

# Base Stocks and Additives for Lubricants and Metalworking Fluids



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# 01 / BASE STOCKS

## BASE STOCKS

### Polyalkylene glycols (PAG) base stocks

ROKOLUB series synthetic base stocks produced by the PCC Group are high-performance lubricants based on Polyalkylene glycols (PAG), which provide excellent lubrication for gears, bearings and circulating lubrication systems which work at temperatures mineral oils are unable to cope with. They are resistant to shear, highly resistant to thermal degradation, oxidation and the formation of sludge and deposits. Rokolub oil bases

have a very high viscosity index of >180, do not contain paraffins and have a very low pour point. PAG-based lubricating products deliver excellent performance in the toughest industrial conditions. Their use is recommended by the leading producers of calenders in the manufacturing of plastics, bearings for paper machines, compressors and gears. It is preferred that these products are used in severe operating conditions.

#### Features

- good thermo-oxidative stability and resistance to formation of deposits and sludge
- very high thermal conductivity that reduces the operating temperatures and extends the life of oil batch
- low friction coefficients

#### Advantages

- excellent low temperature performance
- lower operating temperatures, greater productivity of equipment and ability to reduce energy consumption as well as extended use of seals

#### Benefits

- lower costs of repair and parts replacement
- extended oil service life, increased production efficiency and shorter planned and unplanned downtime
- lower energy consumption and more uniform productivity of machines with faster warm up at a low ambient temperature

## Water-soluble PAG - applications

PRODUCT NAME	DESCRIPTION		ISO VG	COMPRESSOR LUBRICANTS	INDUSTRIAL GEAR OIL	HYDRAULIC FLUIDS	TEXTILE LUBRICANTS	HEAT TRANSFER FLUIDS	METALWORKING FLUIDS	NON-FERROUS METALS PROCESSING	MILL&CALENDER	NSF HX-1	FEATURES AND BENEFITS
<b>PAG BASE STOCK</b>													
Rokolub 50-B-20	EO/PO random copolymers	water-soluble	22	•		•			•				<p>Rokolub 50-B series base stocks are alcohol started polymers containing equal amounts of ethylene oxide and propylene oxide available in a variety of molecular weights and viscosities. They are high performance base stocks commonly used in industrial gears, bearing and calender, textile lubricants and compressors. These synthetic base stocks offer a high viscosity index, often above 200, providing a very low rate of viscosity change with a wide range of temperatures.</p> <p>The lubricity and performance make it also suitable to be used as industrial hydraulic fluids for equipment operating in a wide temperature range. Their excellent low temperature properties make them very suitable for year-round outdoor use. Their high flash point (up to 257°C) is important in the selection of heat transfer fluids and calender lubricants. They may be also used in heat-treatment or processing of rubbers, elastomers or fabricated parts, where compatibility of the heat transfer fluid with the processed part is important.</p> <p>High molecular weight lubricant may be used for a variety of applications, including: plasticizers, modifiers and surfactants, antifoam agents – in boiler water and fermentation processes.</p>
Rokolub 50-B-32	EO/PO random copolymers	water-soluble	32	•		•		•	•				
Rokolub 50-B-46	EO/PO random copolymers	water-soluble	46	•		•		•	•	•			
Rokolub 50-B-100	EO/PO random copolymers	water-soluble	100	•		•	•		•	•	•	•	
Rokolub 50-B-150	EO/PO random copolymers	water-soluble	150	•	•	•	•		•	•	•	•	
Rokolub 50-B-330	EO/PO random copolymers	water-soluble	320		•		•		•	•			
Rokolub 50-B-460	EO/PO random copolymers	water-soluble	460		•		•		•	•			
Rokolub 60-D-68	EO/PO random copolymers	water-soluble	68	•		•			•				<p>Rokolub 60-D series are diol started random alkoxyated copolymers of ethylene oxide and propylene oxide. They are water soluble at ambient temperature and are available in a variety of molecular weights and viscosities. (Their reverse solubility in higher temperatures allows achieving a lubricant film on hot metal surface, what makes them extremely useful in metal working fluids). They offer superior performance, including: low friction coefficients, excellent lubricity and EP/AW properties for improved cutting performance and increased tool lifespan, low pour point temperatures and long fluids lifetime.</p> <p>Rokolub 60-D series consistently maintains water solubility within a higher temperature range and thermo-oxidative stability. These are high performance base stocks used in industrial gear, bearing, calender and textile lubricants, compressor and metal working formulations.</p>
Rokolub 60-D-150	EO/PO random copolymers	water-soluble	150	•	•	•	•		•		•		
Rokolub 60-D-220	EO/PO random copolymers	water-soluble	220	•	•	•	•		•	•	•		
Rokolub 60-D-320	EO/PO random copolymers	water-soluble	320		•		•		•	•			
Rokolub 60-D-460	EO/PO random copolymers	water-soluble	460		•		•		•	•		•	
Rokolub 60-D-1000	EO/PO random copolymers	water-soluble	1000		•		•		•			•	

## Partially water-soluble & insoluble PAG - applications

PRODUCT NAME	DESCRIPTION		ISO VG	COMPRESSOR LUBRICANTS	INDUSTRIAL GEAR OIL	HYDRAULIC FLUIDS	TEXTILE LUBRICANTS	HEAT TRANSFER FLUIDS	METALWORKING FLUIDS	NON-FERROUS METALS PROCESSING	MILL&CALENDER	NSF HX-1	FEATURES AND BENEFITS
<b>PAG BASE STOCK</b>													
Rokolub P-B-20	PO homopolymer	water-insoluble	22	•		•							These water insoluble Rokolubs are applicable where waterless systems of lubricating machines and mechanical equipment are required. These are products with a high viscosity index. Applied as PAG synthetic base oil, they offer excellent inherent lubricity without the use of external lubricity additives. Their excellent low temperature properties make them highly suitable for year-round outdoor use and ensure protection of the lubrication system against sludge, varnish, lacquer, and they also provide a higher level of thermal conductivity. Their lubricity and performance make them ideal industrial hydraulic fluids for equipment that must operate dependably at a wide temperature range.
Rokolub P-B-32	PO homopolymer	water-insoluble	32	•		•							
Rokolub P-B-46	PO homopolymer	water-insoluble	46	•		•							
Rokolub P-B-50	PO homopolymer	water-insoluble	50	•		•						•	
Rokolub P-B-68	PO homopolymer	water-insoluble	68	•		•							
Rokolub P-B-100	PO homopolymer	water-insoluble	100	•		•	•						
Rokolub P-B-120	PO homopolymer	water-insoluble	100+	•		•	•						
Rokolub P-B-150	PO homopolymer	water-insoluble	150	•	•	•	•						
Rokolub P-B-220	PO homopolymer	water-insoluble	220	•	•	•	•						
Rokolub P-B-320	PO homopolymer	water-insoluble	320		•		•						
Rokolub PO-D-460	PO homopolymer	water-insoluble	460		•		•						A high performance water-insoluble base stock used in gear and metal working formulations.
Rokolub PO-D-700	PO homopolymer	water-insoluble	680		•		•						
Rokolub 32	PO homopolymer	partially water-soluble	32	•		•		•	•				A high performance water-insoluble and partially water-soluble base stock used in air conditioning fluids and hydraulic fluids.
Rokolub 68	PO homopolymer	water-insoluble	68	•		•		•					
Rokolub 100	PO/EO random copolymers	partially water-soluble	100	•		•	•		•				
Rokolub 150	PO homopolymer	water-insoluble	150	•	•	•	•				•		A high performance water-insoluble and partially water-soluble base stock used in gear and metal working formulations.
Rokolub 220	PO/EO random copolymers	partially water-soluble	220	•	•	•	•		•				
Rokolub 220VI	PO/EO random copolymers	water-insoluble	220	•	•	•	•						
Rokolub 320F	PO/EO random copolymers	partially water-soluble	320		•		•		•				
Rokolub 320K	PO/EO random copolymers	water-insoluble	320		•		•						
Rokolub 460	PO/EO random copolymers	water-insoluble	460		•		•						A high performance water-insoluble and partially water-soluble base stock used in gear and metal working formulations.
Rokolub 680	PO/EO random copolymers	partially water-soluble	680		•		•		•	•			
Rokolub DE4010	PO/EO block copolymers	water-insoluble	320		•		•						
Rokolub DE4020	PO/EO block copolymers	water-insoluble	320		•		•						Defoamer and low foaming emulsifier.

## Mineral oil soluble PAG – applications

PRODUCT NAME	DESCRIPTION		ISO VG	COMPRESSOR LUBRICANTS	INDUSTRIAL GEAR OIL	HYDRAULIC FLUIDS	GREASES	TEXTILE LUBRICANTS	HEAT TRANSFER FLUIDS	METALWORKING FLUIDS	NON-FERROUS METALS PROCESSING	FEATURES AND BENEFITS
Rokolub MOS 32	PO homopolymer	mineral oil soluble	32	•		•	•					Rokolub MOS are fully synthetic polyglycols (PAG) for use in various applications where contamination or mixture with conventional mineral oils might occur. Rokolub MOS display desired intrinsic properties, such as low friction, high anti-wear, high viscosity index and can withstand high temperatures. Miscibility with Gr.I to Gr.IV base oils and other PAG.
Rokolub MOS 46	PO homopolymer	mineral oil soluble	46	•		•	•					
Rokolub MOS 68	PO/BO random copolymers	mineral oil soluble	68	•		•	•					
Rokolub MOS 100	PO/BO random copolymers	mineral oil soluble	100	•		•	•					
Rokolub MOS 220	PO/BO random copolymers	mineral oil soluble	220	•	•	•	•					
Rokolub MOS 460	BO homopolymer	mineral oil soluble	460		•		•					
Rokolub MOS 680	BO homopolymer	mineral oil soluble	680		•		•					

## High purity Rokochem PAG – applications

PRODUCT NAME	DESCRIPTION		ISO VG	COMPRESSOR LUBRICANTS	INDUSTRIAL GEAR OIL	HYDRAULIC FLUIDS	TEXTILE LUBRICANTS	HEAT TRANSFER FLUIDS	METALWORKING FLUIDS	NON-FERROUS METALS PROCESSING	INTERMEDIATE PRODUCT FOR FURTHER SYNTHESIS	FEATURES AND BENEFITS
Rokochem 1133	EO/PO random copolymers	water-soluble	46	•		•		•	•	•	•	Rokochem product series are synthetic polyether polyols components dedicated as a raw materials for industrial application, such as silicone based surfactants, wetting agents, pigment dispersants, leveling agents for coatings, foaming agents or textile lubricants. Based on highly selective technology we obtain high purity products meeting the highest market demands. Unique properties result from designed chemical structures of Rokochem products, which are propylene (PO) and ethylene (EO) oxide based random polymers.
Rokochem 11150	EO/PO random copolymers	water-soluble	150	•	•	•	•		•	•	•	
Rokochem 2206	PO homopolymer	water-insoluble	22	•		•					•	
Rokochem 2240	PO homopolymer	water-insoluble	46	•		•					•	
Rokochem 2210	PO homopolymer	water-insoluble	100	•		•	•				•	

