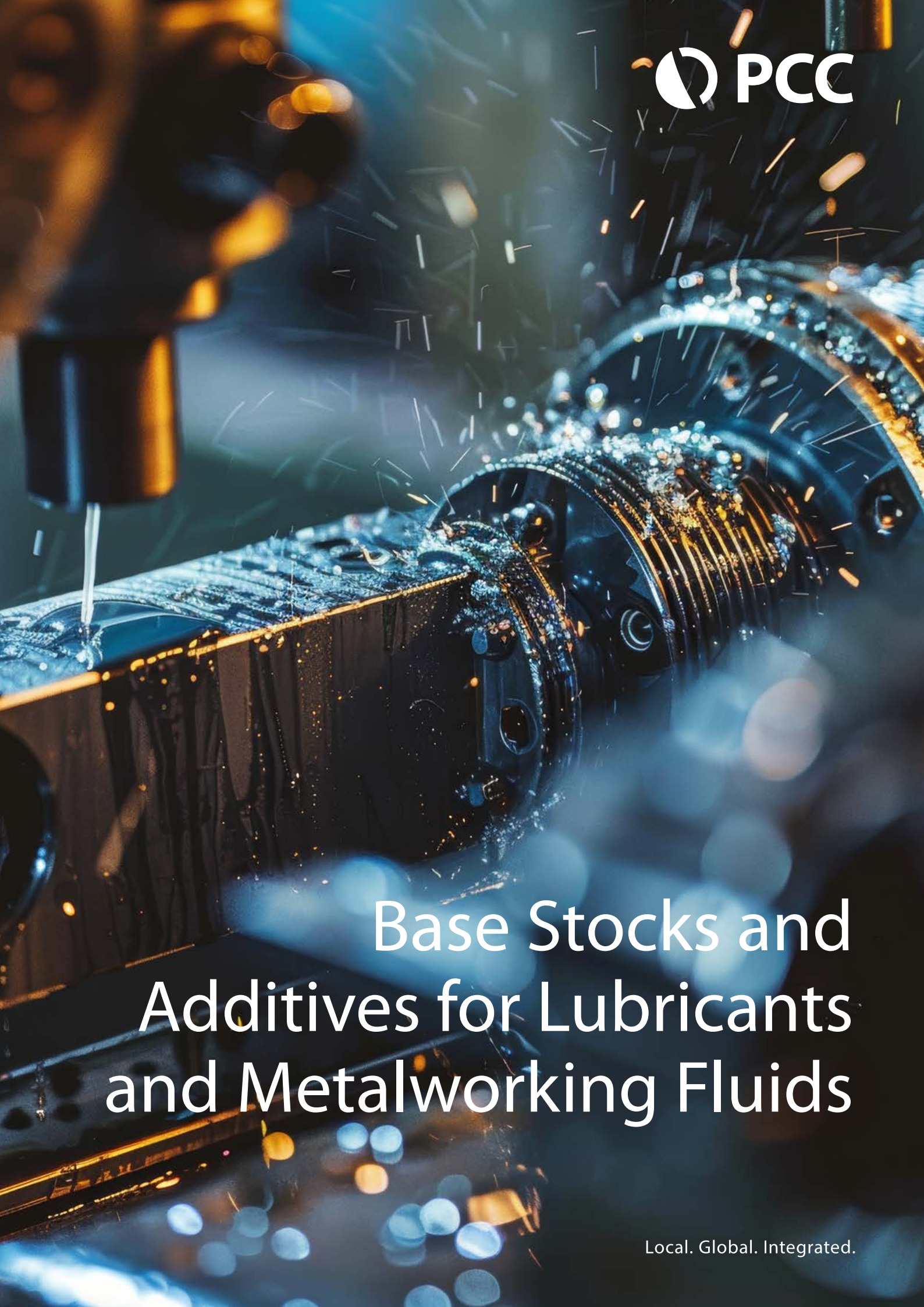

Base Stocks and Additives for Lubricants and Metalworking Fluids

Local. Global. Integrated.


Operating in 17 countries, in 39 different locations, PCC SE currently employs over 3 300 people.

About us

The PCC Group is an international capital structure made up of dozens of companies operating in three major sectors of the economy: Chemicals, Energy and Logistics. The organisations within the PCC Group are both business units engaged in production activities and service companies operating simultaneously for the external market.

The PCC Group is centrally managed by the German company PCC SE and comprises more than 74 companies at 39 locations in 17 countries around the world. One of the key elements of PCC SE's strategy is the dynamic development of the chemicals business by exploiting the potential of new market segments and diversifying the portfolio of raw materials and chemical formulations in line with current trends in various industries. Every day, our specialists work on the stable growth and development of their organisations, making the PCC Group stronger and building a solid business platform for all contractors interested in reliable and longterm cooperation.

PCC ROKITA SA
PCC PCG OXYALKYLATES
IRPC

Polyols

- Polyether polyols
- Polyester polyols
- Prepolymers
- Polyurethane Systems

PCC ROKITA SA

Chlorine

- Chlorine
- MCAA
- Other Chlorine Downstream Product

PCC ROKITA SA

Phosphorus

- Phosphorus derivatives
- Naphthalene derivatives
- Polycarboxyethers (PCE)

PCC EXOL SA
PCC CHEMAX INC
PCC PCG OXYALKYLATES

Surfactants

- Anionic surfactants
- Cationic surfactants
- Nonionic surfactants
- Amphoteric surfactants (betaines)
- Chemical formulation

PCC SYNTEZA

Alkylphenols

- Nonylphenol
- Dodecylphenol
- Tristyrylphenol

PCC CONSUMER PRODUCTS SA

Consumer Products

- Household & industrial Cleaners, Detergents and Personal Care Products

PCC ROKITA SA

Energy

- Renewable Energy
- Conventional Energy

PCC INTERMODAL SA

Logistics

- Intermodal transport
- Road Haulage
- Rail Transport

PCC BAKKISILICON HF.

