

FIREFIGHTING INDUSTRY

Useful functions of raw materials from the portfolio
of PCC EXOL SA



Surfactants from the portfolio of PCC EXOL SA used in the production of fire extinguishing agents

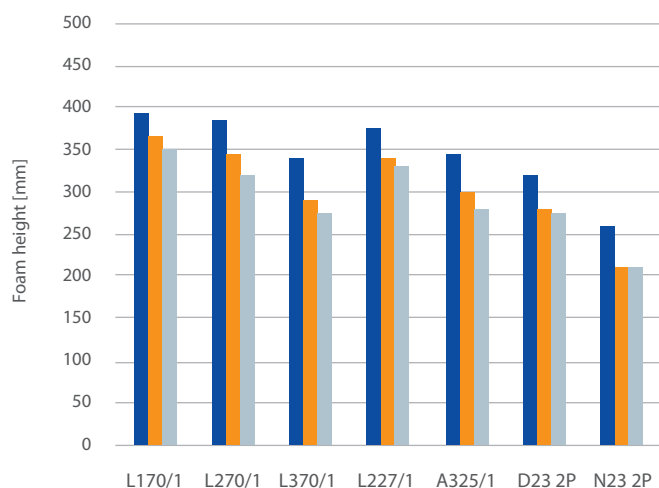
High-foaming surfactants				
Alkyl ether sulphates	Alkyl sulphates	Sulfosuccinates	Corrosion Inhibitors	Foam boosters
SULFOROKAnol L170/1 (Sodium Laureth Sulfate) 70% s.a.	ROSULfan E (Sodium 2-ethylhexyl Sulfate)	Sulfosuccinates DOSS 70GP (Diethylhexyl Sodium Sulfosuccinate)	EXOhib PC500 (Sodium benzoate, 2, 2', 2''-nitri- lotriethanol, 2, 2'-iminodiethanol Mixture)	ROKAmid KAD (Cocamide DEA)
SULFOROKAnol L227/1 (Sodium Laureth Sulfate) 27% s.a.	ROSULfan O (Sodium Octyl Sulfate)	Sulfosuccinates L3/40 (Disodium Laureth Sulfosuccinate)	EXOhib PC400 (Amine Borate Mixture)	ROKAmid RAD (Oleamide DEA or Rapamide DEA)
SULFOROKAnol L270/1 (Sodium Laureth Sulfate) 70%	ROSULfan D (Sodium Decyl Sulfate)	Sulfosuccinates DOSS50BGE (Sulfosuccinate Sodium Salt of di (2-ethylhexyl))	EXOhib PC807 (Phosphoric ester+ TEA) 70% in water	ROKAmina K30 (Cocamidopropyl Betaine)
SULFOROKAnol L370/1 (Sodium Laureth Sulfate) 70% s.a.	ROSULfan OD (Sodium Alcohol C9-C10 Sulfate)		EXOhib PC108 (Phosphoric ester+ TEA + benzotriazole + adhesion pro- moter) 80% in propylene glycol	ROKAmina K30B (Coco-Betaine)
SULFOROKAnol A325/1 (Ammonium Laureth Sulfate)	ROSULfan D911 (Sodium Alcohol C9-C11 Sulfate)			ROKAmina K40 (Cocamidopropyl Betaine)
SULFOROKAnol D232P (Sodium Decyl Ether Sulfate)	ROSULfan L (Sodium Lauryl Sulfate)			
SULFOROKAnol N232P (Sodium Alkyl Ether Sulfate)	ROSULfan A (Ammonium Lauryl Sulfate)			