### Water-soluble PAG - properties

PRODUCT NAME	DESCRIPTION		MW [g/mol]	VISCOSITY 40°C [cSt] -ASTM D445	VISCOSITY 100°C [cSt] -ASTM D445	VISCOSITY INDEX ASTM D2270	CLOUD POINT [1%Aq] °C EN 1890:2006 met. A	POUR POINT [°C] ASTM D97	FLASH POINT [°C] ASTM D92	DENSITY [g/cm³] 20°C DIN51757
Rokolub 50-B-20	EO/PO random copolymers	water-soluble	550	22	5.2	180	77	< -40	>180	1.02
Rokolub 50-B-32	EO/PO random copolymers	water-soluble	700	34	7.4	192	71	< -43	>250	1.03
Rokolub 50-B-46	EO/PO random copolymers	water-soluble	1075	53	12	231	59	< -43	>240	1.03
Rokolub 50-B-100	EO/PO random copolymers	water-soluble	1300	95	18	210	59	< -43	>240	1.04
Rokolub 50-B-150	EO/PO random copolymers	water-soluble	1800	153	30	238	56	< -43	>250	1.05
Rokolub 50-B-330	EO/PO random copolymers	water-soluble	2700	328	61	257	53	< -35	>220	1.05
Rokolub 50-B-460	EO/PO random copolymers	water-soluble	3500	455	78	254	50	< -35	>220	1.05
Rokolub 60-D-68	EO/PO random copolymers	water-soluble	900	65	12	184	n/o*	< -38	>220	1.06
Rokolub 60-D-150	EO/PO random copolymers	water-soluble	1800	155	27	212	n/o*	< -35	>220	1.07
Rokolub 60-D-220	EO/PO random copolymers	water-soluble	2000	230	42	238	83	< -35	>240	1.07
Rokolub 60-D-320	EO/PO random copolymers	water-soluble	2400	315	56	246	80	< -35	>220	1.07
Rokolub 60-D-460	EO/PO random copolymers	water-soluble	3500	470	79	251	73	< -30	>220	1.07
Rokolub 60-D-1000	EO/PO random copolymers	water-soluble	5600	900	150	281	72	< -26	>220	1.07

### Partially water-soluble & insoluble PAG - properties

PRODUCT NAME	DESCRIPTION		MW [g/mol]	VISCOSITY 40°C [cSt] -ASTM D445	VISCOSITY 100°C [cSt] -ASTM D445	VISCOSITY INDEX ASTM D2270	CLOUD POINT [1%Aq] °C EN 1890:2006 met. A	POUR POINT [°C] ASTM D97	FLASH POINT [°C] ASTM D92	DENSITY [g/cm³] 20°C DIN51757
Rokolub P-B-20	PO homopolymer	water-insoluble	550	22	5.0	163	—	< -43	>200	0.99
Rokolub P-B-32	PO homopolymer	water-insoluble	750	34	7.1	178	—	< -43	>210	0.99
Rokolub P-B-46	PO homopolymer	water-insoluble	1050	46	9.3	191	—	< -42	>210	0.99
Rokolub P-B-50	PO homopolymer	water-insoluble	1100	56	11	193	—	< -42	>220	0.99
Rokolub P-B-68	PO homopolymer	water-insoluble	1200	69	13	192	—	< -40	>220	0.99
Rokolub P-B-100	PO homopolymer	water-insoluble	1400	90	18	220	—	< -36	>220	0.99
Rokolub P-B-120	PO homopolymer	water-insoluble	1750	117	21	206	—	< -36	>220	0.99
Rokolub P-B-150	PO homopolymer	water-insoluble	1900	135	23	201	—	< -36	>230	0.99
Rokolub P-B-220	PO homopolymer	water-insoluble	2450	209	35	216	—	< -30	>230	1.00
Rokolub P-B-320	PO homopolymer	water-insoluble	4600	329	52	224	—	< -30	>230	1.00
Rokolub PO-D-460	PO homopolymer	water-insoluble	4000	425	64	226	—	< -32	>200	1.00
Rokolub PO-D-700	PO homopolymer	water-insoluble	6000	760	114	252	—	< -30	>200	1.00
Rokolub 32	PO homopolymer	partially water-soluble	450	33	5.0	62	82	< -40	>230	1.01
Rokolub 68	PO homopolymer	water-insoluble	1000	65	10	139	64	< -36	>200	1.00
Rokolub 100	PO/EO random copolymers	partially water-soluble	500	95	11	100	n/o*	< -31	>230	1.07
Rokolub 150	PO homopolymer	water-insoluble	2000	151	22	173	—	< -34	>200	1.00
Rokolub 220	PO/EO random copolymers	partially water-soluble	2000	225	22	118	49	< -20	>260	1.04
Rokolub 220VI	PO/EO random copolymers	water-insoluble	3600	260	38	198	—	< -30	>250	1.02
Rokolub 320F	PO/EO random copolymers	partially water-soluble	2500	270	47	235	n/o*	< -20	>200	1.08
Rokolub 320K	PO/EO random copolymers	water-insoluble	5000	360	55	221	—	< -30	>200	1.02
Rokolub 460	PO/EO random copolymers	water-insoluble	6000	520	80	239	—	< -20	>200	1.02
Rokolub 680	PO/EO random copolymers	partially water-soluble	5000	600	104	268	n/o*	< -7	>250	1.09
Rokolub DE4010	PO/EO block copolymers	water-insoluble	3700	318	50	221	16	< -20	>200	1.02
Rokolub DE4020	PO/EO block copolymers	water-insoluble	4000	367	60	235	17	< -20	>200	1.02

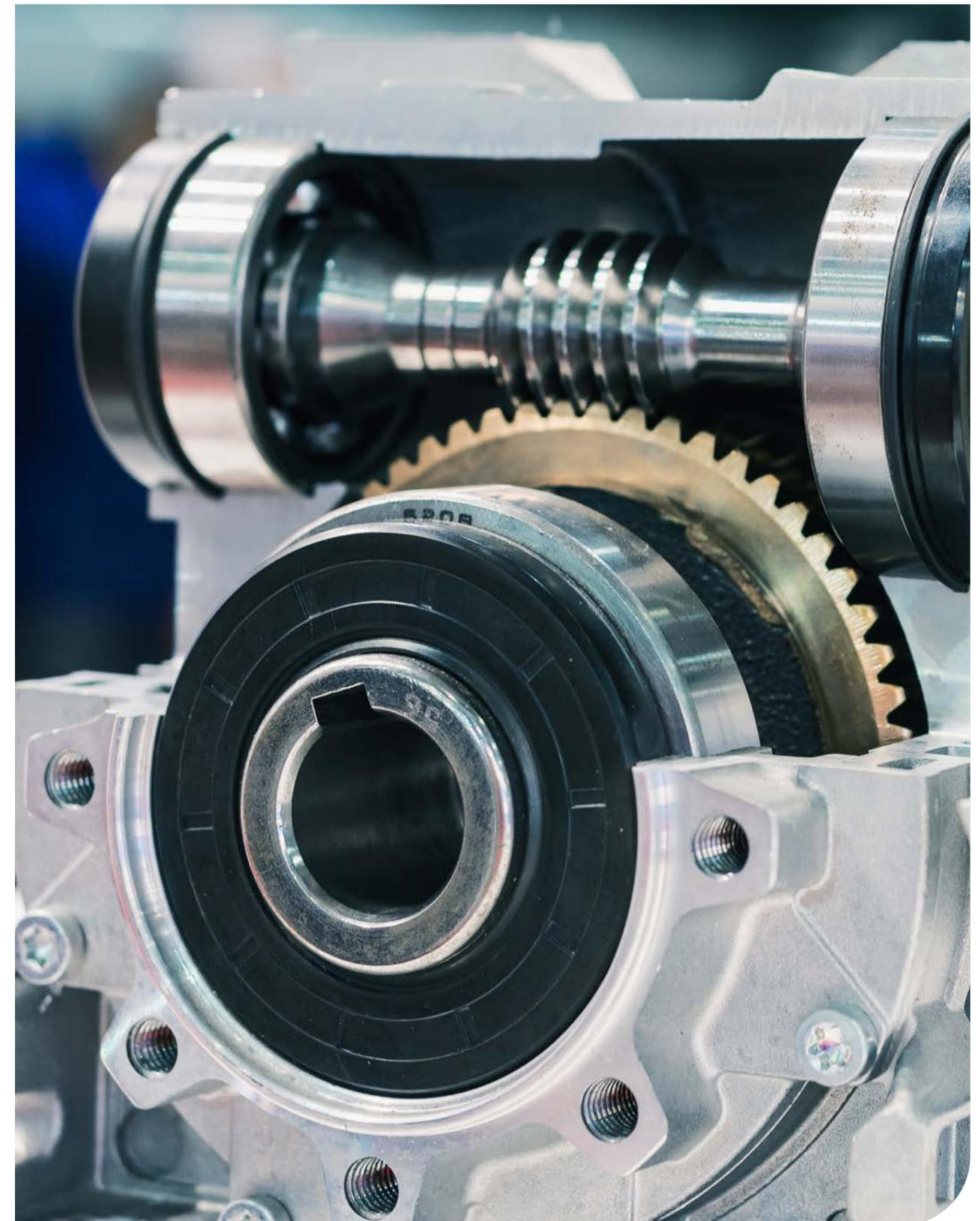
\* n/o - not observed (according to standard determined from 10 to 90°C)

