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rhenus

METAL WORKING FLUIDS

Maximum performance and low consumption



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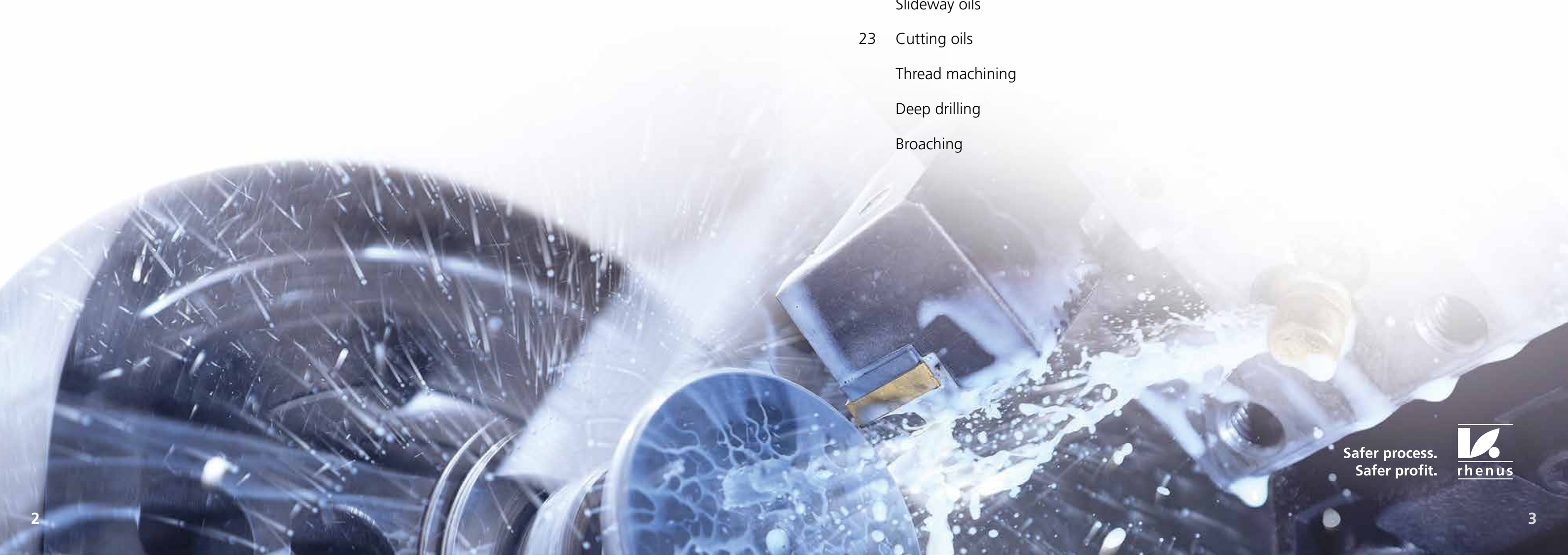
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rhenus METAL WORKING FLUIDS

General information



Optimised for high-tech processes

New materials and machining processes, innovative tool and machine technology – metalworking requires more than just standard metal working fluids. Every application is different.

This makes providing tailor-made products and intelligently applying experience in application technology all the more important.

Whether you are looking for an amine-free or amine-based metal working fluid, a two-component metal working fluid or a multifunctional product, a special metal working fluid for machining magnesium or titanium, metal working fluids for new types of aluminium alloys and composite materials, you can expect more from us. rhenus metal working fluids are always an excellent solution from a technological, economic and ecological point of view.

Innovations – made by Rhenus Lub

Since the company was founded in 1882 we have been setting new standards for industrial lubricants. As a specialist in water-miscible and non water-miscible metal working fluids and in high-performance greases, Rhenus Lub has always been a driver of innovation. As a

technology leader, we use top-quality raw materials and have made metal working fluids with the highest performance characteristics and health requirements a standard.

We are constantly further developing our products specifically for your applications in close cooperation with universities and research institutes. For instance, we are researching the microbiological effects on possible savings potential in the use of lubricants in a joint project with the renowned University of Bremen. We are also developing a new formula for water-miscible metal working fluids with even greater long-term stability and resistance to bacterial and fungal contamination.



