

# EXOlat Series



# EXOlat Series

## Chemical description

EXOlat Series are highly effective surface active agents. These products are aqueous solutions of the sodium salt of acrylic maleic copolymer or aqueous solutions of the polyacrylic acid salts.

## Applications

EXOlat Series are especially effective in the cleaning process. They are water-soluble polymers with a high ability to absorb divalent cations such as  $\text{Ca}^{2+}$  and  $\text{Mg}^{2+}$ , which is why they are often consummate in the I&I industry, but also cope well as a component of laundry detergents or hard surface cleaners.

## Function

The main function is to prevent the limescale deposition as well as enhancing the detergent effect. They have an ability to disperse sediments (e.g. calcium carbonate,) what contributes to preventing them from growing into larger crystals and surface deposition.



## Basic physical and chemical properties

PARAMETER	EXOlat ZA	EXOlat C40	EXOlat C40A	EXOlat MC60
<b>Chemical description</b>	Copolymers of acrylic acid and maleic anhydride	Homopolymers of acrylic acid	Homopolymers of acrylic acid	Copolymers of acrylic acid and maleic anhydride
<b>Appearance at 20-25°C</b>	Clear or slightly turbid liquid	Clear or slightly turbid liquid	Clear or slightly turbid liquid	Clear or slightly turbid liquid
<b>Molecular weight [g/mol]</b>	Approx. 2000	Approx. 11000	Approx. 11000	Approx. 80000
<b>Hazen colour at 20-25°C</b>	70	230	250	Max. 70
<b>Hydroxyl number [mg KOH/g]</b>	185-193	144	130	130
<b>Cloud point [°C]</b>				
Method A 1% in water solution	>95	>95	>95	>95
Method B 1% solution in 5% NaCl solution	>95	>95	>95	>95
Method C 1% solution in 10% NaCl solution	>95	>95	>95	cloudy <10
Method D 10% solution in 25% BDG solution	50	44	54	cloudy <10
Method E 16.7% solution in 25% BDG solution	35	23	33	cloudy <10
<b>Approx. Solidification point [°C]</b>	< -20	-17	< -20	-11
<b>Dry matter. % (m/m) (105°C)</b>	39-41	42-44	42- 46	39-42
<b>pH 10% aqueous solution in deionized water. at 20°C</b>	5.0-6.0	7.0-9.0	7.0-9.0	8.0-9.0 (5% aqueous solution)
<b>Density at 25°C [g/cm<sup>3</sup>]</b>	1.26	1.28	1.18	1.30
<b>Viscosity at 25°C [cP]</b>	Approx. 70	Approx. 330	Approx. 120	Approx. 30 000

## Additional information

### Solubility

Solubility in water and other solvents has been shown in the table below.

#### Solubility – at 25°C, 10% SOLUTIONS

PRODUCT NAME	DEMINERALIZED WATER	METHANOL	ACETONE
EXolat ZA	●	○	○
EXolat C40	●	○	○
EXolat C40A	●	○	○
EXolat MC60	●	○	○

- macroscopic phase separation
- homogeneous, cloudy solution
- clear, homogeneous solution
- homogeneous, opalescent solution



### Detergency on cotton fabric

Determination of detergency on a cotton fabric is tantamount to assessing the effectiveness of washing with the use of surfactants. Detergency tests were performed according to our own method, using EMPA 125 fabric (cotton), soiled with a mixture of oils and pigments, that were washed in EXolat Series solutions.

#### Detergency on cotton fabric results in dL units

PRODUCT NAME	EXolat ZA		EXolat MC60		EXolat C40		EXolat C40A	
Concentration	2 g/L	5 g/L	2 g/L	5 g/L	2 g/L	5 g/L	2 g/L	5 g/L
The arithmetic average of all measurements [dL units]	12.7	13.6	17.8	18.2	15.6	16.0	14.3	14.8

The cleaning process is described by the dL parameter in accordance with the CIE LAB method. dL parameter is the absolute value of the difference between the brightness of the tested fabric after washing and the brightness of the tested fabric before washing. The standard in this case is the soiled fabric, so the higher the value of the dL parameter, the better the tested fabric is cleaned.



