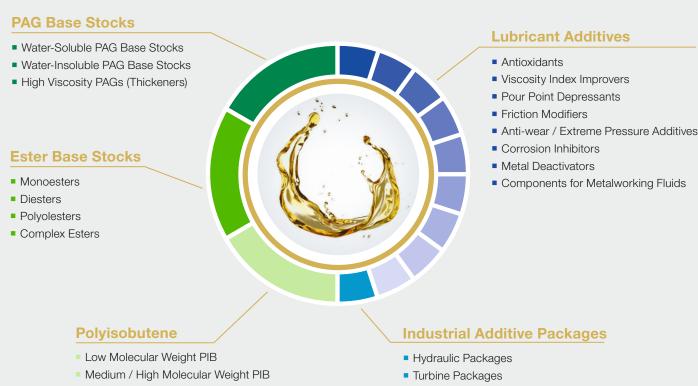
BASF Lubricant Base Stocks and Additives



As a leading global supplier of lubricant base stocks and additives, we are passionate about partnering our customers with strong expertise and best-in-class solutions to meet market requirements today and tomorrow. We are unique in the lubricant industry, offering a broad and extensive portfolio to support the wide range of lubricant applications and enable performance, quality and innovative growth.

Gear Packages

Our high performance and reliable components support the drive towards improved fuel economy, extended equipment lifetime and sustainable solutions. Looking to tomorrow, we are committed to continuously developing products that meet the emerging needs of our customers. Leveraging our global production footprint, strong R&D competence and sustainability expertise, BASF is the ideal partner to fulfill your lubricant component needs.

Key benefits

- High quality products with superior performance
- Products that are effective at low treat rates
- Cost effective technology
- Technical and formulation support
- Comprehensive lubricant additive portfolio
- Global availability and supply network
- Global registration and regulatory

Sustainability features

- Extended service life of lubricants
- Equipment protection for increased lifetime
- State of the art regulatory profile
- Portfolio includes products with FDA/USA approval for use in blending lubricants with incidental food contact
- Portfolio includes LuSC listed products that can be formulated for environmentally sensitive applications









Our lubricant additives keep things moving



Get in contact

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D • **BASF** We create chemistry

Lubricant **Additives Selection Guide**

BASF SE Lubricant Components basf.com/lubricant-components

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03/2023

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Main applications

Chemical and physical properties*

Kinematic

viscositv

[40°C]

solid

280

675

solid

solid

solid

solid

liquid

120

 mm^2/s

[100°C]

