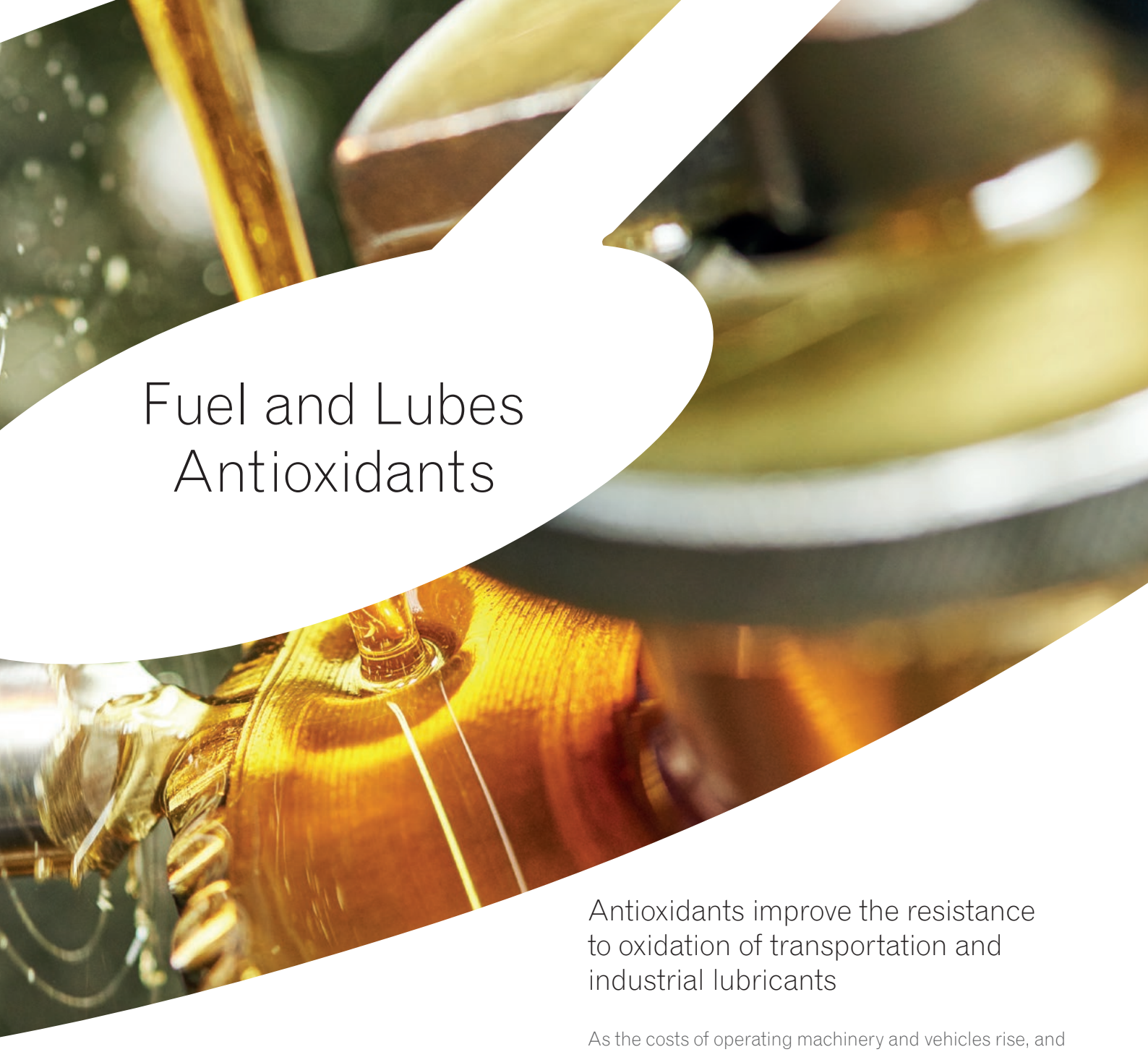

Fuel and Lubes Antioxidants

Antioxidants improve the resistance to oxidation of transportation and industrial lubricants

As the costs of operating machinery and vehicles rise, and emission regulations become ever more stringent, new developments in additives for lubricants and fuels enhance shelf life, protect engines, and help to reduce maintenance and running costs, as well as improving environmental acceptability.

