

FUCHS Industrial Lubricants

RENOFORM

For boosting process safety



Lubricants for metal working

LUBRICANTS.
TECHNOLOGY.
PEOPLE.



OUR LUBRICANTS KEEP THE WORLD MOVING

For more than 80 years, we have been concentrating all our activities and research efforts on the development of innovative lubricants. This specialization means that we are enjoying continuous growth – geographically, technically and in the number of application areas.

Today, FUCHS is a German company that offers high-performance lubricants and associated specialties worldwide in practically all areas of application and industries.



What makes our products more valuable.

We develop lubricants on an application-specific basis and tailored to our partners' processes. Together, we look for the best lubricant for our customers. This type of collaboration is unique in its form, scope and intensity. We call it a development partnership. This ability is based on one fundamental feature: As a German company with its headquarters in Mannheim, we are the largest independent lubricant specialist, and this independence makes all the difference. We are open to new methods and visionary approaches – a prerequisite for innovations. And innovations are a FUCHS trademark.

Together, we move more.

RENOFORM: a comprehensive range of lubricant products for metal working.

Metal forming processes play an important and growing role in many sectors, in particular the automobile industry. Ever more new and in some cases increasingly complex component designs are being made possible thanks to further developments in materials and technology.

The technological and economical advantages of noncutting metal forming such as material savings and utilization, precise dimensional and form accuracy and a high level of profitability when produced in large quantities come into play here.

The success of metal forming is mainly dependent on three factors: the condition of the material, the metal forming process including the available tools, and not least the metal forming lubricant.

The key task of the metal forming lubricant is to reduce friction and wear between the workpiece and the tool by forming an effective separation layer, which is essential for achieving the desired component quality and tool service lives.

With the RENOFORM product range, FUCHS offers lubricants for virtually all kinds of forming processes. And thanks

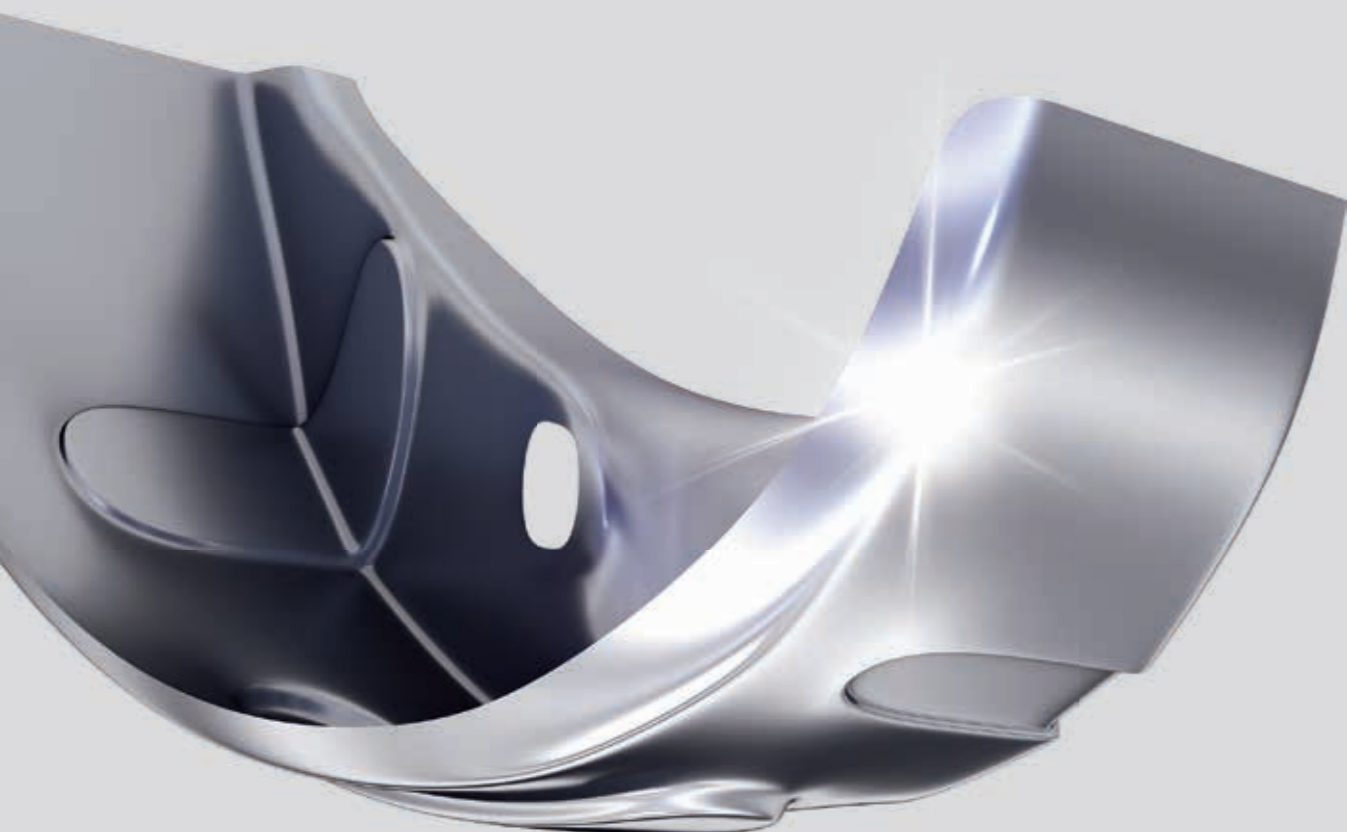
to the constant testing and further development of our lubricants in our own ultra-modern laboratories, our products are state of the art.