Silicon

- Microsillica
- Silicon Metal

PCC SE

Holding & Projects

- Portfolio Management
- Project Development

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01 / 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

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

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

Water-soluble PAGs – applications and properties

Product name	Solubility	ISO VG	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-10	water-soluble	10	450	11	3.1	151	>90	< -40	>120	1.02
Rokolub® 50-B-20	water-soluble	22	550	22	5.2	180	71	< -40	>180	1.02
Rokolub® 50-B-32	water-soluble	32	700	34	7.4	192	71	< -61	>250	1.03
Rokolub® 50-B-46	water-soluble	46	1075	49	10	210	59	< -43	>240	1.03
Rokolub® 50-B-100	water-soluble	100	1300	95	18	220	59	< -43	>240	1.04
Rokolub® 50-B-150	water-soluble	150	1800	153	30	238	56	< -43	>250	1.05
Rokolub® 50-B-220	water-soluble	220	2200	225	42	242	55	< -40	>220	1.05
Rokolub® 50-B-330	water-soluble	320	2700	328	61	257	53	<-35	>220	1.05
Rokolub® 50-B-460	water-soluble	460	3500	455	78	254	50	<-35	>220	1.05
Rokolub® 60-D-68	water-soluble	68	900	65	12	184	n/o*	<-38	>220	1.06
Rokolub® 60-D-150	water-soluble	150	1800	155	27	190	n/o*	<-35	>220	1.07
Rokolub® 60-D-220	water-soluble	220	2000	230	42	238	83	<-35	>240	1.07
Rokolub® 60-D-320	water-soluble	320	2400	315	56	246	80	<-35	>220	1.07
Rokolub® 60-D-460	water-soluble	460	3500	470	79	251	73	<-30	>220	1.07
Rokolub® 60-D-1000	water-soluble	1000	5600	956	165	288	72	<-26	>220	1.07

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

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
•		•			•				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.
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•		•		•	•	•			
•		•	•		•	•	•	•	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.
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	•		•		•	•			
	•		•		•	•			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.
	•		•		•	•			
•		•			•				Rokolub® 60-D series are diol started random alkoxylated 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.
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	•		•		•	•			
	•		•		•	•		•	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.
	•		•		•			•	

Partially water-soluble & insoluble PAGs – applications and properties

Product name	Solubility	ISO VG	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/cm^3] 20°C DIN51757
Rokolub® P-B-20	water-insoluble	10	300	13	3.0	110	—	<-30	>160	0.96
Rokolub® P-B-20	water-insoluble	22	550	22	5.0	180	—	<-43	>200	0.99
Rokolub® P-B-32	water-insoluble	32	750	34	7.1	178	—	<-43	>210	0.99
Rokolub® P-B-46	water-insoluble	46	1050	46	9.3	191	—	<-42	>210	0.99
Rokolub® P-B-50	water-insoluble	—	1100	56	11	193	—	<-42	>220	0.99
Rokolub® P-B-68	water-insoluble	68	1200	69	13	192	—	<-40	>220	0.99
Rokolub® P-B-100	water-insoluble	100	1400	100	18	200	—	<-36	>220	0.99
Rokolub® P-B-120	water-insoluble	—	1750	117	21	206	—	<-36	>220	0.99
Rokolub® P-B-150	water-insoluble	150	1900	144	25	208	—	<-36	>230	0.99
Rokolub® P-B-220	water-insoluble	220	2450	209	35	216	—	<-30	>230	1.00
Rokolub® PO-D-460	water-insoluble	460	4000	425	64	226	—	<-32	>200	1.00
Rokolub® PO-D-700	water-insoluble	680+	6000	760	114	252	—	<-30	>200	1.00
Rokolub® 32	partially water-soluble	32	450	33	5.0	62	82	<-40	>230	1.01
Rokolub® 68	water-insoluble	68	1000	65	10	139	64	<-36	>200	1.00
Rokolub® 100	partially water-soluble	100	500	95	11	100	n/o*	<-31	>230	1.07
Rokolub® 150	water-insoluble	150	2000	151	22	173	—	<-34	>200	1.00
Rokolub® 220	partially water-soluble	220	2000	225	22	118	49	<-20	>260	1.04
Rokolub® 220VI	water-insoluble	220+	3600	260	38	198	—	<-30	>250	1.02
Rokolub® 320F	partially water-soluble	—	2500	270	47	235	n/o*	<-20	>200	1.08
Rokolub® 320K	water-insoluble	320+	5000	360	55	221	—	<-30	>200	1.02
Rokolub® 460	water-insoluble	460+	6000	520	80	239	—	<-20	>200	1.02
Rokolub® 680	partially water-soluble	680	5000	600	104	268	n/o*	<-7	>250	1.09
Rokolub® DE4010	water-insoluble	320	3700	318	50	221	16	<-20	>200	1.02
Rokolub® DE4020	water-insoluble	320+	4000	367	60	235	17	<-20	>200	1.02

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

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
•		•							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.
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•	•	•	•					•	
	•		•						A high performance water-insoluble base stock used in gear and metal working formulations.
	•		•						
•		•		•	•				A high performance water-insoluble and partially water-soluble base stock used in air conditioning fluids and hydraulic fluids.
•		•		•					
•		•	•		•				
•	•	•	•				•		
•	•	•	•		•				A high performance water-insoluble and partially water-soluble base stock used in gear and metal working formulations.
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	•		•						
	•		•		•	•		•	
	•		•						Defoamer and low foaming emulsifier.
	•		•						

Mineral oil soluble PAGs – applications and properties

Product name	Solubility	ISO VG	MW [g/mol]	Viscosity 40°C [cSt] – ASTM D445	Viscosity 100°C [cSt] – ASTM D445	Viscosity index – ASTM D2270	Flash point [°C] – ASTM D92	Density [g/cm³] 20°C – DIN 51757
Rokolub® MOS 32	mineral oil soluble	32	800	31	6.5	171	>240	0.93
Rokolub® MOS 46	mineral oil soluble	46	925	45	8.7	176	>240	0.94
Rokolub® MOS 68	mineral oil soluble	68	1175	70	13	189	>240	0.95
Rokolub® MOS 100	mineral oil soluble	100	1400	106	18	189	>240	0.96
Rokolub® MOS 220	mineral oil soluble	220	2450	206	31	191	>240	0.97
Rokolub® MOS 460	mineral oil soluble	460	2450	433	51	181	>240	0.96
Rokolub® MOS 680	mineral oil soluble	680	3700	637	73	194	>240	0.96

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

High purity Rokochem® PAGs – applications

Product name	Solubility	ISO VG	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	Flash point [°C] – ASTM D92
Rokochem® 1133	water-soluble	46	56	95	48	10	>240
Rokochem® 11150	water-soluble	150	28	307	147	29	>250
Rokochem® 2206	water-insoluble	22	83	45	24	5.5	>200
Rokochem® 2240	water-insoluble	46+	48	106	54	10	>200
Rokochem® 2210	water-insoluble	100	36	206	101	18	>220

