooling and flushing
- Outstanding lubricity
- Excellent wear protection
- Effective corrosion protection
- Low foaming
- Good material compatibility
- Good results with innovative materials
- Excellent EP properties

For the ECOCOOL user, this means more process reliability, more effective and efficient staging and less expensive machine down time.

Available throughout the world

Our customers are located throughout the world and our cutting fluids are available where they are. This means that all raw materials must be registered and comply with chemical regulations in the respective countries. FUCHS offers water-miscible cutting fluids under the name ECOCOOL GLOBAL which can be manufactured anywhere in the world with the same formulation. This allows users to pursue globally-harmonized manufacturing processes with the same fluids.

New cutting fluids with future perspectives

Current discussions about the ingredients in cutting fluids such as boric acid, formaldehyde-releasing substances (FAD), dicyclohexylamine (DCHA) and 2-aminoethanol (MEA) make cutting fluid risk assessments as part of health and safety at work difficult. The demand for high-performance cutting fluids which do not contain risky ingredients is high.

New and future generations of ECOCOOL cutting fluids satisfy today's legislative requirements and also those issues currently being discussed. These demand that cutting fluids should be:

- Free of boron
- Free of formaldehyde-releasing agents
- Free of 2-aminoethanol (MEA)
- Free of dicyclohexylamine (DCHA)

Moreover, ECOCOOL products offer the usual high buffering of cutting fluids containing boron and are low odour both as concentrates and as ready-to-use emulsions.



New Synthetic Cutting Fluids Set New Standards

The new ECOCOOL S series of synthetic, high-performance cutting fluids are an alternative to oil-based products. Intelligent combinations of corrosion preventives and polymers have given them the performance levels of oil-based cutting fluids and thus significantly broadened their application spectrum. These new synthetic products also show their strengths in extreme conditions and can not only be used for staining-prone aluminium alloys but also for ferrous materials with almost no foaming.

Whereas in the past, oily residues had to be removed from machined components by washing, in most cases this cost-intensive operation is no longer necessary. Furthermore, the elastomer compatibility and the poor corrosion protection offered by conventional synthetic cutting fluids were improved by the use of oil-like polymers.

Practical application experience confirms the strengths of the ECOCOOL S series:

- Good corrosion protection
- Absolutely low-foaming
- Leave no sticky residues
- Outstanding wetting and flushing
- Good lubricity

And thus in practice offer

- High process reliability
- Excellent economy.

The water-miscible cutting fluid world is changing and will need vision and courage to introduce reforms. Exploit the benefits of FUCHS ECOCOOL lubricants for your manufacturing processes.

Water-Miscible Cutting Fluids – Selection Assistance and Details

Product	Emulsion type	Boron free	Mono ethanol amine-free	Cast iron	Steel	Aluminium Si 7-12	Aluminium Si 0,5-1	Non-ferrous metals	Special materials	Mixing water °dH
Fully-synthetic products										
ECOCOOL S-CP	Solution	x	—	●●●	●●●	●	○	○	—	0-20
ECOCOOL S-ALU	Solution	x	x	○	●●	●●●	●	○	—	0-20
ECOCOOL TOOLSTAR S-CC-1	Solution Amine- free	x	x	○	○	○	○	●	●●● Tungsten carbides	10-20
Semi-synthetic products										
ECOCOOL R-VHCM	Micro emulsion	—	—	●●●	●●	●	○	○	○	10-20
ECOCOOL R - 2030	Conventional emulsion	—	—	●●	●●●	●●●	●	○	○	5-20
ECOCOOL R - 2030 IDM	Conventional emulsion	—	—	●●	●●●	●●●	●●	—		10-20
ECOCOOL VHCM-1 K	Micro emulsion	—	—	●●●	●●	●	○	○	○	5-20
ECOCOOL R - AFC 1515 L	Conventional emulsion	—	—	●	●●●	●●●	●●	○	○	10-20
ECOCOOL FERROSTAR MBF	Micro emulsion	x	x	●●●	●●●	●●	●	○	○	5-20
ECOCOOL AFC 1515 BW	Conventional emulsion	x	x	●	●●●	●●●	●●●	○	● Ti-Cr-Ni	5-20
ECOCOOL 2516 MG - DC	Conventional emulsion	x	x	○	●●	●●	●●	○	●●● Mg	15-200
Special innovative products, globally available										
ECOCOOL AFC 1515	Conventional emulsion	x	x	●●	●●●	●●●	●●	○	●● Ti-Cr-Ni	5-20
ECOCOOL S-AERO G	Solution	x	x	○	●●	●●●	●	○	●●● Aero Al	0-20

