



# METALWORKING FLUIDS FORMULATION EXAMPLES

Arkema's lubricant additives are used in numerous MWF formulations, either neat oils or soluble oils, synthetic and semi-synthetic fluids.

## GRINDING OIL

Function	Type	Content
Oil	Mineral oil	
Boundary lubricants	Triglycerides Fatty esters Polyol esters	10%
EP additives	TPS20/32 or VPS11/15/17	3-5% or 10-15%

## HEAVY DUTY FORMING OIL

Function	Type	Content	
Oil	Mineral oil (high viscosity)		
Boundary lubricants	Triglycerides Fatty esters or acids Polyol esters	20%	20%
EP additives	TPS20/32	10-15%	3-5%
AW / Lubricity	Phosphoric esters or TBN 400 Calcium Sulfonate	1-3% or	5-10%

## SOLUBLE CUTTING OIL

Function	Type	Content
Oil	Mineral oil	40%
Primary emulsifier	Petroleum sulfonate Fatty acids	15% 5%
Secondary emulsifier	Polyalkylene glycol (PAG) Ethoxylated fatty alcohol	5%
Emulsifier, Lubricity, AW	Phosphoric esters	3-6%
Coupling agent	Hexylen glycol Butyl carbitol	2%
Buffer, alkaline reserve Biopotentor	MEA, TEA BAE, DBAE	10% 3-5%
EP additive	TPS20/32	5-8%
Water		Complement to 100%

## SEMI SYNTHETIC FLUID

Function	Type	Content
Oil	Mineral oil	15%
Boundary lubricants	Fatty esters	15%
Primary emulsifier	Petroleum sulfonate Fatty acids	15% 5%
Secondary emulsifier	Polyalkylene glycol (PAG) Ethoxylated fatty alcohol	5%
Emulsifier, Lubricity, AW	Phosphoric esters	3-6%
Coupling agent	Hexylene glycol Butyl carbitol	2%
Buffer, alkaline reserve Biopotentor	MEA, TEA BAE, DBAE	10% 3-5%
EP additive	TPS20/32 – SPS 10LS	5-8%
Water		Complement to 100%

## SYNTHETIC FLUID

Function	Type	Content
Detergent, foam control	Polyalkylene glycol (PAG) EO-PO copolymers	20%
Corrosion inhibitor	Heptanoic acid	10%
Corrosion inhibitor, biostability	Amine Borate	10% pH 7-8 Aluminium pH 8-10 Steel
Buffer, Alkaline reserve	BAE, DBAE	3%
Emulsifier, Lubricity, AW	Phosphoric esters	3-6%
EP additive	SPS 10LS	10%
Biocide	Grotan (formaldehyde release)	0,5%
Fungicide	Undecylenic acid Sodium omadine	1% 0,1%
Water		Complement to 100%