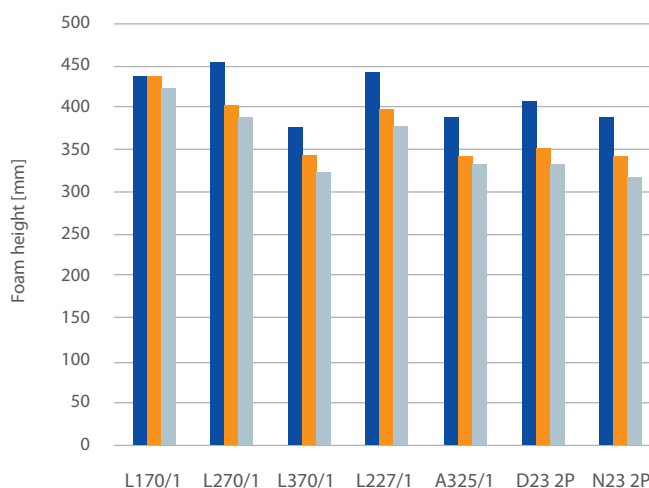
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Foaming of SULFOROKAnols

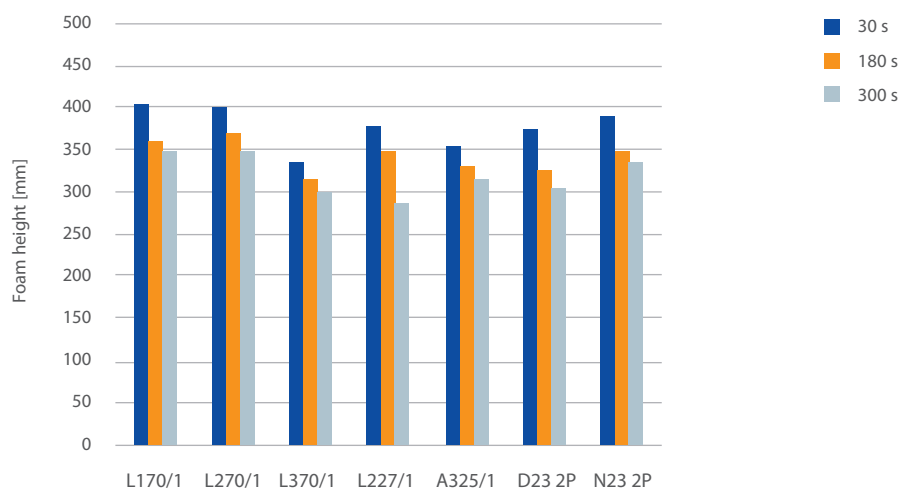
Demineralized water 1g/L for active matter



