

QUALITY BOOSTS.

Solutions

for challenging applications

Additives for the lubricant oil industry

X Additin®

QUALITY WORKS.

LANXESS
Energizing Chemistry

SOLUTIONS FOR CHALLENGING APPLICATIONS

ADDITIVES FOR THE LUBRICANT INDUSTRY. SOLUTIONS FOR HIGH PERFORMANCE

Under the brand name Additin®, the LANXESS Lubricant Additives business unit offers solutions for a wide range of industrial lubricants, lubricating greases and metalworking fluids. Typical application examples are hydraulic and turbine oils, and compressor and industrial gear oils. The customized high-performance additives and formulations in our Additin® range improve extreme pressure resistance, help prevent mechanical wear, increase corrosion protection and enhance antioxidancy – as single components or additive packages. We contribute to the success of our customers' business by increasing efficiency and reducing costs.

A TRADITION OF INNOVATIONS

Right from the beginning, LANXESS was a pioneer in the field of lubricant additives. As early as the 1950s, we started to market low-odor and high-performance extreme-pressure additives for lubricants. In subsequent years, we focused on the development of lubricity esters, phosphorus and sulfur additives to replace chlorinated paraffins. Other examples of the innovative strength of LANXESS are new water-miscible additives and highly efficient additive packages for high-performance lubricants that fulfil the most recent international standards and specifications.

SUSTAINABILITY FOR A GOOD ECOLOGY AND ECONOMY

In recent years, we have developed new additives used to manufacture environmentally acceptable lubricants that can be certified to the new European Ecolabel (EEL). LANXESS can also offer additives with OSPAR certification, for the formulation of lubricants for offshore applications.

QUALITY WITHOUT COMPROMISE

One of our primary goals is the ongoing improvement of our high quality level. Our activities in this context are geared to our ISO 9001 and ISO 14001 certifications, which serve as an incentive to continuously improve our production processes. One key to the excellent quality of our products is the state-of-the-art technology used at our production sites worldwide.

FOCUSING ON CHALLENGES.

Thanks to a worldwide distribution system, additives as well as excellent technical expertise are available practically anywhere around the world. The distribution system depends on employees, agents and distributors in numerous countries and on local distribution centers. Thus, it is not surprising that we are a leading solution provider for industrial lubricant applications worldwide.

ADDITIN® PORTFOLIO

Additin®	Product description	Chemical description	Characteristics	Applications
Additin® EP	Extreme-pressure additives (light and dark, active and inactive sulfur carriers)	Sulfurized compounds like fatty oils, fatty acids and/or olefins, esters	Improves extreme-pressure characteristics (load-carrying capacity) and protection against wear	Metalworking fluids, transmission and slide-way oils, greases
Additin® AW	Antiwear additives	Dialkyldithiophosphates, phosphoric partial esters, organic phosphates, carbamates	Reduces direct metal-to-metal contact while improving surface smoothness	Hydraulic, transmission, compressor, engine and gear oils, metalworking fluids, greases
	Friction modifiers	Molybdenum dialkyldithiophosphates, organic alkanolamides	Helps to reduce friction and wear on metal to metal boundary surfaces	
Additin® CI	Corrosion inhibition additives	Sulfonates, carboxylates, partial esters	Protects surfaces against corrosion	Anti-corrosion, preservation, compressor, engine, transmission, turbine and gear oils, metalworking fluids, greases
Additin® WM	Water-miscible additives	Polyalkylene glycols, polymers, sulfur-containing additives	Variety of carefully matched components to enhance lubricity, EP performance and corrosion protection	Water-miscible metalworking fluids, tank-side addition to water-mixed metalworking fluids, HFC fluids, water-based metal cleaners, anti-freeze
Additin® AO	Antioxidants	Phenols and amine derivatives	Reduction of oxidation	Hydraulic, transmission, turbine, compressor, engine and special oils, greases
Additin® SP	Specialties	Ester, N-containing heterocycles, triazole derivatives	Improves lubricity, antiwear effect and load-carrying properties and acts as deactivator for non-ferrous metals	Hydraulic, transmission, turbine, compressor, engine and special oils, greases, metalworking fluids
Additin® PA	Additive packages	Combination of extreme-pressure, antiwear and anti-corrosion additives, as well as antioxidants	Consists of a variety of carefully matched components to correspond to specific application standards	Ashless and ash-containing hydraulic oils, emulsifying and detergent hydraulic oils, industrial gear oils, slideway oils, greases and metalworking fluids

EXTREME-PRESSURE ADDITIVES

MORE THAN JUST OIL-SOLUBLE SULFUR



Applications

Products in the Additin® Extreme-Pressure (EP) range are generally used as a backbone in the formulation of modern neat oil and water-based metalworking fluids as well as greases, transmission and slideway oils. LANXESS provides the right solution for any application and offers competent assistance for selecting the most suitable alternatives.

