

Cleaning Solutions for the Dairy Industry

Operating in 18 countries, in 41 different locations, PCC Group currently employs more than 3 100 people.



About Us

PCC Exol SA is a major player in the European surfactants market. In the eastern and central-eastern part of the continent, it is the undisputed leader in its industry. Most of the production facilities and the company's headquarters are located in Brzeg Dolny, Poland. Here we develop, test and manufacture a wide range of anionic, non-ionic and amphoteric surfactants and speciality industrial formulations.

New products are continuously added to the portfolio in response to market trends and individual customer requirements. The surfactants produced at the plants have a very wide range of industrial applications. They are used as wetting agents, emulsifiers, auxiliaries in paper, metallurgy and many other industries, as well as in

household chemicals, personal care products and textiles.

Sustainable development is an important element of PCC EXOL's business approach. The company develops its management practices and processes to address environmental, social and ethical challenges. The scope of these activities is determined by the company's strategic priorities, operational capabilities and available, verifiable supporting documentation. Among other areas, PCC EXOL undertakes initiatives aimed at supporting the circular economy, improving energy and resource efficiency, enhancing safety performance, and promoting sustainability-related practices within selected elements of its value chain through cooperation with suppliers and customers.

PCC ROKITA SA PCC PCG OXYALKYLATES IRPC	PCC ROKITA SA	PCC ROKITA SA	PCC EXOL SA PCC CHEMAX INC PCC PCG OXYALKYLATES	PCC SYNTEZA
Polyols 	Chlorine 	Phosphorus 	Surfactants 	Alkylphenols 
• Polyether polyols • Polyester polyols • Prepolymers • Polyurethane Systems	• Chlorine • MCAA • Other Chlorine Downstream Product	• Phosphorus derivatives • Naphthalene derivatives • Polycarboxyethers (PCE)	• Anionic surfactants • Cationic surfactants • Nonionic surfactants • Amphoteric surfactants (betaines) • Chemical formulation	• Nonylphenol • Dodecylphenol • Tristyrylphenol
PCC CONSUMER PRODUCTS SA	PCC ROKITA SA	PCC INTERMODAL SA	PCC BAKKISILICON HF.	PCC SE
Consumer Products 	Energy 	Logistics 	Silicon 	Holding & Projects 
• Household & industrial Cleaners, Detergents and Personal Care Products	• Energy Production	• Intermodal transport • Road Haulage • Rail Transport	• Microsilica • Silicon Metal	• Portfolio Management • Project Development

Cleaning solutions for the dairy industry

Dairy processing plants consist of complex production systems including storage tanks, pipelines, pumps, valves, heat exchangers, pasteurizers, separators and filling equipment. During milk processing, surfaces are exposed to various soils such as proteins, fats, lactose residues and mineral deposits (milk stone). Protein and fat residues form persistent organic films, while calcium phosphate and calcium carbonate create hard inorganic scale, especially on heated surfaces such as heat exchangers.

Cleaning is performed through CIP (Cleaning-In-Place) and OPC (Open Plant Cleaning) procedures. CIP enables automated cleaning

of closed installations using circulating alkaline and acidic solutions, while OPC is applied for accessible surfaces such as conveyor belts, floors, drains, mixers and external equipment, where foam cleaning provides effective soil removal and extended contact time.

Dairy cleaning formulations combine alkaline agents, acids, surfactants, chelating agents and corrosion inhibitors. Surfactants, including ethoxylated alcohols and EO/PO copolymers, improve wetting, penetration, fat emulsification and soil dispersion. Low-foaming surfactants are preferred for CIP systems, while foam-stabilizing solutions are used in OPC applications.

Proposed formulation based on our products

Alkaline CIP

- pH (solution 1%) ~12
- Low foaming
- Effectively removes fats, oils, proteins, and other organic soils
- Suitable for hard water

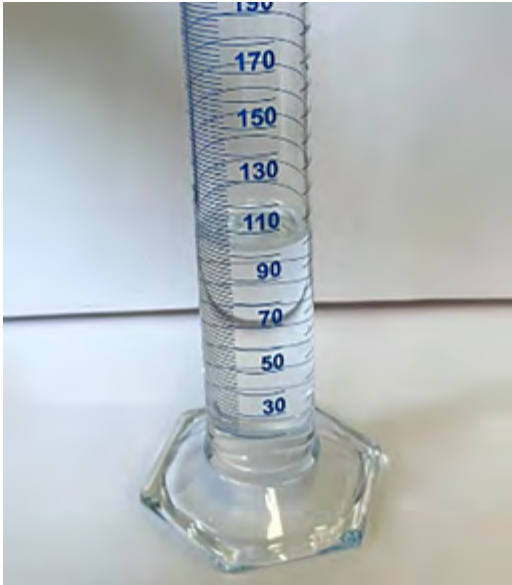
Ingredient	Mass percentage [%]	Function
NaOH (50%)	8	pH adjuster
ROSULfan E	8	Detergency
ROKAmer 2950	1	Defoamer
Sodium metasilicate	5	Metal protection
Na ₄ EDTA	4	Sequestrant
Aqua	Up to 100	Solvent