Our RENOFORM metal forming lubricants stand for the highest quality and outstanding results in application processes. Regardless of whether for drawing/deep drawing, punching, precision cutting, rolling, cold extrusion, wire, tube and rod drawing or internal high-pressure metal forming, we have the right lubricant for you.

Our RENOFORM products stand out thanks to:

- high profitability of your productive operations
- outstanding performance
- innovative concepts and new developments
- compliance with applicable health and safety requirements

We offer metal forming lubricants for even the very toughest requirements and customized solutions for the overall process that are economical, environmentally sound and safe.

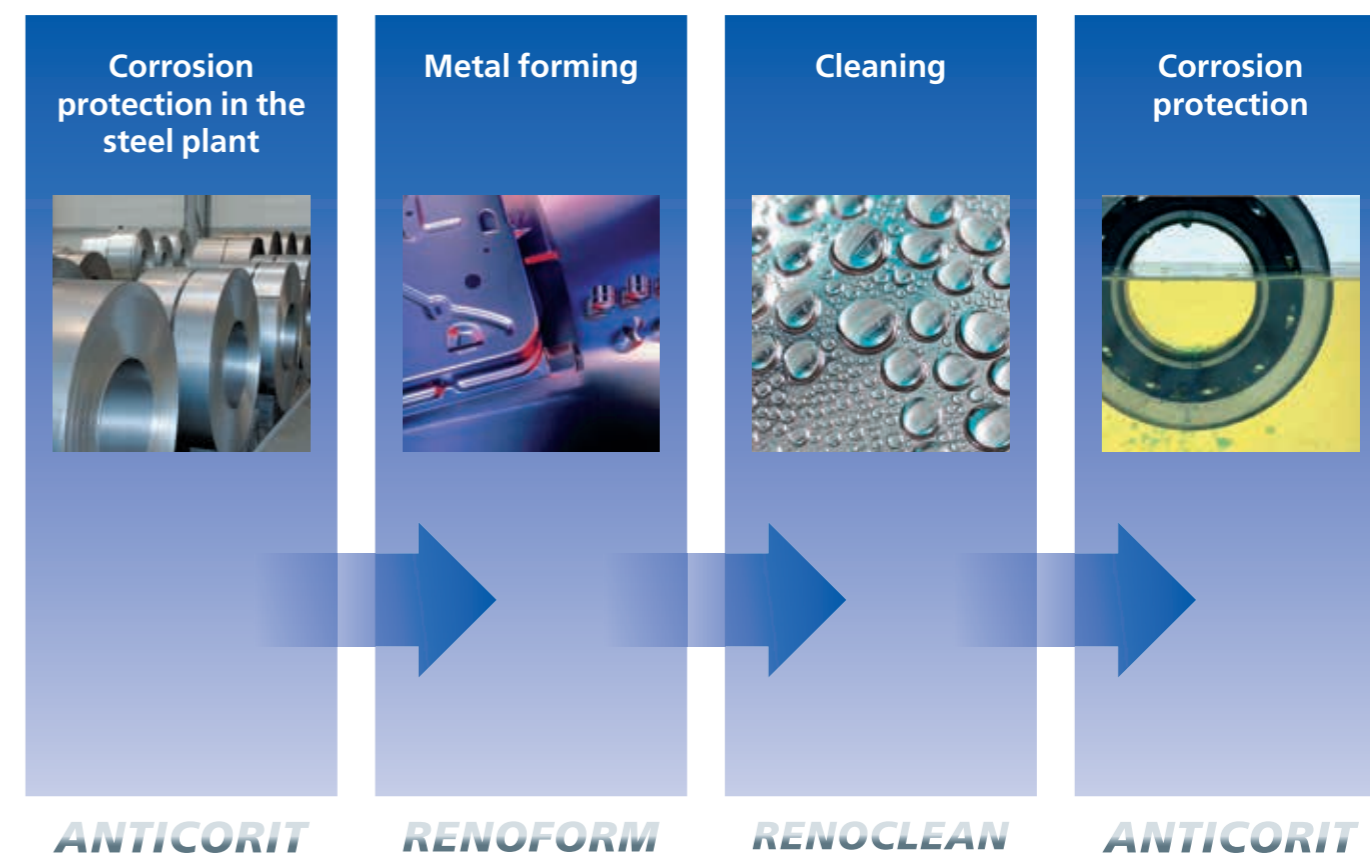


The perfect lubricant for each process step.

The right metal forming lubricants deliver the best metal forming performance, excellent surface quality and process safety. Their power and suitability is also influenced by their compatibility with process materials produced by upstream and downstream processes. Only a seamless workflow throughout the entire process chain ensures optimum operating results. Well-matched lubricants are crucial here.

With system solutions from FUCHS, the world's largest independent lubricant manufacturer, you are placing your trust in a true specialist. And thereby also in our expertise and wealth of experience in consulting and in customized solutions.

Process sequence



Note

The information contained in this product information leaflet is based on the experience and know-how of FUCHS EUROPE 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 pretreatment, possible external contamination, etc. For this reason, universally valid statements about the function of our products are not possible. The information given in this product information 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 EUROPE 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 are subject to continuous further development. We therefore retain the right to change our product program, the products, and their manufacturing processes as well as all details of this product information leaflet at any time and without warning, provided that no customer-specific agreements exist that require otherwise. With the publication of this product information leaflet, all previous editions cease to be valid.

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Lubricants for drawing and deep drawing.