### Mineral oil soluble PAG – properties

PRODUCT NAME	DESCRIPTION		MW [g/mol]	VISCOSITY 40°C [cSt] – ASTM D445	VISCOSITY 100°C [cSt] – ASTM D445	VISCOSITY INDEX – ASTM D2270	POUR POINT [°C] – ASTM D97	FLASH POINT [°C] – ASTM D92	DENSITY [g/cm <sup>3</sup> ] 20°C – DIN 51757
Rokolub MOS 32	PO homopolymer	mineral oil soluble	800	31	6.5	171	<-38	>240	0.93
Rokolub MOS 46	PO homopolymer	mineral oil soluble	925	45	8.7	176	<-10	>240	0.94
Rokolub MOS 68	PO/BO random copolymers	mineral oil soluble	1175	70	13	189	<-15	>240	0.95
Rokolub MOS 100	PO/BO random copolymers	mineral oil soluble	1400	106	18	189	<-20	>240	0.96
Rokolub MOS 220	PO/BO random copolymers	mineral oil soluble	2450	206	31	191	<-30	>240	0.97
Rokolub MOS 460	BO homopolymer	mineral oil soluble	2450	433	51	181	<-30	>240	0.96
Rokolub MOS 680	BO homopolymer	mineral oil soluble	3700	637	73	194	<-25	>240	0.96

### High purity Rokochem PAG – properties

PRODUCT NAME	DESCRIPTION		HYDROXYL VALUE [mg KOH/g] – ASTM D4274 met.D	DYNAMIC VISCOSITY 25°C [mPa•s] – ASTM D4878 met.A	KINEMATIC VISCOSITY 40°C [cSt] – ASTM D445	KINEMATIC VISCOSITY 100°C [cSt] – ASTM D445
Rokochem 1133	EO/PO random copolymers	water-soluble	56	95	48	10
Rokochem 11150	EO/PO random copolymers	water-soluble	28	307	147	29
Rokochem 2206	PO homopolymer	water-insoluble	83	45	24	5.5
Rokochem 2240	PO homopolymer	water-insoluble	48	106	54	10
Rokochem 2210	PO homopolymer	water-insoluble	36	206	101	18



## Hydraulic fluids - base stock (HFDU)

PRODUCT NAME	DESCRIPTION		ISOVG	MW [g/mol]	VISCOSITY 40°C [cSt] -ASTM D445	VISCOSITY 100°C [cSt] -ASTM D445	VISCOSITY INDEX ASTM D2270	CLOUD POINT [1%Aq] °C EN 1890:2006 met. A	POUR POINT [°C] ASTM D97	FLASH POINT [°C] ASTM D92	REFRACTIVE INDEX 20°C-DIN 51423	DENSITY [g/cm³] 20°C DIN51757	FEATURES AND BENEFITS
<b>HYDRAULIC BASE FLUIDS, WATER SOLUBLE</b>													
Rokolub 50-B-32	EO/PO random copolymers	water-soluble	32	700	34	7.4	192	71	<-43	>250	1.453	1.03	
Rokolub 50-B-46	EO/PO random copolymers	water-soluble	46	1075	53	12	231	59	<-43	>240	1.455	1.03	Their lubricity and performance make them ideal industrial for use as industrial hydraulic fluids for equipment that must operate dependably over a wide temperature range. Additional advantage - hydrolytic stability.
Rokolub 50-B-100	EO/PO random copolymers	water-soluble	100	1300	95	18	210	59	<-43	>240	1.457	1.04	
<b>HYDRAULIC BASE FLUIDS, PARTIALLY WATER-SOLUBLE</b>													
Rokolub 32	PO homopolymer	partially water-soluble	32	450	33	5.0	62	82	<-40	>230	1.446	1.01	Products with a high viscosity index, partially water-soluble. The lubricity and performance make them ideal for use as industrial hydraulic fluids for equipment where waterless systems of lubricating machineries and mechanical equipment are required. They have excellent inherent lubricity without the use of external lubricant additives. Cleanliness: no sludge, very good deposit control characteristics over all other base oils. They provide a higher level of thermal conductivity.
Rokolub 100	PO/EO random copolymers	partially water-soluble	100	500	95	11	100	n/o*	<-31	>230	1.459	1.07	
<b>HYDRAULIC BASE FLUIDS, WATER INSOLUBLE</b>													
Rokolub P-B-46	PO homopolymer	water-insoluble	46	1050	46	9.3	191	—	<-42	>210	1.447	0.99	Products with a high viscosity index, insoluble in water. The lubricity and performance make them ideal for use as industrial hydraulic fluids for equipment where waterless systems of lubricating machineries and mechanical equipment are required. They have excellent inherent lubricity without the use of external lubricant additives. Cleanliness: no sludge, very good deposit control characteristics over all other base oils. They provide a higher level of thermal conductivity.
Rokolub P-B-68	PO homopolymer	water-insoluble	68	1200	69	13	192	—	<-40	>220	1.448	0.99	
Rokolub P-B -100	PO homopolymer	water-insoluble	100	1400	90	18	220	—	<-36	>220	1.449	0.99	

\* n/o - not observed (according to standard determined from 10 to 90°C)

## Main properties of PAG based, water free hydraulic fluids (HFDU)

**Hydrolytic stability:** PAGs keep hydrolytic stability, which can be seen as a major advantage of hydraulic fluids based on this solution. In many industrial applications, contamination with water cannot be completely avoided. When this appears, the PAG absorbs water partially and does not change the hydraulic efficiency.

**Deposit control:** A unique benefit of water soluble hydraulic PAG base fluids are superior deposit control characteristics over all other base oil solutions. They provide excellent oxidation resistance and thermal stability at high temperatures to minimize deposit formation and provide long service life. They also protect hydraulic system components from rust and corrosion.

**Wear protection:** PAGs deliver superior protection against shear and wear over extended operating periods, optimising oil film durability and offering maximum equipment protection. Excellent anti-corrosion results can be achieved, even in very hot or very wet operations. These fluids outperform many other technologies and can provide equipment reliability for all seasons.

## Rokolub FR - phosphate esters for fire resistant hydraulic fluids (HFDR)

**Rokolub FR** is a synthetic base oil series intended for formulating non-aqueous fire-resistant hydraulic fluids. This product range is based on triaryl phosphate ester and thereby classified as a HFDR hydraulic fluid in accordance with ISO 6743-4.

Rokolub FR fluids, due to their unique fire resistance properties, are the best available option for applications with a high potential risk of fire. Furthermore, both perfect oxidation stability and appropriate thermal stability make Rokolub FR series preferable for high temperatures.

These Rokolub FR's features enable to formulate fire resistant fluids suitable for the power generation industry as well as many general industrial applications requiring outstanding fire resistance.

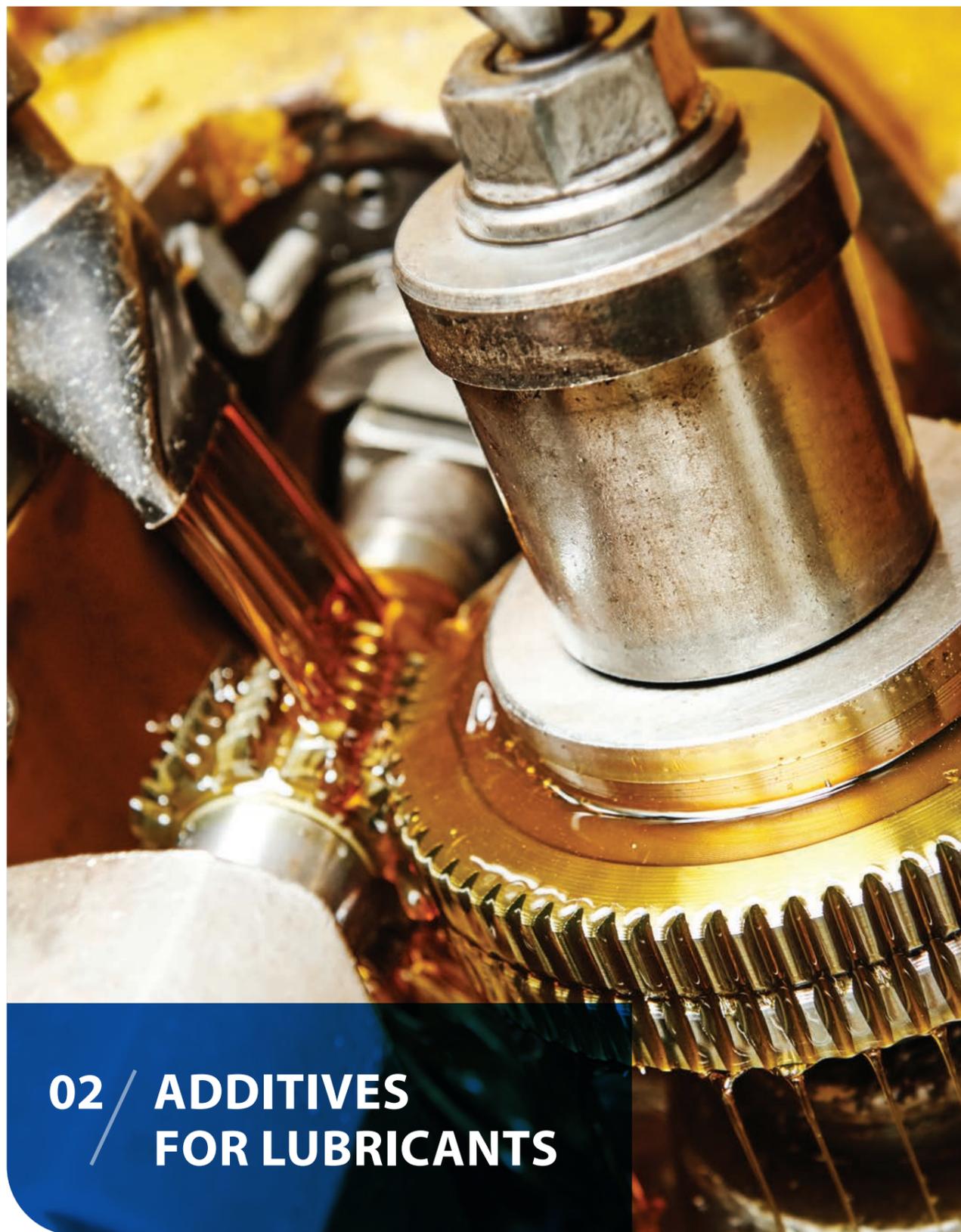
Phosphate ester is the only type of hydraulic fluids applying to turbines at the power station because of fire safety. In the light of these specific requirements, Rokolub FR T-46 ultra is the most carefully designed for steam turbine control systems.

