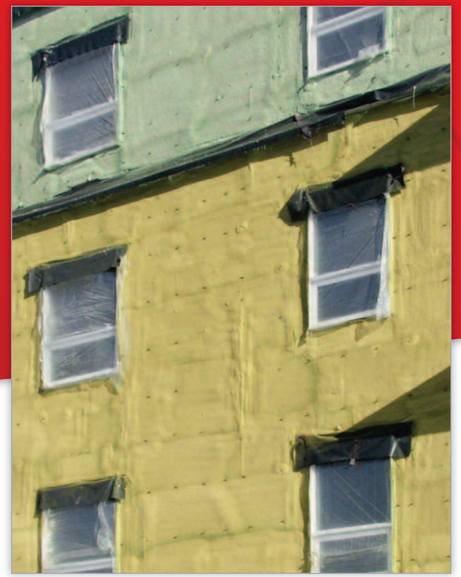
Silicone Surfactants for the Polyurethane Industry

SILTECH

YOUR TECHNOLOGY OUR CHEMISTRY

A Message to Our Customers

Siltech Corporation develops, manufactures and markets a full line of high-quality organo-functional silicone surfactants and related specialties for use in formulating polyurethane foams. Our silicone surfactant products, known as the SILSTAB® series, are used in a variety of polyurethane applications, including rigid foams, flexible foams and elastomers.



Siltech focuses on doing it right the first, and every time, and always to our customer's satisfaction. This commitment to excellence is illustrated by Siltech's ISO 9001:2015 registration. This ISO standard covers every aspect of our business, from product development and manufacturing, to customer service and purchasing, to handling and shipping.

Everything is done with our customers' needs in mind.

Siltech's silicones are manufactured in Ontario, Canada. Each of our state-of-the-art facilities are equipped with dedicated large-scale reactors utilizing our novel hydrosilation manufacturing process technology. To ensure the consistent production of the highest-quality products, we employ advanced in-process controls to prevent variations.

At Siltech's two manufacturing sites, our pilot plant facilities also produce experimental silicone surfactants and smaller quantities to meet our customers' unique requirements.

We also have an advanced analytical laboratory, which features the latest instrumentation. Finally, Siltech's technical service laboratory is equipped to completely evaluate the performance of our products in various polyurethane foams.

We are proud of Siltech's extensive product range as well as our capability to supply products that are specifically tailored to our customers' needs. We are enthusiastic about our ability to provide knowledgeable technical service and to remain in the forefront of silicone technology.

Rigid Polyurethane Foam — Silstab® Silicone Surfactants Selection Guide

APPLICATION	PRODUCT	DESCRIPTION/FEATURE	BLOWING AGENTS					
			WATER	HFC-365mfc	HFC-134a	HYDROCARBONS	HFC-245fa	HFO's
Appliance/ Pour-In-Place Low Density	Silstab 2000	General purpose.		✓	✓	✓	✓	
	Silstab 2100	General purpose.		✓	✓	✓	✓	
	Silstab 2550	General purpose, excellent flow and low K-factor.		✓	✓	✓	✓	
	Silstab 2580	Strong nucleation, improved flow, reduced subsurface voids, lower K-factor.		✓	✓	✓	✓	✓
	Silstab 2590	Strong nucleation, superior flow, low K-factor.				✓		✓
	Silstab 2955	Strong nucleation, excellent flow and low K-factor.		✓	✓	✓	✓	✓
	Silstab 2965	Strong nucleation, excellent flow and low K-factor, reduced subsurface voids.		✓	✓	✓	✓	
	Silstab 2985	Strong nucleation, excellent flow and low K-factor, reduced subsurface voids.		✓	✓	✓	✓	
Spray	Silstab 2100	Improved nucleation and fire performance.	✓	✓	✓	✓	✓	
	Silstab 2400	Smooth foam surface, low cost, improved nucleation.	✓		✓	✓	✓	
	Silstab 2450	Smooth foam surface, low cost, improved nucleation, wall and roofing.	✓	✓	✓	✓	✓	✓
Pour-In-Place High Density	Silstab 2100	General purpose, eliminates surface defects.	✓					
	Silstab 2300	General purpose.	✓					
	Silstab 2800	Capped, eliminates surface defects in high humidity conditions.	✓					
MDI Compatible	Silstab 2800	General purpose, non-reactive with isocyanates.		✓	✓	✓	✓	
	Silstab 2850	Improved HFC-134a/MDI compatibility.		✓	✓	✓	✓	✓
	Silstab 2869	Cell opener, MDI compatible, 1-K foams.				✓		✓
	Silstab 2875	Improved HFO/MDI compatibility.		✓	✓	✓	✓	✓
	Silstab 2880	Improved HFO/MDI compatibility.			✓	✓	✓	✓