Aminic and phenolic antioxidants retard oxidation in the oil by reacting with and stabilizing radicals produced in the lubricant. Phosphite and Thioester antioxidants decompose hydroperoxides.

In engine oils, antioxidants enable drain intervals to be extended. They preserve the integrity of the oil for longer periods, helping to maintain viscosity, reducing deposit and sludge formation, and guarding against the production of corrosion species, whilst protecting oil at higher temperatures.

A comprehensive range of products that enhance the performance and prolong the life of engines and machinery

With more than 50 years' experience in stabilization, SONGWON offers an extensive portfolio of fuel and lubricant additives for automotive, industrial applications and biofuels including aminic, phenolic, phosphite and thioester antioxidants. Close cooperation with customers allows the development of solutions for today and tomorrow, and the range is constantly being expanded to meet market needs.

By improving the performance of lubricants and fuels to ensure that they last longer and help to protect engines and equipment, SONGWON antioxidants also make an important contribution to environmental sustainability.

SONGWON manufactures fuel and lubricant antioxidants at its plant in South Korea, in which it invests continuously in anticipation of new industry requirements. Backward integration of key raw materials and economies of scale help to guarantee availability and reliable supply.

Product range selection guide

Aminic, Phenolic, Phosphite and Thioester Antioxidants

type of Antioxidants		Automotive: Gasoline engine oils	Automotive: Diesel engine oils	Automotive: ATF	Automotive: Gear & axel oils	Industrial: Compressor oils	Industrial: Hydraulic oils	Industrial: Metalworking fluids	Industrial: Turbine oils	Speciality & fuels: Greases	Speciality & fuels: Synthetic base oils	Speciality & fuels: Vegetable oils	Speciality & fuels: Fuels
Aminic	SONGNOX® L570	■	■	■	■	■	■	■	■	■	□	□	
	SONGNOX® L670	■	■	■	■	■	■	■	■	■	□	□	
Phenolic	SONGNOX® L101				□			□		■		□	
	SONGNOX® L107	□	□				□		□	■		□	
	SONGNOX® L115	□	□							□		□	
	SONGNOX® L135	■	■	□	□	□	■		□	□	□	□	
	SONGNOX® 2,6-DTBP			□	□	■	□	■	■	□	□	■	□
Phosphite	SONGNOX® L416			□	□	□	□	□	□	□			
Thioester	SONGNOX® L224				□	□	□	□	□	□			
	SONGNOX® L226				□	□	□	□	□	□			

■ Recommended

□ Suitable

	TGA in air		Solubility* (wt.%) at 20°C					
	°C	% mass loss	Group I	Group II	Group III	Group IV (PAO)	Ester	Water
SONGNOX® L570	233 282 308	5% 25% 50%	> 10.0	> 10.0	> 10.0	> 10.0	> 10.0	< 0.01
SONGNOX® L670	250 299 329	5% 25% 50%	> 10.0	> 10.0	> 10.0	> 10.0	> 10.0	< 0.01
SONGNOX® L101	328 365 392	5% 25% 50%	< 0.3	< 0.2	< 0.2	< 0.1	> 2.0	< 0.01
SONGNOX® L107	297 332 349	5% 25% 50%	> 5.0	> 2.0	> 2.0	> 2.0	> 5.0	< 0.01
SONGNOX® L115	307 341 356	5% 25% 50%	< 1.0	< 1.0	< 1.0	< 1.0	> 5.0	< 0.01
SONGNOX® L135	244 291 315	5% 25% 50%	> 10.0	> 10.0	> 10.0	> 10.0	> 10.0	< 0.01
SONGNOX® 2,6-DTBP	95 144 167	5% 25% 50%	> 5.0	> 5.0	> 5.0	> 5.0	> 10.0	< 0.01
SONGNOX® L416	234 269 291	5% 25% 50%	> 1.0	< 0.8	< 0.8	< 0.8	> 1.0	< 0.01
SONGNOX® L224	262 292 311	5% 25% 50%	> 2.0	> 2.0	> 2.0	> 2.0	> 5.0	< 0.01
SONGNOX® L226	282 327 348	5% 25% 50%	> 5.0	> 5.0	> 5.0	> 5.0	> 5.0	< 0.01