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

Compressor lubricants	Industrial gear oil	Hydraulic fluids	Greases	Textile lubricants	Heat transfer fluids	Metalworking fluids	Non-ferrous metals processing	NSF HX-1	Features and benefits
•		•	•					•	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.
•		•	•						
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Compressor lubricants	Industrial gear oil	Hydraulic fluids	Textile lubricants	Heat transfer fluids	Metalworking fluids	Non-ferrous metals processing	Intermediate product for further syntheses	NSF HX-1	Features and benefits
•		•		•	•	•	•		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, levelling 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.
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•		•					•		
•		•	•				•		

Hydraulic fluids – base stock (HFDU)

Product name	Solubility	ISO VG	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
Rokolub® 50-B-32	water-soluble	32	700	34	7.4	192	71
Rokolub® 50-B-46	water-soluble	46	1075	49	10	210	59
Rokolub® 50-B-100	water-soluble	100	1300	95	18	210	59
Rokolub® 32	partially water-soluble	32	450	33	5.0	62	82
Rokolub® 100	partially water-soluble	100	500	95	11	100	n/o*
Rokolub® P-B-46	water-insoluble	46	1050	46	9.3	191	—
Rokolub® P-B-68	water-insoluble	68	1200	69	13	192	—
Rokolub® P-B -100	water-insoluble	100	1400	100	18	200	—

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

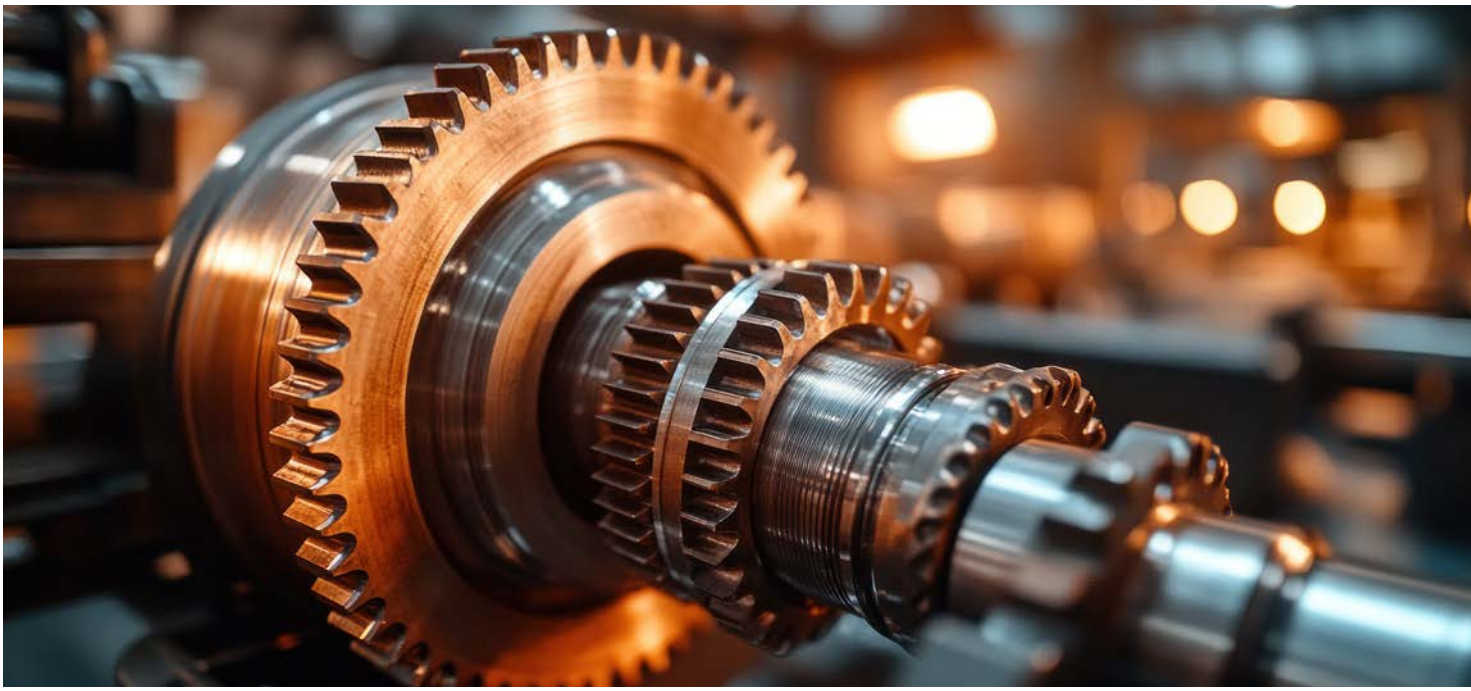
Main properties of PAGs based, water free hydraulic fluids (HFDU)

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 PAGs 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.

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
<-43	>250	1.453	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.
<-43	>240	1.455	1.03	
<-43	>240	1.457	1.04	
<-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.
<-31	>230	1.459	1.07	
<-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.
<-40	>220	1.448	0.99	
<-36	>220	1.449	0.99	



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 stations 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.

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
Rokolub® FR T-32	Triaryl phosphate ester	32	transparent liquid	< 0.1	< 0.1	1.16	-26	> 230	> 300	> 500
Rokolub® FR T-46	Triaryl phosphate ester	46	transparent liquid	< 0.1	< 0.1	1.15	-18	> 230	> 300	> 500
Rokolub® FR T-68	Triaryl phosphate ester	68	transparent liquid	< 0.1	< 0.1	1.13	-14	> 230	> 300	> 500
Rokolub® FR T-46 ultra	Triaryl phosphate ester	46	transparent liquid	< 0.1	< 0.1	1.15	-18	> 230	> 300	> 500

Features, advantages and benefits of HFDR

Features

- extremely difficult to ignite
- unique self-extinguishing properties
- excellent lubricating properties
- superior oxidation and thermal stability

Advantages

- the greatest fire resistance performance
- strong resistance to high temperatures
- perfect water separation
- not classified as a hazard to human health

Benefits

- significantly reduced risk of fire
- safe routine maintenance of operating fluids
- no copper or steel corrosion
- long service life

