

# METALWORKING ADDITIVES

RANGE OF PRODUCTS

## ANIONIC SURFACTANTS

### ETHER CARBOXYLIC ACIDS

**AKYPO® LF** Solubilizers with short alkyl chains (C<sub>4-9</sub>) and moderate to high degree of ethoxylation; besides their excellent foam control ability, they are multifunctional stabilizers for metalworking concentrates and emulsions.

NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS	REGIS-TRATION STATUS*
AKYPO® LF 1	Capryleth-6 carboxylic acid	Low foaming surfactant also in combination with high foaming surfactants, outstanding electrolyte stability, hydrotropic properties.	
AKYPO® LF 2	Capryleth-9 carboxylic acid	Low foaming surfactant also in combination with high foaming surfactants, outstanding electrolyte stability, helps in the solubilization of lime soaps, hydrotropic properties.	
AKYPO® LF 4	Hexeth-4 carboxylic acid + Capryleth-9 carboxylic acid	Very low foaming surfactant also in combination with high foaming surfactants, outstanding electrolyte stability, helps in the solubilization of lime soaps, hydrotropic properties, can be used to adjust drip off behavior.	
AKYPO® LF 6	Capryleth-9 carboxylic acid + Buteth-2 carboxylic acid	Very low foaming surfactant also in combination with high foaming surfactants, good electrolyte stability, very good solubilizer, hydrotropic properties, can be used to adjust drip off behavior.	

**AKYPO® RLM/RO** Emulsifiers with medium to long alkyl chains (C<sub>12-C<sub>18</sub></sub>) and a low degree of ethoxylation; support of anti-corrosion properties.

NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS	REGIS-TRATION STATUS*
AKYPO® RLM 25	Laureth-4 carboxylic acid	Excellent emulsifier, provides strong support of anti-corrosion properties, good wetting ability and improved hard water stability, improves lubricity.	
AKYPO® RO 20 VG	Oleth-3 carboxylic acid	Excellent emulsifier especially when used in formulations with a high oil content, provides strong support of anti-corrosion properties, good wetting ability and improved hard water stability, improves lubricity.	

**AKYPO® RO** Co-emulsifiers with long alkyl chains (C<sub>16-18</sub>) and a moderate to high degree of ethoxylation; essential for a long lifetime of water-miscible metalworking fluids; very powerful in lime soap dispersion.

NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS	REGIS-TRATION STATUS*
AKYPO® RO 50 VG	Oleth-6 carboxylic acid	Stabilizer with good emulsifying properties, strong improvement of hard water stability (lime soap dispersing agent), supports corrosion prevention, moderately improves lubricity.	
AKYPO® RO 90 VG	Oleth-10 carboxylic acid	Stabilizer to balance even sensitive formulations, excellent improvement of hard water stability (lime soap dispersing agent), supports corrosion prevention, moderately improves lubricity.	
AKYPO® RCO 105	Oleth-12 carboxylic acid	Stabilizer, excellent improvement of hard water stability (lime soap dispersing agent), supports corrosion prevention, moderately improves lubricity.	

**AKYPO® PO-E0** Strong co-emulsifiers with propoxylated long saturated alkyl chains (C<sub>16-18</sub>) and low to high degree of ethoxylation; essential for a long lifetime of water-miscible metalworking fluids with decreased foam stability, particularly when used with AKYPO®ROX PO-E0.

NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS	REGIS-TRATION STATUS*
AKYPO® RS-0602	Alkoxyated stearyl carboxylic acid	Excellent co-emulsifier with foam control ability, good improvement of hard water stability, supports corrosion prevention, improves lubricity.	
AKYPO® RSPE 66	Alkoxyated stearyl carboxylic acid	Very strong co-emulsifier with foam control ability, strong improvement of hard water stability (lime soap dispersing agent), supports corrosion prevention, improves lubricity.	
AKYPO® RC-0960	Alkoxyated cetyl carboxylic acid	Strong co-emulsifier with foam control ability, very strong improvement of hard water stability (lime soap dispersing agent), supports corrosion prevention, improves lubricity.	

**AKYPO® Blends** Premixed co-emulsifiers for the stabilization of metalworking concentrates and emulsions; ideal additive for long lifetime metalworking fluids.

NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS	REGIS-TRATION STATUS*
AKYPO® TEC AM VG	Oleth-10 carboxylic acid + Capryleth-9 carboxylic acid + Hexeth-4 carboxylic acid	Ready-to-use mixture that combines the benefits of AKYPO® RO 90 VG and AKYPO® LF 4 for easier handling.	

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## AMIDE ETHER CARBOXYLIC ACIDS

**AKYPO® RA** Amide based co-emulsifiers with long alkyl chains and low to moderate degree of ethoxylation; remarkable combination of corrosion protection and hard water stability (lime soap dispersion power) for long lifetime metalworking fluids.

NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS	REGISTRATION STATUS*
<b>AKYPO® RA 30</b>	Rapeseed oil amide -3 ether carboxylic acid (canola oil amide -3 ether carboxylic acid)	Good emulsifying properties, improvement of hard water stability (lime soap dispersing agent), inhibits corrosion.	
<b>AKYPO® RA 50</b>	Rapeseed oil amide -5 ether carboxylic acid (canola oil amide -5 ether carboxylic acid)	Good emulsifying properties, strong improvement of hard water stability (lime soap dispersing agent), controls corrosion.	

## ALKOXYLATE PHOSPHATE ESTERS

**FOSFODET®** Corrosion inhibiting emulsifiers with propoxylated long saturated alkyl chains (C<sub>16-18</sub>) and low to high degree of ethoxylation; outstanding low foam formation behavior and fast foam collapse as well as enhanced lime soap dispersion power.

NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS	REGISTRATION STATUS*
<b>FOSFODET® RS-0602</b>	Alkoxylated stearyl ether phosphate	Foam control, best corrosion inhibition <sup>1</sup> , hard water stable, extreme pressure and anti-wear additive.	
<b>FOSFODET® RS-0606</b>	Alkoxylated stearyl ether phosphate	Foam control, good corrosion inhibition <sup>1</sup> , hard water stable, moderate lime soap dispersion power <sup>1</sup> , extreme pressure and anti-wear additive.	
<b>FOSFODET® RC-0960</b>	Alkoxylated cetyl ether phosphate	Foam control, moderate corrosion inhibition <sup>1</sup> , hard water stable, strong lime soap dispersion power <sup>1</sup> , extreme pressure and anti-wear additive.	

(<sup>1</sup>compared within this group of product)

## NONIONIC SURFACTANTS

### ETHOXYLATED AMIDES

**AMIDET®** Ethoxylated alkyl monoethanol amide based on rapeseed (canola oil); ideal combination of emulsifying properties and corrosion inhibition.

NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS	REGISTRATION STATUS*
<b>AMIDET® TEC N</b>	PEG-4 rapeseed amide (PEG-4 canola amide)	Excellent emulsifier based on natural raw material, corrosion protection properties, moderate hard water stability.	
<b>AMIDET® TEC-111</b>	PEG-4 rapeseed amide (PEG-4 canola amide + MEA + TEA + fatty acid)	Emulsifier blend based on natural raw materials to simplify formulation process; combines corrosion inhibition, good emulsifying properties and low foaming tendency <sup>1</sup> .	

(<sup>1</sup>compared within this group of product)

### FATTY ALCOHOL ALKOXYLATES

**AKYPO® ROX** **KAO FINDET** Main emulsifiers with propoxylated long saturated alkyl chains (C<sub>16-18</sub>) and low to high degree of ethoxylation; designed for enhanced foam control and long lifetime metalworking fluids, particularly when used with AKYPO® PO-EO, RO or RA.

NAME	CHEMICAL DESCRIPTION	APPLICATION AND BENEFITS	REGISTRATION STATUS*
<b>AKYPO® ROX RS-0602N</b>	Alkoxylated stearyl alcohol	Hydrophobic low foaming emulsifier, synergistic effects with AKYPO® PO-EO, RO or RA for optimized hard water stability.	
<b>KAO FINDET MB-212</b>	Alkoxylated cetyl/stearyl alcohol	Hydrophobic low foaming emulsifier, synergistic effects with AKYPO® PO-EO, RO or RA for optimized hard water stability.	
<b>AKYPO® ROX RS-0606N</b>	Alkoxylated stearyl alcohol	Medium polarity, low foaming emulsifier, moderate hard water and electrolyte stability, synergistic effects with AKYPO® PO-EO, RO or RA for optimized hard water stability.	
<b>AKYPO® ROX RC-0960N</b>	Alkoxylated cetyl alcohol	Hydrophilic low foaming emulsifier, moderate hard water and electrolyte stability, synergistic effects with AKYPO® PO-EO, RO or RA for optimized hard water stability.	

In addition to our standard product range, the Kao Metalworking Toolbox, we also offer customized solutions. KAO's desire is to design ecofriendly products using renewable resources. Depending on our customer requirements, we do, however, also offer solutions using petrochemical distillates, low-salt AKYPO® and the like.

\*REGISTRATION: All our classic metalworking products are registered globally (Europe, the US, Canada, China, Japan, Korea, Taiwan, and Australia as well as additional countries). This is indicated by the full bar in the registration status column. Our aim is to also obtain global registration for our newer generation of products. In this case, the degree to which the registration status column is filled indicates the level of registration expansion. At a minimum, all products are registered in Europe. A full bar indicates global registration. Please contact us to learn more about the latest registration status.

The information in this document has been prepared on the basis of our current experience and knowledge, and every effort has been made to ensure this information is reliable. Statements and suggestions regarding possible fields of application or formulations for specific end products are derived from our experience and testing results with these products. The users of our products must carry out their own tests to determine the applicability and/or suitability of our products for any intended purpose. The user is responsible for ensuring that any proprietary rights and existing laws are observed; the publisher may not be held liable for any infringement on existing patents on the grounds of the information provided above.

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