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Water-miscible metal working fluids

Water-miscible metal working fluids from Rhenus Lub form fine-particle, highly stable emulsions that facilitate above-average service lives and significantly reduce volume

loss. Top-up concentrations of 1-2% are generally sufficient to comply with the target concentration – a key contribution towards reducing process costs.

Amine-free and boric acid-free for optimum skin compatibility

Independent laboratories confirm the extremely low allergy potential of amine-free rhenus metal working fluids, which work in favourable pH conditions of 7.5 to 8.5. The measurement of transepidermal water loss (TEWL), which Rhenus Lub has used to define new standards for water-miscible metal working fluids, also evidences their skin-friendly character.

Advantages at a glance:

- Metal working fluids have long service lives
- High dimensional accuracy and surface quality for your workpieces
- Significantly increased tool life and high cutting performance
- Very low consumption
- Optimum skin compatibility
- Safe and cost-efficient process sequence for a wide variety of applications
- Various metal working fluids that are environmentally friendly and non-hazardous to humans (water hazard class 1 [WGK] without hazard symbols)



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Examples: Products and applications

High performance and effective occupational safety for metal workers

Very good skin compatibility, optimum long-term stability, low foaming and very good material compatibility – the rhenus 700 series impresses with these performance characteristics. From grinding through to the heavy-duty machining of stainless steels and aluminium, the metal working fluids from the innovative product series guarantee a secure lubricating effect and provide reliable protection against discolouration and corrosion.

rhenus FS 750 is suitable for light machining and grinding. The high-performance lubricant can be used seamlessly for normal water hardness and is therefore ideal for customers in the metalworking industry who want to make the most of the advantages of boric-acid-free and amine-free metal working fluids.

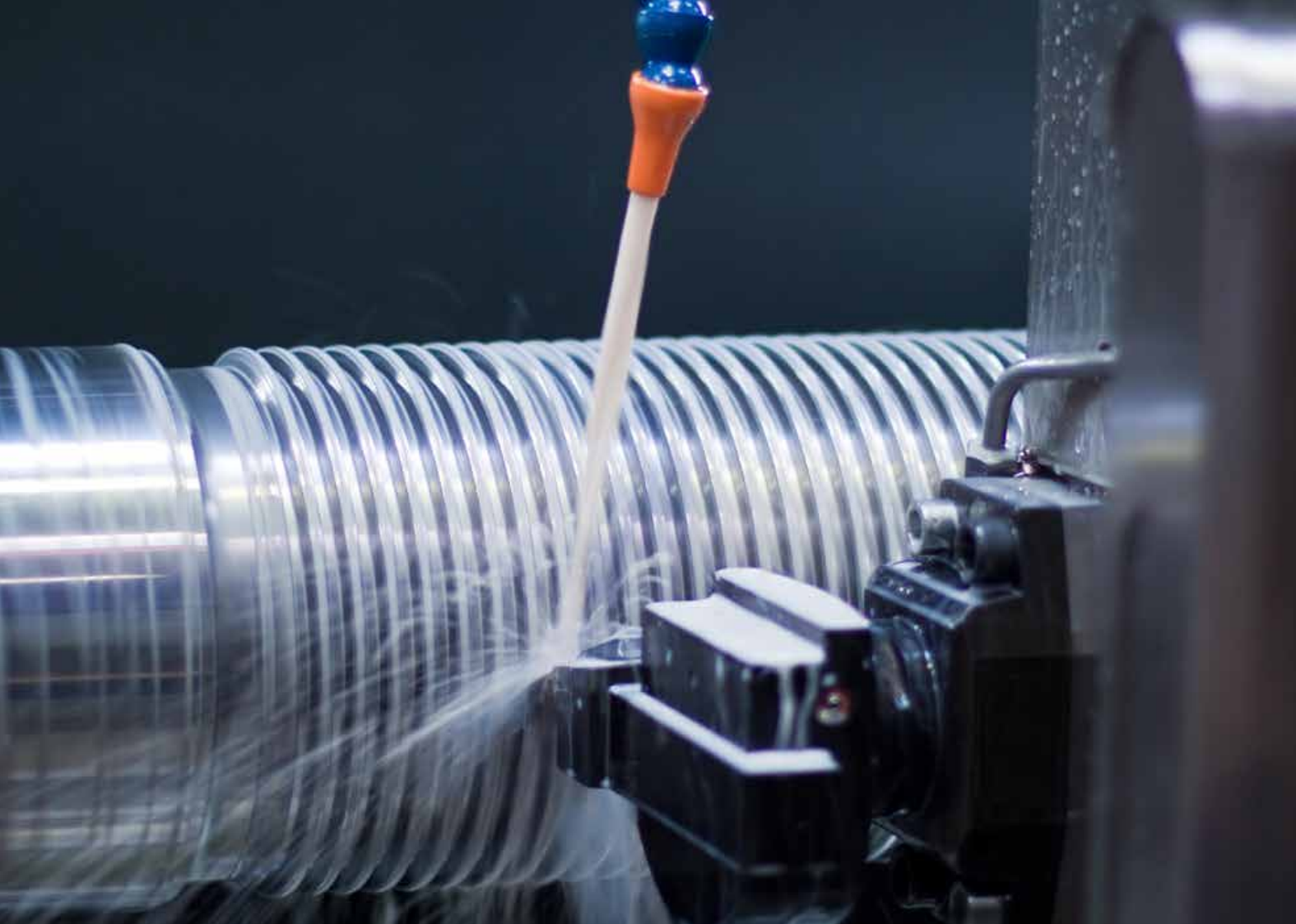
Top results in the machining of aluminium and non-ferrous metals

