

**METALWORKING FLUIDS**

**SLIDEWAY OILS**



**BELGIN**



**BELGİN** provides for the usage of various industries a wide product portfolio over 1000 different products under 32 main groups ranging from hydraulic oils, greases, engine oils to specific industrial lubricants.

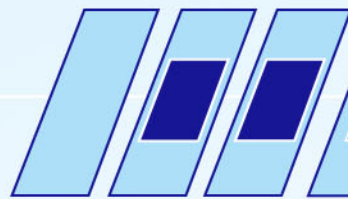
**BELGİN** also produces the high performance RENOL, GENERAX, OLEONOL AND BORTEX branded watersoluble metalworking fluids and WAYLUB slideway lubricants in its modern plant, which operates under SGS ISO 9001 - TSE ISO 9001 quality system certificate and laboratory certificate in the scope of TS EN ISO/IEC 17025 standard. This plant boasts a production with the state-of-the-art technology as well as fully automatic, computer controlled operations, founded on 7800 m<sup>2</sup> closed area within 25000 m<sup>2</sup> open area at the Gebze Organized Industrial Site.

RENOL branded fully synthetic metalworking fluids designed especially for grinding operations, GENERAX and BORTEX branded conventional and semi-synthetic metalworking fluids are produced to meet all the challenging demands of the metal machining industry. Additionally, OLEONOL branded metalworking fluids developed for machining of brass and copper materials and WAYLUB branded slideway oils owning OEM approvals by various CNC and workbench producers, can meet the demanding needs of the industry.

RENOL, GENERAX, OLEONOL and BORTEX branded metalworking fluids and WAYLUB branded slideway oils produced at world standards, are used successfully in metal removal industry, automotive industry, linearly welded pipe production industry and in other various industries.







## → GENERAL TECHNICAL INFORMATION

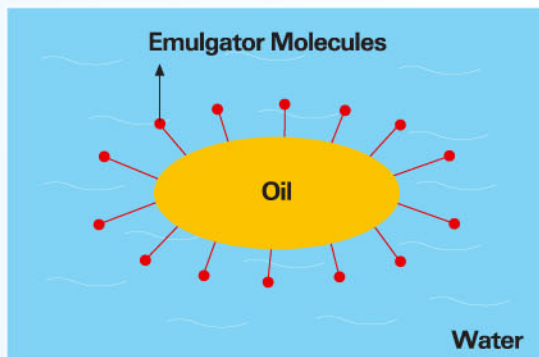
Metal Working Fluids first have been used primitively as soapy and soda water, as the emulgators and other various additives have been developed, they have formed the modern and complex structure of today's metalworking fluids.

- Metalworking fluids designed for metal machining and forming has an important role in meeting the demanding needs of the industry. From the metalworking fluids the following properties to fulfill are expected:

- Cooling of the machining tools and machined parts
- Prevention of corrosion
- Reduction of friction
- Washing and cleaning
- Reduction of oil smoke and mist formation
- Prevention danger of fire



## → APPLICATION OF METALWORKING FLUIDS



Metalworking Fluids are used in emulsions that are formed by adding metalworking fluid to water, creating a heterogeneous mixture of two immiscible fluids. The emulgator molecules bond the bridge between normally immiscible water and oil molecules.

To get the maximum Efficiency from Metalworking fluids, the following points should be considered:

- Needs assessment and system analysis
- Appropriate system cleaning before initial emulsion preparation
- Selection of appropriate water resources for emulsion
- Determination of critical parameters to check for emulsion care and setting a periodic control system
- Taking samples systematically and analysis of them in the laboratory
- Making necessary adjustments according to the results from laboratory analysis.

To receive the services above please contact Belgin Technical Support Team.

## → CLASSIFICATION OF METALWORKING FLUIDS

In general metalworking fluids can be classified under two different categories:

- Classification according to their oil content
- Classification according to their Extreme Pressure (EP) properties

### CLASSIFICATION ACCORDING TO THEIR OIL CONTENT

#### • Conventional (Soluble) Metalworking fluids

These metalworking fluids contain more than 50% mineral oil, they are also called as soluble oils. The emulsion appearance is milky and the emulsion drop size is more than 1 micron.

#### • Semi-synthetic metalworking fluids

They contain mineral oil less than 50%. Emulsion appearance is light blue, semi transparent and the emulsion drop size is between 1 micron and 0,05 microns. At initial preparation, even they look semi transparent, as the emulsions work, they become milky.

