

## Shin-Etsu Silicone

Silicone Products for Personal Care

# Shin-Etsu Unique Materials

Silicone Gels

## **KSG-Z Series**

## **Emulsifiers**

Silicone Gels

## **KSG Series**

Silicone Acrylates

## **KP Series**

Hybrid Silicone Powders

## **KSP Series**

Inorganic Powder Dispersions

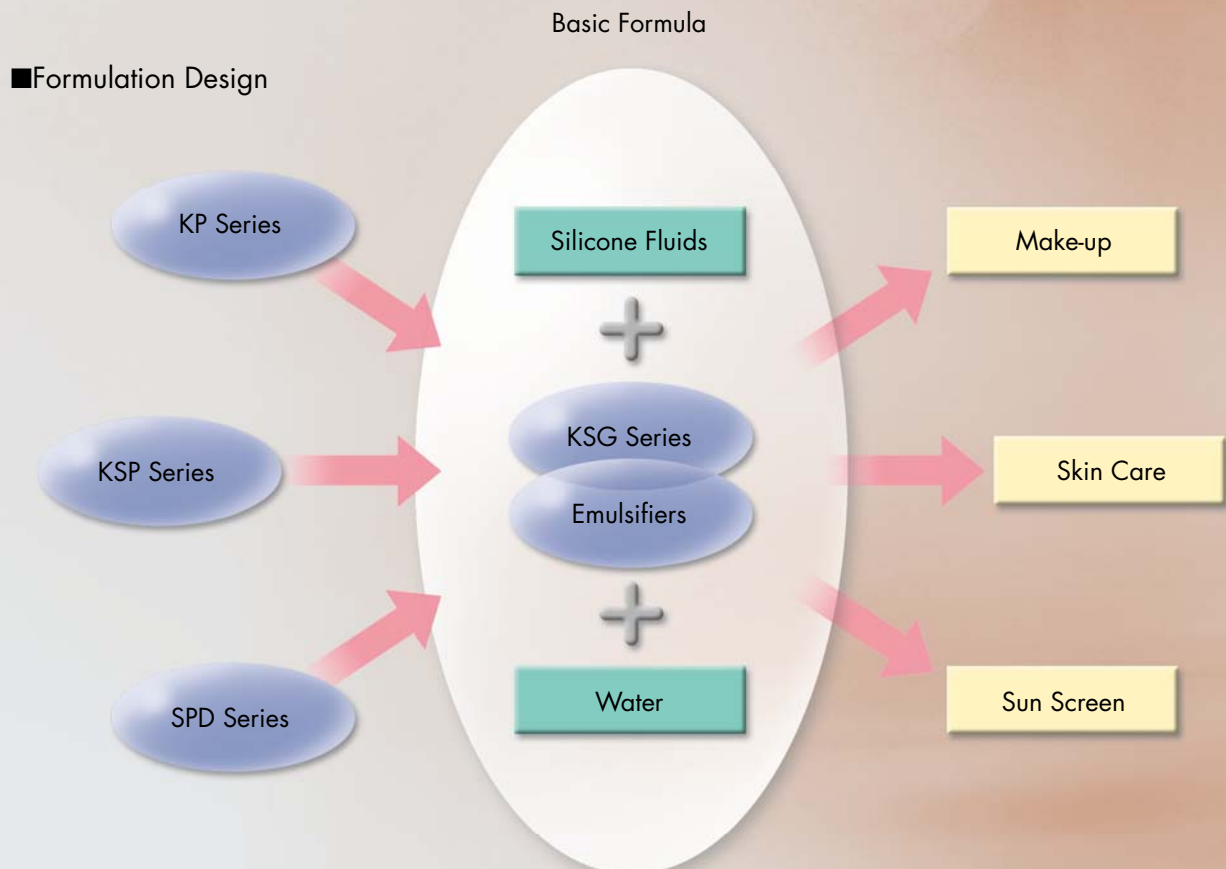
## **SPD Series**

# Shin-Etsu materials enable the personal care industry to develop products with greater functionality and diversity than ever before.

Our silicone materials have the basic properties required for personal care products in general, and also provide the functionality and diversity required for special applications including skin care, make up, and sun care products. Shin-Etsu develops a range of original, innovative materials including silicone-based emulsifiers — essential to basic processing — and silicone gels, silicone acrylates and silicone powders, products that impart unique features to end-products. Our materials make it possible for manufacturers to develop unique, high-quality personal care products with greater functionality.

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# KSG-Z Series

## Silicone Gels for Personal Care

The three-dimensionally crosslinked fine particles used for the KSG-Z series differ from those of our earlier KSG series; they contain two types of branches – silicone chains and alkyl chains – that are not involved in crosslinking. The result is gels that exhibit high swelling ability in both silicone fluids and organic oils.

### Silicone crosslinked polymers

KSG-042Z and KSG-045Z improve the quality attributes of personal care products in various ways, such as imparting a smooth, silky feel and providing a matting effect to inhibit oil sheen.

Product name	INCI	Component A		Appearance	Penetration (worked) 25°C	Refractive-Index 25°C
		Component B				
<b>KSG-042Z</b>	LAURYL POLYDIMETHYLSILOXYETHYL DIMETHICONE/BIS-VINYL DIMETHICONE CROSSPOLYMER	15-25%	75-85%	Colorless transparent paste	330	1.418
	ISODODECANE					
<b>KSG-045Z</b>	LAURYL POLYDIMETHYLSILOXYETHYL DIMETHICONE/BIS-VINYL DIMETHICONE CROSSPOLYMER	15-25%	75-85%	Colorless translucent paste	350	1.401
	CYCLOPENTASILOXANE					

### Polyether-modified silicone crosslinked polymers

KSG-320Z and KSG-350Z are emulsifying agents with a smooth feel that can be used to produce unique water-in-silicone and water-in-oil products.

Product name	INCI	Component A		Appearance	Penetration (worked) 25°C	Refractive-Index 25°C
		Component B				
<b>KSG-320Z</b>	PEG-15/LAULYL POLYDIMETHYLSILOXYETHYL DIMETHICONE CROSSPOLYMER	20-30%	70-80%	Colorless milky white paste	360	1.420
	ISODODECANE					
<b>KSG-350Z</b>	PEG-15/LAULYL POLYDIMETHYLSILOXYETHYL DIMETHICONE CROSSPOLYMER	20-30%	70-80%	Colorless milky white paste	370	1.404
	CYCLOPENTASILOXANE					

### Polyglycerin-modified silicone crosslinked polymers

KSG-820Z and KSG-850Z are emulsifying agents that can be used to produce unique water-in-silicone and water-in-oil products with high moisture retentivity, and are soft, moist, and spread easily on the skin.