Hydraulic fluids	High temp. lubricants	Reciprocating air compressors	Steel& aluminium furnace hydraulics	Die casting hydraulics	Steam & gas turbine lubrication	Steam Turbine EHC Systems	Features and benefits
•	•	•	•	•			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. Rokolub® FR T-46 ultra is a fire-resistant base fluid especially designed for the power generation industry. It is recommended to 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. The essential feature that distinguishes Rokolub® FR series is lack of health hazards in compliance with GHS. Additionally, Rokolub® FR T-46 ultra is featured in neither classification nor labelling in comply with GHS.
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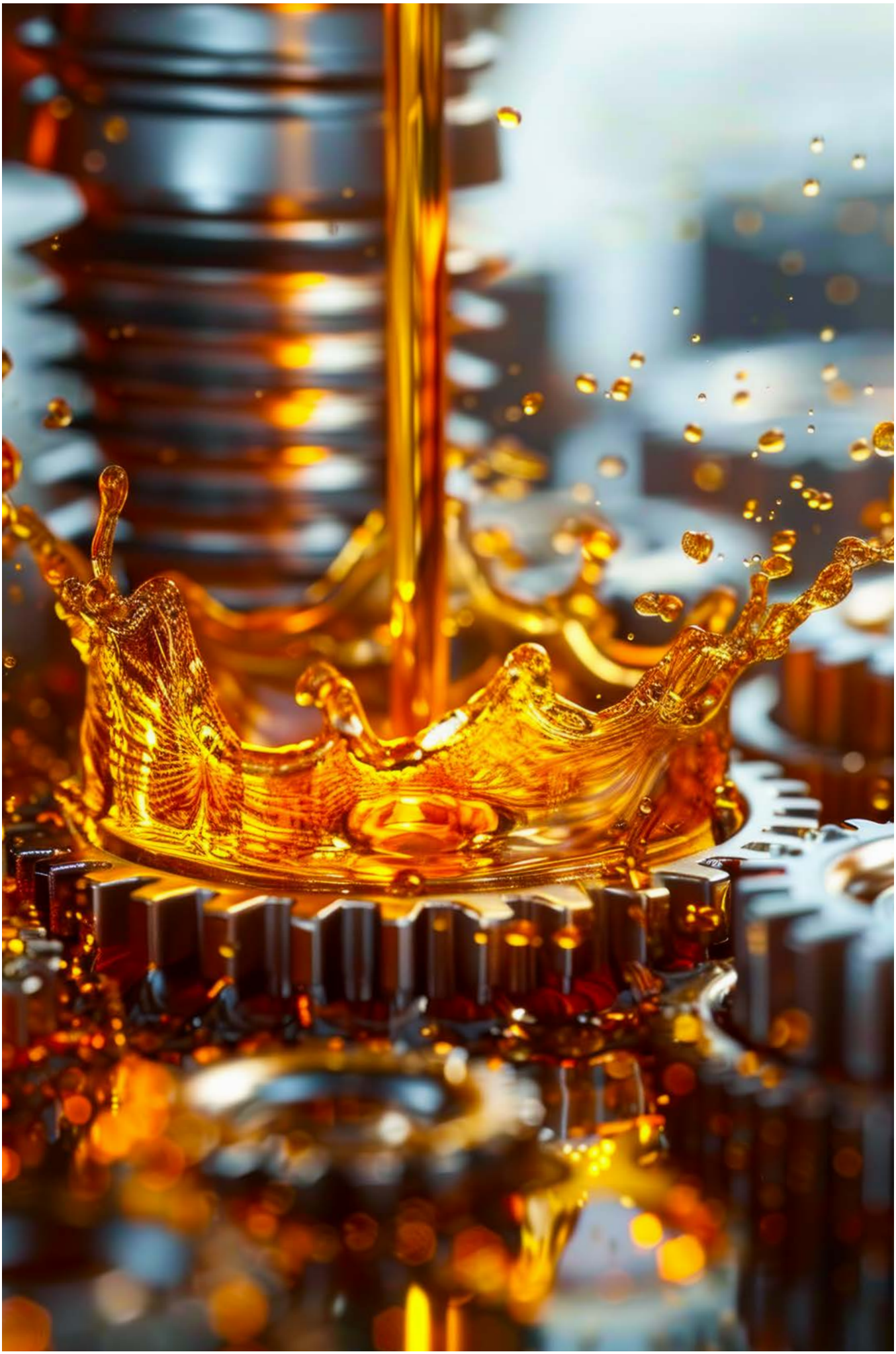
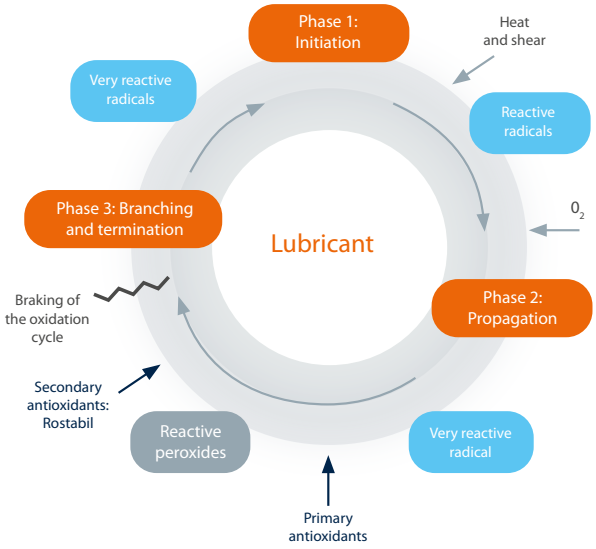


02 / Additives for Lubricants

Secondary antioxidants

Rostabil series of products are phosphite-based secondary antioxidants, which can be successfully implemented in a broad range of lubricants. Synthetic lubricants, especially hydrocarbon-based lubricating oils, are susceptible to degradation when exposed to oxygen. The addition of antioxidants are a critical component to reduce the rate of thermal degradation of the lubricant. The increased oxidative resistance allows the formulated lubricants to be used at high temperatures. Additionally, antioxidants tend to lower the risk of sludge and varnish formation.

A combination of primary and secondary antioxidants are usually applied to maximize the protection against oxidative degradation. Both classifications of antioxidant perform a different role in inhibiting oxidation. Primary antioxidants are known as radical scavengers. They quickly react with free radicals at the propagation phase, reducing the effects of degradation by creating more stable radicals. Secondary antioxidants perform a complementary action by reacting with peroxides which develop when the lubricating oil encounters oxygen. This reaction stops the oil degradation cycle and prevent the propagation of other undesirable reactions. Rostabil series of products function as secondary antioxidants.



