



Coating Stabilizers

Long-lasting protection against degradation caused by light and heat

Used in a wide number of industries, coatings not only provide countless items with color and texture, but also enhance their appearance and prolong their life.

In order to protect coatings against the harmful effects of light and heat, SONGWON offers a comprehensive range of high-value, high-performance coating stabilizers for numerous substrates, including steel, wood, ceramics, special composites, plastic films and plastic parts used in the inks, automotive and transportation, decorative and architectural, furniture and flooring, industrial and agricultural industries among others.

It's all about **the chemistry™**

 **SONGWON**

SONGWON offers a broad range of coating stabilizers

Antioxidants (AOs)

AOs prevent thermally induced degradation of polymers in coatings, adhesives and inks during high-temperature processing, curing and stoving as well as in end use.

Under the brand name SONGNOX® CS, SONGWON offers a wide and diversified portfolio of AOs, ranging from primary (sterically hindered) phenolic products to secondary thioesters and phosphites.

SONGNOX® CS 1010 and SONGNOX® CS 1076, the most commonly used AOs, provide protection against thermal degradation over a vast range of temperatures in numerous different coatings, plastics, adhesives and sealants applications.

SONGWON secondary AOs exhibit synergistic effects with primary antioxidants. SONGWON offers blends of primary and secondary AOs such as SONGNOX® CS 147B, SONGNOX® CS 41B, and many other primary and secondary AOs that can be mixed in different ratios, depending on requirements.

For applications that require heat stabilization during mixing, extrusion or curing and for paints that are cured or stoved at high temperatures, as required for powder and coil coatings, for example, SONGNOX® CS 6260, SONGNOX® CS 1680 and SONGNOX® CS PQ phosphite AOs are the products of choice.

AOs are non-regenerative: both primary and secondary types are consumed during the reaction and left ineffective afterwards. For longer-term effects, the use of certain hindered amine light stabilizers (HALS) is preferred, due to the cyclic nature of their reaction.

UV Absorbers (UVAs)

UVAs prevent the degradation of coating systems by converting the absorbed light into heat. There are several well-known chemical classes of UVA broadly used in coatings, inks and adhesives: 2-hydroxyphenyl-benzophenone or BP type (for example SONGSORB® CS 81), 2-(2-hydroxyphenyl)-benzotriazole or BTZ type (for example SONGSORB® CS 1130 and SONGSORB® CS 928), and 2-hydroxyphenyl-triazine or HPT type (for example SONGSORB® CS 1577). SONGWON's range also includes an oxanilide-type UVA, SONGSORB® CS 312, which is suitable for solvent-borne and powder coatings.

Every UVA has its own specific photo-physical primary and secondary properties. Filter efficiency, for example, varies, depending on the product's extinction coefficient, chemical class and molecular weight. To cater for customer-specific filtering needs, SONGWON offers a broad range of UVAs that can be used alone or in combination with other products such as SONGSORB® CS HALS or SONGNOX® CS AOs.

The synergistic effect of UVA and HALS is particularly beneficial for outdoor conditions, where UVAs alone cannot efficiently provide adequate protection, being unable to prevent discoloration and other detrimental effects on coatings.

The filter effect of a coating, expressed as Absorbance A, is influenced by film thickness and UVA concentration. The thinner the coating, the higher the amount of UVA required. Another important criterion for selection of the right UVA for the final application is its photo-permanence, which is basically a measure of the resistance of the UVA to degradation. Products vary in their tendency to chemical loss and migration out of the coating matrix. Typically, BP types such as SONGSORB® CS 81 can be used in applications with moderate requirements in terms of long-term stability, while for applications requiring medium to higher long-term stability, BTZ types, such as SONGSORB® CS 928, are needed.



Hindered Amine Light Stabilizers (HALS)

HALS are radical scavengers: they trap radicals formed in the coating layer during exposure to light. Since this mechanism is independent of film thickness, HALS are particularly suitable for the surface of a coating, where UVAs offers less protection. In addition, HALS provide protection against surface defects such as cracking and water permeability. SONGWON offers liquid difunctional HALS such as SONGSORB® CS 292, one of the most frequently used products on the market, and SONGSORB® CS 5100, which is non-interacting and has lower basicity.