## Features, advantages and benefits of HFDR

- +
- unique self-extinguishing properties
- great fire resistance performance
- superior oxidation and thermal stability
- excellent lubrication
- good emulsification

## Hydraulic fluids (HFDR) - applications & properties

PRODUCT NAME	DESCRIPTION	ISO VG	APPEARANCE	WATER CONTENT [%] ISO 760	ACID NUMBER [mg KOH/g] IN-HOUSE METHOD	DENSITY AT 25°C [g/cm³] EN ISO 2811	POUR POINT [°C] ASTM D97	FLASH POINT [°C] ASTM D92	FIRE POINT [°C] ASTM D92	AUTOIGNITION TEMP. [°C] ASTM D 2155	HYDRAULIC FLUIDS	HIGH TEMP. LUBRICANTS	RECIPROCATING AIR COMPRESSORS	STEEL & ALUMINIUM FURNACE HYDRAULICS	DIE CAST HYDRAULICS	STEAM & GAS TURBINE LUBRICATION	STEAM TURBINE EHC SYSTEMS	FEATURES AND BENEFITS
<b>PHOSPHATE ESTER BASE STOCKS</b>																		
Rokolub FR T-32	Triaryl phosphate ester	32	clear liquid	< 0.1	< 0.1	1.16	-26	> 230	> 300	> 500	•	•	•	•	•			All products included in Rokolub FR series are a phosphate ester base stock to formulate fire resistant hydraulic fluids. Thanks to their unique self-extinguishing and fire performance, phosphate ester-based fluids are recommended for industrial applications where significant fire resistance is required as well as for high temperature applications. The essential feature that distinguishes Rokolub FR series is lack of health hazards in compliance with GHS.
Rokolub FR T-46	Triaryl phosphate ester	46	clear liquid	< 0.1	< 0.1	1.15	-18	> 230	> 300	> 500	•	•	•	•	•			
Rokolub FR T-68	Triaryl phosphate ester	68	clear liquid	< 0.1	< 0.1	1.13	-14	> 230	> 300	> 500	•	•	•	•	•			
Rokolub FR T-46 ultra	Triaryl phosphate ester	46	clear liquid	< 0.1	< 0.1	1.15	-18	> 230	> 300	> 500	•	•	•	•	•	•	•	Rokolub FR T-46 ultra is a fire-resistant base fluid especially designed for the power generation industry. It is recommended for fluid formulations keeping with demands of hydraulic lubrication of steam-, gas- and combined cycle turbines. Its finely adjusted properties to OEMs requirements make it a perfect choice for formulating fluids applied to steam turbine electro-hydraulic control systems. Additionally, Rokolub FR T-46 ultra is featured in neither classification nor labelling in compliance with GHS.



## 02 / ADDITIVES FOR LUBRICANTS

### ADDITIVES FOR LUBRICANTS

#### Anti-wear/Extreme pressure additives

**Rokolub AD** are phosphate ester-based ashless anti-wear and extreme pressure additives for lubricants and functional fluids. Because of their excellence in reducing friction and wear, these products are a perfect choice for high loads conditions. Moreover, health safety and environment issues are core subject of our new developments. In compliance with these objectives, both **Rokolub AD 246 ultra** and **Rokolub AD 268** require neither labels nor classification according to Globally Harmonized System (GHS).

#### AW/EP additives - applications

PRODUCT NAME	DESCRIPTION	INDUSTRIAL GEAR OILS	TURBINE OILS	COMPRESSOR OILS	HIGH TEMP. LUBRICANTS	METALWORKING FLUIDS	HYDRAULIC FLUIDS	FEATURES AND BENEFITS
<b>AW/EP ADDITIVES</b>								
Rokolub AD 122	Triaryl phosphate ester	•	•	•	•	•	•	Rokolub AD series prevents sliding surfaces from welding under severe conditions. These products provide protection against excessive tool wear from scoring or galling and ensure that lubricating film on the metal surface is deposited.
Rokolub AD 132	Triaryl phosphate ester	•	•	•	•	•	•	
Rokolub AD 232	Triaryl phosphate ester	•	•	•	•	•	•	
Rokolub AD 246	Triaryl phosphate ester	•	•	•	•	•	•	
Rokolub AD 246 plus	Triaryl phosphate ester	•	•	•	•	•	•	
Rokolub AD 246 ultra	Triaryl phosphate ester	•	•	•	•	•	•	
Rokolub AD 268	Triaryl phosphate ester	•	•	•	•	•	•	

#### AW/EP additives - properties

PRODUCT NAME	APPEARANCE	KINEMATIC VISCOSITY AT 40°C [cSt] EN ISO 3104	WATER CONTENT [%] ISO 760	ACID NUMBER [mg KOH/g] IN-HOUSE METHOD	DENSITY AT 20°C [g/cm³] EN ISO 2811	PHOSPHORUS CONTENT [%] CALCULATION METHOD
<b>AW/EP ADDITIVES</b>						
Rokolub AD 122	clear liquid	22	< 0.1	< 0.1	1.20	8.5
Rokolub AD 132	clear liquid	32	< 0.1	< 0.1	1.12	7.9
Rokolub AD 232	clear liquid	32	< 0.1	< 0.1	1.16	8.3
Rokolub AD 246	clear liquid	46	< 0.1	< 0.1	1.15	8.0
Rokolub AD 246 plus	clear liquid	46	< 0.1	< 0.1	1.14	7.9
Rokolub AD 246 ultra	clear liquid	46	< 0.1	< 0.1	1.15	7.8
Rokolub AD 268	clear liquid	68	< 0.1	< 0.1	1.13	7.6

## Anti-wear/**extreme pressure** additives

**EXOfos** series are anionic phosphate esters specially developed to be used as extreme pressure and anti-wear additives for metalworking fluids. They are optimized mixtures of monoesters and diesters. They are incorporated into lubricants in order to reduce friction in high load applications. They work by reacting with the metal surfaces under extreme friction conditions, producing a protective film that prevents welding and surface damage.

### AW/**EP** additives - applications & properties

PRODUCT NAME	DESCRIPTION	APPEARANCE	PHOSPHORUS CONTENT [%]	DENSITY AT 20°C [g/cm³]	POUR POINT [°C]	INDUSTRIAL GEAR OIL	TURBINE OIL	COMPRESSOR OIL	HIGH TEMP. LUBRICANTS	METALWORKING FLUIDS	HYDRAULIC FLUIDS	FEATURES AND BENEFITS
<b>AW/EP ADDITIVES</b>												
EXOfos PB-103	POE(3) decyl phosphate	liquid	11-12	~1.02	<-20					•	•	Multifunctional additives providing extreme-pressure and good emulsification properties. They also provide anti-wear abilities, corrosion and staining inhibition for all types of metalworking formulations. Products used in metalworking, textile lubricants and hard surface cleaning formulations. Recommended for neat oil, soluble oil, semisynthetic and synthetic fluids. Compatible with paraffinic and naphthenic base oils.
EXOfos PB-133	POE(3) isotridecyl phosphate	liquid	5-6	~1.02	<-20					•	•	
EXOfos PB-136	POE(6) isotridecyl phosphate	liquid	3-4	~1.05	~ -15					•	•	
EXOfos PB-139	POE(9) isotridecyl phosphate	liquid	3-4	~1.07	~ -2					•	•	
EXOfos PB-184	POE (4) oleyl phosphate	liquid	4-5	1.03	~ -4	•			•	•	•	
EXOfos PB-253	POE(3) C12-15 alkyl phosphate	liquid	5-6	~1.01	~2					•	•	
EXOfos PB-264	POE (4) lauryl phosphate	liquid	6-7	1.05	~ -2	•			•	•	•	



## ADDITIVES FOR METALWORKING FLUIDS

The metalworking industry continues to change, driven by demand for high quality products to deliver better performance at a lower cost. PCC Group products have many uses and applications across a board spectrum of metalworking fluids. Our focus is the development of additives, which enhance the performance of our customers' formulations.

### Functions of metalworking fluids

Metalworking fluids play a critical role in most machining processes. The main functions of metalworking fluids are:



- Cooling: Reducing heat build-up in the cutting zone and in the workpiece.
- Lubrication: Reducing friction between the tool and the workpiece.
- Chip removal: Flushing chips away from the cutting zone, carrying them back to the sump.
- Corrosion control: Protects the workpiece and the tool from damage caused by corrosion.



## Emulsifiers & Surfactants

### Alcohol ethoxylates - applications & properties

PRODUCT NAME	DESCRIPTION	CAS	APPEARANCE	HLB	ACTIVE INGREDIENT CONTENT [%]	HYDROXYL VALUE [mg KOH/g]*	pH**	DENSITY [g/ml]	CLOUD POINT [°C]***	SOLIDIFICATION POINT, [°C]	SURFACE TENSION AT 25°C [mN/m]	EMULSIFIER	WETTING AGENT	LUBRICANT	COUPLING AGENT	LOW-FOAMING	CORROSION INHIBITOR	FEATURES AND BENEFITS
<b>ALCOHOL ETHOXYLATES</b>																		
Rokanol O3	Fatty alcohol ethoxylate	9004-98-2	liquid	7.1	100%	135-150	5.5-8.5 <sup>a)</sup>	approx. 0.907 (at 20°C)	37-41 E	approx. 0	26	•		•				Excellent emulsifiers for soluble oils and semisynthetic metalworking fluids. Particularly suitable for mineral base oils (paraffinic and naphthenic). Low foaming. Blends with high and low HLB to provide best performance.
Rokanol O5	Fatty alcohol ethoxylate	9004-98-2	liquid	9.1	100%	120-135	5.0-7.0 <sup>a)</sup>	approx. 0.93 (at 20°C)	—	approx. -4	26	•		•				
Rokanol O100	Fatty alcohol ethoxylate	9004-98-2	wax	18.8	100%	22-32	5.5-8.5 <sup>a)</sup>	approx. 1 (at 60°C)	87-92 B	below 48	26	•		•				
Rokanol K3	Fatty alcohol ethoxylate	68920-66-1	semi-liquid paste	7.0	min. 99.0	144-154	5.5-8.5 <sup>a)</sup>	approx. 0.90 (at 50°C)	49-56 D	approx. 15	26	•		•				
Rokanol K5	Fatty alcohol ethoxylate	68920-66-1	liquid/paste	9.2	min. 99.0	120-135	5.5-8.5 <sup>a)</sup>	approx. 0.95 (at 50°C)	60-66 D	approx. 18	28	•		•				Standard emulsifiers for soluble oils and semisynthetic cutting fluids. Suitable for paraffinic and naphthenic base oils.
Rokanol K7	Fatty alcohol ethoxylate	68920-66-1	semi-liquid paste	10.8	min. 99.5	115-122	5.5-8.5 <sup>a)</sup>	approx. 1.02 (at 30°C)	68-72 D	approx. 20	31	•		•				
Rokanol DB3	Fatty alcohol ethoxylate	68131-39-5	liquid/paste	7.8	min. 99.7	164-172	4.6-7.4 <sup>a)</sup>	approx. 0.93 (at 20°C)	55-60 D	approx. 10	27	•	•					
Rokanol DB5	Synthetic alcohol ethoxylate	68131-39-5	liquid/paste	10.2	min. 99.5	130-140	4.6-7.4 <sup>a)</sup>	approx. 0.96 (at 20°C)	65-72 D	approx. 10	28	•	•					Emulsifiers for mineral oils, vegetable and ester-based base stocks. Great wetting agents, especially recommended for water-based metal cleaning formulations.
Rokanol DB7	Synthetic alcohol ethoxylate	68131-39-5	liquid/paste	12.0	min. 99.0	100-114	4.6-7.4 <sup>a)</sup>	approx. 0.97 (at 40°C)	76-81 D	approx. 20	29	•	•					
Rokanol NL 3	Synthetic alcohol ethoxylate	68439-46-3	liquid	8.5	min. 99.5	185-193	5.5-7.5 <sup>a)</sup>	approx. 0.93 (at 20°C)	—	approx. -5	25	•						
Rokanol NL 4	Synthetic alcohol ethoxylate	68439-46-3	liquid	10.6	min. 99.5	—	5.0-7.0 <sup>a)</sup>	approx. 0.96 (at 25°C)	60-65 E	approx. -10	25	•	•					Prime wetting agents for water-based metal cleaners. Apart from cleaning and degreasing properties, they are great emulsifiers for metalworking formulations.
Rokanol NL 5	Synthetic alcohol ethoxylate	68439-46-3	liquid	11.6	min. 99.5	—	4.6-7.4 <sup>a)</sup>	approx. 0.97 (at 25°C)	33-39 A	approx. -2	26	•	•					
Rokanol NL 6	Synthetic alcohol ethoxylate	68439-46-3	liquid	12.3	min. 99.5	119-130	5.5-7.0 <sup>a)</sup>	approx. 0.99 (at 25°C)	50-57 A	approx. 5	27	•						