The boric-acid-free and formaldehyde-free metal working fluid rhenus TU 446, which is based on alternative high-quality, low-volatile amines, delivers optimal results in the machining of aluminium and non-ferrous metals with its high-performance fatty component addition. It is also used in complex machining processes involving steel and cast iron. Its key advantages offering you real added value include very good long-term stability, excellent flushing properties and reliable corrosion protection.

Perfect for magnesium machining

The tried-and-tested water-miscible metal working fluid rhenus XF 80 MG features a high degree of emulsion stability, low hydrogen formation and reduced dissolving of magnesium, without the magnesium alloys being compromised. Extremely long service lives, low top-up concentration and excellent flushing properties help to reduce the overall costs of the fluid process in the long term.





Water-miscible or non water-miscible?

Some applications are borderline. What can be done when everything in the process chain is set up for water-miscible applications and a non water-miscible metal working

fluid is established? Or when products containing additives and mineral oils do not deliver adequate machining results?

This can occur in demanding thread cutting, reaming or broaching operations. Users can quickly find themselves in borderline situations, especially in broaching. There is a solution for this. rhenus XF 61 P is mineral oil-free, stable and contains high-performance additives. The water-miscible metal working fluid impresses as a problem-solver in demanding thread cutting, reaming and broaching operations.

Thanks to its special additives with sulphur EP, the high-performance lubricant guarantees the best results in all borderline cases of metal working fluid use. rhenus XF 61 P complies with all applicable legal standards and protects the environment.



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Neat oils

Our high-performance range of low-evaporation neat oils is based on selected base oils with a low aromatic compound content and application-specific additives. All products generally have low levels of oil mist and are within the legally stipulated limit values.

Perfectly tailored to your application

What neat oil is perfectly suited to your application? This is where our experts can assist you. The machining process (tools, cutting speed, feed rate), the material to be machined and the required surface characteristics are not the only aspects that are analysed. The overall review includes crucial system parameters such as filling quantity, filter system and metal working fluid pressure. The observation of local legal provisions, optimum integration in your production process and disposal of the medium round off the package and ensure one thing in particular – a safe and efficient fluid process.