_

-

-

Treat level^{[1}

wt %

0.1 - 1.0

0.2 - 1.0

0.2 – 1.0

0.2 – 1.0

0.2 - 1.0

0.2 - 0.6

0.1 – 0.8

0.1 – 0.5

0.2 – 1.0

point/range

Product name	Description	Metalworking	Compressor	Turbine	Hydraulic	Grease	Gear	Engine	ATF	
Antioxidants – aminic		2	0	F	Т	Ö	U	ш	٩	
Irganox® L 06	High purity alkylated phenyl alpha naphthylamine		•	•	•	٠		•		
Irganox® L 57	Liquid octylated/butylated diphenylamine	•	•	٠	•	•	•	•	٠	
Irganox® L 67	Liquid nonylated diphenylamine	•	•	•	•	•	•	•	٠	
Antioxidants – phenolic										
Irganox [®] L 101	High molecular weight phenolic antioxidant	•				•				
Irganox [®] L 107	High molecular weight phenolic antioxidant		•			•				
Irganox [®] L 109	High molecular weight phenolic antioxidant	٠	•			•				
Irganox [®] L 115	High molecular weight phenolic antioxidant with a thioether group				٠	•	•	٠		
Irganox [®] L 125	High molecular weight phenolic antioxidant with a thioether group				•	•	•	•		
Irganox® L 135	Liquid high molecular weight phenolic antioxidant	•	•	•	•	•	•	•	•	
Secondary antioxidants										
Irgafos® 168	Tris (ditertbutyl phenyl)phosphite					•	•		•	
Antioxidants – blends										
Irganox® L 55	Liquid mixture of aminic antioxidants		•	•	•	•	•	•	•	
Irganox [®] L 64	Liquid mixture of aminic and high mol. wt. phenolic antioxidants	•	•	•	•	•	•	•	•	
Irganox [®] L 74	Liquid mixture of ashless antioxidants and antiwear additives		•			•	•			
Irganox [®] L 150 Friction modificro	Liquid mixture of aminic and high mol. wt. phenolic antioxidants	•	•	•	•	•	•	•	•	
	Liquid fuel economy additive for engine of							-		
Irgalube [®] FE 1 Synative [®] FER 45	Liquid fuel economy additive for engine oil			-	•			•		
Synative® EEB 45	Polyether based hybrid		•	•	•	•	•		•	
Irgalube [®] F 10 A Extreme pressure/antiwear additives	Liquid high molecular weight multifunctional components	•					•	•		
Irgalube® TPPT	Triphenyl phosphorothionate	•	•		•	•	•			
Irgalube [®] 232	Liquid ashless butylated triphenyl phosphorothionate		•				•		•	
Irgalube [®] 211	Liquid ashless nonylated triphenyl phosphorothionate		•		•	•	•	•	•	
Irgalube [®] 63	Liquid ashless lithiophosphate		•				•			
Irgalube [®] 353	Liquid ashless dithiophosphate		•	•		•	•		•	
Irgalube [®] 355	Partially neutralized amine dithiophosphate derivative	•	•	•	•		•		•	
Irgalube [®] 349	Liquid mixture of amine phosphates	•	•	•	•	•	•	•	•	
Metal deactivators – oil-soluble			-	-		-	-	-		_
Irgamet® 30	Liquid triazole derivative	•	•	•	•		•		•	
Irgamet® 39	Liquid tolutriazole derivative	•	•	•	•	•	•		•	
Irgamet [®] SBT 75	Hydrogenated benzotriazole	•	•	•	•	٠	•		•	
Metal deactivators – water-soluble										_
Irgamet [®] 42	Liquid water soluble tolutriazole derivative	•			• [3]					
Irgamet [®] BTZ	Benzotriazole	٠			•[3]					
Irgamet [®] TTZ	Tolutriazole	•			• [3]					
Irgamet [®] TT 50	50% tolutriazole sodium salt in water	٠			• [3]					
Corrosion inhibitors – oil-soluble										
Amine O	Liquid imidazoline derivative	•			•	٠	•		•	
Irgacor [®] L 12	Liquid alkenyl succinic acid half ester	٠	•	•	•		•			
Irgacor [®] NPA	Liquid iso- nonyl phenoxy acetic acid		•	٠	•					
Irgalube [®] 349	Liquid mixture of amine phosphates	•	•	•	•	•	•	•	٠	
Sarkosyl® O	Liquid N-oleyl sarcosine	•			•	•	•			
Sarkosyl® O-NA	Liquid N-oleyl sarcosine	•			•	•	•			
Corrosion inhibitors – water-soluble										
rgacor [®] DSS G	Disodium sebacate	•				•				
lrgacor® L 184	Liquid; solution of Irgacor® L 190 neutralized with TEA $^{\mbox{\tiny [2]}}$ in water	•			•[3]					
rgacor® L 190	Wet cake of an organic polycarboxylic acid	•			•[3]					
rgacor [®] L 190 Plus	Wet cake of an organic polycarboxylic acid	•			•[3]					
Pour point depressants										
rgaflo [®] 610 P	Methacrylate polymers dispersed in a mineral oil		•	٠	•		٠	٠	٠	
rgaflo® 649 P	Methacrylate polymers dispersed in a mineral oil		•	•	•		•	•	٠	
rgaflo® 710 P	Methacrylate polymers dispersed in a mineral oil		•	٠	٠		•	•	٠	
rgaflo® 720 P	Methacrylate polymers dispersed in a mineral oil		•	•	•		•	•	٠	
rgaflo [®] 820 P	Methacrylate polymers dispersed in a mineral oil		٠	٠	٠		٠	٠	٠	
rgaflo [®] 942 P	Methacrylate polymers dispersed in a mineral oil		•	•	•		•	•	٠	
Viscosity index improvers										
Irgaflo® 1050 V	Methacrylate polymers dispersed in a mineral oil						٠			
Irgaflo® 1100 V	Methacrylate polymers dispersed in a mineral oil				٠					
Irgaflo® 3500 V	Methacrylate polymers dispersed in a mineral oil							•		
Irgaflo® 6000 V	Methacrylate polymers dispersed in a mineral oil				٠					
Irgaflo® 6100 V	Methacrylate polymers dispersed in a mineral oil				٠					
Irgaflo [®] 6200 V	Methacrylate polymers dispersed in a mineral oil				٠					
	Matheory data web means diapered in a mineral oil				•					
rgaflo® 6300 V rgaflo® 6305 V	Methacrylate polymers dispersed in a mineral oil Methacrylate polymers dispersed in a mineral oil									