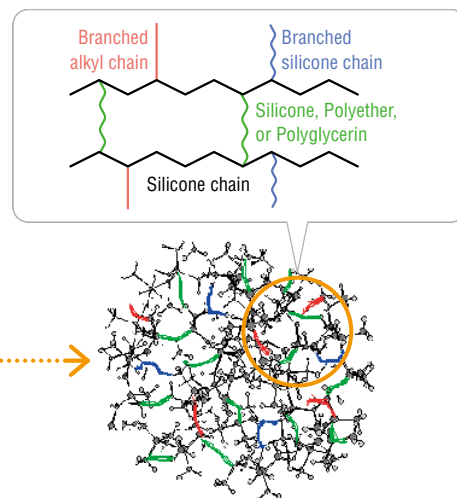
Product name	INCI	Component A		Appearance	Penetration (worked) 25°C	Refractive-Index 25°C
		Component B				
<b>KSG-820Z</b>	POLYGLYCERYL-3/LAURYL POLYDIMETHYLSILOXYETHYL DIMETHICONE CROSSPOLYMER	20-30%	70-80%	Colorless milky white paste	360	1.420
	ISODODECANE					
<b>KSG-850Z</b>	POLYGLYCERYL-3/LAURYL POLYDIMETHYLSILOXYETHYL DIMETHICONE CROSSPOLYMER	20-30%	70-80%	Colorless milky white paste	360	1.404
	CYCLOPENTASILOXANE					

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### Compatibility with Base Oils

Emulsifier Linear/Branched type	Emulsifier & Elastomer Gel Cross-linked type	Elastomer Gel Cross-linked type
<b>Silicone Fluids</b> <b>Light Esters</b> KF-6017 KF-6028 KF-6104 KF-6038 KF-6105	KSG-210, 240 KSG-710 <b>KSG-350Z KSG-850Z</b> KSG-310, 320 KSG-810, 820 330, 340 830, 840	KSG-15, 16, 1610 KSG-18A <b>KSG-045Z</b> KSG-41, 42 43, 44
<b>Organic Oils</b>		



# Emulsifiers

The two main classes of emulsifiers are polyether modified silicones and polyglycerin modified silicones.

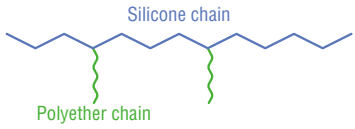
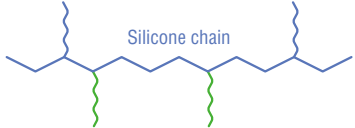
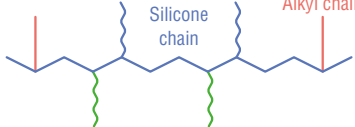
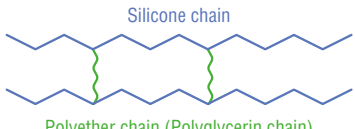
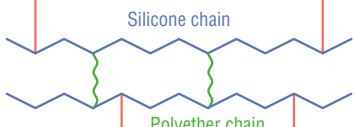
Polyether modified silicones include linear types, branched types and cross-linked polymer types,

while polyglycerin modified silicones include branched types and cross-linked polymer types.

We also offer distinctive alkyl co-modified emulsifiers.

Applying these products enables the development of diverse cosmetic formulations.

## Product Classification

Type		Product	Model
Linear Type	Polyether modified	<b>KF-6011</b> <b>KF-6011P</b> <b>KF-6012</b> <b>KF-6013</b> <b>KF-6015</b> <b>KF-6016</b> <b>KF-6017</b> <b>KF-6017P</b> <b>KF-6043</b>	
Branched Type	Polyether modified	<b>KF-6028</b> <b>KF-6028P</b>	
	Polyglycerin modified	<b>KF-6100</b> <b>KF-6104</b>	
	Polyether / alkyl co-modified	<b>KF-6038</b>	
	Polyglycerin / alkyl co-modified	<b>KF-6105</b>	
Cross-linked polymer Type	Polyether modified	<b>KSG-210</b> <b>KSG-240</b>	
	Polyglycerin modified	<b>KSG-710</b>	
	Polyether / alkyl co-modified	<b>KSG-310</b> <b>KSG-320</b> <b>KSG-330</b> <b>KSG-340</b>	
	Polyglycerin / alkyl co-modified	<b>KSG-810</b> <b>KSG-820</b> <b>KSG-830</b> <b>KSG-840</b>	

Cross-linked polymer Type: Please refer to KSG Series (page 8-11) .

## Polyether modified silicones [Linear Type]

We offer numerous polyether modified silicone emulsifiers with varying HLB values, meaning these products can be used as either Si/W or W/Si emulsifiers.

Product name	INCI	Viscosity 25°C mm <sup>2</sup> /s	Specific Gravity 25°C	Refractive Index 25°C	Calculated HLB wt % EO/5	Cloud Point °C
<b>KF-6011</b>	PEG-11 METHYL ETHER DIMETHICONE	100	1.06	1.456	14.5	65
<b>KF-6011P</b>	PEG-11 METHYL ETHER DIMETHICONE	140	1.07	1.449	14.5	65
<b>KF-6012</b>	PEG/PPG-20/22 BUTYL ETHER DIMETHICONE	1,600	1.03	1.446	7.0	35
<b>KF-6013</b>	PEG-9 DIMETHICONE	400	1.03	1.436	10.0	—
<b>KF-6015</b>	PEG-3 DIMETHICONE	150	1.00	1.420	4.5	—
<b>KF-6016</b>	PEG-9 METHYL ETHER DIMETHICONE	150	1.01	1.417	4.5	—
<b>KF-6017</b>	PEG-10 DIMETHICONE	600	1.01	1.420	4.5	—
<b>KF-6017P</b>	PEG-10 DIMETHICONE	850	1.01	1.420	4.5	—
<b>KF-6043</b>	PEG-10 DIMETHICONE	400	1.09	1.454	14.5	71

● P Grade: odorless versions created using an improved deodorization process.

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## Polyether modified silicones [Branched Type]

The silicone component has a branched structure, providing unique solubility, superior to that of linear structures.

These emulsifiers enable creation of distinctive products in terms of the viscosity and stability of the emulsions.

KF-6038 has good solubility in both silicone fluid and organic oils.

Product name	INCI	Viscosity 25°C mm <sup>2</sup> /s	Specific Gravity 25°C	Refractive Index 25°C	Calculated HLB wt % EO/5
<b>KF-6028</b>	PEG-9 POLYDIMETHYLSILOXYETHYL DIMETHICONE	900	1.00	1.420	4.0
<b>KF-6028P</b>	PEG-9 POLYDIMETHYLSILOXYETHYL DIMETHICONE	900	1.00	1.420	4.0
Alkyl co-modified type					
<b>KF-6038</b>	LAURYL PEG-9 POLYDIMETHYLSILOXYETHYL DIMETHICONE	700	0.96	1.430	3.0

● P Grade: odorless versions created using an improved deodorization process.

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## Polyglycerin modified silicones [Branched Type]

These silicone emulsifiers feature polyglycerin as the hydrophilic component.

These emulsifiers hold moisture well, so emulsions agree with skin and impart a distinctly soft and moist feel.

KF-6105 is a W/O emulsifier that is co-modified with alkyl chains.

