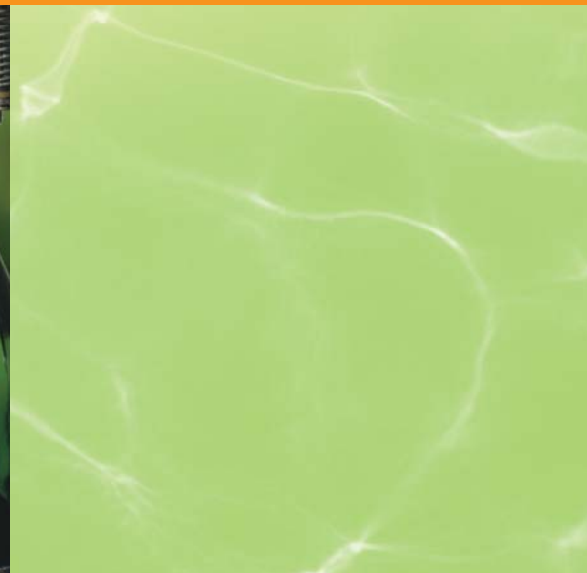


Defoaming Agents

Outstanding defoaming effect
even when used in small amounts.



Silicone defoamers are available in many forms including fluids, fluid compounds, self-emulsifying formulas, emulsions and solvent-based formulas. All provide an outstanding defoaming effect when used in small amounts. Silicone defoamers also offer good resistance to heat and cold, are highly safe, and are chemically inert. They can be used with all types of foaming liquids, contributing to higher quality end products, improved process efficiency, and a better environment. Shin-Etsu Silicone offers an extensive product lineup to meet diverse needs in a variety of industrial fields.



Silicone defoamers are available in many forms including silicone fluids, fluid compounds and emulsions. We offer a wide array of products for specific purposes.

Product Types

Type	Product name	Fast-acting	Long-lasting	Alkali Resistant	Heat Resistant	Stable when Diluted	Description
Emulsions	KM-71	●					
	KM-72S	●					Food industry use
	KM-73	●					General use
	KM-73A	●		●			General use
	KM-73E		●	●			General use
	KM-75					●	
	KM-85						Paintable
	KM-89		●	●	●		
	KM-90					●	Dyeing processes
	KM-98	●	●	●	●		
	KM-7750	●	●			●	
	X-50-992	●	●	●	●		High temperature dyeing processes, Pulp manufacturing processes
KM-7752		●	●	●	●	Paintable	
Self-emulsifying	KS-508				●		Paintable
	KS-530			●			General use
	KS-531						Paintable
	KS-537	●				●	Dyeing processes
	KS-538	●	●	●	●		
KS-540	●	●	●	●		High resistance to alkalinity	
Silicone fluid compounds	KS-66	●			●		
	KS-69		●		●		
	X-50-1090B	●	●		●		Organic resins, Paints,inks industry, Industrial use
	KS-7704S	●			●		Organic resins, Paints,inks industry, Industrial use
Silicone fluids	FA-630		●	●	●		Fluorosilicone-based
	KF-96 (ADF)				●		
	KS-7708						Deaerating agent for epoxy, polyester, polyurethane and acrylic resins
Solvent-based	FA-600		●	●	●		Fluorosilicone-based
	KS-602A				●		
	KS-7709		●	●	●		Fluorosilicone-based

(Not specified values)

Selecting a product

Selection 1 Select according to the foaming liquid

Generally, self-emulsifying products or emulsions should be used with water-based (aqueous solution) foaming liquids. For non-aqueous liquids, use silicone fluids, fluid compounds or solvent-based defoamers.

Selection 2 Defoamers for food products

In food product manufacturing applications, be sure to use food product defoamers KF-96ADF (fluid), KS-66, KS-69 (fluid compounds), or KM-72S (emulsion).

* Note that these products may not be approved for food product applications in all countries. For details, please contact Shin-Etsu.