Application areas and advantages

Honing and grinding oils

- Low oil viscosity, low foaming tendency, safety due to high flash points, no grinding burn
- Excellent lubricating properties, long-lasting removal performance, good filterability, excellent flushing properties

Cutting oils

- Long tool life, increased cutting efficiency, reduced wear and maintenance costs, surface quality and dimensional accuracy ensured

Punching and drawing oils; special oils for metal forming

- High level of machining efficiency, highest shape accuracy and surface quality with complex workpiece geometries, reduction of process costs
- Applications with steel, aluminium and copper
- Reduction of the disposal costs and chlorine-free, so safe for the environment
- Optimal use quantities due to good application accuracies, excellent results through targeted matching to technological demands



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Examples: Products and applications

The pinnacle of grinding and cutting oils

The low-emission, chlorine-free rhenus grinding and cutting oils reduce oil mist and oil evaporation. They have excellent NOACK values with high flash points and low viscosity. The result: low consumption and significant cost reduction.

No more grinding burn in the production of gear wheels

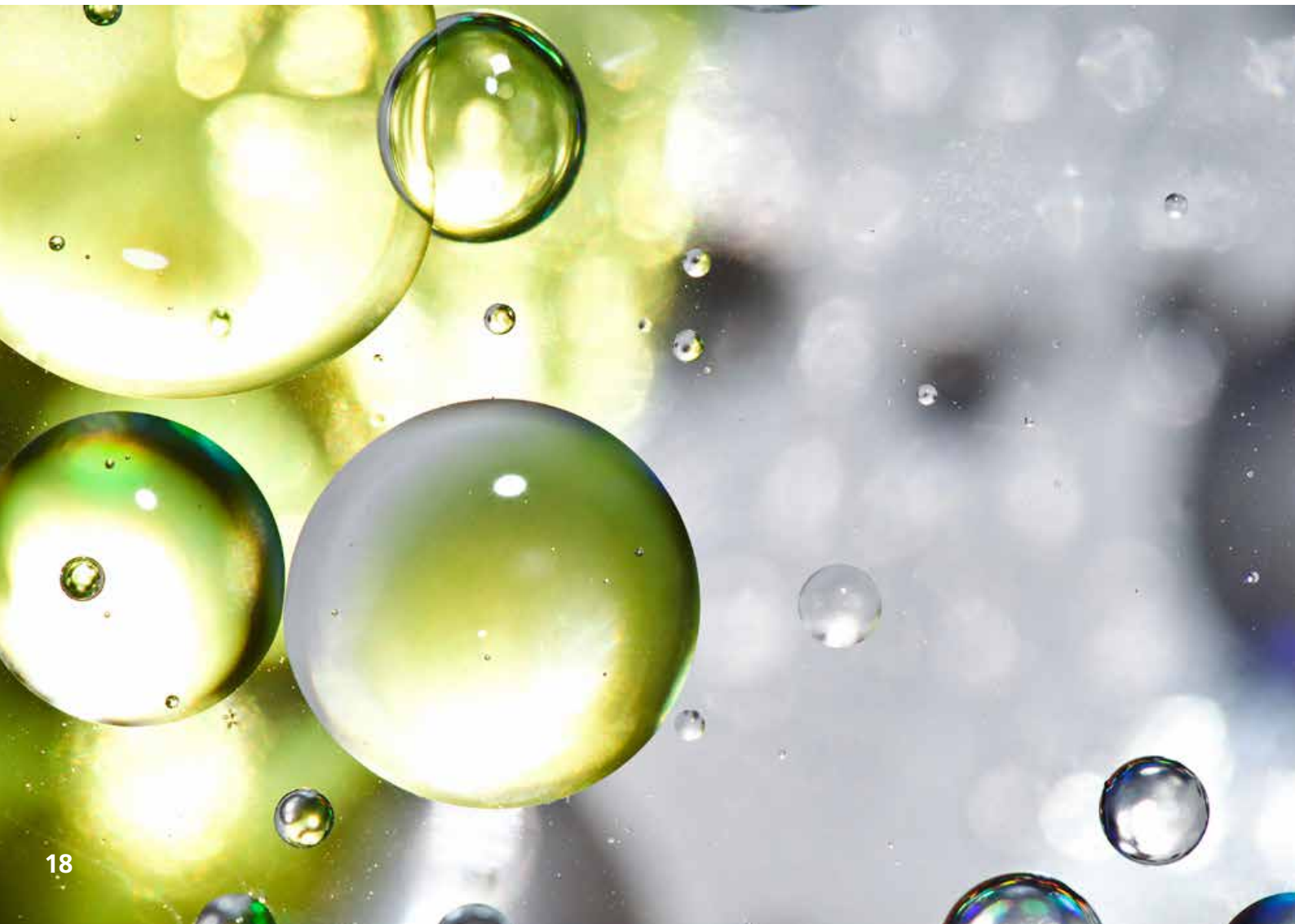
Various processes are involved in producing gear wheels, such as full-form grinding. The grinding oil rhenus CXS guarantees an excellent cooling effect and optimum filtration thanks to its viscosity of 10 mm²/s at 40°C. Grinding burn is also avoided, which was previously a frequent source of error in the machining of gear wheels. Applications on gear-cutting machines from Kapp, Liebherr, Klingelnberg, Gleason Pfauter, Niles and other manufacturers highlight the performance of rhenus CXS.

