YOUR TECHNOLOGY **SILTECH** CHEMISTRY

SILTECH

INNOVATIVE SILICONE SOLUTIONS

Siltech is a privately owned business, managed and operated by the owners for more than 20 years. We hope and believe that the pride we feel in this company channels its way through each of our employees and to every customer.

Siltech is a place where someone answers the phone when you call. It is a place where we feel passion about the quality of our products and realize that our livelihood depends on satisfying you, our customer. And it is a place where you can source products with confidence.

Siltech develops and manufactures a full line of organo-functional silicone compounds and related specialties for a wide range of industrial and personal care applications, using our patented and otherwise proprietary technologies. Our expertise in specialized organo-modified silicone polymers has resulted in more than 40 patents. We always strive to create new materials with unique performance properties that are as yet unavailable.

Siltech owns and operates two manufacturing plants in the Greater Toronto Area. These plants are equipped with efficient, large-scale, high-temperature and pressure reactors, thin film evaporators and other modern equipment required in such unit processes as equilibration, hydrosylilation, quaternization, amidation, phosphation, esterification and homoginization etc. Siltech is ISO 9001:2008 certified.

Siltech serves a wide range of industries, such as personal care, urethane foam, inks and coatings, plastics and polymers, car care, textiles, automotive, oil and gas, HI&I, water treatment, leather, mining and composites. Change is truly the only constant in business, and Siltech understands and embraces the need to ride this wave of change. While these existing silicone-using industries evolve and additional uses are identified and developed, newer industries to silicones, such as 3D-printing, smart coatings, and oil and gas, are finding that many problems can be solved with creative new silicones.

Siltech's philosophy is to constantly innovate and create new products that provide you with enabling solutions to your problems. Siltech invests a substantial portion of our resources into R&D and new product development. Our R&D and technical service laboratories are modernly equipped and staffed by chemists with many decades of experience in diverse segments of the chemical processing industry. In addition, we have efficient pilot plant facilities available to produce special products for your experimental needs.

Siltech's commercial products are approved for use in most global jurisdictions. Siltech is committed to such compliance, and we have dedicated personnel to ensure this. We have pre-registered our current commercial products with European REACH legislation, develop and issue the Globally Harmonized System of safety data sheets, and continue to work with our suppliers and customers to meet implementation deadlines.

We are proud of the quality of the products described in this brochure. Most are available from stock on short notice. However, we will gladly manufacture other homologues to minimum order. Many problems, old and new, can be solved with new silicone specialties. We welcome the opportunity to partner with customers, as we believe that this results in the most creative formulator-friendly and cost-effective silicone specialties possible.

Silicon: The 14th element in the periodic table; chemical symbol; ^{14}Si, density = 2.33g/ml; molar mass = 28.09 g/mol; melting point = 1,420°C; boiling point = 3,265°C; electronic configuration $[Ne]3s^2p^2$; metallic-looking; does not occur naturally in free form; in its combined form, accounts for 27.6% of the Earth's crust; 2nd most abundant element on Earth after oxygen and one of the 10 most abundant elements in the solar system - 4.47×10^7 (rel. to $[H] = 1 \times 10^{12}$).

SILTECH

Silicone is a polymer derived ultimately from minerals and synthetic feedstocks. This incredibly diverse material has been commercially available for over six decades and has found its way into our lives perhaps more than any other synthetic material. Silicones are known for their very low toxicity, low surface energy (20 mN/m), low Tg (153°K), low flammability, lubricity, release, softness, conditioning, thermal stability, photostability, penetration, oxygen permeability, and many other unique features. These features are why silicones are found in the hair and skin products we use, the clothes we wear, the furniture we sit on, the houses we live in, the cars we drive, the electronics we play with, the drugs we take and the foods we eat.

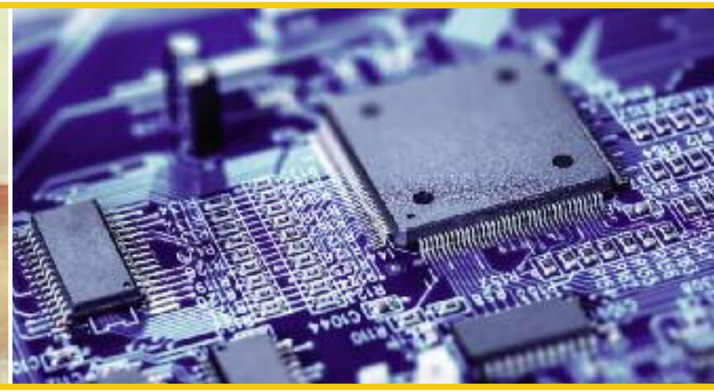
Silicone polymers are known by many pseudonyms, such as siloxane, polydimethylsiloxane, PDMS and others. This most basic silicone polymer is chemically simple and is restricted by its incompatibility with other materials. Whether those materials are water-like or oil-like, silicone is not miscible with them. Fortunately, silicone polymers are readily chemically functionalized by reacting them with a myriad of organic species. These hybrid organo-functional silicones can be completely water soluble, completely oil soluble, or even miscible with both milieus.

These specialized organo-functional silicones are used extensively to enable end users to solve difficult challenges. Their affect in and impact on the formulation dwarf the small percentages in which they are used.

From a safety standpoint, silicones are among the most thoroughly studied polymers and recognized as having very little toxicity. They are approved in a wide variety of food, drug, medical, defense and other sensitive applications. Historical episodes of toxicity concerns and regulatory actions have not withstood scientific testing and have now been reversed.

SILTECH'S SPECIALTY SILICONES

Siltech's **Silsurf** products are chemical hybrids of polyalkyleneoxide polymers with silicone polymers. The resultant materials are surfactants and can be designed to be water-soluble, water-dispersible or water-insoluble. The polyether functionality also confers miscibility with many organic materials, such as ketones, alcohols, ethers, aromatics and esters. Only the most lipophilic solvents such as mineral oils are not miscible with these Silsurf structures.



This extremely useful family of organo-functional silicones finds utility in personal care products for softening, conditioning, shine or formula stabilization among other uses; inks & coatings as additives for flow and levelling, wetting, defoaming, slip, release, lubricity and mar resistance; polyurethane foam for stabilizing the foam as it reacts; and many other industrial applications as well as processing aides in many industries.

Siltech's Silsurf portfolio is vast and diverse. We can manufacture these commercially from 20 kg to 20 tons and routinely develop new Silsurf structures for specific customer needs.

Our **Silwax** line is the oil-soluble analogue of Silsurf surfactants. These materials are the chemical combination of the silicone polymer with styrene or aliphatic alpha-olefins and are available from two to 32 carbon chain lengths. Designed to bring softness, surface tension reduction, wetting and gloss to waxes, polishes and other non-aqueous formulations, these are also emulsified for aqueous delivery applications such as mold release. Some of the more unique applications for these are making mineral oil feel like silicone oil and improving penetration of lubricants. Like that of their Silsurf cousins, our portfolio of Silwax products is unrivalled in breadth and diversity.

Siltech's **Silube** silicones offer both polyether and hydrocarbon moieties appended to the same silicone polymer and are very useful as emulsifiers and formulation stabilizers. The hydrocarbon confers lipophilicity, the polyether brings hydrophilicity, and the silicone provides the low surface and interfacial tensions critical to emulsion stability.

Reactive Silmer silicones contain the same reactive species attached to silicone as used by organic polymer manufacturers. The resultant Silmer products are reactive under the same conditions and allow modification of the polymers, modification of films or composites or homo-polymerization of the reactive silicones. Organic systems are made more flexible and have improved mar resistance, are given more release and lubricity properties and often see advantages like stain resistance. All of the commonly used reactive groups are available, including acrylate esters, amino, epoxy (glycidyl and cycloaliphatic), hydride, hydroxyl, isocyanato, mercapto, trialkoxysilanyl and vinyl. Many are also available with solubilizing groups in addition to the reactive groups to improve miscibility and reactivity.

At Siltech's development labs in Toronto, we have made numerous systems with both homo-polymerized Silmer and co-polymerized Silmer/organic systems. Consequently, we have an extensive knowledge of how these systems react and what properties are brought in.

These reactive silicones can be incorporated into polymers, thin films and three-dimensional elastomeric systems. By including Silmer reactive silicones into these systems, we have seen increased flexibility, stain resistance and release, reduced coefficient of friction, improved surface wetting, and resistance to mar and abrasion. Given the number of different reactive silicones offered, every polymer and cross-linking system can be modified with silicone.

Fluorosil products are silicone polymers with perfluorobutylethyl groups conjoined to the silicones. These molecules bring typical fluoroalkyl properties without perfluorooctyl concerns, and can often be made reactive by using the silicone backbone as with Silmer products.

Siltech's **Silquat** products are alkylamino-modified silicones quaternized with methyl diethyl or methyl distearyl groups to provide a cationic material that is exceptional at migrating and attaching to surfaces, including from an aqueous solution, leaving behind a layer of hydrophobic silicone. These highly unique materials are used in car care, textiles, hair care, hard surface treatments and other applications. Siltech's portfolio of Silquat quaternized silicones is unmatched in the industry.

Siltech antifoam products are silica-filled and/or Silmer MQ resin-fortified silicone oil compounds or emulsions. In formulating these products, we make use of our specialized technologies above to maximize stability and performance.

Many other unique products are available, so we invite you to peruse the pages of this brochure for ideas and then challenge us to build them.