○ Limited suitability ● Suitable ●● Highly suitable ●●● Perfectly suitable

NEAT CUTTING FLUIDS

The correct cutting fluids provide the very highest machining performance and outstanding surface finishes. However, their performance is also influenced by their compatibility with the other machine lubricants used. Perfectly matched lubricants therefore make a significant contribution to optimum machining results.

Increasing productivity while doing justice to increasing ecological and economic considerations is the key to maintaining international competitiveness in the metalworking industry. Cost analyses have shown that cutting fluids account for a significant proportion of total manufacturing costs.

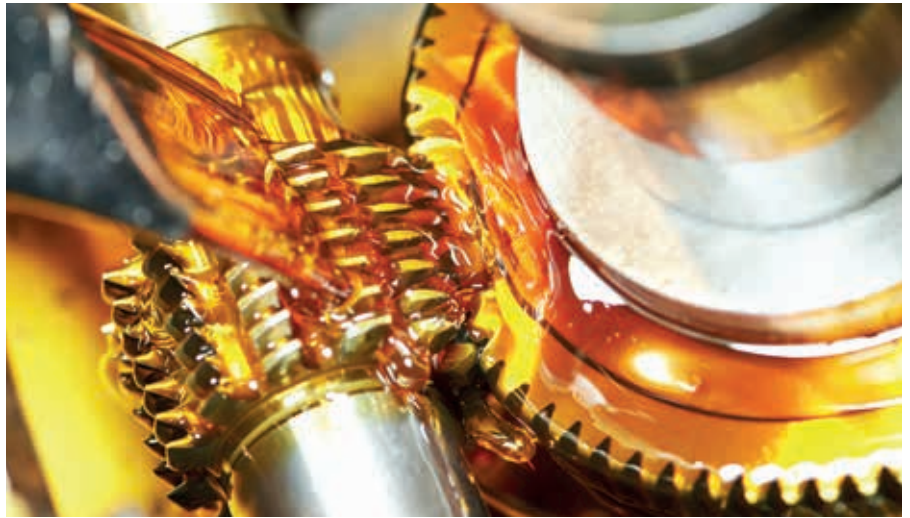
FUCHS ECOCUT and PLANTOCUT neat metalworking fluids are formulated in line with the very latest findings. FUCHS supports its customers with far-reaching research and development activities and by directly including expertise from practical trials in new neat cutting fluids.

ECOCUT and PLANTOCUT cutting fluids meet all current legislative requirements and fulfil all demands to guarantee efficient and cost-effective metalworking.

They offer

- **Good cooling**
- **High lubricity**
- **Good flushing**
- **Active improvements to machining performance**
- **Excellent environmental and health protection.**

The interaction between manufacturers, users, developers and researchers generates successful synergies and new product and process innovations which drive the development of advanced lubricants.



Expert consultation

Our experienced engineers are very well trained and experts in providing competent, on-site advice on product selection and the best service with the aim of reducing process times and complexity and optimizing tool life and process efficiency.

Local and global availability

Cutting fluid technology must adapt to the needs of the worldwide metalworking industry. Our global FUCHS team makes sure that selected products are available in other parts of the world in the same quality.

Industry-specific solutions

With ECOCUT and PLANTOCUT, we offer industry-specific solutions such as for the medical sector. The materials used in medicine make the highest demands on cutting fluids, especially in terms of lubricity and material compatibility. With ECOCUT and PLANTOCUT, FUCHS offers the medical engineering industry a specially tested, non-cytotoxic range of cutting fluids.