Secondary antioxidants – properties

Product name	Chemical name	Appearance	Colour	Density (at 25°C)	Acid value	Phenol content
		Visual method	ASTM D1209	EN ISO 2811	In-house method	In-house method
		–	Hazen	g/cm³	mgKOH/g	% (w/w)
Rostabil TDP	triisodecyl phosphite	colourless, homogenous liquid	max 50	0.887	max 0.1	max 0.1
Rostabil TTDP	triisotridecyl phosphite	colourless, homogenous liquid	max 100	0.884	max 0.2	max 0.1
Rostabil DDPP	diisodecyl phenyl phosphite	colourless, homogenous liquid	max 100	0.947	max 0.1	max 1
Rostabil DPDP	isodecyl diphenyl phosphite	colourless, homogenous liquid	max 100	1.030	max 0.1	max 1
Rostabil TNF	tris(nonylphenyl) phosphite	slightly coloured, homogenous liquid	max 150	0.975	max 0.3	—

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
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	•	•	•	•	•	•	
Rokolub® AD 290 LTPP	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
Rokolub® AD 122	liquid	22	< 0.1	< 0.1	1.20	8.5
Rokolub® AD 132	liquid	32	< 0.1	< 0.1	1.12	7.9
Rokolub® AD 232	liquid	32	< 0.1	< 0.1	1.16	8.3
Rokolub® AD 246	liquid	46	< 0.1	< 0.1	1.15	8.0
Rokolub® AD 246 plus	liquid	46	< 0.1	< 0.1	1.14	7.9
Rokolub® AD 246 ultra	liquid	46	< 0.1	< 0.1	1.15	7.8
Rokolub® AD 268	liquid	68	< 0.1	< 0.1	1.13	7.6
Rokolub® AD 290 LTPP	liquid	90	< 0.1	< 0.1	1.12	7.4

Anti-wear/Extreme pressure additives

EXOfos series are anionic phosphate esters specially developed to be used as extreme pressure and antiwear 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.

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.

AW/EP additives – applications & properties

Product name	Description	Appearance	Phosphorus content [%]	Solidification point [°C]	Industrial gear oils	Turbine oils	Compressor oils	High temp. Lubricants	Metalworking fluids	Hydraulic fluids
EXOfos PA-080S	2-ethylhexyl phosphate	liquid	11-12	<-20	•				•	•
EXOfos PA-1300	isotridecyl phosphate	liquid	8-9	<-20	•				•	•
EXOfos PB-083	PEG (3) 2-ethylhexyl phosphate	liquid	—	<0					•	•
EXOfos PD-103LP	blend	liquid	6-7	<-30					•	•
EXOfos PB-103	POE (3) decyl phosphate	liquid	11-12	<-20					•	•
EXOfos PB-133	POE (3) isotridecyl phosphate	liquid	5-6	<-20					•	•
EXOfos PB-136	POE (6) isotridecyl phosphate	liquid	3-4	-15					•	•
EXOfos PB-139	POE (9) isotridecyl phosphate	liquid	3-4	-2					•	•
EXOfos PB-184	POE (4) oleyl phosphate	liquid	4-5	-4	•			•	•	•
EXOfos PB-253	POE (3) C12-15 alkyl phosphate	liquid	5-6	~2					•	•
EXOfos PB-264	POE (4) lauryl phosphate	liquid	6-7	-2	•			•	•	•
EXOfos PF-623	C8-10 alcohol, Ethoxylated, phosphate	liquid	—	<-20					•	
EXOfos PB-1016M	mono-C10-16 alkyl ethers	liquid	—	~ -20					•	

03 / 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.

Lubricity additives

PEG polyethylene glycols – applications & properties

This products are availble with diffrent MW. Starting from 200 and ending at 6000.

Product name	Description	CAS	Appearance	Active ingredient content [%]	pH*	Solidification point, [°C]
Water-soluble polyethylene glycols with different molar masses (mw 200÷6000)						
POLIkol 400	Polyoxyethylene glycol	25322-68-3	liquid	min. 99.0	4.6-7.4 [d]	approx. 5
POLIkol 1500	Polyoxyethylene glycol	25322-68-3	wax	min. 99.0	4.6-7.4 [d]	approx. 42-48
POLIkol 4500	Polyoxyethylene glycol	25322-68-3	wax	min. 99.0	4.6-7.4 [d]	approx. 55
POLIkol 6000	Polyoxyethylene glycol	25322-68-3	wax	min. 99.0	4.6-7.4 [d]	approx. 52-58

*) 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, sorbitan esters ethoxylates and fatty amides ethoxylates – applications & properties

Product name	Description	CAS	Appearance	HLB	Active ingredient content [%]	pH*
Sorbitan Esters and Sorbitan Esters Ethoxylates						
ROKwin 80	Sorbitan monooleate	1338-43-8	liquid/semi-liquid paste	4.3	min. 99	
ROKwinol 20	Ethoxylated sorbitan monolaurate	9005-64-5	liquid	16.7	min. 97	
ROKwinol 60	Ethoxylated sorbitan monostearate	9005-67-8	liquid/paste	14.9	min. 99	
ROKwinol 80	Ethoxylated sorbitan monooleate	9005-67-6	liquid/semi-liquid paste	15.0	min. 99	
Fatty Amines Ethoxylated						
ROKAmid KAD	Cocoamide DEA	68155-07-7	liquid		100.0	7.5-10.5 [a]
ROKAmid RAD	Oleamide DEA	68603-38-3	liquid		90.0	7.5-10.5 [a]
ROKAmid MRZ4	Rapeseedamide MEA	85536-23-8	liquid		min. 90	9.2-10 [a]

Average molar mass [g/mol]	Emulsifier	Wetting agent	Lubricant	Coupling agent	Low-foaming	Corrosion inhibitor	Features and benefits
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. Recommended for semisynthetic and synthetic metalworking fluids. They improve detergency and enhance viscosity.
1500			•	•	•		
4500			•	•	•		
6000			•	•	•		

Solidification point, [°C]	Emulsifier	Wetting agent	Lubricant	Coupling agent	Low-foaming	Corrosion inhibitor	Features and benefits
—	•		•				Standard emulsifiers for vegetable, ester based and mineral base oils. Can also be used as a lubricant and an antistatic additive.
approx. -5	•		•				
25-31	•		•				
24-28	•		•				
approx. 0°C	•					•	Emulsifiers and corrosion inhibitors for cutting fluids. Thickeners for detergent formulations.
approx. 0°C	•					•	
approx. 0°C	•					•	Emulsifier and thickening agent with anticorrosion properties.