) Not determined or not applicable. 🕅 Typical for lubricants. 🦷 Triethanol amine. 🖷 For water-based formulations. 🦷 These are approximate solubility levels. Values will vary depending on the base fluid charateristics, storage conditions and other additives present. Generally it is recommended that the additive solubility be checked in the finished fluid. Mineral oil used is ISO VG 32 and ester used is Diisodecyl adipate.

0.1 – 0.3 solid 183 – 186 solid 0.2 – 1.0 565 1.00 0.2 – 1.0 800 1.00 1.0 --1.02 7.5 98 0.5 - 1.0_ _ 0.1 – 0.8 2800 - - 1.00 0.8 0.4 - 1.0155 – 233 0.96 _ 1-5% 305 - 354 40 - 50 - 37 0.93 -0.5 – 1.5 400 0.99 _ 0.2 – 1.0 solid 52 solid 9.3 0.2 - 1.0 1.16 8.1 55 -0.5 - 20.0 1.00 3000 4.4 0.2 - 0.8 21.5 5 1.10 0.01 - 2.0 90 _ 1.10 19.8 _ 0.01 - 2.0 260 -1.04 13.9 0.1 – 2.0 2390 0.92 _ 0.05 - 0.1 33 0.92 0.95 – 0.02 - 0.1 80 – _ 0.02 - 0.2 80 - 86 solid solid --0.1 – 0.3 1.16 33 < 5 0.01 – 1.0 solid 93 solid --0.01 - 1.0 solid 85 solid --0.5 - 2.0 18 - - 8 1.19 -0.05 - 2.0 0.94 114 ≤ – 15 _ 0.02 - 0.1 1500 --0.96 – 1750 1.03 0.02 - 0.1_ < 0 _ 0.1 - 1.0 2390 - <10 0.92 -0.03 - 1.0 350 0.96 ---0.03 - 1.0 350 0.96 _ _ _ 0.3 - 3.0solid > 200 solid 0.5 – 2.2 80 1.15 – -0.2 – 1.1 180 – 182 solid solid _ -0.2 – 1.5 solid _ 180 - 182 solid _ 0.1 - 0.80.89 < 0.01 65 0.1 – 0.8 0.89 < 0.01 -90 70 0.1 – 0.8 --0.89 < 0.01 0.89 < 0.01 0.1 – 0.8 - 65 -0.1 – 0.8 265 0.91 < 0.01 ---0.1 – 0.8 750 0.91 < 0.01 10 - 30 < 0.01 490 0.92 5 – 15 800 0.90 < 0.01 --3 – 7 1100 0.89 < 0.01 --5 – 10 1700 0.90 < 0.01 --0.90 5 – 10 1200 < 0.01 _ -5 – 15 - 850 0.92 < 0.01 5 - 15 _ 1000 -0.90 < 0.01 5 – 15 1000 0.92 < 0.01 dditives cleared by the FDA under 21 CFR 178.3570 for use in blending lubricants with incidental food contact. 🗮 Between 1 % and 15 % solubility gap. At all other ratios fully miscible. 🕅 When pH adjusted with triethanolamine (TEA) or another base to pH > 8 can increase solubility to > 5.0 % in water. Standard ASTM Methods are not necessarily applicable for active components. Values are rounded.