The perfect product

FUCHS has a perfect cutting fluid for every machining operation in the metalworking industry. Just contact us, we will be glad to be of assistance.

Special Product Solutions: Low-Emission Cutting and Grinding Oils



Better for People, Better for Companies

FUCHS low-emission oils solve the problems associated with the use of conventional cutting oils which display pronounced misting and evaporation. Our tried and tested, high-performance series of low-emission products stand out with their excellent economy and low emissions.

Emissions are almost unavoidable when neat cutting and grinding oils are used in machining centers for grinding, turning, thread cutting, milling, deep hole drilling and reaming.

With the help of special additive technologies, our research and development laboratories have created low-emission products which are extraordinarily low misting and low evaporation. And the use of carefully selected base oils also reduces evaporation. Vapours in particular, are usually not removed by the most common separators and can be recycled back into the workshop if no extraction system is installed.

The special additives used in these products significantly reduce the formation of oil mists during machining operations.

The low-emission ECOCUT and PLANTOCUT series of products offer double safety: they keep the air in workshops clean and they reduce fire and explosion hazards in line with BGI/GUV-I 719.

The resulting benefits are:

- Better workshop air improves health and safety
- Reduced fire and explosion hazards
- Extended service intervals for oil separators
- Lower consumption.

ECOCUT LE: Formulated with HC base oils

ECOCUT FT: Formulated with GTL base oils

PLANTOCUT: Formulated with synthetic esters

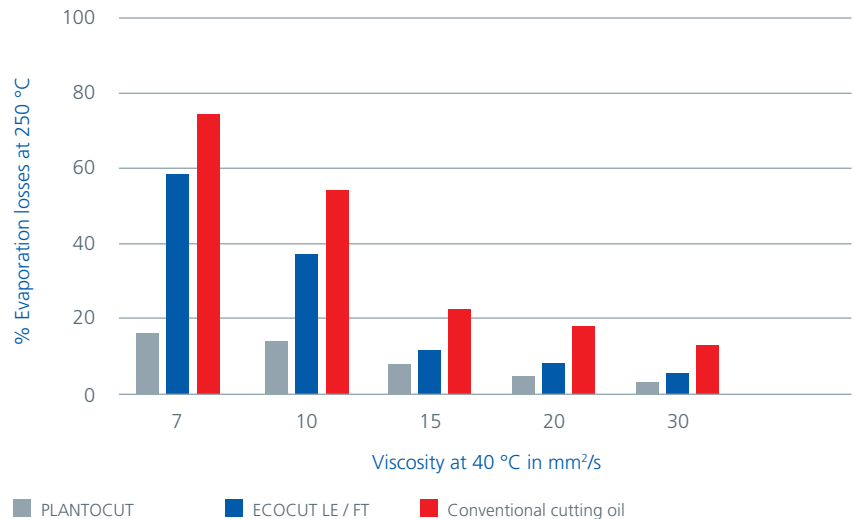
Our application engineers will be glad to be of assistance.

Fundamentally rational

They do not just fulfil all technical requirements. Their outstanding properties make the use of ECOCUT and PLANTOCUT cutting and grinding oils especially economical because they offer:

- Low consumption
- Good cooling
- Good flushing
- High lubricity
- Longer tool life.

Evaporation losses of various base oils / Typical values



Reduction of cutting fluid fire and explosion hazards according to BGI / GUV-I 719.

Tendency	Viscosity grade according to DIN 51519 (ISO 3448:1992)	Viscosity at 40 °C according to DIN 51562 [mm²/s]	Flashpoint according to ISO 2592 (Cleveland open cup) [°C]	Evaporation losses at 250 °C according to DIN 51581-1 and 2 (Noack method) [%]	Machining examples
Declining fire and explosion hazards	ISO VG 5	4.14–5.06	> 120	< 85	Viscosity tends to increase from honing to broaching
	ISO VG 7	6.12–7.48	> 145	< 80	
	ISO VG 10	9.00–11.00	> 155	< 60	
	ISO VG 15	13.50–16.50	> 190	< 25	
	ISO VG 22	19.80–24.20	> 200	< 15	
	ISO VG 32	28.80–35.20	> 219	< 13	
	ISO VG 46	41.40–50.60	> 220	< 11	

Source: BGI/GUV-I 719

Special Product Solutions: Fluid Families



Leakages as cost drivers

The complexity of machine tools is reflected in the lubricants it requires: Cutting fluids, hydraulic oils, slideway oils and gear oils.