Product name	INCI	Viscosity 25°C mPa·s	Specific Gravity 25°C	Refractive Index 25°C	Estimated HLB
<b>KF-6100</b>	POLYGLYCERYL-3 DISILOXANE DIMETHICONE	40,000	1.08	1.458	Medium
<b>KF-6104</b>	POLYGLYCERYL-3 POLYDIMETHYLSILOXYETHYL DIMETHICONE	4,000	1.00	1.409	Low
Alkyl co-modified type					
<b>KF-6105</b>	LAURYL POLYGLYCERYL-3 POLYDIMETHYLSILOXYETHYL DIMETHICONE	4,000	0.95	1.426	Low

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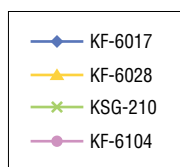
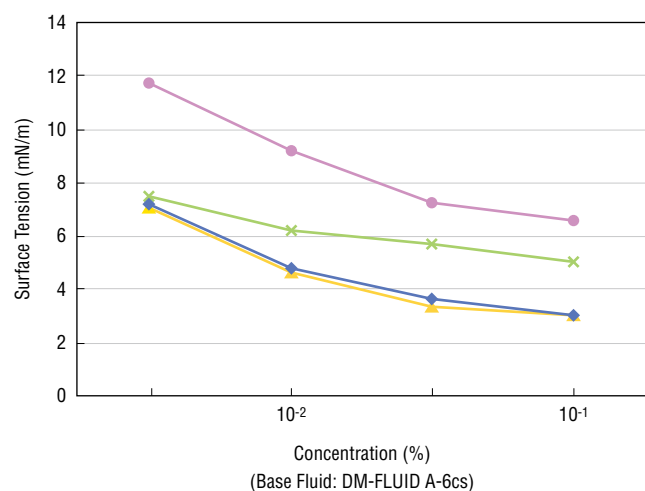
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Compatibility (concentration 20%)

	KF-6011 KF-6011P	KF-6012	KF-6013	KF-6015	KF-6016	KF-6017 KF-6017P	KF-6028 KF-6028P	KF-6038	KF-6043	KF-6100	KF-6104	KF-6105
<b>DM-FLUID A-6cs</b> (Dimethicone)	I	I	PS	I	S	S	S	S	I	PS	S	S
<b>TMF-1.5</b> (Methyl Trimethicone)	I	I	I	S	S	S	S	S	I	PS	S	S
<b>KF-995</b> (Cyclopentasiloxane)	I	I	I	S	S	S	S	S	I	PS	S	S
<b>KF-56A</b> (Diphenylsiloxy Phenyl Trimethicone)	S	S	PS	S	S	S	S	S	I	I	S	S
<b>Mineral Oil</b>	I	PS	I	I	PS	PS	PS	S	I	I	I	S
<b>Isotridecyl Isononanoate</b>	I	S	S	S	S	S	S	S	I	PS	S	S
<b>Triethylhexanoin</b>	S	S	S	S	S	S	S	S	S	PS	PS	S
<b>Ethyl Alcohol</b>	S	S	S	S	S	S	S	PS	S	S	PS	PS
<b>Isopropyl Alcohol</b>	S	S	S	S	S	S	S	S	S	S	S	S
<b>Propylene Glycol</b>	S	I	S	I	I	S	I	PS	S	S	I	I
<b>1,3-Butylene Glycol</b>	S	I	S	I	I	S	I	PS	S	S	PS	PS
<b>Glycerin</b>	I	I	I	I	I	I	I	PS	I	S	PS	PS
<b>Water</b>	S	S	I	I	I	I	I	I	S	G	I	I

S: Soluble PS: Partially Soluble I: Insoluble G: Gel

Surface tension



\* Measured using a "fully automated interfacial tensiometer (model PD-W, KYOWA INTERFACE SCIENCE CO., LTD.)"

# KSG Series

## Silicone Gels for Personal Care

Commonly known thickening agents have never been compatible with silicone systems and have left a heavy, draggy feel on the skin. The KSG series was developed to solve these problems.

### Silicone Cross-linked polymers

Because of their 3-dimensional network structure, the KSG series products silicone systems, improve formulation stability, and provide a smooth, silky and luxurious feel to products.

Product name	INCI	Component A	Appearance	Penetration (worked) 25°C	Refractive-Index 25°C	Heavy Metal	Arsenic
		Component B					
<b>KSG-15</b>	DIMETHICONE/VINYL DIMETHICONE CROSSPOLYMER	4-10%	Colorless transparent paste	420	1.397	< 20ppm	< 2ppm
	CYCLOPENTASILOXANE	90-96%					
<b>USG-103</b>	DIMETHICONE/VINYL DIMETHICONE CROSSPOLYMER	8-12%	Colorless transparent paste	350	1.398	< 20ppm	< 2ppm
	CYCLOPENTASILOXANE	88-92%					
<b>KSG-16</b>	DIMETHICONE/VINYL DIMETHICONE CROSSPOLYMER	20-30%	Colorless translucent paste	330	1.400	< 20ppm	< 2ppm
	DIMETHICONE	70-80%					
<b>KSG-1610</b>	DIMETHICONE/VINYL DIMETHICONE CROSSPOLYMER	15-20%	Colorless translucent paste	380	1.389	< 20ppm	< 2ppm
	METHYL TRIMETHICONE	80-85%					
<b>USG-106</b>	DIMETHICONE/VINYL DIMETHICONE CROSSPOLYMER	8-12%	Colorless transparent paste	420	1.418	< 20ppm	< 2ppm
	ISODODECANE	88-92%					
<b>KSG-18A</b>	DIMETHICONE/PHENYL VINYL DIMETHICONE CROSSPOLYMER	10-20%	Colorless translucent paste	330	1.495	< 20ppm	< 2ppm
	DIPHENYLSILOXY PHENYL TRIMETHICONE	80-90%					
<b>KSG-41</b>	VINYL DIMETHICONE/LAURYL DIMETHICONE CROSSPOLYMER	25-35%	Colorless translucent paste	400	1.455	< 20ppm	< 2ppm
	MINERAL OIL	65-75%					
<b>KSG-42</b>	VINYL DIMETHICONE/LAURYL DIMETHICONE CROSSPOLYMER	20-30%	Colorless translucent paste	380	1.422	< 20ppm	< 2ppm
	ISODODECANE	70-80%					
<b>KSG-43</b>	VINYL DIMETHICONE/LAURYL DIMETHICONE CROSSPOLYMER	25-35%	Colorless translucent paste	400	1.442	< 20ppm	< 2ppm
	TRIETHYLHEXANOIN	65-75%					
<b>KSG-44</b>	VINYL DIMETHICONE/LAURYL DIMETHICONE CROSSPOLYMER	25-35%	Colorless translucent paste	380	1.451	< 20ppm	< 2ppm
	SQUALANE	65-75%					

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## Polyether modified Silicone Cross-linked polymers

KSG-210, 240, 310, 320, 330, 340 are polyether modified self-emulsifying systems allowing for easy formulation of unique W/Si and W/O products, and provide a smooth and silky feel to them.

Product name	INCI	Component A	Appearance	Penetration (worked) 25°C	Refractive-Index 25°C	Heavy Metal	Arsenic
		Component B					
<b>KSG-210</b>	DIMETHICONE/PEG-10/15 CROSSPOLYMER	20-30%	Colorless milky white paste	400	1.403	< 20ppm	< 2ppm
	DIMETHICONE	70-80%					
<b>KSG-240</b>	DIMETHICONE/PEG-10/15 CROSSPOLYMER	15-25%	Colorless milky white paste	400	1.400	< 20ppm	< 2ppm
	CYCLOPENTASILOXANE	75-85%					
Alkyl co-modified type							
<b>KSG-310</b>	PEG-15/LAURYL DIMETHICONE CROSSPOLYMER	25-35%	Colorless milky white paste	400	1.450	< 20ppm	< 2ppm
	MINERAL OIL	65-75%					
<b>KSG-320</b>	PEG-15/LAURYL DIMETHICONE CROSSPOLYMER	20-30%	Colorless milky white paste	400	1.420	< 20ppm	< 2ppm
	ISODODECANE	70-80%					
<b>KSG-330</b>	PEG-15/LAURYL DIMETHICONE CROSSPOLYMER	15-25%	Colorless milky white paste	395	1.442	< 20ppm	< 2ppm
	TRIETHYLHEXANOIN	75-85%					
<b>KSG-340</b>	PEG-10/LAURYL DIMETHICONE CROSSPOLYMER	25-35%	Colorless milky white paste	430	1.445	< 20ppm	< 2ppm
	PEG-15/LAURYL DIMETHICONE CROSSPOLYMER						
	SQUALANE	65-75%					

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## Polyglycerin modified Silicone Cross-linked polymers

KSG-710, 810, 820, 830, 840 contain a hydrophilic polyglycerin group, which acts as a moisturizer. These products allow for easy formulation of unique W/Si and W/O products.