#### • Fully synthetic metalworking fluids

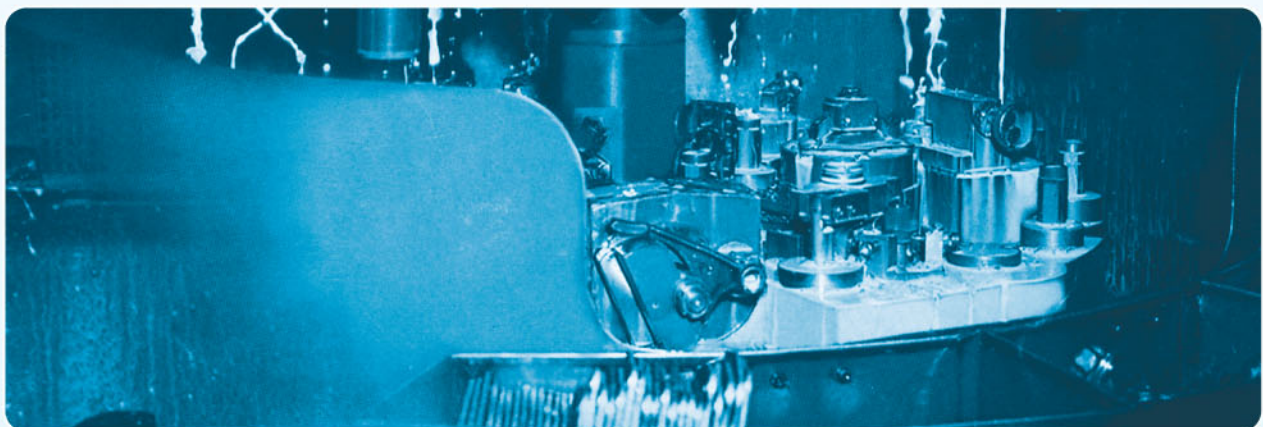
These are mineral oil free, so called "fully synthetic" metalworking fluids. Their emulsions are transparent and the emulsion droplet size is below 0,5 microns.

#### • Vegetable based metalworking fluids

These metalworking fluids contain only vegetable and vegetable derivatives in their formulation. Their waste is treated like any other metalworking fluid, but due to their vegetable structure they are much easily treated. Emulsion appearance is usually semi transparent.

### CLASSIFICATION ACCORDING TO THEIR EXTREME PRESSURE (EP) PROPERTIES

- Metalworking fluids can be categorized as metalworking fluids with EP additives and without EP additives. The EP containing metalworking fluids form stronger films carrying higher loads, thus resulting in improved tool and mould life, providing maximum efficiency.







## → IMPORTANT TESTS FOR METALWORKING FLUIDS

### pH VALUE MEASUREMENT

This test method measures the concentration of free hydrogen ions in emulsions. The scale is between 1 and 14. Due to the general structure of metalworking fluids, the pH values are between 8,5 and 9,5. pH is one of the important parameters when using emulsions.



### CONDUCTIVITY TEST

This test provides information about the concentration of ions in water and emulsions, its unit is microSiemens. It is also one of the important parameters when using emulsions.

### EMULSION STABILITY

This method is used for testing of the emulsion stability in various water types for a certain time at constant temperature. The emulsion is checked for phase separation and creaming.



### FOAM RESISTANCE AND STABILITY

The emulsions of metalworking fluids are pumped with high pressure and the amount of foam formed is measured. This test method provides an indication of emulsions' foaming tendency.

### CONCENTRATION DETERMINATION

This method is used for determination of active matter content in emulsions. Most widely used method is measurement by a refraktometer. Additionally, titration method can be used for determination of concentration. The result is given in percentage.



### CORROSION PROTECTION (DIN 51360 PART 2)

This tested method measures the corrosion protection of metalworking fluids. Corrosion on a filter paper is evaluated according to a scale from 0 to 4, indicating a higher corrosion with a higher number.

### REICHERT WEAR TEST

This test method determines the lubricity properties of metalworking fluids. The wear surface is measured in mm<sup>2</sup>. Less surface wear indicates better lubricating properties.