Selection 3 Defoamers for harsh environments

Self-emulsifying defoamers can be diluted with water (below 30 °C) to produce uniform emulsions. They can be used in a wide temperature range and are highly stable in harsh conditions such as mechanical

shear. These products also offer better resistance to acids and bases than do emulsion defoamers.

Selection 4 Defoamers for wastewater treatment

In wastewater treatment, to suppress foaming in the aeration tank, use emulsion defoamers KM-73, KM-73A or KM-75, which have little effect on activated sludge. These defoamers have very low BOD values, and do not increase the sludge load.

Selection 5 If problems of cissing or oil spots occur:

In paints and synthetic resins, some defoamers cause problems of cissing or poor paintability and adhesion. If you experience such problems, consider switching to the self-emulsifying defoamers KS-508 or KS-531, or the emulsion defoamer KM-85. For high temperature foaming systems or to combat problems of oil spots, use the self-emulsifying defoamers KS-531 or KS-537, or the emulsion defoamers KM-90 or KM-98.

The following table will help you select a silicone defoamer.

	Silicone fluids	Silicone fluid compounds	Self-emulsifying	Emulsions	Solvent-based
For aqueous foaming liquids	▲		●	●	
For non-aqueous foaming liquids	●	●	●		●
For high temperature foaming liquids	●	●	●	▲	●
Acid & base resistant	▲	▲	●	▲	
Shear resistant	●	●	●	●	

Product Characteristics & General Properties

Emulsion defoamers

Emulsion defoamers*1 (O/W*2) are produced by emulsifying a silicone fluid compound with a nonionic activator.

They are easy to use, highly stable, and there are many products to choose from. They can be used for a variety of water based foaming liquids.

*1: For emulsion defoamers, the diluent is water. *2: Oil-in-water emulsion.

Viscosity guidelines: Low: up to 1,000 mPa·s, Medium: 1,000-3,000 mPa·s, High: 3,000 mPa·s and higher.

Product name	Appearance	Specific Gravity 25°C	Viscosity mPa·s	Active Ingredients %	Diluent
KM-71	Creamy white liquid	1.03	Low	46	Water
KM-72S	Creamy white liquid	1.02	Medium	36	Water
KM-73	Creamy white liquid	1.02	Low	19	Water
KM-73A	Creamy white liquid	1.02	Low	22.5	Water
KM-73E	Creamy white liquid	1.02	Low	15.5	Water
KM-75	Creamy white liquid	1.03	Medium	39	Water
KM-85	Creamy white liquid	1.01	Low	16	Water
KM-89	Creamy white liquid	1.02	High	34	Water
KM-90	Grayish white translucent liquid	1.04	High	53	Water
KM-98	Creamy white liquid	1.02	Medium	34	Water
KM-7750	Creamy white liquid	1.01	Low	38	Water
X-50-992	Creamy white liquid	1.02	Low	34	Water
KM-7752	Creamy white liquid	1.01	Medium	55	Water

*KM-72S is approved by the US FDA. *KM-85 contains toluene.

(Not specified values)

Self-emulsifying defoamers

Self-emulsifying defoamers contain 100% active ingredient, and consist of hydrophilic modified silicone fluids and fluid compounds.

They can be used for aqueous or non-aqueous foaming liquids. These defoamers have unique properties, including good high-temperature stability, alkali resistance and acid resistance. Just add water to produce uniform emulsions.

Product name	Appearance	Specific Gravity 25°C	Viscosity mPa·s	Active Ingredients %	Diluent
KS-508	Light brown translucent liquid	1.00	2,000	100	Water, alcohol
KS-530	Slightly yellow liquid	1.03	7,000	100	Water, alcohol
KS-531	Pale yellowish white liquid	1.04	1,800	100	Water, alcohol
KS-537	Pale yellowish white liquid	1.02	600	100	Water, alcohol
KS-538	Pale yellowish white liquid	1.01	8,000	100	Water, alcohol
KS-540	Light brown translucent liquid	1.03	8,000	100	Water, alcohol

(Not specified values)

Fluid compound defoamers

These defoamers are made by blending silicone fluid with fine powdered silica. They contain no emulsifiers and so do not disperse in water on their own. But they are 100% silicone resins, and thus offer the many useful, intrinsic properties of silicones.