SILTECH

Environmental Awareness ...and Sustainability

Siltech advocates and follows the three pillars of sustainability: environmental, social and economic. Sustainability pervades our decisions both strategically and tactically. We believe that every person and every company needs to consider their impact on our planet. Everything we do has implications for all other people and for all of the animals and plants that also call Earth home. Whether we burn fossil fuels by driving cars, travelling by train or heating homes; consume electricity that is generated by burning fossil fuels or damming rivers; or consume food and other goods that require fertilizers, cutting down forests or eroding soils, virtually every action negatively impacts the Earth.

We need to mitigate these actions. While it is unrealistic to completely stop everything we do, we need to limit our negative activities thereby reducing our impact on the environment.

In fact, a major concern of today's consumers and users of any chemicals is how they impact the environment. This includes the impact on the environment during the manufacturing of the chemicals, during the use of those chemicals and any residual effects arising from the disposal of the finished products. Of critical importance are the chemicals' effects on the environment and the time it takes for them to degrade.

Siltech's commitment to the environment is strong. As a Canadian corporation, we adhere to and go beyond the highly stringent requirements of the Canadian Environmental Protection Act. We invest a large proportion of our profits each year modernizing our facilities to achieve the most efficient manufacturing and waste stream management processes possible.

Siltech is acutely aware of our consumption of energy, water and other resources. Improving efficiencies and reducing our inputs while increasing our outputs is something that drives our production every day. We also strive to develop processes that use few, if any, harmful raw materials. We have also developed sophisticated methods for capturing any harmful byproducts to make sure they are not released into the environment. Siltech also considers the downstream implications of our silicones. Two main factors minimize the environmental impact when silicones are used. First, because such low concentrations of silicones are usually required to achieve the desired properties, any environmental effect is minimized. Second, during soil contact silicones readily degrade via hydrolysis into silica, carbon dioxide and water, thereby minimizing the environmental impact. This is supported by numerous studies that have concluded that the degradation of polydimethylsiloxanes (which are the backbone of Siltech's surfactants) is ecologically inert and does not inhibit the biological process by which wastewater is treated.

We have done extensive research on how to minimize the use of silicones in personal care products to meet that industry's desire for using more naturally derived products. Our work shows that small percentages of special silicones can make natural oils feel like volatile silicone oils such as cyclosiloxanes. This has allowed our customers to reformulate their products by eliminating cyclosiloxanes, without losing any performance attributes.

Recent papers from our R&D team discuss how regulations have driven rather than hindered innovation at Siltech across the years and markets. Additives which reduce VOC and synergistic Fluorosil polymers which reduce the need for fluoroalkyl groups are specific examples cited therein.

In many cases, silicones are a greener alternative to the commonly used petroleum-based products due to their ultra-low use levels and higher efficiencies. Also, unlike many chemicals that use starting materials that come from plants that are used to produce food such as coconut, palm or soybean oil, our food sources are not compromised with the making of silicones.

In multitudes of industrial processes, silicone-based antifoam products are used at ppm use levels to minimize foam, thereby allowing for faster output, less energy usage and less spillage.

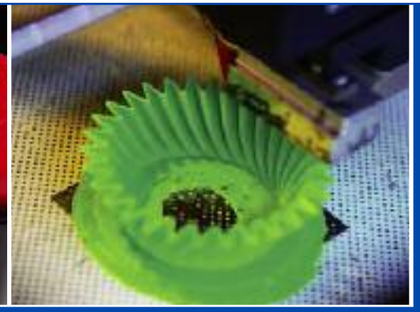
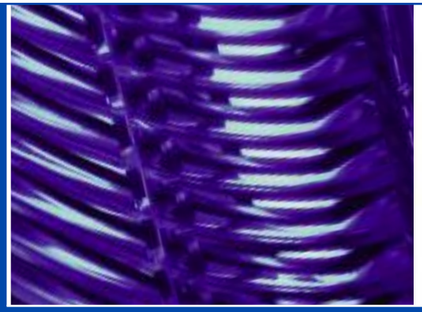
And while humans develop alternative energies and chemical sources, silicones are being used increasingly in the oil and gas industry to better collect, transport and process the petroleum, thereby allowing us to make the most efficient use of this non-renewable resource and extending the time until alternatives become available.

SILTECH

As our customers' and consumers' needs change and there is an increasing demand for more environmentally safe and efficient products, Siltech will continue to lead the way with the introduction of additional products and technologies to meet these needs. This is not only good for Siltech, but for everyone who calls Earth home.

Properties & Applications



FUNCTIONS

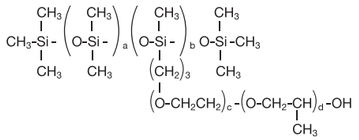
INDUSTRIES

Class of Silicone Products	Defoaming/Antifoams	Emulsifiers	Foam Stabilizers	Gloss Additives	Levelling	Lubricants	Oil Repellent	Polymer Modifiers	Release Agents	Softeners/Conditioners	Water Repellents	Wetting Agents	3D Printing	Agriculture	Automotive	Composites	Cosmetics/Personal Care	Electronics	Household	Inks & Coatings	Medical	Metal Working	Oil & Gas	Paper Release Coatings	Plastics	Polyurethane Foam	Pulp & Paper	Textiles
Alkylated	✓	✓	✓	✓	✓	✓			✓	✓	✓		✓	✓	✓		✓		✓	✓		✓	✓		✓		✓	✓	
Amines				✓		✓				✓	✓				✓		✓		✓	✓								✓	
Defoamers	✓												✓	✓					✓	✓		✓	✓				✓	✓	
Emulsions				✓		✓			✓	✓					✓		✓		✓	✓		✓			✓		✓	✓	
Fluids	✓			✓		✓			✓	✓					✓		✓		✓	✓		✓	✓				✓	✓	
Fluorinated	✓			✓	✓	✓	✓			✓	✓	✓	✓		✓		✓			✓					✓	✓	✓		
Gels						✓				✓			✓				✓												
Phosphates		✓			✓	✓					✓						✓	✓	✓	✓		✓						✓	
Polyethers	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	
Q Resins	✓	✓				✓	✓				✓	✓					✓						✓				✓		
Quats	✓	✓		✓	✓	✓				✓	✓	✓			✓		✓		✓	✓			✓				✓	✓	
Reactive							✓	✓	✓	✓			✓			✓			✓					✓	✓		✓	
Resins										✓	✓		✓				✓	✓			✓								
Silicone Anionic/ Cationic Complex						✓				✓							✓											✓	

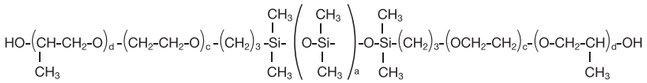
Silicone Polyethers – Silsurf

Silicone polyethers, also known as dimethicone copolyols in the personal care industry, contain both a water-insoluble silicone backbone and a number of water-soluble polyether pendant groups. The ratio of the silicone to polyether and the molecular weight and composition of the components determine the solubility and specific properties of a product. These products exist as multi-pendant and linear-difunctional polymers. Siltech offers a broad range of silicone polyethers as well as custom-designed products for specific applications. These are also available in cosmetic grades.

Multi



Linear



Products	Properties and Applications	Appearance	Colour (Gardner)	Cloud Point (°C)	Viscosity (cps @ 25°C)	Mol. Wt.	Density (g/ml)	Refractive Index	Solubilities at Room Temperature													
									Water		IPA		Mineral Spirits		Mineral Oil		Aromatic Solvents		Cyclo Methicone		350 Viscosity Silicone Fluid	
									1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
Silsurf A008-UP	Shortest silicone chain possible for silicone polyethers. These products are excellent wetters. Used in textiles, agricultural, paints and coatings, and any other applications where superior wetting is required. Also act as a flow and levelling aid in paints and coatings.	clear light straw liquid	<2	35	75	650	1.034	1.450	D	D	S	S	I	I	I	I	S	S	I	I	D	D
Silsurf A010-D		clear light straw liquid	<2	45	75	900	1.030	1.450	S	S	S	S	I	I	S	I	S	S	D	I	D	I
Silsurf C208	Water-soluble silicone polyether. Used in personal care applications. Provides conditioning and lubricity. Provides good wetting and is more hydrolytically stable than Silsurf A008-UP.	clear light straw liquid	<2	58	200	2,000	1.070	1.449	S	S	S	S	I	I	I	I	S	S	I	I	D	I
Silsurf J208	Similar to Silsurf D208 but higher molecular weight. Is more substantive and provides thicker foam than Silsurf C208 and Silsurf D212-CG. Used as a conditioner and lubricant.	clear light straw liquid	<2	60	600	6,300	1.079	1.453	S	S	S	S	I	I	I	I	S	S	I	I	D	D
Silsurf D212-CG	Low-odour, cosmetic-grade silicone polyether. Used in personal care applications. Provides conditioning and lubricity.	clear light straw liquid	<2	55	320	2,800	1.070	1.449	S	S	S	S	I	I	I	I	S	S	I	I	D	D
Silsurf B608	Self-emulsifying in water. Can be used as an oil-in-water emulsifier. Also useful as a lubricant in textile and personal care applications.	clear light straw liquid	<2	N/A	200	2,000	1.034	1.432	D	D	S	S	I	I	I	I	S	S	I	I	D	D
Silsurf C410	Water-dispersible silicone polyether. Used as a lubricant in textiles and personal care. Useful as slip agent in inks and coatings.	clear to hazy light straw liquid	<2	RT	400	2,700	1.047	1.445	D	D	S	S	I	I	I	I	S	S	I	I	D	D
Silsurf E608	Water-dispersible silicone polyether. Provides slip and mar resistance to paints and coatings. Also used as a lubricant.	clear light straw liquid	<2	RT	700	4,700	1.040	1.437	D	D	S	S	I	I	I	I	S	S	I	I	D	D
Silsurf J1015-O	High-molecular-weight, water-soluble ethoxylated and propoxylated silicones. Provide slip and mar resistance, and act as a flow and levelling agent in paints and coatings. Also act as a lubricant and emulsifier in personal care applications. Silsurf J1015-O-AC is an acetoxy-capped version of Silsurf J1015-O.	clear light straw liquid	<2	40	2,000	24,000	1.029	1.444	S	S	S	S	I	I	I	I	S	S	I	I	D	D
Silsurf J1015-O-AC		clear light straw liquid	<2	32	2,000	24,500	1.029	1.440	S	S	S	S	I	I	I	I	S	S	D	D	S	I
Silsurf Di-1010	Polyether-terminated silicones. Used in personal care and textile applications where lubricity and conditioning are needed. Can be reacted with isocyanates, epoxides and other reactive compounds to modify resins and coatings.	clear light straw liquid	<2	RT	250	1,800	1.040	1.441	D	D	S	S	I	I	I	I	S	S	I	I	D	D
Silsurf Di-2012		clear to hazy liquid	<2	60	350	2,900	1.040	1.441	D	I	S	S	I	I	D	I	S	S	I	I	I	I
Silsurf Di-15I		clear light straw liquid	<2	N/A	200	2,400	1.040	1.440	I	I	S	S	S	S	I	I	S	S	S	D	D	I
Silsurf Di-5018-F	Polyether-terminated silicone. Gel-like at room temperature. Used as a lubricant and as a chain modifier for resins and coatings.	clear light straw gel at RT	<2	N/A	gel at RT	6,200	0.986	1.428	D	I	S	S	S	S	I	I	S	S	D	D	D	D