\*) Hydroxyl value method: Hydroxyl value according to PN-EN13926, method B  
 \*\*) pH determination methods: a - pH of a 1% aqueous solution at 20°C, the potentiometric method according to EN 1262

b - pH of a 5% solution according to EN 1262 solution C  
 c - pH of a 5% aqueous solution at 20°C, the potentiometric method according to EN 1262  
 d - pH of a 10% aqueous solution at 20°C, the potentiometric method according to EN 1262

\*\*\*) Cloud point method: Cloud point according to EN 1890

## Emulsifiers & Surfactants

### Alcohol ethoxylates - applications & properties

PRODUCT NAME	DESCRIPTION	CAS	APPEARANCE	HLB	ACTIVE INGREDIENT CONTENT [%]	HYDROXYL VALUE [mg KOH/g]*	pH**	DENSITY [g/ml]	CLOUD POINT [°C] ***	SOLIDIFICATION POINT, [°C]	SURFACE TENSION AT 25°C [mN/m]	EMULSIFIER	WETTING AGENT	LUBRICANT	COUPLING AGENT	LOW-FOAMING	CORROSION INHIBITOR	FEATURES AND BENEFITS
<b>Rokanol IT3</b>	Synthetic alcohol ethoxylate	69011-36-5	liquid	8.0	min. 99.0	152-167	5.0-7.0 <sup>a)</sup>	approx. 0.93 (at 30°C)	48-51 D	approx. -20	28		•	•	•			
<b>Rokanol IT5</b>	Synthetic alcohol ethoxylate	69011-36-5	liquid	10.5	min. 99.0	125-132	5.0-7.0 <sup>a)</sup>	approx. 0.96 (at 30°C)	60-62 E	approx. -5	29		•	•	•			
<b>Rokanol IT8W</b>	Synthetic alcohol ethoxylate	69011-36-5	liquid	12.8	min. 90.0	—	5.0-7.0 <sup>a)</sup>	approx. 1.00 (at 30°C)	75-79 D	approx. -20	28		•	•	•			Prime wetting agents for water-based metal cleaners. Apart from cleaning and degreasing properties, they are great emulsifiers for metalworking formulations. Possess solubilizing properties.
<b>Rokanol IT8</b>	Synthetic alcohol ethoxylate	69011-36-5	paste	12.8	min. 99.5	95-104	5.0-7.0 <sup>a)</sup>	approx. 1.00 (at 30°C)	76-78 D	approx. 8	28		•	•	•			
<b>Rokanol IT12</b>	Synthetic alcohol ethoxylate	69011-36-5	liquid/paste	14.5	min. 99.0	74-83	5.0-7.0 <sup>a)</sup>	approx. 1.02 (at 30°C)	79-85 A	approx. 20	31		•	•	•			

\* Hydroxyl value method: Hydroxyl value according to PN-EN13926, method B  
 \*\* pH determination methods:  
 a - pH of a 1% aqueous solution at 20°C, the potentiometric method according to EN 1262

b - pH of a 5% solution according to EN 1262 solution C  
 c - pH of a 5% aqueous solution at 20°C, the potentiometric method according to EN 1262  
 d - pH of a 10% aqueous solution at 20°C, the potentiometric method according to EN 1262

\*\*\* Cloud point method: Cloud point according to EN 1890

## Emulsifiers & Surfactants

### Alcohol ethoxylates - applications & properties

PRODUCT NAME	DESCRIPTION	CAS	APPEARANCE	ACTIVE CONTENT [%]	HYDROXYL VALUE [mg KOH/g]*	pH**	DENSITY [g/ml]	Cloud point [°C]***	OLIDIFICATION POINT, [°C]	SURFACE TENSION AT 25°C [mN/m]	EMULSIFIER	WETTING AGENT	LUBRICANT	COUPLING AGENT	LOW-FOAMING	CORROSION INHIBITOR	FEATURES AND BENEFITS
<b>Rokanol GA3</b>	Fatty alcohol ethoxylate	160875-66-1	liquid	min. 99.5	190	5-7 <sup>a)</sup>	0.95 (at 25°C)	30-33 E	0	28	•	•					
<b>Rokanol GA5</b>	Fatty alcohol ethoxylate	160875-66-1	liquid	min. 99.5	150	5-7 <sup>a)</sup> (1% solution ethanol: water)	0.97 (at 25°C)	54-57 E	approx. 10	27	•	•					
<b>Rokanol GA7</b>	Fatty alcohol ethoxylate	160875-66-1	liquid	min. 99.5	125	5-7 <sup>a)</sup>	1.01 (at 25°C)	67-70 E	< 20	27	•	•					
<b>Rokanol GA7W</b>	Fatty alcohol ethoxylate	160875-66-1	liquid	min. 84-87	—	5-7 <sup>a)</sup>	1.01 (at 25°C)	67-70 E	< -10	27	•	•					Excellent wetting action and good degreasing properties. Can be used as components for professional cleaning formulations, very effective solubilizers. Perform very well as emulsifiers in metalworking formulations.
<b>Rokanol GA8</b>	Fatty alcohol ethoxylate	160875-66-1	liquid	min. 99.5	110	5-7 <sup>a)</sup>	0.97 (at 30°C)	54-57 A	< 20	28	•	•					
<b>Rokanol GA8W</b>	Fatty alcohol ethoxylate	160875-66-1	liquid/paste	min. 84-86	—	5-7 <sup>a)</sup>	1.01 (at 25°C)	54-58 A	< -10	28	•	•					
<b>Rokanol GA9</b>	Fatty alcohol ethoxylate	160875-66-1	liquid	min. 99.5	100	5-7 <sup>a)</sup>	1.02 (at 30°C)	67-70 A	approx. 20	28	•	•					
<b>Rokanol GA9W</b>	Fatty alcohol ethoxylate	160875-66-1	liquid/paste	min. 84-86	—	5-7 <sup>a)</sup>	1.02 (at 30°C)	67-70 A	< -10	29	•	•					

\* Hydroxyl value method: Hydroxyl value according to PN-EN13926, method B  
 \*\* pH determination methods:  
 a - pH of a 1% aqueous solution at 20°C, the potentiometric method according to EN 1262

b - pH of a 5% solution according to EN 1262 solution C  
 c - pH of a 5% aqueous solution at 20°C, the potentiometric method according to EN 1262  
 d - pH of a 10% aqueous solution at 20°C, the potentiometric method according to EN 1262

\*\*\* Cloud point method: Cloud point according to EN 1890

## Emulsifiers & Surfactants

### Ethoxylated fatty acids - applications & properties

PRODUCT NAME	DESCRIPTION	CAS	APPEARANCE	HLB	ACTIVE INGREDIENT CONTENT [%]	pH**	DENSITY [g/ml]	SOLIDIFICATION POINT, [°C]	EMULSIFIER	WETTING AGENT	LUBRICANT	COUPLING AGENT	LOW-FOAMING	CORROSION INHIBITOR	FEATURES AND BENEFITS
<b>ETHOXYLATED FATTY ACIDS</b>															
Rokacet RZ17	Fatty acid glycerol ester ethoxylated	70914-02-2	oily liquid	—	min. 99.0	min. 9.0 (12% solution)	approx. 1.00 (at 20°C)	approx. 0	•		•				Environmentally friendly emulsifier based on vegetable raw material for mineral base stocks and for natural oils. Non corrosive.
Rokacet R11	Castor oil ethoxylate	61791-12-6	liquid	6.9	min. 99.0	5.0-7.0 <sup>a)</sup>	approx. 0.996 (at 25°C)	approx. -20	•		•				
Rokacet R26	Castor oil ethoxylate	61791-12-6	liquid	11.0	min. 99.0	7.5-9.5 <sup>d)</sup>	approx. 1.03 (at 30°C)	approx. 0	•		•				Biodegradable and non corrosive emulsifiers for mineral base stocks and vegetable oils. Recommended for soluble oils and semisynthetic cutting fluids.
Rokacet R36	Castor oil ethoxylate	61791-12-6	liquid/paste	12.6	min. 99.0	5.0-7.0 <sup>d)</sup>	approx. 1.04 (at 40°C)	approx. 8	•		•				
Rokacet R40	Castor oil ethoxylate	61791-12-6	paste	13.0	min. 99.0	6.5-8.0 <sup>a)</sup>	approx. 1.04 (at 30°C)	—	•		•				
Rokacet O7	Oleic acid etoxylate	9004-96-0	liquid	10.6	min. 99.0	5.5-8.5 <sup>a)</sup>	approx. 0.95 (at 50°C)	approx. 0	•		•				Standard emulsifier and lubricant for soluble oils; mostly aliphatic solvents and cutting oils. Non-corrosive. Biodegradable.

