



## EXOfos<sup>®</sup> PF-623

C8-C10 ALCOHOL,  
ETHOXYLATED, PHOSPHATE

### KEY BENEFITS

- Extreme pressure properties
- Corrosion control
- Compatible with other additives
- Emulsifier (Lubricants Additive)
- Wetting Agent
- Cleansing Agent
- Hydrotrope/Solubilizer

## GENERAL INFO & USES

**EXOfos® PF-623** is a free acid form of a complex mixture of mono- and di-phosphate esters ester based on C8–C10 alcohol, ethoxylated. This anionic surfactant is an effective coupling agent for nonionic. It works exceptionally well in synthetic and semisynthetic fluids due to good EP and lubricity properties. This ester also has good alkaline compability, wetting and detergency attributes. It is used in alkaline industrial detergent systems, textile wet processing and corrosion inhibitors.

## KEY APPLICATIONS

- Industrial and institutional cleaning
- Textiles
- Metalworking (synthetic and semisynthetic fluids)

## PHYSICAL-CHEMICAL PROPERTIES

Parameter	Method	EXOfos PF-623
CAS	–	68130-47-2
Chemical name	–	C8-C10 alcohol, ethoxylated, phosphate
Appearance at 20-25[°C]	Visual method	Liquid
Color (Gardner)	PN-EN ISO 4630	max 2
AV to the first inflection point [mg KOH/g]	In-house method	100-120
AV to the second inflection point [mg KOH/g]	In-house method	165-190
pH value	PN-EN 1262, 1% in water	2.0–3.0
Solidification point [°C]	PN-ISO 1392	<-20
Density at 25°C [g/cm <sup>3</sup> ]	PN-EN ISO 3675:2004	~ 1.08
P-content [%]	in-house method	~6
Water content [%]	PN-ISO 760:2001, direct method	<1
Surface tension [mN/m (25°C, 0,1%)]	EN 14370:2004	27

# APPLICATION PROPERTIES

Solubility of EXOfos series products (PN-EN 13955: 25°C, 5%[w/w])

Product name	Solvent						
	Demineralized water	Ethyl ether	Acetone	Paraffinic base oil	Naphtenic base oil	Rapeseed oil	Rapeseed oil methyl esters (RME)
EXOfos PF-623	●	●	●	●	●	●	●

- soluble
- insoluble
- partially soluble

## ALKALI AND ACID RESISTANCE

The analysis of this stability for low foaming surfactants has been performed in accordance with the PN-EN 14712:2005 standard.

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

Alkali and acid (NaOH) resistance (Sulphuric acid); concentration of 1%; temperature 20°C

Product name	g/l	1	5	10	20	40	70	80	120	130	180
NaOH		●	●	●	●	●	●	●	●	●	○
H <sub>2</sub> SO <sub>4</sub>		●	○	○	○	○	○	○	○	○	○



## WETTING CAPABILITY

The capability of wetting cotton fabric was determined according to EN 1772:2001.

Wetting time (time in seconds necessary for wetting the textile material) was measured at EXOfos PF-623 solution with a concentration of 0.5, 1.0 and 1.5 g/l in deionized water at a temperature of 25°C.

Concentration	Demineralized water
0.5	moderate
1.0	good
1.5	excellent

Time (s)	Description
<20	Excellent
20-50	Good
50-100	Moderate
100-300	Low
>300	Poor

## FOAMING CAPABILITY

Determination of the foaming capability was preformed according to PN-ISO 696:1994 (the modified Ross-Miles method) for solution with a concentration of 1.0 g/l in deionised and hard water at a temperature of 25°C.

Product name	Demineralized water	Hard water
EXOfos PF-623	Poor	Poor

Foam value [ml]	Description
100-200	Moderate
70-100	Low
20-70	Poor
0-20	None

## Extreme-Pressure (EP)

Four-ball extreme-pressure (EP) tests in Rapeseed oil methyl esters (RME) according to ASTM D2783 (1760 rpm, 10 s)

Sample	Last nonseizure load [N]	Weld point [N]
Rapeseed oil methyl esters (RME)	392	981
RME + 3% EXOfos PF-623	1236	1962

## CORROSION INHIBITION

### Chip/filter paper method (DIN-51360)

Test method description: cast iron chips are placed on filter paper and wetted with analysed solution. The corroded area is evaluated after 2 h.