Product name	INCI	Component A	Appearance	Penetration (worked) 25°C	Refractive-Index 25°C	Heavy Metal	Arsenic
		Component B					
<b>KSG-710</b>	DIMETHICONE/POLYGLYCERIN-3 CROSSPOLYMER	20-30%	Colorless milky white paste	400	1.400	< 20ppm	< 2ppm
	DIMETHICONE	70-80%					

Product name	INCI	Component A	Appearance	Penetration (worked) 25°C	Refractive-Index 25°C	Heavy Metal	Arsenic
		Component B					
Alkyl co-modified type							
<b>KSG-810</b>	LAURYL DIMETHICONE/POLYGLYCERIN-3 CROSSPOLYMER	25-35%	Colorless milky white paste	380	1.450	< 20ppm	< 2ppm
	MINERAL OIL	65-75%					
<b>KSG-820</b>	LAURYL DIMETHICONE/POLYGLYCERIN-3 CROSSPOLYMER	20-30%	Colorless milky white paste	340	1.420	< 20ppm	< 2ppm
	ISODODECANE	70-80%					
<b>KSG-830</b>	LAURYL DIMETHICONE/POLYGLYCERIN-3 CROSSPOLYMER	15-25%	Colorless milky white paste	380	1.442	< 20ppm	< 2ppm
	TRIETHYLHEXANOIN	75-85%					
<b>KSG-840</b>	LAURYL DIMETHICONE/POLYGLYCERIN-3 CROSSPOLYMER	25-35%	Colorless milky white paste	380	1.445	< 20ppm	< 2ppm
	SQUALANE	65-75%					

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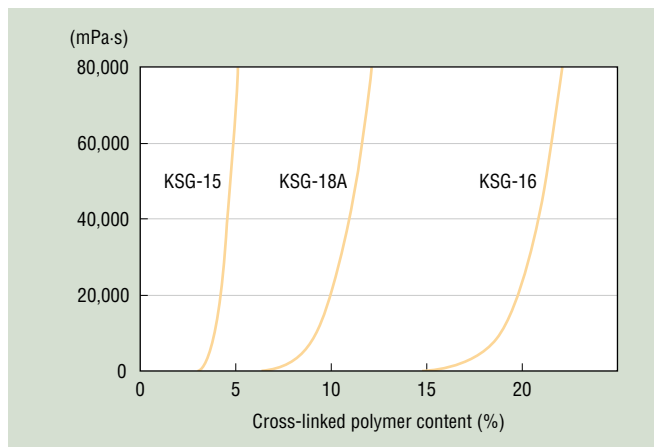
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	Elastomer Gel										Emulsifier & Elastomer Gel														
	KSG-15	KSG-16	KSG-1670	KSG-18A	KSG-41	KSG-42	KSG-43	KSG-44	KSG-042Z	KSG-045Z	KSG-210	KSG-240	KSG-310	KSG-320	KSG-330	KSG-340	KSG-320Z	KSG-350Z	KSG-710	KSG-810	KSG-820	KSG-830	KSG-840	KSG-820Z	KSG-850Z
<b>TMF-1.5</b> (Methyl Trimethicone)	O	O	B	O	R	R	R	R	O	O	O	O	R	R	R	R	O	O	O	R	R	R	R	O	O
<b>KF-995</b> (Cyclopentasiloxane)	B	O	O	O	R	R	R	R	O	B	O	B	R	R	R	R	O	B	O	R	R	R	R	O	B
<b>DM-FLUID A-6cs</b> (Dimethicone)	O	B	O	O	R	R	R	R	O	O	B	O	R	R	R	R	O	O	B	R	R	R	R	O	O
<b>DM-FLUID A-20cs</b> (Dimethicone)	O	O	O	R	R	R	R	R	O	O	O	O	R	R	R	R	O	O	O	R	R	R	R	O	O
<b>DM-FLUID A-100cs</b> (Dimethicone)	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
<b>KF-56A</b> (Diphenylsiloxy Phenyl Trimethicone)	O	O	O	B	R	R	R	R	O	O	O	O	R	R	R	R	O	O	O	R	R	R	R	O	O
<b>Isododecane</b>	O	O	O	R	O	B	O	O	B	O	O	O	B	O	O	B	O	O	O	B	O	O	B	O	
<b>Mineral Oil</b>	R	R	R	R	B	O	O	O	O	R	R	B	O	O	O	O	O	R	B	O	O	O	O	O	
<b>Squalane</b>	R	R	R	R	R	R	R	B	O	O	R	R	R	R	B	O	O	R	R	R	R	B	O	O	
<b>Isotridecyl Isononanoate</b>	R	R	R	O	O	O	O	O	O	R	R	O	O	O	O	O	O	R	O	O	O	O	O	O	
<b>Cetyl Caprylate</b>	R	R	R	O	O	O	O	O	O	R	R	O	O	O	O	O	O	R	O	O	O	O	O	O	
<b>Jobba (Buxus Chinensis) Oil</b>	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	
<b>Triethylhexanoin</b>	O	O	O	O	O	B	O	O	O	O	O	O	B	O	O	O	O	O	O	B	O	O	O		
<b>Triisostearin</b>	R	R	R	R	O	O	O	O	O	R	R	O	O	O	O	O	O	R	O	O	O	O	O	O	
<b>Macadamia Ternifolia Nut Oil</b>	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	

B: Base Oil O: Optional Amount R: Restrictive Use

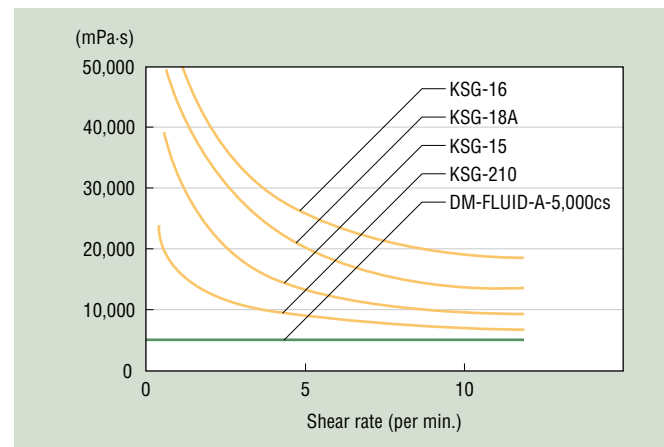
### Viscosity vs. Cross-linked polymer content

KSG-10 series enables us to make gel-like products from low viscosity silicone fluids. This is accomplished by combining a silicone cross-linked polymer with a silicone fluid. The viscosity of the final product depends upon the concentration of cross-linked polymer as illustrated in this graph. The viscosity curve is different for each KSG-10 series due to the type of silicone fluid and the ability of the cross-linked polymer to thicken that particular silicone fluid. Note that KSG-15 requires much less cross-linked polymer to reach a particular viscosity than does KSG-16. As a result, the cross-linked polymer film formed by KSG-15 is thinner than that of KSG-16.