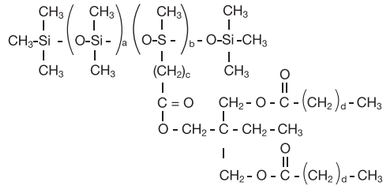
Silicone Gels

The Silmer G-162 series is a group of related silicone elastomers that are based on unique dimethicone/vinyl dimethicone cross polymers in cyclopentasiloxane. The different products vary in the modifier added to the base polymer which alters the ultimate aesthetics. Silmer G-162 series elastomers are easy to formulate and improve gloss, pigment dispersion and softness to many personal care products. The Silube 550 is based on urethane siloxanes.

Products	Properties and Applications	Appearance	% Solids	Viscosity (cps @ 25 °C)	Solvent	Solubilities at Room Temperature													
						Water		IPA		Mineral Spirits		Mineral Oil		Aromatic Solvents		Cyclo Methicone		350 Viscosity Silicone Fluid	
						1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
Silube 550	Silicone urethane resin that can be incorporated into coatings and fabric protectants to provide good water and soil repellence.	liquid	40-50	5,000	isododecane	I	I	S	S	S	S	I	I	S	S	S	S	D	I
Silmer G-162	Used in formulating various personal care products to provide a dry, soft, powdery-skin feel.	clear liquid	80-90	400,000	cyclopentasiloxane	I	I	I	I	I	I	I	I	I	I	D	D	D	D
Silmer G-162A	More cushion and play time.	clear liquid	80-90	400,000	cyclopentasiloxane	I	I	I	I	I	I	I	I	I	I	S	D	D	D
Silmer G-162F	Forms thinner and more spreadable film.	clear liquid	80-90	400,000	cyclopentasiloxane	I	I	I	I	I	I	I	I	I	I	S	D	S	D
Silmer G-162Q	More powdery and silky feel. Adds transfer resistance to lipsticks.	clear liquid	80-90	400,000	cyclopentasiloxane	I	I	I	I	I	I	I	I	I	I	S	D	S	D

Silicone Multi-Esters

These 100% active silicone multi-esters are trimethylpropane-based and are available on branched silicones. These products have improved oxidative stability and higher oxidative onset temperatures relative to the base silicone polymer and trimethylolpropane esters. They are used as lubricants in high-temperature, anaerobic systems such as combustion engines and gearboxes.



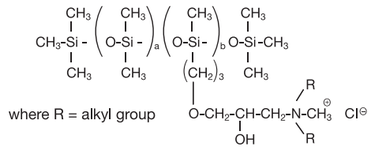
Products	Properties and Applications	Appearance	Colour	Viscosity (cps @ 25 °C)	Alkyl Group	Solubilities at Room Temperature													
						Water		IPA		Mineral Spirits		Mineral Oil		Aromatic Solvents		Castor Oil		Soybean Oil		350 Viscosity Silicone Fluid	
						1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
Silube TMP D2	Branched silicones with varying fatty groups. Typically used in processes that require high heat stability that cannot be achieved with traditional silicones, such as for non-stick cookware and high-temperature paint.	clear liquid	1	1,000	C8/C10	I	I	I	I	S	S	D	D	S	S	D	I	S	S	D	I
Silube TMP D218		soft wax	1	N/A	C18 stearic	I	I	S	S	S	S	S	S	S	S	I	I	I	I	I	I
Silube TMP D219		clear liquid	1	600	C18 isostearic	I	I	I	I	S	S	S	S	S	S	I	I	S	S	D	I

Silicone Quaternary Compounds – Silquat

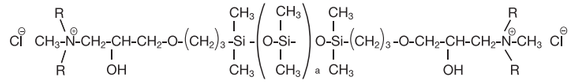
Siltech offers two classes of quaternary compounds: **1. Silicone Dialkyl Quats, 2. Silicone Polyether Fatty Quats**

1. Silicone Dialkyl Quats. Where the alkyl group can range from C1 to C18. These are 70% active in hexylene glycol, except as otherwise noted. The dialkyl quats are substantive to fibres, are non-yellowing and provide softness, lubricity and anti-stat properties in textile applications. They also provide water repellency to glass and automotive surfaces.

Multi



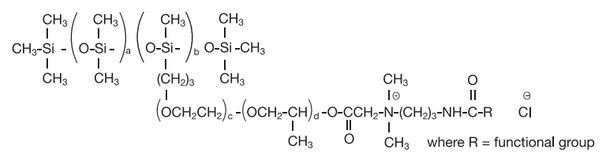
Linear



Products	Properties and Applications	Appearance	Colour (Gardner)	Alkyl Group	Contact Angle°	Solubilities at Room Temperature													
						Water		IPA		Mineral Spirits		Mineral Oil		Aromatic Solvents		Cyclo Methicone		350 Viscosity Silicone Fluid	
						1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
Silquat A0	Shortest silicone chain quat. Used in coatings as a levelling agent, and in textiles as a wetter and anti-stat.	clear amber liquid	3	C2	72	S	S	S	S	I	I	I	I	I	I	I	I	I	I
Silquat J2	Water-soluble quats. Are substantive to hair and fibres.	clear amber viscous liquid	3	C2	83	S	S	S	S	I	I	I	I	I	I	I	I	I	I
Silquat J15	Water-insoluble quat. Gives excellent water repellency to glass and automotive surfaces.	clear amber viscous liquid	3	C2	101	I	I	S	S	I	I	I	I	I	I	I	I	I	I
Silquat Di-10	Difunctional linear silicone quats. Silquat Di-25 has a higher percentage of silicone.	clear amber liquid	3	C2	87	S	D	S	S	I	I	I	I	I	I	I	I	I	I
Silquat Di-25			3	C2	93	D	D	S	S	I	I	I	I	I	I	I	I	I	I
Silquat J2-B	Products contain low ratio of silicone to fatty groups. Silquat J2-B has a lower molecular weight than Silquat J15-B.	clear amber viscous liquid	3	C18	91	I	I	S	S	S	S	S	S	S	S	D	I	D	I
Silquat J15-B	This quat contains a higher ratio of silicone to fatty groups than Silquat J2-B. Provides water repellency and increased softness and hand to textiles.	clear amber viscous liquid	3	C18	100	I	I	S	S	S	S	S	S	S	S	S	S	D	D
Silquat J208-1B	Products have polyether groups incorporated to make them more water.	clear amber viscous liquid	3	C18	N/A	S	S	S	S	I	I	I	I	S	S	I	I	D	I
Silquat CR 4000	Very-high-molecular-weight water-soluble silicone quaternary compound. 70% active in hexylene glycol. Excellent hair conditioner for both clear and opaque 2-in-1 shampoos.	clear amber viscous liquid	8	C2	90	S	S	S	S	I	I	I	I	I	I	I	I	I	I
Silquat 3180	Water-dispersible blend of high-molecular-weight and low-molecular-weight silicone quats. 70% active in hexylene alcohol.	clear amber viscous liquid	3	C2	96	D	D	S	S	I	I	I	I	S	S	I	I	D	I
Silquat 3150	Water-dispersible silicone quats. These products are blends of fatty quats and silicone quats. Excellent beading for car care products.	clear amber viscous liquid	3	C2	98	D	D	S	S	S	S	I	I	I	I	I	I	D	I
Silquat 3152			3	C2	94	S	D	S	S	I	I	I	I	I	I	D	I	D	D

Silicone Quaternary Compounds – Silquat (continued)

2. Silicone Polyether Fatty Quats. Where the fatty group can range from lauric to stearic.



Products	Properties and Applications	Appearance	Colour (Gardner)	Viscosity (cps @ 25°C)	Functional Group	Solubilities at Room Temperature													
						Water		IPA		Mineral Spirits		Mineral Oil		Aromatic Solvents		Cyclo Methicone		350 Viscosity Silicone Fluid	
						1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
Silquat AD	These products provide lubricity and softness to fibres. The water solubility can be varied according to the ratio of silicone, polyether and the molecular weight of the alkyl group. Compatible with anionic systems. Provides outstanding conditioning and anti-stat for 2-in-1 shampoos. Does not adversely affect foam. Silquat AD and AC are 40% active in water.	clear to hazy yellow liquid	3	20	Dimer	S	S	S	S	I	I	I	I	I	I	I	I	I	I
Silquat AC		clear to hazy yellow liquid	3	20	Coco	S	S	S	S	I	I	I	I	I	I	I	I	I	I

Silicone MQ Resins

Silmer Q Resins

Silmer Q Resins are the kinetic reaction products of silicates with trimethyl siloxy groups, which generates a silicon-based, cross-linked network. These are often referred to as MQ resins because they are built of a network of tetrafunctional silicon atoms (Q group – silicon surrounded by four oxygen groups) endcapped with monofunctional silicon (M group – silicon with one oxygen group and three alkyls).