Hard water 17°d, 1g/L for active matter



Seawater 1g/L for active matter

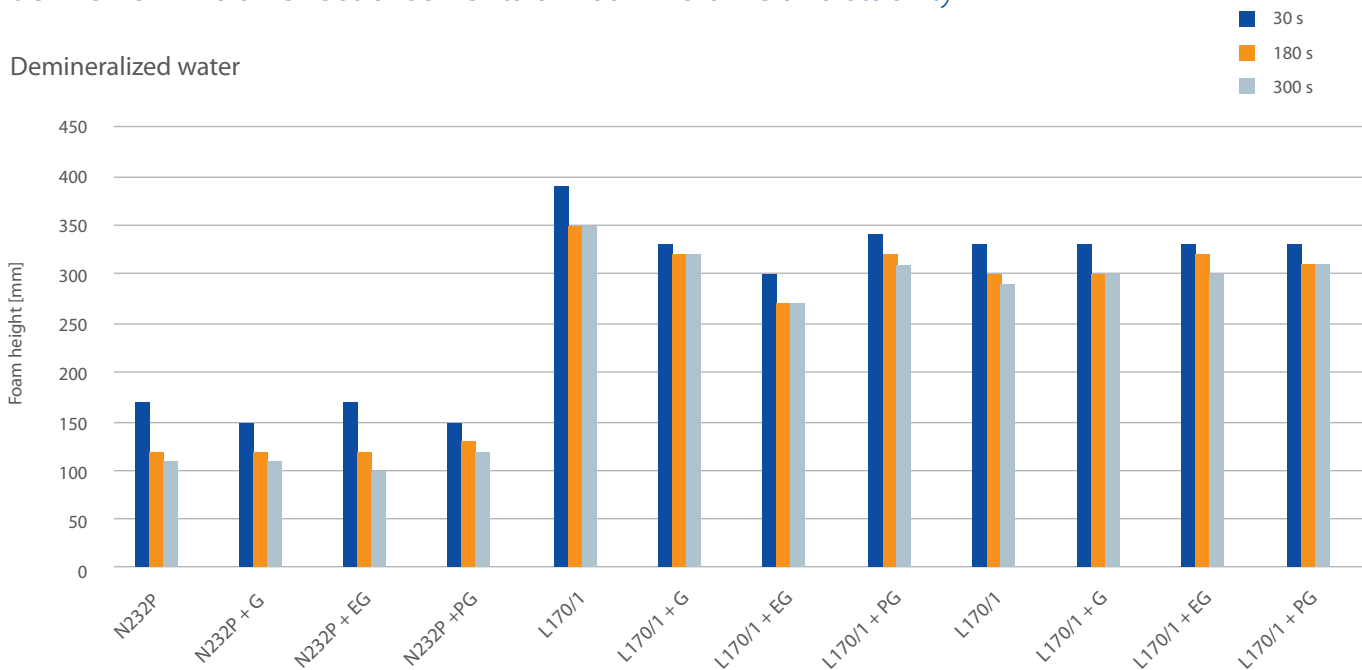


30 s; 180 s; 300 s are times showing the stability of the foam from the start of foaming.

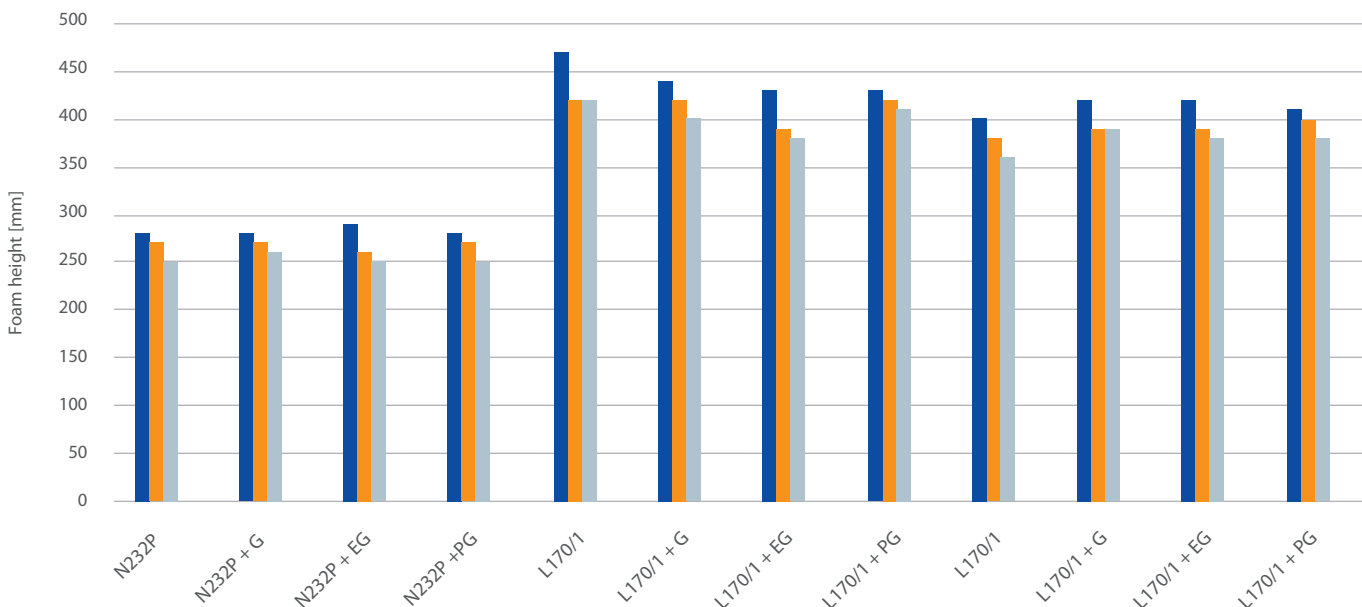
- In the case of SULFOROKAnols, a foam dependence is observed - those prepared in solutions with hard water and seawater have a higher foam volume than in demineralized water, which is advantageous in using them for firefighting with tap or seawater.
- SULFOROKAnol N232P in hard and sea water, it shows much better foaming properties than in demineralized water.