Drawing/deep drawing is one of the most important sheet metal forming procedures. During this process, tensile and compressive force is applied to the workpiece; however, the sheet metal thickness generally remains the same. Important factors for the process are the material, the

material thickness, the draw ratio and – not least – the lubricant used. The friction conditions and thus also the requirements of the lubricant are more complex than in any other metal forming process. However, thanks to our experience, we have the ideal lubricant for your application.

Brand name	Viscosity 40 °C mm ² /s	Metal forming performance	wmb	Material				Comment
				Steel	Stainless steel	Aluminum	Non-ferrous metal	
RENOFORM HBO 1969	19	••	–	+	–	+	–	Low-viscous lubricant containing mineral oil with very good lubricating performance and heat dissipation properties; in particular for ring rolling.
RENOFORM HBO 962/3	37	••	–	+	+	+	–	Universal, low-viscous lubricant containing mineral oil with very good friction reduction and wear protection properties.
RENOFORM 96	39	•••	–	+	+	+	–	Low-viscous, high-performance lubricant containing mineral oil, suitable for a variety of applications with outstanding friction reduction properties and lubricating performance as well as good wear protection.
PLANTOFORM MBO 2797	49	•	–	+	+	+	+	Metal forming lubricant based on easily biodegradable esters with high lubricating performance; in particular for application on nonferrous metals.
RENOFORM HBO 962/2	85	••	–	+	+	+	–	Universal lubricant containing mineral oil; high-viscous variant of RENOFORM HBO 962/3.
RENOFORM MCO 3802 SN	100	•	–	+	–	+	○	Lubricant containing mineral oil; primarily deployed as spot lubricant in car body construction; meets requirements of VDA 201 - 213.
RENOFORM HBO 2790	105	••	–	+	+	+	–	High-performance lubricant containing mineral oil with high active substance content.
RENOFORM 93 B	110	•••	–	+	+	+	–	High-performance lubricant containing mineral oil with outstanding friction reduction, lubricating performance and wear protection.
RENOFORM MCO 3028	130	••	–	+	○	+	–	Lubricant containing mineral oil; primarily deployed as spot lubricant in car body construction; meets requirements of VDA 201 - 213.
RENOFORM 19 B	195	•••	–	+	+	+	–	High-performance lubricant containing mineral oil, suitable for a variety of applications, with outstanding friction reduction, lubricating performance and wear protection.
RENOFORM ZSB 200	200	•••	–	+	○	+	–	High-performance lubricant containing mineral oil, very high active substance content.
RENOFORM DMX 6001	445	••••	–	+	○	+	–	Thixotropic drawing oil containing mineral oil for extremely heavy and deep drawing without regreasing.