Lower consumption – lower costs

We have developed the product rhenus DU 42 P specially for aluminium processing. The high-alloy special lubricant has an excellent wetting performance, forms a uniformly thin lubricant film over the entire metal surface and adheres securely to the workpiece. It enables companies to significantly reduce their oil consumption – in the drawing of profiles and wires with material thicknesses of up to one millimetre and in flow forming. With a viscosity of 42 mm²/s, rhenus DU 42 P can be applied to the lubricated surfaces by spraying or flooding.

The use of an additional lubricant can be avoided in machining operations. Customers who need to subject their forming products to an additional wash benefit from using the new drawing oil.

rhenus METAL WORKING FLUIDS
Product data tables



rhenus water-miscible metal working fluids

Universal products

Product	Mineral-oil content (%)	Polar/EP additives	Usage concentration from %	Materials					Usage notes
				Cast iron G	Steel S	Difficult-to-machine alloys H/X/Z	Aluminium N	Brass and copper N	
rhenus FS 750 ¹⁾	41	-	4	X	XX		X		Grinding and light machining operations. WGK 1
rhenus FU 75 T ^{1) 3)}	37	+	6		XXX	XX	XX	XX	Universal metal working fluid. WGK 1
rhenus FU 71/2T ^{1) 3)}	42	+	6	x	XXX	XX	XX	XX	Universal metal working fluid, low-foaming. WGK 1
rhenus FU 760 ^{1) 3)}	29	+	5		XXX	XX	X		For the heavy-duty machining of tough steels. High sulphur content. WGK 1
rhenus TS 421 ²⁾	25	-	6	XX	XXX	X	X		Universal metal working fluid for grinding and for light machining. WGK 1
rhenus TS 46 ²⁾	32	-	5	XXX	XXX		X	X	For grinding and light machining operations. WGK 1
rhenus TU 426 ²⁾	18	+	6	XX	XXX		XX		Universal metal working fluid, also suitable for grinding. WGK 1
rhenus TU 24 ³⁾	32	+	4	XX	XXX	X	X		Universal metal working fluid. WGK 1
rhenus TS 440 ²⁾	40	-	6	XXX	XXX	X	X	X	Universal metal working fluid for grinding and for light machining. WGK 1
rhenus TU 43 ^{2) 3)}	16	+	4	XXX	XXX	X	XX		Universal metal working fluid with excellent long-term stability. WGK 1
rhenus TU 410 ²⁾	35	+	6	XX	XXX	X	XX	X	Universal metal working fluid with excellent rinsing effect. WGK 1