SONGWON also offers special-feature HALS such as SONGSORB® CS 144 and SONGSORB® CS 119, which have triboelectric charging properties and are the products of choice for powder coatings.

The cyclic nature of the stabilization mechanism of HALS means that they typically show higher and longer-term efficiency. While HALS are usually not effective in preventing thermal degradation (for which SONGWON antioxidants are the products of choice), they are well suited as light stabilizers and thanks to their regenerative nature they function over much longer time scales.

Oligofunctional HALS such as SONGSORB® CS 622 can also effectively function as long-term heat stabilizers under moderate thermal exposure.



Product range selection guide

Antioxidants

		Automotive Inks	Industrial Wood	Construction	Solventborne	Waterborne	UV curing	Powder
SONGNOX® CS 1010		■	■	■	■			
SONGNOX® CS 1076		■	■	■	■			
SONGNOX® CS 2450		■	■	■	■			
SONGNOX® CS 1035			■		■			
SONGNOX® CS 1135		■	■		■			
SONGNOX® CS 4425		■	■		■			
SONGNOX® CS 1680		■	■		■			■
SONGNOX® CS 6260		■	■		■			■
SONGNOX® CS PQ		■	■	■	■			■

Please ask the expert about additional antioxidants and blends.

UV Absorbers (UVAs)

SONGSORB® CS 1130	■	■	■	■	■	■		
SONGSORB® CS 928	■		■	■	■			■
SONGSORB® CS 329	■		■	■	■			
SONGSORB® CS 328*		■	■					
SONGSORB® CS 326	■		■	■	■			
SONGSORB® CS 384-2	■	■	■	■	■			
SONGSORB® CS 900	■	■	■					■
SONGSORB® CS 81			■			■		
SONGSORB® CS 312	■		■					■
SONGSORB® CS 1577	■		■			■		
SONGSORB® CS 400	■		■	■	■			

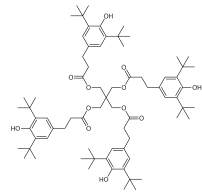
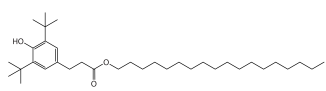
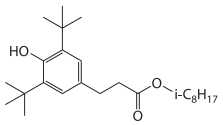
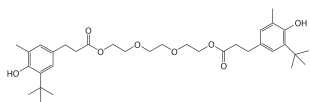
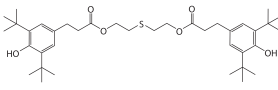
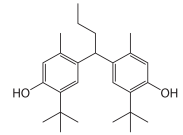
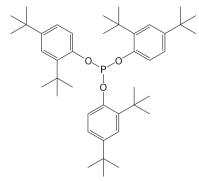
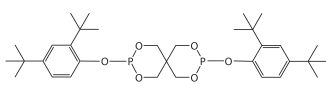
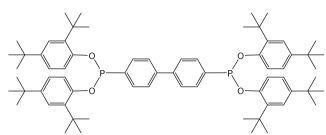
* Not available in Europe

Hindered Amine Light Stabilizers (HALS)

