

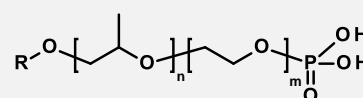


FOSFODET CS products are low foaming co-emulsifiers that combine outstanding corrosion inhibition and lubrication power with the hard water resistance crucial for technical applications.

MAIN PROPERTIES

- Alkoxylated phosphate ester
- Low foaming
- Ideal (co-)emulsifier
- Improves lubricity
- Liquid
- Easy to formulate

FOSFODET CS



R = Alkyl

APPLICATION BENEFITS

- Foam control due to less foam formation and fast foam collapsing
- Corrosion inhibition, particularly in terms of aluminum staining
- Improved lubrication and extreme pressure/anti-wear performance
- Enhanced hard water and electrolyte stability compared with standard phosphate esters on the market
- Synergistic effects with long-chain AKYPOs[®] such as AKYPO[®] RO for optimized hard water stability and lime soap dispersion



PERFORMANCE COMPARISON

The FOSFODET CS product range spans three different grades, each with its own specific performance profile. The table below indicates the performance level in the peer group of phosphate esters to assist with selecting the ideal FOSFODET CS product to achieve optimal formulation performance on the job.

PRODUCT	DEGREE OF ETHOXYLATION	LOW FOAM	CORROSION INHIBITION	HARD WATER AND ELECTROLYTE STABILITY	EP/AW*	LUBRICITY
FOSFODET CS-0602	low	●●●	●●●	●	●●●	●●●
FOSFODET CS-0606	medium	●●●	●●	●●	●●	●●
FOSFODET CS-0609	high	●●●	●	●●●	●	●●

* Extreme pressure/anti-wear performance



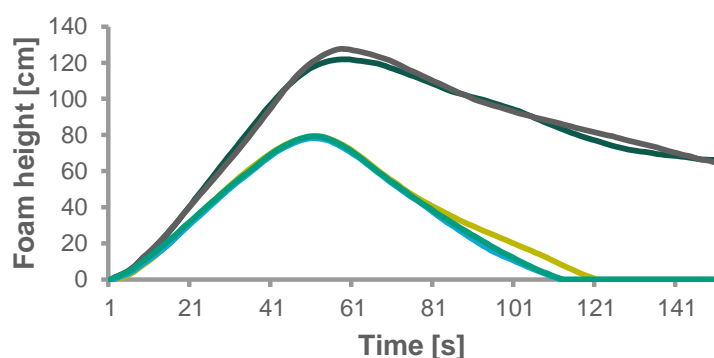
TYPICAL APPLICATIONS AND FORMULATION GUIDANCE

FOSFODET CS products serve as ideal ingredients in such technical formulations as metalworking fluids, rolling oils, conveyor belt lubrication and hydraulic fluids. The table below provides guidance on the specific product for use in different types of formulations.

PRODUCT	STRAIGHT OIL	WATER MISCIBLE SOLUBLE OIL AND SEMI SYNTHETIC	SYNTHETIC
FOSFODET CS-0602	•••	••	•
FOSFODET CS-0606	•	•••	••
FOSFODET CS-0609		•••	•••

LOW FOAMING BEHAVIOR

The foaming behavior of two different ethoxylated phosphate esters was compared with FOSFODET CS phosphate esters by testing with a 5% metalworking fluid emulsion in 10°dH (178 ppm) with a Krüss DFA100 Dynamic Foam Analyzer.



- Reference phosphate ester Cetyl/Oleyl 2EO
- Reference phosphate ester Cetyl/Oleyl 5EO
- FOSFODET CS-0602
- FOSFODET CS-0606
- FOSFODET CS-0609

GUIDELINE FORMULATION	%w/w
Mineral oil	49.1
Water	5.5
Triethanolamine	18.4
Monoethanolamine	3.6
Boric acid	4.9
Tall oil fatty acid	4.3
Butyldiglycol	3.6
Alcohol ethoxylate	8.5
Reference phosphate ester Cetyl/Oleyl 2EO	
Reference phosphate ester Cetyl/Oleyl 5EO	
FOSFODET CS-0602	2.0
FOSFODET CS-0606	
FOSFODET CS-0609	

STANDARD EMULSIFIER CHARACTERISTICS

TECHNICAL DATA*	HLB**	CONTACT ANGLE ON STEEL (DC04B)	SURFACE TENSION (mN/m)	SOLUBILITY IN WATER	CLOUD POINT [°C]
	LUMiFuge® (in-house method)	0.1% in 1% NaOH	0.1% in 1% NaOH (static ring)	neutralized	Hoffmann 5 g in 25 g BDG in 25% solution
FOSFODET CS-0602	5	51.1	31.6	s	55
FOSFODET CS-0606	8	54.2	33.4	s	70
FOSFODET CS-0609	9	53.7	34.8	s	> 80

* Please contact us for further technical information about the products. This data is provided as guidance. It does not represent the product specifications, which are presented in the technical data sheets. Additional information is also available in the product safety data sheets.

** HLB values stated in the table are measured as non-neutralized; neutralized anionic (co)-emulsifiers show generally higher HLB values.

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For more information, contact us at metalworking@kaochemicals.de

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