### Viscosity vs. Shear rate

The viscosity of KSG products remains constant over time when the products are in a still, unagitated condition. However, the materials are shear sensitive and the viscosity will decrease upon the application of shear. This is illustrated for each KSG product in the accompanying graph. When formulating, this can be advantageous to facilitate the dispersion of cosmetic ingredients, such as pigments. Once formulated, the dispersions demonstrate excellent stability.



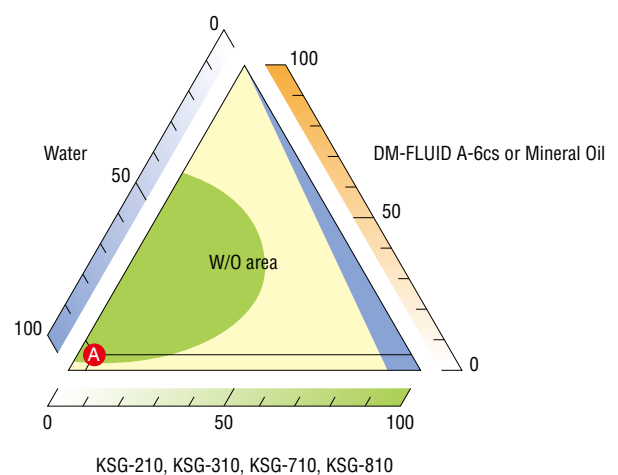
### Formulating W/O creams with KSG-210, KSG-310, KSG-710 or KSG-810

KSG-210 and KSG-710 are self-emulsifying paste which can be used to formulate stable W/Si creams without the addition of an emulsifying agent. This graph illustrates formulation ratios of KSG-210 or KSG-710, DM-FLUID A-6cs and water (and also ratios of KSG-310 or KSG-810, Mineral Oil and water). W/O emulsions can be produced in the area marked W/O area illustrating the formulation latitude of KSG-210, KSG-310, KSG-710 or KSG-810. Stable W/O emulsions can be obtained using the formulation area indicated in green.

W/O emulsion with KSG-310 (x200 **A** point)



- A** Component of Emulsion
- KSG-310 ..... 5wt %
  - Mineral Oil ..... 5wt %
  - Water ..... 90wt %



**The **A** point**

This diagram illustrates a formulation containing 90 % water, 5 % DM-FLUID A-6cs and 5 % KSG-210 or KSG-710 (90 % water, 5 % mineral oil and 5 % KSG-310 or KSG-810). This example illustrates the ability of KSG-210, KSG-310, KSG-710 or KSG-810 to form stable W/O creams with extremely high water content.

# KP Series

## Silicone Acrylates for Personal Care

KP products combine the benefits of acrylic resins with silicones.

They are graft copolymers with an acrylic polymer backbone and dimethylpolysiloxane side chains.

Silicone acrylates dissolved in volatile silicone or hydrocarbon carriers to form soft flexible films with excellent water and oil repellency.

### Powder treatment

Product name	INCI	Component A	Appearance	Viscosity 25°C mPa·s	pH	Heavy Metal	Arsenic
		Component B					
<b>KP-541</b>	ACRYLATES/DIMETHICONE COPOLYMER	60%	Colorless transparent- light yellow hazy fluid	500- 10,000	Neutral	< 20ppm	< 2ppm
		40%					
	ISOPROPYL ALCOHOL						

### Dispersant

Product name	INCI	Appearance	Viscosity 25°C mm <sup>2</sup> /s	pH	Heavy Metal	Arsenic
<b>KP-578</b>	ACRYLATES/ETHYLHEXYL ACRYLATE/DIMETHICONE METHACRYLATE COPOLYMER	Colorless transparent- light yellow hazy fluid	150- 200	—	< 20ppm	< 2ppm

### Film former

Product name	INCI	Component A	Appearance	Viscosity 25°C mm <sup>2</sup> /s	pH	Heavy Metal	Arsenic
		Component B					
<b>KP-543</b>	ACRYLATES/DIMETHICONE COPOLYMER	50%	Colorless transparent- light yellow hazy fluid	100- 1,000	Neutral	< 20ppm	< 2ppm
		50%					
	BUTYL ACETATE						
<b>KP-545</b>	ACRYLATES/DIMETHICONE COPOLYMER	30%	Colorless transparent- light yellow hazy fluid	100- 500	Neutral	< 20ppm	< 2ppm
		70%					
	CYCLOPENTASILOXANE						
<b>KP-549</b>	ACRYLATES/DIMETHICONE COPOLYMER	40%	Colorless transparent- light yellow hazy fluid	500- 5,000	Neutral	< 20ppm	< 2ppm
		60%					
	METHYL TRIMETHICONE						
<b>KP-550</b>	ACRYLATES/DIMETHICONE COPOLYMER	40%	Colorless transparent- light yellow hazy fluid	100- 3,000	Neutral	< 20ppm	< 2ppm
		60%					
	ISODODECANE						

### Silicone wax

Product name	INCI	Appearance	Melting Point °C	pH	Heavy Metal	Arsenic
<b>KP-561P</b>	ACRYLATES/STEARYL ACRYLATE/DIMETHICONE METHACRYLATE COPOLYMER	Colorless- light yellow hazy solid	25-35	Neutral	< 20ppm	< 2ppm
<b>KP-562P</b>	ACRYLATES/BEHENYL ACRYLATE/DIMETHICONE METHACRYLATE COPOLYMER	Colorless- light yellow hazy solid	45-55	Neutral	< 20ppm	< 2ppm

\* This document is not a certification of quality. For documentation of quality assurance and standards, please contact our Sales Department.

\* INCI names are subject to change without notice.

## The physical properties of silicone acrylate film

	KP-541	KP-543	KP-545
Contact Angle degree	103	98	103
Glass Transition Point °C	50	20	50
Softening Point °C	90	80	90

## Performance of nail enamel\* containing KP-543

Testing sample:

KP-543 and other raw materials are combined at 1 %, 3 %, 5 % of KP-543.

Each enamel is painted on a glass plate by wire bar (#20).

\* Main component is Nitrocellulose.

Tack free time

KP-543 wt %	Tack free time (min)
0	11
1	9
3	9
5	9

\* Tack free time of each sample is measured by touching with cotton every one minute.

Water repellency

KP-543 wt %	Contact angle degree (°)
0	70
1	99
3	100
5	100

\* Measure the contact angle of water on each sample.