## → BELGİN METALWORKING FLUIDS

### FULLY SYNTHETIC METALWORKING FLUIDS

#### TRANSPARANT A

TRANSPARANT A is a fully synthetic grinding fluid, which forms transparent emulsions with water. Due to its colorless, transparent emulsion, it provides ease of seeing the tools and machined parts during grinding operations without any problems. TRANSPARANT A has a high detergency property and transports easily the chips to the tank keeping the system and the machined surface clean. It prevents corrosion and minimizes the level of bacteria and yeast growth.



#### RENOL CB

RENOL CB is a full synthetic grinding fluid with high corrosion protection, especially designed for machining of carbide and cobalt containing metals preventing the color change of the emulsion to red. Due to its colorless, transparent emulsion, RENOL CB provides ease of seeing the tools and machined parts during grinding operations without any problems. It also increases lifetime of grinding wheel and grinding period by preventing the hone formation in pores of grinding wheels. RENOL CB has a high detergency property keeping the system and metal surface clean and transports the chips to the emulsion tank. It is highly resistant to bacterial and yeast growth. RENOL CB does not irritate the skin thanks to its regulated pH level.





### → BELGiN METALWORKING FLUIDS

#### FULLY SYNTHETIC METALWORKING FLUIDS

##### RENOL EP-50

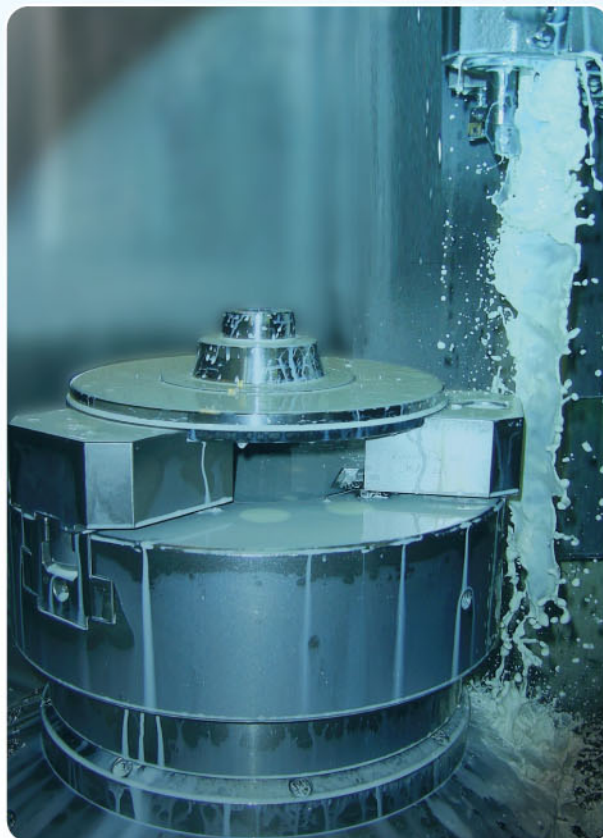
RENOL EP-50 is an oil-free, fully synthetic metalworking fluid designed for grinding and cutting operations. Due to its colorless, transparent emulsion, RENOL EP-50 provides ease of seeing the tools and machined parts during grinding operations without any problems. It provides high lubricity and load carrying performance due to the EP additives in the formulation, as a result RENOL EP-50 increases tool life and provides cleaner metal surface with higher quality.

RENOL EP-50 is highly resistant to bacterial and yeast growth and does not irritate the skin thanks to its regulated pH level.

##### RENOL SF 3/BM

RENOL SF 3/BM is a fully synthetic grinding fluid, which forms transparent fluorescent emulsions with water. Due to its colorless, transparent emulsion, RENOL SF 3/BM provides ease of seeing the tools and machined parts during grinding operations without any problems. It also increases lifetime of grinding wheel and grinding period by preventing the hone formation in pores of grinding wheels.

RENOL SF 3/BM has very good corrosion protection properties. Additionally, it keeps the machined surface and emulsion clean by transporting the chips to the emulsion tank. RENOL SF 3/BM is highly resistant to bacterial and yeast growth and does not irritate the skin thanks to its regulated pH level.





## → BELGIN METALWORKING FLUIDS

### SEMI-SYNTHETIC AND CONVENTIONAL (SOLUBLE) METALWORKING FLUIDS

#### GENERAX 85

GENERAX 85 is a semi-synthetic metalworking fluid that makes transparent emulsions with water. GENERAX 85 can be used successfully in grinding processes and in cutting operations without extreme loads and in linearly welded tube production sector. It has also very good detergent power, helping both the machine and material surfaces to be clean.