Emulsifiers & Surfactants

Alcohol ethoxylates – applications & properties

Product name	Description	CAS	Appearance	HLB	Active ingredient content [%]	Hydroxyl value [mg KOH/g]*	pH*
ROKAnol® O3	Oleyl Alcohol + 3EO	9004-98-2	liquid	7.1	min. 99.0	135-150	5.5-8.5 [a)]
ROKAnol® O5	Oleyl Alcohol + 5EO	9004-98-2	liquid	9.1	min. 99.0	120-135	5.0-7.0 [a)]
ROKAnol® O23/70	Oleyl Alcohol + 23EO	9004-98-2	liquid	15.8	approx. 70	40-56	5.0-6.5 [b)]
ROKAnol® O100	Oleyl Alcohol + 100EO	9004-98-2	wax	18.8	min. 99.0	22-32	5.5-8.5 [a)]
ROKAnol® K3	Alkohols, C16-C18 and C18-unsatd. + 3EO	68920-66-1	semi-liquid paste	7.0	min. 99.0	144-154	5.5-8.5 [a)]
ROKAnol® K5	Alkohols, C16-C18 and C18-unsatd. + 5EO	68920-66-1	liquid/paste	9.2	min. 99.0	120-135	5.5-8.5 [a)]
ROKAnol® K7	Alkohols, C16-C18 and C18-unsatd. + 7EO	68920-66-1	semi-liquid paste	10.8	min. 99.5	115-122	5.5-8.5 [a)]
ROKAnol® DB3	Alcohols, C12-15 + 3EO	68131-39-5	liquid/paste	7.8	min. 99.7	164-172	4.6-7.4 [a)]
ROKAnol® DB5	Alcohols, C12-15 + 5EO	68131-39-5	liquid/paste	10.2	min. 99.5	130-140	4.6-7.4 [a)]
ROKAnol® DB7	Alcohols, C12-15 + 7EO	68131-39-5	liquid/paste	12.0	min. 99.0	100-114	4.6-7.4 [a)]
ROKAnol® NL3	Alcohols, C9-11, + 3EO	68439-46-3	liquid	8.5	min. 99.5	185-193	5.5-7.5 [a)]
ROKAnol® NL4	Alcohols, C9-11, + 4EO	68439-46-3	liquid	10.6	min. 99.5	—	5.0-7.0 [a)]
ROKAnol® NL5	Alcohols, C9-11, + 5EO	68439-46-3	liquid	11.6	min. 99.5	140-150	4.6-7.4 [a)]
ROKAnol® NL6	Alcohols, C9-11, + 6EO	68439-46-3	liquid	12.3	min. 99.5	119-130	5.5-7.0 [d)]

*) 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

Cloud point [°C] ***ww	Solidification point, [°C]	Emulsifier	Wetting agent	Lubricant	Coupling agent	Low-foaming	Corrosion inhibitor	Features and benefits
37-41 E	approx. 0	•		•				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.
—	approx. -4	•		•				
70-75 C	approx. 2	•		•				
87-92 B	below 48	•		•				
49-56 D	approx. 15	•		•				Standard emulsifiers for soluble oils and semisynthetic cutting fluids. Suitable for paraffinic and naphthenic base oils.
60-66 D	approx. 18	•		•				
68-72 D	approx. 20	•		•				
55-60 D	approx. 10	•	•					Emulsifiers for mineral oils, vegetable and ester-based base stocks. Great wetting agents, especially recommended for water-based metal cleaning formulations.
65-72 D	approx. 10	•	•					
76-81 D	approx. 20	•	•					
55-59 D	approx. -5	•						Prime wetting agents for water-based metal cleaners. Apart from cleaning and degreasing properties, they are great emulsifiers for metalworking formulations.
60-65 E	approx. -10	•	•					
33-39 A	approx. -2	•	•					
50-57 A	approx. 5	•						

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]*
ROKAnol® IT3	Alcohol, C13, branched + 3EO	69011-36-5	liquid	8.0	min. 99.0	152-167
ROKAnol® IT5	Alcohol, C13, branched + 5EO	69011-36-5	liquid	10.5	min. 99.0	125-132
ROKAnol® IT8W	Alcohol, C13, branched + 8EO	69011-36-5	liquid	12.8	min. 90.0	—
ROKAnol® IT8	Alcohol, C13, branched + 8EO	69011-36-5	paste	12.8	min. 99.5	95-104
ROKAnol® IT12	Alcohol, C13, branched + 12EO	69011-36-5	liquid/paste	14.5	min. 99.0	74-83
ROKAnol® ID3	Isodecanol + 3EO	78330-20-8	liquid	9.2	min. 99.0	—
ROKAnol® ID5	Isodecanol + 3EO	78330-20-8	liquid	11.7	min. 99.0	135-150
ROKAnol® ID7	Isodecanol + 7EO	78330-20-8	liquid	13.2	min. 99.0	125-140
ROKAnol® ID8	Isodecanol + 8EO	78330-20-8	liquid	13.8	min. 99.0	110-125
ROKAnol® TMP3	Alcohols, C13-15 + 3 EO	157627-86-6	liquid	7.2	min. 99.0	—
ROKAnol® GA3	Alcohol, C10 + 3 EO	160875-66-1	liquid	9	min. 99.5	190
ROKAnol® GA5	Alcohol, C10 + 5 EO	160875-66-1	liquid	11.5	min. 99.5	150
ROKAnol® GA7	Alcohol, C10 + 7 EO	160875-66-1	liquid	13	min. 99.5	125
ROKAnol® GA7W	Alcohol, C10 + 7 EO	160875-66-1	liquid	13	min. 84-87	—
ROKAnol® GA8	Alcohol, C10 + 8 EO	160875-66-1	liquid	14	min. 99.5	110
ROKAnol® GA8W	Alcohol, C10 + 8 EO	160875-66-1	liquid/paste	14	min. 84-86	—
ROKAnol® GA9	Alcohol, C10 + 9 EO	160875-66-1	liquid	14.5	min. 99.5	100
ROKAnol®GA9W	Alcohol, C10 + 9 EO	160875-66-1	liquid/paste	14.5	min. 84-86	—