EXOL surfactants in the production of firefighting agents

SULFOROKAnols - effect of solvents on foam volume and stability



Hard water 17°d,



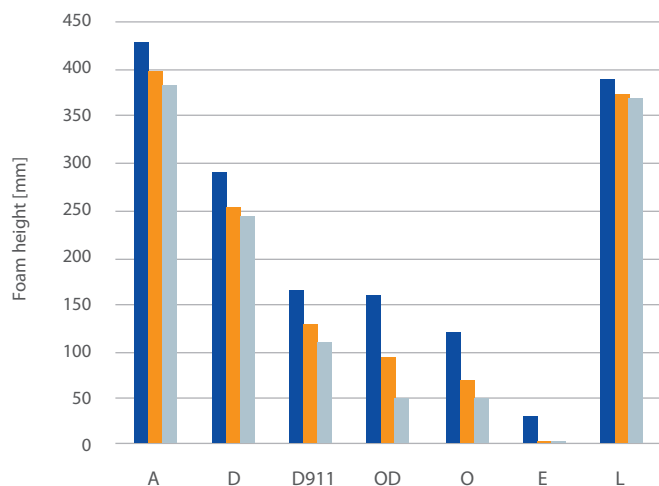
G – Glycerol, EG - Ethylene Glycol, PG – Propylene Glycol

- For the SULFOROKAnols tested, none of the solvents show a significant effect on foam volume or stability.
- SULFOROKAnol N232P, L170/1 and L270/1, in combination with three solvents (Propylene Glycol, Glycerol and Ethylene Glycol), have higher foaming capabilities in hard water, which is important when using them in fire extinguishing agents used in combination with tap water.

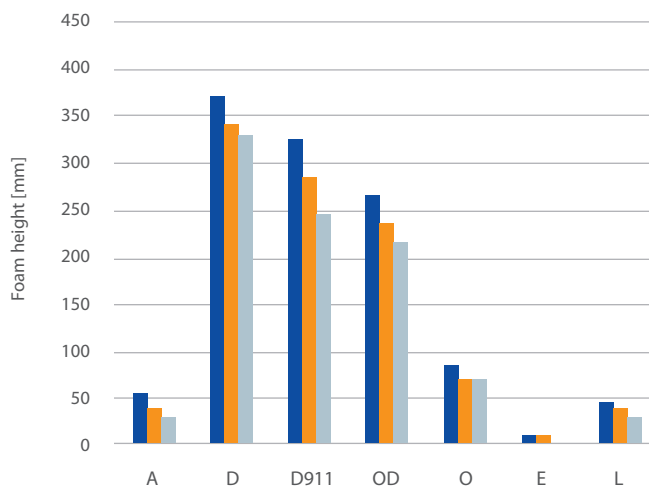
Surfactants from the portfolio of PCC EXOL SA are being used in the production of fire extinguishing agents