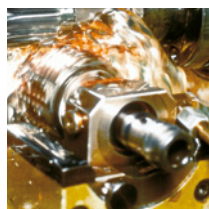
Mode of action:

Reduced cutting force and lower friction

Additin® EP products chemically react with the metal surface to form a protective sulfur-containing film. This reduces direct metal-to-metal contact, thereby reducing friction as well as material damage, e.g. damage caused by welding.

This product group was specially developed to meet the latest requirements of the lubricant oil industry and offers precisely the characteristics required in high-performance environments:

- Low-odor, light-colored additives with good solubility in many base fluids
- Multifunctional performance due to efficient friction reduction and anti-aging protection



Additin® EP / light-color, low-odor sulfur carriers

Additin®	Chemical basis	Total sulfur	Active sulfur	Viscosity 40 °C	Color	Cu-Corr. 3h/100 °C	Main applications				
							Metalworking fluids	Industrial gear oils	Greases	Slideway oils	
		approx. %	ASTM-D 1662 approx. %	ASTM-D 445 approx. mm ² /s	ASTM-D 1500 typical	ASTM-D 130 typical					
							Oils	Water-miscible			
							Cutting	Forming			
Based on esters											
RC 2310	Fatty acid ester	11	1	30	3.5	1b	■	■			■
RC 2315	Fatty acid ester	15	4	45	3.5	1b	■	■			■
RC 2317	Fatty acid ester	17	8	55	4.5	3a-3b	■		■		■
Based on triglycerides											
RC 2410	Triglyceride	10	1	350	3.5	1b	■	■	■		■
RC 2411	Triglyceride	9.5	< 1	230	3	1b	■	■	■		■
RC 2415	Triglyceride	15	5	300	4	3a-3b	■	■	■		
RC 2416	Triglyceride	15	5	230	5.5	1b-3a	■	■	■		
RC 2418	Triglyceride	18	9	220	4.5	3b-4c	■	■	■		
Based on olefins											
RC 2515	Fatty acid ester / Olefin	15	4	640	4	1b	■	■		■	■
RC 2516	Fatty acid ester / Olefin	15	4	650	4	1b	■	■		■	■
RC 2526	Fatty acid ester / Olefin	26	15	750	4.5	3a-4b	■	■	■		
RC 2540	Dialkylpentasulfide	40	36	45	2.5	3b-4b	■	■	■		■
RC 2541	Dialkylpentasulfide	40	35	45	2.5	1b	■	■			■
RC 2542	Dialkylpentasulfide	40	35	45	3	1b	■	■			■
RC 2545	Sulfurized isobutene	45	<5	65	2.5	1b				■	■

Additin® EP / dark-color sulfur carriers

Additin®	Chemical basis	Total sulfur	Active sulfur	Viscosity 40 °C	Color	Cu-Corr. 3h/100 °C	Main applications				
							Metalworking fluids	Industrial gear oils	Greases	Slideway oils	
		approx. %	ASTM-D 1662 approx. %	ASTM-D 445 approx. mm ² /s	ASTM-D 1500 typical	ASTM-D 130 typical					
							Oils	Water-miscible			
							Cutting	Forming			
RC 2811 (M 28.001)	Triglyceride	11	1	1400	D8	1b	■	■	■		■

ANTIWEAR ADDITIVES

EFFECTIVE REDUCTION OF MECHANICAL WEAR



Applications

Additin® Antiwear (AW) additives are widely used in metalworking fluids, greases, hydraulics and a variety of other industrial applications. The advantages of phosphorus additives are especially effective in medium- to low-stress boundary lubrication situations.

Mode of action: Harder and smoother metal surfaces

Phosphorus-based products in the Additin® AW range offer a flexible chemistry for a wide variety of solutions.

- Thermal and hydrolytic stability through phosphoric acid esters
- Multifunctional effect through dithiophosphates
- Extremely high AW performance at a low dosage through amine-neutralized phosphoric acid esters
- Excellent thermal stability due to carbamates

Additin® AW / dialkyldithiophosphates

Additin®	Chemical basis	Zn Mo	S	P	Color		Mineral oil content	Main applications				
					approx. %	typical		Metalworking oils / fluids	Hydraulic oils	Industrial gear oils	Engine oils	Greases
ASTM-D 1500												
Zinc dialkyldithiophosphates												
RC 3038	prim./sec. alkyl-ZnDTP	9.0	17.0	8.5	1.5	20	■					■
RC 3045	prim. alkyl-ZnDTP	10.5	19.0	9.5	4	10	■	■	■	■	■	■
RC 3048	prim. alkyl-ZnDTP	9.0	16.5	8.5	1.5	15	■	■	■			■
RC 3058	prim. alkyl-ZnDTP	9.5	18.0	9.0	5	20	■	■	■			■
RC 3080	2-ethylhexyl-ZnDTP	8.0	15.0	7.5	1.5	10		■				■
▼ Mineral-oil-free												
RC 3180	2-ethylhexyl-ZnDTP	9.5	16.0	8.0	1.5	0	■	■			■	■
Ashless dialkyldithiophosphates												
RC 3880	Amine dialkyldithio-phosphate	0.0	11.0	5.0	2	10	■	■	■	■	■	■
RC 3890	Neutral dialkyldithio-phosphate	0.0	11.0	5.0	0.5	0	■	■	■	■	■	■