Melting oint/range °C	Density	Element content			TAN/TBN ^[8]				FDA/NSF ^[5]	LuSC listing ^{[9}				
	g/cm³ [20 °C]	S (%)	P (%)	N (%)	mg KOH/g	Group I	Group II	Group III	Group IV (PAO)	Group V (PAG)	Ester	Water	Maximum treat level wt %	
> 75	solid	_	_	4.2	< 10/ -	3.0	3.0	3.0	3.0	10.0	> 5.0	< 0.01	≤ 0.5	yes
-	0.98	-	-	4.5	- /180	> 5.0	10.0	10.0	10.0	5.0	> 5.0	< 0.01	≤ 0.5	-
-	0.952	-	-	3.6	ND	> 5.0	> 5.0	> 5.0	> 5.0	-	-	-	-	yes
110 – 125	solid	_	-	-	< 10/-	< 0.5	0.3	0.3	0.1	1.0	2.0	< 0.01	≤ 0.5	yes
50	solid	-	-	-	< 10/-	5.0	1.0	1.0	1.0	< 0.01	> 5.0	< 0.01	-	yes
105	solid	-	-	-	< 10/-	3.0	1.0	1.0	1.0	1.0	> 5.0	< 0.01	≤ 0.5	yes
70	solid	4.9	-	-	< 10/-	1.0	0.8	0.8	0.8	1.0	> 5.0	< 0.01	≤ 0.5	yes
-	0.98	15	-	-	< 10/-	1.0	0.8	0.8	< 3.0	> 5.0	< 5.0	< 0.01	≤ 0.5	yes
-	0.96	-	-	-	< 10/ -	> 5.0	10.0	10.0	10.0	10.0	> 5.0	< 0.01	-	yes
183 – 186	solid	-	4.8	-	< 10/ -	1	0.5	0.5	0.1	0.1	1.0	< 0.01	≤ 0.5	yes
-	1.00	_	_	4.3	- /175	10.0	10.0	10.0	10.0	10.0	> 5.0	< 0.01	≤ 0.62	_
-	1.00	1.0	-	3.8	- /145	3.0	0.5	0.5	1.0	1.0	> 5.0	< 0.01	≤ 0.6	-
-	1.02	7.5	2.3	2.3	< 10/91	1.0	1.0	1.0	0.5	1.0	> 5.0	< 0.01	-	-
-	1.00	0.8	-	3.2	< 10/127	5.0	1.0	1.0	1.0	5.0	> 5.0	< 0.01	≤ 0.7	-
_	0.96	_	_	3.2	TBN 4.0	> 5.0	> 5.0	> 5.0	> 5.0	_	_	_	_	_
- 37	0.93	_	_	-	< 0.5	fully	fully	fully	fully	> 20	fully	_	_	_
- 37	0.99	-	-	_	< 10/ -	0.5	0.05	0.05	0.05	5.0	> 5.0	< 0.1	-	-
52	solid	9.3	8.9	-	< 10/-	1.0	1.0	1.0	1.0	3.0	> 5.0	< 0.01	≤ 0.5	yes
-	1.16	8.1	7.9	-	< 10/-	1.0	1.0	1.0	3.0	5.0	> 5.0	< 0.01	≤ 0.5	-
-	1.00	4.4	4.3	-	< 1/-	10.0	5.0	5.0	5.0	10.0	> 5.0	< 0.01	≤ 0.5	yes
-	1.10	21.5 19.8	9.7 9.3	-	< 10/-	10.0	1.0	1.0	3.0	5.0	> 5.0	< 0.01	-	-
-	1.10 1.04	13.9	6.6	- 0.9	120/-	10.0 10.0	10.0 10.0	10.0 10.0	3.0 3.0	5.0 5.0	> 2.0 > 2.0	< 0.01 < 0.01	-	yes
-	0.92	-	4.8	2.7	140/95	5.0	5.0	5.0	10.0	0.5	> 5.0	< 0.01	≤ 0.5	yes yes
-	0.92 0.95	_	-	17.3 14.6	< 10 / 175 - / 145	5.0 5.0	10.0 10.0	10.0 10.0	0.5	3.0 0.1	> 5.0 > 5.0	< 0.01 < 0.01	_ ≤ 0.1	_ yes