Lubricity

KP-543 wt %	COF (μk)
0	0.48
1	0.25
3	0.24
5	0.21

\* Measure the COF (Coefficient of friction) of each sample. (PET, 150 mm/min, 200 g pressure)

## Gloss degree of lipstick containing KP-561P

		Sample A	Sample B	Sample C
Testing sample formulations	Candelilla Wax	8.0 wt %	8.0 wt %	8.0 wt %
	Polyethylene	8.0 wt %	8.0 wt %	8.0 wt %
	KP-561P	15.0 wt %	—	—
	Polyol Ester	—	15.0 wt %	—
	Rosin Ester	—	—	15.0 wt %
	KF-54	3.0 wt %	3.0 wt %	3.0 wt %
	Isotridecyl Isononanoate	20.0 wt %	20.0 wt %	20.0 wt %
	Glyceryl Isostearate	16.0 wt %	16.0 wt %	16.0 wt %
	Polyglyceryl-2 Triisostearate	30.0 wt %	30.0 wt %	30.0 wt %
	Pigment	q.s.	q.s.	q.s.
Test results	Gloss degree	47	39	21

\* Testing method

Measure the gloss degree of each sample above painted on test paper by Gloss Meter VG-2000. (Gloss Meter VG-2000, Nippon Denshoku Co., Ltd.)

## Dispersibility of titanium dioxide

Powder: Fine grain titanium dioxide

Solvent: Cyclopentasiloxane (KF-995)

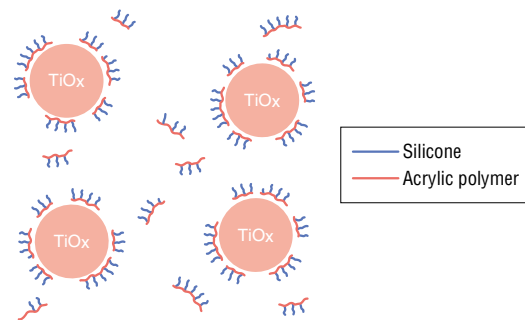
Dispersing agent: KP-545

Test method: Mix KF-995 with KP-545, add 2 g of titanium dioxide, then put in a 30 ml sedimentary tube, disperse by ultrasound, observe without disturbing.

Test results

The resin portion of KP-545*	Sedimentary capacity (ml)	
	After 4 hours	After 68 hours
0	18.7	18.3
5	16.5	11.9
7.5	9.2	6.4
10	0	3.3
12.5	0	2.3
25	0	2.1
37.5	0	1.7
50	0	2

\* 100 powder weight: KP-545 resin weight



## Compatibility in cosmetic ingredients

Cosmetic Ingredients	KP-541	KP-543	KP-545	KP-561P	KP-562P
Water	I	I	I	I	I
Ethanol	S	P	S	I	I
Isopropyl Alcohol	S	S	S	I	I
Glycerin	I	P	I	I	I
C13-16 Isoparaffin	S	I	S	S	S
Liquid Isoparaffin	I	I	I	S	S
Squalane	I	I	I	S	S
Cetyl Isooctanoate	S	I	S	S	S
Triethylhexanoil	S	I	S	S	S
Jojoba Oil	I	I	I	P	P
Oleic Acid	I	I	I	S	S
KF-995	S	I	S	S	S
DM-FLUID A-6cs	S	I	S	S	S
DM-FLUID A-10cs	I	I	I	S	S
KF-50-100cs	I	I	I	I	I
KF-54	P	I	P	I	I

S: soluble P: partially soluble I: insoluble

KP series/Cosmetic ingredients = 1/10 (weight ratio)

(at room temperature)

# KSP Series

## Hybrid Silicone Powders for Personal Care

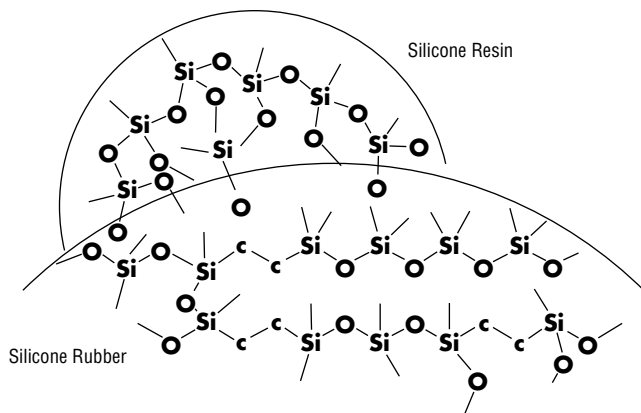
The KSP series is a new generation of "hybrid" silicone powders.

The structure consists of silicone rubber coated with silicone resin.

The KSP series provides a uniquely soft, silky feel and good dispersibility with reduced agglomeration.

### Hybrid silicone powders combine the features of rubber and resin powders

#### ■ Molecular structure of KSP Series



KSP series powders consist of a spherical silicone rubber core chemically bonded to an outer shell of silicone resin. KSP-100 powders will swell in silicone fluids such as cyclomethicone and dimethicone. Therefore, KSP-300 was developed for applications where swelling is undesirable.

KSP-300 is a hybrid silicone powder functionalized with phenyl groups. The phenyl groups prevent swelling in low viscosity dimethicone fluids.

### The physical properties

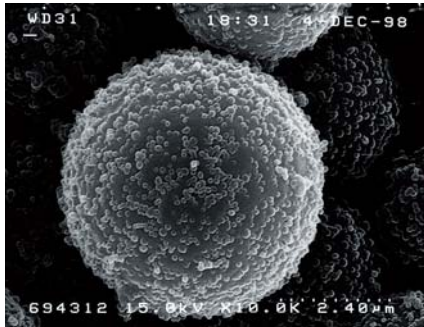
Product name	INCI	Appearance	Volatile Content 105°C/3h %	Heavy Metal	Arsenic	True Specific Gravity	Average Particle- Size $\mu$	Hardness Durometer A
<b>KSP-100</b>	VINYL DIMETHICONE/METHICONE SILSESQUIOXANE CROSSPOLYMER	White spherical powder	0.1	< 20ppm	< 2ppm	1.00	5	30
<b>KSP-101</b>	VINYL DIMETHICONE/METHICONE SILSESQUIOXANE CROSSPOLYMER	White spherical powder	0.1	< 20ppm	< 2ppm	0.98	12	30
<b>KSP-102</b>	VINYL DIMETHICONE/METHICONE SILSESQUIOXANE CROSSPOLYMER	White spherical powder	0.1	< 20ppm	< 2ppm	0.98	30	30
<b>KSP-105</b>	VINYL DIMETHICONE/METHICONE SILSESQUIOXANE CROSSPOLYMER	White spherical powder	0.1	< 20ppm	< 2ppm	0.99	2	75
<b>KSP-300</b>	DIPHENYL DIMETHICONE/VINYL DIPHENYL DIMETHICONE/SILSESQUIOXANE CROSSPOLYMER	White spherical powder	0.1	< 20ppm	< 2ppm	1.11	5	40

\* This document is not a certification of quality. For documentation of quality assurance and standards, please contact our Sales Department.

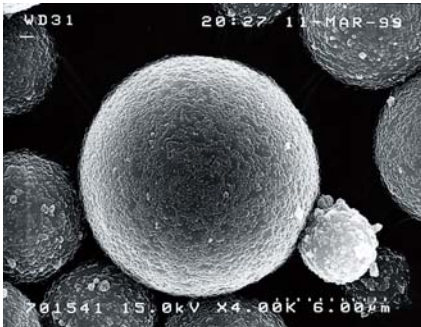
\* INCI names are subject to change without notice.