Applications

Additin® RC 3502 is a fully organic friction modifier lubricant additive, soluble in a range of Group I-V base oils. Key applications include:

- Gasoline (spark-ignition) and diesel (compression combustion) engine oils
- Automatic transmission fluids
- Automotive and industrial gear oils
- Greases
- Marine and railroad diesel engine oils

Mode of action: Lower friction on surfaces

Our organic friction modifiers are with zero sulfated ash, phosphorus and sulfur, helping to reduce friction on metal to metal boundary surfaces. Non corrosive and fully soluble in a range of group I-V base oil chemistries.

- Acting at mixed & boundary-layer surfaces for lowering friction over a broad temperature range and surface types including gears and piston rings
- Provides durable-friction modifiers performance retention leading to extended fuel economy improvements in GF-6 ASTM D8114 engine dynamometer testing
- Gives supportive synergy with ZDDP EP-AW additives to help reduce wear
- Compatible and synergistic with other friction modifier additives especially MoDTC, as well as compatible with full scope of other lubricant additives

Additin® AW / friction modifiers

Additin®	Chemical basis	Zn Mo	S	P	Color	Mineral oil content	Main applications					
							Metalworking oils / fluids	Hydraulic oils	Industrial gear oils	Automotive	Greases	
		approx. %	approx. %	approx. %	Typical (Gardner)	approx. %			Engine oils	Gear oils	Transmission fluids	
Organic friction modifier												
RC 3502	100% Active ashless (C,H,O,N based)	0	0	0	8.7	0	■	■	■	■	■	
Molybdenum dialkyldithiophosphates												
RC 3580	2-ethylhexyl-MoDTP	8.0	12.0	6.0	-	20	■	■	■			■

Additin® AW / phosphoric acid derivatives

Additin®	Chemical basis	P	N	S	Mineral oil content	Main applications					
						Metalworking oils / fluids	Hydraulic oils	Industrial gear oils	Engine oils	Greases	
		approx. %			approx. %						
RC 3661	Phosphoric acid ester	8.5	-	-	0	■	■	■			
RC 3662	Phosphoric acid ester	8.5	-	-	0	■	■	■			
RC 3680	Phosphoric acid ester	7.0	-	-	0	■	■	■			
RC 3690	Phosphoric acid ester	9.1	-	-	0	■	■	■			
RC 3740	Phosphoric acid ester, amine-neutralized	9.0	3.8	-	0	■					
RC 3760	Phosphoric acid ester, amine-neutralized	4.9	2.5	-	0	■	■	■			
RC 3770	Phosphorus-sulfur-nitrogen additive	2.7	1.4	6.7	30	■	■	■			
RC 3775	Phosphorus-sulfur-nitrogen additive	3.8	3.1	6.2	0	■	■	■			■

Additin® AW / carbamates

Additin®	Chemical basis	Zn Sb	S	N	Mineral oil content	Main applications					
						Metalworking oils / fluids	Hydraulic oils	Industrial gear oils	Engine oils	Greases	
		approx. %			approx. %						
RC 6340	Methylene-bis-dialkyldithiocarbamate	-	30.0	6.5	-	■		■	■	■	

CORROSION INHIBITION ADDITIVES

PROTECTION FOR METAL SURFACES



Applications

Tribological systems need to be protected against corrosion by appropriate additivation. The Additin® Corrosion Inhibition (CI) range includes ash-containing and ash-free products to inhibit corrosion.

The Additin® CI range offers a number of desirable characteristics:

- Excellent corrosion inhibition
- Demulsibility in hydraulic oils
- Antiwear performance in gear oils
- Water resistance in greases
- Detergency in engine oils

Mode of action:

Creating hydrophobic metal surfaces

Corrosion inhibition additives in the Additin® CI range, such as synthetic calcium alkyl benzene sulfonates, are adsorbed on the polar metal surface to form a water-repellent and protective film, thereby effectively reducing corrosion.

Certain acidic fumes, such as sulfur dioxide, are well known for their accelerating effect on corrosion. To neutralize their impact, Additin® CI products are recommended for all applications in highly aggressive environments. They are equipped with additional alkaline reserves to neutralize any fumes contributing to corrosion.