Product name	Appearance	Specific Gravity 25°C	Viscosity mPa·s	Active Ingredients %	Diluent
KS-66	Light gray translucent liquid	1.01	300	100	Toluene, xylene, etc.
KS-69	Light gray translucent liquid	1.01	2,500	100	Toluene, xylene, etc.
X-50-1090B	Grayish white translucent liquid	0.99	800	100	Toluene, xylene, etc.
KS-7704S	Grayish white translucent liquid	0.99	200	100	Toluene, xylene, etc.

(Not specified values)

Silicone fluid defoamers

Silicone fluid defoamers are 100% silicone fluid with no silica. These defoamers can be added with no negative effects to the characteristics of the end product. They are highly stable, making them suitable for a wide array of applications.

Product name	Appearance	Specific Gravity 25°C	Viscosity mPa·s	Active Ingredients %	Diluent
FA-630	Colorless transparent liquid	1.28	2,000	100	MXHF, MIBK, etc.
KF-96	Colorless transparent liquid	0.97	100 - 100,000	100	Toluene, xylene, etc.
KS-7708	Light brown translucent liquid	0.99	600	100	Toluene, xylene, etc.

(Not specified values)

Solvent-based defoamers

Solvent-based defoamers feature silicone fluid dissolved in isoparaffin or other solvent, and offer excellent dispersibility when used.

They are suitable for defoaming in oil refining and drilling processes and defoaming of non-aqueous foaming liquids including solvents and lubricants.

Product name	Appearance	Specific Gravity 25°C	Viscosity mPa·s	Active Ingredients %	Solvent	Diluent
FA-600	Colorless transparent liquid	0.92	10	30	Methyl ethyl ketone	Acetone, methyl ethyl ketone, etc.
KS-602A	Colorless transparent liquid	0.87	1,700	50	Kerosene	Industrial gasoline, etc.
KS-7709	Colorless transparent liquid	1.38	2	7.7	MXHF	MXHF, MIBK, etc.

(Not specified values)

Instructions for Use

By making adjustments in the way silicone defoamers are used, depending on the qualities and form of the foam in the liquid being treated, silicone defoamers provide an outstanding defoaming effect.

1 Dilution

Except in special cases, silicone defoamers are added to foaming liquids in very small amounts (1-200 ppm). The defoamers should thus be diluted beforehand with water, solvent, or the liquid to be defoamed. This makes it easier to adjust the amount being added, improves dispersibility, and is more economical.

Silicone fluid & fluid compound defoamers

Silicone fluid & fluid compound defoamers can be diluted with solvent for greater dispersibility and convenience.

Solvent-based defoamers are already diluted with solvent to improve dispersibility, but they can be diluted further if concentration is still too high and dispersion is poor. Aromatics or aliphatic hydrocarbons are suitable solvents for dilution.

Self-emulsifying defoamers

Dilute self-emulsifying defoamers to a 5- to 10-fold dilution with water to produce uniform emulsions. Use water of 30 °C or below. The user can dilute straight to the desired concentration, but a more stable emulsion can be obtained by adding the same amount of water gradually and stirring until the desired concentration is reached. Additionally, various thickeners can be used to prepare emulsions that can be stored for longer periods. The thickeners that can be used vary depending on the product and intended purpose. For details, talk to a Shin-Etsu representative. When using as a blend-in defoamer, first prepare a high concentration master batch before adding for best results.