Synthetic products

Product	Mineral-oil content (%)	Polar/EP additives	Usage concentration from %	Materials					Usage notes
				Cast iron G	Steel S	Difficult-to-machine alloys H/X/Z	Aluminium N	Brass and copper N	
rhenus TY 116 S ²⁾	0	-	4	XX	XX	XX	(X)	(X)	Transparent grinding fluid for roller grinding. WGK 1
rhenus TY 150 L ²⁾	0	+	6	X	XX	XX	(X)	(X)	Water-soluble EP metal working fluid that can be used for machining, grinding and forming.
rhenus FY 121 L ³⁾	0	+	3	XX	XXX	XX	XXX	XXX	Water-soluble EP metal working fluid that can be used for machining and grinding. Suitable for non-ferrous metals. WGK 1
rhenus XY 100 RS ^{2) 3)}	0		0.5 - 1	XXX	XXX				Rust protection additive

Special products

Product	Mineral-oil content (%)	Polar/EP additives	Usage concentration from %	Materials	Usage notes
rhenus FS 71 ¹⁾	66	-	5	Aluminium, non-ferrous metals	Grinding and light machining operations. WGK 1
rhenus FU 800 ¹⁾	36	+	6	Aluminium, steel	Universal metal working fluid, good rinsing effect, white emulsion. WGK 1
rhenus TU 446 ²⁾	31	+	7	Aluminium, steel, non-ferrous metals	Universal product for changing machining conditions. Also suitable for non-ferrous metals. Foam-inhibited. WGK 1
rhenus TU 43 P ^{2) 3)}	18	+	4	Cast iron, steel and aluminium alloys	EP metal working fluid for complex machining processes. WGK 1
rhenus FU 70 W ^{1) 3)}	33	+	6	Steel, aluminium	Metal working fluid for heavy-duty steel and aluminium machining. Foam-inhibited. WGK 1
rhenus TU 46 P ²⁾	8	+	6	Cast iron, steel	Metal working fluid for heavy-duty machining. High sulphur content. WGK 1
rhenus FU 60 ^{1) 3)}	0	+	5	Difficult-to-machine aluminium alloys	Heavy-duty machining, ester-based, aviation. WGK 1
rhenus TU 560 ²⁾	0	+	7	Aluminium alloys, steel, titanium alloys, special materials	Benchmark product. Ester-based. WGK 1
rhenus XF 61 P ^{1) 3)}	0	+	6	Difficult-to-machine steels and wrought aluminium alloys	Synthetic metal working fluid for heavy-duty machining, high sulphur content. WGK 1
rhenus R-FLEX	0	+	2/2	Difficult-to-machine steel, aluminium and special alloys G, X, N, Z	The two-component metal working fluid: - rhenus R-FLEX lub, the ester lubricant - rhenus R-FLEX emdf 1 ³⁾ /em, the emulsifier package, flexibly adjustable cutting performance, minimal foaming.
rhenus XF 80 MG ¹⁾	36	+	5	Magnesium	Special metal working fluid for magnesium machining, minimises hydrogen formation.
rhenus XT 46 FC ²⁾	8	+	6	Composite (CFRP/GFRP) and stacks with aluminium	Special metal working fluid for the machining of composite materials and aluminium stacks.
rhenus XY 190 FC ²⁾	0	+	6	Composite (CFRP/GFRP)	Synthetic special metal working fluid for machining composite materials. Ultra-filterable.
rhenus XY 123 HM ¹⁾	0	-	3	Hard metal	Grinding product for the manufacture of hard-metal tools.

() = possible in some cases

X = suitable

XX = well suited

XXX = ideally suited

1) boric acid-free/amine-free

2) boric acid-free/amine-containing

3) containing FAD additive

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rhenus non water-miscible metal working fluids

Honing and grinding oils

Product	Viscosity (40°C) [mm²/s]	Copper corrosion	Usage notes
rhenus GP 5 M	4.3	1	Universal honing oil for steel and non-ferrous metals, also suitable for high-precision machining.
rhenus EG 5	5	1	Aromatic-free, low emission grinding and cutting oil.
rhenus CXS	10	1	Grinding oil for full-form grinding of gear- and profile parts using CBN grinding discs.
rhenus EG 10	10	1	Aromatic-free, low-emission grinding oil.
rhenus EHM 6	6.4	1	Aromatic-free grinding and cutting oil for hard metal processing with a GTL base.
rhenus EHM 7	7.5	1	Aromatic-free, low-emission grinding oil for hard metal processing.
rhenus EHM 12	11.5	1	Aromatic-free grinding and cutting oil for hard metal processing with a GTL base.