Depending on the specific structures, molecular weights and cross-link densities, these are available as pourable liquids or solids diluted in solvents. All are presented as clear liquids.

Products	M:Q Ratio	Viscosity (cps @ 25°C), Appearance	% Actives	Molecular Weight	Refractive Index
Silmer Q20	2:1	250, clear liquid	100%	2,000	1.404
Silmer Q12IDD	1.25:1	20, clear liquid	70% in isododecane	2,500	1.413
Silmer Q12XYL	1.25:1	10, clear liquid	70% in xylene	2,500	1.413
Silmer Q9IDD	0.9:1	20, clear liquid	70% in isododecane	4,700	1.413
Silmer Q9XYL	0.9:1	10, clear liquid	70% in xylene	4,700	1.413

Silmer HQ Containing Resins

Silmer HQ Resins are MQ resins with reactive hydride groups. These can be used in two-component siloxane VIN/SiH cured systems to help improve rheological properties such as tear strength and elongation.

Products	Description	M:Q Ratio	Viscosity (cps @ 25°C), Appearance	% Actives	Molecular Weight	% Hydride
Silmer HQ20	Low-molecular-weight MQ resin with all "M" endcapped portions functionalized with SiH.	2:1	12, clear liquid	100%	2,000	0.65
Silmer HQ203	Higher-molecular-weight MQ resins. Contains less SiH than Silmer HQ 20.	2:1	100, clear liquid	100%	2,500	0.12

Silmer VQ Resins

Silmer VQ Resins are MQ resins with reactive vinyl groups. These can be used in two-component siloxane VIN/SiH cured systems to help improve rheological properties such as tear strength and elongation. The G-180 series are blends of VQ resins and vinyl terminated siloxanes for ease of use.

Products	M:Q Ratio	Viscosity (cps @ 25°C), Appearance	% Actives	Molecular Weight	% Vinyl
Silmer VQ20	2:1	1,000, clear liquid	100%	2,000	12.0
Silmer VQ92XYL	0.9:1	20, clear liquid	70%	4,700	2.0
Silmer VQ92IDD	0.9:1	30, clear liquid	70% in isododecane	4,700	2.0
Silmer G-180	0.9:1	14,000, clear liquid	50% VQ92 in Silmer VIN 1,000	Not Applicable	1.0
Silmer G-181	0.9:1	50,000, clear liquid	50% VQ92 in Silmer VIN 10,000	Not Applicable	1.0
Silmer G-182	0.9:1	70,000, clear liquid	50% Silmer VQ92 in Silmer VIN 65,000	Not Applicable	1.0

Silicone Polyether MQ Resins

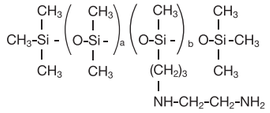
These are highly branched silicone polyethers. Due to their branched properties, these products can provide for better substantivity than standard silicone polyethers and also act as improved carriers for applications such as defoaming.

Products	Viscosity (cps @ 25°C), Appearance	OH Value	Refractive Index	Cloud Pt (°C)	Mol. Wt.
Silsurf Q25315-O	500, clear liquid	30	1.448	44	2,000
Silsurf Q20308	800, clear liquid	55	1.439	<25	3,000

Silicone Amines – Silamine

Siltech offers two classes of silicone amines: **1. Primary-Secondary Amines, 2. Solubilized Primary-Secondary Amines**

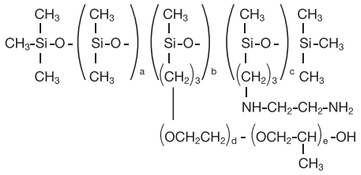
1. Primary-Secondary Amines. These are aminoethylaminopropyl-based amines.



Products	Properties and Applications	Colour (Gardner)	Viscosity (cps @ 25 °C)	Amine Value
Silamine 2972	An aminopropylmethylpolysiloxane that can impart softness and durability to textiles and are very low yellowing. In personal care applications, they provide good conditioning to hair and provide good feel and delivery properties to creams and lotions.	<1	1,500	15
Silamine MUE	An amino-functional polydimethylsiloxane that is reactive with fibres, textiles, automobile surfaces and plastics. Is used in both solvent-and water-based polishes to give a durable shine to various surfaces and can impart softness to textiles. Has higher amine value than Silamine 2972 so will be more durable.	1	2,000	28
Silamine T-97	An aminoethylaminopropyl polysiloxane with high % branched alkyl group to improve organic compatibility. Imparts softness to textiles and improved hair conditioning.	1	50	10
Silamine DG-50	Amino-functional polydimethylsiloxane. Excellent durable gloss for automotive polishes and hard surface cleaners. This clear to hazy liquid is 50% active in mineral spirits and isopropyl alcohol.	<1	150	16

Silicone Amines – Silamine (continued)

2. Solubilized Primary-Secondary Amines. Where the aminoethylaminopropyl silicone is solubilized with polyether groups. These products add softness and lubricity in personal care and textile applications. They are substantive to fibres and are low yellowing.



Products	Properties and Applications	Colour (Gardner)	Molecular Weight	Equivalent Weight	Amine Value
Silamine AS	100% active amino silicone.	3	3,000	3,000	2.0
Silamine C-100	50% active in water.	3	2,500	2,500	1.0
Silamine PD	90% active in water.	3	3,500	3,500	4.0
Silamine D208 EDA	100% active amino silicone.	3	2,500	2,500	22

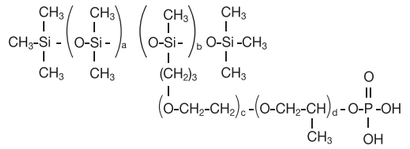
Silicone Polyether Esters and Carboxylates

Siltech offers a series of silicone polyether esters and carboxylates based on fatty acids such as lauric and isostearic. These products are excellent emulsifiers and provide good conditioning to hair and fibres. The fatty portion of the molecule as well as the molecular weight of the silicone can be altered to suit customer needs.

Products	Properties and Applications	Appearance	Colour (Gardner)	Viscosity (cps @ 25 °C)	Solubilities at Room Temperature													
					Water		IPA		Mineral Spirits		Mineral Oil		Aromatic Solvents		Cyclo Methicone		350 Viscosity Silicone Fluid	
					1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
Silwax WD-IS	Silicone isostearate. Forms a lubricious micro-emulsion in water. Excellent for making oil-or silicone-in-water emulsions.	clear liquid	2	200	D	D	S	S	I	I	D	I	S	S	D	I	D	I
Silwax WS-L	Silicone laurate. Acts as an emulsifier, slip additive and conditioner.	clear liquid	2	200	S	S	S	S	I	I	I	I	S	S	D	I	D	I
Silube CS-1	Carboxy silicone in the free acid form based on succinic acid. Excellent emulsifier and complexation agents for quats and amines.	clear liquid	2	3,000	S	I	S	S	I	I	D	I	D	I	D	I	D	I

Silicone Phosphates – Silphos

Siltech offers a series of phosphated silicone polyethers that are available as free acids or sodium salts. Silicone phosphates exhibit good foaming, emulsification, detergency and wetting properties and, due to their anionic character, have good substantivity to glass and other surfaces. Phosphates also help sequester iron and other metal ions and have good rust-inhibition properties.



Products	Properties and Applications	Appearance	Colour (Gardner)	Viscosity (cps @ 25 °C)	Solubilities at Room Temperature													
					Water		IPA		Mineral Spirits		Mineral Oil		Aromatic Solvents		Cyclo Methicone		350 Viscosity Silicone Fluid	
					1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
Silphos A-100	Silicone polyether phosphate ester in free acid form. Excellent emulsifier, dispersant and anti-stat.	clear yellow liquid	1	300	S	S	S	S	I	I	I	I	I	I	I	I	I	I
Silphos J208	Higher molecular weight than Silphos A-100.	clear yellow liquid	2	600	S	S	S	S	I	I	I	I	I	I	I	I	I	I

Silicone Anionic/Cationic Complex – SilPlex

Siltech offers a series of silicone complexes that are the salts of anionic and cationic silicones.

Products	Properties and Applications	Appearance	Colour (Gardner)	Viscosity (cps @ 25 °C)	Solubilities at Room Temperature													
					Water		IPA		Mineral Spirits		Mineral Oil		Aromatic Solvents		Cyclo Methicone		350 Viscosity Silicone Fluid	
					1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
SilPlex J2-S	These are unique complexes of varying silicone quaternary compounds and anionic silicone compounds. These water-soluble silicones are compatible with anionic surfactants and provide outstanding conditioning to hair and skin and softening to textile fibres. These are very mild to the skin and eyes, making their use in baby shampoos an important application.	clear liquid	2	700	S	S	S	S	I	I	I	I	I	I	I	I	I	I
SilPlex JQ-40		clear liquid	2	20	S	S	S	S	I	I	I	I	I	I	I	I	I	I

Castor Oil Silicones

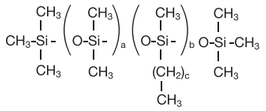
These silicones are modified to have the castor oil triglyceride attached to the silicone backbone, making these silicones more compatible with castor oil-containing consumer products. For personal care products these silicones add gloss and give an excellent feel. For inks and coatings they enhance slip and mar resistance. The hydroxyl group can also be reacted into certain coating systems to provide anti-graffiti properties.