GENERAX 85 prevents bacteria, fungi and yeast formation due to its additives and does not irritate the skin thanks to its regulated pH level.

#### GENERAX 95

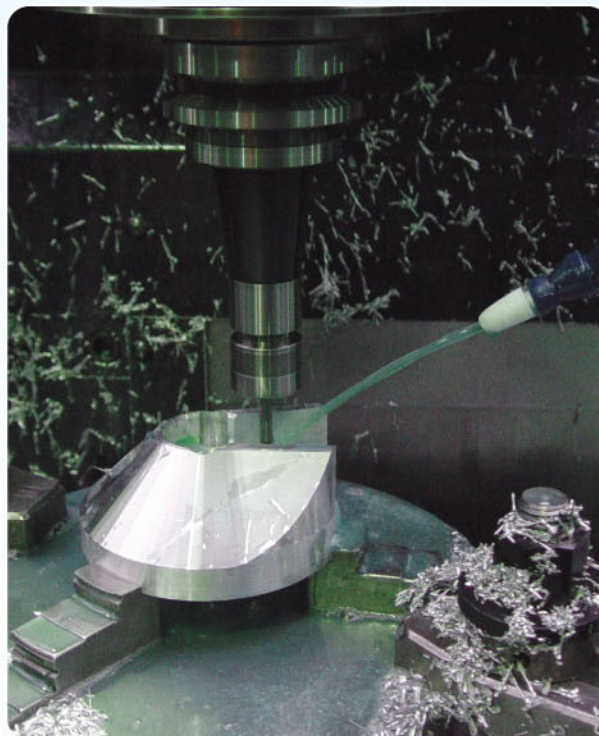
GENERAX 95 is a high performance, semi synthetic, general purpose metalworking fluid that forms stable and translucent emulsions with water. It is successfully used in operations, such as machining, grinding, pipe and tube industry, in which no extreme pressures are present and especially effective corrosion prevention and washout characteristics are required. It has many areas of usage in the processing of iron and iron-alloy materials.

#### GENERAX ULTRA

GENERAX ULTRA is a watersoluble semi-synthetic metalworking fluid with a long sump life that can be used for machining of steel and cast iron. GENERAX ULTRA has a good detergency power keeping the workbench and machined part clean and protects against corrosion. GENERAX ULTRA is used successfully also with hard waters and does not irritate the skin thanks to its regulated pH level.

#### GENERAX ULTRA EP

GENERAX ULTRA EP is a watersoluble semi-synthetic metalworking fluid designed for difficult cutting operations with a long sump life that can be used for machining of steel, aluminum alloys and cast iron.



GENERAX ULTRA EP has a good detergency power keeping the workbench and machined part clean and protects against corrosion. Due to the EP additives contained, it builds lubricating films resistant to high pressures and loads and it extends tool life. GENERAX ULTRA EP is used successfully also with hard waters and does not irritate the skin thanks to its regulated pH level.

#### GENERAX URS

GENERAX URS is a watersoluble semi-synthetic metalworking fluid designed for difficult cutting operations for machining of steel, aluminum alloys and cast iron. Due to the EP additives contained in the formulation, it builds lubricating films resistant to high pressures and loads; as a result GENERAX URS extends tool life. GENERAX URS does not irritate the skin thanks to its regulated pH level.





## → BELGIN METALWORKING FLUIDS

### SEMI-SYNTHETIC AND CONVENTIONAL (SOLUBLE) METALWORKING FLUIDS

#### GENERAX U/Y

GENERAX U/Y is a watersoluble semi-synthetic metalworking fluid with a long sump life that can be used for machining of steel and cast iron. GENERAX U/Y transports the chips and dirt to the filter thanks to its good detergency power, keeping the workbench and machined part clean. As a result, the emulsion life is maximized and the emulsion is kept clean. GENERAX U/Y is used successfully also with hard waters and does not irritate the skin thanks to its regulated pH level.

#### GENERAX SE

GENERAX SE is a watersoluble semi-synthetic vegetable-oil based metalworking fluid, which does not contain any mineral oil. Its semi-synthetic structure derived from self-emulsifiable esters as and at the same time, they cause GENERAX SE to be an environmentally friendly product. GENERAX SE provides high detergency power and contains special esters for lubricity and special additives for limiting growth of bacteria, yeast and fungi. GENERAX SE, keeps the workshops very clean, rejects tramp oil and protects the material against corrosion for a long time. GENERAX SE does not require flushing before blackening operation. Parts machined with GENERAX SE can be directly used in blackening.