Minimum-quantity spray lubricants

Product	Viscosity (40°C) [mm²/s]	Copper corrosion	Usage notes
rhenus CBR	22	1	Thin-film spray lubricant for sawing steel and aluminium.
rhenus SSL	47	1	Spray lubricant for the machining of non-ferrous metals, steel, high-strength steels and aluminium. Can also be used when drawing copper/nickel tubes.
rhenus SSU	39	3	High-performance EP spray lubricant, adjusted to be washable.
rhenus SSC	6	1	Sawing and machining of steel, aluminium and non-ferrous metals.

Slideway oils

Product	Viscosity (40°C) [mm²/s]	Usage notes
rhenus SLO 68	68	rhenus slideway oils are optimally adapted to rhenus metal working fluids. Adjusted to be demulsifying, they ensure maximum safety for the machine tool – no stick-slip – and they can be easily separated from the emulsions. They achieve the best results in the SKC test.
rhenus SLB 220	220	

Cutting oils

Product	Viscosity (40°C) [mm²/s]	Copper corrosion	Usage notes
rhenus EP 10 M	10	1	Low-emission EP neat oil for steel, cast iron, non-ferrous metals and aluminium, for the grinding of camshafts.
rhenus UP 21 M	21.2	1	Low-emission multi-purpose cutting oil.
rhenus EA 19 S	19	4	Low-emission EP cutting oil for drilling, milling and thread cutting.
rhenus EU 12	11.7	1	Aromatic-free cutting and grinding oil with a GTL base for the grinding of crankshafts, for example.
rhenus UA 13 S	13	4	High-performance cutting oil, drilling oil in X and ball bearing steels.

Thread machining

Product	Viscosity (40°C) [mm²/s]	Copper corrosion	Usage notes
rhenus UA 24 S	23.5	4	Thread cutting and tapping in high-alloy materials and cast steel, as well as for broaching, milling and shape working.
rhenus UA 42 S	42.7	4	Comparable to rhenus UA 24 S, but with a higher viscosity.

Deep drilling

Product	Viscosity (40°C) [mm²/s]	Copper corrosion	Usage notes
rhenus EDD 10	10	4	Aromatic-free deep drilling oil, particularly suitable for single-lip drills with a diameter range of 1 to 15 mm.
rhenus EP 15 S	15	1	Low-emission drilling oil for all standard drilling techniques. Multi-purpose cutting oil offering high performance.
rhenus UA 19 S	19.3	4	Suitable for deep hole drilling using the BTA process in tough steels; also suitable for heavy-duty machining operations.

Broaching

Product	Viscosity (40°C) [mm²/s]	Copper corrosion	Usage notes
rhenus UA 28 S	28	4	Broaching, milling and deep drilling of difficult-to-machine materials.
rhenus EA 25 S	25	4	EP broaching oil for heavy-duty machining operations with good adhesiveness.