Products	Properties and Applications	Appearance	Colour (Gardner)	Viscosity (cps @ 25 °C)	% Castor Oil	Solubilities at Room Temperature															
						Water		IPA		Mineral Spirits		Mineral Oil		Aromatic Solvents		Cyclo Methicone		350 Viscosity Silicone Fluid		Triglyceride	
						1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
Silube CO Di-10	Linear castor oil-based silicone.	clear liquid	3	1,000	80	I	I	S	S	S	S	D	I	S	S	I	I	D	I	S	S
Silube CO Di-50		clear liquid	3	2,400	40	I	I	S	S	S	S	D	I	S	S	I	I	D	I	I	I

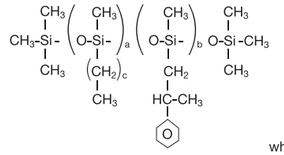
Alkylated Silicones – Silwax

Silwax alkylated silicones are based on alkyl pendant groups ranging from C2 to C32. The ratio of silicone to alkyls and the chain length of the alkyls determine the melting point and liquidity of the final product. These products can range from liquids to soft pastes to hard waxes. They are excellent lubricants in textile, metalworking and automotive applications. They impart water and solvent repellency to textiles, and flow, levelling, slip and mar resistance to inks and coatings. They also provide gloss, emollience and softness in personal care applications. The Silwax alkylated silicones are represented by both alkyl and alkyl aryl silicones.

Alkyl



Alkyl Aryl

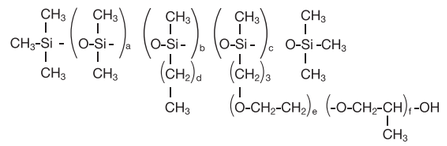


where c = 1-29

Products	Properties and Applications	Appearance	Colour (Gardner)	Melting Point (°C)	Viscosity (cps @ 25°C)	% Alkyl	Solubilities at Room Temperature															
							Water		IPA		Propylene Glycol		Mineral Spirits		Mineral Oil		Hisol 10		Cyclo Methicone		350 Viscosity Silicone Fluid	
							1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
Silwax D02	These products are all liquid silicone alkylates and are compatible with many organic systems. They are used as lubricants and provide softness and gloss to textile and personal care applications.	liquid	<1	<-20	10	20	I	I	S	S	I	I	S	S	S	S	S	S	S	S	S	S
Silwax E1316		liquid	<1	<-20	140	20	I	I	I	I	I	I	S	S	S	S	S	S	S	S	S	D
Silwax H416		liquid	<1	-10	110	40	I	I	I	I	I	I	S	S	S	S	S	S	S	S	I	I
Silwax B116		liquid	<1	-4	25	50	I	I	I	I	I	I	S	S	S	S	S	S	S	S	D	I
Silwax L118	These products are gel-like at room temperature. They provide good slip, lubricity and emollience to shampoos, creams and conditioners.	gel	<1	30	N/A	65	I	I	I	I	I	I	S	S	S	S	S	S	I	I	I	I
Silwax J1022		gel	<1	20	100	30	I	I	I	I	I	I	S	S	S	S	S	S	S	D	I	I
Silwax D222	These products are soft lubricous waxes that are used in personal care, textile and other applications where lubricity and softness are needed.	soft wax	<1	37	N/A	55	I	I	I	I	I	I	S	S	S	S	S	S	I	I	I	I
Silwax D226		soft wax	<1	54	N/A	60	I	I	I	I	I	I	S	S	S	S	S	S	I	I	I	I
Silwax J1026		soft wax	<1	46	N/A	30	I	I	I	I	I	I	S	S	S	S	I	I	I	I	I	I
Silwax J226	These products are used in applications where a wax with a high melting point is useful. Can be used in lipstick applications, and in textiles as a softener and water and solvent repellent.	hard wax	<1	51	N/A	60	I	I	I	I	I	I	I	I	S	D	I	I	I	I	I	I
Silwax D026		hard wax	<1	65	N/A	80	I	I	I	I	I	I	I	I	S	S	S	D	I	I	I	I
Silwax J1032		hard wax	<1	60	N/A	35	I	I	I	I	I	I	S	D	S	D	I	I	I	I	I	I
Silwax Di-5026	Difunctional alkyl silicone that gives excellent lubricity and slip.	soft wax	<1	31	N/A	15	I	I	I	I	I	I	S	S	S	S	S	S	I	I	I	I
Silwax D221M	This series of Multi-Domain-Silicones are silicone waxes that contain both liquid and solid alkyl chains on the same molecule. This results in products that are easily spreadable, yet also provide excellent cushion and a long-lasting feel.	soft wax	<1	35	N/A	53	I	I	I	I	I	I	S	S	I	I	S	S	I	I	I	I
Silwax J219M		soft wax	<1	30	N/A	55	I	I	I	I	I	I	S	S	S	S	S	S	I	I	I	I
Silwax J221M		soft wax	<1	32	N/A	58	I	I	I	I	I	I	S	S	S	I	S	S	I	I	I	I
Silwax Di-1021M		soft wax	<1	37	N/A	40	I	I	I	I	I	I	S	S	S	I	S	S	I	I	I	I
Silwax 3H32	A siloxane with C32 alkyl groups that provides improved durability, gloss and water repellence for various waxes and polishes.	hard wax, prilled	<1	70	N/A	90	I	I	I	I	I	I	I	I	I	I	S	I	I	I	I	I
Silwax CR 5016	Loosely cross-linked alkyl silicone that gives better substantivity and surface migration.	liquid	<1	-10	110	40	I	I	I	I	I	I	S	S	S	S	S	S	S	S	D	D
Silwax 3H12-MS	An alkyl aryl siloxane based on C12. Used as a paintable release agent for die-casting metals, molding, plastics, etc.	liquid	<1	N/A	1,200	70	I	I	I	I	I	I	S	S	S	S	S	S	S	I	D	I
Silwax 3H2-MS	An alkyl aryl siloxane based on C2. It acts as a paintable mold release agent for plastics and rubber.	liquid	<1	N/A	1,000	45	I	I	D	D	D	D	S	S	S	S	S	S	S	S	D	D
Silwax 3H-MS	Aryl siloxanes that have a very high refractive index and give excellent shine to various substrates.	liquid	<1	N/A	8,000	65	I	I	D	D	D	D	S	S	S	S	S	S	D	I	I	I
Silwax D0-MS		liquid	<1	N/A	100	55	I	I	S	S	D	D	S	S	S	S	S	S	S	S	D	I

Alkylated Silicone Polyethers – Silube

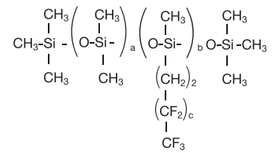
Siltech offers a series of alkylated silicones co-reacted with polyethers to make them either fully or partially soluble in water. The products listed below represent only a partial list. Siltech has the capability of offering any alkylated silicone wax in a water-soluble form. The Silube products are represented by the following structure:



Products	Properties and Applications	Appearance	Colour (Gardner)	Viscosity (cps @ 25°C)	% Alkyl	% Ethylene Oxide	Solubilities at Room Temperature													
							Water		IPA		Mineral Spirits		Mineral Oil		Aromatic Solvents		Cyclo Methicone		350 Viscosity Silicone Fluid	
							1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
Silube T308-16	Water-insoluble silicone alkyl polyether. Provides good lubricity and is a good water-in-oil emulsifier for creams and lotions used in the personal care industry.	clear liquid	1	800	30	12	I	I	S	S	S	S	S	S	S	S	S	D	I	I
Silube T310-A16	Water-insoluble silicone alkyl polyether. Provides good lubricity and is a good water-in-oil emulsifier for creams and lotions used in the personal care industry.	clear liquid	1	1,500	27	17	I	I	S	S	S	S	S	S	S	S	S	D	I	I
Silube FF108-16	Water-soluble silicone alkyl polyether. Provides good lubricity and is a good oil-in-water emulsifier when used in combination with Silube T308-16.	clear liquid	1	1,500	10	60	S	S	S	S	I	I	D	I	D	I	I	I	D	I
Silube J208-212	Water-soluble alkyl silicone polyether. Good oil-in-water emulsifier.	clear liquid	1	1,000	6	48	S	S	S	S	I	I	I	I	I	I	I	I	I	I
Silube J208-412	Water-dispersible alkyl silicone polyether. Good oil-in-water emulsifier.	clear liquid	1	800	13	39	D	D	S	S	I	I	I	I	S	S	I	I	I	I
Silube J208-612	Water-dispersible silicone alkyl polyethers. Good ester-in-oil emulsifier.	clear liquid	1	600	22	28	D	I	S	S	S	S	I	I	S	S	I	I	I	I
Silube J208-812	Water-insoluble alkyl silicone polyether. Good water-in-oil emulsifier.	clear liquid	1	300	32	16	I	I	S	D	S	D	S	S	S	S	S	D	I	I

Fluorinated Silicones – Fluorosil

Siltech offers a series of fluorinated silicones as well as fluorinated silicones that also contain alkyl or polyether pendant groups. By virtue of the fluorine group, these products offer good solvent resistance, lubricity and slip. The ratio of fluorine and silicone can be varied to suit customer needs.