Foaming of ROSULfans

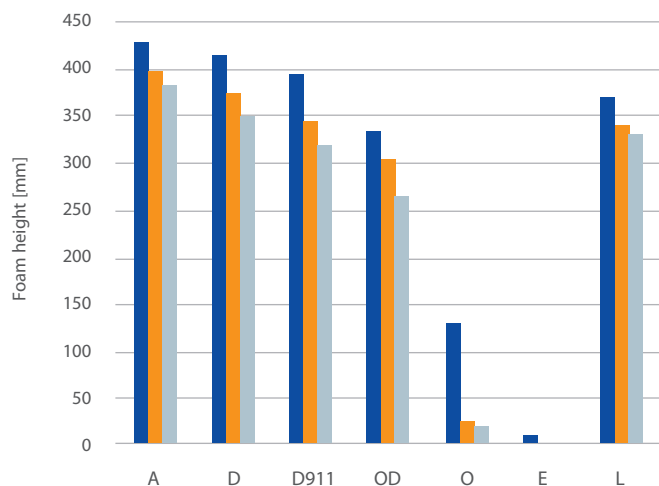
Demineralized water 1g/L for active matter



Hard water 17°d, 1g/L for active matter



Seawater water 1g/L for active matter



■ 30 s
■ 180 s
■ 300 s

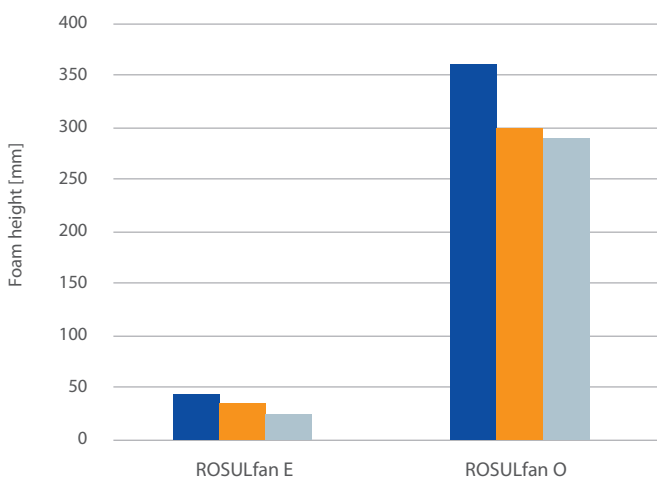
30 s; 180 s; 300 s are times showing the stability of the foam from the start of foaming.

- ROSULfan A in demineralized and sea water shows the best foaming properties of all ROSULfans.
- ROSULfan L in demineralized and sea water shows very good foaming properties.
- ROSULfans D, D911, OD are characterized by much better foaming abilities in hard and sea water than in demineralized. What positively affects their use for firefighting with the use of tap or seawater.
- ROSULfans O i E are characterized by low foaming for the measured concentration of the active substance (large CMC - Critical Micelle Concentration).

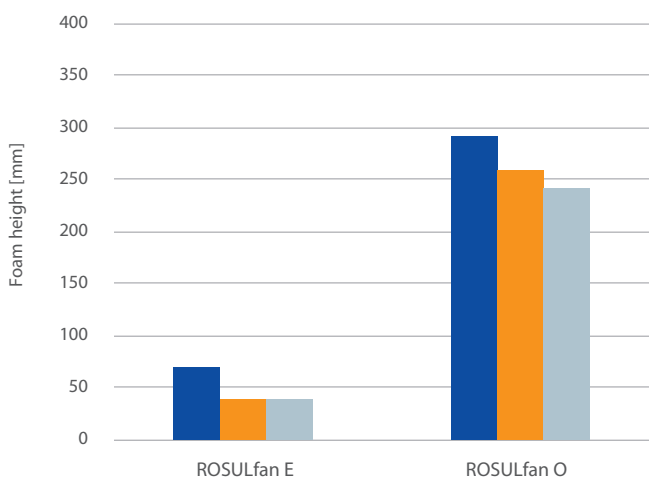
Surfactants from the portfolio of PCC EXOL SA are being used in the production of fire extinguishing agents

Foaming of ROSULfans E and O

Hard water 17 d - 5 g/L for active matter



Demineralized water - 5 g/L for active matter



■ 30 s ■ 180 s ■ 300 s

ROSULfan O shows better foaming properties in hard water than in demineralized water, this positively affects their use for firefighting with tap water.

ROSULfan E shows medium foaming properties.