rhenus special oils for forming operations

Stamping and drawing oils

Product	Viscosity (40°C) [mm ² /s]	Copper corrosion	Materials	Usage notes
rhenus SCM	225	1	Steel, aluminium, non-ferrous metals	Water-miscible drawing oil for forming operations involving all materials.
rhenus SU 125 P	125	1	Aluminium, non-ferrous metals	Drawing oil for deep drawing and wall ironing of aluminium, such as in the production of thin-walled tubes.
rhenus SU 120 A	125	4	Steel	Universal deep-drawing and stamping oil for difficult forming operations.
rhenus SU 200 A	200	4	Steel	Deep-drawing and fine blanking of steels and stainless steels with a maximum wall thickness of approx. 5 mm.
rhenus SU 500 A	500	4	Steel	Deep-drawing and fine blanking of high-strength steels and stainless steels with a maximum wall thickness of approx. 12 mm.
rhenus SE 5	1.3	1	Steel, aluminium, non-ferrous metals	Evaporating stamping oil for the manufacture of transformer plates, clips and similar stamped and bent parts, for example.
rhenus SE 16	1.9	1	Steel, aluminium, non-ferrous metals	Evaporating stamping oil for the production of perforated sheets up to a material thickness of approx. 2 mm and stamped and bent parts in a comparable dimensional range for example.
rhenus DE 12 P	10.7	1		Evaporating drawing oil. Especially used to draw soft and semi-rigid copper tubes in the last draw (plug drawing).
rhenus SF 125 A	125	4	For steels such as: QStE 420; C 10, etc.	Chlorine-free precision cutting oil for all normal steel grades up to a maximum of 8 mm.
rhenus SF 150 A	149	4	Steels such as: 20 MnCr5; C35; 100 Cr 6	Chlorine-free precision cutting oil especially for high levels of difficulty and also for less demanding steel qualities and for abrasive materials (quenched-and-tempered steels, spring steels/hot and cold-rolled steels to GKZ quality).
rhenus SF 260 A	255	4	Steels such as: 20 MnCr5; C35; 100 Cr 6	High-viscosity, chlorine-free, precision cutting oil specially designed for difficult materials with material thicknesses up to 12 mm (quenched-and-tempered steels, spring steels/hot and cold-rolled steels to GKZ quality).
rhenus DU 42 P	42	1	Aluminium, non-ferrous metals	For the drawing of profiles and wires made from copper, brass and aluminium. Can be applied by means of spraying or immersing.
rhenus DU 2700 P	2700	1	Non-ferrous metals	For the drawing of rods, profiles and tubes made from aluminium, brass and copper.
rhenus DU 700 P	700	1	Non-ferrous metals	For the drawing of rods, profiles and tubes made from non-ferrous metals. Washing is not required for annealing with protective gas.
rhenus DU 601 P	600	1	Aluminium, non-ferrous metals	Well suited to drawing non-ferrous metals and forming aluminium.

Special oils

Product	Viscosity (40°C) [mm ² /s]	Copper corrosion	Materials	Usage notes
rhenus FSC-IHU	12/20°C			Water-soluble pressure medium for internal high-pressure forming. Approved by the company Schuler Hydroforming.
rhenus PU 60 A	60	4	Steel, alloyed, phosphated, sometimes stea-rated	Light-coloured, odourless, low-viscosity cold extrusion press oil for the manufacture of screws and connecting elements with a high degree of forming.
rhenus PU 90 A	90	4	Alloyed steel, e.g. 1.4301, 1.4401 Quenched-and-tempered steels e.g. 41Cr4	Extremely high-alloy extrusion oil. Cold extrusion of special screws.



Focus on sustainability

Protecting the environment and nature is relevant like never before. A new way of thinking, in industrial high-performance environments in particular, is becoming increasingly important and calls for concepts for minimising environmental impacts, using raw materials more sustainably and reducing consumption. As an innovation leader, we apply many different ideas to further advance environmental protection and sustainability in the field of lubricants in combination with maximum performance.

As an active Member of the UN "Global Compact" initiative, we demonstrate that we take responsibility as a company in the areas of human rights, working standards, the environment and climate, as well as in corruption prevention. We are the first manufacturer to successfully develop and launch skin-friendly metal working fluids that do not contain any boric acid or amines. Today, we are a leader in metal working fluids, offering a high level of user protection.

The GHS regulation, which is valid worldwide, reduces risks to both human health and the environment during manufacturing, transport and use of chemicals and mixtures. More than 86% of the metal working fluids are classified in water hazard class 1 (WGK 1), which is the lowest class.

We have made it our mission to develop sustainable metal working fluids. We are also pursuing this goal in the leading market competition EnergieUmweltwirtschaft.NRW. Together with universities and higher education institutions, we are conducting research into metal working fluids that are predominantly based on plant-based base oils and bio-based additives. Rhenus Lub has regularly been certified according to Environmental Management System ISO 14001 and Occupational Health and Safety ISO 45001 since 2004.



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