<sup>a)</sup> pH determination methods:  
a - pH of a 1% aqueous solution at 20°C, the potentiometric method according to EN 1262  
b - pH of a 5% solution according to EN 1262 solution C

c - pH of a 5% aqueous solution at 20°C, the potentiometric method according to EN 1262  
d - pH of a 10% aqueous solution at 20°C, the potentiometric method according to EN 1262

<sup>a)</sup> pH determination methods:  
a - pH of a 1% aqueous solution at 20°C, the potentiometric method according to EN 1262  
b - pH of a 5% solution according to EN 1262 solution C

c - pH of a 5% aqueous solution at 20°C, the potentiometric method according to EN 1262  
d - pH of a 10% aqueous solution at 20°C, the potentiometric method according to EN 1262

## Emulsifiers & Surfactants

### Fatty amines ethoxylated - applications & properties

PRODUCT NAME	DESCRIPTION	CAS	APPEARANCE	HLB	ACTIVE INGREDIENT CONTENT [%]	pH**	DENSITY [g/ml]	SOLIDIFICATION POINT, [°C]	EMULSIFIER	WETTING AGENT	LUBRICANT	COUPLING AGENT	LOW-FOAMING	CORROSION INHIBITOR	FEATURES AND BENEFITS
<b>FATTY AMINES ETHOXYLATED</b>															
Rokamin SR5	Tallow amine ethoxylated	61791-26-2	liquid/paste	9.8	100	—	approx. 0.95 (at 25°C)	approx. 3	•					•	
Rokamin SR8 CONC.	Tallow amine ethoxylated	61791-26-2	liquid	12.4	min. 99.0	—	approx. 0.98 (at 50°C)	approx. 10	•					•	Emulsifier used in formulations of soluble oils and semisynthetic cutting fluids. Corrosion inhibitor.
Rokamin SR15	Tallow amine ethoxylated	61791-26-2	liquid/slip paste	14.2	min. 99.0	9.0-11.5 <sup>d</sup>	approx. 1.02 (at 25°C)	approx. -3	•					•	
Rokamin SR22	Tallow amine ethoxylated	61791-26-2	paste	16.1	min. 99.0	—	approx. 1.024 (at 50°C)	approx. 20	•					•	
Rokamin K15	Cocoamine ethoxylated	61791-14-8	liquid	15.5	min. 97.0	—	approx. 1.02 (at 30°C)	approx. -8	•					•	Emulsifier, corrosion inhibitor, specific surfactant for industrial cleaners to dispersants.
Rokamin K5	Cocoamine ethoxylated	61791-14-8	liquid	10.4	min. 99.0	9.0-11.5 <sup>a)</sup>	approx. 0.96 (at 25°C)	approx. -20	•					•	

\*\* pH determination methods:  
a - pH of a 1% aqueous solution at 20°C, the potentiometric method according to EN 1262  
b - pH of a 5% solution according to EN 1262 solution C

c - pH of a 5% aqueous solution at 20°C, the potentiometric method according to EN 1262  
d - pH of a 10% aqueous solution at 20°C, the potentiometric method according to EN 1262

\*\* pH determination methods:  
a - pH of a 1% aqueous solution at 20°C, the potentiometric method according to EN 1262  
b - pH of a 5% solution according to EN 1262 solution C

c - pH of a 5% aqueous solution at 20°C, the potentiometric method according to EN 1262  
d - pH of a 10% aqueous solution at 20°C, the potentiometric method according to EN 1262

## Emulsifiers & Surfactants

### Sorbitan esters and sorbitan esters ethoxylates - applications & properties

PRODUCT NAME	DESCRIPTION	CAS	APPEARANCE	HLB	ACTIVE INGREDIENT CONTENT [%]	DENSITY [g/ml]	SOLIDIFICATION POINT, [°C]	EMULSIFIER	WETTING AGENT	LUBRICANT	COUPLING AGENT	LOW-FOAMING	CORROSION INHIBITOR	FEATURES AND BENEFITS
<b>SORBITAN ESTERS AND SORBITAN ESTERS ETHOXYLATES</b>														
Rokwin 60	Sorbitan monostearate	1338-41-6	solid wax	4.7	min. 99	0.92 (at 60°C)	—	•		•				
Rokwin 80	Sorbitan monooleate	1338-43-8	liquid/semi-liquid paste	4.3	min. 99	0.97 (at 60°C)	—	•		•				
Rokwinol 20	Ethoxylated sorbitan monostearate	9005-64-5	liquid	16.7	min. 97	1.04 (at 25°C)	approx. -5	•		•				Standard emulsifiers for vegetable, ester-based and mineral base oils. Can also be used as a lubricant and an antistatic additive.
Rokwinol 60	Ethoxylated sorbitan monostearate	9005-67-8	liquid/paste	14.9	min. 99	1.05 (at 40°C)	25-31	•		•				
Rokwinol 80	Ethoxylated sorbitan monooleate	9005-67-6	liquid/semi-liquid paste	15.0	min. 99	1.06 (at 57°C)	24-28	•		•				

## Lubricity additives

### Fatty acid amide ethoxylated - applications & properties

PRODUCT NAME	DESCRIPTION	CAS	APPEARANCE	ACTIVE INGREDIENT CONTENT [%]	pH**	DENSITY [g/ml]	SOLIDIFICATION POINT, [°C]	SURFACE TENSION AT 25°C [mN/m]	EMULSIFIER	WETTING AGENT	LUBRICANT	COUPLING AGENT	LOW-FOAMING	CORROSION INHIBITOR	FEATURES AND BENEFITS
<b>FATTY ACID AMIDE ETHOXYLATED</b>															
Rokamid KAD	Cocoamide DEA	—	liquid	100.0	7.5-10.5 <sup>a)</sup>	approx. 0.98 (at 20°C)	approx. 0°C	27	•					•	Emulsifiers and corrosion inhibitors for cutting fluids. Thickeners for detergent formulations.
Rokamid RAD	Oleamide DEA	68603-38-3	liquid	90.0	7.5-10.5 <sup>a)</sup>	approx. 0.98 (at 20°C)	approx. 0°C	29	•					•	
Rokamid MRZ4	Rapeseedamide MEA	85536-23-8	liquid	min. 90	9.2 - 10 <sup>a)</sup>	approx. 1.00 (at 25°C)	approx. 0°C	28	•					•	Emulsifier and thickening agent with anticorrosion properties.

## Lubricity additives

### PEG polyethylene glycols - applications & properties

PRODUCT NAME	DESCRIPTION	CAS	APPEARANCE	ACTIVE INGREDIENT CONTENT [%]	pH**	DENSITY [g/ml]	SOLIDIFICATION POINT, [°C]	AVERAGE MOLAR MASS [g/mol]	EMULSIFIER	WETTING AGENT	LUBRICANT	COUPLING AGENT	LOW-FOAMING	CORROSION INHIBITOR	FEATURES AND BENEFITS
<b>WATER-SOLUBLE POLYETHYLENE GLYCOLS WITH DIFFERENT MOLAR MASSES* (MW 200÷6000)</b>															
Polikol 400	Polyoxyethylene glycol	25322-68-3	liquid	min. 99.0	4.6-7.4 <sup>d)</sup>	approx. 1.13 (at 20°C)	approx. 5	400			•	•	•		A very versatile range of products. Depending on their molar mass, they can be used as solubilizers, lubricants, dispersing agents and mould-release agents.
Polikol 1500	Polyoxyethylene glycol	25322-68-3	wax	min. 99.0	4.6-7.4 <sup>d)</sup>	approx. 1.08 (at 70°C)	approx. 42-48	1500			•	•	•		
Polikol 4500	Polyoxyethylene glycol	25322-68-3	wax	min. 99.0	4.6-7.4 <sup>d)</sup>	approx. 1.08 (at 70°C)	approx. 55	4500			•	•	•		Recommended for semisynthetic and synthetic metalworking fluids. They improve detergency and enhance viscosity.
Polikol 6000	Polyoxyethylene glycol	25322-68-3	wax	min. 99.0	4.6-7.4 <sup>d)</sup>	approx. 1.08 (at 70°C)	approx. 52-58	6000			•	•	•		

<sup>a)</sup> pH determination methods:  
a - pH of a 1% aqueous solution at 20°C, the potentiometric method according to EN 1262  
b - pH of a 5% solution according to EN 1262 solution C

c - pH of a 5% aqueous solution at 20°C, the potentiometric method according to EN 1262  
d - pH of a 10% aqueous solution at 20°C, the potentiometric method according to EN 1262

<sup>a)</sup> pH determination methods:  
a - pH of a 1% aqueous solution at 20°C, the potentiometric method according to EN 1262  
b - pH of a 5% solution according to EN 1262 solution C

c - pH of a 5% aqueous solution at 20°C, the potentiometric method according to EN 1262  
d - pH of a 10% aqueous solution at 20°C, the potentiometric method according to EN 1262

<sup>\*)</sup> this products are available with different MW. Starting from 200 and ending at 6000