Formulation performance

Foaming propeties

- Concentration: 1%
- Water: Hard



Foam after (60 s)

V (5 s)	V (60 s)	V (100 s)
35 ml	0 ml	0 ml

Application test

- Concentrtion: 1%
- Water: Demi
- Temprature: 60°C
- Dipping time: 10 minutes
- Result: approx. 99%



Tile before



Tile after

Proposed formulation based on our products

Acidic CIP

- pH (solution 1%) ~2
 - Low foaming
- High detergency
 - Effectively removes mineral deposits, scale, and inorganic residues

Ingredient	Mass percentage [%]	Function
Phosphoric acid	40	pH adjuster
ROKAnol LP220	1.5	Cleaning, wetting agent
ROKAmer 2100	1.5	Foam control agent
Water	Up to 100	Solvent

Formulation performance

Foaming propeties

- Concentration: 2%
- Water: Hard

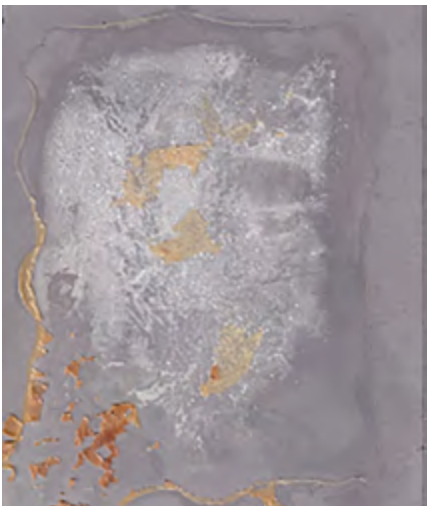
V (5 s)	V (60 s)	V (100 s)
0 ml	0 ml	0 ml

Application test

- Concentrtion: 2%
 - Water: Demi
 - Temprature: 25°C
- Dipping time: 10 minutes
 - Result: approx. 88%



Tile before



Tile after

Proposed formulation based on our products

Phosphoric acid CIP

- pH (solution 1%) ~2
- Effectively removes inorganic scale, smut
- Low foaming
- With corrosion inhibitor

Ingredient	Mass percentage [%]	Function
Phosphoric acid	42	pH adjuster
ROKAnol H5	3	Detergency, wetting
EXOfos PB-065	3	Corrosion inhibitor
Aqua	Up to 100	Solvent

Formulation performance

Foaming properties

- Concentration: 1%
- Water: Hard

V (5 s)	V (60 s)	V (100 s)
10 ml	0 ml	0 ml

Application test

- Concentration: 1%
- Water: Demi
- Temperature: 60°C
- Dipping time: 10 minutes
- Result: approx. 89%



Tile before



Tile after

Proposed formulation based on our products

Highly acidic CIP

- pH (solution 1%) ~2
- Mix of acids
- Effectively removes inorganic scale, smut
- Low foaming

Ingredient	Mass percentage [%]	Function
Formic acid	10	pH adjuster
Citric acid	15	pH adjuster, antiscalant
Lactic acid (80%)	12.5	pH adjuster
Phosphoric acid (75%)	20	pH adjuster
ROKAnol LP200	4	Detergency, wetting
Aqua	Up to 100	Solvent

Formulation performance

Foaming propeties

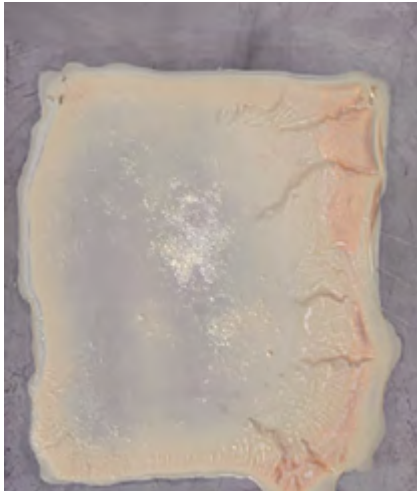
- Concentration: 1%
- Water: Hard

V (5 s)	V (60 s)	V (100 s)
0 ml	0 ml	0 ml



Application test

- Concentration: 1%
- Water: Demi
- Temperature: 60°C
- Dipping time: 10 minutes
- Result: approx. 85%