Brand name	Viscosity 40 °C mm ² /s	Metal forming performance	wmb	Material				Comment
				Steel	Stainless steel	Aluminum	Non-ferrous metal	
RENOFORM DSO 7006	490	••••	–	+	+	+	–	High-performance synthetic drawing oil for extremely heavy and deep drawing; particularly recommended for stainless steels.
RENOFORM HBO 3212	800	••••	–	+	+	+	–	High-performance, high-viscous drawing oil for extremely heavy and deep drawing; particularly recommended for stainless steels.
RENOFORM HBT 581/3	n.a.	••••	–	+	+	+	○	Pigmented high-performance drawing grease for extremely heavy and deep drawing.
RENOFORM DSW 2012	2,1	•	+	+	○	+	+	RENOFORM DSW series: Mineral oil & solvent-free metal forming lubricants with excellent heat dissipation and good friction reduction; only leave a thin film on the components, meaning that in most cases degreasing for subsequent processes is redundant.
RENOFORM DSW 5301	3,2	••	+	+	○	–	○	
RENOFORM DSW 5112	7,8	••	+	+	○	○	+	
RENOFORM MBW 2755	110	••	+	+	+	○	–	Emulsifiable metal forming concentrate containing mineral oil with balanced additive package; Zn-free.
RENOFORM MBW 677/6	166	••	+	+	+	○	–	Emulsifiable metal forming concentrate containing mineral oil with balanced additive package; contains Zn.
RENOFORM MBW 2055	286	•••	+	+	+	○	+	Emulsifiable high-performance metal forming concentrate containing mineral oil with balanced additive package for heavy drawing; contains Zn.
RENOFORM MBW 2815	311	•••	+	+	+	○	–	Emulsifiable high-performance metal forming concentrate containing mineral oil with balanced additive package for heavy drawing; Zn-free.
RENOFORM SB 2	n.a.	•••	+	+	○	○	+	Pasty, pigment-free drawing grease for heavy drawing; can be deployed as concentrate or emulsion.
RENOFORM HAP 801/6	n.a.	••••	+	+	+	○	+	Pasty, pigmented high-performance drawing grease; can be deployed as concentrate or emulsion; particularly recommended for stainless steels.

+ = applicable; ○ = applicable to a limited extent/advance test required; – = not applicable; wmb = Water-miscible; n.a. = testing method not applicable

Lubricants for blanking.

The blanking process exerts extreme pressure on both workpiece and tool. If the parts are inadequately lubricated, the relative movement between tool and workpiece

inevitably leads to friction and wear. Our RENOFORM products provide an effective separation layer and thereby an optimal blanking result.