Products	Properties and Applications	Appearance	Colour (Gardner)	Viscosity (cps @ 25°C)	% Fluoro	% Alkyl	% Ethylene Oxide	Refractive Index	Solubilities at Room Temperature													
									Water		IPA		Mineral Spirits		Mineral Oil		Aromatic Solvents		Cyclo Methicone		350 Viscosity Silicone Fluid	
									1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%	1%	10%
Fluorosil J15	Fluorinated silicone. Superior slip and lubricity in cosmetic and textile applications.	clear light straw liquid	<1	500	17	0	0	1.399	I	I	I	I	S	S	I	I	S	S	S	S	S	S
Fluorosil D2				25	48	0	0	1.381	I	I	I	I	S	S	D	I	S	D	S	S	S	D
Fluorosil H418	Liquid alkylfluorosilicone. Provides slip and lubricity.	clear light straw liquid	<1	300	20	20	0	1.422	I	I	I	I	S	S	S	S	S	S	S	S	S	D
Fluorosil L118	Alkylfluorosilicone with melting point of 23-28°C. Good emolliency in cosmetic applications, as well as a good lubricant.	off-white lubricious paste	<1	N/A	6	60	0	1.440	I	I	I	I	S	S	S	S	S	S	D	I	D	I
Fluorosil 2110	Fluorinated silicone polyethers. The water solubility can be varied to suit customer needs.	clear light straw liquid	<1	300	8	0	55	1.448	S	D	S	S	I	I	I	I	D	I	I	I	I	I
Fluorosil 2010				800	3	0	70	1.451	S	S	S	S	I	I	I	I	S	S	I	I	D	I

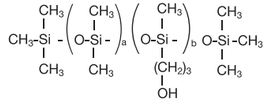
Reactive Silicones – Silmer

The Silmer line of reactive silicones consists of both multifunctional and linear-difunctional silicone pre-polymers with reactive terminal end groups. The silicones can be co-reacted into various polymers for coatings, plastics, resins and other applications to incorporate a silicone moiety into a polymer structure. Some basic homologues are offered in each class, but other homologues can be custom made.

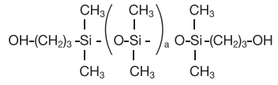
Siltech offers ten classes of reactive silicones **1. Silmer OH, 2. Silmer OHT, 3. Silmer ACR, 4. Silmer OH ACR, 5. Silmer H, 6. Silmer NCO, 7. Silmer NH, 8. EP, 9. Silmer VIN, 10. Silmer TMS.**

1. Silmer OH – Hydroxyl-Functional Pre-Polymer

Multi



Linear-difunctional

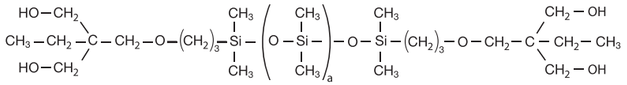


Products	Properties and Applications	Appearance	Mol. Wt.	Equivalent Wt.	Viscosity cps @ 25°C
Silmer OH A0-UP	Lowest-molecular-weight reactive silicone. Contains one reactive group on a heptamethyltrisiloxane backbone. Used as a chain terminator and polymer modifier.	clear liquid	280	280	20
Silmer OH C50	High-molecular-weight trifunctional silicone pre-polymer.	clear liquid	11,600	3,800	500
Silmer OH J10	High-molecular-weight multifunctional silicone pre-polymer.	clear liquid	8,800	880	1,300
Silmer OH Di-10	Linear-difunctional hydroxyl-terminated silicone pre-polymer.	clear liquid	1,000	500	50
Silmer OH Di-50	Linear-difunctional hydroxyl-terminated silicone pre-polymer.	clear liquid	4,000	2,000	100
Fluorosil OH C7-F	Fluorinated hydroxyl-functional silicone that provides stain resistance, flexibility and slip to urethane, epoxy and other coatings.	clear liquid	2,200	1,100	80

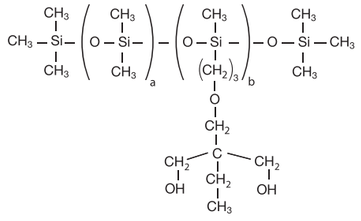
2. Silmer OHT – Dual Hydroxyl-Functional Pre-Polymer

Provides the superb slip, mar and stain resistance of linear silicones but also provide some degree of crosslinking to better anchor the silicone co-polymer into the system.

Linear-difunctional



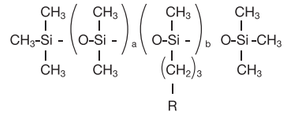
Multi



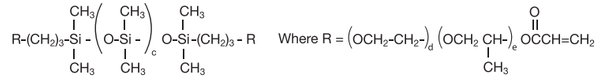
Products	Properties and Applications	Appearance	Mol. Wt.	Equivalent Wt.	Viscosity cps @ 25°C
Silmer OHT A0	Two-functional hydroxyl attached to silicone backbone. Can be reacted into urethane coatings to have a single monofunctional silicone layer incorporated into the coating	clear liquid	400	200	100
Silmer OHT Di-10	Tetra-functional hydroxyl silicone. Best organic compatibility	clear liquid	1,200	300	200
Silmer OHT Di-50	Tetra-functional hydroxyl silicone. Provides good slip, mar resistance and release	clear liquid	3,800	950	300
Silmer OHT Di-100	Tetra-functional hydroxyl silicone. Provides good slip, mar resistance and release	clear liquid	7,900	1,975	500
Silmer OHT Di-400	Tetra-functional hydroxyl silicone. Provides best slip, mar resistance and release	clear liquid	30,000	7,500	9,500
Silmer OHT E13	Ten-functional hydroxyl silicone. Provides good slip, mar resistance and release and high degree of crosslinking	clear liquid	6,100	1,525	1,500

3. Silmer ACR – Acrylate-Functional Pre-Polymer

Multi



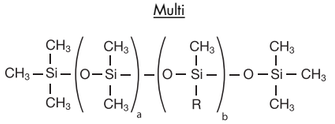
Linear-difunctional



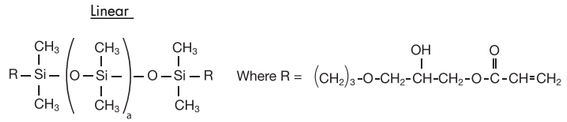
Products	Properties and Applications	Appearance	Mol. Wt.	Equivalent Wt.	Viscosity cps @ 25°C
Silmer ACR D208	Water-soluble multifunctional acrylate silicone pre-polymer.	clear liquid	3,000	1,200	270
Silmer ACR D2	Multifunctional acrylate silicone pre-polymer.	clear liquid	1,400	560	340
Silmer ACR Di-10	Linear-difunctional acrylate-terminated silicone pre-polymer.	clear liquid	1,100	550	30
Silmer ACR Di-50	Linear-difunctional acrylate-terminated silicone pre-polymer.	clear liquid	4,100	2,050	120
Silmer ACR Di-400	Linear-difunctional acrylate-terminated silicone pre-polymer.	clear liquid	24,100	14,200	2,100
Silmer ACR Di-1508	Linear-difunctional water-insoluble acrylate silicone pre-polymer.	clear liquid	1,500	750	160
Silmer ACR Di-2510	Linear water dispersible cross-linkable silicone acrylate pre-polymer.	clear liquid	2,800	1,400	350
Silmer ACR Di-4515-0	Linear difunctional water dispersible acrylate silicone pre-polymer.	clear liquid	6,600	3,000	2,200

4. Silmer OH ACR – Acrylate-Functional Pre-Polymer with Secondary Hydroxyl Groups

Multi



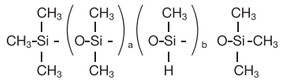
Linear



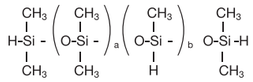
Products	Properties and Applications	Appearance	Mol. Wt.	Equivalent Wt.	Viscosity cps @ 25°C
Silmer OH ACR Di-10	Linear low Mol. Wt. silicone acrylate pre-polymer for UV cured systems. More compatible to organics. Fast curing, provides good slip, mar resistance and release.	clear liquid	1,200	600	120
Silmer OH ACR Di-50	Linear medium Mol. Wt. silicone acrylate pre-polymer for UV cured systems. Fast curing, provides good slip, mar resistance and release.	clear liquid	3,900	1,900	210
Silmer OH ACR Di-100	Linear high Mol. Wt. silicone acrylate pre-polymer for UV cured systems. Fast curing, provides good slip, mar resistance and release.	clear liquid	8,000	4,000	310
Silmer OH ACR Di-400	Linear high Mol. Wt. silicone acrylate pre-polymer for UV cured systems. Fast curing, provides best slip, mar resistance and release.	clear liquid	12,000	6,000	1,500
Silmer OH ACR C50	Multi tri-functional high Mol. Wt. silicone acrylate pre-polymer for UV cured systems. Provides for a good flexible resin with slip, mar resistance and release.	clear liquid	12,000	4,000	1,200
Fluorosil OH ACR C7-F	Fluorinated hydroxy functional silicone acrylate that provides improved stain resistance, flexibility and slip to UV based coatings.	clear	2,600	1,300	200