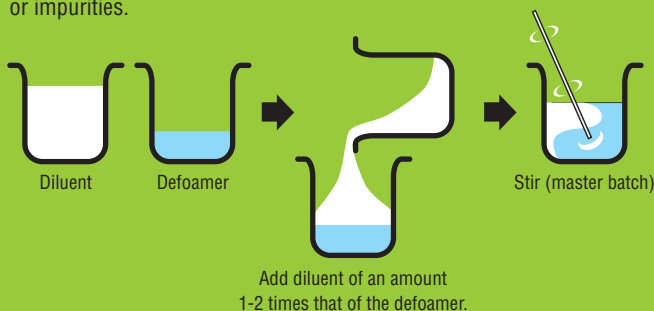
Emulsion defoamers

Most emulsion defoamers contain between 10% and 30% silicone. The amount of silicone added to the foaming system should be from 1 ppm to around 200 ppm; diluting with water in advance will improve dispersibility and effectiveness and be more economical.

These defoamers are typically diluted to a 2- to 10-fold dilution. If they are diluted further, there may be oil separation or other problems. Furthermore, the defoamer should be used as soon as possible after dilution. If the fluid layer separates during storage, stir slowly until uniform, and defoaming performance will not be affected.

Diluting with liquid from the foaming system

The master batch technique is particularly suitable when the user wants to avoid lowering the concentration or introducing foreign substances or impurities.



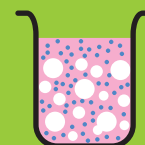
2 Amount to add

In determining the optimal amount to add, a good method is to first add defoamer such that the active ingredient is around 50 ppm (0.005%), observe the defoaming effects, and add more as appropriate.

3 Addition methods

Adding defoamer in advance to the foaming liquid

Foam is controlled by adding defoamer in advance to a liquid which may exhibit foaming. This method is effective for controlling foam in closed containers and equipment.



Continuous drip

If the foaming liquid is being replaced or is flowing, the defoamer will be consumed with the foaming liquid. In such cases, adding defoamer in a continuous drip is effective.



Spray application

The spray method is effective when a lot of foam is generated in a short time, or the user wants to temporarily eliminate foam that has developed. Diluted defoamer is sprayed directly on the foam by air gun or spray apparatus. Foam is broken up as the defoamer hits it, and defoamer is dispersed in the liquid; this combined effect makes it possible to eliminate large amounts of foam in a short time. The spray gun should have a nozzle with a somewhat large aperture. If it is too small, the defoamer will exit as a fine mist and not be as effective.



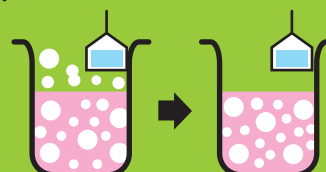
Application to the container

This method is effective when the user wants to prevent foam from growing beyond a certain amount. Apply silicone fluid defoamer, oil compound defoamer or emulsion defoamer as a "band" around the inside of the container of foaming liquid. The foam will be broken up when it reaches this band of defoamer.



Placing a container of defoamer inside the foaming tank

Place a container filled with defoamer inside the foaming tank. As the foam level rises and reaches the container, it comes in contact with the defoamer and is broken up. This method is not suitable for cases in which foam develops rapidly, but is effective for keeping mild foaming from growing beyond a certain amount.



Packaging

Type	Product name	Packaging							
		1 L cans	1 L paper carton	1 L plastic bottles	18 L cans				
		1 kg	1 kg	1 kg	14 kg	15 kg	16 kg	17 kg	18 kg
Emulsions	KM-71			●			●		
	KM-72S		●						●*
	KM-73			●			●		
	KM-73A			●			●		
	KM-73E			●				●	
	KM-75			●			●		
	KM-85	●					●		
	KM-89			●		●			
	KM-90			●			●		
	KM-98			●			●		
	KM-7750			●			●		
	X-50-992			●			●		
KM-7752			●			●			
Self-emulsifying	KS-508			●				●	
	KS-530			●			●		
	KS-531			●			●		
	KS-537			●			●		
	KS-538			●			●		
	KS-540			●			●		
Silicone fluid compounds	KS-66	●							●
	KS-69	●							●
	X-50-1090B			●			●		
	KS-7704S	●							●
Silicone fluid	FA-630	●							●
	KF-96	●					●		●
	KS-7708	●					●		
Solvent-based	FA-600	●				●			
	KS-602A	●							
	KS-7709	●							●

*18 L cans contain liner bags.