APPLICATION	PRODUCT	DESCRIPTION/FEATURE	BLOWING AGENTS					
			WATER	HFC-365mfc	HFC-134a	HYDROCARBONS	HFC-245fa	HFO's
PIR Bun/ Boardstock	Silstab 2935	Capped, improved emulsification. Very fine cell structure, low K-factor.				✓		
	Silstab 2955	Very fine cell structure, low K-factor.				✓		
	Silstab 2966	Improved emulsification, fine cell structure, low K-factor.				✓		
	Silstab 2970	Improved emulsification, low K-factor.				✓		
	Silstab 2975	Capped, improved emulsification, low K-factor.				✓		
	Silstab 2985	Capped, improved emulsification, low K-factor.				✓		
	Silstab 2987	High functionality. Improved emulsification, finer cell structure, low K-factor.				✓		✓
	Silstab 2993	Improved emulsification, fine cell structure, low K-factor.				✓		✓
	Silstab 2994	High functionality. Improved emulsification, finer cell structure, low K-factor.				✓		✓
Open-celled, pour, spray, packaging foam	Silstab 2755	Methyl-capped impart superior B-side hydrolytic stability, high open cell, with wider processing latitude.	✓					
	Silstab 2760	High open-cell content to prevent shrinkage, hydrolytically stable.	✓					
	Silstab 2780	High open-cell content, hydrolytically stable, wider processing latitude.	✓					
	Silstab 2791	Strong cell opener, hydrolytically stable. Wide processing latitude.	✓					
One Component Aerosol	Silstab 2800	General purpose, prepolymer stable.			✓	✓		
	Silstab 2850	Improved HFC-134a/MDI compatibility.			✓	✓		✓
	Silstab 2875	Improved HFO/MDI compatibility.			✓	✓		✓
	Silstab 2880	Improved HFO/MDI compatibility.			✓	✓		✓

Properties for Silstab® Silicone Surfactants for Rigid Polyurethane Foam

PRODUCT	VISCOSITY 25°C mPas	SPECIFIC GRAVITY 25°C	WATER SOLUBILITY @10%	HYDROXYL No. mg KOH/g	FREEZING POINT °C	FLASH POINT °C
Silstab 2000	600	1.051	Soluble	56	<0	>100
Silstab 2100	300	1.055	Soluble	85	<0	>100
Silstab 2300	460	1.044	Dispersible	62	2	>100
Silstab 2400	600	1.060	Soluble	70	0	>100
Silstab 2450	1,300	1.040	Soluble	60	<0	>100
Silstab 2550	800	1.047	Dispersible	55	<0	>100
Silstab 2580	4,000	1.050	Soluble	190	<0	>100
Silstab 2590	600	1.030	Soluble	60	<0	>100
Silstab 2755	1,000	1.030	Soluble	10	<0	>100
Silstab 2760	2,000	1.110	Soluble	25	<0	>100
Silstab 2780	1,100	1.030	Soluble	35	<0	>100
Silstab 2791	800	1.040	Soluble	50	<0	>100
Silstab 2800	600	1.056	Soluble	0	<0	>100
Silstab 2850	250	1.040	Soluble	0	<0	>100

PRODUCT	VISCOSITY 25°C mPas	SPECIFIC GRAVITY 25°C	WATER SOLUBILITY @10%	HYDROXYL No. mg KOH/g	FREEZING POINT °C	FLASH POINT °C
Silstab 2869	1,500	1.030	Soluble	0	<0	>100
Silstab 2875	2,000	1.070	Soluble	0	<0	>100
Silstab 2880	2,800	1.050	Soluble	0	<0	>100
Silstab 2935	600	1.040	Soluble	10	<0	>100
Silstab 2955	400	1.050	Soluble	50	<0	>100
Silstab 2965	1,200	1.130	Dispersible	40	<0	>100
Silstab 2966	1,600	1.080	Dispersible	95	<0	>100
Silstab 2970	3,500	1.127	Dispersible	155	4	>100
Silstab 2975	2,000	1.070	Soluble	0	<0	>100
Silstab 2985	1,600	1.070	Soluble	0	<0	>100
Silstab 2987	2,600	1.100	Dispersible	100	4	>100
Silstab 2993	2,000	1.070	Dispersible	35	<0	>100
Silstab 2994	1,200	1.000	Soluble	30	<0	>100

Silstab® Silicone Surfactants for Flexible Polyurethane Foam

Siltech Corporation is focused on meeting our customers' high expectations by committing significant resources to research and new product development. We also work closely with our customers to form responsive partnerships enabling us to develop innovative product solutions. It is through attentive listening and integration of our market knowledge that we are able to develop superior products and processes. To maintain our leadership position in silicone innovation, we are committed to a management process that allows our people to be trained, encouraged and challenged to produce superior results. We also pledge to conduct every aspect of our business in a safe and environmentally responsible manner.