*) 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

pH**	Cloud point [°C] ***ww	Solidification point, [°C]	Emulsifier	Wetting agent	Lubricant	Coupling agent	Low-foaming	Corrosion inhibitor	Features and benefits
5.0-7.0 a)	48-51 D	approx. -20	•	•		•			Prime wetting agents for water-based metal cleaners. Apart from cleaning and degreasing properties, they are great emulsifiers for metalworking formulations. Possess solubilizing properties.
5.0-7.0 a)	60-62 E	approx. -5	•	•		•			
5.0-7.0 a)	75-79 D	approx. -20	•	•		•			
5.0-7.0 a)	76-78 D	approx. 8	•	•		•			
5.0-7.0 a)	79-85 A	approx. 20	•	•		•			
5.0-8.0 a)	51-55 E	approx. -16		•	•	•			
5.0-7.0	66-69 E	approx. 3		•	•	•			
5.0-7.0	59-62 A	approx. 6		•	•	•			
5.0-7.0	64-68 A	approx .9		•	•	•			
5.0-8.0 b)	44-46 E	approx. 5		•	•	•			
5-7 a)	30-33 E	approx. 0	•	•					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.
5-7 (1% solution ethanol: water)	54-57 E	approx. 10	•	•					
5-7 a)	67-70 E	< 20	•	•					
5-7 a)	67-70 E	< -10	•	•					
5-7 a)	54-57 A	< 20	•	•					
5-7 a)	54-58 A	< -10	•	•					
5-7 a)	67-70 A	approx. 20	•	•					
5-7 a)	67-70 A	< -10	•	•					

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**
Ethoxylated Fatty Acids						
ROKAcet RZ17	Fatty Acid Glocerol Ester, C14-18 + 17 EO	70914-02-2	oily liquid	—	min. 99.0	min. 9.0 (12% solution)
ROKAcet R11	Castrol oil + 11 EO	61791-12-6	liquid	6.9	min. 99.0	5.0-7.0 [a)]
ROKAcet R26	Castrol oil + 26 EO	61791-12-6	liquid	11.0	min. 99.0	7.5-9.5 [d)]
ROKAcet R36	Castrol oil + 36 EO	61791-12-6	liquid/paste	12.6	min. 99.0	5.0-7.0 [d)]
ROKAcet R40	Castrol oil + 40 EO	61791-12-6	paste	13.0	min. 99.0	6.5-8.0 [a)]
ROKAcet O7	Oleic acid + 7 EO	9004-96-0	liquid	10.6	min. 99.0	5.5-8.5 [a)]
Fatty Amines Ethoxylated						
ROKAmin SR5	Tallow Amine + 5EO	61791-26-2	liquid/paste	9.8	100	—
ROKAmin SR8K	Tallow Amine + 8EO	61791-26-2	liquid	12.4	min. 99.0	—
ROKAmin SR15	Tallow Amine + 15EO	61791-26-2	liquid/slip paste	14.2	min. 99.0	9.0-11.5 [c)]
ROKAmin SR22	Tallow Amine + 22EO	61791-26-2	paste	16.1	min. 99.0	—
ROKAmin K15	Cocoamine + 15EO	61791-14-8	liquid	15.5	min. 97.0	—
ROKAmin K5	Cocoamine + 5EO	61791-14-8	liquid	10.4	min. 99.0	9.0-11.5 [a)]

*) 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

Solidification point, [°C]	Emulsifier	Wetting agent	Lubricant	Coupling agent	Low-foaming	Corrosion inhibitor	Features and benefits
approx. 0	•		•				Environmentally friendly emulsifier based on vegetable raw material for mineral base stocks and for natural oils. Non corrosive.
approx. -20	•		•				Biodegradable and non corrosive emulsifiers for mineral base stocks and vegetable oils. Recommended for soluble oils and semisynthetic cutting fluids.
approx. 0	•		•				
approx. 8	•		•				
—	•		•				
approx. 0	•		•				Standard emulsifier and lubricant for soluble oils; mostly aliphatic solvents and cutting oils. Non-corrosive. Biodegradable.
approx. 3	•					•	Emulsifier used in formulations of soluble oils and semisynthetic cutting fluids. Corrosion inhibitor.
approx. 10	•					•	
approx. -3	•					•	
approx. 20	•					•	
approx. -8	•					•	Emulsifier, corrosion inhibitor, specific surfactant for industrial cleaners to dispersants.
approx. -20	•					•	

Foam control agents

Low foaming non-ionic surfactants, wetting agents and emulsifiers.

Product name	Description	CAS	Appearance	Active content [%]	pH*
ROKAnol® GA4LA	Alcohol, C10 + EO/PO	166736-08-9	liquid	min. 99.5	5.0-7.0 c)
ROKAnol® GA9LA	Alcohol, C10 + EO/PO	166736-08-9	liquid	approx. 99.5	5.0-7.0 c)
ROKAnol® GA7LA	Alcohol, C10 + EO/PO	166736-08-9	liquid	min 99.5	5.0-7.0 a)
ROKAnol® GA7LAW	Alcohol, C10 + EO/PO	166736-08-9	liquid	approx. 85	5.0-7.0 c)
ROKAnol® LP2227	2-propylheptanol + EO/PO	166736-08-9	liquid	min. 99	5.0-7.0 a)
ROKAnol® L10|80	Alcohols, C12-14 + 10EO	103819-01-8	clear liquid	77-81	4.6-7.4
ROKAnol® L4P5	Alcohols, C12-C14 + EO/PO	68439-51-0	liquid	min. 99.0	5.5-8.5 c)
ROKAnol® L5P5	Alcohols, C12-C14 + EO/PO	68439-51-0	liquid	min. 99.0	5.0-7.0 a)
ROKAnol® LP42	Alcohols, C16-18 + EO/PO	68002-96-0	liquid	approx. 99	5.0-7.0 a)
ROKAnol® LP60	Alcohols, C9-11 + PO	130454-91-0	liquid	min. 99.0	6.0-8.0 (1% ethanol: water)
ROKAnol® LP64	Alcohols, C16-18 + EO/PO	68002-96-0	liquid	approx. 99	5.0-7.0 a)
ROKAnol® LP66	Alcohols, C16-18 + EO/PO	68002-96-0	liquid	—	5.0-7.0 a)
ROKAnol® LP180	Butanol + EO/PO	9038-95-3	liquid	min. 99.5	5.0-7.0 b)
ROKAnol® LP200	Isodecyl + EO/PO	68439-30-5	liquid	min. 99.5	5.0-7.0 d)
ROKAnol® LP400	Isodecyl + EO/PO	103818-93-5	liquid	min. 99.5	5.0-7.0 d)
ROKAnol® LP600	Alkohols, C12-18 + EO/PO	130454-91-0	liquid	min. 99.5	6.0-8.0 a)
ROKAnol® LP700	Isotridecyl Alcohol + EO/PO	—	liquid	min. 99.5	5.0-7.0 a)