Scanning electron micrographs and particle size distributions

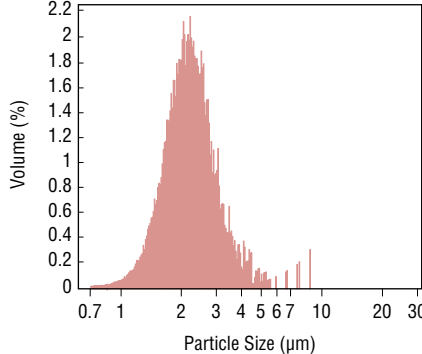
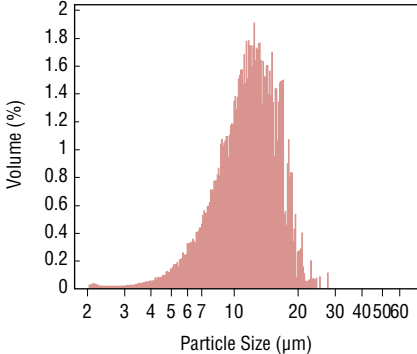
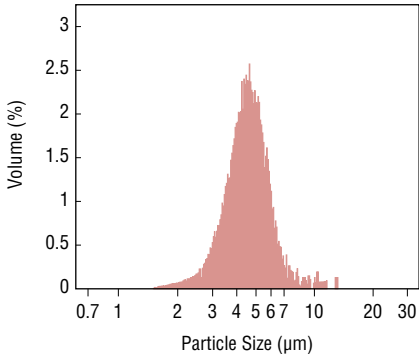
KSP-100



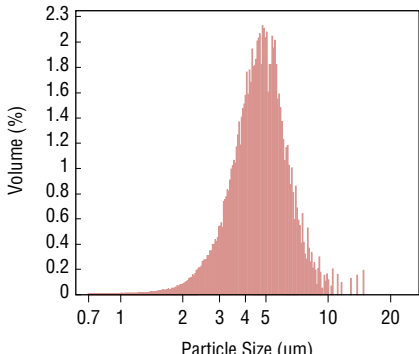
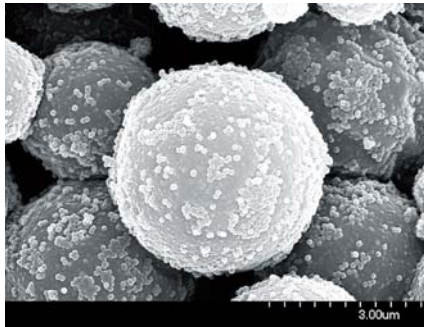
KSP-101



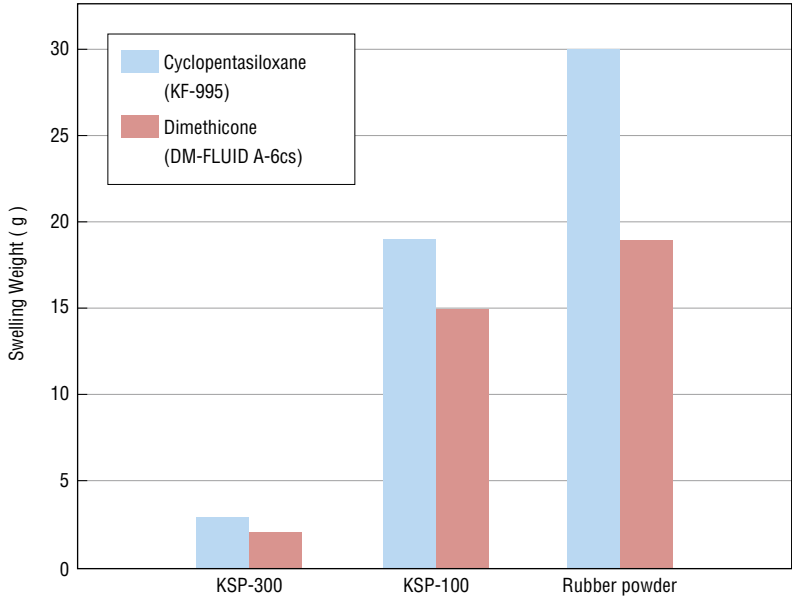
KSP-105



KSP-300



Swelling properties of silicone powder



\* Swelling weight = A - Original weight (5.0 g)  
\* 'A' value is the filtered cake weight (g) of powder after shaking for 3 days in silicone fluid (50 g).



# SPD Series

## Inorganic Powder Dispersions for Personal Care

The SPD series is a dispersion of fine TiO<sub>2</sub>/ZnO in Volatile silicone designed for use in sunscreens as well as other skincare and make-up products.

The SPD products offer performance enhancements due to the use of high performance dispersant.

### Features

- High Solids Dispersions that are Stable and have Very Low Viscosity
- Excellent Stability
- High Transparency that facilitates transparent formulations without the use of organic UV absorbers
- High SPF
- Enhanced Water Resistance
- Smooth, Non-Tacky Skin Feel

### The physical properties

Product name	Composition	Appearance	Viscosity 25°C mPa.s	Specific Gravity 25°C	Powder Content wt %	Transmissivity* %
<b>SPD-T5</b>	CYCLOPENTASILOXANE TITANIUM DIOXIDE POLYGLYCERYL-3 POLYDIMETHYLSILOXYETHYL DIMETHICONE ALUMINUM HYDROXIDE STEARIC ACID	White- light gray	< 4,000	1.3	40	> 65
<b>SPD-Z5</b>	ZINC OXIDE CYCLOPENTASILOXANE POLYGLYCERYL-3 POLYDIMETHYLSILOXYETHYL DIMETHICONE TRIETHOXSILYLETHYL POLYDIMETHYLSILOXYETHYL HEXYL DIMETHICONE	White- light yellow	< 4,000	1.7	60	> 65

\* Percent transmission at 400nm by using spectrophotometer.

\* This document is not a certification of quality. For documentation of quality assurance and standards, please contact our Sales Department.

\* INCI names are subject to change without notice.

#### SPD-T5



#### Composition

Fine Titanium Dioxide (coated) ..... 40 wt %  
Cyclopentasiloxane ..... 50 wt %  
Silicone Dispersant ..... 10 wt %



#### SPD-Z5



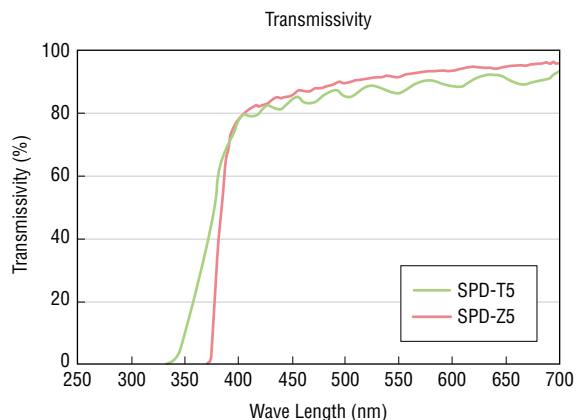
#### Composition

Fine Zinc Oxide (coated) ..... 60 wt %  
Cyclopentasiloxane ..... 35 wt %  
Silicone Dispersant ..... 5 wt %



\* Photographs taken through a glass plate coated with SPD-T5/Z5 (Thickness ; 6 μm).

### Water resistance of SPD-T5, SPD-Z5



#### \* Test method

A sample was coated on a quartz plate with thickness of 6 μm by wire bar. Percent transmission was measured by a spectrophotometer after the plate was immersed in water for 24 hours at room temperature.

#### \* Result

The same spectrum was got after immersed in water.