Tests performed for products neutralized by triethanolamine to pH value 7-8 in demineralized water.

Sample	Result
Water demi	3/3
1% EXOfos PF-623/TEA in water demi	1/1

### Result of Chip/filter paper method

Result	Description of the result	Degree of surface colouring
0	Lack of corrosion	None
1	Slight corrosion	A maximum of 3 tracks, none of which exceeds 1 mm in size
2	Weak corrosion	Surface stained by less than 1% but more marks or more than with result 1
3	Medium corrosion	More than 1%, but less than 5% of the surface colour
4	Strong corrosion	More than 5% surface staining

## Copper corrosion according to ASTM D130-18

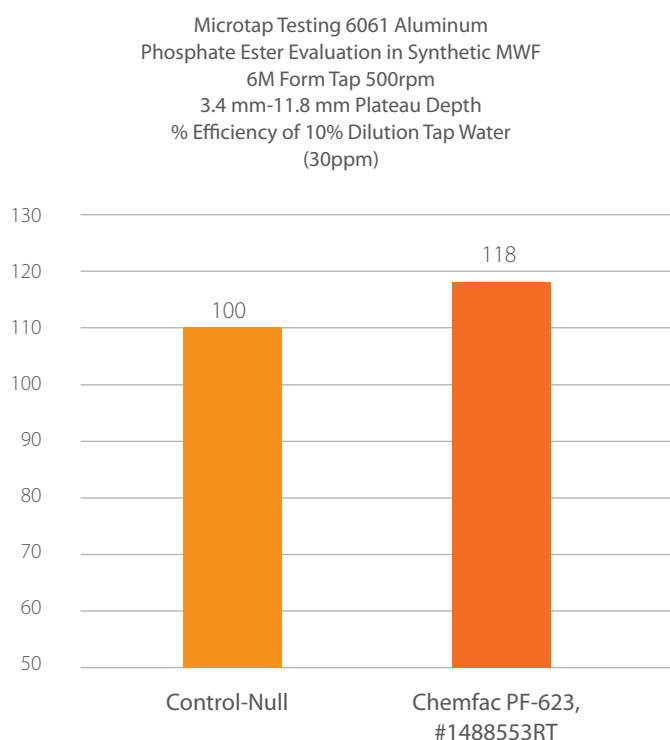
Method for evaluating the effect of lubricants on the copper surface. Copper plate placed in the sample for analysis, temperature 50°C, duration 3 hours. Evaluation of changes in the appearance of the plate according to the standard.

Sample	Result
Hard water 20 d	3a/3a
1% EXOfos PF-623/TEA in water 20 d	1a/1a

A score of 1a and 1b qualifies a sample as safe for copper  
3a -Dark tarnish/staining-corrosion

## MICROTAP TESTING\*

Comparison of performance of a synthetic metal working fluid containing EXOfos PF-623 (Chemfac PF-623) vs a synthetic metalworking fluid with no phosphate ester. Evaluation performed doing six cuts on Aluminum and Cold Roll Steel, using a Microtap megatap II-G8 thread-tapping machine.



Graph 1

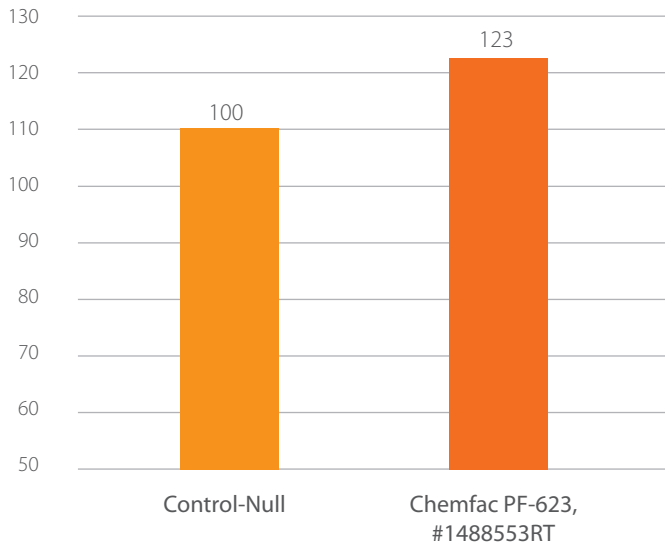
Plateau 3.4 mm to 11.8 mm Depth		
Aluminium 6061 6M Form Tap 500rpm	Control-Null	Chemfac PF-623 #1488553RT
1	392.1	253.4
2	346.8	300.1
3	343.0	311.9
4	353.3	285.9
5	310.1	347.1
6	402.6	323.2
Average Ncm	358.0	303.6
Percent Efficiency	100	118

Table 1

### Notes:

- Control Cuts#s 3, 4, 5, and 6 exhibited smoke during testing on 606 Aluminum.
- Control Cuts#s 3, 4, and 5 produced a double plateau graph in collection depth when testing on 6061 Aluminum.

