

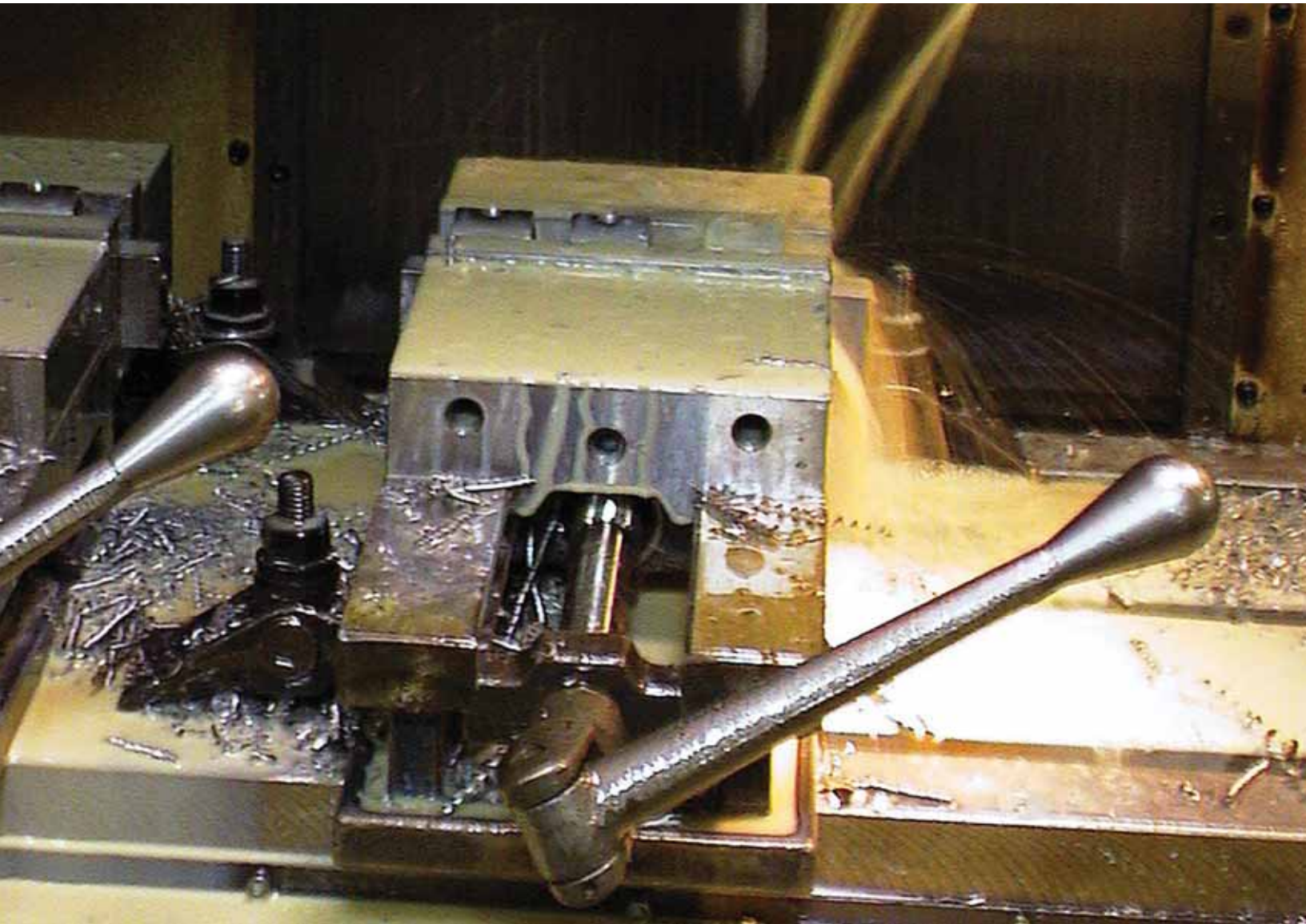
HUNTSMAN

Enriching lives through innovation

Performance Products

METALWORKING CHEMICALS

Americas Surfactant Product Information



Huntsman Capabilities and Products



Huntsman Capabilities

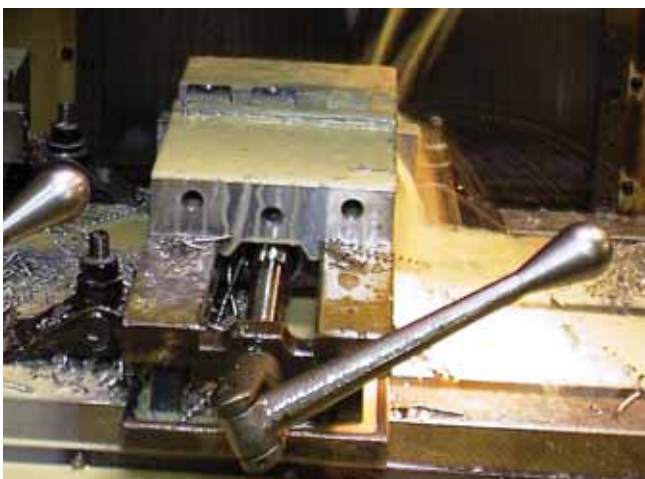
Huntsman is a major supplier of surfactants, manufacturing all the major classes which find application in the metalworking industry. With well equipped development laboratories and pilot facilities in the United States, Europe and Asia, we are committed to delivering new surfactant systems to the metalworking industry.

Huntsman Products

Surfactants are an important component of metalworking fluids and in metal cleaning applications where they provide essential properties such as emulsification, lubricity, corrosion inhibition and foam control. Some surfactants also act as extreme pressure agents and coupling agents.

Huntsman produces a number of other chemicals useful in the metalworking industry, from chemical intermediates to functional fluids to various glycols.

The following is a brief introduction to those products which are specifically recommended for use in metalworking.



SURFONIC® PE series Phosphate Esters

The SURFONIC® phosphate ester surfactants can be used in the formulation of neat oils and soluble oils and also both semi-synthetic and synthetic lubricants. The surfactants offer extreme pressure protection in combination with emulsification and corrosion inhibition.