#### GENERAX 3010

GENERAX 3010 is a high performance, semi synthetic, general purpose metalworking fluid which forms stable and translucent emulsions with water. It is successfully used in operations, such as machining, grinding, pipe and tube industry, in which no extreme pressures are present and especially effective corrosion prevention and washout characteristics are required. Even if the total hardness of the water is high and chloride content is higher than 50 mg/L, it keeps the emulsion stable and provides corrosion preventive properties.

#### GENERAX 3020

GENERAX 3020 is a high performance, semi synthetic, general purpose metalworking fluid which forms stable and translucent emulsions with water. It is formulated with a well-balanced additive content which consist of high quality mineral base oils, strong emulsifiers, EP additives and corrosion, foam and microorganism preventive chemicals. It is successfully used in operations, such as machining, grinding, pipe and tube industry, in which especially effective corrosion prevention and washout characteristics are required. Even if the total hardness of the water is high and chloride content is higher than 50 mg/L, it keeps the emulsion stable and provides corrosion preventive properties.





## → BELGIN METALWORKING FLUIDS

### SEMI-SYNTHETIC AND CONVENTIONAL (SOLUBLE) METALWORKING FLUIDS

#### **BORTEX H**

BORTEX H is a mineral oil based, conventional, economic watersoluble metalworking fluid with high lubricity properties. Due to its special additives, BORTEX H is more resistant to bacteria and yeast compared to other conventional metalworking fluids. As a result, it has a longer sump life and does not cause biofouling. BORTEX H can be used successfully for all sawing and cutting operations of ferrous metals. BORTEX H does not irritate the skin thanks to its regulated pH level. It can be used also as water soluble rust preventative for protection of ferrous metals.

#### **BORTEX RT 98**

BORTEX RT 98 is a mineral oil based, conventional watersoluble metalworking fluid with high EP additives and corrosion preventative additives. Due to its special additives, BORTEX RT 98 is highly resistant to bacteria and yeast, thus it has a longer sump life and does not cause biofouling. BORTEX RT 98 builds lubricating films resistant to high pressures and loads for all kind of cutting operations of ferrous metals. BORTEX RT 98 can also protect the machined parts against corrosion for certain amount of time.

#### **BORTEX 21**

BORTEX 21 is a semi-synthetic, biostable metalworking fluid with very stable semi-transparent emulsion appearance. BORTEX 21 builds lubricating films resistant to high pressures and loads for all kind of cutting operations of ferrous metals. BORTEX 21 has a long sump life due to its resistant structure against bacteria and yeast. It also protects the machined parts against corrosion for certain amount of time.

#### **BORTEX 21-P**

BORTEX 21-P is a semi-synthetic, biostable metalworking fluid with very stable semi-transparent emulsion appearance. BORTEX 21-P builds lubricating films resistant to high pressures and loads for all kind of cutting operations of ferrous metals. BORTEX 21-P has a long sump life due to its resistant structure against bacteria and yeast. It also protects the machined parts against corrosion for certain amount of time and extends tool life.

#### **BORTEX PRO 3000**

BORTEX PRO 3000, is a conventional type high performance metalworking fluid that produces milky, green colored emulsions when mixed with water. BORTEX PRO 3000 can operate in very hard water and has a superior corrosion protection for ferrous, copper and aluminum alloys. Due to the antiwear and extreme pressure additives, BORTEX PRO 3000 provides excellent lubricity that will result in extended tool life and minimized surface roughness.

#### **BORTEX 622**

BORTEX 662 is a high mineral oil content conventional watersoluble metalworking fluid that builds up milky emulsions resistant to bacteria and yeasts. Due to its special additives, BORTEX 662 is more resistant to bacteria and yeast compared to other conventional metalworking fluids. BORTEX 622 can be used successfully for all sawing and cutting operations of ferrous metals and nonferrous metals like brass and copper. BORTEX 622 emulsion does not become green due to yellow metals and can be also used as mould release lubricant in molds.





## → BELGIN METALWORKING FLUIDS

### SEMI-SYNTHETIC AND CONVENTIONAL (SOLUBLE) METALWORKING FLUIDS

#### OLEONOL P

OLEONOL P is mineral oil based conventional metalworking fluid that can form stable milky emulsions when mixed with water. OLEONOL P emulsion does not change its color to green due to the special additives in the formulation. It is used successfully in CNCs and transfer workbenches that machine copper alloys and brass. OLEONOL P can be also used as mould release lubricant in molds.