Additin® CI / sulfonates

Additin®	Chemical basis	Ba, Ca, Mg, Na approx. %	ASTM-D 445	ASTM-D 4739	Mineral oil content approx. %	Main applications				
			Viscosity 40 °C approx. mm ² /s	TBN mg KOH/g		Power transmission oils	Industrial gear oils	Metalworking oils/fluids	Anti-corrosion oils	Greases
RC 4202 (M 42.008)	Calcium sulfonate/Carboxylate	2.5	high viscosity	40	28			■	■	■
RC 4203	Calcium sulfonate/Carboxylate	2.6	high viscosity	40	28			■	■	■
RC 4210 N	Calcium carboxylate/sulfonate	0.9	-	10	10			■	■	■
RC 4211	Calcium carboxylate/sulfonate	0.4	-	50	30			■	■	■
RC 4220	Synthetic, neutral calcium sulfonate	2.0	high viscosity	< 6	45	■	■	■	■	■
RC 4242	Overbased calcium alkylbenzene sulfonate	16	medium viscosity	400	40			■	■	■

Additin® CI / carboxylates

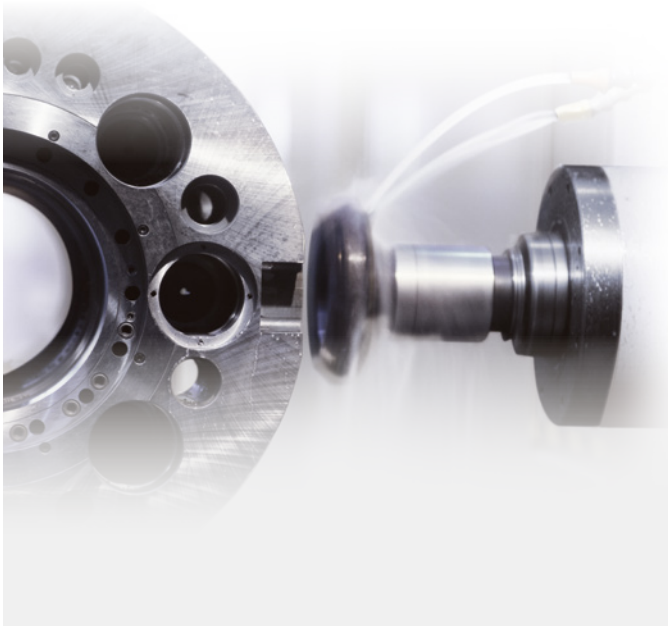
Additin®	Chemical basis	Zn approx. %	ASTM-D 445	Mineral oil content approx. %	Main applications					
			Viscosity 40 °C approx. mm ² /s		Power transmission oils	Industrial oils	Metalworking oils/fluids	Anti-corrosion oils	Greases	
RC 4530	Zinc naphthenate	6	medium viscosity	45		■	■			■
RC 4580	Zinc salt of an aliphatic acid	15	high viscosity	0			■	■		■

Additin® CI / carboxylic acid derivatives

Additin®	Chemical basis	Viscosity 40 °C approx. mm ² /s	ASTM-D 664	Mineral oil content approx. %	Main applications				
			Acid number approx. mg KOH/g		Power transmission oils	Industrial oils	Metalworking oils/fluids	Anti-corrosion oils	Greases
RC 4801	Succinic acid semi-ester derivative	1100	160	30	■	■	■	■	■
RC 4802	Amidated succinic acid derivative	2300	50	50	■	■	■	■	■
RC 4803	Amidated succinic acid derivative	450	85	0	■	■	■	■	■
RC 4810	Neutral, synthetic sulfonic acid ester based on natural raw materials	800	-	10			■	■	■
RC 4820	Amine-neutralized phosphoric acid partial ester of aliphatic alcohols	1050	-	0	■	■	■		■

WATER-MISCIBLE ADDITIVES

SOLUTIONS FOR WATER-MISCIBLE METALWORKING FLUIDS



Applications

Already today, many LANXESS components can be used in water-miscible metalworking fluids with the help of emulsifiers. The Additin® Water-Miscible (WM) series is developed for water-soluble and emulsifiable metalworking fluids. The series is ideally designed for the formulation of:

- Emulsifiable, semi-synthetic as well as water-soluble metalworking fluids
- HFC fluids
- Water-based metal cleaners and antifreeze
- In addition, several products can be used as tank-side additives

Mode of action:

Lubrication and protection of metal surfaces in aqueous systems

The Additin® WM range provides water-miscible additives that optimize the performance of water-miscible metalworking fluids by enhancing lubricity and extreme-pressure characteristics as well as corrosion protection.

Additin® WM / lubricity additives

Additin®	Chemical basis	Water solubility at 20 °C	Viscosity 40 °C ASTM-D 445 approx. mm ² /s	Main applications					
				Emulsifiable MWF	Semi-synthetic MWF	Water-soluble MWF	Tank-side addition to water-mixed MWF	HFC fluids	Water-based metal cleaners and antifreeze
RC 5001	Polyalkylene glycol	Water-soluble	160	■	■	■	■	■	
RC 5007	Polyalkylene glycol	Water-soluble	1,100			■		■	
RC 5010	Polymer	Water-soluble	750	■	■	■	■		