Phosphate esters also find application in metal cleaning formulations, where they can be used alone or in combination with nonionic surfactants where they help solubilize the nonionics into formulations containing caustic and silicate.

SURFONIC® Product	Hydrophobe	Appearance at 25°C	Acid # at pH 5-5.5	Acid # at pH 9-9.5	Viscosity, cSt, 40°C	Function
PE-1198	Aromatic	Clear liquid	68	103	1510	Hydrotrope in cleaners Extreme pressure resistance in water-based systems
PE-2258	Aliphatic	Clear, light amber liquid	83	135		Solubilizer in semisynthetics Offers good lubricity and mild resistance to extreme pressure
PE-1218	Aromatic	Clear, light yellow viscous liquid	115	220	6600	Hydrotrope for cleaners
PE-1265	Aliphatic	Clear liquid	76	135	183	
PE-2852	Aliphatic	Clear liquid	97	142	116	
PE-533	Aliphatic	Clear liquid	65	100	375	
PE-BP2	Aliphatic	Clear yellow liquid		310		
PE-2200	Aliphatic	Clear liquid	Neutralized	Neutralized	188	

SURFONIC® CO series Castor Oil Ethoxylates, SURFONIC E series Fatty Acid Ethoxylates and SURFONIC MW-100 Additive

The SURFONIC® CO and E series ethoxylates are used as emulsifiers for a variety of oils used in the metalworking industry.

SURFONIC MW-100 additive is a single-component emulsifier designed to enhance the metalworking properties of vegetable oil-based lubricants.