Brand name	Viscosity 40 °C mm ² /s	Metal forming performance	wmb	Material				Comment
				Steel	Stainless steel	Aluminum	Non-ferrous metal	
PLANTOFORM BSO 1002	5,4 (20°C)	•	-	+	+	+	+	Low-viscous metal forming lubricant based on easily biodegradable esters; leaves behind a very thin film, meaning that in some cases component cleaning for subsequent processes is redundant.
RENOFORM VZ 1530/4	10	•	-	o	o	+	+	Synthetic, low-viscous punching oil for punching and stamping aluminum materials, in particular for manufacturing aluminum lamellae.
RENOFORM HBO 859/4	18	••	-	+	+	+	+	Low-viscous metal forming lubricant for a broad range of applications and materials.
PLANTOFORM MBO 2797	49	••	-	+	+	+	+	Metal forming lubricant based on easily biodegradable esters with high lubricating performance.
RENOFORM HBO 2790	105	•••	-	+	+	+	-	High-performance lubricant containing mineral oil with high active substance content.
RENOFORM DSW 2012	2,1	••	+	+	o	+	+	RENOFORM DSW series: mineral oil & solvent-free metal forming lubricants with excellent heat dissipation properties and good friction reduction; only leave a thin film on the components, meaning that in most cases degreasing for subsequent processes is redundant.
RENOFORM DSW 5301	3,2	•••	+	+	o	-	o	
RENOFORM DSW 5112	7,8	•••	+	+	o	o	+	

+ = applicable; o = applicable to a limited extent/advance test required; - = not applicable; wmb = water-miscible

Brand name	Viscosity 20 °C mm ² /s	Metal forming performance	wmb	Material				Comment
				Steel	Stainless steel	Aluminum	Non-ferrous metal	
RENOFORM UBO 377/1	2,0	•	-	+	+	+	+	Low-viscous, low-residue and predominantly quickly self-evaporating, aromatic-free punching oils with various additive levels. Flashpoint > 61°C. They only leave a very thin film on the component surface, meaning that in most cases component cleaning for subsequent processes is redundant.
RENOFORM UBO 377/5	2,1	•	-	+	+	+	+	
RENOFORM UBO 377/13	2,4	••	-	+	+	+	+	
RENOFORM HBO 1514	11	•••	-	+	+	+	o	Low-viscous, low-residue and predominantly fast self-evaporating, aromatic-free punching oils. Flashpoint 70°C. In most cases component cleaning for subsequent processes is redundant. The thin film that remains corresponds to RENOFORM MCO 3028 and fulfills the requirements of VDA 201 - 213.
RENOFORM MCO 3028 LV	2,1	••	-	+	-	+	-	
RENOFORM LVO 377/1	3,5	•	-	+	+	+	+	Low-viscous, low-residue and predominantly self-evaporating, aromatic-free punching oils with various additive levels. Flashpoint > 90°C. They only leave a very thin film on the component surface, meaning that in most cases component cleaning for subsequent processes is redundant. The products of the LVO range are free from VOC ¹ , fulfill the requirements of 31st BImSchV ² , and are therefore not subject to an annual solvent statement.
RENOFORM LVO 377/13	3,5	••	-	+	+	+	+	
RENOFORM LVO 1518	7,0	•••	-	+	+	+	o	

+ = applicable; o = applicable to a limited extent/advance test required; - = not applicable; wmb = water-miscible

1) VOC = volatile organic compound
2) 31. BImSchV = 31st Ordinance for the Implementation of the Federal Immission Protection Act (ordinance for limiting emissions of volatile organic compounds when using organic solvents in certain systems)



Lubricants for fine blanking.

Fine blanking enables the manufacture of precise components with a high level of dimensional and form accuracy. Thanks to the significant surface increase during the shear action, the surface has a tendency to form adhesions.

Application of a suitable lubricant ensures the perfect roughness depths of the cut surfaces and optimal tool service lives.

Brand name	Viscosity 40 °C mm ² /s	Metal forming performance	Material				Comment
			Steel	Stain- less steel	Alu- mi- num	Non- ferrous metal	
RENOFORM ZSB 30	27	••	+	+	+	-	Low-viscous precision punching oil containing mineral oil offering a very good range of applications.
RENOFORM HBO 962/3	37	••	+	+	+	-	Universal, low-viscous lubricant containing mineral oil with very good friction reduction and wear protection properties.
RENOFORM 96	39	•••	+	+	+	-	Low-viscous, high-performance lubricant containing mineral oil, suitable for a variety of applications, outstanding friction reduction properties and lubricating performance as well as good wear protection.
RENOFORM FSO 4003	53	••••	+	o	+	-	Synthetic precision cutting oil with highly effective additivation; particularly suitable for precision punching processes with large stroke rates (>500 min ⁻¹).
RENOFORM HBO 2222	58	•••	+	+	+	-	Highly additivated precision cutting oil offering an outstanding range of applications; particularly recommended for stainless steels.
RENOFORM HBO 962/2	85	••	+	+	+	-	Universal lubricant containing mineral oil; high-viscous variant of RENOFORM HBO 962/3.
RENOFORM HBO 2222 HV	130	••••	+	+	+	-	Highly additivated precision cutting oil offering an outstanding range of applications; high-viscous variant of RENOFORM HBO 2222.
RENOFORM FMO 5012	131	•••	+	+	+	-	Precision cutting oil containing mineral oil offering an outstanding range of applications; particularly recommended for stainless steels.
RENOFORM ZSB 120 JBM	135	•••	+	+	+	-	Precision punching oil containing mineral oil offering an outstanding range of applications.