Surfactants from the portfolio of PCC EXOL SA used in the production of fire extinguishing agents

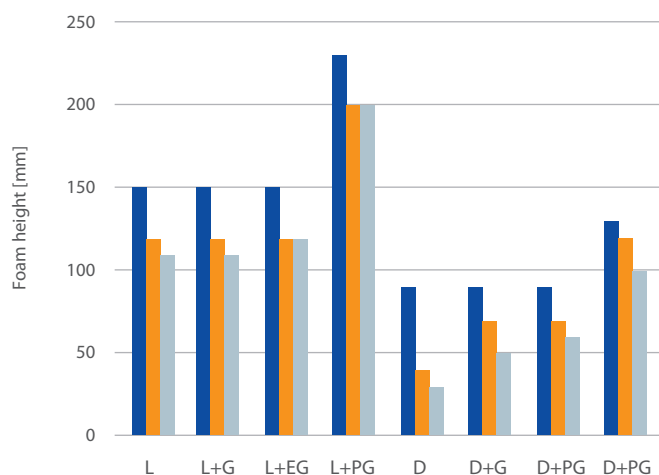
Alkyl sulphates

- ROSULfan O is available as a 39 - 42% aqueous solution with low viscosity and color from colorless to light yellow. It exhibits moderate foaming properties, forming medium and poorly stable foams over time even in hard water. Foams obtained from ROSULfan O are characterized by a high degree of hydration (so-called wet foam) and a non-uniform bubble structure. ROSULfan O also has a low tendency to gel in electrolyte solutions, which eliminates problems associated with local viscosity increases, such as in dispensing systems.
- ROSULfan A has the ability to produce a thick and stable foam especially in seawater
- ROSULfan E is an anionic, low-foam surfactant
- ROSULfans are very soluble in demi water, except for ROSULfan E, which is well soluble
- ROSULfans show poor solubility in methanol, except for ROSULfan A, which dissolves very well in methanol

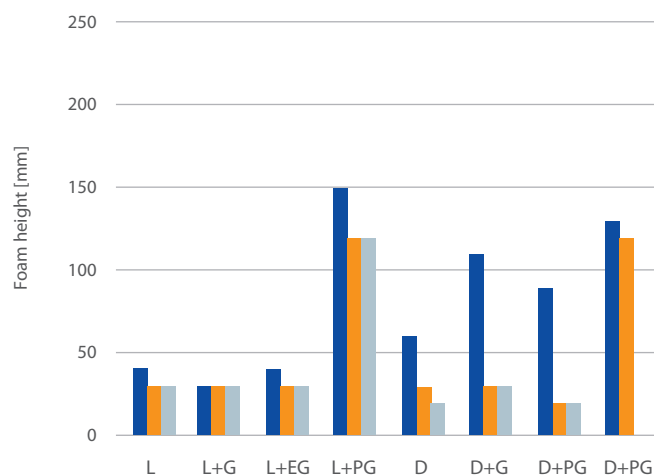
Surfactants from the portfolio of PCC EXOL SA used in the production of fire extinguishing agents