80 - 86	solid	-	-	25	- /370	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.01	_	-
-				17.5	105/170	0.04	0.01	0.04	0.01	10.0				
< 5	1.16	-	-	17.5	165/170	< 0.01	< 0.01	< 0.01	< 0.01	10.0	< 0.1	see note [6]	-	-
93 85	solid	-	-	35.3	_	0.05	0.05	0.05	0.05	0.1	< 0.1	2 > 5 ^[7]	-	yes
- 8	solid 1.19	_	_	31.6 14	-	< 0.05 < 0.05	< 0.01 < 0.01	< 0.01 < 0.01	< 0.01 0.1	< 0.01 0.1	< 0.1 < 0.1	100	-	yes -
-		1		1										
≤ - 15	0.94	-	-	8.2	- /160	10.0	10.0	10.0	10.0	10.0	10.0	< 0.01	≤ 0.5	-
-	0.96	-	-	-	160/215	5.0	5.0	5.0	1.0	5.0	> 3.0	< 0.01	-	yes
< 0	1.03	-	-	-	200/-	10.0	10.0	10.0	1.0	1.0	> 3.0	< 0.01	-	-
< 10	0.92	-	4.8	2.7	140/95	3.0	5.0	5.0	10.0	0.5	> 5.0	< 0.01	≤ 0.5	yes
-	0.96	-	-	3.7	160/- 160/-	10.0 10.0	10.0 10.0	10.0 10.0	10.0 10.0	3.0 3.0	5.0	< 0.01	≤ 0.5	yes
-	0.90	-	-	3.7	1007 -	10.0	10.0	10.0	10.0	3.0	5.0	< 0.01	≤ 0.5	-
> 200	solid	-	-	-	-	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.1	5	≤ 2.0	-
-	1.15	-	-	-	-	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.1	> 5	-	-
180 – 182 180 – 182	solid solid	-	-	18 22.8	355/-	0.01	< 0.01 < 0.01	< 0.01 < 0.01	< 0.01 < 0.01	< 0.01 < 0.01	< 0.1 < 0.1	> 5 ^[7] > 5 ^[7]	-	-
-	0.89	< 0.01	-	-	-	> 50	> 50	> 50	> 50	-	> 50	immiscible	-	-
-	0.89	< 0.01	-	-	-	> 50	> 50	> 50	> 50	-	> 50	immiscible	-	-
-	0.89	< 0.01 < 0.01	-	-	-	> 50	> 50	> 50	> 50	-	> 50	immiscible	-	-
-	0.89	< 0.01	-	-	-	> 50 > 50	> 50 > 50	> 50 > 50	> 50 > 50	-	> 50 > 50	immiscible immiscible	-	_
-	0.91	< 0.01	_	-	-	> 50	> 50	> 50	> 50	_	> 50	immiscible	-	-
-	0.92	< 0.01	-	-	-	> 50	> 50	> 50	> 50	-	> 50	immiscible	-	-
-	0.90	< 0.01	-	-	-	> 50	> 50	> 50	> 50	-	> 50	immiscible	-	yes
-	0.89	< 0.01 < 0.01	-	-	-	> 50 > 50	> 50 > 50	> 50 > 50	> 50 > 50	-	> 50 > 50	immiscible immiscible	-	-
_	0.90	< 0.01	-	-	_	> 50	> 50	> 50	> 50	_	> 50	immiscible	-	_
	0.90	< 0.01	_	_	_	> 50	> 50	> 50	> 50	_	> 50	immiscible	_	_
-	0.90	< 0.01	-	-	-	> 50	> 50	> 50	> 50	_	> 50	immiscible	-	-
	0.92	< 0.01	_	_	_	> 50	> 50	> 50	> 50	_	> 50	immiscible	_	_