Tile before



Tile after

Proposed formulation based on our products

Universal neutral CIP

- pH (solution 1%) ~8
- Neutral pH, delicate
- Suitable for soft metals
- Degreasing effect

Ingredient	Mass percentage [%]	Function
ROKAnol GA6	10	Detergency, degreasing, wetting
Propylene glycol	20	Solvent
Glycerin	5	Stabilizer
Triethanolamine	2	Saponification of fats, corrosion inhibitor
Aqua	Up to 100	Solvent

Formulation performance

Foaming propeties

- Concentration: 1%
- Water: Hard

V (5 s)	V (60 s)	V (100 s)
20 ml	10 ml	10 ml

Application test

- Concentrtion: 1%
- Water: Demi
- Temperature: 60°C
- Dipping time: 10 minutes
- Result: approx. 92%



Tile before



Tile after

Proposed formulation based on our products

Mild hygiene CIP

- pH (solution 1%) ~4
- Low foam
- Suitable for hard water

Ingredient	Mass percentage [%]	Function
ROKAmin K15K	15	Cationic surfactant
ROKAnol IT5	10	Detergency, wetting
ROKAnol LP60	2	Defoamer
Isopropanol	15	Disinfectant
Ethylene Glycol	5	Detergency booster, solvent
Na ₄ EDTA	2	Sequestrant
Glicolic acid (70%)	1.5	pH adjuster
Aqua	Up to 100	Solvent

Formulation performance

Foaming propeties

- Concentration: 1%
- Water: Hard

V (5 s)	V (60 s)	V (100 s)
25 ml	10 ml	10 ml

Application test

- Concentrion: 1%
- Water: Demi
- Temperature: 60°C
- Dipping time: 10 minutes
- Result: approx. 95%



Tile before



Tile after



Proposed formulation based on our products

Alkaline OPC

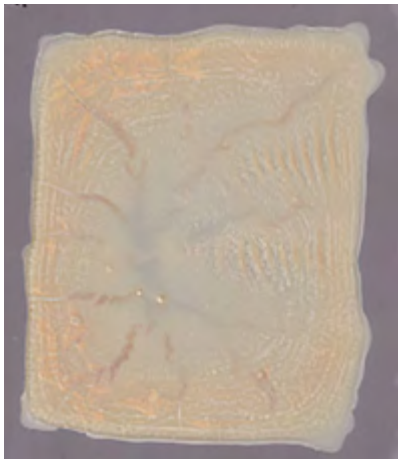
- pH (solution 1%) ~12
 - High foam
- Effectively removes fats, oils, proteins, and other organic soils
 - Milk/brewery/poultry plant

Ingredient	Mass percentage [%]	Function
NaOH	5	Builder
ROKAnol L7A	5	Detergency, wetting agent
EXOfos PB-139	3	Wetting and hydrotropic agent
ROSULfan D	3.5	Foam stabilizer
Water	Up to 100	Solvent

Proposed formulation based on our products

Application test

- Concentrtion: 1%
 - Water: Demi
 - Temprature: 60°C
- Dipping time: 10 minutes
 - Result: approx. 86%



Tile before



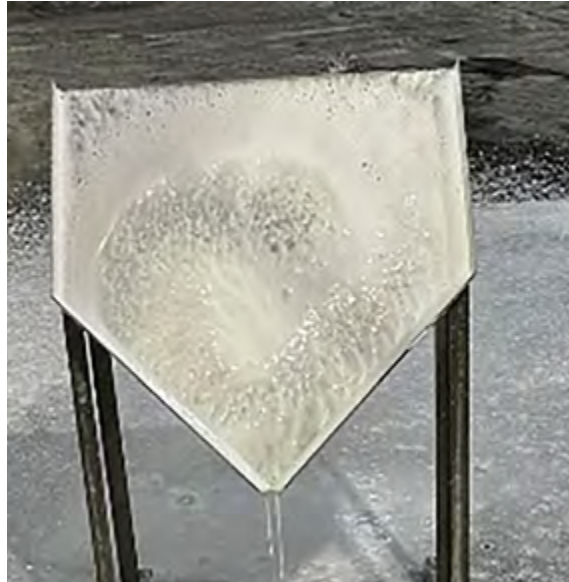
Tile after



Foaming properties

The next step of the performance evaluation involved assessing the formulation's foaming behavior on vertical surfaces. A dedicated test stand was used to replicate real application conditions, allowing us to observe the foam's stability and its ability to remain in place after

application. The product was applied to the vertical panel using a Karcher spray gun to ensure a controlled and repeatable application process. Foamability was evaluated visually.