+ = applicable; o = applicable to a limited extent/advance test required; - = not applicable

Lubricants for rolling.

Rolling is a classic form of pressure forming. During the process, the workpiece is compressed in the direction of force in order to achieve the desired material thickness. Our RENOFORM products allow rolling oil consumption and process costs to be reduced.

They improve belt cleanliness with innovative additive combinations and through their optimized lubrication effect bring about an increase in productivity.

Brand name	wmb	Material				Comment
		Non- ferrous metal	Stain- less steel	Steel	Alu- mi- num	
TRENOIL S-Reihe	+	+	-	-	-	Water-miscible cold rolling oils combine outstanding lubricating and cleaning properties and thereby enable a high surface quality in the annealing process. Suitable for reversing stands, tandem mills and 20-rollers.
TRENOIL CU-Reihe	+	-	-	o	+	Water-miscible cold rolling oils for rolling nonferrous metals. Prevent marks on the belt surface, outstanding lubricating properties. Suitable for reversing stands and tandem mills.
TRENOIL SP-Reihe	+	+	-	-	-	Water-miscible dressing media with lubricating properties and optimized corrosion protection.
TRENOIL ST-Reihe	-	+	+	o	o	Non-water-miscible oils for cold rolling of very hard materials with thin final thicknesses. Good behavior in the annealing process, outstanding lubricating properties for an optimum surface quality. Suitable for reversing stands, tandem mills and 20-rollers.
ANTICORIT SPO-Reihe	-	+	+	+	+	Non-water-miscible dressing media for hard materials with good corrosion protection. In different viscosities for optimal application to the surface structure.

+ = applicable; o = applicable to a limited extent/advance test required; - = not applicable; wmb = water-miscible



Lubricants for cold extrusion.

Cold extrusion is a typical solid metal forming method for manufacturing predominantly rotation-symmetric components. The workpiece is pressed into a forming female die. This causes tribological properties to arise which in particu-

lar cause adhesive wear. When using a suitable lubricant, a tribologically effective separating layer is created between the workpiece and the tool that minimizes wear and scuffing of the tools.

Brand name	Viscosity 40 °C mm ² /s	Material				Comment
		Steel	Stain- less steel	Alu- mi- num	Non- ferrous metal	
PLANTOFORM BSO 1002	5,4 (20°C)	+	+	+	+	Low-viscous metal forming lubricant based on easily biodegradable esters; leaves behind a very thin film, meaning that in some cases component cleaning for subsequent processes is redundant.
PLANTOFORM MBO 2797	49	+	+	+	+	Metal forming lubricant based on easily biodegradable esters with high lubricating performance; cold extrusion of small parts made of nonferrous metals.
RENOFORM MBO 68	68	+	+	+	+	Cold extrusion oil containing mineral oil for normal to medium difficulty levels; subsequent to application-technical testing also applicable as a multifunctional fluid.
RENOFORM EMO 4013	100	+	+	+	-	Cold extrusion oil containing mineral oil for demanding processes; with extremely pressure-resistant lubricating film and increased wear protection.
RENOFORM EYO 5001	150	+	+	+	+	Copper-inactive cold extrusion oil containing mineral oil for demanding processes; subsequent to application-technical testing also applicable as a unifluid (cold extrusion oil and slideway oil).
RENOFORM MBO 369/2	118	+	+	+	-	High-performance cold extrusion oil containing mineral oil for demanding to extreme processes with highly pressure-resistant lubricating film and increased wear protection.
RENOFORM MBO 369 UNI	122	+	+	+	+	High-performance, copper-inactive cold extrusion oil containing mineral oil for demanding processes; following prior application-technical test also applicable as a multifunctional oil (cold extrusion oil and slideway oil).