ROSULfans - effect of dissolvers on foam volume and stability

Demineralized water - 5 g/L for active matter



Hard water 17°d



■ 30 s ■ 180 s ■ 300 s

G – Glycerol, EG - Ethylene Glycol, PG – Propylene Glycol

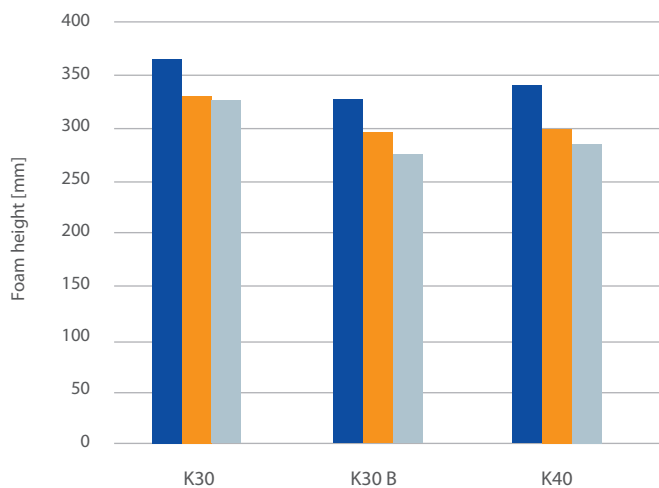
- In the case of sulfated fatty alcohols (Rosulfan L and Rosulfan D), only propylene glycol shows a visible effect on the foaming properties of surfactants. In both cases, it produces foam with visibly higher volume and better stability. This effect is evident for both foams made in demineralized and hard water.



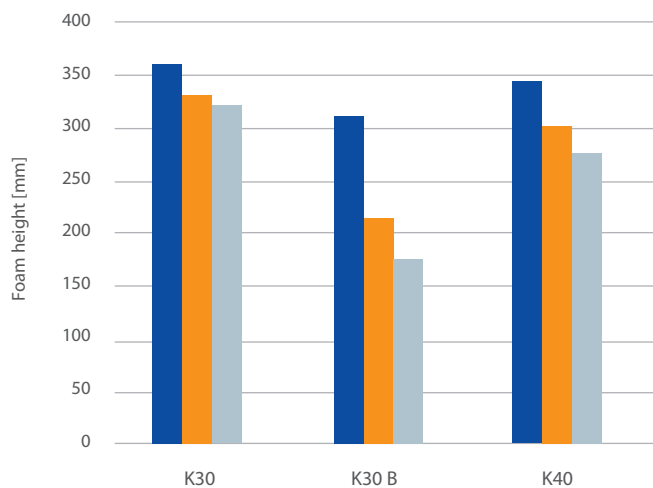
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Foaming of ROKamins

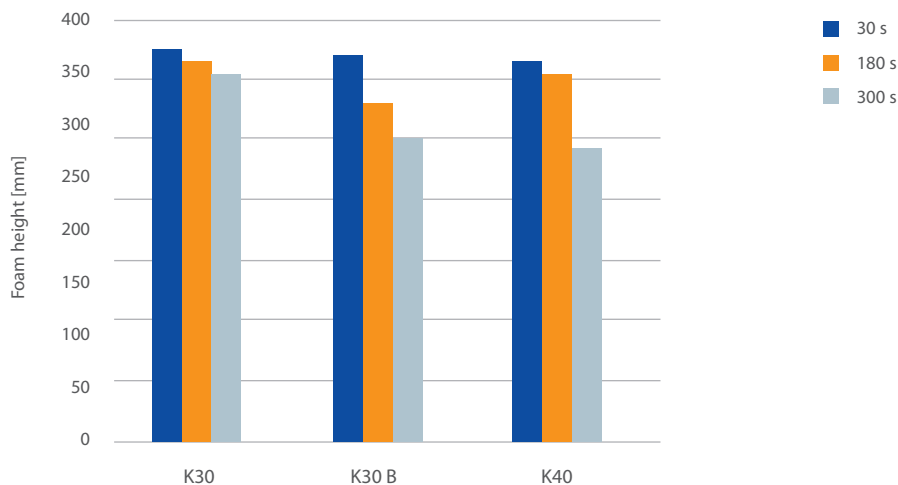
Demineralized water 1g/L for active matter



Hard water 17°d, 1g/L for active matter



Seawater 1g/L for active matter



Rokamina K30 and K40 in all types of water, retain very good foaming properties, but the best foam is noticed for hard water. What positively affects their use for firefighting with the use of tap water.

Rokamina K30B in demineralized and sea water, shows very good foaming properties.