Leakages in running machine tools can never be totally eliminated. And if the different lubricants used

are not compatible with each other, high follow-up costs often occur: Increased tool wear, filtration problems, machine damage, lost production and poor surface finishes.

If costs should be kept under control, customized cutting fluid solutions are necessary.

Compatible fluid families – Problem solvers in the case of hydraulic oil leakages

We have developed compatible system solutions for a broad spectrum of applications which facilitate unproblematic, cost-reducing and high performance machining operations:

- Universal oils – for machining and machine lubrication – UNIFLUID
- Neat multifunctional oils based on low-evaporation mineral oils – ECOCUT HFN
- Neat, ester-based fluid families – PLANTOCUT, PLANTOHYD, PLANTOLUBE

The benefits to the user are obvious:

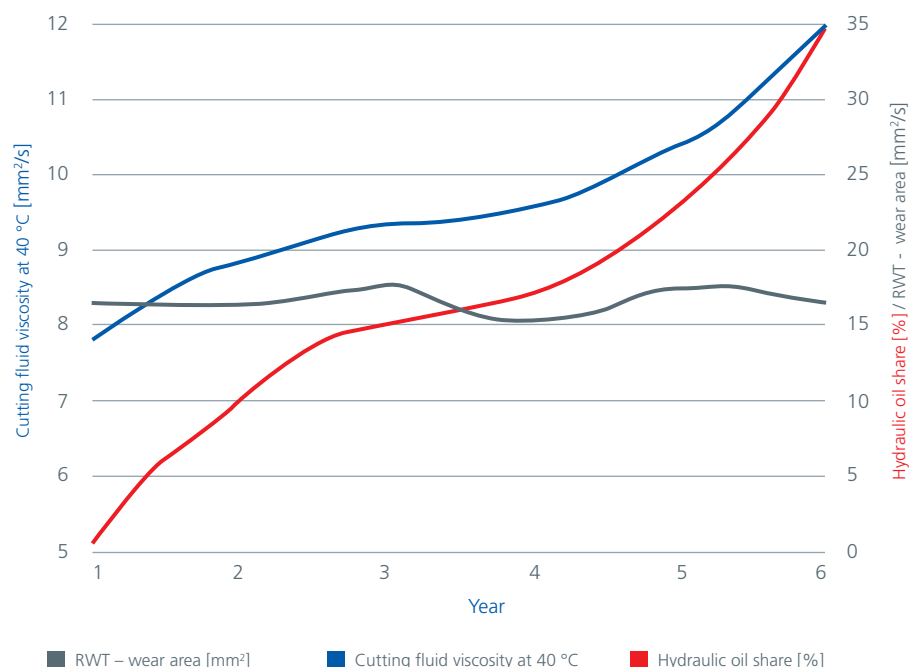
- Greater process reliability
- Prolonged tool life
- Optimum surface finishes
- Longer cutting fluid life and lower monitoring and maintenance costs.

In a nutshell:

Greater performance and lower operating costs.

This diagram of a machine after the changeover to the HFN series of multifunctional oils shows how these oils can significantly increase the performance of a machine tool: In spite of high hydraulic oil leakages, wear behaviour remain consistently good.

Reichert Wear Test (RWT): No drawbacks resulting from hydraulic oil



Special Product Solutions: Minimum Quantity Lubrication (MQL) Products



Source: Bielomatik Leuze GmbH + Co. KG

FUCHS PLANTO MIKRO and ECOCUT MIKRO PLUS are product series which were specially developed for MQL. And practical trials have shown that the optimization of the cutting fluid is what makes Minimum Quantity Lubrication technology economically worthwhile for certain machining operations.