## Alkali and acid resistance

There are many cases where raw materials used in industrial cleaning have to be resistant to strong acids or alkalis. Acidic cleaning agents are mainly used to remove mineral deposits from acid-resistant surfaces, while alkaline agents are known primarily for their remarkable degreasing ability.

The analysis of this stability for EXolat series has been performed in accordance with the **PN-EN 14712:2005** Standard.

- macroscopic phase separation
- homogeneous, cloudy solution
- clear, homogeneous solution
- homogeneous, opalescent solution

### Alkali resistance (Sodium Hydroxide); concentration of 1%; temperature 20°C

PRODUCT NAME	NaOH conc. [g/l]									
	10	20	30	40	50	100	200	300	360	
EXolat ZA	●	●	●	●	●	●	●	●	●	●
EXolat C40	●	●	●	●	●	●	●	●	●	●
EXolat C40A	●	●	●	●	●	●	●	●	●	●
EXolat MC60	●	●	●	○	○	○	○	○	○	○

### Acid resistance (Sulphuric Acid); concentration of 1%; temperature 20°C

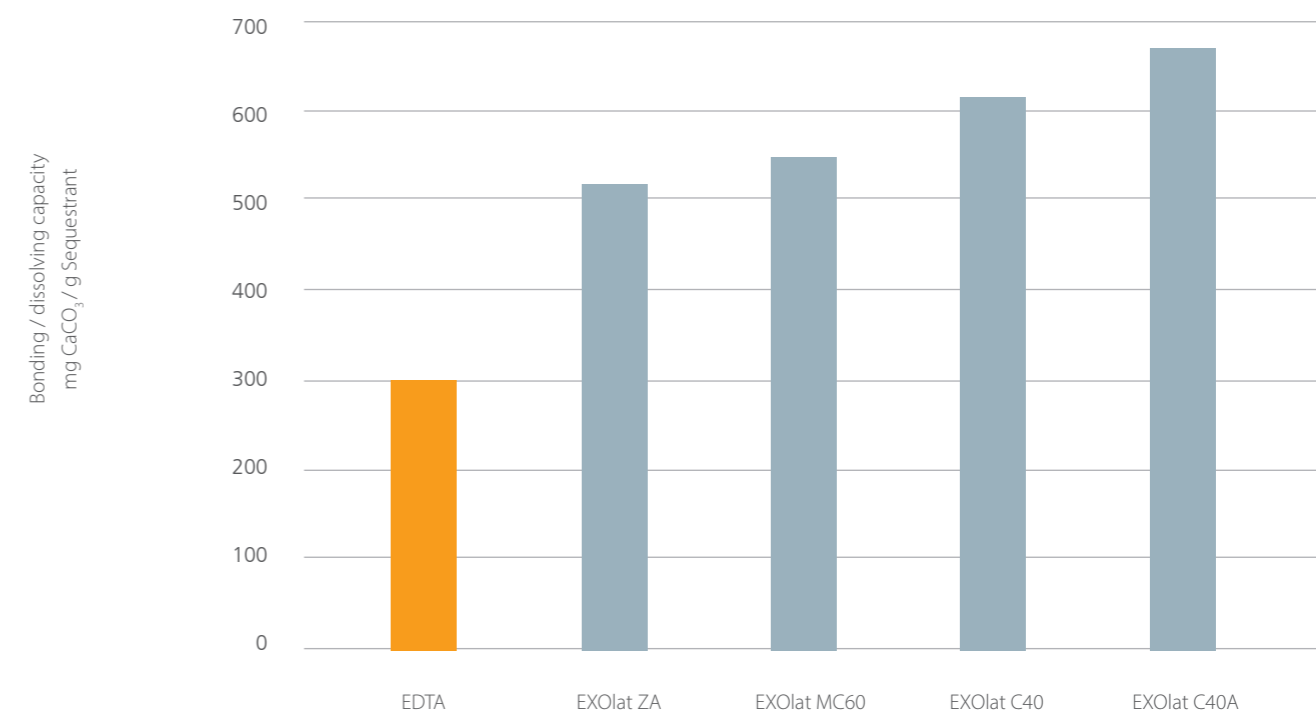
PRODUCT NAME	H <sub>2</sub> SO <sub>4</sub> conc. [g/l]							
	1	10	40	60	120	140	225	
EXolat ZA	●	●	●	●	●	●	●	
EXolat C40	●	●	●	●	●	●	●	
EXolat C40A	●	●	●	●	●	●	●	
EXolat MC60	●	●	●	●	●	●	●	

## The complexing effect

The complexing effect is the most important parameter in the case of sequestering agents. It shows how many metal ions the product is able to bind or disperse. The complexity testing method is based on **US4474916** patent - "Concentrated aqueous solutions of mixtures of organic complexing agents and dispersing agents based on polymeric aliphatic carboxylic acids".