Values given in this table represent only typical characteristics. Detailed prod specifications are given in the relevant product data sheets or MSDS.

Features and benefits

Antioxidants

Our core competency in antioxidants has set the standard for lubricant oxidative stability.

When lubricants are exposed to heat, gases or mechanical stress, the molecules can break down and form radicals which react with oxygen to cause oil thickening, deposits and acid build-up. Antioxidants eliminate these radicals and prevent thermo-oxidative breakdown.

IRGANOX® Antioxidants help extend the life and improve the performance of industrial and engine lubricants. The manufacturing industry benefits from longer equipment life and fewer maintenance shutdowns. Automotive lubricants benefit from longer drain intervals and improved fuel economy. Our ongoing research and development efforts are aimed at helping our customers meet ever tougher performance standards and tighter specifications.

Many of our antioxidants are FDA regulated to formulate incidental food contact lubricants and greases for use in food-handling and manufacturing equipment.

Extreme pressure/antiwear additives

IRGALUBE® Antiwear and Extreme Pressure Additives provide long term lubricant stability together with excellent antiwear and corrosion prevention while protecting industrial and mobile equipment operating at high pressure and temperature.

Our IRGALUBE® range is ashless, helping the customer to formulate lubricants for more environmentally sensitive applications.

Metal deactivators

Our IRGAMET® Metal Deactivators suppress chemical attack on the surface of copper and copper alloys, as well as protecting copper surfaces from blackening upon exposure to sulfur-containing lubricants at high temperatures. They contribute to longer oil lifetime by passivating the metal surface and avoiding residues that act as catalysts for radical formation.

Our IRGAMET® range are effective at very low treat rates and have high synergism with IRGANOX® Antioxidants to deliver superior oxidative stability. Our range contains oil-soluble and water-soluble products, some are released by FDA for incidental food-contact applications.

Corrosion inhibitors

Corrosion occurs when water enters the lubricant system. This can be counteracted by the use of corrosion inhibitors. In addition, they deactivate the metal surface thus ensuring that lubricant degradation processes are not catalyzed. Corrosion inhibitors can protect ferrous metal surfaces by surface adsorption, changing the interfacial properties and neutralizing acidic species.

Our IRGACOR® Corrosion Inhibitors are the solution to protect ferrous metals against rust and oxidation. In some cases even multi-metal protection is possible. Oil-soluble and water-soluble products are available, with low foaming tendency and excellent air release. Use of ashless corrosion inhibitors can also reduce heavy metal contamination of the environment. Many of the products are FDA regulated for use in incidental food-contact applications.

Pour point depressants

Modern lubricants are expected to maintain their high performance at a range of different temperatures. Pour point depressants ensure lubricant flowability and efficient functioning at low temperatures.

Our IRGAFLO® Pour Point Depressants are engineered to provide cost effective solutions for your low temperature requirements across different base stock groups, performance packages and applications.

Viscosity index improvers

Lubricants today should promote higher productivity, fuel economy, higher power density (eg. in hydraulic systems), longer service intervals and reduced maintenance time.

Our IRGAFLO® Viscosity Index Improvers help overcome these challenges in a wide variety of applications with effective thickening and VI improvement in group I to IV base stocks at low treat rates.