Special ester oils and fatty alcohols

Lubricants based on special ester oils and fatty alcohols have been shown to be especially suitable for Minimum Quantity Lubrication applications.

PLANTO MIKRO – Ester oil based MQL

- Have a higher boiling and flashpoint even at lower viscosities
- Create significantly less vapour
- Form a thin film on components but nevertheless feel dry

ECOCUT MIKRO PLUS – Fatty alcohol based MQL

- Have a lower flashpoint than ester oils of the same viscosity
- Evaporate relatively easily so that components dry quickly
- Generate moderate cooling.

Over 25 years

experience in the application of
Minimum Quantity Lubrication

PLANTO MIKRO and ECOCUT MIKRO PLUS lubricants are "low-emission" according to the German publication BGI 718 "Minimum Quantity Lubrication for Chip-Forming Machining Operations".

PLANTO MIKRO and ECOCUT MIKRO PLUS products are approved by leading Minimum Quantity Lubrication equipment manufacturers and are noteworthy for the following properties:

- Good sprayability
- Optimum droplet characteristics
- Good lubrication
- Low odour
- Tried and tested

Minimum Quantity Lubrication for a variety of machining operations

Lubrication	Turning	Suitable for MQL processes with geometrically-defined cutting edges
	Milling Sawing Drilling Thread cutting	
Flushing	Grinding Honing Lapping	Limited suitability for MQL processes with geometrically undefined cutting edges

PLANTO MIKRO and ECOCUT MIKRO PLUS products are suitable for use with single-channel (AEROSOL BUSTER) and/or two-channel spray systems.

Product	Spray system		Steel	Cast iron	Aluminium	Cu
	1 channel	2 channel				
ECOCUT MIKRO PLUS 20	x	x	●●●	●●●	●●●	●●●
PLANTO MIKRO UNI	x	x	●●●	●●	●●●	●●
PLANTO MIKRO 830 S-CS	—	x	●●●	●●	●	—

●●● Perfectly suitable ●● Suitable ● Limited suitability — Not suitable

Extract from our Product Program. Further products on request.

Neat Cutting Fluids – Selection Assistance

Material/ Process	Normal machining steels	Difficult-to- machine steels	Very-difficult-to- machine steels	Titanium and titanium- alloys	Cast iron and malleable cast iron	Nonferrous metals	Aluminium and aluminium alloys
Machining centers	ECOCUT HFN LE-series FT-series	ECOCUT 600 LE-series FT-series	ECOCUT 700 LE-series	ECOCUT 7520 LE-S PLANTOCUT- series	ECOCUT HFN LE-series FT-series	ECOCUT HFN LE-series PLANTOCUT- series	ECOCUT HFN LE-series FT-series
Deep hole drilling	ECOCUT 515 PLANTOCUT- series	ECOCUT 515 ECOCUT MXB 14	ECOCUT 515 ECOCUT MXB 14	ECOCUT 7520 LE-S	ECOCUT HFN LE-series 600 LE-series PLANTOCUT- series	ECOCUT HFN LE-series PLANTOCUT- series	ECOCUT HFN LE-series PLANTOCUT- series
Broaching	ECOCUT 600 LE-series PLANTOCUT- series	ECOCUT 700 LE-series	ECOCUT 800-series 8500-series	ECOCUT 800-series 8500-series	ECOCUT HFN LE-series 600 LE-series	ECOCUT HFN LE-series PLANTOCUT- series	ECOCUT HFN LE-series PLANTOCUT- series
Gear cutting	ECOCUT HFN LE-series 600 LE-series	ECOCUT HFN LE-series 600 LE-series 700 LE-series	ECOCUT 8500-series	–	–	ECOCUT HFN LE-series	–
Honing / Finishing	ECOCUT GBS 5 PLANTOCUT- series	ECOCUT GBS 5 PLANTOCUT- series	ECOCUT HFN 5 LE UNI PLANTOCUT- series	ECOCUT HFN 5 LE UNI PLANTOCUT- series	ECOCUT GBS 5 HFN LE-series	ECOCUT HFN LE-series	ECOCUT HFN LE-series
Lapping	ECOCUT HO 74	ECOCUT HO 74	ECOCUT HO 74	–	ECOCUT HO 74	ECOCUT HO 74	ECOCUT HO 74
Grinding	ECOCUT HFN LE-series FT-series	ECOCUT HFN LE-series FT-series	ECOCUT HSG LE-series FT-series	ECOCUT 7520 LE-S PLANTOCUT- series	ECOCUT HFN LE-series FT-series	ECOCUT HFN LE-series FT-series	ECOCUT HFN LE-series FT-series
Thread cutting	ECOCUT HFN LE-series 500 LE-series PLANTOCUT- series	ECOCUT 500 LE-series 700 LE-series	ECOCUT 500 LE-series 700 LE-series 8500-series	ECOCUT 7520 LE-S PLANTOCUT- series	ECOCUT HFN LE-series PLANTOCUT- series	ECOCUT HFN LE-series PLANTOCUT- series	ECOCUT HFN LE-series PLANTOCUT- series
Spark erosion	ECOCUT 1520 ECOCUT FE	ECOCUT 1520 ECOCUT FE	ECOCUT 1520 ECOCUT FE	ECOCUT 1520 ECOCUT FE	ECOCUT 1520 ECOCUT FE	–	–
Minimum Quantity Lubrication	ECOCUT MIKRO PLUS- series	PLANTO MIKRO-series	PLANTO MIKRO-series	PLANTO MIKRO-series	ECOCUT MIKRO PLUS- series	ECOCUT MIKRO PLUS- series	ECOCUT MIKRO PLUS- series