## Foam control agents

### Alcohol alkoxyates - applications & properties

PRODUCT NAME	DESCRIPTION	CAS	APPEARANCE	HLB	ACTIVE CONTENT [%]	pH*	DENSITY [g/ml]	CLOUD POINT [°C] **	SOLIDIFICATION POINT, [°C]	EMULSIFIER	WETTING AGENT	LUBRICANT	COUPLING AGENT	LOW-FOAMING	CORROSION INHIBITOR	PROPERTIES AND BENEFITS
<b>LOW FOAMING SURFACTANTS - ALCOHOL ALKOXYLATES</b>																
Rokanol GA4LA	Alkoxylated fatty alcohol	166736-08-9	liquid	—	min. 99.5	5.0-7.0 <sup>d</sup>	approx. 0.98 (at 25°C)	45-48 E	approx. -8					•		
Rokanol GA9LA	Alkoxylated fatty alcohol	166736-08-9	liquid	—	approx. min. 99.5	5.0-7.0 <sup>d</sup>	approx. 1.0 (at 25°C)	67-70 A	approx. 13					•		
Rokanol GA7LAW	Alkoxylated fatty alcohol	166736-08-9	liquid	—	approx. 85	5.0-7.0 <sup>d</sup>	approx. 1.02 (at 25°C)	66-71 E	< -20					•		
Rokanol L10 80	Alkoxylated fatty alcohol	103819-01-8	clear liquid	14.1	77-81	4.6-7.4 (1% rr)	approx. 0.98-1.0 (at 50°C)	59-63 C	approx. 2					•		
Rokanol L4P5	Alkoxylated fatty alcohol	68439-51-0	liquid	5.3	min. 99.0	5.5-8.5 <sup>d</sup>	approx. 0.91-0.99 (at 20°C)	25 A	approx. -10					•		
Rokanol L5P5	Alkoxylated fatty alcohol	68439-51-0	liquid	6.0	min. 99.0	5.0-7.0 <sup>a)</sup>	approx. 0.97 (at 25°C)	27-31 A	approx. -9					•		
Rokanol LP60	Alkoxylated fatty alcohol	130454-91-0	liquid	—	min. 99.0	6.0-8.0 (1% ethanol: water)	approx. 0.96 (at 25°C)	14-18 D	< -20					•		Low foaming non-ionic surfactants, wetting agents and emulsifiers.
Rokanol LP64	Alkoxylated fatty alcohol	68002-96-0	liquid	—	99.5	5.0-7.0 <sup>a)</sup>	approx. 0.96 (at 25°C)	60-62 D	approx. 2					•		
Rokanol LP66	Alkoxylated fatty alcohol	68002-96-0	liquid	—	—	5.0-7.0 <sup>a)</sup>	approx. 0.98 (at 25°C)	64-68 E	approx. 4					•		
Rokanol LP180	Alkoxylated fatty alcohol	9038-95-3	liquid	—	min. 99.5	5.0-7.0 <sup>b)</sup>	approx. 1.01 (at 20°C)	27-31 E	< -20					•		
Rokanol LP200	Alkoxylated fatty alcohol	68439-30-5	liquid	7.3	min. 99.5	5.0-7.0 <sup>d)</sup>	approx. 1.00 (at 20°C)	37-41 E	approx. -15					•		
Rokanol LP400	Alkoxylated fatty alcohol	102782-43-4	liquid	9.4	min. 99.5	5.0-7.0 <sup>d)</sup>	approx. 1.00 (at 20°C)	39-42 A	approx. -5					•		
Rokanol LP600	Alkoxylated fatty alcohol	130454-91-0	liquid	—	min. 99.5	6.0-8.0 <sup>a)</sup>	approx. 0.98 (at 25°C)	31-35 A	approx. -9					•		
Rokanol LP700	Alkoxylated fatty alcohol	—	liquid	9.7	min. 99.5	5.0-7.0 <sup>a)</sup>	approx. 0.98 (at 25°C)	54.0 57.5 D	approx. -10					•		

## Foam control agents

### Alcohol alkoxyates - applications & properties

PRODUCT NAME	DESCRIPTION	CAS	APPEARANCE	HLB	ACTIVE CONTENT [%]	pH*	DENSITY [g/ml]	CLOUD POINT [°C] **	SOLIDIFICATION POINT, [°C]	EMULSIFIER	WETTING AGENT	LUBRICANT	COUPLING AGENT	LOW-FOAMING	CORROSION INHIBITOR	PROPERTIES AND BENEFITS
<b>LOW FOAMING SURFACTANTS - ALCOHOL ALKOXYLATES</b>																
Rokanol LP1319	Alkoxyated fatty alcohol	68002-96-0	liquid	—	99.5	4.0 - 7.0 (1% solution ethanol: water)	approx. 0.98 (at 25°C)	13-19 E	below 20					•		
Rokanol LP2023	Alkoxyated fatty alcohol	68002-96-0	liquid	3.0	min. 99.5	5.0-7.0 <sup>a)</sup>	approx. 0.97 (at 25°C)	20-23 E	approx. -10					•		
Rokanol LP2024	Alkoxyated fatty alcohol	37251-67-5	liquid	6.3	min. 99.0	5.0-7.0 <sup>a)</sup>	approx. 0.97 (at 25°C)	20-24 A	approx. -15					•		
Rokanol LP2126	Alkoxyated fatty alcohol	68002-96-0	liquid	1.3	min. 99.5	4.0 - 6.0 (1% solution ethanol: water)	approx. 0.98 (at 25°C)	21-26 D	approx. -20					•		
Rokanol LP2529	Alkoxyated fatty alcohol	68551-13-3	liquid	3.5	min. 99.0	5.0-7.0 <sup>a)</sup>	approx. 0.95 (at 25°C)	25-29 E	approx. -15					•		
Rokanol LP3034	Alkoxyated fatty alcohol	68551-13-3	liquid	—	min. 99.0	5-7 (1%rr)	approx. 0.97 (at 25°C)	30-34	(-20)					•		Low foaming non-ionic surfactants, wetting agents and emulsifiers.
Rokanol LP3135	Alkoxyated fatty alcohol	154518-36-2	liquid	7.9	min. 99.0	5.0-7.0 <sup>a)</sup>	approx. 1.00 (at 25°C)	31-35 A	approx. -20					•		
Rokanol LP3943	Alkoxyated fatty alcohol	68551-13-3	liquid	3.0	min. 99.0	5.0-7.0 <sup>a)</sup>	approx. 0.95 (at 25°C)	39-43 E	approx. -20					•		
Rokanol LP4045	Alkoxyated fatty alcohol	—	liquid	—	min. 99.5	5.0-7.0 <sup>b)</sup>	approx. 0.96 (at 25°C)	40-47 E	approx. -13					•		
Rokanol NL8P4	Alkoxyated fatty alcohol	103818-93-5	liquid	—	min. 99.0	5.0-7.0 <sup>a)</sup>	approx. 1.00 (at 25°C)	38-48 A	approx. -6					•		
Rokanol RZ4P11	Alkoxyated fatty alcohol	68002-96-0	liquid	3.3	min. 99.0	5.5-8.5 <sup>a)</sup>	approx. 0.97 (at 20°C)	23-27 E	approx. 0					•		

\*) pH determination methods:  
a - pH of a 1% aqueous solution at 20°C, the potentiometric method according to EN 1262  
b - pH of a 5% solution according to EN 1262 solution C  
c - pH of a 5% aqueous solution at 20°C, the potentiometric method according to EN 1262  
d - pH of a 10% aqueous solution at 20°C, the potentiometric method according to EN 1262  
\*\*) Cloud point method:  
Cloud point according to EN 1890

## Foam control agents

### EO/PO block copolymers - applications

PRODUCT NAME	DESCRIPTION	CAS	SURFACE TENSION at 25°C [mN/m]	EMULSIFIER	WETTING AGENT	LUBRICANT	COUPLING AGENT	LOW-FOAMING	CORROSION INHIBITOR	FEATURES AND BENEFITS
<b>EO/PO BLOCK COPOLYMERS</b>										
Rokamer 2950	PEG/PPG Copolymer	9003-11-06	42			•		•		Product with high detergency power and low foaming properties used in cutting and grinding fluids as a lubricant and a coolant
Rokamer R2800	PEG/PPG Copolymer	6003-11-6	36			•		•		Low foaming nonionic surfactant.

## Foam control agents

### EO/PO block copolymers - properties

PRODUCT NAME	APPEARANCE	HLB	ACTIVE CONTENT [%]	pH*	DENSITY [g/ml]	CLOUD POINT [°C]**	SOLIDIFICATION POINT, [°C]
<b>EO/PO BLOCK COPOLYMERS</b>							
Rokamer 2950	liquid/paste	8.1	min. 99	4.6-7.4 <sup>d)</sup>	approx. 1.04 (at 25°C)	54-60 (10% aqueous solution)	approx. 15
Rokamer R2800	liquid	2.8	min. 99.5	4-7 (1% solution ethanol: water)	approx. 1.01 (at 25°C)	28-31 D	< -20

\* ) pH determination methods:  
a - pH of a 1% aqueous solution at 20°C, the potentiometric method according to EN 1262  
b - pH of a 5% solution according to EN 1262 solution C

c - pH of a 5% aqueous solution at 20°C, the potentiometric method according to EN 1262  
d - pH of a 10% aqueous solution at 20°C, the potentiometric method according to EN 1262

\*\* ) Cloud point method:  
Cloud point according to EN 1890



# Notes for guidance concerning the functional parameters and notation used in the catalogue

## HLB (Hydrophilic-Lipophilic Balance)

The hydrophilic-hydrophobic balance is a parameter that determines the ratio of the content of the hydrophilic group and that of the hydrophobic group in a particle. The validity scope of the HLB number for non-ionic surface-active compounds is included within the range of 0 to 20 and is the measure of the share of the hydrophilic group in the particle.

$$HLB=20 \cdot \frac{\text{molecular mass of hydrophilic part}}{\text{molecular mass of the compound}}$$

On the other hand, for aqueous solutions of ionic surface active agents requiring additional transformations increasing their degree of hydrophilicity, the value of the HLB goes up to 40.

HLB for ester type compounds (polyoxyethylenated fatty acids):

$$HLB=20 \cdot \left(1 - \frac{LZ}{LK}\right)$$

where:

**LZ** saponification number of oxyethylenation product, mgKOH/g

**LK** acid number of acids subjected to oxyethylenation, mgKOH/g

On the basis of the HLB scale, the range of the utility fitness of surface-active agents can be determined.

HLB NUMBER	EO CONTENTS IN PRODUCT, %	PRODUCT APPLICATION
1-3	5-15	Anti-foaming agent
4-6	20-30	Emulsifier W/O
7-11	35-55	Wetting agent
8-18	40-90	Emulsifier W/O
10-15	50-75	Detergent
10-18	50-90	Solubilizer

## Cloud point

Cloud point is an indicator determining the behaviour of water or other organic solutions of nonionic surfactants. Solutions of surfactants become cloudy when heated and revert to a clear solution at a certain temperature when cooled - this temperature is defined as a "cloud point".

Depending on the temperature range at which the solution becomes cloudy, five determination methods are distinguished:

**Method A** – aqueous solution (10 - 90°C)

**Method B** – solution of NaCl 50g/l (>90°C)

**Method C** – solution of NaCl 100g/l (>90°C)

**Method D** – solution 45g of butyl diglycol/water (<10°C)

**Method E** – solution 25 g of butyl diglycol/water (<10°C)



# PCC Group

## We build value through sustainable innovation



Operating in 18 countries, in 41 different locations, PCC SE currently employs 3500 people.

Each project or venture with a long-term success story shares one common thing – it's based on in-depth market research and knowledge acquired through years of experience. It is knowledge and experience that enable us to constantly aim higher and deliver greater value through dynamic and sustainable world-wide development of the PCC Group.