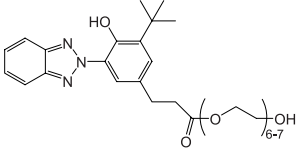
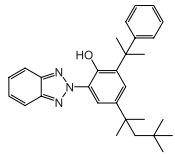
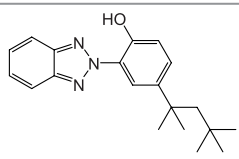
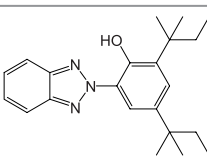
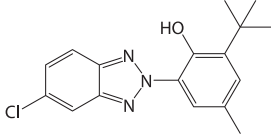
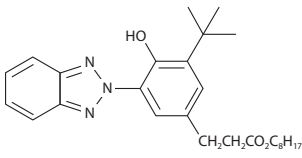
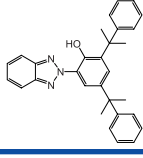
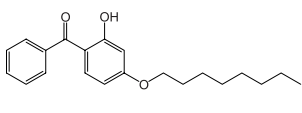
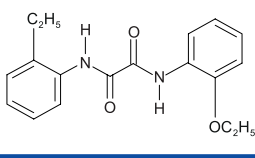
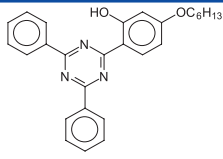
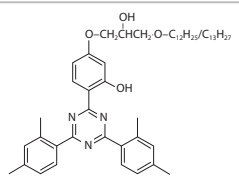
SONGSORB® CS 292	■	■	■	■	■	■		
SONGSORB® CS 770			■			■		
SONGSORB® CS 622			■					■
SONGSORB® CS 119	■		■					■
SONGSORB® CS 144	■		■					■
SONGSORB® CS 5100			■	■	■			
SONGSORB® CS AQ01	■	■	■	■	■			

■ Recommended
■ Suitable

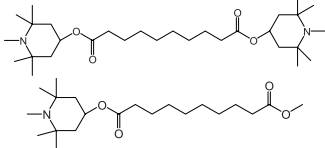
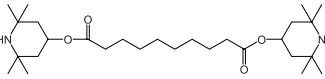
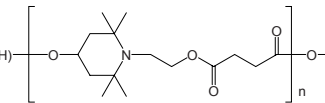
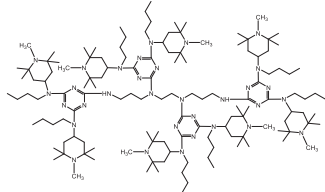
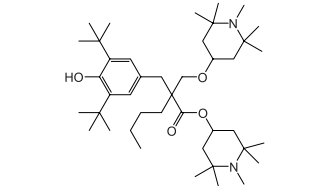
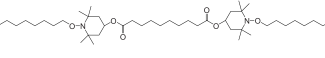
Antioxidants

		Molecular Weight	Melting Range (°C)	Solubility (g/100 g solvent at 25°C)
SONGNOX® CS 1010 Tetrakis[methylene-3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate]methane CAS NO. 6683-19-8 SL		1178	110.0 ~ 125.0	Squalane < 0.05 n-Hexane < 0.1 Acetone < 50.0 Ethanol < 0.1 Toluene 48.0 Xylene 24.2 Ethyl acetate > 50.0
SONGNOX® CS 1076 Octadecyl-3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate CAS NO. 2082-79-3 SL		531	50.0 ~ 55.0	Squalane 0.5 n-Hexane > 50.0 Acetone > 50.0 Ethanol < 0.1 Toluene > 50.0 Xylene > 50.0 Ethyl acetate > 50.0