TITRANT	TITRANT VOLUME [ml]	ACTIVE MATTER [%]
EDTA	11.5	40
EXolat ZA	20.5	40
EXolat C40	25.0	43
EXolat C40A	26.5	45
EXolat MC60	21.5	41

According to the obtained results it is clearly visible that homopolymers of acrylic acid in the form of ammonium and sodium salts are the best for the purpose of removal water hardness, however copolymers have also very good properties because they have higher calcium ions dispersing ability in comparison to EDTA.



## PCC EXOL SA

### Sustainable technologies for new generations



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

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

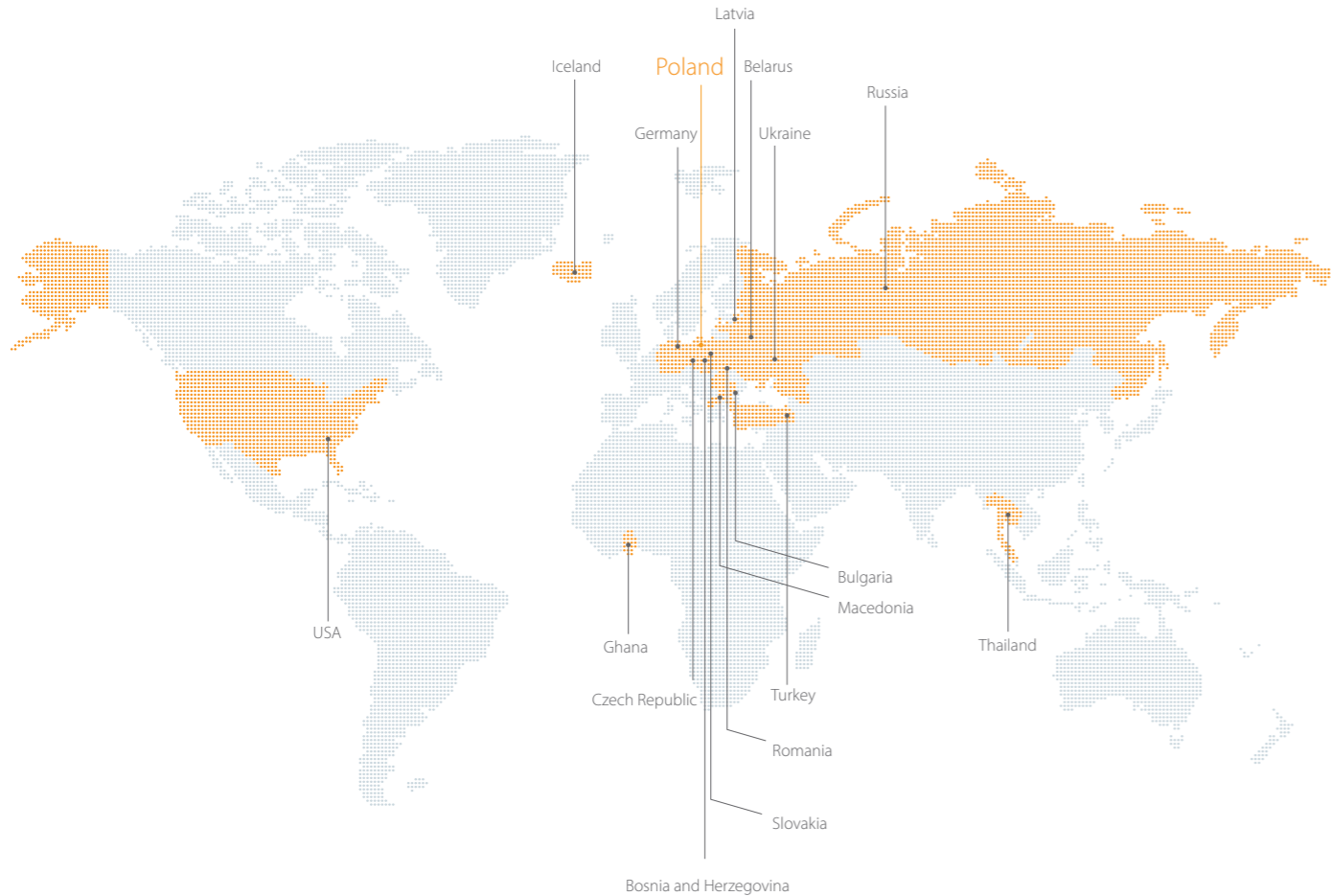
The offered surfactants have a very broad range of application. Aside from the mass production for personal care products industry, cosmetics and detergents, the substances produced by PCC EXOL SA also include specialised products used in various industries, such as textiles, agrochemicals, metal machining, oil drilling, building & construction, paints & coatings, paper industry, extraction & drilling, and many others.