Storage & Handling Precautions

Product quality, storage, and handling

1. Certain fluid compound, self-emulsifying, emulsion, and solvent-based defoamers may exhibit separation of the fluid layer and precipitation during storage, but this does not affect the products' defoaming performance. Before use, be sure to shake or stir until evenly mixed.
2. After first opening silicone defoamers, be sure to seal tightly and store in a cool dark place, and use the product quickly. Emulsion defoamers should be stored at temperatures between 1 °C and 25 °C. Products may freeze at temperatures below 0 °C, but heating with warm water and slowly stirring will return the product to its original state.
3. Use soon after first opening. KM-72S do contain preservatives, but should still be used soon after first opening. KM-72S retain sufficient quality for a period of 360 days after manufacture. This period refers to quality retention for the unopened product, and is not a guarantee of quality after opening.

Safety & Hygiene

1. When using these products, take care to prevent contact with the skin and mucous membranes. In case of contact, wash immediately with soap and water, then flush thoroughly with running water.
2. When handling products that contain solvent, provide ventilation and take care to avoid breathing solvent vapors.
3. Please read the Material Safety Data Sheet (MSDS) before use. MSDS can be obtained from our Sales Department.

UN Classifications

Classification	UN No.	Products
Flammable Liquids/Class 3	UN 1866	FA-600, KM-85, KS-602A, KS-7709
	UN 1993	KF-96-0.65cs, KF-96-1cs
Not applicable	—	KM-71, KM-89 KF-96 series products with viscosity of over 1.5cs KM-72S, KM-73, KM-73A, KM-73E, KM-90 KM-98, KM-7750, X-50-992, KS-7708 KM-7752, KS-508, KS-530, KS-531, KS-537, KS-538 KS-540, KS-66, KS-69, X-50-1090B, KS-7704S, FA-630

Silicone Division Sales and Marketing Department I

6-1, Ohtemachi 2-chome, Chiyoda-ku, Tokyo, Japan

Phone : +81-(0)3-3246-5132 Fax : +81-(0)3-3246-5361

Shin-Etsu Silicones of America, Inc.

1150 Damar Drive, Akron, OH 44305, U.S.A.

Phone : +1-330-630-9860 Fax : +1-330-630-9855

Shin-Etsu Silicones Europe B. V.

Bolderweg 32, 1332 AV, Almere, The Netherlands

Phone : +31-(0)36-5493170 Fax : +31-(0)36-5326459

Shin-Etsu Silicone Taiwan Co., Ltd.

Hung Kuo Bldg. 11F-D, No. 167, Tun Hua N. Rd.,

Taipei, 10549 Taiwan, R.O.C.

Phone : +886-(0)2-2715-0055 Fax : +886-(0)2-2715-0066

Shin-Etsu Silicone Korea Co., Ltd.

Danam Bldg., 9F, 120, Namdaemunno5(o)-ga,

Jung-gu, Seoul 100-704, Korea

Phone : +82-(0)2-775-9691 Fax : +82-(0)2-775-9690

Shin-Etsu Singapore Pte. Ltd.

4 Shenton Way, #10-03/06, SGX Centre II, Singapore 068807

Phone : +65-6743-7277 Fax : +65-6743-7477

Shin-Etsu Silicones (Thailand) Ltd.

7th Floor, Harindhorn Tower, 54 North Sathorn Road,

Bangkok 10500, Thailand

Phone : +66-(0)2-632-2941 Fax : +66-(0)2-632-2945

Shin-Etsu Silicone International Trading (Shanghai) Co., Ltd.

29F Junyao International Plaza, No.789,

Zhao Jia Bang Road, Shanghai, China

Phone : +86-(0)21-6443-5550 Fax : +86-(0)21-6443-5868

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