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Sulfosuccinates

DOSS 70 GP - Sulfosuccinate is a concentrated anionic surfactant (70%) in Propylene Glycol with the INCI name: Diethylhexyl Sodium Sulfosuccinate,

Thanks to its unique particle structure, the product has very effective wetting properties for highly hydrophobic materials, such as anthracite carbon,

- Effectively reduces the interfacial voltage and wetting angle,
- Very effective wetting of hydrophobic surfaces,
- Safe due to the presence of propylene glycol and higher flash point,
- It is a surfactant with limited water solubility; recommended use with synergy with a surfactant with good solubility, such as ROKAnol IT6 (Isotrideceth-6)

Corosion inhibitors

EXOhip PC 500 is a specialized blend of appropriately selected chemical compounds that make it a highly effective and efficient anti-flash rust corrosion inhibitor.

Recommended level of use from 0.1-1% depending on the type of finished product.

- EXOhib PC400 is a corrosion inhibitor that is used in processing fluids, paint products and industrial cleaners. The product is stable in hard water and has low-foaming properties
- EXOhib PC400 (mixture of ethanolamine borate salts, 40%) - for steel, the suggested amount of use is: 0.2% to 2%
- EXOhib PC807 - for steel and non-ferrous metals, the suggested amount of use is: from 0.2% to 2%
- EXOhib PC108 - for steel and non-ferrous metals, the suggested amount of use is: from 0.2% to 2%

Foam stabilizer

- ROKAmid KAD - is a non-ionic surfactant with the INCI name Cocamide DEA. It is made from natural vegetable oils. It is in the form of a clear or slightly cloudy liquid with a light yellow to yellow color.
- ROKAmid RAD - is a non-ionic surfactant from the alkanolamide group with the INCI name Rapamide DEA or Oleamide DEA. The product is in the form of a clear or slightly cloudy liquid with a light yellow to yellow color. ROKAmid RAD is produced on the basis of rapeseed oil.
 - Foam stabilizers effective in low concentrations
 - Exhibit anti-static properties

PCC EXOL SA

Sustainable technologies for new generations



PCC EXOL SA is a company that combines cutting-edge technologies with rich experience in production of surfactants (surface active agents). The company is located in Brzeg Dolny (Poland), where anionic, nonionic and amphoteric surfactant production plants have been launched. Due to the flexible production processes, the company offers a wide spectrum of surfactants and industrial formulations, which are often suited for the individual customers operating in plenty of various industry sectors. As one of the leading surfactant manufacturers, PCC EXOL SA carries out new investment projects and implements innovative technologies based on the global sustainability trends.

PCC EXOL SA portfolio includes surfactants with a broad range of applications. Besides of the mass production for personal care and detergents industry, the substances produced by PCC EXOL SA also include specialized products used in various branches, such as textile, agrochemical, metal cleaning, oil drilling, building & construction, paints & coatings, paper industry, extraction & drilling, and many others. The company comprehensive portfolio is continuously enriched with new innovative products, which meet even the strictest market requirements and adapt to the individual needs of customers. This is possible due to the dynamic development of the research faci-



PCC EXOL SA combines innovative technologies with experience in designing, producing and selling surfactants and chemical formulations

ties, flexible production, knowledge as well as experienced personnel.

PCC EXOL SA has the key competence necessary for a worldwide production of surfactants. The ongoing projects will soon bring the new opportunities for the company's further development and expansion into new markets. The company offers not only a wide portfolio and professional servicing but most of all flexible production and comprehensive system solutions that meet individual customer demands. The strategic PCC EXOL SA investor is PCC SE, operating on international markets of the chemical raw materials, transport, energy, coal,

coke, petrol, plastics and metallurgy. PCC SE includes 80 companies operating in 39 different locations in 17 countries.



In accordance with our environmental concerns, this publication from the PCC Group was printed on Cocoon Silk - an ecological double-sided-coated matt paper. This paper is made of 100% waste paper via environment-friendly technology. The FSC® Certificate confirms that the raw materials used during the paper production process come from well-managed forests or other certified and controlled sources.

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Grammage	250
Number of pages	4

PUBLICATION

Size (cm)	21 x 29.7
Quantity	250

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