Microtap Testing 1018 CRS  
 Phosphate Ester Evaluation in Synthetic MWF  
 6M Form Tap 500rpm  
 3.4 mm-11.8 mm Plateau Depth  
 % Efficiency of 10% Dilution Tap Water  
 (30ppm)



Graph 2

Plateau 3.4 mm to 11.8 mm Depth		
1018 CRS 6M Form Tap 500rpm	Control-Null	Chemfac PF-623 #1488553RT
1	315.2	273.4
2	347.8	328.2
3	386.3	320.5
4	397.2	316.5
5	440.1	317.4
6	426.6	317.5
<b>Average Ncm</b>	385.5	312.3
<b>Percent Efficiency</b>	100	123

Table 2

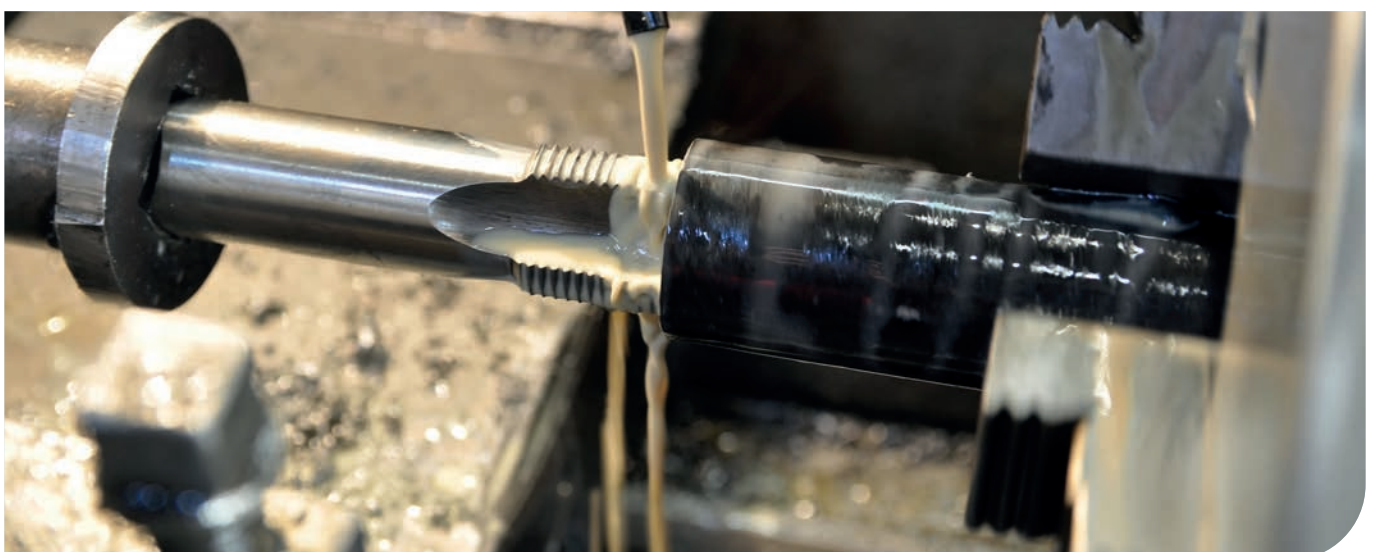
**Notes:**

1. Control Cuts#s 4, 5, and 6 exhibited smoke during testing on 1018 Cold Roll Steel.

When evaluating percent efficiency graph, higher percent efficiency values represent better lubricity. When evaluating the data, it is important to note that percent efficiency's at 5% or greater are considered statistically significant with a 95% confidence level.

The synthetic metal working fluid containing EXOfos PF-623 exhibited better efficiency on both metal types than the Control formula without EXOfos PF-623.