* Test oils are of ISO 32 viscosity grade or similar

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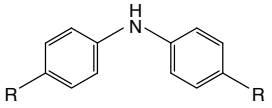
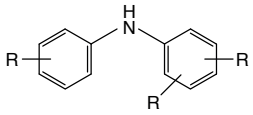
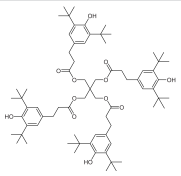
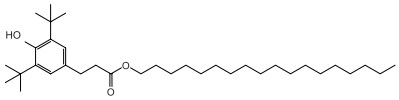
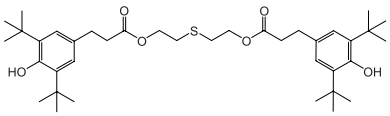
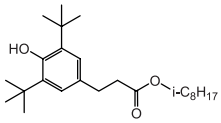
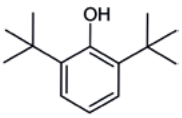
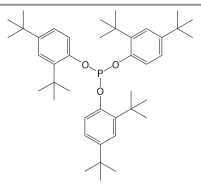
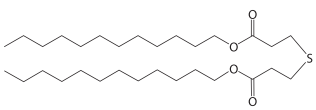
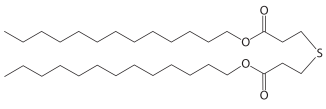
Aminic, Phenolic, Phosphite and Thioester Antioxidants

		Molecular Weight	Melting Range (°C)
SONGNOX® L570 Mixture of butylated & octylated diphenylamine CAS No: 68411-46-1 LQ		butyl, octyl diphenylamine antioxidant	–
SONGNOX® L670 Bis(nonylphenyl)amine CAS No: 36878-20-3 LQ		nonyl diphenylamine antioxidant	–
SONGNOX® L101 Tetrakis[methylene-3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate]methane CAS NO. 6683-19-8 PW		1178	110.0 ~ 125.0
SONGNOX® L107 Octadecyl-3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate CAS NO. 2082-79-3 CP		531	50.0 ~ 55.0
SONGNOX® L115 Thiodiethylenebis[3-(3,5-ditert-butyl-4-hydroxyphenyl)propionate] CAS NO. 41484-35-9 PW		643	> 65.0
SONGNOX® L135 Benzenepropanoic acid, 3,5-bis(1,1-dimethyl-ethyl)-4-hydroxy-, C7-9-branched alkyl esters CAS NO. 125643-61-0 LQ		390	–
SONGNOX® 2,6-DTBP 2,6-di-tert-butylphenol CAS NO. 128-39-2 SL		206	> 34.0
SONGNOX® L416 Tris(2,4-di-tert-butylphenyl) phosphite CAS NO. 31570-04-4 PW, FF		647	181.0 ~ 187.0
SONGNOX® L224 Dilauryl thiodipropionate CAS NO. 123-28-4 PW, SB, LQ		515	38.0 ~ 41.0
SONGNOX® L226 Ditridecyl thiodipropionate CAS NO. 10595-72-9 LQ		543	–

Viscosity at 40°C Kinematic (mm^2/s)	Density at 20°C (g/cm^3)	Element Content (%)				
		S	P	N	NSF / FDA[1]	LuSc List[2]
400	0.98	–	–	4.8	0.5 wt.%	Yes
600	0.95	–	–	3.5	–	Yes
Solid	Solid	–	–	–	0.5 wt.%	–
Solid	Solid	–	–	–	–	Yes
Solid	Solid	5.0		–	0.5 wt.%	Yes
125	0.97	–	–	–	–	Yes
Solid	Solid	–	–	–	–	–
Solid	Solid	–	4.8	–	0.5 wt.%	–
Solid	Solid	6.2	–	–	–	–
27	0.94	5.9			–	–

1. Approved by NSF / FDA for use in blending food grade lubricants with incidental food contact, at a maximum level as specified.
2. Meet the European Ecolabel criteria for lubricants and is featured on the Lubricant Substance Classification List (LuSc-list).