SONGNOX® CS 1135 Benzenepropanoic acid, 3,5-bis(1,1-dimethylethyl)-4-hydroxy-, C7-9-branched alkyl esters CAS NO. 125643-61-0 LQ		390	—	Squalane > 50.0 n-Hexane > 50.0 Acetone > 50.0 Ethanol > 50.0 Toluene > 50.0 Xylene > 50.0 Ethyl acetate > 50.0
SONGNOX® CS 2450 Triethylene glycol-bis-3-(3-tert-butyl-4-hydroxy-5-methylphenyl)propionate CAS NO. 36443-68-2 SL		587	76.0 ~ 80.0	Squalane < 0.05 n-Hexane < 0.1 Acetone > 50.0 Ethanol 9.0 Toluene 10.0 Xylene 0.5 Ethyl acetate > 50.0
SONGNOX® CS 1035 Thiodiethylene bis[3-(3,5-di-tert-butyl-4-hydroxyphenyl)propionate] CAS NO. 41484-35-9 SL		643	> 65.0	Squalane < 0.05 n-Hexane 0.8 Acetone > 50.0 Ethanol 1.1 Toluene > 50.0 Xylene > 50.0 Ethyl acetate > 50.0
SONGNOX® CS 4425 4,4'-Butylidenebis(6-tert-3-methylphenol) CAS NO. 85-60-9 SL		383	208.0 ~ 214.0	Squalane < 0.05 n-Hexane < 0.1 Acetone > 50.0 Ethanol 29.0 Toluene 1.0 Xylene < 0.1 Ethyl acetate > 50.0
SONGNOX® CS 1680 Tris(2,4-di-tert-butylphenyl) phosphite CAS NO. 31570-04-4 SL		647	181.0 ~ 187.0	Squalane < 0.05 n-Hexane 10.0 Acetone 1.3 Ethanol < 0.1 Toluene 25.0 Xylene 24.0 Ethyl acetate 5.0
SONGNOX® CS 6260 Bis(2,4-di-tert-butylphenyl) pentaerythritol diphosphite CAS NO. 26741-53-7 SL		605	170.0 ~ 180.0	Squalane < 0.05 n-Hexane 2.0 Acetone 3.0 Ethanol < 0.1 Toluene 26.0 Xylene 17.0 Ethyl acetate 0.7
SONGNOX® CS PQ Phosphorous trichloride, reaction products with 1,1'-biphenyl and 2,4-bis(1,1-dimethyl-ethyl) phenol CAS NO. 119345-01-6 SL		1035	75.0 ~ 100.0	Squalane 0.1 n-Hexane > 50.0 Acetone 9.0 Ethanol < 0.1 Toluene > 50.0 Xylene > 50.0 Ethyl acetate > 50.0