Their comprehensive portfolio is continuously extended by new, innovative products, so the company can meet even the strictest market requirements and adapt to individual needs

of customers. This is possible due to the dynamic development of the research facilities, flexible production as well as the knowledge and experienced personnel. PCC EXOL SA have the key competence necessary for a worldwide production of surfactants. The ongoing projects will soon bring new opportunities for the company 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 suit individual customer demands.

The strategic investor in PCC EXOL SA is PCC SE, operating on international markets of chemical raw materials, transport, energy, coal, coke, petrol, plastics and metallurgy. PCC SE includes 82 companies operating in 41 different locations in 18 countries.

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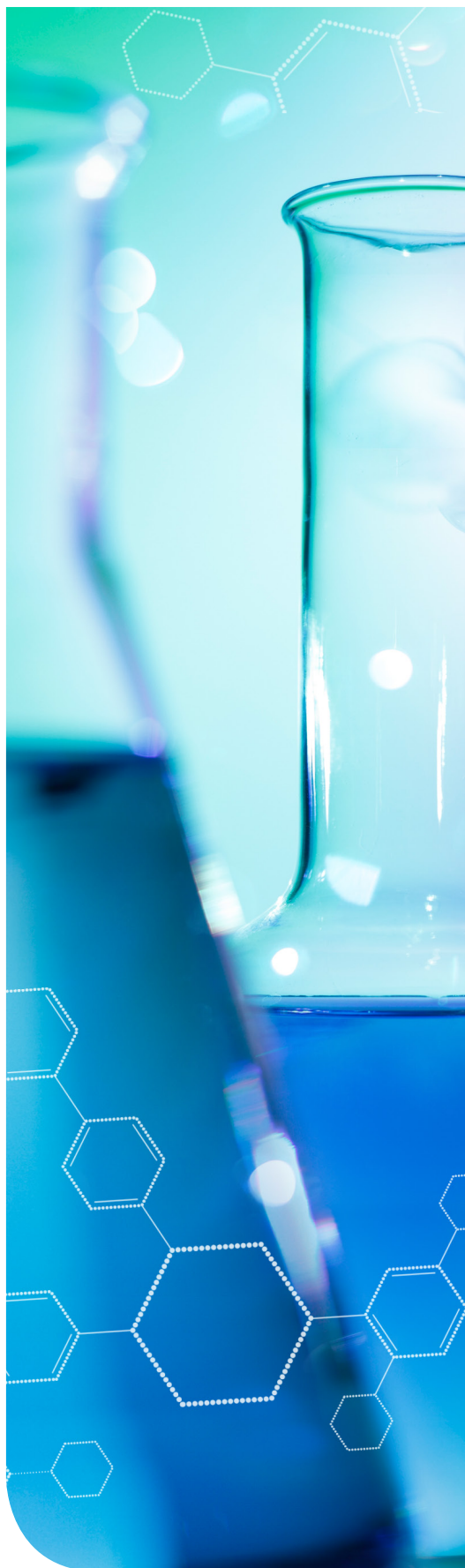


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