The products in a series are available in different viscosities but with the same additives.

Complete Solutions for all your Manufacturing Processes

With system solutions from FUCHS, the world's largest independent manufacturer of lubricants with the most extensive program of metalworking fluids, you have chosen an absolute specialist. And thus benefit from all the know-how, years of application engineering experience and customized solutions.

Example: Manufacturing gearboxes.



ECOCOOL

MACHINING: WM*

- High performance
- Economical
- Outstanding lubricity



ECOCUT

MACHINING: NEAT

- Increased reliability
- Economical
- Low misting and low evaporation



THERMISOL

QUENCHING

- Low distortion
- Low consumption
- Good compatibility



RENOCLEAN

CLEANING

- Highly effective
- Unproblematic processes
- Outstanding emulsification and demulsification



RENOLIT

LUBRICATION: GREASES

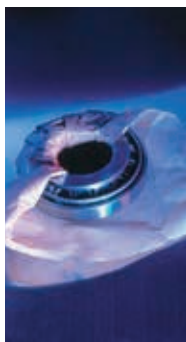
- Compatible
- Long-term and life-long lubrication
- Optimum compatibility with



RENOLIN

LUBRICATION: OILS

- Compatible
- Excellent corrosion protection
- Optimum wear protection



ANTICORIT

PROTECTION

- Optimum protection
- Clean application



CPM

FLUID MANAGEMENT

- For all fluids
- Auditable documentation
- Better performance
- High process reliability
- Cost reductions

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The information contained in this brochure is based on the experience and know-how of FUCHS SCHMIERSTOFFE 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 aircrafts/spacecrafts or their components, unless such products are removed before the components are assembled into the aircraft/spacecraft. The information given in this brochure represents general, non-binding guidelines. No warranty expressed or implied is given concerning the properties of the product or its suitability for any given application. We therefore recommend that you consult a FUCHS SCHMIERSTOFFE GMBH application engineer to discuss application conditions and the performance criteria of the products before the product is used. It is the responsibility of the user to test the functional suitability of the product and to use it with the corresponding care. Our products undergo continuous improvement. We therefore retain the right to change our product program, the products, and their manufacturing processes as well as all details in this brochure at any time and without warning, unless otherwise provided in customer-specific agreements. With the publication of this brochure, all previous editions cease to be valid.

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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 can the best lubricant system 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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