#### BORTEX 227

BORTEX 227 is a conventional, multi-purpose metalworking fluid which forms stable and milky emulsions with water. It is especially used for cutting operations which need lubrication property. It is used for processing of iron and iron-alloy materials. Since it has excellent lubrication property, it provides to get high quality surface. It also provides long service life of the emulsion by reducing the wears.



## → GENERAL TECHNICAL INFORMATION

Slideway Oils are oils that lubricate in hydrodynamic region where the slides of machines, CNCs and workbenches move with low speeds, but under heavy loads. During this hydrodynamic lubrication, the slideway oils should prevent especially the "stick-slip" at low speeds.

● The following properties are expected from slideway oils:

- To form a soft and lubricating film on the slides by containing tackiness additives that will prevent the slideway oil to run down from the slide surfaces
- To be able to carry heavy loads
- To protect steel and other metals against corrosion
- Should not harm sealing materials
- Should contain additives that prevent "stick-slip"
- Should prevent oxidation and aging
- Should not cause any incompatibility with metalworking fluids
- Should have appropriate viscosity index

## → CLASSIFICATION OF SLIDEWAY OILS

ISO VG	Min. Kinematic Viscosity 40°C (cSt)	Max. Kinematic Viscosity 40°C (cSt)
32	28,80	35,20
68	61,20	74,80
100	90,00	110,00
150	135,00	165,00
220	198,00	242,00

Slideway oils are classified according to their viscosity grades at 40°C and performance levels.

The classification of slideway oils according to their viscosity grades is done by using ISO VG classification as in other industrial lubricants. Usually, for the slideway oils, not all the ISO VG viscosity classifications are used.

**Slideway oils meeting the performance levels below are recommended for lubrication of slides.**

### CINCINNATI MACHINE P-53, P-47, P-50

Cincinnati Machine is a performance test method that measures the thermal stability of slideway oils. In this test, the slideway oil is aged at 101°C, after 24 hours the steel and copper plates are examined visually and the amount of dissolved metals in the oil is measured. P-53 approval is granted to ISO VG 32 viscosity grade slideway oils, whereas P-47 approval is granted to ISO VG 68 viscosity grade slideway oils and P-50 is granted to ISO VG 220 viscosity grade slideway oils.





## → PERFORMANCE TESTS OF SLIDEWAY OILS

### KINEMATIC VISCOSITY TEST (ASTM D 445):

This test determines the resistance to flow of oil under gravity. Viscosity is measured at 40°C for industrial applications and at 100°C for automotive industry applications in the units of mm<sup>2</sup>/s or cSt.



### VISCOSITY INDEX (ASTM D 2270):

This test determines the variation in the kinematic viscosity of a fluid with temperature. For oils of similar kinematic viscosity, the higher the viscosity index, the smaller would be the decrease of the kinematic viscosity with increasing temperatures.

### POUR POINT (ASTM D 97):

This test determines the lowest temperature at which movement of the oil is observed. The pour point of oils provides an indication of the lowest temperature of its utility in certain applications.



### FLASH POINT (ASTM D 92):

This test determines the flash and fire point of the oil. These values are important to provide work safety.

### WATER SEPARABILITY TEST (ASTM D 1401):

This test method covers measurement of the ability of oils to separate from water. The volumes of oil, water and emulsion separated at specified time are reported in mL.

### TOTAL ACID NUMBER (ASTM D 974):

This test method covers the determination of acidic constituents in the oil.

### FZG GEAR TEST (ASTM D 5182):

This test determines load-carrying capacity of oils.





## → BELGİN SLIDEWAY OILS

### WAYLUB SERIES

WAYLUB Series, are slideway oils that are produced by blending high quality refined baseoils with the latest additive technology. Due to the superior additives contained in the formulation, the wear is minimized and the slides are protected against corrosion and rust. Additionally, the tackiness agents help to form a homogenous lubricating film and cause to hang especially on vertical slides. WAYLUB Slideway oils do not contain any chlorinated, zinc or sulfur containing additives. When slideway oils containing sulfurized additives leak to metalworking emulsions as tramp oil, they promote a fast growth of sulfur-eating bacteria causing degradation of essential ingredients of the metalworking fluid. On the other hand, being free of zinc and chlorinated additives WAYLUB slideway oils do not pollute the environment. WAYLUB Series hold CINCINNATI MILACRON P-47, P-50 and P-53 international approvals.