\* tests performed with Chemfac PF-623 is USA name of EXOfos PF-623



## EXAMPLE OF FORMULATIONS FOR CLEANING METAL SURFACES

### Aluminum cleaner

	Content [%]
EXOfos PF-623	5-12
ROKAnol DB7	3-7
Butyl glycol	5
Water	up 100

Appearance at 20-25°C: clear solution  
 pH at 25°C: 2-3  
 Solidification point: approx. 1°C  
 Clarification temperature: approx. 4°C

#### Procedure:

1. Dissolve EXOfos PF-623 in water.
2. Add ROKAnol DB7.
3. Add solvent.
4. Mix until a homogeneous mixture is obtained.

### Stainless steel cleaner

	Stainless steel cleaner 1	Stainless steel cleaner 2	Stainless steel cleaner 3	Stainless steel cleaner 4
EXOfos PF-623	10	10	10	10
ROKAnol DB7	2			
ROKAnol IT7		2		
ROKAnol NL8			2	
ROKAnol GA7LA				2
Butyl glycol	5	5	5	5
ROKAmina K30	5	5	5	5
water	up 100	up 100	up 100	up 100

Appearance at 20-25°C: clear solution  
 pH at 25°C: 2-3  
 Solidification point: approx. -1°C  
 Clarification temperature: approx. 4°C

#### Procedure:

1. Dissolve surfactant (ROKAnol DB7 or ROKAnol IT7 or ROKAnol NL8 or ROKAnol GA7LA ) in water.
2. Then add ROKAmina K30 and mix.
3. Add EXOfos PF-623.
4. Add solvent.





# 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 facili-

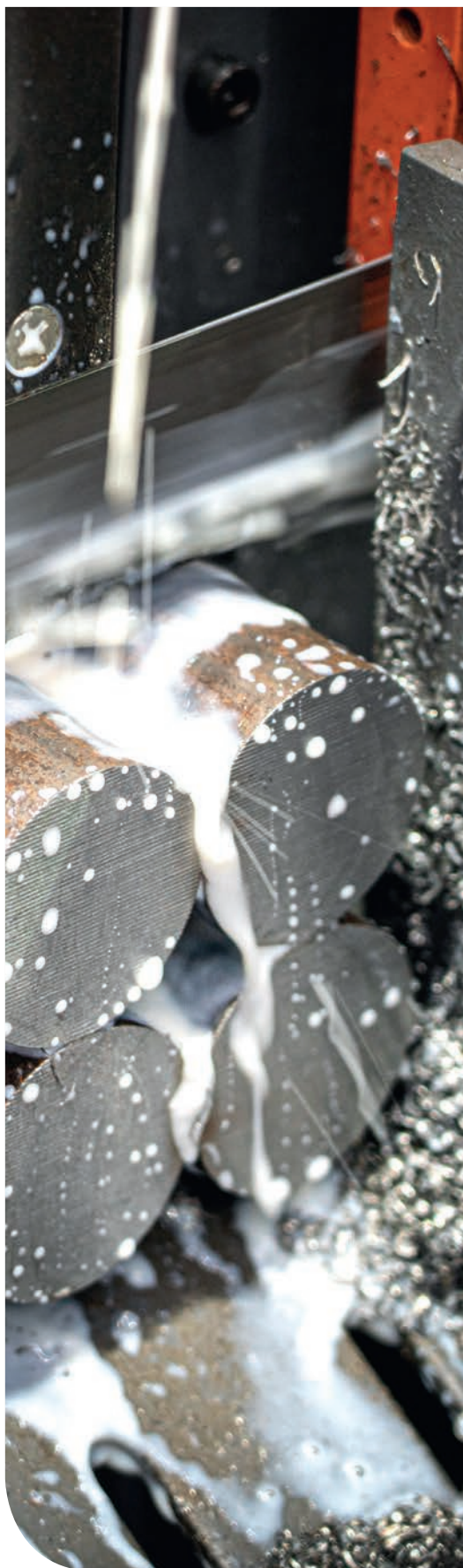


## PCC EXOL SA combines innovative technologies with experience in designing, producing and selling surfactants and chemical formulations

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.



**PCC Exol SA**

Sienkiewicza St. 4  
56-120 Brzeg Dolny  
Poland

September 2023

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Chemistry*