Foaming performance on vertical wall

Proposed formulation based on our products

Acidic OPC

- pH (solution 1%) ~3
- Moderate foam
- Fast action
- Corrosion inhibition
- Effectively removes mineral deposits, scale, inorganic residues

Ingredient	Mass percentage [%]	Function
Phosphoric acid	30	pH adjuster
ROKAnol ID5	5	Wetting agent
ROKAnol LP400	5	Cleaning agent
EXOfos PB-139	1	Corrosion inhibitor
Water	Up to 100	Solvent

Formulation performance

Application test

- Concentrtion: 2%
- Water: Demi
- Temprature: 25°C
- Dipping time: 10 minutes
- Result: approx. 91%



Tile before



Tile after

Foaming properties

The next step of the performance evaluation involved assessing the formulation's foaming behavior on vertical surfaces. A dedicated test stand was used to replicate real application conditions, allowing us to observe the foam's stability and its ability to remain in place after

application. The product was applied to the vertical panel using a Karcher spray gun to ensure a controlled and repeatable application process. Foamability was evaluated visually.



Foaming performance on vertical wall

Formulation selection matrix

Formulation	Industry	pH	Main soil	Typical application, proces element	Recommended equipment, Dosage	Foam profile	Page
Alkaline CIP	Dairy	Alkaline	Proteins, fats, sugar	Tanks, pipes, mixers	Spraying, 1-2%	Very low	4
Acidic CIP	Dairy	Dairy	Scales	Tanks, pipes, mixers	Spraying, 1-2%	Very low	6
Phosphoric acid CIP	Dairy	Acid	Scales	Tanks, pipes, mixers	Spraying, 1-2%	Very low	7
Highly acidic CIP	Dairy	Acid	Scales	Tanks, pipes, mixers	Spraying, 1-2%	Very low	8
Universal neutral CIP	Dairy	Neutral	Fats	Tanks, pipes, mixers, kettles	Spraying, 1-2%	Very low	9
Mild hygiene CIP	Dairy	Acid	Bacteria, yeast	Conveyor belts, floors, drains, tanks	Spraying, 1-2%	Very low	10
Alkaline OPC	Dairy	Alkaline	Proteins, fats, sugar	Conveyor belts, floors, drains, tanks	Spraying, 1-2%	High	12
Acidic OPC	Dairy	Acid	Scales, smut	Conveyor belts, floors, drains, tanks	Spraying, 1-2%	High	13

Methods

Foaming properties

In house method

The foaming performance test was conducted using a 1.0 wt.% solution of the tested surfactant prepared in hard water (3 mmol/L Ca^{2+} hardness). A 100 g sample was prepared in a graduated glass cylinder fitted with a stopper, taking care to avoid foam formation during preparation. The sample was conditioned at $22 \pm 3^\circ\text{C}$ or at the required test temperature. The solution was mixed by inverting

the cylinder at a rate of 1 inversion/s for 60 s. Foam height was measured 5, 60, and 180 s after mixing, as the distance between the liquid surface and the top of the foam layer. In the case of an uneven foam surface, the reported foam height was calculated as the average of the highest and lowest foam levels.

Application tests

In house method

The cleaning performance test was designed to simulate CIP-type dairy soils on stainless-steel surfaces. A model soil consisting of milk and 1 wt.% sodium carbonate was applied to stainless-steel tiles at a load of 10 g per tile and thermally cured at 100°C for 24 h. The prepared tiles were immersed in a working solution of the tested

formulation prepared in demineralized water for 10 min. After the exposure period, the cleaning performance was evaluated both gravimetrically, based on soil mass loss, and visually by assessing the residual soil on the tile surface.





PCC Exol SA

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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The information in the catalogue is believed to be accurate and compiled to the best of our knowledge; however, it should be considered as introductory only. Detailed information about our products is available in TDS and MSDS.

The suggestions for product applications are based on our best knowledge.

The responsibility for the use of products in conformity or otherwise with the suggested application, and for determining product suitability for the user's own purposes rests with the user.

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