SURFONIC® Product	Appearance at 25°C	HLB	Density, g/ml, 25°C	Viscosity, cSt, 40°C	Function
E400-MO	Liquid	11.8	1.013		Emulsifier and lubricity additive.
CO-15	Liquid	8.2	1.04	59	Emulsifier for oil-based formulations.
CO-25	Liquid	10.7	1.04	66	Emulsifier for oil-based formulations.
CO-30	Liquid	11.7	1.04	71	Hydrophilic emulsifier for oil-based formulations.
MW-100	Slightly turbid liquid	5 - 7	0.98 (20°C)	393 cSt at 20°C	Emulsifier for vegetable oil-based lubricants.

SURFONIC® POA series EO/PO Block Copolymers

The SURFONIC® POA series block copolymers are used in a variety of applications including soluble oils, semi-synthetic and synthetic lubricants where they offer a combi-

nation of good lubricity, emulsification, solubilization and dispersion combined with low foam characteristics

SURFONIC® Product	Appearance at 25°C	HLB	Cloud Point °C, 1% aq	Specific Gravity, 25/25°C	Viscosity, cSt, 40°C	Function
POA-L61	Liquid	3	24	1.017	360	Defoamer for synthetic and semi-synthetic fluids. Lubricity enhancement.
POA-L62	Liquid	7	32	1.04	150	Active for cleaners. Lubricity enhancement.
POA-L62LF	Liquid	6.6	28	1.04	460	Defoamer and lubricant additive.
POA-L101	Liquid	1	15	1.02	800	Solubilizer for semi-synthetic and synthetic fluids.
POA-17R2	Liquid	8	35	1.03	205 (100°F)	
POA-25R2	Liquid	6.3	30	1.02	570	Lubricant in synthetic fluids and solubilizer in semi-synthetic fluids.

SURFONIC® LF, P and JL series

Alcohol Alkoxylates

The SURFONIC® alcohol alkoxylates are ideally suited for metalworking operations. The LF and P series products are low foaming and offer excellent solubilization characteristics. Some of the products are also useful in metal cleaning applications.

SURFONIC JL-80X is also used in some metal cleaning applications. The unique structure of this product eliminates the gel phase common to alcohol ethoxylates in aqueous solutions.

SURFONIC® Product	Appearance at 25°C	Pour Point, °C	Specific Gravity, 25/25°C	Viscosity, cSt, 40°C	Cloud Point °C, 1% aq	Function
LF-17	Clear liquid	-12	0.998	96	34	Wetting agent for acid cleaning operations. Low foam emulsifier / rinse aid
LF-18	Clear liquid	-6	1.013	240	17	Low foam additive for semi-synthetic and synthetic formulations, active defoamer in metal cleaning operations
LF-37	Clear to hazy liquid	-12	0.9904 at 100°F	96	17	Low foam emulsifier for semi-synthetic and synthetic formulations
LF-41	Clear to hazy liquid		1.0343	260	37	
P1	Clear to hazy liquid	-30	0.975	90	25	Solubilizer/emulsifier for semi-synthetic formulations. Emulsifier / rinse aid for metal cleaners. Low foam. Wetting agent in dilute acid.
P3 liquid	Clear to hazy	-30	0.973	56	35	Rinse aid for cleaners/secondary emulsifier for semi-synthetic. Wetting agent in dilute acid.
P5	Clear to hazy liquid	-26	0.985	85	45	Hydrophilic emulsifier for semi-synthetic. Soluble in dilute acid
P6	Clear to hazy liquid	4	1.018		35 ¹	Low foam additive for semi-synthetic and synthetic formulations. Active defoamer in metal cleaning operations.
L4-29X	Solid	37	1.018	596 at 100°	75	High molecular weight emulsifier for semi-synthetic and soluble oils. Offers some thickening
JL-80X	Clear liquid	-5	1.003	51	59	Prime surfactant in cleaners

¹ 10% in 25% butyl diglycol

SURFONIC® L series Fatty Alcohol Ethoxylates

The SURFONIC® L series linear alcohol ethoxylates are widely used as emulsifiers, cleaners, penetrants and wetting agents in metalworking formulations.

Appropriate selection of the alcohol chain length and degree of ethoxylation can provide the surfactant properties required for a particular application.