*) 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

Cloud point [°C] **	Solidification point, [°C]	Emulsifier	Wetting agent	Lubricant	Coupling agent	Low-foaming	Corrosion inhibitor
45-48 E	approx. -8					•	
67-70 A	approx. 13					•	
67-70 E	approx. 11					•	
66-71 E	< -20					•	
22-27 A	approx -3					•	
59-63 C	approx. 2					•	
22-26 A	approx. -10					•	
27-31 A	approx. -9					•	
51-53 D	approx. 6	•				•	
14-18 D	<-20					•	
60-62 D	approx. 2	•				•	
64-68 E	approx. 4	•				•	
27-31 E	< -20					•	
37-41 E	approx. -15					•	
39-42 A	approx. -5					•	
31-35 A	approx. -9					•	
54-57.5 D	approx. -10					•	

Foam control agents

Alcohol alkoxylates – applications & properties

Low foaming non-ionic surfactants, wetting agents and emulsifiers.

Product name	Description	CAS	Appearance	HLB	Active content [%]	pH*
ROKAnol® LP1319	Alcohols, C16-18 + EO/PO	68002-96-0	liquid	—	99.5	4.0 - 7.0 (1% solution ethanol: water)
ROKAnol® LP2023	Alcohols, C16-18 + EO/PO	68002-96-0	liquid	3.0	min. 99.5	5.0-7.0 a)
ROKAnol® LP2024	Dodecanol + EP/PO	37251-67-5	liquid	6.3	min. 99.0	5.0-7.0 a)
ROKAnol® LP2126	Alcohols, C16-18 + EO/PO	68002-96-0	liquid	1.3	min. 99.5	4.0 - 6.0 (1% solution ethanol: water)
ROKAnol® LP3034	Alcohols, C12-15 + EO/PO	68551-13-3	liquid	—	min. 99.0	5-7 (1%rr)
ROKAnol® LP3135	Alcohols, C9-11 + EO/PO	154518-36-2	liquid	7.9	min. 99.0	5.0-7.0 a)
ROKAnol® LP3943	Alcohols, C12-15 + EO/PO	68551-13-3	liquid	3.0	min. 99.0	5.0-7.0 a)
ROKAnol® LP4045	Alcohols, blend EO/PO	—	liquid	—	min. 99.5	5.0-7.0 b)
ROKAnol® NL8P4	Alcohols, C9-11 + EO/PO	103818-93-5	liquid	—	min. 99.0	5.0-7.0 a)
ROKAnol® RZ4P11	Alcohol, C16-18 + EO/PO	68002-96-0	liquid	3.3	min. 99.0	5.5-8.5 a)

*) 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

Cloud point [°C] **	Solidification point, [°C]	Emulsifier	Wetting agent	Lubricant	Coupling agent	Low-foaming	Corrosion inhibitor
13-19 E	below 20					•	
20-23 E	approx. -10					•	
20-24 A	approx. -15					•	
21-26 D	approx.-20					•	
30-34	approx. -20					•	
31-35 A	approx. -20					•	
39-43 E	approx. -20					•	
40-47 E	approx. -13					•	
38-48 A	approx. -6					•	
23-27 E	approx. 0					•	

Foam control agents

EO/PO block copolymers – applications

Product with high detergency power and low foaming properties used in cutting and grinding fluids as a lubricant and a coolant. Low foaming nonionic surfactant.

Product name	Description	CAS	Emulsifier	Wetting agent	Lubricant	Coupling agent	Low-foaming	Corrosion inhibitor
ROKAmer 2000	PEG/PPG Copolymer	9003-11-6			•		•	
ROKAmer 2100	PEG/PPG Copolymer	9003-11-6			•		•	
ROKAmer 2950	PEG/PPG Copolymer	9003-11-6			•		•	
ROKAmer R2150	PEG/PPG Copolymer	9003-11-6			•		•	
ROKAmer R2650	PEG/PPG Copolymer	9003-11-6			•		•	
ROKAmer R2800	PEG/PPG Copolymer	9003-11-6			•		•	

Foam control agents

EO/PO block copolymers – properties

Product name	Appearance	HLB	Active content [%]	pH*	Cloud point [°C] **	Solidification point, [°C]
ROKAmer 2000	liquid	2.4	min. 99	4.6-7.4 [a)]	23-27A	approx. -20
ROKAmer 2100	liquid	—	min. 99	4.6-7.4 [a)]	17-20 A	<0
ROKAmer 2950	liquid/paste	8.1	min. 99	4.6-7.4 [d)]	54-60 A	approx. 15
ROKAmer R2150	liquid	—	min. 99.5	6-8 [c)]	33-38 A	< -20
ROKAmer R2650	liquid	—	min. 99.5	6-8 [c)]	49-53 E	approx. 2
ROKAmer R2800	liquid	2.8	min. 99.5	4-7 [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 2.5% 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

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

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

HLB for ester type compounds (ethoxylated fatty acids):

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

LZ saponification number of ethoxylated product, mgKOH/g
LK acid number of acids subjected to ethoxylated product, mgKOH/g

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

Cloud point

Cloud point is an indicator determining the behavior of water or other organic solutions of non-ionic surfactants. Solutions of surfactants become cloudy during heating and revert to a clear solution at a certain temperature when cooled - this temperature is defined as '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)

HLB number	EO content in product %	Product application
1-3	5-15	Anti-foaming agent
4-6	20-30	W/O emulsifier
7-11	35-55	Wetting agent
8-18	40-90	W/O emulsifier
10-15	50-75	Detergent
10-18	50-90	Solubilizer

PCC Group
Sienkiewicza 4
56-120 Brzeg Dolny, Poland
products@pcc.eu

Please visit our capital group business platform:
www.products.pcc.eu

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