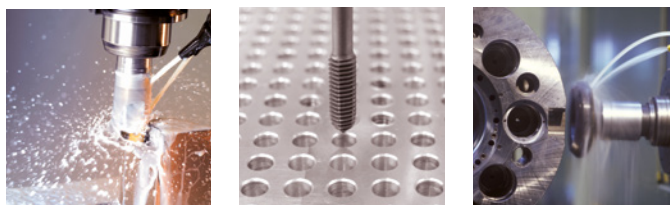
Additin® WM / extreme-pressure additives

Additin®	Chemical basis	Water solubility at 20 °C	Sulfur content approx. %	Main applications					
				Emulsifiable MWF	Semi-synthetic MWF	Water-soluble MWF	Tank-side addition to water-mixed MWF	HFC fluids	Water-based metal cleaners and antifreeze
RC 5201	Sulfur-nitrogen additive	Water-soluble after neutralization	63		■	■			
RC 5202	Sulfur-nitrogen additive	Water-soluble	21		■	■	■		■
RC 5250	Sulfurized fatty acid	Emulsifiable after neutralization	15	■	■	■			

Additin® WM / corrosion inhibition additives

Additin®	Chemical basis	Water solubility at 20 °C	Corrosion inhibitor for	Main applications						
				Emulsifiable MWF	Semi-synthetic MWF	Water-soluble MWF	Tank-side addition to water-mixed MWF	HFC fluids	Water-based metal cleaners and antifreeze	
RC 5428	Arylsulfonic carboxylic acid	Water-soluble after neutralization	Iron metals		■	■			■	■

For stabilization of water-miscible metal working fluids, we recommend the LANXESS MPP business unit's Preventol® O series



ANTIOXIDANTS

PREVENTING THE EFFECTS OF AGING



Applications

Lubricants are highly susceptible to aging. The additives of the Additin® Antioxidants (AO) range dramatically delay the aging process with all its negative side-effects.

Antioxidants perform well in nearly all lubricants and fuels. Depending on the temperature of a given application, phenolic or aminic formulations, or mixtures of both, may be recommended.

Mode of action: preventing the effects of aging

All products in the Additin® AO range are primary antioxidants that function as radical scavengers to slow down the aging process before it reaches a critical stage. Synergies can be achieved in combination with special AW, CI and EP Additin® grades.

- For applications where solid raw materials cannot be used, we offer our specially developed liquid antioxidants Additin® RC 7132 and Additin® RC 7135.
- Additin® RC 7010 is an oligomeric aminic antioxidant, designed for all applications where a very low volatility is required.
- Additin® RC 7001, Additin® RC 7110 and Additin® RC 7130 are the appropriate choice for applications which require FDA-listed additives. These products are HX-1 registered at NSF.



Additin® AO / phenolic antioxidants

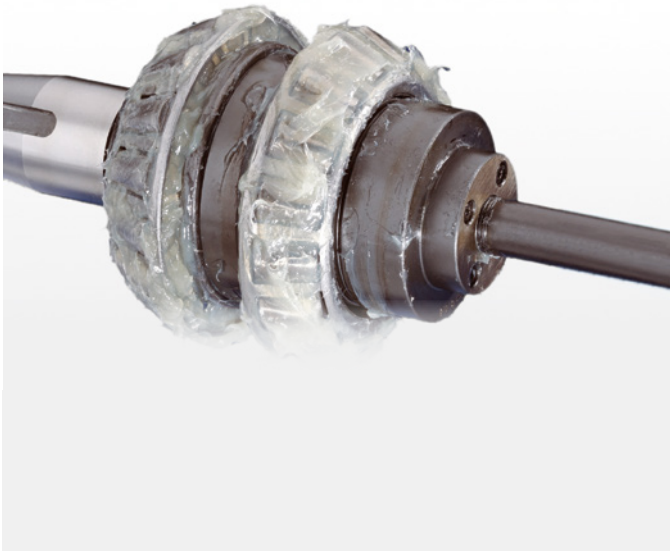
Additin®	Chemical basis	Flash point	Density 20 °C	Purity	Main applications					
					Metalworking oils/fluids	Power transmission oils	Industrial gear oils	Automotive gear oils	Greases	Other
		ASTM-D 92 approx. °C	ASTM-D 941 approx. kg/m ³							
RC 7110	2,6-Di-tert-butyl-4-methylphenol	127	1030	> 99.8	■	■	■		■	Turbine, compressor oils, fuels, polyglycols
RC 7115	Phenol derivative, sterically hindered	198	1040	> 99.0		■	■	■	■	Natural and synthetic ester oils, turbine, compressor and engine oils
RC 7120	2,6 Di-tert-butylphenol	110	910	> 99.0	■	■	■	■	■	Hydraulic fluids, natural and synthetic ester oils