### WAYLUB /72 SERIES

WAYLUB /72 Series, are slideway oils without tackiness agents that are produced by blending high quality refined baseoils with the latest additive technology. WAYLUB /72 Series are especially used in workbenches on horizontal slides with very thin lubrication capillars. WAYLUB /72 Slideway oils do not contain any chlorinated, zinc or sulfur containing additives. When slideway oils containing sulfurized additives leak to metalworking emulsions as tramp oil, they promote a fast growth of sulfur-eating bacteria causing degradation of essential ingredients of metalworking fluid. On the other hand, being free of zinc and chlorinated additives WAYLUB slideway oils do not pollute the environment. WAYLUB /72 Series meet the CINCINNATI MILACRON P-47, P-50 and P-53 specifications.



Product Name	ISO VG Classification	Cincinnati Machine P-47	Cincinnati Machine P-50	Cincinnati Machine P-53
WAYLUB 1	VG 32			✓
WAYLUB 2	VG 68	✓		
WAYLUB 3	VG 100			
WAYLUB 4	VG 150			
WAYLUB 5	VG 220		✓	



	Full Synthetic					Semi Synthetic						Vegetable Base		Soluble Oil (Conventional)			Semi Synthetic			Soluble Oil (Conventional)		
	Transparent A	Renol SF-3BM	Renol SF-3T	Renol EP-50	Renol CB	Generax 85	Generax 95	Generax Ultra	Generax Ultra EP	Generax URS	Generax U/Y	Generax SE	Generax 3010/3020	Bortex H	Bortex 622	Bortex RT 98	Bortex 21	Bortex 21 P	Bortex PRO 3000	Oleonol P	Bortex 227	
Operation																						
Grinding	Fe	Fe	Fe, Al	Fe, Al, Cc	Fe, Al, Cc	Fe, Cs	Fe, Cs				Fe, Cs	Fe, Cs	Fe, Cs, Al, Mg, Ti									
Turning																						
Milling																						
Tapping																						
Sawing																						

\* Al= Aluminum Fe=Ferrous Metals Cs=Cast Iron Mg=Magnesium Cu=Copper and Brass Cc=Carbide and Cobalt Ti=Titanium

- Full Synthetic
- Semi Synthetic
- Vegetable Base
- Soluble Oil (Conventional)



## PRODUCT RANGE

- GRINDING FLUIDS
- WATERSOLUBLE METALWORKING FLUIDS
- HYDRAULIC OILS
- GREASES
- NEAT CUTTING OILS
- HONING OILS
- QUENCHING OILS AND FLUIDS
- HEAT TRANSFER OILS
- CIRCULATION AND LUBRICATION OILS
- CORROSION PREVENTITIVE OILS
- NEAT FORMING AND DEEPPDRAWING LUBRICANTS
- SOLUBLE FORMING AND DEEPPDRAWING LUBRICANTS
- SLIDEWAY LUBRICANTS
- INDUSTRIAL GEAR LUBRICANTS
- OPENGear LUBRICANTS
- HOTFORMING AND FORGING LUBRICANTS
- VARIOUS LUBRICANTS
- CLEANERS
- MOTOR OILS
- TRANSMISSION OILS
- PROSES OILS
- TEXTILE LUBRICANTS
- BIOCIDES
- ELECTRO EROSION FLUIDS
- INJECTOR ADJUSTMENT FLUIDS
- SHOCKABSORBER OILS
- MOULD RELEASE LUBRICANTS
- COMPRESSOR LUBRICANTS
- MARINE OILS
- COMPLEMENTARY AUTOMOTIVE PRODUCTS
- CHAIN OILS



### **BELGiN MADENİ YAĞLAR TİC. ve SAN. A.Ş.**

Gebze Organize Sanayi Bölgesi (GOSB), İhsan Dede Cad. No: 125, P.K. 1003, 41480 Gebze - Kocaeli - TÜRKİYE  
Tel: 0262 751 02 92 PBX - 751 01 90 Faks: 0262 751 01 98 - 751 06 67  
e-mail: [info@belginoil.com](mailto:info@belginoil.com) [www.belginoil.com](http://www.belginoil.com)