+ = applicable; - = not applicable

Lubricants for wire, tube and rod drawing.

Wire, tube and rod drawing is a solid metal forming procedure in which the workpiece is subjected to tensile and compression force. The base material is drawn through a female die and the cross section of the workpiece is continuously reduced. This process is used to manufacture work-

pieces with smooth surfaces and low tolerances. Application of the right lubricant enables good drawing performance, a high-quality surface finish and low wear as well as a long service life and system cleanliness.

Brand name	Kin. Visc. at 40 °C mm ² /s	wmb	Material				Comment
			Steel	Stain- less steel	Alu- mi- num	Non- ferrous metal	
RENOFORM MCU 20	147	+	o	-	o	+	Water-miscible metal forming concentrate containing mineral oil; applicable for coarse and intermediate copper wire drawing.
RENOFORM TYW 4007	58	+	o	-	o	+	Water-miscible metal forming concentrate containing mineral oil for intermediate to superfine copper wire drawing.
RENOFORM MF 9	n.a.	+	+	o	o	+	Pasty, pigment-free drawing grease for tube, rod and coarse wire drawing.
RENOFORM SB 2	n.a.	+	+	o	o	+	Pasty, pigment-free drawing grease for bar and wire drawing; can be deployed as concentrate or emulsion.
RENOFORM HBO 3014	348	-	+	o	+	-	High-performance lubricant for drawing round and polygonal bars; forms an extremely pressure-resistant lubricating film and has a strong wear-reducing effect.

+ = applicable; o = applicable to a limited extent/advance test required; - = not applicable; wmb = water-miscible; n.a. = testing method not applicable



Lubricants for hydroforming.

Hydroforming enables completely new design solutions when manufacturing hollow parts with complex geometry and specific hardness. The requirements of lubricants during hydroforming are demanding, as alongside typical factors for metal forming such as the tool, workpiece sur-

face, temperature, viscosity and flow speed, the internal pressure and axial forces must also be taken into account. However, the selection of suitable active media and external lubricants plays a key role in determining the metal working result.

Brand name	Kin. Visc. at 40 °C mm ² /s	wmb	Material				Comment
			Steel	Stain-less steel	Alu-minum	Non-ferrous metal	
RENOFORM MBO 2755 SD	5,4	+	+	-	-	+	Synthetic, water-soluble internal high-pressure metal forming active medium; good demulsifying behavior, outstanding rinsing and wetting effect and high resistance to microorganisms.
RENOFORM HMO 7001	634	-	+	+	+	-	Internal high-pressure metal forming external lubricant containing mineral oil with good lubricating performance, excellent wear protection and good demulsifying behavior.
RENOFORM MBO 2907	161	-	+	+	+	+	Synthetic internal high-pressure metal forming external lubricant with good lubricating performance and wear protection and good demulsifying behavior.
RENOFORM MBO 2907 HV	490	-	+	+	+	-	Synthetic internal high-pressure metal forming external lubricant with very good lubricating performance, excellent wear protection and good demulsifying behavior.

+ = applicable; - = not applicable; wmb = water-miscible

Choosing the right metal forming lubricant.

Just ask the specialists. The FUCHS checklist for your product recommendation. On the basis of this questionnaire we determine the lubricant best suited to your individual requirements.

Your details

Customer Date
 Address Phone no.
 Contact person E-mail address

Which materials are processed?

Workpiece Steel Stainless steel Nonferrous metals Aluminum
 Alloy Other
 Material thickness mm
Tool Material Coating

Which metal forming procedure will be used?

Drawing/deep drawing Blanking Fine blanking Cold extrusion
 Hydroforming Wire, tube and rod drawing Rolling
 Component
 Difficulty level Normal Medium Difficult Very difficult

How is the medium applied?

Spraying Rolling Manual (painting/roller) Flooding Other

Which requirements should be fulfilled?

Previously used Name Manufacturer
 Are there any problems with this? Yes No If so, which?
 Type of lubricant Water-miscible Non-water-miscible Containing mineral oil
 Mineral oil-free Self-evaporating Pasty
 Kin. viscosity at 40°C
 Subsequent processes to be taken into account
 Desired goal



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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