Additin® AO / aminic antioxidants

Additin®	Chemical basis	N	Density 20 °C	Viscosity 40 °C	Main applications					
					Metalworking oils/fluids	Power transmission oils	Industrial gear oils	Automotive gear oils	Greases	Other
		approx. %	ASTM-D 941 approx. kg/m ³	ASTM-D 445 approx. mm ² /s						
RC 7001	p,p'-Diocetyl-diphenylamine	3.5	990	solid				■	■	Synthetic aircraft turbine oils, polyglycols, silicone oils
RC 7010	Oligomeric 1,2-dihydro-2,2,4-trimethylquinoline	7.5	1100	solid					■	Brake fluids, polyglycols, synthetic ester
RC 7130	1-Naphthyl-phenylamine	6	1200	solid		■	■	■	■	Engine oils, aircraft turbine oils
RC 7132	Combination of aminic antioxidants	5	1090	300	■	■	■	■	■	Heat transfer oils, quenching oils, chain oils
RC 7135 LD	Diphenylamine derivative	4.3	1090	650	■	■	■	■	■	Engine oils, high-temp. chain oils, turbine and compressor oils

SPECIALTIES

SOLUTIONS FOR PARTICULAR REQUIREMENTS



Synthetic esters and polymers

These additives are based on selected raw materials to optimize affinity to different metal surfaces, such as stainless steel (e.g. Additin® RC 8100) or aluminum (e.g. Additin® RC 8103).

EP additives and non-ferrous metal deactivators

Non-ferrous metal deactivators with special EP properties (e.g. Additin® RC 8210) play an important role in reducing corrosion and aging. These additives act as synergists to primary and secondary antioxidants.

Additin® SP / synthetic esters and polymers

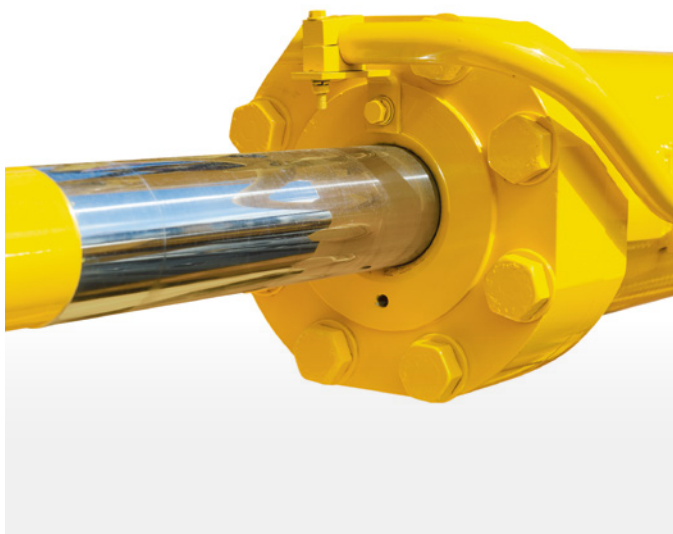
Additin®	Chemical basis	Density	Viscosity	Mineral oil content	Main applications						
		20 °C	40 °C		Metalworking oils/fluids	Power transmission oils	Industrial gear oils	Automotive gear oils	Greases	Other	
		ASTM-D 941 approx. kg/m ³	ASTM-D 445 approx. mm ² /s	approx. %							
RC 8000	Sulfur-linked polymer	990	highly viscous	0	■					■	
RC 8012	Sulfur-containing semi-synthetic ester	950	60	0	■	■	■		■		Offshore lubricants
RC 8100	Polycarboxylate	1000	3000	0	■					■	Slideway oils
RC 8103	Trimethylpropane ester of special fatty acids	940	85	0	■					■	Slideway oils

Additin® SP / extreme-pressure additives and non-ferrous metal deactivators

Additin®	Chemical basis	Density	Bulk density	Sulfur content	Mineral oil content	Main applications					
		20 °C					Metalworking oils/fluids	Power transmission oils	Industrial gear oils	Automotive gear oils	Greases
		ASTM-D 941 approx. kg/m ³	approx. kg/m ³	approx. %	approx. %						
RC 8210	Dimercapto thiazole derivative	1070	-	30	0	■	■	■	■	■	
RC 8213	Dimercapto thiazole derivative	1080	-	36	0	■	■	■	■	■	
RC 8220	Benzotriazole	-	500	0	0	■	■	■	■	■	
RC 8221	Tolytriazole	-	550	0	0	■	■	■	■	■	
RC 8239	Tolytriazole derivative	950	-	0	0	■	■	■	■	■	Fuels

ADDITIVE PACKAGES

SYNERGY FOR HIGHER PERFORMANCE



Applications

The ashless and zinc-based Additin® Packages (PA) meet the latest technological OEM and industry requirements and specifications. New low-sulfur base oils, in combination with optimized additive packages offer superior opportunities for improving performance in hydraulic, turbine and compressor oils. Highly efficient packages for low-friction slideway oils, greases, industrial gear oils and metalworking provide solutions for the strictest requirements.

Mode of action:

Our Know-How and Service in one Package

The idea behind additive packages is to form a well-balanced composition of many different single components. Such solutions reflect a high level of know-how and clearly set LANXESS apart from other chemical suppliers as a true specialist in the field of additives. Additive packages in the Additin® PA range are complex formulations, proven solutions that help cut development time while assuring high quality and reducing costs and complexity in analysis, inventory and order management.