5. Silmer H – Hydride-Functional Pre-Polymer

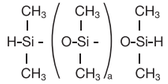
Multi



Linear and Multi Combination



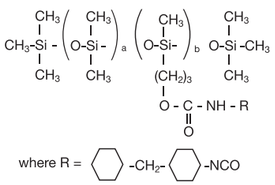
Linear



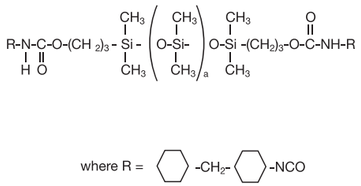
Products	Properties and Applications	Appearance	Mol. Wt.	Equivalent Wt.	Viscosity cps @ 25°C
Silmer H D2	Multifunctional silicone hydride pre-polymer.	clear liquid	1,100	270	10
Silmer H E4	Multifunctional silicone hydride pre-polymer.	clear liquid	2,100	420	25
Silmer H Di-10	Linear-difunctional silicone hydride pre-polymer.	clear liquid	875	438	10
Silmer H Di-E2	Linear-difunctional and multifunctional silicone hydride pre-polymer.	clear liquid	1,000	142	10

6. Silmer NCO – Isocyanate-Functional Pre-Polymer

Multi



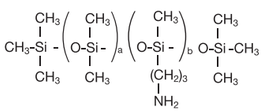
Linear-difunctional



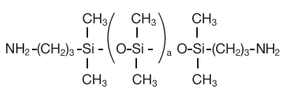
Products	Properties and Applications	Appearance	Mol. Wt.	Equivalent Wt.	Viscosity cps @ 25°C
Silmer NCO C50	High-molecular-weight trifunctional silicone pre-polymer.	clear liquid	12,400	4,100	1,100
Silmer NCO Di-50	Linear-difunctional isocyanate-terminated silicone pre-polymer.	clear liquid	4,300	2,150	1,400
Silmer NCO Di-100	Linear-difunctional isocyanate-terminated silicone pre-polymer. Twice the molecular weight of Silmer NCO Di-50.	clear liquid	8,000	4,000	3,000

7. Silmer NH – Amino-Functional Pre-Polymer

Multi

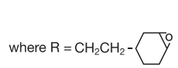


Linear-difunctional

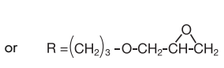


Products	Properties and Applications	Appearance	Mol. Wt.	Equivalent Wt.	Viscosity cps @ 25°C
Silmer NH C50	High-molecular-weight trifunctional silicone pre-polymer.	clear liquid	11,600	3,800	500
Silmer NH Di-8	Linear-difunctional amino-terminated silicone pre-polymer.	clear liquid	850	425	12
Silmer NH Di-50	Linear-difunctional amino-terminated silicone pre-polymer.	clear liquid	3,600	1,800	70

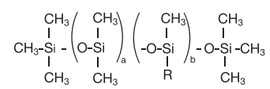
8. Silmer EP – Epoxide-Functional Pre-Polymer



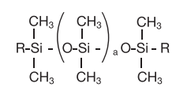
or



Multi



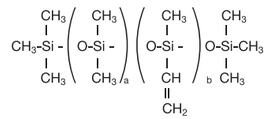
Linear-difunctional



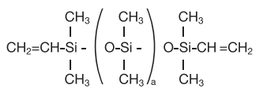
Products	Properties and Applications	Appearance	Mol. Wt.	Equivalent Wt.	Viscosity cps @ 25°C
Silmer EP C50	High-molecular-weight trifunctional silicone pre-polymer.	clear liquid	11,800	3,900	500
Silmer EPC C50	High-molecular-weight trifunctional silicone pre-polymer, with a cyclic epoxide.	clear liquid	11,800	3,900	500
Silmer EP J10	High-molecular-weight multifunctional silicone pre-polymer.	clear liquid	9,300	930	900
Silmer EP Di-50	Linear-difunctional epoxide-terminated silicone pre-polymer.	clear liquid	4,100	2,050	70
Silmer EP Di-100	Linear-difunctional epoxide-terminated silicone pre-polymer. Twice the molecular weight of Silmer EP Di-50.	clear liquid	7,800	3,900	160
Silmer EPC Di-50	Linear-difunctional silicone pre-polymer terminated with a cyclic epoxide.	clear liquid	4,100	2,050	85
Silmer EP D208	Water-dispersible glycidyl-based reactive silicone epoxy pre-polymer. Often improves compatibility in non-aqueous formulations.	clear liquid	2,400	2,400	300
Silmer EPC F418-F	Water-dispersible multifunctional cycloaliphatic-based reactive silicone epoxy pre-polymer. Often improves compatibility in non-aqueous formulations.	clear liquid	8,200	8,200	900

9. Silmer VIN – Vinyl-Functional Pre-Polymer

Multi



Linear-difunctional

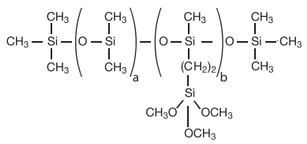


Products	Properties and Applications	Appearance	% Vinyl	Vinyl Meq.	Viscosity cps @ 25°C
Silmer VIN C50	High-molecular-weight trifunctional silicone pre-polymer.	clear liquid	0.701	0.260	250
Silmer VIN J10	High-molecular-weight multifunctional silicone pre-polymer.	clear liquid	3.190	1.182	170
Silmer VIN 70	Linear-difunctional vinyl-terminated silicone pre-polymers with viscosities ranging from 70 to 65,000 cps. Please refer to Silmer H cross-linkers for hydride silicones as part of our silicone line.	clear liquid	1.390	0.514	70
Silmer VIN 100		clear liquid	0.882	0.327	100
Silmer VIN 200		clear liquid	0.500	0.185	200
Silmer VIN 1,000		clear liquid	0.311	0.115	1,000
Silmer VIN 5,000		clear liquid	0.115	0.0426	5,000
Silmer VIN 10,000		clear liquid	0.100	0.0370	10,000
Silmer VIN 20,000		clear liquid	0.080	0.0296	20,000
Silmer VIN 65,000		clear liquid	0.050	0.0185	65,000

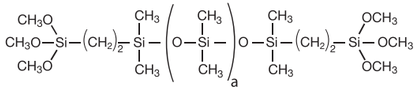
10. Silmer TMS – Trimethoxysilane Pre-Polymer

These trimethoxysilane functionalized siloxanes cure by condensation with silanols, organic hydroxyl groups and other alkoxy silane materials. These can be used "as is" for slow cure condensation or used with tin or titanium catalysts for faster cure. Can be reacted with pigments to provide good hydrophobicity.

Multi



Linear-difunctional



Products	Properties and Applications	Appearance	Mol. Wt.	# of Trimethoxy Silane Groups	Viscosity cps @ 25°C
Silmer TMS C50	Trifunctional polysiloxane with trimethoxysilane groups.	clear liquid	12,000	3	500
Silmer TMS Di-10	Linear, trimethoxysilane terminated polysiloxane.	clear liquid	1,100	2	15
Silmer TMS Di-50	Linear, trimethoxysilane terminated polysiloxane.	clear liquid	3,800	2	60

Defoamers and Antifoams

Silicones are widely used as defoamers and antifoams in pulp and paper, paints and coatings, water treatment and other industrial applications. Siltech offers a range of defoamers, which include basic emulsions of hydrophobized silica. Siltech also offers specialized silicone polyethers that are effective defoamers in the following industries: paints and coatings, pulp and paper, metalworking fluids and any other area where paintability is important.

Products	Properties and Applications
Siltech 5800 Siltech 5821	Water-dispersible silicone polyether reacted with silica. Excellent defoamers for metal working fluids, pulp and paper, paints, coatings and other applications where dyeing and paintability are important. Prevents entrained foam. Product is cold water rinsable and will not leave deposits. Siltech 5821 is 75% active.
Siltech 2200	Industrial-grade antifoam with added MQ resin to boost defoaming capabilities.100% active. Can also be used as is or preferably diluted in a suitable carrier for non-aqueous systems.
Siltech E-2210 Siltech E-2211 Siltech E-2220 Siltech E-2221 Siltech E-2230 Siltech E-2231	Industrial-grade antifoam emulsions. Used in aqueous systems. 10%, 20% and 30% active.
Siltech 2300	Industrial-grade antifoam with added MQ resin to boost defoaming capabilities.100% active. Can also be used as is or preferably diluted in a suitable carrier for non-aqueous systems.
Siltech PA-140	Emulsifiable antifoam concentrate for use in brownstock washing for kraft and sulfite processes.100% active.
Siltech C-4700	A water insoluble silicone polyether copolymer with hydrophobized silica. Siltech C-4700 is designed to control foam without defects in waterborne and solvent based paints and coatings.
Siltech C-4760	An emulsion of silicone polyether copolymers and hydrophobized silica. Siltech C-4760 is designed to control foam without defects in waterborne paints and coatings. Siltech C-4760 is emulsified with nonionic emulsifiers and can be used as is or at diluted concentrations.
Siltech C-4800	Fully formulated industrial-grade antifoam. Easily dispersed, durable foam control. 65% active.
Siltech C-4830	Defoamer and antifoam for use in water-based coating and ink applications as well as in various water-based industrial formulations. 40% active.

Silicone Resins

Silmer G-100 and Silmer G-200 series. Siltech offers a number of two-part, optically clear silicone gels that can be used for Pressure-Sensitive Adhesives, encapsulation, dampeners and many other applications.

The Silmer G-100 products are a series of two-part, optically clear, addition cured-silicone gel systems that range from soft, tacky gels to hard rubbers. They can be used over a wide range of temperatures and offer chemical and electrical resistance with various mechanical properties. They are particularly useful in dental impressions, electronic encapsulants and dampeners, photonic, aerospace and under-the-hood applications.