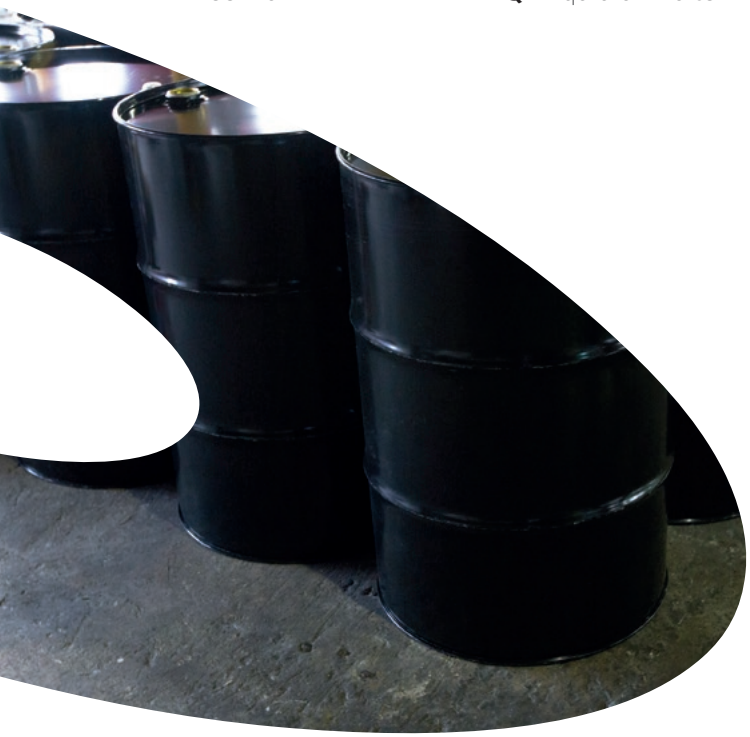
Standard Packaging

- **Antioxidants, Solids:** 20 kg PE Bag
- **Antioxidants, Liquids:** 185 kg Steel Drum
  190 kg Steel Drum
  900 kg IBC
  20 MT ISO Tank

Standard pallet size is CP1 and CP3.

Key to Abbreviations of Physical Forms

- **PW:** Powder
- **SB:** Semi Bead
- **SL:** Solid
- **FF:** Free Flow
- **DW:** Dispersion
- **MB:** Micro Beads
- **FC:** Fusion Crystal
- **LQ:** Liquid or Molten
- **BD:** Beads
- **DF:** Dust Free Flow
- **CP:** Crystalline Powder
- **PS:** Pastilles
- **GR:** Granule
- **FG:** Fine Grind
- **VL:** Viscous Liquid



Transport and Storage

As a general guideline, we recommend storing the products mentioned in this brochure in their original sealed containers in a cold and dry place. For more detailed information on a specific product, please refer to the corresponding **Technical Data Sheet.**

By law, a number of chemical products must be labeled in respect of transport, storage and handling. Thus corresponding care is a prerequisite for their appropriate handling. Furthermore, local legal regulations may apply.

Detailed information is given in the respective **Safety Data Sheets.**

About SONGWON Industrial Group

SONGWON, which was founded in 1965 and is headquartered in Ulsan, South Korea, is a leader in the development, production and supply of specialty chemicals.

The second largest manufacturer of polymer stabilizers worldwide, SONGWON operates group companies all over the world, offering the combined benefits of a global framework and readily accessible local organizations.

Dedicated experts work closely together with customers to develop tailor-made solutions that meet individual requirements.

For further information, please go to:
www.songwon.com

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