### Quality, Storage and Handling

- Since changes in quality may occur due to exposure to heat, humidity, light or acidic or alkaline environments, be sure to close tightly and store in a cool, dark location.
- Do not leave products in an open state while working.
- Please read the Material Safety Data Sheet (MSDS) before use. MSDS can be obtained from our Sales Department.

## Si/W Cream

1. KSG-15*1	8.0 wt %
2. KSG-16*1	30.0 wt %
3. KF-995*1	10.0 wt %
4. 1,3-Butylene Glycol	3.0 wt %
5. KF-6100*1	0.6 wt %
6. KF-6104*1	0.3 wt %
7. SIMULGEL 600*2	0.6 wt %
8. Ammonium Acryloyldimethyltaurac/ vp copolymer (5% aq)	13.0 wt %
9. Sodium Chloride (1% aq)	8.0 wt %
10. Water	26.5 wt %

- A. Combine 1, 2 and 3 with stirring.  
 B. Combine 4 - 9 and 10 with stirring.  
 C. Add A to B with stirring.  
 \*1: Shin-Etsu \*2: SEPPIC

## W/Si Cream

1. KSG-210*1	4.0 wt %
2. KF-6017*1	0.3 wt %
3. KSG-15*1	3.0 wt %
4. DM-FLUID A-6cs*1	10.7 wt %
5. 1,3-Butylene Glycol	8.0 wt %
6. Sodium Citrate	0.2 wt %
7. Sodium Chloride	0.5 wt %
8. Ethyl Alcohol	5.0 wt %
9. Water	68.3 wt %

- A. Combine 1 - 3 and 4 with stirring.  
 B. Combine 5 - 8 and 9 with stirring.  
 C. Add B to A with stirring.  
 \*1: Shin-Etsu

## O/W Cream

1. KSG-43*1	25.0 wt %
2. Isotridecyl Isononanoate	20.0 wt %
3. Glycerin	5.0 wt %
4. 1,3-Butylene Glycol	7.0 wt %
5. KF-6100*1	0.7 wt %
6. PEG-60 Hydrogenated Caster Oil	0.5 wt %
7. SIMULGEL EG*2	0.8 wt %
8. Ammonium Acryloyldimethyltaurac/ vp copolymer (5% aq)	10.0 wt %
9. Sodium Chloride	0.1 wt %
10. Water	30.9 wt %

- A. Combine 1 and 2 with stirring.  
 B. Combine 3 - 9 and 10 with stirring.  
 C. Add A to B with stirring.  
 \*1: Shin-Etsu \*2: SEPPIC

## W/O Cream

1. KSG-310*1	4.0 wt %
2. KSG-41*1	6.0 wt %
3. KF-6038*1	0.5 wt %
4. Mineral Oil	12.0 wt %
5. Neopentyl Glycol Diethylhexanoate	5.0 wt %
6. KSP-100*1	1.5 wt %
7. Glycerin	3.0 wt %
8. 1,3-Butylene Glycol	7.0 wt %
9. Sodium Citrate	0.2 wt %
10. Sodium Chloride	0.5 wt %
11. Water	60.3 wt %

- A. Combine 1 - 5 and 6 with stirring.  
 B. Combine 7 - 10 and 11 with stirring.  
 C. Add B to A with stirring.  
 \*1: Shin-Etsu

### W/O Liquid foundation

1. KSG-210*1	3.5 wt %
2. KSG-15*1	5.0 wt %
3. KF-6028*1	2.0 wt %
4. Quaternium-18 Hectorite	1.2 wt %
5. Triethylhexanoin	5.0 wt %
6. DM-FLUID A-6cs*1	6.5 wt %
7. KF-995*1	21.6 wt %
8. KP-575*1 (KP-545*1)	1.5 wt %
9. Pigment (Treated with KF-9909)	10.0 wt %
10. Dipropylene Glycol	5.0 wt %
11. Sodium Citrate	0.2 wt %
12. Water	38.5 wt %

A. Combine 1 - 5, a part of 6 and a part of 7 until uniformly dispersed.

B. Add 9 to the rest of 6, the rest of 7 and 8, and mix with roller.

C. Combine 10, 11 and 12 mix until dissolved

D. Add C to A with Stirring.

E. Add B to D with Stirring.

\*1: Shin-Etsu

### Sunscreen lotion (SPF: 50+, PA++\*2)

1. KSG-210*1	3.0 wt %
2. KSG-15*1	2.0 wt %
3. DM-FLUID A-6cs*1	5.0 wt %
4. KF-995*1	5.0 wt %
5. KF-6028*1	1.0 wt %
6. Isotridecyl Isononanoate	4.0 wt %
7. SPD-T5*1	25.0 wt %
8. SPD-Z5*1	35.0 wt %
9. Dipropylene Glycol	2.0 wt %
10. Sodium Citrate	0.2 wt %
11. Sodium Chloride	1.0 wt %
12. Water	16.8 wt %

A. Combine 1 - 5 and 6 with stirring.

B. Combine 9 - 11 and 12 with stirring.

C. Add B to A. with stirring.

D. Add 7, 8 to C with stirring.

\*1: Shin-Etsu

\*2: By Consumer Product Testing Co.

### W/O Cream foundation

1. KSG-310*1	2.0 wt %
2. KSG-41*1	2.0 wt %
3. KF-6038*1	1.0 wt %
4. Mineral Oil	2.0 wt %
5. Triethylhexanoin	5.0 wt %
6. Isotridecyl Isononanoate	9.0 wt %
7. Lecithin	0.2 wt %
8. Polysorbate 80	0.5 wt %
9. 1,3-Butylene Glycol	5.0 wt %
10. KSP-100*1	2.0 wt %
11. Pigment (Treated Pigment)	10.0 wt %
12. Sodium Citrate	0.2 wt %
13. Sodium Chloride	0.5 wt %
14. Water	60.6 wt %

A. Combine 1 - 5 and 6 until uniformly dispersed.

B. Combine 7 - 10 and 11 mix with roller.

C. Combine 12, 13 and a part of 14 mix until dissolved.

D. Add B to the rest of 14, and until uniformly dispersed.

E. Add C to A with Stirring.

F. Add D to E with Stirring.

\*1: Shin-Etsu

### Lip Stick

1. Candelilla Wax	4.0 wt %
2. Polyethylene	2.0 wt %
3. Microcrystalline Wax	3.0 wt %
4. Ceresin	7.0 wt %
5. KP-561P*1	15.0 wt %
6. KF-6105*1	3.0 wt %
7. Macadamia Ternifolia Nut Oil	28.0 wt %
8. Diisostearyl Malate	10.0 wt %
9. Hydrogenated Polyisobutene	10.0 wt %
10. Isotridecyl Isononanoate	18.0 wt %
11. Pigment Base*2	q.s
12. Mica	q.s

A. Combine 1 - 9 and 10 with stirring (90°C).

B. Add 11, 12 to A with stirring.

\*1: Shin-Etsu

\*2: Polyglyceryl-2 Triisostearate 60 % Base

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The Development and Manufacture of Shin-Etsu Silicones are based on the following registered international quality and environmental management standards.

**Gunma Complex** ISO 9001 ISO 14001  
(JCQA-0004 JCQA-E-0002)

**Naoetsu Plant** ISO 9001 ISO 14001  
(JCQA-0018 JCQA-E-0064)

**Takefu Plant** ISO 9001 ISO 14001  
(JQA-0479 JQA-EM0298)

<http://www.silicone.jp/>