The ashless and zinc-based additive packages provide outstanding performance in a variety of applications even at the lowest treat rates. With the newly developed ashless HLP-D package Additin® RC 9317, LANXESS sets a new standard in the industry.

Additin® PA / hydraulic packages

Additin®	Chemical basis	Zn	P	S	Ca	N	Viscosity 40 °C ASTM-D 445 approx. mm ² /s	Mineral oil content approx. %	Main application	Others			Remarks
										Power transmission oils / Hydraulics	Compressor oils	Turbine oils	
Ash-containing													
RC 9200 N	AW/CI/AO	4.7	4.2	9.2	1.2	-	145	20	■				HF-0, HLP, RDE 90235
RC 9207	AW/CI	7.6	6.6	13.8	-	-	120	10	■				HLP
RC 9217	AW/CI/AO	6.6	6.3	13.6	0.1	-	70	20	■				HLP-D
Ash-free													
RC 9300	AW/CI/AO	-	0.8	1.7	-	2.6	55	23	■	■	■		HF-0, HLP
RC 9305	AW/CI/AO	-	1.0	-	-	3.1	120	5	■	■			HLP
RC 9317	AW/EP/CI/AO	-	0.4	14.4	-	2.3	580	13	■				HLP-D
RC 9321	CI/AO	-	0.5	7.0	-	3.6	80	5	■	■	■	■	R&O oils
RC 9330	AW/CI/AO	-	1.0	-	-	1.5	70	-	■	■			HLP, CLP, NSF

The multifunctional package Additin® RC 9410 is designed for industrial gear oils and can be used in numerous other applications, including metalworking fluids, slideway oils and many more. Additin® RC 9420 is a modern package meeting all industrial gear oil standards.

Additin® PA / multifunction packages

Additin®	Chemical basis	Zn	P	S	Ca	N	Viscosity 40 °C ASTM-D 445 approx. mm ² /s	Mineral oil content approx. %	Main applications		Remarks
									Metalworking fluids	Industrial gear oils	
Ash-free											
RC 9410	AW/EP/AO/CI	-	1.3	16	-	1.0	65	20	■	■	CLP
RC 9420	AW/EP/AO/CI	-	0.5	23.0	-	1.0	40	30		■	CLP

Our packages for greases feature excellent properties. They are designed specifically for high demands on extreme-pressure and antiwear performance, corrosion protection (even under severe conditions e.g. sea water), as well as showing yellow metal compatibility combined with very good oxidation stability.

Additin® PA / grease packages

Additin®	Chemical basis	Zn	P	S	Ca	N	Viscosity 40 °C ASTM-D 445 approx. mm ² /s	Mineral oil content approx. %	Properties					
									AW	EP	AO	CI	Cu-Corr. 24h/120 °C	Color
Ash-containing														
RC 9502	EP/AW/CI	4.5	3.7	15.6		1.1	80	9	++	+++	++	++	+	light
RC 9505	EP/AW/CI	5.1	4.5	14.5		0.3	250	21	++	+	++	+	++	dark
RC 9506	EP/AW/CI	3.3	2.4	22.2		0.3	80	15	++	+++	+++	+	+++	dark

+++ = excellent ++ = very good + = good

The chlorine- and zinc-free additive packages, with their excellent load-carrying capacities, antiwear properties and corrosion protection, can be adapted to the requirements of multi-applications by varying treatment level and base fluid viscosity.

Additin® PA / metalworking packages

Additin®	Chemical basis	P	S	Viscosity 40 °C ASTM-D 445 approx. mm ² /s	Materials					Main applications				
					Steel	Stainless steel	Aluminum	Yellow metals	Titanium	Cemented carbide	Cutting	Forming	Stamping	Grinding
RC 9701	EP/AW	3.0	6.6	36	■					■				■
RC 9720	EP/AW/CI	0.3	16.0	105	■	■	■	■	■		■	■		
RC 9730	EP/AW/CI	0.7	16.0	220	■	■	■	■	■		■	■		