SURFONIC® Product	Appearance at 25°C	HLB	Pour Point, °C	Specific Gravity, 25/25°C	Viscosity, cSt, 40°C	Cloud Point	Function
L12-3	Clear to hazy liquid	9.0	-9	0.932	35	45 ¹	
L12-6	Clear to hazy liquid	12.4	10	0.9820	43	50 ³	Prime wetting agent for water-based metal cleaners.
L12-8	Clear to hazy liquid	13.6	18	1.004	98	80 ³	Prime wetting agent in metal cleaners.
L24-2	Clear to hazy liquid	6.2	10	0.903	25		Oil soluble additive for water-based cleaners. Additive for rolling oils.
L24-3	Clear to hazy liquid	8.0	4.4	0.9239	25	45 ¹	Oil soluble additive for water-based cleaners and hydrophobic esters.
L24-4	Clear to hazy liquid	9.4	4.4	0.9432	31	81 ¹	Oil soluble additive for water-based cleaners and hydrophobic esters.
L24-5	Clear to hazy liquid	10.6	10	0.9626	44	73 ²	Emulsifier for soluble oils.
L24-7	Clear to slightly turbid liquid	11.9	15.6	0.9824	47	50 ³	Emulsifier for soluble oils.
L24-9	White semisolid	13	21	0.9935	61	75 ³	Emulsifier for semi-synthetic formulations.
L24-12	Waxy solid	14.4	29.4	1.0075 at 100°F	47 at 140°F	68 ⁴	Improves hard water tolerance of soluble oils.
L24-22	Waxy solid	16.6	39	1.0309 at 140°F	46 at 140°F		Improves hard water tolerance of soluble oils. Good dispersing.
L46-7	White semisolid	11.6	21.1	0.979	63	50 ³	

¹ Water titration, mls H₂O to cloud

² °C, 10% in 25% butyl diglycol

³ °C, 1% aqueous solution

⁴ °C, 1% surfactant in 10% NaCl.

SURFONIC® N series Nonylphenol Ethoxylates

The main area of application for the SURFONIC® nonylphenol ethoxylates in metalworking fluids is in the emulsification of oils. The nonylphenol ethoxylates are

highly effective materials for formulating soluble oil, semi-synthetic and metal cleaning compounds.

SURFONIC® Product	Appearance at 25°C	HLB	Pour Point, °C	Specific Gravity, 25/25°C	Viscosity, cSt, 40°C	Cloud Point	Function
N-31.5	Clear liquid	7.7	-4	1.01	294	24 ¹	Emulsifier for soluble oils and semisynthetics
N-40	Clear liquid	8.9	-7	1.026	255	34 ¹	Emulsifier for soluble oils and semisynthetics
N-60	Clear liquid	10.9	-7	1.041	239	84 ¹	Emulsifier for soluble oils and semisynthetics
N-85	Clear liquid	12.6	10	1.056	251	44 ²	Emulsifier for soluble oils and semisynthetics
N-95	Clear liquid	13.1	4	1.061	293	54 ²	Emulsifier for soluble oils and semisynthetics, metal cleaners
N-100	Clear liquid	13.3	3	1.064	250	65 ²	Emulsifier for soluble oils and semisynthetics, metal cleaners
N-102	Clear liquid	13.5	6	1.065	290	71 ²	Emulsifier for soluble oils and semisynthetics, metal cleaners
N-120	Clear liquid	14.1	3	1.070	308	52 ³	Emulsifier for soluble oils and semisynthetics, metal cleaners
N-150	White semisolid	15	23	1.065	306	65 ³	Improves hard water tolerance of soluble oil and semisynthetics
NB-307	Clear liquid	17.1	2	1.02		78 ³	Improves hard water tolerance of soluble oil and semisynthetics
NB-407	Clear liquid	17.8	5	1.022		76 ³	Improves hard water tolerance of soluble oil and semisynthetics

¹ Water titration, mls H₂O to cloud

² °C, 1% aqueous solution

³ °C, 1% surfactant in 10% NaCl

SURFONIC® OP series Octylphenol Ethoxylates

The three main application areas in metalworking for the SURFONIC® OP series ethoxylates are acid-based

cleaners, emulsifiers for soluble oils and semi-synthetic formulations.