UV Absorbers (UVAs)

		Molecular Weight	Melting Range (°C)	Solubility (g/100 g solvent at 25°C)
SONGSORB® CS 1130 Mixture of α -3-(3-(2H-benzotriazole-2-yl)-5-tert-butyl-4-hydroxyphenyl)-1-oxopropyl- ω -hydroxy poly(oxyethylene) and α -3-(3-(2H-benzotriazole-2-yl)-5-tert-butyl-4-hydroxy phenyl)-1-oxopropyl- ω -3-(3-(2H-benzotriazole-2-yl)-5-tert-butyl-4-hydroxyphenyl)-1-oxopropoxy poly(oxyethylene) and polyethyleneglycol CAS NO. 104810-48-2 / 104810-47-1 / 25322-68-3 LQ		Mix	—	Squalane < 0.05 n-Hexane 1.00 Acetone > 50 Ethanol > 50 Toluene > 50 Xylene > 50 Ethyl acetate > 50
SONGSORB® CS 928 2-hydroxy-3-(1,1-dimethylbenzyl)-5-(1,1,3,3-tetramethylbutyl)phenyl]-2Hbenzotriazole CAS NO. 73936-91-1 SL		442	110.0 ~ 113.0	Squalane 0.15 n-Hexane 10.10 Acetone 10.20 Ethanol 0.15 Toluene > 50 Xylene > 50 Ethyl acetate 28.6
SONGSORB® CS 329 2-(2H-benzotriazole-2-yl)-4-(1,1,3,3-tetramethylbutyl)phenol CAS NO. 3147-75-9 SL		323	103.0 ~ 105.0	Squalane 0.3 n-Hexane 6.0 Acetone 11.5 Ethanol < 0.1 Toluene 44.7 Xylene 49.0 Ethyl acetate 21.3
SONGSORB® CS 328 2-(2'-hydroxy-3',5'-di-t-amylphenyl)benzotriazole CAS NO. 25973-55-1 SL		352	80.0 ~ 88.0	Squalane 3.3 n-Hexane 20.0 Acetone 8.0 Ethanol 0.3 Toluene < 50.0 Xylene < 50.0 Ethyl acetate 30.0
SONGSORB® CS 326 2-(2'-hydroxy-3'-tert-butyl-5'-methylphenyl)-5-chlorobenzotriazole CAS NO. 3896-11-5 PW		316	138.0 ~ 141.0	Squalane 0.7 n-Hexane 1.5 Acetone 1.5 Ethanol 0.1 Toluene 10.4 Xylene 11.8 Ethyl acetate 3.2
SONGSORB® CS 384-2 Benzenepropanoic acid, 3-(2H-benzotriazol-2-yl)-5-(1,1-dimethylethyl)-4-hydroxy-, C7-9branched and linear alkyl esters with 4-7% 1-methoxy-2-propyl acetate CAS No. 127519-17-9 LQ		451.6	—	Squalane > 50.0 n-Hexane > 50.0 Acetone > 50.0 Ethanol 0.11 Toluene > 50.0 Xylene > 50.0 Distilled Water Insoluble Ethyl Acetate > 50.0
SONGSORB® CS 900 2-[2-hydroxy-3,5-di(1,1-dimethylbenzyl)phenyl]-2H-benzotriazole CAS NO. 70321-86-7 SL		448	138.0 ~ 142.0	Squalane < 0.05 n-Hexane < 0.1 Acetone 2.5 Ethanol < 0.1 Toluene 18.1 Xylene 13.1 Ethyl acetate 5.1
SONGSORB® CS 81 2-hydroxy-4-n-octoxybenzophenone CAS NO. 1843-05-6 SL		326	> 47.0	Squalane 0.3 n-Hexane 18.0 Acetone > 50.0 Ethanol 1.0 Toluene > 50.0 Xylene > 50.0 Ethyl acetate > 50.0
SONGSORB® CS 312 N-(2-ethoxyphenyl)-N'-(2-ethylphenyl)ethanediamide CAS NO. 23949-66-8 SL		312	124.0 ~ 128.0	Squalane < 0.05 n-Hexane < 0.1 Acetone 4.0 Ethanol < 0.1 Toluene 7.3 Xylene 5.2 Ethyl acetate 5.0
SONGSORB® CS 1577 2-(4,6-diphenyl-1,3,5-triazine-2-yl)-5-hexyloxy phenol CAS NO. 147315-50-2 SL		425	147.0 ~ 151.0	Squalane < 0.05 n-Hexane < 0.1 Acetone 0.2 Ethanol < 0.1 Toluene 6.3 Xylene 5.5 Ethyl acetate 0.8
SONGSORB® CS 400 Mixture of 2-[4-[(2-Hydroxy-3-dodecyloxypropyl)oxy]-2-hydroxyphenyl]-4,6-bis(2,4-dimethylphenyl)-1,3,5-triazine CAS No. 153519-44-9 LQ		646	—	Squalane < 0.05 n-Hexane > 50.0 Acetone > 50.0 Ethanol 0.5 Toluene > 50.0 Xylene > 50.0 Distilled Water Insoluble Ethyl Acetate > 50.0

Hindered Amine Light Stabilizers (HALS)