APPLICATION-DRIVEN CHEMISTRY

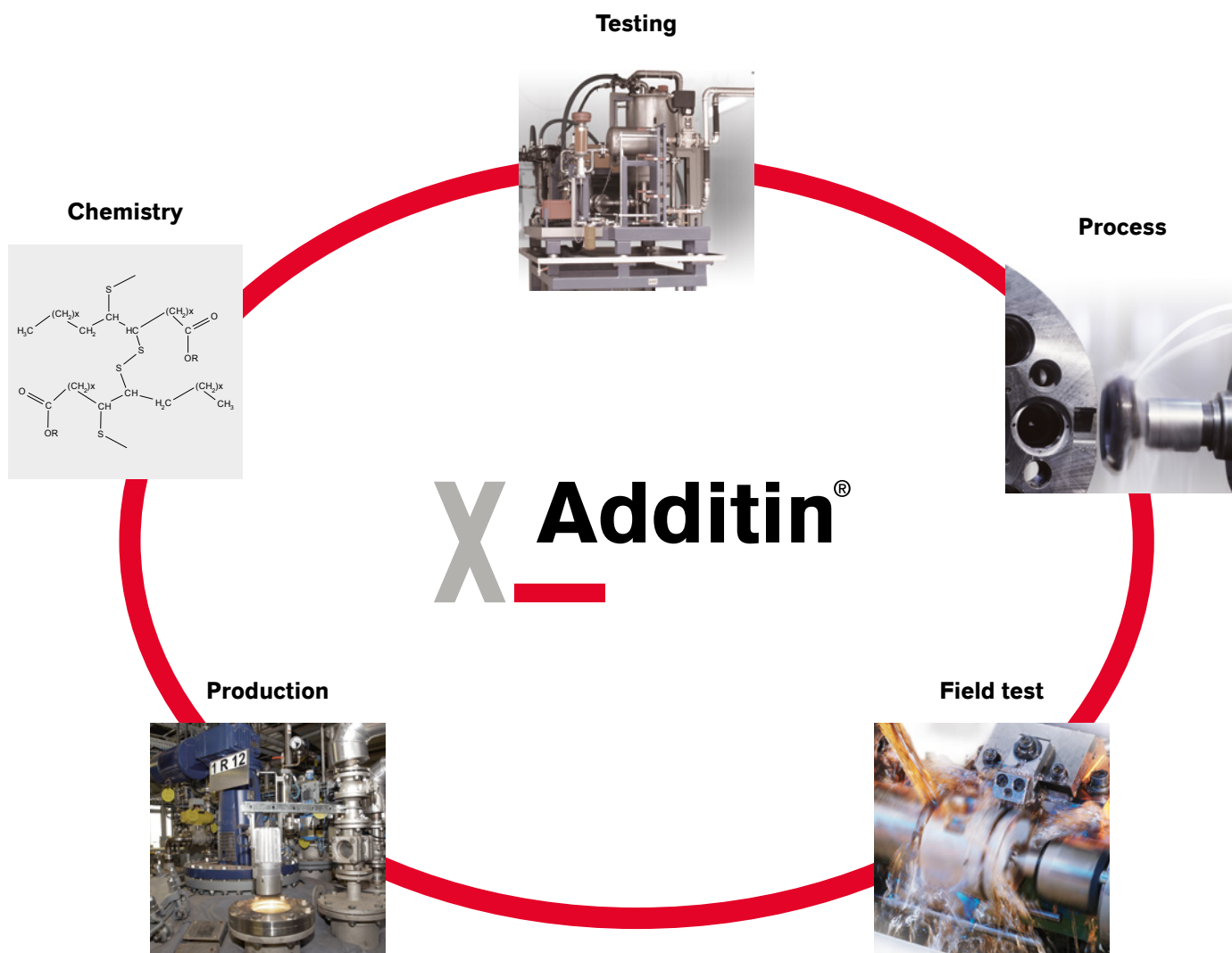
Innovative worldwide

We are a reliable and innovative partner for our customers, on-site in all regions across the globe. Since we want to be where our customers are, we have established technical competence and development centers in Europe, Asia and the United States. With our own analytic labs and research centers and our teams that are familiar with the requirements of the local market, we can respond to individual customers' needs for technical service in relation to products and applications. Knowing what the market wants also enables us to work on targeted new product developments for selected applications in the regions.

Integrated technology

Our core competence lies in the optimal connection between all conditions that are required for developing and producing a premium lubricant oil additive:

- Thorough chemical knowledge
- Expertise in analytical and tribological testing
- Long-term field experience
- Extensive production know-how



Performance test equipment

Our in-house testing devices are used for the development of new lubrication technologies. In addition, we offer testing services to our customers for the evaluation of their finished formulations based on Additin® technology.

We have all the specific testing equipment necessary for the development of industrial oils, metalworking fluids and greases. Particular worth mentioning is the fact that we are among the few companies worldwide that own a Parker Denison T6H20C hybrid pump and a Bosch Rexroth RFT-APU-CL test rig for high performance hydraulic fluids.

Highlights

- Parker Denison T6H20C hybrid pump
- Bosch Rexroth RFT-APU-CL test rig
- FAG FE-8 bearing tester
- FZG gear tester
- Timen test rig
- Microtap tapping torque machine
- SRV-4 test rig for friction measurement
- Flender Foam Test
- 3D optical profilometer
- Basic equipment such as for the four ball test, salt spray cabinet and a wide range of application and analytical tests



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Unless specified to the contrary, the values given have been established on standardized test specimens. The figures should be regarded as guide values only and not as binding minimum values. Kindly note that the results refer exclusively to the specimens tested. Under certain conditions, the test results established can be affected to a considerable extent by the processing conditions and manufacturing process.

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