SURFONIC® Product	Appearance at 25°C	HLB	Pour Point, °C	Specific Gravity, 25/25°C	Viscosity, cSt, 25°C	Cloud Point	Function
OP-15	Liquid	5.1	-9	0.985	790	15 ¹	Oil soluble coupler and defoamer for semi-synthetic and soluble oil formulations
OP-35	Liquid	8.6	-23	1.023	370	24 ¹	Emulsifier for soluble oil formulations
OP-70	Liquid	12.0	-26	1.054	260	23 ²	Emulsifier for semi-synthetic formulations
OP-100	Liquid	13.6	2	1.065	240	66 ²	Emulsifier for semi-synthetic formulations. Wetting agent for phosphoric and hydrochloric acids
OP-120	Liquid	14.4	16	1.071	330	58 ³	Improves hard water tolerance of soluble oil and semi-synthetic formulations

¹ Water titration, mls H₂O to cloud

² °C, 1% aqueous solution

³ °C, 1% surfactant in 10% NaCl

Alkylate H-230L – Linear Alkylbenzene Highboiler for Sulfonation Feedstock

Alkylate H-230L, a synthetic sulfonation feedstock widely used in the metalworking industry to augment natural sodium petroleum sulfonate, is a blend of alkyl tetralins, dialkyl benzenes, alkyl naphthalene and diphenyl

alkanes. The carbon number distribution peaks at C₂₃. Sulfonation of the alkylate can be accomplished using air/SO₃ or oleum.

Typical Properties

Appearance	Color, ASTM	Specific Gravity, 60/60°F	Viscosity, cSt, 100°F	Refractive Index, 25°C
Clear yellow liquid	~1	~ 0.88	~ 17	1.493

JEFFOX® Functional Fluids

The JEFFOX® functional fluids are alkoxyates of mono-, di- or tri-functional starting materials. These versatile fluids have varying degrees of solubility in water and oil. As lubricants, the fluids possess many desirable prop-

erties of natural lubricants and have distinctive properties of their own which recommend their use in difficult applications such as metalworking fluids and machine lubricants.

JEFFOX® Product	Average Molecular Weight	Functionality	Appearance at 25°C	Viscosity, SUS, 100°F	Viscosity, cSt			Density, lb/gal 20°C	Pour Point, °F
					60°F	100°F	150°F		
WL-440	488	Tri	Clear liquid	440	386	100	30	9.6	-30
WL-590	990	Tri	Clear liquid	590	508	135	43	9.3	0
WL-660	1800	Mono	Clear liquid	660	471	158	60	8.7	-45
WL-1400X2	2500	Di	Clear amber liquid	1400	970	299	109	9.2	0
WL-5000	4365	Mono	Clear amber liquid	5000	3556	1107	409	8.8	-10

POGOL® Polyethylene Glycols

The POGOL® polyethylene glycols have numerous uses in metalworking and allied industries. While the largest use is the manufacture of PEG esters for use as lubricants, the polyethylene glycols are also useful as addi-

tives in hydraulic fluids, as dispersants and carriers for abrasive slurries, and carrier solvents of release agents in aluminum die cast operations.

Product	Average Molecular Weight	Molecular Weight Range	Average EO Units	Density, g/ml at 20°C	Melt/Freeze Range, °C	Viscosity, cSt at 37.8°C
POGOL 200	200	190-210	4.2	1.124	-	25
POGOL 300	300	285-315	6.4	1.125	-15 to -8	37
POGOL 400	400	380-420	8.7	1.125	4 to 8	42
POGOL 600	600	570-630	13.2	1.126	20 to 25	64

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Emergency Assistance

For transportation emergencies only, call CHEMTREC 1-800-424-9300 or 1-800-328-8501.

For all other emergencies, call 409-722-8381, our 24-hour emergency number in Port Neches, Texas.

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