		Molecular Weight	Melting Range (°C)	Solubility (g/100 g solvent at 25°C)
SONGSORB® CS 292 Mixture of bis (1,2,2,6,6-pentamethyl-4-piperidinyl)-sebacate and 1-(methyl)-8-(1,2,2,6,6-pentamethyl-4-piperidinyl)-sebacate CAS NO. 41556-26-7 / 82919-37-7 LQ		509/370	—	Squalane > 50.0 n-Hexane > 50.0 Acetone > 50.0 Ethanol > 50.0 Toluene > 50.0 Xylene > 50.0 Ethyl acetate > 50.0
SONGSORB® CS 770 Bis(2,2,6,6-tetramethyl-4-piperidinyl) sebacate CAS NO. 52829-07-9 SL		481	81.0 ~ 85.0	Squalane < 0.05 n-Hexane < 0.1 Acetone 35.0 Ethanol > 50.0 Toluene > 50.0 Xylene 49.0 Ethyl acetate 38.1
SONGSORB® CS 622 Polymer of dimethyl succinate and 4-hydroxy-2,2,6,6-tetramethyl-1-piperidine ethanol CAS NO. 65447-77-0 SL		3100 ~ 4000	> 55.0 (softening point)	Squalane < 0.05 n-Hexane < 0.1 Acetone 39.0 Ethanol < 0.1 Toluene 7.1 Xylene 35.0 Ethyl acetate 21.0
SONGSORB® CS 119 1,3,5-triazine-2,4,6-triamine, N2,N2''-1,2-ethanediylbis [N2-[3-[[4,6-bis[butyl (1,2,2,6,6-pentamethyl-4-piperidinyl)amino]-1,3,5-triazin-2-yl]amino]propyl]-N',N''-dibutyl-N',N''-bis (1,2,2,6,6-pentamethyl-4-piperidinyl)- CAS NO. 106990-43-6 PS		2286	115.0 ~ 150.0	Squalane < 0.05 n-Hexane < 0.1 Acetone 0.2 Ethanol < 0.1 Toluene 25.0 Xylene 24.0 Ethyl acetate 0.9
SONGSORB® CS 144 Bis (1,2,2,6,6-pentamethyl-4-piperidinyl)-[[3,5-bis(1,1-dimethylethyl)-4-hydroxyphenyl]methyl]butylmalonate CAS NO. 63843-89-0 SL		685	146.0 ~ 150.0	Squalane < 0.05 n-Hexane 1.70 Acetone 3.00 Ethanol 0.33 Toluene 21.9 Xylene 13.2 Ethyl acetate 5.4
SONGSORB® CS 5100 Decanedioic acid, bis(2,2,6,6-tetramethyl-1-(octyloxy)-4-piperidinyl)ester, reaction products with 1,1-dimethylethyl-hydroperoxide and octane CAS NO. 129757-67-1 LQ		737	—	Squalane > 50 n-Hexane > 50 Acetone > 50 Ethanol 0.60 Toluene > 50 Xylene > 50 Ethyl acetate > 50
SONGSORB® CS AQ01 POE (n) 2,2,6,6-tetramethyl-4-piperidinol CAS No. Proprietary LQ	Proprietary information	Polymer, confidential information	—	Squalane < 0.05 n-Hexane < 0.05 Acetone > 50 Ethanol > 50 Toluene 14 Xylene > 50 Ethyl acetate > 50 Water > 50

Light and heat stabilization formulations guide

	Antioxidants (AOs)	UV Absorbers (UVAs)	Hindered Amine Light Stabilizers (HALS)
Mechanism	Deactivate free radicals	Convert UV into heat	Deactivate free radicals
Application	Interior / Exterior	Interior / Exterior	Exterior
Protection	Thermal oxidation	Photo oxidation and degradation	Photo degradation
Prevention	Yellowing Loss of mechanical properties Embrittlement	Yellowing Loss of adhesion Blistering	Loss of mechanical properties Surface defects Pigment fading Loss of water impermeability
Field	Coating	Underneath substrate Deeper coating layers	Coating surface Pigments for coatings

Film Thickness	UVA
10 ~ 20 µm	8 ~ 4 %
20 ~ 40 µm	4 ~ 2 %
40 ~ 80 µm	2 ~ 1 %

Pigmentation	HALS	UVA (*)
opaque	1.0 % ~ 2.0 %	0.0 % ~ 0.5 %
semi-transparent	0.5 % ~ 1.5 %	0.5 %
clear	0.5 % ~ 1.0 %	1.0 % ~ 1.5 %

% of binder solid

(*) % UVA based on dry film thickness of 40 µm

% UVA depends on the pigments used

Standard Packaging

- **Antioxidants, Solids:** 25 kg Carton Box
20 kg PE Bag (20 kg aluminum coated bags for SONGNOX® CS 6260, SONGNOX® CS PQ)
- **Antioxidants, Liquids:** 185 kg Steel Drum
25 kg PE Drum
- **HALS, Solids:** 20 kg PE Bag
25 kg Carton Box
- **HALS, Liquids:** 25 kg PE Drum
200 kg Steel Drum
900 kg IBC
- **UV Absorbers, Solids:** 20 kg Carton Box
25 kg Carton Box
- **UV Absorbers, Liquids:** 25 kg PE Drum
200 kg Steel Drum

Standard pallet size is CP1.

Key to Abbreviations of Physical Forms

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



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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