The companies, operating as a part of the PCC Group, act with responsibility and care. We only

embark on new business challenges when we are certain that we have the skills and knowledge to achieve success. We operate in three major markets: chemicals, energy and logistics. Several dozen business units, managed by PCC SE, work in synergy to generate the greatest possible competitive advantage in both local and international markets. Each day nearly three thousand professionals contribute their energy and effort to secure the sustainable develop

ment of the PCC Group. The key element of our strategy is to ensure the development of each individual business unit through taking advantage of innovative technology and new market applications. We achieve our goals in a sustainable and responsible way – we care about the environment and the society within which we operate.

We are always ready to reach our strategic goals. Efficient and dynamic management helps our employees to fully develop their potential and therefore enhances the overall PCC Group value. Joint enterprises and individual initiatives of our companies are the results of the entrepreneurship culture promoted within the PCC Group.

Our philosophy is built on simple values - integrity, trust and reliability. We believe that following those principles is the only way to build a long-term competitive advantage.

The PCC Group currently employs nearly 3500 people. We operate in 18 countries, in 41 different locations around the world. Our portfolio includes eight basic segments. Individual operational responsibility is assigned to seven of them - Polyols, Surfactants, Chlorine, Speciality Chemicals, Consumer Products, Energy and Logistics. Each of these segments is supported by 19 business units, all under the management of the PCC Group.

### The divisions, segments and business units of the PCC Group

Divisions	Segments	Business units	Divisions	Segments	Business units
Chemicals	Polyols	<ul style="list-style-type: none"> <li>• Polyols</li> <li>• Polyurethane Systems</li> </ul>	Energy	Energy	<ul style="list-style-type: none"> <li>• Renewable Energy sources</li> <li>• Conventional Energies</li> </ul>
	Surfactants	<ul style="list-style-type: none"> <li>• Anionic Surfactants</li> <li>• Non-ionic Surfactants</li> <li>• Amphoteric Surfactants (Betaines)</li> </ul>		Logistics	<ul style="list-style-type: none"> <li>• Intermodal Transport</li> <li>• Road Haulage</li> <li>• Rail Transport</li> </ul>
	Chlorine	<ul style="list-style-type: none"> <li>• Chlorine</li> <li>• MCAA</li> <li>• Other Chlorine Downstream Products</li> </ul>		Holding	<ul style="list-style-type: none"> <li>• Portfolio Management</li> <li>• Projects</li> <li>• Services</li> </ul>
	Speciality Chemicals	<ul style="list-style-type: none"> <li>• Phosphorus and Naphthalene Derivatives</li> <li>• Alkylphenols</li> <li>• Chemicals and Commodities Trading</li> <li>• Quartzite</li> </ul>			
	Consumer Products	<ul style="list-style-type: none"> <li>• Household and Industrial Cleaners, Detergents and Personal Care Products</li> <li>• Matches and Firelighters</li> </ul>			

## PCC Group - Industrial Park in Brzeg Dolny, Poland

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- PCC Rokita SA**
- PCC Prodex Sp. z o.o.
- PCC Prodex GmbH (Germany)
- PCC PU Sp. z o.o.
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- PCC EXOL SA**
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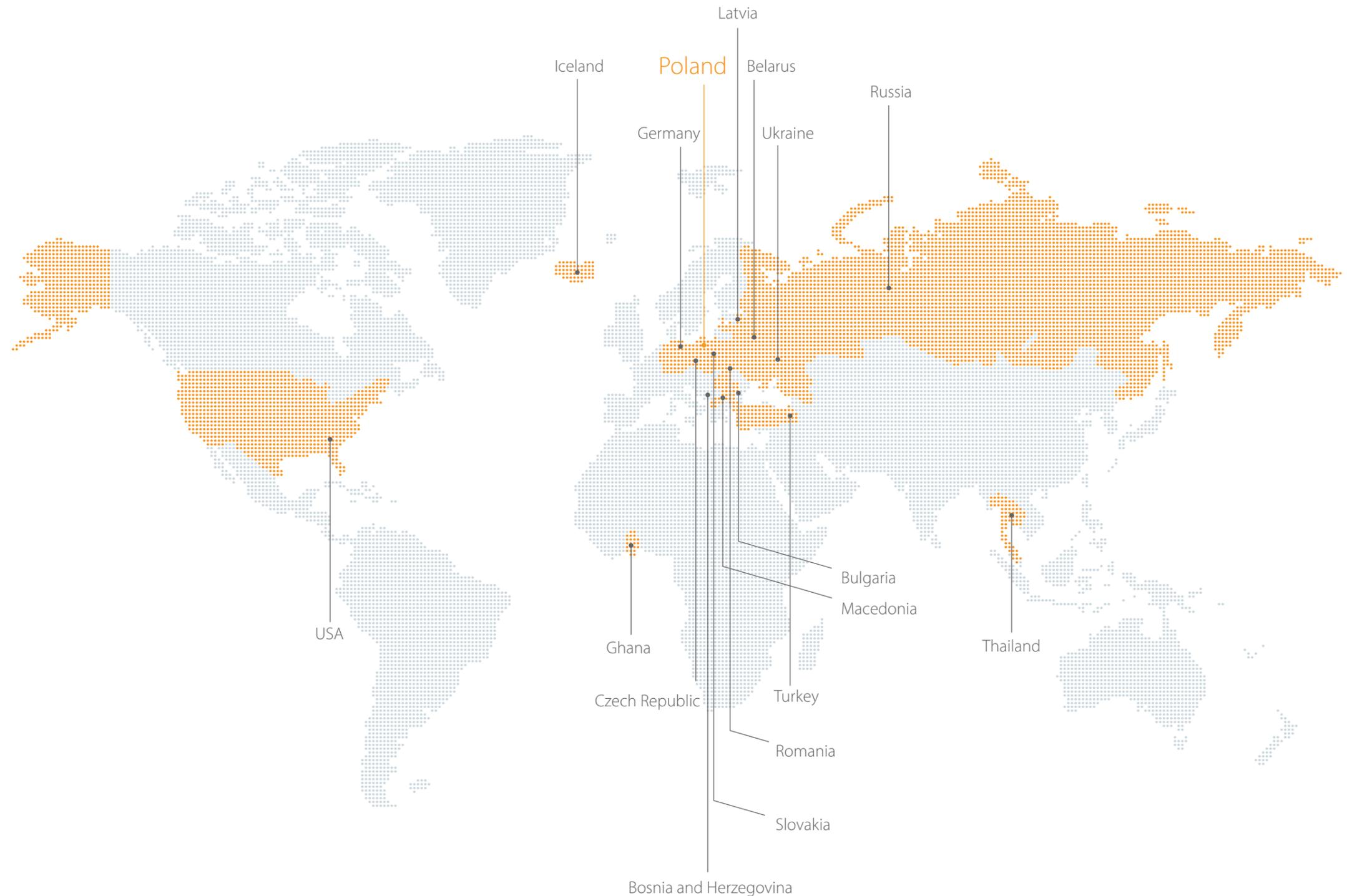
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## PCC Group in the world







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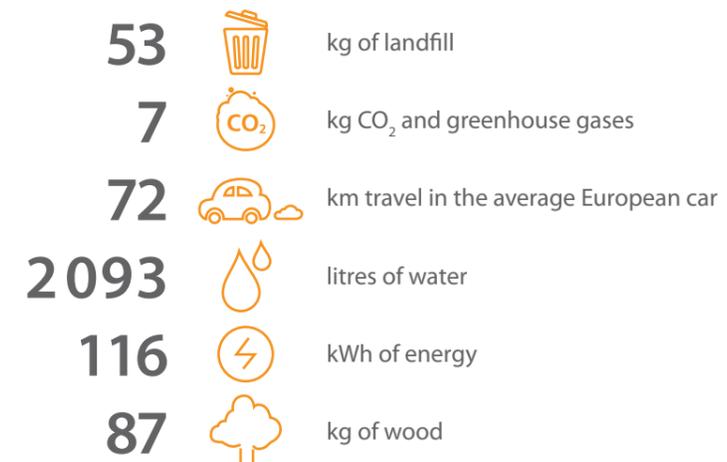
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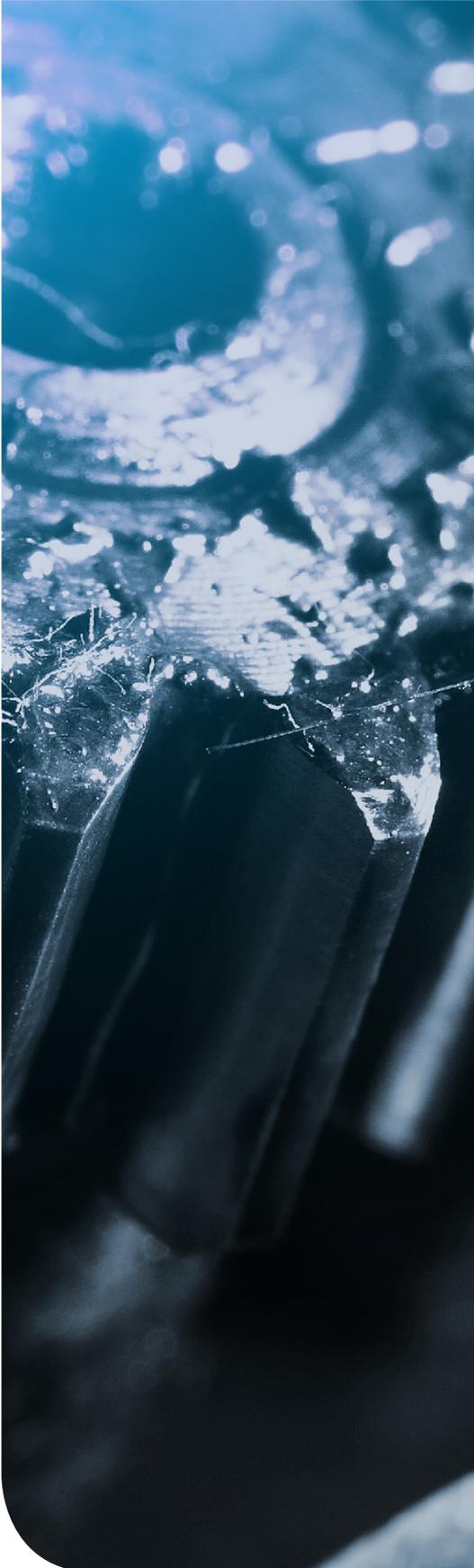
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