Moulded - Flexible Polyurethane Foam

PRODUCT	PROPERTY	APPLICATION	VISCOSITY 25°C mPas	SPECIFIC GRAVITY 25°C	HYDROXYL No. mg KOH/g
Silstab 3000	General purpose, TDI HR moulded foam, medium potency.	Automotive seating, furniture, TDI and TDI/MDI systems.	375	1.0	23
Silstab 3040	Low fogging, medium potency, impart reduced surface defects. Strong bulk stabilizer.	Automotive seating, furniture, TDI and TDI/MDI systems.	500	1.01	30
Silstab 3055	High potency, impart reduced surface defects.	Moulded TDI HR foams.	400	1.02	28
Silstab 3070	Low fogging, TDI HR moulding, with medium potency. Improved bulk stability.	TDI and MDI HR systems.	50	1.01	75
Silstab 3085	Universal surfactant with wide processing.	HR slab foams.	130	1.0	50
Silstab 3900	Low fogging, cell regulator and surface stabilizing surfactant. Used as co-additive.	HR moulded foams, TDI, TDI/MDI or MDI foam systems.	10	0.93	210

Slab - Flexible Polyurethane Foam

PRODUCT	PROPERTY	APPLICATION	VISCOSITY 25°C mPas	SPECIFIC GRAVITY 25°C	HYDROXYL No. mg KOH/g
Silstab 3100	General purpose, wide processing, low potency.	Slab foams.	370	1.00	24
Silstab 3115	General purpose, low potency.	High density slab foams (30-43 kg/m3)	500	1.02	75
Silstab 3120	General purpose, B-side stable.	Mid density slab foams. (9-40 kg/m3).	800	1.01	30
Silstab 3135	General purpose, wide processing latitude, with medium potency.	Low density slab foams.	900	1.02	80
Silstab 3165	Universal surfactant, with wide processing latitude, high potency. Non-hydrolyzable, B-side stable.	Low density slab foams (8-32 kg/m3).	800	1.02	22
Silstab 3185	General purpose, with high potency, B-side stable.	Slab foams.	600	1.01	80
Silstab 3200	Used as a co-surfactant.	Viscoelastic slab foams.	9,500	0.92	75
Silstab 3300	Medium potency.	CO_2-blown slab foams.	1,200	1.02	120
Silstab 3401	Universal surfactant for polyester polyol systems.	Slab foams.	530	1.01	90
Silstab 3600	Wide processing latitude.	Super-soft slab foams.	850	1.05	180

Rigid Polyurethane Foam — Siltech's SILSTAB® silicone surfactants are used to stabilize rigid polyurethane foam systems. The selection of the proper silicone stabilizer depends on the chemical formulation (polyols, isocyanates, blowing agents, etc.) of the foam system, the manufacturing process (spray, pour, etc.) and the desired foam properties. Siltech offers a comprehensive range of silicone surfactants for water-blown systems, including both open and closed cell. Siltech also offers novel silicone surfactants for the next generation of blowing agents such as HFC, HFO and hydrocarbons. Typical applications include spray, boardstock, pour-in-place and high-density moulded foams.

Specialty Applications — Footwear, Microcellular Foams

PRODUCT	PROPERTY/DESCRIPTION & APPLICATION
Silstab 2100	Standard surfactant for microcellular foams recommended for polyether and polyester shoe sole formulations, medium strength nucleator.
Silstab 2550	Recommended for polyether and polyester shoe sole formulations, for low to high densities, strong nucleator, improved flow, reduced surface skin defects and reduced shrinkage.
Silstab 3000	Cell regulator for polyether and polyester shoe sole formulations, used in mid to high densities. Imparts excellent flow, reduced shrinkage and reduced surface skin defects.

Siltech offers a wide range of SILSTAB® silicone surfactants for use in formulating high resilience (HR) moulded and flexible slab foams. These products offer the producers: a variety of stabilizing and cell regulating efficiencies; an optimum balance between stabilizing and cell regulating without sacrificing foam breathability and crushability; and a low volatile/fogging contribution in freshly made foam.

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