Silmer G-100 Series. Typical Cured Properties, @ 100°C for 1 hour

Products	Viscosity (cps @ 25°C) before Curing	Appearance after Curing	Hardness (Shore A)	Penetration	Elongation at Break (%)	Tack (gm)	Rebound
Silmer G-100	1,800	clear, soft gel	0	>15	617	220	Yes
Silmer G-102	350	clear, very soft gel	0	>15	>700	175	Yes
Silmer G-104	700	clear, hard dough	0	2	>1,700	380	No
Silmer G-106	8,000	clear, tough rubber	11	<1	274	NIL	No

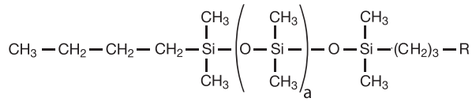
The Silmer G-200 products are a two-part, optically clear series of organic and silicone epoxy resins. The resultant hybrid gels offer various mechanical properties and all give good chemical and electrical resistance over a wide range of temperature usage. These materials offer the flexibility of silicone and the Shore D hardness of traditional epoxy resins.

Silmer G-200 Series. Typical Cured Properties, @ 100°C for 12 hours

Product	Viscosity (cps @ 25°C) before Curing	Appearance after Curing	Hardness (Shore D)	Tensile at Break (MPa)	Elongation at Break (%)	Flexibility
Silmer G-218	2,150	soft gel	73	19.9	60.25	moderate
Silmer G-220	1,500	very soft gel	48	12.0	111.4	moderate to high
Silmer G-222	1,000	hard dough	20	3.3	120.3	high
Silmer G-223	750	tough rubber	11	2.0	113.9	high

Monofunctional Silicones

Siltech has a range of monofunctional siloxanes that are linear silicones with one functional group on one of the terminal ends. These products can be incorporated into reactive systems and can act as chain terminators that provide a silicone moiety. The products listed below are a small sampling of what is available. Other functional end groups that can be incorporated include amines, epoxides, polyethers and isocyanates.



R = functional group

Products	Properties and Applications	Appearance	Mol. Wt. and Eq. Wt.
Silmer ACR Mo 1000	This is an acrylate ester monofunctional siloxane for use in UV cured systems.	clear liquid	1,000
Silmer OH Mo 1000	This is a hydroxy-functional monofunctional siloxane that can be used to react with urethane-and epoxy-based systems.	clear liquid	1,000
Silmer TMS Mo 1000	This is a trimethoxysilane-functional monofunctional siloxane. The methoxy groups can condensate with silanols and other hydroxyl-containing products.	clear liquid	1,000

Fluids

Siltech offers a series of silicone fluids (also known as polydimethylsiloxanes) that are used in many applications and markets.

Products	Properties and Applications	Viscosity (cps @ 25 °C)	Mol. Wt.
Siltech F-20	These products are inert and exhibit low surface tensions, low toxicity and good thermal stability. They are very effective as lubricants in personal care and textile applications and in many other industries. Fluids are also used as a mold release and flow and levelling aids in coating applications.	20	2,000
Siltech F-50		50	3,780
Siltech F-100		100	5,970
Siltech F-350		350	13,650
Siltech F-500		500	17,250
Siltech F-1,000		1,000	28,000
Siltech F-10,000		10,000	62,700
Siltech F-12,500		12,500	67,700
Siltech F-60,000		60,000	116,500
Siltech S-701	100% active hydroxyl-terminated silicone (silanol). These are more substantive than the silicone fluids.	100	2,000
Siltech S-5,000		5,000	20,000
Siltech S-20,000		20,000	80,000
Siltech CF-954	100% active cyclomethicone fluid. More than 98% pure octamethyltetrasiloxane.	<5	296
Siltech CF-955	100% active cyclomethicone fluid. More than 98% pure decamethylpentasiloxane.	<5	370

Emulsions

Often, it is highly desirable to use silicone fluids in dilute form. To be used as such, the silicone compounds must be emulsified. Siltech's line of emulsions exhibits a wide variety of uses, including mold release, polish for tires and furniture, and lubrication and conditioning for personal care applications.

Products	Properties and Applications
Siltech E-600	35% active emulsion of Siltech F-60,000.
Siltech E-660	60% active emulsion of high-and low-viscosity silicone fluids.
Siltech E-2140	Emulsion of Siltech F-350. Is an effective mold release compound. Also used to give glossy finish to tires and vinyl and as a furniture polish. 60% active.
Siltech E-2145	Emulsion of an amino-functional polydimethylsiloxane. Excellent lubricant and softener for use in textiles. Is non-yellowing. Good mold release for metal applications. Also gives a durable gloss to tires, vinyl and furniture polishes. More durable than Siltech E-2140. 60% active. Siltech E-2145 is 60% active and Siltech E-2145-35 is 35% active.
Siltech E-2145-35	
Siltech E-2145HG	60% active emulsion of reactive silicones. Provides best durability and gloss to tires and vinyl.
Siltech E-2150	30% active emulsion of a cross-linked high-molecular-weight silicone amine.
Siltech E-2152	50% active emulsion of a cross-linked alkyl siloxane that will form a dry siloxane film on dry down. Excellent durability and softness to textiles, leather and other substrates.
Siltech E-2155	30% active emulsion of a medium viscosity cross-linking amino silicone that forms a durable finish on dry down. Excellent durability and shine to tires, furniture polishes and hard surface cleaners.
Siltech E-2178	35% active emulsion used to provide hydrophobicity to a wide variety of substrates, including cementitious surfaces.
Siltech E-3130	Emulsions of unstripped alkyl aryl silicones. Provides excellent mold release for plastics, rubber, and die cast metal parts where paintability is important. 50% active.
Siltech E-3160	
Siltech E-3132	Emulsion of a stripped alkyl aryl silicone. Excellent mold release for plastics, rubber, and die cast metal parts where paintability is important. 50% active.
Siltech E-4135	Micro-emulsion of an amino-functional polydimethylsiloxane.
Siltech E-4080	60% active emulsion of a silicone resin.
Siltech E-5050	30% active emulsion of a high-molecular-weight silicone urethane resin. Used as an additive to improve water repellence, soil resistance, slip, mar resistance and softness to coated materials.
Siltech C-4405	An 80% active dispersion of a very-high-molecular-weight polydimethylsiloxane. Very effective additive for both water-based and solvent-based coating systems providing excellent softness to leather and slip, mar resistance, gloss, antiblocking and release to coatings.
Siltech C-4436	A 100% active. Similar to Siltech C-4405, but does not contain any tin-based catalysts.
Siltech C-4445	80% active. Similar to Siltech C-4405, but does not contain any tin-based catalysts.

Siltech Patents

Number	U.S. Patent	Date Issued	Topic
1	4,868,236	Sept/89	Guerbet Citrate Esters
2	5,051,489	Sept/91	Silanol Waxes
3	5,070,168	Dec/91	Ether Amine Functional Silicone Polymers
4	5,070,171	Dec/91	Phosphated Silicone Polymers
5	5,073,619	Dec/91	Silicone Amphoterics
6	5,091,493	Feb/92	Silicone Phosphobetaines
7	5,098,979	Mar/92	Silicone Quats
8	5,115,049	May/92	Silicone Amine Salts
9	5,120,812	June/92	Free-Radical Silicone Monomers
10	5,136,063	Aug/92	Silicone Waxes
11	5,149,765	Sept/92	Terminal Silicone Phosphates
12	5,153,294	Oct/92	Silicone Quats
13	5,162,472	Nov/92	Silicone Free-Radical Polymers
14	5,164,471	Nov/92	Fluorine Silicone Waxes
15	5,166,297	Nov/92	Silicone Quat Intermediates
16	5,180,843	Jan/93	Silicone Esters
17	5,196,499	Feb/93	Terminal Silicone Quats
18	5,378,787	Jan/95	Silicone Amines
19	5,446,114	Aug/95	Fluorinated Dimethicone Copolyols
20	6,346,595	Feb/02	Aromatic Dimethicone Copolyol Polymers as Sun Screen Agents
21	6,388,042	May/02	Dimethicone Copolyol Esters
22	6,727,340	April/04	Fluoro Alkyl Dimethicone Copolyol Esters
23	6,777,521	Aug/04	Silicone Sulfate Polymers
24	6,841,649	Jan/05	Fluoro Alkyl Dimethicone Esters
25	7,132,558	Nov 7/06	Silicone Vitamin Esters
26	7,247,696	July 24/07	Alkyl Dimethicone Copolyol Sulfosuccinates
27	7,279,503	Oct 9/07	Water in Oil Emulsions
28	7,291,323	Nov 6/07	Silicone Lubricating and Conditioning Compositions
29	7,361,721	Apr/08	Crosslinked Silicone Polymers
30	7,407,666	Aug/08	Linear Silicone Resins in Personal Care Applications
31	7,495,062	Feb/09	Silicone Methoxy Ester Compositions
32	7,632,488	Dec/09	Crosslinked Silicone Polymers
33	7,718,750	May/10	Multi Alkoxylated Silicone Surfactants
34	7,723,443	May/10	Multifunctional Linear Silicone Resin Polymers
35	7,786,241	Aug/10	Polyester Silicone Resins
36	7,790,813	Sept/10	Multifunctional Silicone Resin Polymers
37	7,811,976	Oct/10	Dimer Alkyl Silicone Polymers
38	7,834,116	Nov/10	Fluoro Silicone Acrylates and Polymers Thereof
39	7,875,263	Jan/11	Polymeric Structured Gels
40	7,951,893	May/11	Star Silicone Polymers
41	7,956,152	Jun/11	Star Silicone Polymers
42	8,025,870	Sep/11	Vinyl Ether Silicone Polymers
43	8,124,062	Feb/12	Dimer Alkyl Silicone Polymers in Personal Care Applications
44	8,148,483	Apr/12	Fluoro Silicone Acrylates and Polymers Thereof
45	8,153,106	Apr/12	Silicone Based Sun Screening Compositions with Improved UVA1/UV Ratios
46	8,263,061	Sep/12	Alkyl Quaternary Silicone Compounds

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